

EXHIBIT– 11

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December 19, 2011

VIA E-MAIL AND U.S. FIRST CLASS MAIL

Stephen S. Perkins
Director, Office of Ecosystem Protection
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RE: Additional Exhibit to Permit Comments Submitted on Dec. 15, 2011, in Response to Request for Public Comment on Proposed Town of Newmarket, NH, NPDES Permit No. NH0100196

Dear Mr. Perkins:

The Great Bay Municipal Coalition (“the Coalition”) is an organization dedicated to the establishment of appropriate and cost-effective restoration measures to protect Great Bay and its resources. The Coalition represents five of the major communities whose wastewater flows into various parts of the Great Bay system – Dover, Exeter, Newmarket, Portsmouth, and Rochester. These communities are directly impacted by the proposed nutrient reduction water quality objectives and requirements for the Town of Newmarket. On Dec. 15, 2011, the Coalition submitted to Region 1 comments and objections to the proposed Town of Newmarket, NH, NPDES Permit No. NH0100196. Attached is an additional exhibit to the Coalition’s Dec. 15, 2011, submission. The attached exhibit, Ex. 27, a court filing in *Friends of the Wild Swan, Inc. v. EPA*, is referenced on page 10 of the Dec. 15, 2011, submission at comment no. 8. Please note that page 10, comment no. 8, second sentence should be amended to read as follows: (*See Ex. 27 – Court Filing in Friends of the Wild Swan, Inc. v. EPA.*) Thank you for your consideration of these comments. We look forward to the Region’s response.

Sincerely,


John C. Hall

Enclosures

cc: Coalition Members
Ted Diers, DES

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IN THE UNITED STATES DISTRICT COURT
FOR THE DISTRICT OF MONTANA
MISSOULA DIVISION

FRIENDS OF THE WILD SWAN INC., <i>et al.</i> ,)	CV 97-35-M-DWM
)	
Plaintiffs,)	
)	UNOPPOSED
v.)	JOINT MOTION FOR
)	SECOND AMENDED
U.S. ENVIRONMENTAL)	JUDGMENT
PROTECTION AGENCY, <i>et al.</i> ,)	
)	
Defendants,)	
)	
and)	
)	
STATE OF MONTANA, <i>ex rel.</i>)	
DEPARTMENT OF ENVIRONMENTAL)	
QUALITY, <i>et al.</i> ,)	
<u>Intervenors.</u>)	

INTRODUCTION

Plaintiffs, EPA, and the State of Montana (the “parties”) jointly move to amend Paragraph 1 of the Court’s November 18, 2004, Amended Judgment. The proposed amendments are consistent with, and respectful of, the judgments entered

by this Court in the underlying case. The Amended Judgment requires that by December 31, 2012, EPA shall approve or establish Total Maximum Daily Loads (“TMDLs”) for all waterbodies in Montana identified as impaired in 1996 and still identified as impaired as of 2006 (the “1996/2006 list”). Although Montana and EPA have made significant progress toward meeting that requirement, and are fully prepared to meet it,¹ the agencies have developed a more efficient and effective system for addressing Montana’s impaired waterbodies. Rather than address in a piecemeal fashion those waterbodies listed as impaired as of 1996, which are scattered throughout the state, Montana and EPA propose to organize their efforts around watersheds. The Plaintiffs support this proposal, and believe that it furthers the purposes of the TMDL program and the Court’s original Order requiring compliance with Section 303(d) of the Clean Water Act.

The parties therefore request the Court to change the Amended Judgment so that Montana and EPA must address the attached list of waterbodies, instead of only those that were identified as impaired fourteen years ago. The parties agree that this amendment would enable Montana and EPA to implement a watershed approach that is more efficient, more likely to encourage stakeholder involvement, and more effective in advancing the parties’ common goal of improving water quality throughout the state. A proposed Second Amended Judgment is attached.

¹ Plaintiffs take no position on this representation by EPA and Montana.

STANDARD

Under Federal Rule of Civil Procedure 60(b)(6), the Court may grant a party relief from a judgment for any reason that justifies relief.

STATUTORY AND REGULATORY BACKGROUND

The oft-stated over-arching purpose of the Clean Water Act, 33 U.S.C. § 1251 et seq. (“CWA” or “Act”), is to “restore and maintain the chemical, physical, and biological integrity of the Nation’s waters.” 33 U.S.C. § 1251(a). The Act divides responsibility for clean water protection between the states and the federal government. As relevant to this case, the CWA directs each state, with federal approval and oversight, to promulgate water quality standards for its waters. *Id.* § 1313(a), (b), (c)(1). These water quality standards include a determination of the “designated uses” of the relevant waters and “water quality criteria” that are intended to render the waters suitable for their designated uses. *Id.* § 1313(c)(2)(A). Designated uses include drinking water, recreation, and protection of cold-water fisheries, among others.

Under the CWA, no person may discharge any pollutant into waters of the United States except in compliance with the Act, which usually means pursuant to a National Pollutant Discharge Elimination System (“NPDES”) permit. *Id.* § 1311(a). EPA or a duly authorized state may issue such permits, which limit the amount of pollutants that may be discharged by a “point source,” such as a pipe.

Id. §§ 1342(a), (b); 1362(14). Those permits establish effluent limitations for point sources to ensure that water quality standards will be attained or maintained in the relevant water. *Id.* § 1311(b)(1)(C). At a minimum, such effluent limitations must be based upon any nationally applicable technology-based requirements that may be appropriate for the point source in question, but they must be more stringent than such technology-based requirements would dictate if necessary to meet water quality standards. *Id.*

The CWA also requires each State to determine whether any of its waters do not meet water quality standards, and are not expected to do so even after technology-based limitations are implemented. *Id.* § 1313(d)(1)(A). If not, then the waters are considered “impaired,” and are identified or listed pursuant to Section 303(d). *Id.* Impairments are typically addressed by a “total maximum daily load,” or “TMDL,” for the pollutant that causes the impairment. *Id.* § 1313(d)(1)(C).

A TMDL represents the maximum amount of a pollutant the particular segment of water can receive from all combined sources and still meet water quality standards. *Id.* Specifically, the CWA provides that

[s]uch load shall be established at a level necessary to implement the applicable water quality standards with seasonal variations and a margin of safety which takes into account any lack of knowledge concerning the relationship between effluent limitations and water quality.

Id. See generally *Sierra Club v. Meiburg*, 296 F.3d 1021, 1025-26 (11th Cir. 2002) (describing the process of listing impaired waters and developing TMDLs); see also 40 C.F.R. § 122.44(d)(1)(vii)(A), (B) (water quality-based effluent limits must derive from and comply with all applicable water quality standards and be “consistent with the assumptions and requirements of any available wasteload allocation for the discharge prepared by the State and approved by EPA pursuant to 40 C.F.R. § 130.7”). Because states typically divide waterbodies within their state boundaries into multiple segments, and because multiple pollutants may impair each segment, one “water quality limited segment” (“WQLS”) may require multiple TMDLs.² The number of impairments is often accounted for in terms of waterbody/pollutant combinations. For example, if one stream segment is impaired by sediments, copper and iron, then that segment has three waterbody/pollutant combinations which must be addressed.

A waterbody/pollutant combination may be addressed by a TMDL, and once EPA has approved a TMDL that waterbody/pollutant combination can be removed from a State’s 303(d) list. A waterbody/pollutant combination may also be addressed if it is determined that no TMDL is required. For example, a waterbody/pollutant combination can be delisted if new data and information show

² A water quality limited segment is a segment of a waterbody where water quality “does not meet applicable water quality standards, and/or is not expected to meet applicable water quality standards, even after the application of technology-based effluent limitations.” 40 C.F.R. § 130.2(j).

that water quality standards are being met or if there is a change in the applicable standards. A waterbody/pollutant combination can also be delisted if it is demonstrated that the impairment is not caused by the excess loading of that pollutant, because if a pollutant is not responsible for the impairment then no load can be calculated.³

TMDL development can be a complex and technical process. Pollutants may enter a waterbody from both “nonpoint sources” (which the CWA does not directly regulate), such as unchanneled surface runoff of sediment or nutrients from agriculture or through “point sources” (which the CWA directly regulates) such as pipes and other discrete conveyances.⁴ According to EPA’s regulations, the total maximum daily load that applies to an impaired water segment is the sum of the “load allocations” of pollutants from nonpoint sources, the “wasteload allocations” of pollutants from point sources, and natural background levels of the

³ For example, if a waterbody segment fails to meet water quality standards due to habitat modification, there is no loading of a pollutant, either from point sources or nonpoint sources, and thus no level that can be established that will attain the standard. In these situations the waterbody would be placed in a separate category of the state’s biennial Integrated Water Quality Report, required by CWA section 305(b), 42 U.S.C. § 1315(b), indicating that identified threats or impairments result from activities such as dewatering or habitat modification and, thus, a TMDL is not required.

⁴ The CWA defines “point source” as “any discernible, confined and discrete conveyance,” such as a “pipe, ditch, [or] channel . . . from which pollutants are or may be discharged.” 33 U.S.C. § 1362(14).

pollutant. *See* 40 C.F.R. § 130.2(g)-(i). The TMDL and its constituent load and wasteload allocations are therefore generally developed simultaneously, often using computer models that simulate the natural background levels of a pollutant and the amount of pollutants entering a waterbody segment at a variety of points along its course. This process allows States and EPA to account for the accumulation of pollutants from individual sources or groups of sources over the length of a waterbody segment.

TMDLs are not self-executing, and often function as “information tools.” *Pronsolino v. Nastri*, 291 F.3d 1123, 1129 (9th Cir. 2002). The TMDL sets a pollutant reduction goal to be implemented through individual NPDES permits or through nonpoint source controls. *Meiburg*, 296 F.3d at 1025. Water quality improves when point sources and nonpoint sources reduce the amount of pollutants to the levels established in the TMDL.

For point sources, NPDES permits must be “consistent with the assumptions and requirements” of a TMDL’s wasteload allocations. 40 C.F.R. § 122.44(d)(1)(vii)(B). In contrast, nonpoint sources of pollutants are not required to obtain an NPDES permit. Nonpoint sources implement TMDL load allocations through a variety of programs, which in Montana are largely based on voluntary action by interested citizens. It is therefore important to have stakeholders (*e.g.*, local landowners, watershed groups, Conservation Districts, etc.) who are willing

and able to carry out the TMDL's recommended nonpoint source reductions, closely involved in the TMDL development process.

FACTUAL BACKGROUND

Five Montana public interest groups filed this lawsuit alleging that EPA arbitrarily approved Montana's 1996 list of impaired waterbodies, and failed to promptly establish TMDLs for the waterbodies that were listed. The State of Montana and several industry groups intervened, and after Plaintiffs amended the complaint to add a challenge to EPA's approval of the 1998 list, the Court granted in part Plaintiffs' motion for summary judgment, finding that EPA's approval of the pace at which Montana was submitting TMDLs was arbitrary and capricious under the Administrative Procedure Act, 5 U.S.C. § 706(2). *Friends of the Wild Swan v. EPA*, 130 F. Supp. 1184 (D. Mont. 1999). A primary concern of Plaintiffs in filing the original lawsuit was to establish TMDLs for the many impaired waterbodies that provide cold-water fishery habitat for Montana's native trout, such as bull trout and westslope cutthroat trout. As this Court found, the pace and scope of the Montana TMDL program was lagging, and judicial intervention was required to insure timely establishment of TMDLs.

In a separate lawsuit, three of the Plaintiffs in this case challenged EPA's approval of Montana's decision in 2000 to de-list certain WQLSs. *American Wildlands v. EPA*, No. CV-02-197-M-DWM (D. Mont.) In a consent decree

settling that case Montana and EPA agreed to re-assess the delisted waters, a task they completed in 2006. *See* Docket # 53. As a result of that re-assessment, Montana and EPA determined that 484 WQLSs on Montana's 1996 impaired waters list should be retained on the 2006 list. The 484 WQLSs contained 904 waterbody/pollutant combinations that still needed to be addressed.

In this case, the Court amended its judgment in 2000, at Plaintiffs' request, to clarify that neither Montana nor EPA shall issue new permits or increased permitted discharges under NPDES or MPDES permits for waterbodies on the 1996 list until all necessary TMDLs are established for the particular water-body. The Court again amended its judgment in 2004, at the request of all of the parties, to extend to December 31, 2012, the deadline for EPA to approve or establish TMDLs for waters on the 1996 list. Paragraph 1 of the Amended Judgment currently provides that

By December 31, 2012, the USEPA shall approve or establish TMDLs for WQLSs identified on Montana's 1996 list submitted under section 303(d) of the Clean Water Act, and are still identified as impaired on Montana's 2006 list.

The parties now respectfully request the Court to amend Paragraph 1 to read as follows:

By December 31, 2014, the USEPA shall address each of the 664 waterbody/pollutant combinations identified in Attachment A, by either (a) approving or establishing a TMDL, or (b) determining after further assessment that the waterbody/pollutant combination is not impaired, in which case the USEPA shall approve or establish a TMDL for a different impaired waterbody/pollutant combination in Montana. In addition, by December 31, 2014, USEPA shall prepare and provide to plaintiffs a report detailing USEPA's monitoring and assessment work on the 12 additional waterbodies identified in Attachment B.

ARGUMENT

THE COURT SHOULD AMEND THE JUDGMENT TO ALLOW EPA TO ADDRESS THE 664 PRIORITY WATERBODY/POLLUTANT COMBINATIONS LISTED IN ATTACHMENT A TO THE PROPOSED SECOND AMENDED JUDGMENT.

The parties share the common goal of preparing high-quality TMDLs for Montana's impaired waters. In addition, the parties seek a comprehensive approach that is based upon watersheds rather than individual water segments and that incorporates the most current data. All the parties agree that shifting the emphasis of TMDL development away from the current segment-by-segment approach based on the 1996 list to a watershed-based approach is reasonable and

consistent with the CWA's goal to protect and restore the quality of our nation's waters. It is also consistent with this Court's original rulings in this case that recognize the importance of the TMDL program as part of the CWA's overall goal of maintaining and restoring the aquatic health of our nation's waters. The parties believe that the ecological health of waterbodies in Montana is best restored by focusing on the entire watershed, rather than on discrete segments within a watershed. Plaintiffs also believe that this settlement will ensure that TMDLs are developed in waters designated as bull trout critical habitat by the U.S. Fish and Wildlife Service thereby facilitating recovery of this threatened species. Relief under Fed. R. Civ. P. 60(b)(6), in the form of the proposed Second Amended Judgment, is therefore justified.

Montana and EPA have made significant progress in implementing Montana's TMDL program since 2004, though the task of completing TMDLs on impaired watersheds is not complete. Montana has improved its TMDL program by increasing resources, including four new staff positions since 2004, and reorganizing the staff devoted to TMDL development. EPA has hired three full-time staff members specifically devoted to the Montana TMDL Program. Montana has also updated and integrated its data management systems to more efficiently store and access water quality data, which is the starting point for the TMDL process, and has completed a re-assessment of 462 water bodies that in 2000 were

removed from the 1996 list. The re-assessment effort allowed Montana to develop a more thorough understanding of the water quality problems in the State, to identify and prioritize the sources of the water quality problems, and to work with the public to implement voluntary nonpoint source measures to restore water quality. Since 2004, the last amendment to the Court's order, Montana and EPA have completed TMDLs for 602 waterbody/pollutant combinations, although not all of these waterbody/pollutant combinations are on the 1996/2006 list.

Montana continues to evaluate water quality limited segments using newly collected data and information, both identifying newly impaired segments and removing segments that its assessment reveals are not impaired. Multiple federal, state, and local agencies collect water quality data and submit that data to Montana for review and assessment. EPA also receives input from citizen-based organizations, scientific groups and other local stakeholders through the TMDL process. Based on its assessment of the new data, Montana updates that status of impairment in waterbodies throughout the state, and reports this information every two years in its list of impaired waters under CWA Section 303(d), 33 U.S.C. § 1313(d). Therefore, the Section 303(d) list of impaired waterbodies changes every two years when waterbodies are added or deleted. Also, waterbodies are removed from the Section 303(d) List when TMDLs are completed.

As the parties reported in 2004, another aspect of Montana's improved TMDL program is the State's adoption of a watershed-scale approach for the development of TMDLs. Instead of considering water quality on a stream-by-stream, segment-by-segment basis, and preparing TMDLs one at a time, Montana now examines all waterbody/pollutant combinations within a watershed and bundles TMDLs into a single planning document. This allows Montana to address similar water quality issues in multiple streams together, within the context of the watershed in which they occur. Montana staff typically begin the watershed study process with a field season of supplemental data collection to verify impairments, diagnose problems, identify sources, and quantify the pollutant loads from each source. They then prepare TMDLs for all of the impaired segments and, potentially, for any other waters in the watershed discovered to be impaired by the same pollutant. This watershed process generally takes one to five years to complete, depending on the complexity of the system, available data, and available resources.

The watershed approach ensures all water quality problems that may be contributing to impairment are adequately understood and helps create a TMDL that focuses on restoration of the ecological health of the entire watershed. It allows Montana and EPA to focus time, resources, and effort on developing TMDLs within a specific environmentally-related area. The agencies can then

coordinate the data collection and field activities for multiple impairments in that watershed. Since 2000, EPA and Montana have learned that the efficiencies gained through this coordination makes it possible to collect a greater amount of data and conduct a more detailed watershed analysis than if efforts were spread across the state and analyses were conducted to address state impairments identified by an initial listing date.

In addition to allowing for an improved level of depth and accuracy in the scientific analysis of the TMDLs in a watershed, coordination of stakeholder involvement for multiple TMDLs also allows for an increased level of public participation. For example, Montana and EPA can hold multiple meetings addressing all of the watershed impairment issues instead of fewer meetings addressing individual listings spread out across a larger geographical area.

Additional opportunities for more meaningful public involvement of this sort, in conjunction with a more detailed watershed analysis, often leads to greater stakeholder interaction and acceptance of the results of the TMDL study.

Reducing pollutant loads from nonpoint sources of pollutants is largely voluntary.

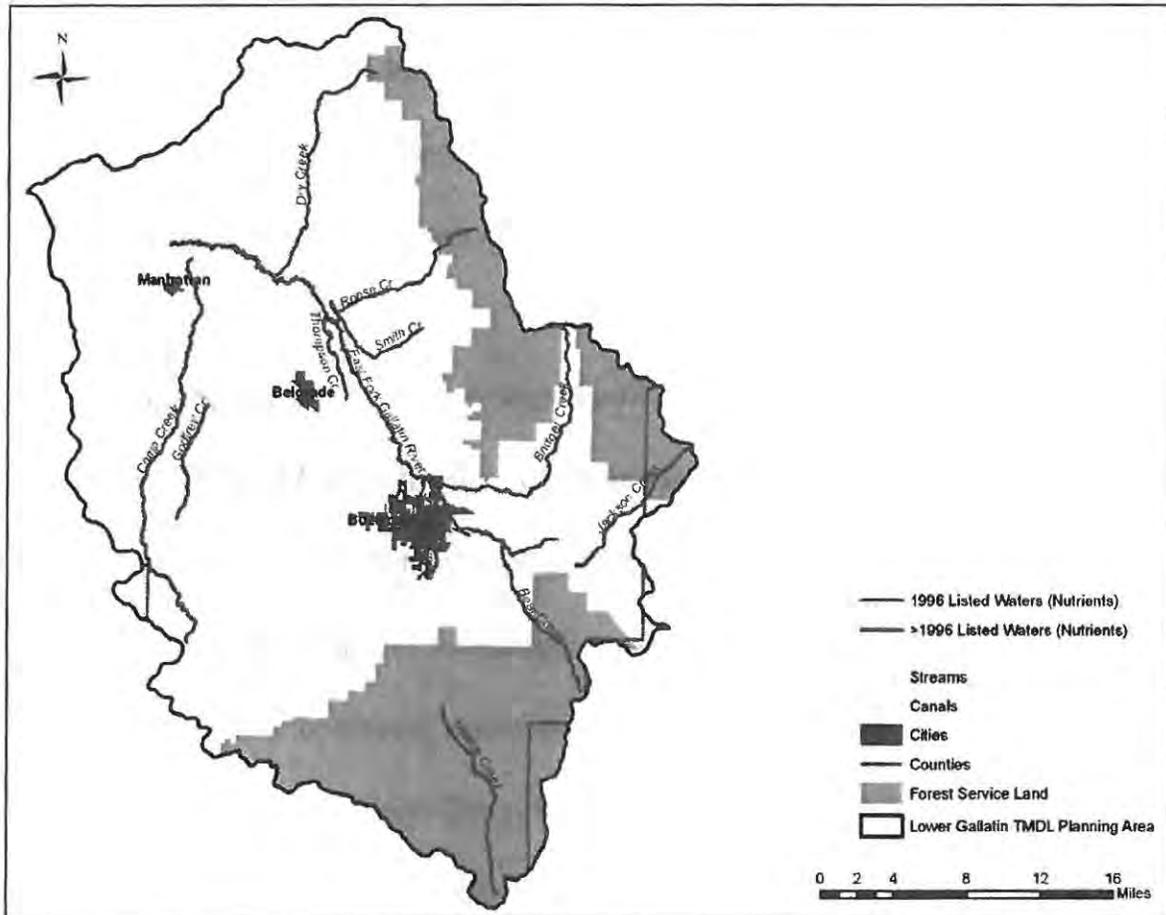
The involvement of watershed stakeholders is essential to the success of the nonpoint source reductions specified in the TMDL, and TMDLs developed using this watershed approach are more likely to be successfully implemented.

The 997 square mile Lower Gallatin watershed illustrates the watershed approach. A total of fourteen stream segments within the Lower Gallatin TMDL Planning Area are listed as impaired on Montana's current Section 303(d) list for nutrients (Table 1 and Figure 1). Of those, only five appeared on Montana's 1996 list, and remained listed in 2006, while the remaining nine were first listed after 1996. All fourteen stream segments are tributaries of the mainstem East Fork Gallatin River, and based on the information developed to date using the watershed approach, Montana and EPA believe that all fourteen segments likely contribute to the nutrient problem in the mainstem. However, if Montana and EPA must focus their resources on addressing waterbody/pollutant combinations first listed in 1996, then by 2012 Montana and EPA would be able to develop TMDLs for only the five earliest listed segments and would leave the remaining nine to be addressed at some point after 2012.

Table 1. Nutrient Impaired Water Quality Limited Segments in the Lower Gallatin TMDL Planning Area

Name	Listed in 1996	First Listed Post-1996
Bear Creek		X
Bridger Creek		X
Camp Creek	X	
Dry Creek		X
East Gallatin River (Confluence of Rocky and Bear Creeks to Bridger Creek)		X
East Gallatin River (Bridger Creek to Smith Creek)	X	
East Gallatin River (Smith Creek to the Mouth [Gallatin River])	X	
Godfrey Creek	X	
Hyalite Creek		X
Jackson Creek		X
Reese Creek		X
Smith Creek		X
Sourdough Creek	X	
Thompson Creek		X

Figure 1. Nutrient Impaired Water Quality Limited Segments in the Lower Gallatin TMDL Planning Area



The proposed revision to the 2004 Amended Judgment would allow Montana and EPA to address impairments on a watershed basis, using a list-neutral approach. The proposed revision also allows Montana and EPA to address and prioritize which watersheds and associated WQLSs should be addressed first. Montana's 2010 Integrated Report presents a prioritization strategy for addressing impairments, which is based on protecting and restoring native fish such as bull

trout and westslope cutthroat, stakeholder interest, significant new pollutant sources, linkage to discharge permits, data availability, and funding. Plaintiffs also believe the amendment helps further their goals of emphasizing the prompt development of high-quality TMDLs in key watersheds that are critical to the recovery of native cold-water fish, particularly in the western and southwestern part of Montana.

The waterbodies presented in Attachment A to this Joint Motion reflect this prioritization strategy, which has been mutually agreed upon by the Montana, EPA, and the Plaintiffs. Montana, EPA, and the Plaintiffs also request an extension of the court-ordered deadline to December 31, 2014, to ensure that there is adequate time to address the priority impairments presented in Attachment A to the proposed Second Amended Judgment. This will result in addressing roughly the same number of waterbody/pollutant combinations (*i.e.*, 1404 versus 1428) as required by the current Court order, and will leave 360 water body/pollutant combinations from the 1996/2006 list to be completed after 2014. These 360 waterbody/pollutant combinations will be addressed after 2014 as part of the agencies' continuing list-neutral, watershed approach to TMDL development.

In addition, the parties agree that the agencies should complete additional monitoring and assessment work for 12 additional waterbodies by 2014, as set forth in Attachment B to the proposed Second Amended Judgment. After

addressing the waterbody/pollutant combinations listed in Attachment A, these 12 additional waterbodies represent the remaining impairments in the Flathead River watershed. Insufficient data are currently available to initiate the TMDL process for these waterbody/pollutant combinations, and the additional monitoring and assessment will provide EPA and Montana with the data needed to facilitate the development of all necessary TMDLs for the Flathead River watershed.

Although the parties' proposal will require an additional two years, and result in the agencies deferring until after 2014 some of waterbody/pollutant combinations on the 1996/2006 list, it will produce more comprehensive and therefore more beneficial TMDLs. Allowing Montana and EPA to address impairments on a watershed basis, as opposed to initiating a new information-gathering process for each individual impaired waterbody listed in 1996, would be a more effective use of resources and yield a better environmental result. As described above, the TMDLs would include greater input from stakeholders; would be based on a greater body of data, including upstream and downstream effects; would incorporate a more refined level of analysis and restoration planning; and consequently would be more likely to be successfully implemented to restore water quality.

The waterbody/pollutant combinations listed in Attachments A and B to the proposed Second Amended Judgment reflect the parties' agreement that TMDL

development should be prioritized by a number of factors, and not just when a waterbody was first identified as impaired (*i.e.*, 1996). The Court's order freezes the prioritization of TMDLs as of 1996. However, the date on which an impairment was identified does not necessarily correlate with the date on which the impairment first developed, the severity of the impairment, or the priority Montana places on the waterbody. Depending on the nature of the impairment and other factors specific to the waterbody, the later discovered impairment may be of a more critical nature and merit attention sooner than earlier-listed impairments. Further, Montana has developed improved methods for identifying and prioritizing water quality impairments. As a result, the current list of impaired waterbodies better reflects the overall condition of the State's waterbodies and the priority for addressing the problems identified.

Under Section 303 of the Clean Water Act, Montana is required to develop TMDLs for all impaired waterbodies and will do so in a timely manner for those impairments not addressed by this proposed amendment. EPA and Montana remain committed to addressing impairments and developing TMDLs for all impaired waters beyond 2014. This proposed amendment prioritizes which watersheds will have TMDLs completed or assessed by 2014.

Taking all of these factors into consideration, the parties agree that the proposed amendment allows Montana and EPA to better analyze, protect, and

restore Montana's waters. The parties also agree that Plaintiffs are entitled to reasonable attorneys' fees incurred in developing this joint proposal, in the amount of \$3,740.00. The parties have agreed upon this lump sum for settlement purposes, based upon unique and case-specific factors, and it is not an acknowledgment by either Montana or EPA that Plaintiffs' counsel is entitled to compensation at a particular hourly rate.

CONCLUSION

For the foregoing reasons, the Court should grant the parties' motion to amend the Amended Judgment, to require EPA: to approve or establish by December 31, 2014, TMDLs for the 664 waterbody/pollutant combinations listed in Attachment A to the proposed Second Amended Judgment; to prepare and submit to Plaintiffs a report describing the results of EPA's monitoring and assessment work on the additional 12 waterbodies listed in Attachment B to the proposed Second Amended Judgment; and to pay Plaintiffs \$3,740.00. The undersigned counsel for EPA has contacted counsel for Intervenors Montana Stockgrowers Association and Montana Farm Bureau Federation, and those have taken no position on this motion.

Respectfully submitted,

For Plaintiffs:

/s/ Jack Tuholske
JACK TUHOLSKE

For Defendants:

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Date: September 23, 2011

Environment & Nat. Res. Div.

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CERTIFICATE OF SERVICE

I hereby certify that, on 09/23/2011 , a copy of the foregoing document was served on the following persons by the following means:

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EXHIBIT- 12

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Subject: RE: Supplemental Comments by the Great Bay Municipal Coalition re: Draft NPDES Permit No. NH0101311 for the City of Dover, NH; Town of Exeter, NH, NPDES Permit No. NH0100871; Town of Newmarket, NH, NPDES Permit No. NH0100196
Date: Thursday, August 30, 2012 12:06:54 PM
Attachments: [pmcurrier_061212.pdf](#)
[Philip Trowbridge Depo - Vol 2.pdf](#)
[Philip Trowbridge-Depo - Vol 1.pdf](#)
[2012 5 14 Short Deposition Transcript Full Size.pdf](#)

The Deposition transcripts of Currier, Short and Trowbridge.

John

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City of Dover, et al.
vs.
State of New Hampshire, et al.

Deposition of Paul M. Currier
6/12/12

City of Dover, et al. vs. State of NH, et al.
Deposition of Paul M. Currier 6/12/12

VOLUME: I
PAGES: 1-164

STATE OF NEW HAMPSHIRE

MERRIMACK, SS.

SUPERIOR COURT

* * * * *

CITY OF DOVER, TOWN OF EXETER, TOWN
OF NEWMARKET, CITY OF PORTSMOUTH,
AND CITY OF ROCHESTER

v.

NO. 217-2012-CV-212

STATE OF NEW HAMPSHIRE AND NEW
HAMPSHIRE DEPARTMENT OF
ENVIRONMENTAL SERVICES

* * * * *

DEPOSITION OF PAUL M. CURRIER

This deposition was taken at the offices of
Sheehan, Phinney, Bass + Green, 1000 Elm
Street, Manchester, New Hampshire, on
Tuesday, June 12, 2012, commencing at 9:03
a.m.

City of Dover, et al. vs. State of NH, et al.
Deposition of Paul M. Currier 6/12/12

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11 STIPULATIONS

12 It is agreed that the deposition shall be taken
13 in the first instance in stenotype and when
14 transcribed may be used for all purposes for which
15 depositions are competent under New Hampshire
16 practice.
17 Notice, filing, caption and all other formalities
18 are waived. All objections except as to form are
19 reserved and may be taken in court at time of trial.
20 It is further agreed that if the deposition is
21 not signed within 30 days after submission to counsel,
22 the signature of the deponent is waived.
23

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14 (Reporter's note: The original exhibits were returned
15 to Attorney Lucic. Copies of the first page of each
16 exhibit, showing the deposition exhibit label, were
17 provided to Attorney Mulholland.)
18
19
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22
23

1 PAUL M. CURRIER, being first duly sworn,
2 deposes and states as follows:
3 EXAMINATION
4 Q. (BY MR. HALL) Good morning.
5 A. Good morning, John.
6 Q. Mr. Currier, could you state your -- oh, actually,
7 before we get into all the formalities.
8 MR. HALL: We've covered that the normal
9 stipulations are applying, Evan; is that fine?
10 MR. MULHOLLAND: That's fine.
11 Q. Okay. Mr. Currier, could you please state your
12 full name for the record?
13 A. Paul M. Currier.
14 Q. And could you give us an idea of what your current
15 employment status is?
16 A. I'm currently retired.
17 Q. Very good. And when did you retire?
18 A. June 1st, 2011.
19 Q. Congratulations. I hope you're having a restful
20 retirement.
21 A. Yes, indeed.
22 Q. Is this the first time you've ever been deposed?
23 A. No.

1 Q. Can you tell me about how many times you've been
2 deposed before?
3 A. Once.
4 Q. Once. Well, we'll try to make this as equally
5 pleasant an experience and hopefully more so. I'd
6 like to go over just a little bit of background
7 first on your prior positions with the Department
8 of Environmental Services. Can you give us a
9 rundown, say for the last 10 years, regarding your
10 positions prior to your retirement?
11 A. Yes. For a little more than 10 years I was
12 administrator of the Watershed Management Bureau
13 at the Department of Environmental Services.
14 Q. Okay. And --
15 A. I was actually the first administrator of the
16 Watershed Management Bureau.
17 Q. The first administrator.
18 A. Under a reorganization.
19 Q. Congratulations. Within that, the scope of your
20 work what were you responsible for doing?
21 A. Various programs related to surface water quality.
22 Q. Okay. Did you deal with Great Bay issues?
23 A. Yes.

1 Q. How much of your time do you think was devoted to
2 Great Bay issues?
3 A. Over, over the 10 years not a lot, but over the
4 last two or three years perhaps five or ten
5 percent, something like that.
6 Q. So a considerable amount of your --
7 A. Yes.
8 Q. Yeah. Okay. And with your involvement on Great
9 Bay issues were you, did you participate in their
10 Technical Advisory Committee?
11 A. Periodically, yes.
12 Q. Periodically.
13 A. Yeah.
14 Q. And can you give me an idea of what kind of role
15 you played when you participated with that
16 committee?
17 A. Basically I was a technical supervisor of the
18 staff person for the committee, Phil.
19 Q. Phil Trowbridge?
20 A. There you go.
21 Q. You were Phil's supervisor?
22 A. Yes.
23 Q. What about Ted Diers, were you Ted's supervisor in

1 any way?
2 A. Yes, for -- for -- I forget -- two or three years.
3 There was rearrangement of the Coastal Program,
4 and the Coastal Program became part of the
5 Watershed Management Bureau.
6 Q. And Mr. Diers was involved on Great Bay water
7 quality issues, correct?
8 A. Right. He was the manager of the Coastal Program.
9 Q. Okay. So he had direct responsibility on that
10 issue?
11 A. Well, he had direct responsibility for the Coastal
12 Program, which is a federal program funded by
13 NOAA.
14 Q. Okay. And that included Great Bay issues?
15 A. It included Great Bay and the coastal area as
16 defined by NOAA.
17 Q. Gotcha. The Technical Advisory Committee, can you
18 give me an idea of some of the responsibilities or
19 issues that that committee was looking into?
20 A. It -- the Technical Advisory Committee was, as I
21 recall, a body that was formed under the estuaries
22 project, which is now -- I forget. Its name
23 changed. But anyway, it was the Technical

1 Advisory Committee for the estuaries project, and
2 its job was to advise the estuaries management
3 committee on -- and I may get the name of that
4 committee wrong -- on technical issues related to
5 implementation of the, of the estuaries program.
6 There was a document with, with lots of
7 implementation steps, and the Technical Advisory
8 Committee's role was to advise on those.
9 Q. Did that include assessments of whether different
10 areas of the estuary were impaired and the causes
11 thereof?
12 A. No.
13 Q. No. Did that include recommendations on numeric
14 criteria development to protect the estuary?
15 A. Yes.
16 Q. And -- okay. Within your management on Great Bay
17 issues did you have much involvement with Dr. Fred
18 Short?
19 A. Not much.
20 Q. Do you know if the department relied on any of
21 Dr. Short's claims regarding causes of eelgrass
22 decline in Great Bay?
23 A. Dr. Short was a participant in the advisory

1 committee, as I recall.
2 Q. But do you know if the department relied on any of
3 his recommendations as to causes of eelgrass
4 decline?
5 A. Not to my knowledge.
6 Q. Not to your knowledge. Okay. All right. I'm
7 going to -- let me ask you one more backup
8 question to try to clear some of the cobwebs away.
9 The State of the Estuaries reports, can you give
10 me an idea of what your involvement might have
11 been in review or participation in the State of
12 the Estuaries reports?
13 A. Not extensive. As you know, Phil Trowbridge
14 functioned in a dual role. He was the coastal
15 scientist for the estuaries project, and he was
16 also under my technical supervision at DES, so my
17 role in the State of the Estuaries report was one
18 of technical supervision.
19 Q. Okay. So if Phil had various conclusions or
20 findings in the State of the Estuaries report,
21 would you have been responsible for reviewing
22 whether or not those conclusions were adequately
23 supported? Or can you give me -- what did you do

1 when you look --
2 A. Yeah. General review and being aware of the work
3 that he was doing. Again, he was working for the
4 estuaries project under a, I don't want to say a
5 memorandum of agreement, but anyway, under a -- it
6 was a contractual arrangement between us and, DES
7 and the estuaries project.
8 Q. All right. I'm going to hand you a copy of --
9 it's the New Hampshire's Narrative Water Quality
10 Standard, and that's -- probably end up marking
11 that. Ah, we'll wait until I finish asking you
12 questions. And you can assume that I've correctly
13 typed the version. That can be, that can be
14 verified and/or objected to later.
15 Are you familiar with the state's narrative
16 water quality standard as it applies to nutrients?
17 A. Yes, I am.
18 Q. You've seen this before?
19 A. I have.
20 Q. I've got a few just general questions I wanted to
21 ask you about how this, how this rule is
22 implemented. Looking at provision (b), the one
23 that says, "Class B waters shall contain no

1 nitrogen or phosphorus in such concentrations that
2 would impair any existing designated uses, unless
3 naturally occurring," are you familiar with that
4 provision?
5 A. Yes.
6 Q. Okay. Under that provision -- can you describe to
7 me how that provision works? How has the
8 department historically implemented that
9 provision? How do you decide whether or not
10 nitrogen or phosphorus is impairing an existing or
11 designated use?
12 A. Well, in recent years we document how we make
13 those decisions in the Consolidated Assessment and
14 Listing Methodology.
15 Q. Okay. But can you just describe to me -- oh. Can
16 you describe to me how you make those decisions?
17 How do you decide if nitrogen or phosphorus is
18 causing an impairment?
19 A. The basic process is to examine the designated
20 uses. And I used to be able to rattle off the
21 list but I --
22 Q. It's okay.
23 A. One of them is aquatic life, and basically the

1 process would involve -- for aquatic life, for
2 example, the process would involve identifying the
3 aquatic life that inhabits the water body,
4 identifying the limiting factors for the health
5 and happiness of that aquatic life and identifying
6 set points at which there would be an impairment
7 of the, say, in this case, using aquatic life as
8 an example. And all of that is documented in the
9 CALM.
10 Q. Okay. Let me -- let me try to ask the question a
11 little differently. Nitrogen and phosphorus are
12 not toxics, correct?
13 A. Everything is toxic at a certain amount, but
14 they're not -- they're not -- they're considered
15 nutrients, not toxics.
16 Q. Considered nutrients. I mean, at the levels that
17 are commonly found in the environment, for
18 example, in Great Bay, they're not toxic, right?
19 A. Not in the -- no, not in the, not in the general
20 sense. They're not on EPA's list of toxic
21 substances.
22 Q. Are they on any DES list of toxic substances?
23 A. No.

1 Q. No. So if I have a level of nitrogen or
2 phosphorus, it has to, what, generally cause some
3 kind of excessive plant growth to cause an impact,
4 correct?
5 A. Well, cause -- that is one impact that would be
6 defined as an impairment of a designated use.
7 Q. So let me -- let's go through the sequence. Well,
8 so just the fact that I have a certain nitrogen or
9 phosphorus concentration in the water doesn't tell
10 me I've got an impairment, correct?
11 A. That's correct.
12 Q. Okay. Then you look to see whether the nitrogen
13 or phosphorus causes a certain other adverse
14 effect to occur; would that be the correct
15 statement?
16 A. Yes.
17 Q. Okay. And at least with regard to -- let's look
18 at subsection (c). It says, "Which encourage
19 cultural eutrophication," which is defined as,
20 further defined in the regs as "excessive plant
21 growth or a decrease, and/or a decrease in
22 dissolved oxygen."
23 So the nitrogen or phosphorus needs to

1 trigger some type of excessive plant growth under
2 your narrative criteria; wouldn't that be correct?
3 A. The answer is not necessarily.
4 Q. Okay. Could you explain?
5 A. Well, for example, nitrogen is a component of
6 ammonia. Ammonia is directly toxic to fish.
7 Q. Let me stop you there. Completely excluding
8 toxicity effects from subfractions like ammonia,
9 because they're separately regulated, correct?
10 A. Ammonia is separately regulated.
11 Q. We're just talking nutrients as total nitrogen or
12 total phosphorus. The effect that you look for in
13 the water body, isn't the effect some type of
14 excessive plant growth that then might trigger
15 other adverse effects happening in the water
16 colony?
17 A. Under this, yes.
18 Q. I mean, that's all I was trying to get at. I'm
19 trying to understand like if I'm the public and
20 I'm reading this document and I'm trying to
21 understand what the purpose of the narrative
22 criteria is. So the purpose isn't to just
23 regulate any concentration of nitrogen and

1 phosphorus. It's to regulate concentrations of
2 nitrogen and phosphorus that cause excessive plant
3 growth and thereby harm beneficial or designated
4 uses?
5 A. Yes. In the context of cultural eutrophication,
6 yes.
7 Q. Is there any other -- other than the ammonia point
8 that you were talking about, is there anything
9 else other than cultural eutrophication that
10 nitrogen and phosphorus adversely impacts in terms
11 of beneficial use?
12 A. Yes.
13 Q. Okay. Can you explain?
14 A. And I am not an expert in aquatic biology, but it
15 was my understanding based on the literature that
16 nitrogen can be directly toxic to eelgrass.
17 Nitrate can be directly toxic to eelgrass.
18 Q. I'm sorry. Could you -- which form of nitrogen?
19 A. I believe it's nitrate.
20 Q. Nitrate can be directly toxic. And based on this
21 narrative criteria how would I know -- is there
22 any way for me to know that nitrate is going to be
23 regulated under this narrative criteria when I

1 read this? I mean, I'm the public, I'm picking up
2 this document, and I'm trying to decide, to know
3 how I'm being regulated. How would I know that
4 nitrate toxicity to eelgrass is being regulated
5 under this?
6 A. It wouldn't be, actually.
7 Q. Okay.
8 A. It would be more likely to be regulated under the
9 biological integrity narrative standard.
10 Q. Ah. Kind of no toxic in toxic amounts, or
11 something like that?
12 A. No. I can't quote you the book and page.
13 Q. Okay. But it wouldn't be regulated under this
14 provision, it would be regulated under something
15 else if it was causing that effect?
16 A. Right.
17 Q. Okay.
18 A. Obviously, yeah.
19 Q. Okay. All right. So -- so let me just wrap this
20 up. So this narrative standard, when it's
21 applied, you look for some kind of causal effect
22 that nitrogen or phosphorus caused, something
23 caused excessive plant growth, and then that

1 caused an impact on the beneficial use, right?
2 A. Right.
3 Q. Okay. I think I now understand how this --
4 A. Yeah. Although -- although, this rule basically
5 applies to cultural eutrophication, and the end
6 point is the excessive plant growth.
7 Q. Okay. And let's take another -- let's just do a
8 slight example of this. Suppose I had nitrogen or
9 phosphorus discharge into the water body and it
10 didn't cause a change in plant growth. Would that
11 nitrogen or phosphorus be considered in violation
12 of this provision in any event?
13 A. No. I don't believe so.
14 Q. Sometimes it's helpful to ask a question in the
15 negative --
16 A. Right.
17 Q. -- after you've asked it in the positive. I'm
18 just trying to get things straight. Okay. Well,
19 thank you for your clarification on that.
20 MR. HALL: Let's mark that as Exhibit --
21 what are we up to, 20 --
22 (Reporter responds.)
23 (Exhibit 28 marked.)

1 Q. What I'm going to do next, Mr. Currier -- by the
2 way, Paul, is it Dr. Currier?
3 A. No.
4 Q. Okay. I was just -- occasionally -- you know, for
5 some reason I thought you had a doctorate in an
6 area, but I was confused. It must be because you
7 usually give pretty clear answers on things, so --
8 A. Thank you.
9 Q. No. Quite all right. What I'd like to do is give
10 a little, let's call this a walk-through history
11 on -- I'm going to kind of go back in time over
12 the sequence of events that led up, I guess,
13 eventually to impairment listings and then the
14 draft criteria and then the MOA and things like
15 that, the whole sequence. I know you were
16 involved in a good part of this. You weren't
17 necessarily involved in everything in detail. So
18 to the degree you remember, you know, what
19 happened and why it happened, it's great. If you
20 don't, you know, maybe someone else will remember.
21 I'd like to start with the Technical Advisory
22 Committee and the needs to develop numeric
23 nutrient criteria. Okay. Can you tell me why,

1 why the state felt it needed to develop numeric
2 nutrient criteria for Great Bay?
3 A. Well, there were two reasons. EPA was encouraging
4 states to develop numeric nutrient criteria in
5 fact for all water body types and had put forth
6 various guidance and was seeking agreements and
7 timetables with us and other states to do that.
8 And the other, the other reason was basically the
9 estuaries project process to implement their
10 management plan. And the biological health to
11 Great Bay was a significant concern in their
12 management plan.
13 Q. Okay. I'm going to show you a document. We'll
14 mark it as -- let me show you this document first.
15 It's a -- this was a presentation done by Matthew
16 Liebman, USEPA. He did the presentation to the
17 Technical Advisory Committee, and I believe it was
18 in September 2005. You can check the record. And
19 do you recall this presentation at all? Do you
20 remember if you were there for it?
21 A. I don't think I was. Anyway, I don't recall it.
22 Q. Okay.
23 A. I was aware of it.

1 Q. You were aware of it. I'd like you to look at
2 the, what we'll call -- ah, you are already
3 looking at it, the first page of the document.
4 The title is, "We have lots of problems, so let's
5 get started." And it talks about EPA's nutrient
6 strategy. And the first bullet identifies that
7 there are a few different approaches. I guess the
8 idea is you're going to try to keep nutrient
9 levels below conditions that cause nuisance and
10 impairments of uses, like any other water quality
11 criteria. That's the purpose of a criteria,
12 right, to protect the use, a numeric criteria --
13 A. Right.
14 Q. -- to protect the use, and certainly not allow a
15 nuisance condition to exist, right?
16 A. Right.
17 Q. Okay. And the last bullet, it says they want the
18 state to adopt the criteria into state water
19 quality standards. Was it, was it your
20 understanding that when, the development of a
21 numeric criteria that eventually, or the purpose
22 of it was to be eventually adopted into state
23 water quality standards?

1 A. Probably, but I don't recall.
2 Q. One of many that had been prepared over the years
3 for Great Bay, right?
4 A. Yes.
5 Q. What's the purpose of the State of the Estuaries
6 report, can you tell me generally?
7 A. In general it's to track the indicators of things
8 of concern to the Estuaries Management Project and
9 to track them and report, report on them over
10 time.
11 Q. Okay. Indicators such as, say, like nitrogen
12 level, chlorophyll-a changes, eelgrass changes,
13 oyster changes, just a whole range of different
14 factors; correct?
15 A. Yes. And lots of others. There was one on
16 impervious surface, for example. A whole range of
17 things that had been identified in the, in the
18 work plan of the estuaries project as important.
19 Q. Okay. I'm going to, I'm going to bring your
20 attention to two statements in the report.
21 They're on page 13, 14. I can read them to you.
22 A. Okay.
23 Q. And one is -- the first one is under "nutrients."

1 A. Yes.
2 MR. HALL: We'll just mark that as
3 Exhibit --
4 (Reporter responds.)
5 MR. HALL: Twenty-nine.
6 MR. KINDER: Can we take a short break?
7 (Discussion off the record.)
8 (Exhibit 29 marked.)
9 (Recess taken; 9:25-9:32 a.m.)
10 Q. (BY MR. HALL) Paul, in advance of this TAC group
11 that was looking at the numeric nutrient criteria
12 development there was some of these State of the
13 Estuaries reports done. And I'm going to show you
14 a couple of them. I reviewed these all with
15 Dr. Short, and I can paraphrase what his
16 conclusions were, but why don't we just go through
17 a couple of these and just see whether or not your
18 understanding was any different.
19 This was Exhibit 16 from the Fred Short
20 deposition. It's the -- it's the 2000 State of
21 the Estuaries report. And I'm going to just bring
22 your attention to -- well, actually, let me ask
23 you. Have you seen that report before?

1 It starts on page 13, goes over to page 14.
2 There's a -- as a matter of fact, you probably
3 should turn to page 14 because there's a nice
4 little chart there that shows what the nutrient
5 levels are doing.
6 A. No page numbers.
7 Q. Oh, let me have it. That was another one of those
8 where the page numbers were very lightly copied on
9 the bottom. It was hard to see. I think we went
10 through that last time at Fred Short's deposition.
11 A. Color doesn't reproduce as well.
12 Q. It's easier to find when it's in color as always.
13 Ah, there (indicating).
14 MR. MULHOLLAND: And Paul, feel free to
15 take your time and look around it, if you want,
16 for context.
17 Q. And I'm going to just read you, it's a quote that
18 starts on page 13, the bottom of 13, goes over to
19 14. It says, "Evidence suggests that nutrient
20 concentrations within the main area of the bay
21 have not changed significantly over the past 20
22 years. No widespread eutrophication effects have
23 been observed." Then I'll skip a sentence, and it

1 goes, "Documented effects on phytoplankton blooms
2 in other areas are rare. Eutrophication and
3 related impacts do not appear to be imminent, an
4 imminent widespread problem." This is in 2000.
5 So in 2000 this report is indicating: "I'm not
6 seeing eutrophication impacts in Great Bay yet."
7 Is that a fair statement?
8 A. That's what the words say.
9 Q. Yeah. Do you have any reason to believe that what
10 would be in this report would be inaccurate?
11 A. No.
12 Q. Okay. So as of 2000 would this language in this
13 report indicate there was a narrative criteria
14 violation associated with nutrients?
15 A. No.
16 Q. Now, let's -- let's -- and by the way, Fred Short
17 said the same thing. He didn't think that the bay
18 was impaired in 2000. Running to page 28, and
19 again I'll apologize for the lack of page numbers
20 at the bottom. I'll just read you a statement
21 about -- it's on eelgrass.
22 A. Okay.
23 Q. It says, "In the late '80s eelgrass wasting

1 disease caused dramatic eelgrass declines in Great
2 Bay Estuary arousing great concern into the early
3 '90s; however, historic eelgrass" -- let me state
4 it again. "However, historical eelgrass beds have
5 made an impressive recovery of acreage and
6 densities." Then I'll skip a sentence. "While
7 the overall resource is improving, lost eelgrass
8 beds in Little Bay have been significantly slower
9 to recover."
10 So at this point in time the understanding is
11 eelgrass in Great Bay looked pretty good in 2000.
12 That's when this is. This is the 2000 State of
13 the Estuaries report. Would that be a fair
14 statement?
15 A. Yes. I believe those words say it had been a
16 substantial recovery from the wasting disease
17 episode.
18 Q. And I won't hold you to Fred Short's quote, but
19 Fred Short indicated that in 2000 he didn't
20 believe the bay was adversely impacted for
21 eelgrass. Is that your understanding of the
22 condition of the bay in 2000?
23 A. To be honest with you, I have not considered the

1 condition of the bay in 2000.
2 Q. Okay. That's fine. Okay. Well, let's look at
3 the next one. I'm going to show you the 2003
4 State of the Estuaries report. This was
5 Exhibit 17 from the Fred Short deposition. And
6 it's on page --
7 A. This has better page numbers.
8 Q. Let's go to page 8. And it talks about -- the
9 title is, "Indicator no. 3. Have nitrogen
10 concentrations in Great Bay changed significantly
11 over time?" All right. Then there's a little
12 graph that shows nitrate and nitrite at Adams
13 Point, and it shows a line snaking through some
14 bouncing data. You're on that page, right?
15 A. Yes.
16 Q. I'd like to draw your attention to the statement
17 on the left-hand side of the graph. "Despite the
18 increase in concentration of nitrate/nitrite in
19 the estuary, there have not been significant
20 trends for the typical indicators of
21 eutrophication, dissolved oxygen and chlorophyll-a
22 concentrations; therefore, the load of
23 nitrate/nitrite to the bay appears to have not yet

1 reached a level at which undesirable effects of
2 eutrophication occur."
3 Okay. Based on that statement is there any
4 indication that the state's narrative criteria for
5 nutrients is violated, violated as of the 2003
6 estuaries report?
7 A. No. The statement speaks for itself.
8 Q. Okay. And now I'd like to bring your attention to
9 page 16. Again, it talks about eelgrass, and it
10 has a nice chart showing eelgrass. That's the
11 very next page. There you go. It's indicator no.
12 7. And I think the data run up through 2001. And
13 this was another one that we asked Fred Short
14 about as to whether or not these data indicated
15 any kind of eelgrass impairments in -- we're
16 talking in Great Bay. We're not talking anywhere
17 else in the estuary, just in Great Bay.
18 A. Right.
19 Q. And there's a statement in the middle of, I think
20 it's the second paragraph. "Eelgrass cover in
21 Great Bay has been relatively constant for the
22 past 10 years at approximately 2,000 acres," and
23 then again talks about the major decline in 1989

1 wasting disease.
2 Based on this information, is there any
3 indication that eelgrass was suffering impairment
4 in Great Bay as of 2001?
5 A. I believe, again, the words speak for themselves.
6 "Eelgrass cover in Great Bay has been relatively
7 constant over the last 10 years."
8 Q. So whatever nitrogen or whatever nutrients are
9 entering the bay, at least at this point they
10 don't appear to be causing excessive algal growth
11 and they don't appear to be affecting the eelgrass
12 growth, do they?
13 A. That's right.
14 Q. That's what Fred Short said also, so you're in
15 good company. Let's go to --
16 MR. HALL: Tupper, do you have a copy of
17 the 2006? For some reason --
18 MR. KINDER: Yeah.
19 MR. HALL: -- I don't have an extra copy of
20 the 2006.
21 Q. Okay. I'd like to bring your attention to pages
22 12 and 13. Do you have page numbers at the
23 bottom?

1 A. Not specifically.
2 Q. Are the hydrodynamics of Great Bay significantly
3 different than Chesapeake Bay, to your knowledge?
4 A. Yes.
5 Q. Much shorter detention time?
6 A. Fairly short detention time, yes.
7 Q. What about Narragansett Bay? Is Great Bay just
8 like Narragansett Bay, or is it significantly
9 different?
10 A. I think it's safe to say all estuaries are unique
11 in their hydrodynamics.
12 Q. But this one has a particularly short residence
13 time given its nature and the tidal exchange,
14 doesn't it?
15 A. Yes, it does.
16 Q. And that affects the ability for nutrients to
17 cause excessive plant growth?
18 A. It is certainly a factor.
19 Q. Thank you for that clarification. See, you know,
20 you may have retired, you know, a year ago, but
21 you've still got it, so...
22 Okay. The next -- the next sentence. "So
23 far" -- and this is similar, I guess, to the last

1 A. Yeah. They're good.
2 Q. Okay. Good. All right. On page 12 -- and this
3 is another one -- one more time they're asking
4 "What are the nitrogen concentrations doing in
5 Great Bay?" I mean, that's a focus and it's
6 always a concern to track that, to make sure it's
7 not causing an adverse effect, correct? That's
8 what we're trying to do with this report?
9 A. Yes. Track things over time using a consistent
10 set of indicators.
11 Q. Okay. I'd like to bring your attention to the
12 right-hand column first on page 12. It starts,
13 "The researchers are still debating the possible
14 effects of increasing DIN concentrations on Great
15 Bay because it is a unique system, both
16 hydrodynamically and biologically, that may
17 respond differently to excess nitrogen than other
18 estuaries."
19 Let me ask you a question about that
20 statement. Do you know what they're talking
21 about, how Great Bay may be responding differently
22 from other estuaries? Do you know what the
23 background is on that?

1 two reports we looked at. "So far the typical
2 effects of nitrogen have not been observed in
3 Great Bay, although DIN concentrations are similar
4 to concentrations in other estuaries where
5 negative effects have been clearly observed."
6 Okay. Does that statement indicate that
7 there's any violation of the narrative criteria,
8 excessive plant growth being caused by nitrogen
9 discharges to the bay?
10 A. No.
11 Q. Okay. Now, let's look at the next page because
12 the next page is interesting because it's got two
13 graphs of dissolved inorganic nitrogen. It's
14 called Figure 6. This is all at Adams Point.
15 Where is Adams Point?
16 A. It's roughly in the middle of the bay.
17 Q. Okay. And is this a typical indicator location
18 that the department uses to assess the health of
19 the bay?
20 A. Yes. My understanding is it was a point selected
21 by UNH researchers a long time ago, so it has a
22 lot of data.
23 Q. Ah. So somebody that knows more than us about

1 where they should collect data on the bay?
2 A. Yes.
3 Q. All right. So there's two charts. One is
4 dissolved inorganic nitrogen, the other one is
5 suspended solids concentrations. The inorganic
6 nitrogen looks like it's gone up over time, I
7 mean, if you compare the 1980s to this time frame
8 of 1997 to 2004; correct?
9 A. (Deponent nodded.)
10 Q. Okay. So that's gone up. Apparently, it hasn't
11 caused a change in chlorophyll-a growth, though,
12 right, based on the statements on the prior page?
13 A. Right.
14 Q. Correct. But the suspended solids have jumped
15 from -- I'll just pick a rough average -- say, 6
16 milligrams per liter in the 1980 time frame to,
17 say, 15 milligrams per liter in the period of 1999
18 to 2004.
19 A. Yes.
20 Q. So the suspended solids have gone up. So what,
21 what would have caused the change in suspended
22 solids, caused the suspended solids to go up, but
23 not the chlorophyll to go up; do you know?

1 A. I don't know.
2 Q. Do you know if anybody ever figured that out for
3 Great Bay?
4 A. I know it was the subject of lots of conversation.
5 Q. Okay. But that wasn't, that wasn't caused by a
6 change in algal growth, right?
7 A. One component of suspended solids is algae.
8 Q. But, I mean, the increase wasn't caused by change
9 in algal growth?
10 A. The increase in?
11 Q. Suspended solids.
12 A. Well, this plot does not, does not detail that.
13 Q. I can show you another one that does.
14 A. I'm sure you can.
15 Q. So you can answer the question, if you recall,
16 from whether or not the suspended -- whether or
17 not in Great Bay the suspended solids did
18 increase, but the data showed the chlorophyll-a
19 levels remained pretty constant; is that your
20 recollection?
21 A. I don't recall the details but --
22 Q. Okay. But that could have been the case?
23 A. I'll take your word for it.

1 Q. I'll show you a graph later so you don't have to
2 take my word for it. Okay. So as of this point
3 in time Great Bay looks like it's not being, not
4 being considered nutrient impaired, but let's --
5 let's go to page 20 on this same, this same
6 report, if you could, please.
7 MR. SERELL: What's the number of that
8 exhibit?
9 MR. HALL: That was Short Exhibit --
10 MR. KINDER: Seventeen, I think.
11 MR. SERELL: Seventeen?
12 MR. KINDER: I'm sorry. Eighteen.
13 MR. HALL: I think you might have it marked
14 at the top of yours.
15 MR. KINDER: That's 18.
16 MR. SERELL: Just for the record.
17 A. Eighteen, yeah.
18 Q. Let's look at page 20 and 21. I'm sorry. I'll
19 make you flip over to the next page. You can see
20 the typical eelgrass chart?
21 A. Yeah.
22 Q. You've seen that eelgrass chart before --
23 A. Yes.

1 Q. -- or charts like that, right?
2 A. Yes.
3 Q. Okay. And looking at the language on the prior
4 page, because it's talking about Figure 17,
5 eelgrass cover and biomass in Great Bay. It says,
6 on the left-hand column, "The current 2004 extent
7 of eelgrass in Great Bay is 2,008 acres, which is
8 17 percent less than the maximum observed in
9 1996."
10 Do you know whether or not DES considered a
11 2000-acre coverage of eelgrass to be an impaired
12 level of eelgrass in Great Bay or unimpaired level
13 of eelgrass?
14 A. A couple of, a couple of things.
15 Q. Please.
16 A. DES doesn't consider Great Bay -- or in the
17 process, which is outlined in the CALM again,
18 Great Bay is not considered as a whole in making
19 an assessment like that. And the second answer is
20 that aerial coverage of eelgrass is not, would not
21 be the only consideration that would be used.
22 Q. Okay. What other consideration would there be?
23 A. I would refer you to the CALM.

1 Q. Ah. Do you know if there was a CALM written in
2 2004 that indicated whether or not this level of
3 eelgrass coverage was considered an impairment?
4 A. I'm pretty sure there wasn't because the guidance
5 document wasn't produced till 2009.
6 Q. Okay. So the 2009 guidance document, the numeric
7 nutrient criteria -- when you say, "Guidance
8 document," you mean the numeric nutrient document,
9 right?
10 A. Yes.
11 Q. Okay. So that document eventually became the
12 basis for deciding whether or not something was
13 impaired?
14 A. Yes. And that's further described in the CALM.
15 Q. But that was a numeric nutrient criteria document.
16 That didn't necessarily say what the amount of
17 eelgrass in the bay needed to be, how many acres
18 would be considered a healthy amount of eelgrass
19 in the bay, did it?
20 A. No, no. Nor was that judgment ever made.
21 Q. Hmm.
22 A. To my knowledge.
23 Q. I'd like to draw your attention to the language at

1 a transparency impact, does it?
2 A. No. The words that we've talked about don't.
3 Q. I'd like -- let me see. I'm going to show you one
4 more of these. Ah, let's mark this as Exhibit 30.
5 This is a State of the Estuaries report in 2009.
6 Ah, let me just ask you one last question.
7 So as of the 2006 State of the Estuaries
8 report, just so I make sure I have your
9 recollection correct, you're not sure whether or
10 not Great Bay was considered impaired for eelgrass
11 loss at that time yet?
12 A. I'm sure it wasn't because the criteria had not
13 been developed on which to make that judgment.
14 Q. Thank you. I didn't remember what you had said
15 three minutes before, yeah, so maybe I should
16 retire. Let's look at page 13.
17 MR. LUCIC: Why don't we have it marked.
18 Is it marked already?
19 (Reporter responds.)
20 MR. LUCIC: So why don't we --
21 MR. HALL: Oh, yeah. Why don't we mark --
22 MR. LUCIC: Since we identified it, let's
23 mark it.

1 the top of the second paragraph on the right-hand
2 side on page 20. It's discussing that the
3 eelgrass -- first it discusses the eelgrass are
4 bouncing around in terms of acreage. And I'll
5 read the quote. "The specific cause of the
6 decline in eelgrass cover and biomass is unclear,
7 but it appears to be related to the reduction in
8 the amount of light reaching the plants." I'll
9 skip a line. "The observed changes in eelgrass
10 cannot be linked directly to a water quality trend
11 in Great Bay, although increasing concentrations
12 in suspended solids have been observed at Adams
13 Point."
14 So at this point in time the change in
15 eelgrass levels, I guess people don't, don't know
16 what's causing it, correct?
17 A. Yes. That coincides with my memory of the
18 discussions in -- this is 2006?
19 Q. Yeah.
20 A. Yeah. 2006.
21 Q. It's 2006. But the only trend that's mentioned
22 here is suspended solids. It doesn't mention that
23 there's any increased phytoplankton growth causing

1 MR. HALL: Since we identified it, let's
2 mark it. Thank you.
3 (Exhibit 30 marked.)
4 Q. (BY MR. HALL) I'd like to draw your attention to
5 page 13. And I had asked you a question earlier.
6 There were three charts on that page, one is
7 dissolved inorganic nitrogen, the other one is
8 suspended solids, and the other one is
9 chlorophyll-a. I had asked you whether or not you
10 had any recollection as to whether or not the
11 chlorophyll-a level had changed over time and when
12 that -- and if so, when that change might have
13 occurred. And there's a Figure 10 at the bottom.
14 And looking at the data -- actually, let me back
15 up for a second. Who's the person that develops
16 these figures?
17 A. This would be Phil Trowbridge, coastal scientist,
18 is the primary author for -- not all of them we
19 talked about, but certainly for this one.
20 Q. So if we have a bone to pick about any figures, we
21 have to go to Phil?
22 A. Yes. And I would say since the report was a
23 collaborative effort, he's not the sole author.

1 Q. Okay. Looking at Figure 10, the one that says
2 chlorophyll-a concentration measured at Adams
3 Point, does that, does that figure show that there
4 was any material change in chlorophyll-a
5 concentration between 1981 and 2000?
6 A. I would give you my visual impression from the
7 graph, recognizing I think that the graph
8 incorporates lots of data. Yes.
9 Q. Yes, that chlorophyll-a significantly changed, or
10 it didn't change up until 2000?
11 A. That there is -- I'm sorry. I lost your question.
12 Q. I think -- I think you answered yes to a negative
13 question, and I asked a positive. Let me rephrase
14 it. Does this graph show any significant change
15 in chlorophyll-a from the 1981 time frame to the
16 1993-2000 time frame?
17 A. It doesn't appear to, no.
18 Q. No. And then after 2001 there is somewhat of an
19 increase in chlorophyll-a, isn't there?
20 A. Yes.
21 Q. Can you tell me about how much that looks like?
22 A. Well, just reading off the graph, the mean
23 concentration, '93-2000 period is maybe three and

1 Q. I mean, it's really not much of a change in
2 chlorophyll-a, is it?
3 A. I don't know.
4 Q. Okay. Let's look at the -- do you remember that
5 earlier question about the inorganic nutrient
6 levels had gone up but the chlorophyll hadn't
7 changed? Let's look at that top graph. That
8 shows -- and I'm talking about Figure 8. That
9 shows the inorganic nitrogen went from -- I'll
10 just rough it out -- .1 to, say, .15 milligrams
11 per liter in the system between 197 -- 1980 and
12 the 1990-2000 time frame. But at the same time
13 frame the chlorophyll-a in the system -- down
14 below -- didn't change in response to that,
15 correct?
16 A. I don't believe that you can draw that conclusion
17 from these graphs; that is, I have no idea
18 whether, whether the response, that the
19 chlorophyll-a response here is related to the
20 nitrogen based on the graph.
21 Q. Well, how would you determine, if you didn't use a
22 graph, to plot the data and see if one went up and
23 the other one didn't go up, there isn't a cause

1 a half, and in the 2001 to 2008 time period it's
2 maybe four and a half.
3 Q. So it went up about a microgram?
4 A. (Deponent nodded.)
5 Q. Okay. Do you have any idea of the, how much of an
6 impact on transparency a single microgram change
7 in chlorophyll-a would be?
8 A. No, I don't.
9 Q. Who would know that at DES?
10 A. Well, Phil would be the person to, to whom I could
11 ask the question.
12 Q. Okay. Has anybody ever told you that a change in
13 one microgram of chlorophyll-a is a significant
14 change in algal growth in a system?
15 A. I haven't considered that issue, I don't think.
16 Q. In any other system, fresh water, salt water,
17 anywhere in the state, has the state ever said
18 before that a one-microgram change is a, would
19 constitute cultural eutrophication in a system, do
20 you know, historically?
21 A. Yeah. Not to my knowledge.
22 Q. Not to your knowledge.
23 A. I never heard it framed that way, actually.

1 and effect between the two?
2 MR. MULHOLLAND: Objection. I think you're
3 getting into some expert testimony. He said he
4 doesn't understand any connection between the two.
5 He's not your expert.
6 Q. Ah. Well, let me back up. Is that graph
7 consistent with the earlier statements that were
8 contained in the State of the Estuaries reports
9 that we walked through where it said the inorganic
10 nitrogen increased, but I'm not seeing the
11 response in algal growth in the system?
12 A. Yes, it is.
13 Q. Okay. All right. Let's just leave that one
14 marked as -- what was that?
15 (Reporter responds.)
16 MR. HALL: Thirty?
17 MR. LUCIC: Yeah.
18 A. Yeah.
19 Q. A side question. Move away from --
20 (Discussion off the record.)
21 Q. Macroalgae, are you familiar with the term
22 macroalgae? M-a-c-r-o-a-l-g-a-e.
23 A. Yes, I am.

1 Q. Can you tell me what they are?
2 A. Seaweed.
3 Q. That's a fair definition. Can you tell me when
4 you recall first hearing that macroalgae growth in
5 Great Bay might be a problem?
6 A. Not long after Phil Trowbridge came to work for
7 us. I don't recall the specific date.
8 Q. By the way, do you know when Phil came to work for
9 you?
10 A. I don't. I think it was around 2005, but I'm not
11 sure.
12 Q. Okay. I mean, because we looked through some of
13 these prior State of the Estuaries reports and I
14 didn't see the words macroalgae, I mean, literally
15 appear anywhere in the reports. If macroalgae
16 were a problem in the system, do you think it
17 would have been reported in those State of the
18 Estuary reports?
19 A. Yes.
20 Q. Okay.
21 A. If it had been identified as well.
22 Q. Okay. But people were out there looking. I mean,
23 Fred Short was out there looking at the bay and

1 swimming around and inspecting eelgrass every
2 year, right?
3 A. Yes.
4 Q. Do you recall whether Fred Short ever said the
5 bay, when Fred Short might have said the bay has a
6 significant macroalgae problem?
7 A. No. But I never talked to Fred Short about that.
8 Q. Okay. Phil Trowbridge might have?
9 A. It would be Phil. He might have.
10 Q. Thank you. Okay. Let's go back to the TAC
11 committee, because this one report talks about
12 there was a -- I guess the 2006 State of the
13 Estuaries report talks about eelgrass populations
14 are changing. They're not sure what the cause is.
15 Was the TAC committee to your knowledge tasked
16 with trying to evaluate what the cause of the
17 changing eelgrass populations might be?
18 A. Not specifically. But they were, they did agree
19 to take on the task of developing numeric nutrient
20 criteria as a subcommittee of the water quality
21 standards advisory committee, and I don't remember
22 exactly when they agreed to do that. It was in
23 that time frame somewhere.

1 Q. I'm going to show you a couple of reports done by
2 Phil Trowbridge for the TAC committee. And can
3 you look at that document? It's entitled, "New
4 Hampshire Estuaries Project Environmental
5 Indicators. Phil Trowbridge. June 15, 2006." Do
6 you recall that presentation? And this was a
7 presentation Phil did to the TAC committee.
8 A. I don't recall it specifically, but yes, I --
9 Q. Okay.
10 A. -- would have, I would have been present at this
11 presentation.
12 Q. Right. Yeah. We have the TAC meeting minutes and
13 I think you were, you were in attendance at most
14 all of them. I'd like to bring your attention
15 to -- so this is, this is Phil evaluating,
16 evaluating some of the indicators of the
17 pollutants in the system. And let's look at
18 page -- oh, let's look at the third page, the
19 nitrogen trends page. Is Phil's analysis
20 indicating that nitrogen has increased up through,
21 from the 1980s through the 1990-2004 period?
22 A. Well --
23 Q. You can go to the next chart also.

1 A. It's the past 25 years on that page.
2 Q. Right. His charts of dissolved inorganic nitrogen
3 and --
4 A. Yes. There's a significant increase.
5 Q. So it's the same type of thing that was discussed
6 in the State of the Estuaries reports, right?
7 A. Yeah.
8 Q. It also shows a significant increase in suspended
9 solids level too, right? It's the same
10 observation?
11 A. Yes.
12 Q. And now let's go, let's go to the next set of
13 charts, or the next page where he talks about "Any
14 increase in nitrogen concentration has apparently
15 not resulted in increased phytoplankton blooms."
16 I don't see the -- the data was plotted on the
17 next page. So Phil then charts the chlorophyll-a
18 levels at Adams Point and compares 1981 to the
19 time frame up through 2004 and reaches this
20 conclusion.
21 Is that consistent with your understanding
22 that up through 2004 the increased nitrogen
23 concentrations were apparently not causing

1 significant change in phytoplankton blooms in the
2 bay?
3 A. Yes. That was -- as of June 15, 2006 that was --
4 Q. Now --
5 A. -- the understanding.
6 Q. Okay. So up and through -- because his data is
7 only plotted through 2004.
8 A. Right.
9 Q. So up at least to 2004, if I looked at this data,
10 would I conclude that I've got a narrative
11 criteria violation caused by nitrogen and
12 phosphorus related to chlorophyll-a growth, or
13 that I don't have a narrative criteria violation
14 related to chlorophyll-a growth?
15 A. The conclusion I think would be that there's no
16 violation.
17 Q. And I think that would be a fair statement. Let's
18 see if there's anything else in this.
19 MR. HALL: Let's just mark that as
20 Exhibit 31.
21 (Exhibit 31 marked.)
22 Q. Let me just ask you one other question regarding
23 that exhibit, Mr. Currier. Is there -- can you

1 just flip through it quickly and can you give me
2 an idea as to whether or not you're seeing any
3 references to excessive macroalgae growth in this
4 analysis?
5 MR. MULHOLLAND: Do you want him to read
6 the whole thing?
7 Q. No. Just flip through it. I think the words
8 macroalgae don't appear anywhere in the entire
9 document.
10 A. I'll take your word for it.
11 Q. If increased nitrogen did not cause an increased
12 algal growth in Great Bay, would it likely have
13 caused any increased algal growth in the
14 Piscataqua River, do you know?
15 A. Say it --
16 Q. If this report indicates -- because it's only
17 looking at Adams Point, right --
18 A. Right.
19 Q. -- that for Great Bay we didn't have increased
20 algal growth. But let's switch to the Piscataqua
21 River, because the Great Bay flows eventually to
22 the Piscataqua River. Do you know if there were
23 any indications of excessive phytoplankton growth

1 in the Piscataqua River ever reported to your
2 knowledge?
3 A. No, not to my knowledge.
4 Q. Now, let's go to the next analysis that was done
5 by Mr. Trowbridge, and it's called, "Summary of
6 Light Availability and Light Attenuation Factors
7 in Great Bay," dated February 14, 2007. Mr.
8 Currier, are you familiar with this report?
9 A. Not in detail, but I'm sure I was at the time.
10 Q. Okay. Well, do you know why this report was
11 developed?
12 A. I believe it was part of the continuing process to
13 develop nutrient criteria for the estuary.
14 Q. And I could walk you through the Technical
15 Advisory Committee notes if we need to refresh
16 your recollection, but let me just make a few
17 statements and see whether or not you're in
18 general reliance on your recollection.
19 Part of the TAC assignment was to try to
20 determine what was changing the eelgrass levels in
21 the system, correct?
22 A. Yes. My recollection is that there was
23 substantial discussion leading to the

1 identification of eelgrass as the end point to be,
2 to be selected.
3 Q. And one of the major factors that they wanted to
4 look at was transparency, light penetration,
5 correct?
6 A. Yes.
7 Q. Because people understood light penetration can
8 affect eelgrass growth?
9 A. Yes.
10 Q. As a result of looking at light penetration, then
11 one needed to look at the different factors that
12 could affect light penetration, correct?
13 A. Yes.
14 Q. And those factors could include -- I'll just list
15 several of them. You may have a few more.
16 Colored dissolved organic matter would be one,
17 correct?
18 A. Yes.
19 Q. Phytoplankton or chlorophyll-a level would be
20 another?
21 A. Yes. Although --
22 Q. Organic and other inorganic suspended solids would
23 be another?

1 A. Yes.
2 Q. I guess they said the water itself has an effect
3 on light transmission too --
4 A. Right.
5 Q. -- to a degree too. So it's those kind of factors
6 that one would need to look at to find out what's
7 causing a change in transparency if a change in
8 transparency is occurring, correct?
9 A. Yes.
10 Q. Okay. And the Trowbridge analysis that you have
11 in front of you, I mean, TAC indicated that these
12 were things that needed to be evaluated, and
13 Mr. Trowbridge with Professor Short proceeded to
14 evaluate; is that your recollection of the events
15 at that time?
16 A. Yes. Yeah. Fred Short was part of the Technical
17 Advisory Committee.
18 Q. Right.
19 A. He had a significant role because of his expertise
20 in eelgrass.
21 Q. And just to be clear on the record, when I asked
22 Fred about this, because the Technical Advisory
23 Committee notes which are -- where are the TAC

1 flip through and just, you know, refresh your
2 recollection on that report. And then I'd like to
3 bring your attention to page 9, which is, you
4 know, he reaches some initial conclusions on this.
5 So he's saying, "Colored dissolved organic
6 matter account for 50 percent of the light
7 attenuation in Great Bay." Is that your
8 recollection of which factor had the greatest
9 impact on light attenuation in the system?
10 A. Well, it's my recollection that that statement is
11 correct.
12 Q. That's correct. So -- and the next statement,
13 "Light attenuation by CDOM," which is colored
14 dissolved organic matter, "is a more complicated
15 process than increased nitrogen increases
16 phytoplankton increases shading," right? That's
17 what it says.
18 A. Right.
19 Q. Is -- where does colored dissolved organic matter
20 come from in these systems?
21 A. From, my understanding is from plant growth in the
22 system. That is --
23 Q. You mean in the watershed?

1 notes? They were -- oh, they were Short
2 Exhibit 24.
3 MR. KINDER: Yeah.
4 Q. Fred and Phil were assigned to do this, but Fred
5 said, "Well, they didn't give me research dollars
6 to do it so I couldn't put any time" --
7 A. I think I remember that.
8 Q. There you go. See, you know, it's those little
9 statements everybody always remembers. You know,
10 "If you'll give me some money, I'll do it." Okay.
11 So let's, let's look at this document. Look
12 at page 3 where it talks about "Factors
13 influencing light attenuation." Those are the
14 same several factors you and I just talked about,
15 correct?
16 A. Yes.
17 Q. And then Phil Trowbridge analyzes -- oh, he looks
18 at chlorophyll-a trends, and then he looks at
19 suspended solids trends, then he looks at
20 turbidity trends, then he looks at where colored
21 dissolved organic matter is coming from. I mean,
22 we can -- you can flip through. And then he does
23 univariate regressions of these things. If you

1 A. In the watershed, yes.
2 Q. In the watershed. It's kind of like leaching out
3 of decaying leaves and other plant growth,
4 correct?
5 A. Right.
6 Q. Okay. And every time the flows in the system go
7 up or, in other words, more fresh water comes down
8 the system, more colored dissolved organic matter
9 comes down into the system, correct?
10 A. Yes.
11 Q. Okay. How would regulating nitrogen at a
12 wastewater plant control the colored dissolved
13 organic matter coming into the system?
14 A. It would not.
15 Q. It would not. Okay. Let's go to the last page.
16 Well, actually, let me back up before we go to the
17 last page. Transparency. Everybody is focusing
18 on transparency at this point as a possible
19 explanation for why you do or don't have eelgrass
20 in various locations, correct? That's what the
21 main focus is?
22 A. Uh-hum.
23 Q. Did you ever see any data for Great Bay or any of

1 the tidal rivers that showed transparency had
2 changed over time in the system, amount of light
3 penetration had changed?
4 A. I don't recall. My recollection is there was a
5 scarcity of data.
6 Q. All right. The one thing that's discussed in this
7 report is that Phil Trowbridge is saying,
8 transparency predicts where the eelgrass are going
9 to grow or not grow. Do you recall that being
10 evaluated by Phil?
11 A. Yes.
12 Q. So if transparency is predicting where the
13 eelgrass will grow, does that mean that the
14 nitrogen level is controlling what the
15 transparency is, or does that require yet another
16 piece of analysis to make?
17 A. It requires further analysis.
18 Q. For the tidal rivers -- and when I, when I want to
19 say tidal rivers, let me be really clear because
20 there's a lot of tidal rivers in Great Bay. Let's
21 say the Squamscott and the Lamprey. They have
22 more fresh water in them as tidal rivers than
23 Great Bay has as a percentage of the water in the

1 those rivers is going to be poorer than Great Bay,
2 correct?
3 A. To the -- yes. CDOM is part of the, of the light
4 attenuation --
5 Q. Okay.
6 A. -- factors.
7 Q. At this point in Mr. Trowbridge's analysis does
8 this evaluation anywhere indicate that -- and I'd
9 like you to just flip through the report from one
10 end to the other, that the chlorophyll-a level or
11 the algal level in Great Bay is having a
12 significant impact on the transparency in the
13 system?
14 A. It's hard to evaluate things by flipping. Looking
15 at the observation page, page 17, my
16 understanding, and based on my recollection as
17 well, is that the purpose of this presentation was
18 to evaluate transparency as a predictor of
19 eelgrass.
20 Q. But, I mean, it's also evaluating the components
21 of what may be affecting transparency.
22 A. Yes.
23 Q. I mean, it's not just -- I mean, first is where

1 system, correct?
2 A. Yes.
3 Q. Okay. Would the impact of the colored dissolved
4 organic matter be greater in those tidal rivers
5 than it would be in Great Bay?
6 MR. MULHOLLAND: Objection.
7 Q. To your knowledge.
8 MR. MULHOLLAND: It's an unclear question.
9 There's no predicate of the impact. Impact on
10 what?
11 Q. Impact on -- thank you. The impact on
12 transparency, the water clarity. Colored
13 dissolved organic matter would have a greater
14 impact on the water clarity in those tidal rivers,
15 correct?
16 A. The answer is I need further information to be
17 able to make any evaluation. And the reason is
18 that the amount of colored dissolved organic
19 matter being, coming, associated with the fresh
20 water is watershed-specific.
21 Q. Okay. Well, if the colored dissolved organic
22 matter levels are significantly higher in the
23 Lamprey and Squamscott River, the transparency in

1 the eelgrass are present or absent, does
2 transparency seem to explain that? That was
3 question no. 1, right?
4 A. Yes.
5 Q. Question no. 2 was: And what explains the
6 transparency levels that we're finding at these
7 different locations?
8 A. Yes.
9 Q. And the conclusion was colored dissolved organic
10 matter accounts for 50 percent of the transparency
11 that's occurring in these, at least in Great Bay?
12 A. Yes.
13 Q. Okay. And in the tidal rivers if the colored
14 dissolved organic matter were higher than Great
15 Bay, then one would think that would have had an
16 even greater impact on transparency in those
17 areas, correct?
18 A. Yes.
19 Q. Okay. And then in the -- let's take the
20 Piscataqua River south of Great Bay. Does this
21 analysis tell me anything about what's controlling
22 the transparency levels in that area?
23 A. This analysis does not deal at all with the

1 Piscataqua River.
2 Q. So we don't know whether or not it's a
3 chlorophyll-a transparency issue, a colored
4 dissolved organic transparency issue, or a just
5 turbulent mixing suspended solids transparency
6 issue in that area, do we?
7 A. That's right. As we talked about before, the
8 systems are unique and the Piscataqua River is a
9 substantially different system hydrodynamically
10 than the bay itself.
11 Q. But -- and at this point in time -- let me go back
12 to my question on change in transparency, what may
13 have caused a change in transparency over time,
14 assuming a change happened over time.
15 If the chlorophyll-a levels did not change
16 significantly over time, that would not have
17 caused -- therefore, it would not have caused the
18 change in transparency due to chlorophyll-a,
19 correct?
20 A. Yes.
21 Q. Okay. And does this analysis indicate on page 4
22 that the chlorophyll-a trend changed significantly
23 over time or didn't change significantly over

1 whether or not the topics that were discussed here
2 that you had any familiarity with or input on.
3 Now, it's a -- I'd like to go all the way to the
4 bottom.
5 MR. MULHOLLAND: Paul, feel free to read
6 the whole thing, if you want.
7 Q. I've really only got a couple of minor questions
8 on this. It says, "As I said at the meeting," and
9 I imagine it was some meeting between Fred Short,
10 Phil Trowbridge and maybe Phil Colarusso and Jen
11 -- who are Phil Colarusso and Jim Latimer and
12 Jennifer Hunter? Do you know who they are?
13 A. Jennifer at that time was the executive director
14 of the estuaries project. Phil Colarusso is an
15 EPA employee, and Jim Latimer is EPA Narragansett
16 Laboratory.
17 Q. Okay. So it looks like the parties were
18 discussing what's going on with the nitrogen, but
19 I'll just bring your attention to the bottom. "As
20 I said at the meeting, because of the intertidal
21 nature of Great Bay it has the ability to support
22 eelgrass (despite the worst water quality in the
23 estuary) as plants get adequate light at low

1 time? And I'll draw your attention to the
2 chlorophyll-a trends at Adams Point chart, which
3 has a 1974 to '81 at a certain level, and a 1997
4 to 2004 level.
5 A. Right. And the caption reads, "No apparent
6 change." Right?
7 Q. Oh, you're right. It does read, "No apparent
8 change."
9 A. I would agree with that based on my visual
10 observation.
11 Q. Okay. Well, thank you.
12 MR. HALL: That is marked as exhibit what?
13 (Reporter responds.)
14 MR. HALL: Could you please mark it as
15 Exhibit 32?
16 (Exhibit 32 marked.)
17 Q. This whole issue of transparency and where it's
18 important and what's affecting eelgrass growth
19 apparently is being looked at pretty carefully,
20 and I'd like to show you an e-mail. It's an
21 e-mail entitled, "Nitrogen criteria," Fred Short
22 to Phil Trowbridge, dated January 17, 2008.
23 You're not a recipient of this, but I'm wondering

1 tide."
2 This issue of eelgrass getting adequate light
3 at low tide despite the transparency level
4 currently there, do you recall discussions on
5 that?
6 A. I don't recall these, but yes, I do recall
7 discussions.
8 Q. Do you recall what the conclusion of that
9 discussion, those discussions were? Do the
10 eelgrass get adequate light at low tide to support
11 their growth?
12 A. Well, I believe the discussions were that the,
13 that is a factor in eelgrass existence and growth
14 in Great Bay is that it, in fact, it's shallow
15 enough so eelgrass floats at low tides.
16 Q. So is that different than, say, the Piscataqua
17 River where the, it maybe doesn't get as shallow
18 where the eelgrass are growing?
19 A. Yes.
20 Q. So Great Bay would be treated for that factor
21 differently than, say, the Piscataqua River, or
22 should be?
23 A. Yes.

1 Q. Okay. Okay. Now here's a point of confusion on
2 my part. If Fred Short, the eelgrass expert, is
3 saying plants get adequate light at low tide, why
4 are we developing a nutrient criteria for
5 transparency in Great Bay if they get adequate
6 light at low tide?
7 A. Again, my recollection is that the question that
8 we were batting around was: Why does eelgrass
9 exist at all in Great Bay, given the transparency
10 conditions? And the thought was, at the time is
11 that the shallowness of the bay and the low-tide
12 situation were a factor in the existence of
13 eelgrass. And that -- that would make the
14 transparency all the more critical because it's,
15 it's light over time that, that eelgrass requires
16 to grow. And light over time is a, integrates
17 both the low-tide and the high-tide conditions.
18 Q. But apparently whatever light it gets is adequate
19 at low tide. That's what Dr. -- is there anybody
20 that's ever -- to your knowledge, is there anybody
21 that's ever given a technical opinion on eelgrass
22 for Great Bay that concludes the existing
23 transparency level in Great Bay is insufficient to

1 asked that question. He answered it.
2 Q. If you can answer the question.
3 A. Again, I'll give you my, my simplified conceptual
4 model.
5 Q. Please.
6 A. And that is that eelgrass requires light
7 integrated over time. And the conclusion was that
8 eelgrass has declined in several areas of Great
9 Bay, and that that can be related to the light
10 situation. And that the light situation can be
11 related -- the change in the light situation over
12 time -- and that that can be related to change in
13 nitrogen.
14 Q. Okay.
15 A. I'm not sure that DES in our guidance document, I
16 don't believe that we concurred with Fred Short's
17 conclusion that the low-tide situation was,
18 provided adequate light for eelgrass growth.
19 Q. Okay. We looked at some State of the Estuaries
20 reports, right? And we looked at some eelgrass
21 charts in those State of the Estuaries reports,
22 correct?
23 A. Yes.

1 support eelgrass growth? Have you ever seen that
2 expert opinion from Fred Short?
3 A. That's -- the conclusion of the 2000 guidance
4 document is that the existing transparency level
5 is insufficient to support eelgrass growth and,
6 therefore, through a series of analysis, there
7 should be limits on nitrogen.
8 Q. All right. Well, Paul, I'm not trying to give you
9 a hard time, but if -- I know what the 2009
10 document says. What I'm reading, and suffice it
11 to say that Fred Short has got a half dozen of
12 these same exact statements that he's made in
13 phone logs to EPA, I mean, I suspect he's made
14 this statement to everybody. He made it to Tom
15 Gallagher at the meeting. "The light transmission
16 in Great Bay is fine. They get enough light at
17 low tide."
18 What I'm wondering is if the eelgrass expert
19 for Great Bay keeps saying plants get adequate
20 light at low tide and the eelgrass are there and
21 growing, what was the technical basis for
22 concluding that that position was incorrect?
23 MR. MULHOLLAND: Objection. You already

1 Q. And up through the time period, I'll pick 2000 to
2 2004, the eelgrass populations were considered
3 healthy in those reports, correct?
4 A. Yes.
5 Q. Okay. So the eelgrass were healthy during that
6 time frame. Whatever transparency was occurring
7 in Great Bay was sufficient to maintain healthy
8 eelgrass, correct?
9 A. Yes.
10 Q. Okay. Do you know of any information that shows
11 transparency changed significantly after 2004 in
12 Great Bay such that it caused a decline in
13 eelgrass?
14 A. No. But I'm pretty sure that that was not the
15 question that was examined --
16 Q. Okay.
17 A. -- in making determinations about the biological
18 integrity of the bay relative to water quality
19 standards.
20 Q. Let me ask it a different way, then. Whatever
21 transparency level existed in Great Bay from 2000
22 to 2004, that was a sufficient transparency level
23 to allow eelgrass growth, correct?

1 A. Yes.
2 Q. Okay. So if I were looking at the narrative
3 criteria and -- by the way, is there, is there any
4 way I could look at this narrative criteria and
5 know I should be controlling a transparency level
6 based on this narrative criteria?
7 A. No, not on the face of it.
8 Q. Yeah. That's kind of why you developed a numeric
9 water quality criteria, right?
10 A. Yes.
11 Q. So in terms of narrative criteria compliance, the
12 transparency level that was present in the bay --
13 I'll pick my range again -- 2000 to 2004 for Great
14 Bay, not talking about anywhere else in the
15 system, but that that transparency level would be
16 considered compliant with the narrative criteria
17 for Great Bay, right?
18 A. Yes.
19 Q. Okay.
20 A. Yes. Now, I may be wrong, but I don't believe
21 that this part of the standards is the part that
22 was applied in the listing of Great Bay.
23 Q. Well, there were different parts that would apply.

1 There was a biological impairment part.
2 A. Right.
3 Q. And, I mean --
4 A. That's my recollection.
5 Q. -- the one -- let's make sure you and I get our
6 jargon correct on this one. You can determine
7 something is biologically impaired without
8 determining what the cause of it was, right?
9 A. That's correct.
10 Q. And the transparency numbers that came out were
11 kind of determined to be the cause of the
12 biological impairment eventually?
13 A. Yes, yes.
14 Q. Right. And what I was trying to ask a question on
15 is -- okay. If it was the cause of the
16 impairment, a fair thing to do would be for me to
17 compare, for example, the transparency level
18 present in 2000 to 2004 with maybe a transparency
19 level present in 2008 and see whether or not it
20 had changed significantly; and if it had --
21 A. Yes.
22 Q. -- then it would be fair to say that could have
23 been the cause of the eelgrass decline?

1 A. Yes.
2 Q. If it hadn't changed, then it wouldn't be fair to
3 say that that was the cause of the eelgrass
4 decline, right?
5 A. Yes.
6 Q. I'm going to -- did we mark that one yet as
7 Exhibit --
8 MR. LUCIC: I don't believe so.
9 MR. HALL: What are we up to,
10 thirty-something?
11 MR. LUCIC: Thirty-three, I believe.
12 MR. HALL: Thirty-three.
13 (Exhibit 33 marked.)
14 Q. Before I go to the question on numeric criteria,
15 we're looking at an analysis that Phil Trowbridge
16 did previously in -- oh, heck, what was -- it was
17 in the middle of -- it was June of -- February of
18 2007. All right. In February of 2007
19 Mr. Trowbridge looks at these various factors
20 affecting light availability and impacts on Great
21 Bay and doesn't really see an algal connection,
22 chlorophyll-a connection to causing the impact.
23 We covered that before. I think you pointed out

1 the "no apparent change" quote at the top.
2 Can you please tell me whether anybody showed
3 you any new information from the time frame that
4 Phil Trowbridge did that analysis to the time
5 frame when the numeric criteria came out that
6 showed that the nitrogen had actually caused a
7 significant change in plant growth and then that
8 caused a change in the transparency level? Do you
9 recall any data that showed that?
10 A. I would have to refer you to the 2009 guidance
11 document and the data behind that. There was -- I
12 can -- I am sure that there was a very substantial
13 amount of analysis done between February 2007 when
14 this was written and the, and when the guidance
15 document was finalized.
16 Q. Let me just ask you your recollection. Do you
17 recall anybody coming into your office and saying,
18 "Paul, look at the chlorophyll-a level in 2004 and
19 it quadrupled by the time 2008 occurred and look
20 at how significantly that affected light
21 transmission in the system"? Do you ever recall
22 anybody coming into your office and showing you an
23 analysis like that?

1 A. I do not. But I do recall a number of discussions
2 concerning the dependency of eelgrass on light
3 transmission and being certain that eelgrass
4 depends on light transmission for its existence.
5 Q. Does that mean nitrogen caused it?
6 A. No.
7 Q. Do you recall that a Dr. Morrison did a detailed
8 study of light transmission in Great Bay under a
9 federal research project?
10 A. Yes.
11 Q. Okay. That was a prior exhibit in Dr. Short's
12 deposition. I'll just -- I can either show you
13 the report or I could just ask you your basic
14 recollection. Do you recall whether or not that
15 report reached any different, significantly
16 different conclusions on the causes, on the
17 factors affecting light transmission in Great Bay
18 than Mr. Trowbridge reached in his conclusions in
19 that 2007 analysis?
20 A. I don't believe it did, but my recollection is
21 that Dr. Morrison's report went into more detail
22 about the partitioning of the, of the effects on
23 light transmission.

1 Q. All right. And I'm going to just show you the
2 report just to make sure we're both talking about
3 the same report. It's --
4 A. Do you want to put a number on this?
5 Q. It was Short Exhibit No. 25. Is that the same
6 report, that Dr. Morrison report we were just
7 talking about?
8 A. I believe so, yes. I recognize the figures.
9 Q. Yeah.
10 A. That I recall, yes.
11 Q. Okay. And do you recall whether or not DES
12 developed any information that showed the results
13 of Dr. Morrison's analysis were in error?
14 A. No.
15 Q. Okay.
16 A. No. I recall there being some issues with the
17 hyper-spectral data but they didn't, they didn't
18 result in invalidating the report.
19 Q. Okay. Thank you. Where was I? I'm going to show
20 you a -- can we take a five-minute break? Do you
21 mind?
22 A. Sure.
23 MR. MULHOLLAND: Let's go.

1 (Recess taken; 10:43-10:49 a.m.)
2 Q. Mr. Currier, do you recall that after those
3 initial analyses were done by Mr. Trowbridge and
4 then the subsequent analysis was done by Dr.
5 Morrison on the factors affecting transparency,
6 that Phil Trowbridge completed further analyses
7 indicating that nitrogen was, in fact, the cause
8 of changes in transparency?
9 A. Well, all of that is memorialized in the 2009
10 guidance document.
11 Q. I'm talking about documentation that was presented
12 to the Technical Advisory Committee. Do you
13 recall him presenting graphs to the Technical
14 Advisory Committee on, well, basically similar
15 to -- this is Short Exhibit 26. Similar to that
16 chart?
17 A. Yes, I do.
18 Q. And --
19 A. Well, I recall this chart and it was presented in
20 various forms.
21 Q. Okay. And that chart purports to indicate that
22 the nitrogen is what's causing changes in
23 transparency in the system, doesn't it?

1 A. It shows a relationship between, what is it,
2 median total nitrogen in various parts of the bay
3 and median light attenuation coefficients in
4 various parts of the bay.
5 Q. That's a regression, correct?
6 A. Yes.
7 Q. Does that analysis prove causation?
8 A. No, it does not.
9 Q. And that was Short Exhibit 26 we were referring
10 to. By the way, just as a side note, and I don't
11 want to walk you through all the Technical
12 Advisory Committee notes because that's a tour of
13 history you don't necessarily want to have to talk
14 about. But the Technical Advisory Committee had
15 reached the same conclusion that these kind of
16 analyses don't show causation; they just show a
17 correlation. Do you recall the Technical Advisory
18 Committee making that observation? Just --
19 A. No.
20 Q. You don't recall it. Okay. So I have to show you
21 the meeting minutes if I wanted to refresh your
22 recollection.
23 A. But I would, I would, I would believe that.

1 Q. Okay. Because it's a true statement?
2 A. Right.
3 Q. Right. Can I show you a document that I just
4 received today? So I'm as new at looking at this
5 as you are.
6 MR. KINDER: Can I just make a
7 representation that Evan provided us with this
8 document that's about to be shown to Paul this
9 morning. And as I understand it, it's part of the
10 production that the state is continuing to give to
11 us in response to requests for production.
12 MR. MULHOLLAND: That is in response to the
13 document subpoena for Ted Diers.
14 MR. KINDER: Oh, okay.
15 Q. This is apparently an e-mail exchange. You're
16 included in the second e-mail below from Gregg
17 Comstock. Who is Gregg Comstock?
18 A. He was the water quality planning section
19 supervisor. He worked directly for me.
20 Q. He worked for you?
21 A. And Phil worked for him.
22 Q. Okay. It says, "Hi all. Al Basile just called.
23 To avoid a potential lawsuit with CLF EPA has

1 the state list Great Bay as nutrient impaired?
2 A. I don't remember the details, but yes, for the --
3 this would have been the 2008 list. The ultimate
4 result was listing for, for multiple assessment
5 units in the Great Bay Estuary.
6 Q. Okay.
7 MR. HALL: Let's just mark that as
8 Exhibit 34.
9 MR. MULHOLLAND: John, do you want to mark
10 the e-mail or --
11 MR. HALL: The whole package.
12 MR. MULHOLLAND: Okay.
13 (Exhibit 34 marked.)
14 Q. Mr. Currier, you indicated that this analysis of
15 light attenuation versus total nitrogen at trend
16 stations, that this analysis doesn't prove
17 causation, correct?
18 A. Yes.
19 Q. Okay. So is this analysis sufficient in your mind
20 to determine that nitrogen is causing a violation
21 of the narrative standard in that it doesn't
22 demonstrate causation?
23 A. It's not sufficient, no.

1 decided that Great Bay should be listed for
2 nitrogen."
3 Do you recall this e-mail?
4 A. Not specifically, no. I recall conversations with
5 EPA around the listing issue.
6 Q. And that CLF was threatening a lawsuit unless you
7 took a specific action to list Great Bay as
8 nutrient impaired?
9 A. I recall a significant desire by CLF that Great
10 Bay, certain -- that certain assessment units in
11 Great Bay be listed, yes.
12 Q. At this point in time I take it the department had
13 not considered Great Bay to be nutrient impaired?
14 A. We had not assessed Great Bay for nutrients prior
15 to that time.
16 Q. Not assessed for nutrients, what does that mean?
17 A. Again, referring to the CALM. The CALM details
18 how we, how we do assessments. And we had not,
19 because the nutrient criteria were in the process
20 of development, the procedures for making those
21 assessments for the estuary had not been
22 developed.
23 Q. Okay. And subsequent to this e-mail coming in did

1 Q. Okay. Thank you for that clarification.
2 A. Necessary, perhaps.
3 Q. Actually -- no. I won't ask any further questions
4 on that. We need to move on to some other topics
5 because there's more to cover.
6 I'd like to show you an e-mail that -- it
7 came from USEPA and it was comments on the -- it
8 was a comment document on a draft numeric
9 criteria. And it's an exchange again with Al
10 Basile back and forth to Phil Trowbridge. You're
11 copied on it, so is Gregg Comstock, and commenting
12 on the draft report. I'd like to draw your
13 attention to the last sentence of the end of the
14 first page. It says, "We strongly encourage you
15 to work as expeditiously as possible to ensure
16 that the criteria are finalized and ultimately
17 adopted as water quality standards."
18 I think we covered this earlier. That was
19 consistent with your understanding as to the, what
20 the state was going to do; they were going to
21 finalize the draft criteria and then adopt them
22 into water quality standards?
23 A. Yes.

1 Q. You have other numeric water quality standards
2 already adopted in state law, right?
3 A. Yes.
4 Q. Do you have any numeric water quality standards
5 that you -- to your knowledge are there other
6 numeric water quality criteria that the state has
7 and utilizes in the permitting or impairment
8 listing process that are not adopted into your
9 water quality standards?
10 A. Yes.
11 Q. Okay. What are they?
12 A. Well, I can give you an example.
13 Q. Please.
14 A. For rivers and streams we use indices of
15 biological integrity which are based on the
16 multi-metric indices.
17 Q. Okay.
18 A. And they're numeric.
19 Q. Do those indices control a specific pollutant
20 level?
21 A. No, they do not.
22 Q. Are there any specific pollutant level criteria,
23 numeric criteria that you utilize for the 303(d)

1 that document established a specific numeric
2 criteria for nitrogen?
3 A. Yes, it does.
4 Q. Did it do that both for dissolved oxygen and for
5 light transmission?
6 MR. MULHOLLAND: Objection. Attorney Hall,
7 there's a page in there that summarizes the
8 numbers. I think it might be more helpful than
9 trying to rely on his memory just to be accurate.
10 There's a lot of numbers in there.
11 MR. HALL: Oh, yeah. I'm not going to --
12 Evan, I'm not going to ask him about the specific
13 numbers. I'm just going to ask him what numbers
14 were set forth, what values were, had specific
15 numeric criteria.
16 Q. So we have a specific numeric criteria for
17 nitrogen, correct?
18 A. (Deponent nodded.)
19 Q. And we have a specific -- and that nitrogen
20 criteria set both for protecting DO, correct, and
21 eelgrass? Separate criteria?
22 A. Right.
23 Q. Okay.

1 process or the permitting process that are not
2 adopted into your water quality standards to your
3 knowledge?
4 A. I would have to review the CALM. Not that I
5 would -- not that I recall right off the top. You
6 can find that information in the CALM.
7 MR. HALL: Let's mark that as Exhibit 35.
8 (Exhibit 35 marked.)
9 Q. This is a copy of a transmittal letter for --
10 actually, let me back up for a second before we go
11 into the transmittal letter on the numeric
12 criteria. The June 2009 numeric criteria
13 document, that's -- do you recognize that as the
14 numeric criteria that the department developed?
15 A. Yes. It certainly looks like it.
16 Q. That was -- that was Short Exhibit No. --
17 MR. KINDER: Twenty-seven.
18 Q. -- 27. Okay. Can you please tell me what numeric
19 values were established via that document?
20 A. I would have to refer you to the document.
21 Q. Let me --
22 A. I can find it.
23 Q. Let's do it easier. Do you recall whether or not

1 A. And DO has a numeric standard, a separate numeric
2 standard.
3 Q. Right. Then we had a separate chlorophyll-a
4 standard set for DO purposes also, correct?
5 A. I'll take your word for it. I don't remember.
6 Q. There was a separate standard set for
7 transparency, correct?
8 A. Yes, yes.
9 Q. Looking at the narrative standard that the state
10 had published, I imagine many, many years ago, is
11 there any way I could look at that standard and
12 know that those specific numeric values were
13 necessary to ensure compliance with this criteria?
14 A. And you're talking about the standard --
15 Q. New Hampshire -- New Hampshire Narrative Standard.
16 A. No. Again, you would have to, you would have to
17 go to the CALM document which is, which explains
18 how the standards, the adopted rules are applied
19 in specific situations.
20 Q. Okay. With regard to the numeric values for
21 nitrogen and transparency, light penetration that
22 were adopted, or that were established in the 2009
23 document, do you recall whether or not any

1 conclusion had been reached that it was necessary
2 to apply those criteria also in the Lamprey and
3 Squamscott River to protect eelgrass?
4 A. I recall discussions about whether, for specific
5 assessment units about whether eelgrass was the
6 end point to be protected.
7 Q. Okay. And do you recall whether or not a
8 determination was made that it was necessary to
9 apply those values in the tidal rivers, in those
10 tidal rivers to ensure eelgrass restoration?
11 A. I don't recall specifically, but I do recall -- I
12 recall the conversations. I don't recall the
13 result. But you will find that in the, in the
14 305(b) report.
15 Q. If light transmission -- if light -- let me
16 rephrase this.
17 If transparency in the Squamscott and Lamprey
18 Rivers was inadequate to allow eelgrass to grow,
19 regardless of the nitrogen or chlorophyll-a level
20 present, would application of those criteria be
21 appropriate in that situation anyway?
22 A. Let me think about that. If transparency was
23 inadequate for eelgrass growth?

1 Q. Eelgrass growth, regardless of the nitrogen level.
2 A. And we had determined that eelgrass was the
3 appropriate biological end point to be protected,
4 and we determined that nitrogen was not a factor,
5 then applying the nitrogen criteria developed here
6 would not be appropriate.
7 Q. Okay. If the transparency level in the Squamscott
8 and Lamprey River were naturally low because of
9 colored dissolved organic matter and turbidity in
10 those systems, would that transparency level be
11 considered a violation of your state standards?
12 A. No. I should add that if the transparency were
13 naturally low and insufficient for eelgrass
14 propagation, the eelgrass would not be there. And
15 I don't know whether it -- what the history is, I
16 don't remember, but I'm sure of that.
17 Q. With regard to the development of the 2009
18 criteria, do you know if, has anybody ever shown
19 you an analysis that confirms chlorophyll-a is a
20 major component influencing transparency anywhere
21 in the Great Bay system?
22 A. I don't recall, but chlorophyll-a is always a
23 component and my recollection is that in general

1 is not the most significant one as we talked
2 about.
3 Q. Regarding that 2009 document also, there were
4 several individual studies done for the tidal
5 rivers, the Squamscott and Lamprey, on dissolved
6 oxygen. There was a study by Pennock. Do you
7 recall that one?
8 A. Yes.
9 Q. And there was a study by Dr. Jones on the
10 Squamscott. Pennock I believe did the Lamprey.
11 A. Lamprey. I think so, yes.
12 Q. Neither of those studies -- do you recall if
13 either of those studies showed that chlorophyll-a
14 or algal growth was the cause of low DO
15 periodically occurring in either the Squamscott or
16 Lamprey?
17 A. I don't recall what their conclusions were.
18 Q. All right. If those two studies indicated that
19 the cause of low DO was not excessive algal growth
20 in either the Lamprey or Squamscott, would it be
21 appropriate to apply the nitrogen DO-based
22 criteria from that document in the Squamscott and
23 Lamprey River?

1 A. No, it wouldn't.
2 Q. Okay. This document, the 2009 document says it's
3 using a weight-of-evidence analysis. I think
4 those words appear in there. Do you know if
5 there's anywhere in state regulations that defined
6 what weight of evidence means?
7 A. Not to my knowledge.
8 Q. Is there a guidance document that describes what
9 weight of evidence means?
10 A. Not specifically that I know of. I know that it
11 is, it is a term that is used in EPA publications.
12 Q. Have you ever seen a federal criteria document for
13 developing numeric criteria that explains this is
14 how a weight-of-evidence analysis is conducted?
15 Have you ever seen that?
16 A. No, not that I recall.
17 Q. What does weight of evidence mean?
18 A. Weight of evidence, again, my understanding, means
19 that one particular line of reasoning is not
20 relied on entirely to reach a conclusion about
21 whether or not the water quality standards are
22 violated. It's several lines of reasoning are
23 taken together and considered in order to make a

1 decision.
2 Q. Under a weight-of-evidence analysis if you've got
3 specific information on, say, Great Bay, let's
4 take that as an example, that shows nitrogen did
5 not cause a chlorophyll-a change in Great Bay, and
6 therefore, it did not impact transparency or cause
7 a transparency change, if you have that specific
8 information for Great Bay, do you use generalized
9 information for a weight-of-evidence analysis to
10 conclude the opposite occurred in the system?
11 A. Proving a negative is very difficult. I would
12 suggest to you that that specific information does
13 not exist.
14 Q. Well, didn't we -- I'm just saying, assuming that
15 you have data that shows the chlorophyll-a levels
16 did not change in the system, would you use a
17 weight-of-evidence analysis to reach a conclusion
18 that you have to regulate nutrients anyway under
19 the theory that it did cause a change in the
20 system?
21 A. No. You could not use -- if there were no change
22 in chlorophyll-a levels during a period of time in
23 which eelgrass did change, you could reach the

1 system, now, would it?
2 A. No. The data would drive the weight of evidence.
3 Q. So the data should drive the weight of evidence
4 determination?
5 A. Yes.
6 Q. Thank you. That's -- that's what I was hoping
7 should be the case.
8 A. And I trust that that is what has been
9 consistently done in the CALM.
10 Q. I won't ask a question on that. All right. We
11 covered -- we covered that the department had had
12 an understanding that it needed to adopt these
13 numeric criteria into standards and the department
14 made that statement or acknowledgment on several
15 occasions, correct?
16 A. Yes. I made that statement on several occasions.
17 Q. Okay. I mean, there's more e-mails that say so,
18 so it's not like that it's a state secret or
19 something like that. Do you recall -- do you know
20 whether or not federal, federal water quality
21 standard rules require states to adopt numeric
22 values into state law before using them in a
23 regulatory process?

1 conclusion that chlorophyll-a is not a causative
2 factor. That is one way in which you can use
3 statistical analyses. You can use statistical
4 analyses to rule things out.
5 Q. I guess the point I'm getting at with weight of
6 evidence is you don't use weight of evidence to
7 trump site-specific information that is showing
8 something is not actually occurring, right?
9 A. Actually, my understanding is that weight, the
10 weight-of-evidence approach is always used in a
11 site-specific context; that is, you want to apply
12 several lines of reasoning in this case to a
13 particular assessment unit relative to the
14 question of whether water quality standards are
15 met for a particular designated use. It's always
16 site-specific.
17 Q. All right. Well, okay. That's good. Because, I
18 mean, I understand that you could have a theory
19 that nitrogen can grow chlorophyll-a and then that
20 can adversely impact transparency. That's a
21 sequence of events that might occur. So, but
22 weight of evidence wouldn't be used to trump data
23 that showed it didn't actually occur in the

1 MR. MULHOLLAND: Objection. That calls for
2 a legal conclusion he's not qualified to give.
3 You're asking a legal question.
4 MR. HALL: I'm asking what his knowledge of
5 the applicable regulations are for the program
6 that he manages.
7 Q. So if you can answer the question, do you know if
8 the federal regulations require the state to
9 formally adopt their numeric nutrient standards
10 before they are applied in a regulatory context?
11 A. I don't believe they do.
12 Q. You don't believe they do. Okay. These numeric
13 criteria, can you tell me how they, how they were
14 subsequently used in a regulatory context?
15 A. Yes. Again, I can refer you to the CALM. That is
16 how they were used in the regulatory context.
17 Q. Were they used to identify which waters were
18 considered impaired for nitrogen and transparency
19 and DO in the Great Bay Estuary?
20 A. Yes.
21 Q. Okay. Were they used to do calculations as to
22 what the necessary effluent limitations needed to
23 be to ensure compliance with the numeric values?

1 A. No.
2 Q. No?
3 A. The process for assessment is completely separate
4 from the permitting process.
5 Q. Ah. Did DES conduct analyses that were designed
6 to identify the allowable discharges of nitrogen
7 from the wastewater plants in order to ensure
8 compliance with the standards?
9 A. There was several published -- or not published --
10 by DES, analyses which examine various scenarios
11 for discharge relative to compliance in various
12 parts of the bay with these standards, yes. I
13 believe, I believe it's -- it was -- I don't know
14 what it's called now. At one time it was called
15 the wasteload allocation.
16 Q. So the short answer to my question is yes, that
17 DES did take these numeric criteria and perform a
18 series of calculations to determine what were the
19 necessary effluent limitations to ensure the
20 compliance?
21 A. We ran multiple scenarios as to assist both the
22 municipalities and EPA in the, in future permit
23 processes.

1 Q. Okay. So the purpose of the analyses was to
2 identify potential effluent limitations with the
3 facilities? One purpose.
4 A. Yes.
5 Q. Okay. And that analysis was provided to EPA?
6 A. Yes, and to the municipalities.
7 Q. Do you know at what point in time the
8 municipalities were given an opportunity to
9 formally object to or challenge the conclusions on
10 the necessary numeric values that were contained
11 in the June 2009 document?
12 A. I can tell you the municipalities fully
13 participated in the management committee process
14 and all had the opportunity to fully participate
15 in the Technical Advisory Committee process from
16 its inception.
17 Q. But that wasn't my question. My question is: Can
18 you tell me at what point in time the communities
19 had an opportunity to formally object as to the
20 development and application of these values to
21 determine impairment listings and potential
22 effluent limitations, to object to the state's use
23 of these and development of them?

1 A. That would -- well, the CALM is made available for
2 public comment before, before each listing cycle.
3 Q. Is the CALM a regulation?
4 A. No.
5 Q. Okay. So how do I -- if I don't like what you've
6 done in the CALM, where do I go to object to this?
7 MR. MULHOLLAND: Objection. That's a legal
8 question. He answered it already.
9 Q. Do you know -- do you know if there's a right to
10 appeal the CALM?
11 MR. MULHOLLAND: Objection. That's also a
12 legal question.
13 MR. KINDER: No. It isn't a
14 legal question.
15 MR. MULHOLLAND: It's exactly a legal
16 question.
17 MR. HALL: He runs the program, so...
18 MR. KINDER: What's his understanding?
19 MR. MULHOLLAND: You can ask me what my
20 understanding was and I would tell him. That's a
21 legal question.
22 MR. KINDER: Well, what's his
23 understanding?

1 MR. MULHOLLAND: He can answer if he wants.
2 A. Certainly opportunity. We solicit comments on the
3 CALM and we solicit comments via various
4 mechanisms. And the intent and the desire is that
5 the details of the CALM receive the broadest
6 scrutiny as possible before the CALM is used for
7 assessments.
8 Q. I'd like to show you some -- before that 2009
9 document was developed, would Great Bay have been
10 classified as impaired, Great Bay or any part of
11 the Great Bay Estuary been classified as impaired
12 for transparency?
13 A. I don't believe so.
14 Q. What about for nitrogen causing adverse impacts on
15 transparency?
16 A. No.
17 Q. What about chlorophyll-a causing DO violations?
18 A. No.
19 MR. SERELL: We need to get oral answers to
20 those. I can't hear him.
21 A. Oh, no.
22 MR. HALL: He's been saying no.
23 A. I've been saying it quietly.

1 MR. SERELL: I'm sorry.
2 MR. HALL: They were quiet noes.
3 Q. So based on the 2009 document, the division felt
4 it was appropriate to utilize those values to make
5 impairment determinations?
6 A. Yes.
7 Q. Okay. Once those impairment determinations were
8 made, can you tell me what regulatory processes
9 would be triggered? Like do you have to do a TMDL
10 for the system?
11 A. Well, as a requirement, no. As a -- but certainly
12 the NPDES permit process, the limits in permits
13 are substantially driven by water quality
14 standards as they apply to specific assessment
15 units, which is, which is what these nutrient
16 criteria do.
17 Q. So those nutrient criteria would be used in the
18 permitting process; that was one of their
19 purposes?
20 A. They would be used by EPA in drafting permits,
21 yes.
22 Q. Is EPA free to ignore those nutrient criteria once
23 they've been developed and used to establish

1 applicable to the Exeter facility?
2 A. To be honest with you, I'm out of touch by a year
3 so I don't know whether that permit has been
4 drafted or not.
5 Q. Oh, I thought Exeter came out during --
6 A. Maybe it did. Maybe it did. This is --
7 Q. I'm pretty sure it did.
8 A. Certainly a draft on the street.
9 Q. So you saw draft permits that utilize these
10 numeric nutrient criteria values as the basis for
11 calculating effluent limitations?
12 A. Yes.
13 Q. Did you tell EPA that was inappropriate to do
14 that?
15 A. No.
16 Q. Did you tell EPA it was appropriate to do it?
17 A. I don't recall doing either one.
18 Q. We might have some e-mails that might say that.
19 A. Probably.
20 Q. Probably do. Right. In your opinion would you
21 say that the 2009 document defined, changed, or
22 established, established a level of protection to
23 be applied for nutrient water quality attainment

1 impairment listings?
2 A. My understanding is EPA can do anything they want
3 to in permits.
4 Q. I'm saying from a regulatory context. You've been
5 managing this program for a long time. You use
6 those specific nutrient values to establish this
7 is the level of water quality that constitutes an
8 impairment. If you're worse than this, does EPA
9 have any discretion to ignore that when issuing
10 the permits for the facilities that discharge to
11 the system?
12 A. I believe EPA's obligation is to use all, all
13 available information in writing permits, and they
14 would, in fact, use these.
15 Q. They would have to use it, in fact, wouldn't they?
16 A. I believe so.
17 Q. Right.
18 A. Yeah.
19 Q. Okay. That's a correct answer. They would have
20 to use it.
21 Do you know whether or not EPA, in fact, did
22 use these values as a basis for calculating more
23 restrictive effluent limitations possibly

1 decisions?
2 A. Yes.
3 Q. Did the 2009 document define, change, or establish
4 the magnitude or concentration of allowable
5 pollutant levels in the system?
6 A. Yes.
7 Q. Did it define the, establish or change the
8 allowable duration of those pollutant
9 concentrations in the system?
10 A. I believe so.
11 Q. Did it --
12 A. It was an annual mean.
13 Q. It was an annual mean. By the way, on that point,
14 do you know if --
15 A. Or a median maybe.
16 Q. A median.
17 A. Yeah.
18 Q. Yeah. Do you know if the state ever told EPA it
19 was appropriate to apply an annual mean nutrient
20 criteria under seven-day once-in-ten-year low-flow
21 conditions to calculate permit limits?
22 A. I don't recall specific discussions on that.
23 Q. Is an annual mean nutrient concentration, does

1 that duration of exposure, annual mean, have
2 anything to do with a seven-day once-in-ten-year
3 low-flow condition?
4 A. I'm sure there's a connection, but it would not be
5 one that would be straightforward.
6 Q. Well, if it was an annual mean, shouldn't it be
7 applied under some type of annual mean condition?
8 A. Yes.
9 Q. Okay. That's what I was getting at.
10 A. Yes, yes.
11 Q. Thank you.
12 A. And that would -- I agree. That would need to be
13 factored in.
14 Q. In terms of those nutrient criteria and other
15 transparency and chlorophyll-a values, what
16 frequency of compliance was established by that
17 2009 document? Is it annual mean once in ten
18 years, once in five years, once in three years; do
19 you know?
20 A. In general the frequency of compliance for water
21 quality standards is all the time. That, however,
22 is not practical.
23 Q. Okay.

1 A. If you ask EPA, I believe that's the answer you
2 will get.
3 Q. This document itself used multiyear long-term
4 averages to calculate these values, correct?
5 A. That's right.
6 Q. So if you used multi-year long-term averages to
7 calculate the allowable value, would it be
8 appropriate scientifically to apply it as a "not
9 to exceed at any time"?
10 A. Purely opinion, probably not.
11 Q. I mean, the two analysis periods wouldn't be
12 consistent --
13 A. Yes.
14 Q. -- with each other, would they?
15 A. That's correct.
16 Q. For the water bodies that this was designed to
17 apply to, I mean, this, the June 2009 numeric
18 criteria designed to apply to, the impairment
19 classifications changed after this document came
20 out as a result of the numbers in this document,
21 correct?
22 A. Right.
23 Q. Okay. Do you know if the pollutant levels in

1 those water bodies had changed before and after
2 this document had come out?
3 A. I believe the change was from unassessed to
4 assessed with a determination as to whether or not
5 water quality standards were met relative to
6 specific designated uses.
7 Q. But the actual pollutant levels that were
8 occurring before and after this document hadn't
9 changed; it was just the document got applied to
10 those pollutant levels?
11 A. That's correct.
12 Q. And this document has yet to be proposed for
13 rulemaking by the state, correct, to your
14 knowledge?
15 A. This document wouldn't be, is not appropriate for
16 rulemaking.
17 Q. Would the numeric criteria generated by that
18 document be appropriate for rulemaking?
19 A. Yes.
20 Q. That document merely -- that document explains how
21 the numeric criteria are calculated, correct?
22 A. Yes.
23 Q. So that document produced the numeric criteria,

1 correct?
2 A. Yes.
3 Q. If I were looking at the narrative, the statement
4 of New Hampshire narrative criteria, is there any
5 way I could look at this statement and know that
6 those were the specific numeric values that needed
7 to be attained as to have such concentrations that
8 would not impair designated uses?
9 A. No. That's the reason why we write a CALM.
10 Q. It's also the reason why you generate a numeric
11 nutrient value, right?
12 A. Right.
13 Q. In terms of specific changes that happened before
14 and after the issuance of the document, is it your
15 recollection that eelgrass impairments in Great
16 Bay were originally identified as unknown in the
17 department's 2008 impairment assessment?
18 A. I don't recall.
19 Q. I'd like to show you, this is a cover letter that
20 you used to transmit I believe the 2000 --
21 actually, it was to transmit the 2009 updated
22 numeric -- I'm sorry -- the 2009 updated
23 impairment listings to EPA. It's a letter dated

1 August 14, 2009 to Al Basile. Do you recall
2 sending this letter to EPA?
3 A. Yes.
4 Q. Okay. And can you tell me who Al Basile is?
5 A. He's basically the person that deals with New
6 Hampshire relative to water quality standards and
7 the 305(b) report and the 303(d) list.
8 Q. The impairment listings and the water quality
9 standards person?
10 A. Right. He's our main point of contact.
11 Q. And there's a statement in the middle paragraph,
12 second paragraph, "DES identified these
13 impairments using the numeric nutrient criteria
14 that DES published for Great Bay Estuary in
15 June 2009 and updated eelgrass cover assessments
16 that reflect the new data from 2006 to 2008." Is
17 that a correct statement of how the revised
18 impairment listing was done?
19 A. Yes.
20 Q. Okay. And that's consistent with the discussion
21 we just had?
22 A. Right.
23 MR. HALL: Let's just mark that as

1 there's some discussion about EPA looking at the
2 letter. Al Basile is looking at the letter and
3 Ann Williams is making a comment on it. It says,
4 "I've only glanced at it briefly," so it's the
5 letter that we just --
6 A. That's Ann's comment, yeah.
7 Q. So the prior exhibit that we just talked about.
8 "One thing that caught my attention was Paul's
9 reference in the cover letter to numeric nutrient
10 criteria that DES published in 2009. Because this
11 criteria have not been adopted into the water
12 quality standards submitted to EPA for review and
13 approval, it's important to make clear that these
14 are not formal criteria, rather are based on DES's
15 interpretation and application of existing
16 narrative criteria."
17 Do you recall having discussion with EPA that
18 you needed to characterize, that the state needed
19 to characterize its numeric nutrient criteria as a
20 narrative criteria interpretation if you wanted to
21 use it?
22 A. Yes. I believe the word was translator.
23 Q. And do you recall why they told you that? Or,

1 Exhibit 36.
2 (Exhibit 36 marked.)
3 Q. And if I can bring your attention to the
4 attachment, if you could just hand it back,
5 there's attached a Table 1 that has a, various
6 assessments and impact zones and it has a column
7 that says, "New impairments"?
8 A. Yes.
9 Q. So the column that says, "New impairments," these
10 were all the new impaired waters and causes of the
11 impairments that were added to your impaired
12 waters list as a result of the 2009 numeric
13 criteria document?
14 A. Yes.
15 Q. I'd like to show you -- I don't have any further
16 questions on that one. I'd like to show you
17 another e-mail, and it's another Al Basile -- and
18 we marked that last exhibit, right?
19 (Reporter responds.)
20 Q. Okay. And basically your e-mail is the last one
21 in the string. It starts at the bottom. It says,
22 "Here is -- hi, all. Here is a letter of
23 requested provisions to the 303(d) list." And

1 actually, let me back up. Who suggested to the
2 state that it was a good idea to call a numeric
3 nutrient criteria a narrative translator?
4 A. I believe that first showed up in our -- we have a
5 document that is a plan for adoption of nutrient
6 criteria by water body type, and I believe it
7 showed up in there. That was -- that was how we
8 proposed to do it.
9 Q. Okay.
10 A. And I don't remember the date on that document,
11 but it might have been 2004, the first one.
12 Q. Okay. In terms of differences in regulatory
13 effect, what's the difference in regulatory impact
14 between calling those numeric nutrient criteria
15 versus calling them a narrative criteria
16 translator?
17 A. The one that I'm most aware of is bound to the
18 Clean Water Act. The process for water quality
19 standards provides that, for EPA to approve them,
20 and once they are approved they become enforceable
21 as federal regulation, and a translator because
22 it's not adopted by, under the state rulemaking or
23 statutory process is not directly federally

1 enforceable as federal rule.
2 Q. Okay. Let me reword the question. Actually, who
3 told you that was true?
4 A. I'm not sure, but Ann Williams may have.
5 Q. So EPA is the one that came up with the idea of
6 calling this a narrative criteria translator so it
7 could be used immediately in the 303(d) process to
8 generate impairment listings?
9 A. This is -- again, this is my understanding based
10 on written EPA guidance, which is nationwide, is
11 that in our conversations with the Region One
12 folks is that this was an acceptable way from
13 EPA's point of view for us to move in the
14 direction of adopting nutrient criteria.
15 Q. Okay. Now, let's change -- put yourself in the
16 position of the regulated community, so you're
17 sitting in my seat, or you're sitting in Exeter's
18 seat. Whether or not you call that a narrative
19 criteria translator or you call it a numeric
20 nutrient criteria, does that change whether or not
21 you declare the water body impaired by nutrients
22 based on the information in that document?
23 A. No.

1 Q. Does that change how they calculate whether or not
2 the existing loadings of nitrogen or phosphorus
3 are acceptable to the water body depending upon
4 how you call that, what you call that document?
5 A. No.
6 Q. So in terms of regulatory effect on the
7 regulatory, the impact on the regulatory
8 community, calling it a narrative translator
9 versus a numeric criteria has no change in
10 regulatory impact. It only has a change in
11 whether or not you believe you need to publish it
12 as a new water quality standard; is that your
13 understanding?
14 A. Yes. Although I would argue that a translator
15 actually provides greater flexibility in its
16 application in the regulatory context, because the
17 evidence can be provided that would allow for a
18 change in a translator without going through the
19 rulemaking process.
20 Q. So long as the translator were not being applied
21 as if it were a strict numeric criteria, correct?
22 A. My understanding is two things. The agency is
23 obligated to use the best information available in

1 all -- this is EPA, it's not -- all the
2 information we can get our hands on in order to
3 make listings, in order to determine impairment
4 status, and then EPA, who is the permit writer for
5 New Hampshire, is obligated to use all the
6 information available to it in order to write
7 permits.
8 Q. All right. So let me --
9 A. And that's true independent of whether something
10 is a rule or not.
11 Q. Okay. So let me just give you a quick example.
12 Suppose I had data on the Squamscott River that
13 showed that the chlorophyll-a level had little or
14 nothing to do with the level of transparency
15 present in that river. All right. Then that
16 numeric translator should not be applied in the
17 Squamscott River for transparency, should it?
18 A. That's right.
19 Q. Okay. If this was considered a numeric criteria
20 and I presented that same information, would that
21 information change the numeric criteria?
22 A. Repeat that again. I'm not sure.
23 Q. If this were being applied as a numeric nutrient

1 criteria --
2 A. As a rule?
3 Q. As a rule, would that same information be
4 considered to justify nonapplication of the
5 numeric nutrient criteria, or would I have to
6 change the numeric nutrient criteria?
7 A. You'd have to change the criteria. Yes, you'd
8 have to change the criteria.
9 Q. You'd have to change it.
10 MR. HALL: Can we mark that as Exhibit 37?
11 (Exhibit 37 marked.)
12 Q. As a result of that numeric nutrient criteria
13 document, whether implemented as a narrative
14 translator or a formal numeric nutrient criteria,
15 does that document trigger the need to reduce
16 loads of nitrogen going into the water bodies that
17 were now identified as impaired due to nitrogen in
18 the Great Bay Estuary?
19 A. Yes.
20 Q. Thank you. And would that document, would that
21 document and the impairment listings based on it
22 normally trigger a TMDL process to ensure that
23 both point and nonpoint source loads can be

1 reduced going into the system?
2 A. Yes.
3 Q. And when would these -- would more restrictive
4 limits be required at the time of permitting as a
5 result of using that numeric nutrient criteria to
6 identify waters as impaired for nutrients?
7 A. Well, that would depend on the results of the
8 TMDL, but the expectation would be yes.
9 Q. Suppose the TMDL wasn't done yet. The TMDL is not
10 completed yet. Does the impairment listing then
11 trigger nonetheless the need to impose reductions
12 on the pollutants causing and contributing to the
13 impairment that's been identified?
14 A. Yes, it does.
15 Q. Okay. And that's a federal regulatory
16 requirement, right?
17 A. Yes.
18 Q. As a result of being listed as impaired due to
19 nutrients, right?
20 A. That's correct.
21 Q. What about, would that same impairment listing and
22 designation based on that June 2009 document
23 trigger the need for more restrictive stormwater

1 A. It's on the Cocheco.
2 Q. I'm going to draw your attention to a statement at
3 the bottom where it says, "Greg and Phil are
4 working on more detail, but I think the number for
5 Farmington desire will need to be 3 nitrogen,
6 3 milligrams total nitrogen."
7 What -- can you tell me what that nitrogen
8 limit is all about and why you were thinking a
9 three-nitrogen limit was necessary for Farmington?
10 A. I can tell you it was based on Phil's numbers
11 and -- no, not the June document.
12 MR. KINDER: Oh.
13 A. The wasteload allocation --
14 Q. Actually --
15 A. -- is what it was based on.
16 Q. When you say Phil's numbers, let's just -- because
17 I could have --
18 A. Phil has lots of numbers.
19 Q. I could have given you the wasteload allocation
20 documents first and then maybe I would have had an
21 easier sequence on this, but I just came along
22 this one first. So when you say Phil's numbers,
23 Phil was developing some wasteload allocation

1 permitting requirements to reduce nutrient loads
2 from those point sources into the system?
3 A. Yes. Although, that, my understanding is a little
4 bit hazy on that. My understanding is that there
5 are federal regulations which require control of
6 point sources as a priority over nonpoint sources.
7 Q. Okay. I'm going to show you just a series of kind
8 of e-mails, permitting documents, things like
9 that, some of the, some of the e-mails on the
10 wasteload allocation information that you said
11 that DES had been developing. I believe Phil
12 Trowbridge was developing that analysis.
13 A. Yes.
14 Q. First is an e-mail that's dated March 2009, Draft
15 Summary of Farmington Wastewater Treatment
16 Facility Situation. And the original message was
17 from you to Gregg Comstock and Phil Trowbridge,
18 Harry Stewart regarding Farmington.
19 MR. MULHOLLAND: Thanks.
20 MR. HALL: We did mark all the prior
21 exhibits I handed Mr. Currier, right? Okay.
22 Thank you.
23 Q. Where is Farmington located?

1 values in order to achieve the nitrogen numbers
2 contained --
3 A. Yes.
4 Q. -- in the June 2009 criteria document, right?
5 A. Yes.
6 Q. Okay. And so Phil came up with some calculations
7 and the initial calculation looked like they might
8 need to meet three nitrogen, right?
9 A. That's correct.
10 Q. And was that a more restrictive value than they
11 were currently discharging?
12 A. Yes.
13 Q. Okay. And would that have had an economic impact
14 of some sort on Farmington?
15 A. Yes.
16 Q. Okay. I'd like to look at the page right behind
17 it, because I think that pretty much says exactly
18 what you've just told me. It says, "DES recently
19 published a draft nitrogen concentrations standard
20 for Piscataqua River/Great Bay tidal assessment
21 units. Using these limits, the tidal AUs that
22 receive the Cocheco River drainage are impaired
23 for N and therefore N loads must be reduced."

1 Is that an accurate -- does that accurately
2 reflect your understanding of the impact --
3 A. Yes.
4 Q. -- of the June 2009 numeric criteria? Yes?
5 A. Yes.
6 Q. And it says, "DES proposes to compute separate
7 wasteload allocation for point sources and a load
8 allocation for nonpoint sources over the next two
9 years." That sounds like a TMDL. Is it?
10 A. Our concept was that there would be separate --
11 that the wasteload allocation would be published
12 separate from the load allocation.
13 Q. But that's what a TMDL develops.
14 A. The elements of a TMDL, yes.
15 Q. So the state was developing the elements of a TMDL
16 at this point in time?
17 A. Yes.
18 Q. Okay.
19 A. Although, I should say that my recollection is
20 that the wasteload allocation was developed as a
21 decision matrix.
22 Q. Your recollection is exactly correct. And I've
23 got an e-mail on that which I'll show you in a

1 the first paragraph. "As you can read, the AU is
2 impaired for DO. The assessment unit is impaired
3 for DO, and violations are likely correlated with
4 stratification during low flushing times."
5 Do you recall that Dr. Pennock evaluated what
6 was causing low DO in the Lamprey River?
7 A. Yes.
8 Q. Is that consistent with what you understood that
9 Dr. Pennock evaluated?
10 A. Yes.
11 Q. Okay. If low DOs were caused by stratification
12 during low flushing time, would that necessarily
13 lead to the need to regulate nitrogen as the
14 solution to low DOs occurring during
15 stratification?
16 A. Well, you notice the word used here is correlated,
17 and not caused by.
18 Q. Ah. Okay. So the fact that there's a low DO in
19 the Lamprey River doesn't mean I've somehow
20 violated the narrative criteria for nutrients,
21 does it?
22 A. No, not directly. Not without further analysis.
23 Q. You would need to -- and what further analysis

1 moment.
2 A. Okay. Good.
3 Q. All right. A curiosity. Whatever happened to --
4 whatever happened to Farmington? What effluent
5 limit did they end up getting, do you recall?
6 A. I don't.
7 Q. Do you know if they got a nitrogen limit?
8 A. I don't recall.
9 MR. HALL: Okay. Let's mark that as
10 Exhibit 38.
11 (Exhibit 38 marked.)
12 Q. Here's another e-mail. This one is a little bit
13 earlier. It's June 4, 2007, quite a few years
14 ago. It was an e-mail from you to Steve Clifton.
15 It had to do with Newmarket. Can you take a look
16 at that e-mail and tell me whether or not you
17 recall that e-mail?
18 A. I don't recall the specific e-mail, but I do
19 recall the conversations --
20 Q. Okay.
21 A. -- discussions.
22 Q. All right. I'll just draw your attention to the
23 second sentence in the first line, second line in

1 would need to be demonstrated to show that it was
2 caused by nitrogen?
3 A. Or that nitrogen was a significant contributing
4 factor.
5 Q. Right. What would you -- what would that analysis
6 be?
7 A. Well, I'm not sure off the top of my head, but it
8 would include the -- it would include the
9 stratification effects.
10 Q. But nitrogen doesn't cause a stratification
11 effect, right?
12 A. No.
13 Q. No. Of course not.
14 A. There's no relationship.
15 Q. Right. I mean, so if you were going to regulate
16 nitrogen because of DO in this area, wouldn't you
17 have to show the nitrogen was causing some level
18 of excessive algal growth which was then settling
19 to the bottom and then causing low DO during
20 stratification events?
21 A. There would be need to be something like that,
22 yes.
23 Q. Can you think of anything else that you would say

1 nitrogen would cause in terms of a nutrient impact
2 on DO?
3 A. No.
4 Q. No. Okay.
5 MR. HALL: Let's mark that as Exhibit 39.
6 (Exhibit 39 marked.)
7 Q. I think you'll get a chuckle out of this one. I'd
8 like to show you some e-mail exchanges with EPA
9 and DES regarding the wasteload allocation that
10 Mr. Trowbridge was developing in order to
11 implement the 2009 numeric nutrient criteria.
12 Okay. This is an e-mail exchange that happened in
13 November of 2009, about -- what's November -- like
14 four months after, five months after the June 2009
15 numeric criteria were completed. Can you tell me
16 what this e-mail exchange is all about, Mr.
17 Currier?
18 A. I believe this was the first, the release of the
19 first version of the wasteload allocation for
20 comment.
21 Q. Okay. So the wasteload allocation evaluation was
22 done by Mr. Trowbridge, right?
23 A. Yes.

1 Q. Okay. And the purpose of that evaluation was to
2 try to estimate what the acceptable nitrogen load
3 to the system would be from point sources and
4 nonpoint sources, right?
5 A. Yes.
6 Q. That was all to meet the June 2009 numeric
7 criteria, right?
8 A. Yes.
9 Q. Now, these -- Phil sends these to EPA, I presume
10 with your approval?
11 A. Yes. And --
12 Q. And EPA's reaction is, "Now that DES has been so
13 kind as to tell us and the world what nitrogen
14 limits we should put in the Great Bay permits, we
15 should get together and discuss our next steps."
16 Do you recall EPA being upset or otherwise
17 concerned that you had instructed, had provided
18 instructions as to the appropriate nitrogen limits
19 to meet the --
20 MR. MULHOLLAND: I'm going to object to
21 that one. EPA is an agency and EPA doesn't get
22 upset.
23 MR. KINDER: They don't?

1 MR. HALL: You should have seen them at the
2 oversight hearing.
3 MR. MULHOLLAND: The objection is that
4 individual people might be upset. The agency
5 doesn't have any emotions.
6 MR. KINDER: Understood.
7 MR. HALL: They are an emotionless void
8 that -- all right.
9 Q. So do you recall the exchanges with any EPA
10 personnel being concerned or upset about DES
11 providing instructions on this?
12 A. Yes. Well, I recall that David Pinkham was mildly
13 miffed.
14 Q. And what did David say to you?
15 A. Well, and his -- his -- the reason he was
16 displeased was that we had released it to the
17 world at the same time we released it to EPA.
18 Q. Oh, okay. David Pinkham, was he an EPA permit
19 writer, or who is he?
20 A. Yes.
21 Q. Okay. So he's the person that would have had to
22 have taken these numbers and put them in the
23 permit or explained why he didn't?

1 A. Yes. He's a supervisor in the permit writer
2 chain.
3 Q. Okay. And at this point, I mean, DES and EPA, I
4 mean, you're working cooperatively, right? I
5 mean, you have been for a while?
6 A. Yes.
7 Q. I mean, so it's no surprise, I mean --
8 A. It's a love-hate relationship.
9 Q. There is that. It is a marriage of convenience as
10 well. So, I mean, EPA worked with you and
11 coordinated with the Technical Advisory Committee,
12 right?
13 A. Oh, yes, yes.
14 Q. And the estuary -- New Hampshire Estuary Project,
15 right?
16 A. Yes. We receive substantial technical support to
17 the project.
18 Q. They knew Phil was in the process of developing
19 these wasteload allocations to meet the 2009
20 criteria?
21 A. Yes.
22 Q. As a matter of fact, they assisted in development
23 of the 2009 criteria, right?

1 A. Absolutely.
2 Q. Okay. So, I mean, none of this is a surprise
3 that, you know, development of the criteria, we're
4 going to set wasteload allocations, we're going to
5 come up with more stringent permit limits; I mean,
6 this wasn't a surprise to anybody on either side,
7 right?
8 A. No.
9 Q. Okay. Now, I'd like to draw your attention to a
10 couple of statements within, within this e-mail
11 sequence. Let's see. Let's look at page -- I'm
12 on the third page. I'm kind of like right around
13 yonder (indicating).
14 A. Okay.
15 Q. "For this report DES developed an analytic steady
16 state watershed nitrogen loading model to estimate
17 the watershed nitrogen loading thresholds needed
18 for nitrogen concentrations in the Great Bay
19 Estuary to equal the numeric criteria for
20 nitrogen."
21 This is -- let me just reword this. This is
22 telling EPA and whomever else this was sent to
23 that DES has run a model to ensure that the

1 consensus that eelgrass should be present in Great
2 Bay, Little Bay, and upper Piscataqua River, but
3 more research is needed to determine whether
4 eelgrass restoration is an appropriate or feasible
5 goal for the tidal rivers."
6 Can you explain that a little bit to me? I
7 mean, it seems like at this point in time DES is
8 saying, "By June numeric nutrient criteria must be
9 applied in Great Bay, Little Bay and upper
10 Piscataqua."
11 MR. MULHOLLAND: Is that a statement or a
12 question? Objection.
13 MR. HALL: No. This is what -- I'm
14 characterizing.
15 A. I think we described it as a scientific consensus.
16 Q. You know, there's a consensus that those criteria
17 should apply there. But you shouldn't apply the
18 eelgrass numbers in, for example, the Squamscott
19 or Lamprey yet?
20 A. That's right.
21 Q. Okay. And that there needs to be more research
22 before that occurs. Can you tell me who was
23 conducting research on whether or not the eelgrass

1 numeric criteria from June 2009 are met, right?
2 A. (Deponent nodded.)
3 Q. And that the way you meet it is by deciding what
4 nitrogen loadings are allowed from various
5 components contributing to the system, right?
6 A. Right.
7 Q. And those components would include nonpoint
8 sources, stormwater and wastewater, and I suppose
9 industrial discharges, right?
10 A. Right. Although, I don't believe there were any
11 industrial discharges.
12 Q. All right. Now, I'd like to bring your attention
13 to a statement on page, the last page of this
14 e-mail, the one right in the middle of that first
15 full paragraph, where Phil's talking about where
16 the -- where the nitrogen values need to be
17 applied. It says, "The attainment of this water
18 quality would result in -- of water quality
19 objective would result in water quality in Great
20 Bay, Little Bay, and upper Piscataqua to support
21 eelgrass habitat and water quality in the tidal
22 rivers to prevent violations of the DO standard.
23 This decision is supported by the scientific

1 numbers should be applied in the Squamscott and
2 Lamprey, as you recall?
3 A. Who?
4 Q. Who was doing this research to make this
5 determination?
6 A. I think that's a recommendation. To my knowledge
7 nobody is doing it.
8 Q. Well, do you know what would be the basis for
9 concluding that eelgrass targets should be applied
10 in those tidal rivers?
11 A. A very significant factor would be the historical
12 presence of eelgrass.
13 Q. Okay. I mean, but if eelgrass disappeared 40, 50,
14 60 years ago, how could I know that those numeric
15 criteria needed to be applied in the river to
16 restore those eelgrass? How would I know that?
17 A. I believe that was exactly the discussion that we
18 were hoping would ensue from this correspondence.
19 Q. At this point in time do you know -- so let me
20 just see if I can get this straight because I'm
21 trying to understand. Assume that this is a
22 narrative translator and that, therefore, you have
23 to use some intelligent discretion as to where you

1 apply it. Okay. Let's go with that assumption.
2 The mere historical presence of eelgrass, would
3 that be conclusive proof that the narrative
4 translator must be applied in that water body?
5 A. No.
6 Q. Okay. What else would you need to have to make
7 that decision, in your opinion?
8 A. Well, again, in my opinion, in my opinion there
9 would be a significant amount of judgment involved
10 as to whether it was, I think feasible is the word
11 we used here, whether a goal of eelgrass
12 restoration in those areas would be feasible,
13 would be -- although you can't, you know, you
14 can't use the word feasible under, in the context
15 of water quality standards, but exactly what you
16 had suggested was the discussion. Yes, there was
17 some evidence that eelgrass was there. And the
18 question was, should that drive the application of
19 the, of the, of the standards for eelgrass to
20 these areas. And our suggestion in this
21 correspondence was that perhaps it should.
22 Q. Let's go back to a narrative criteria, because I
23 guess in the end that's what we're saying that

1 environmental condition that would allow salmon to
2 exist should be maintained. The same line of
3 reasoning would be applied to an eelgrass
4 situation. Eelgrass doesn't exist. It hasn't for
5 a long -- I'm not saying it should be applied.
6 I'm saying it could be applied. This was a
7 discussion. It doesn't exist, hasn't existed in a
8 long time, yet it's known that it once did, so
9 therefore, it's desirable that the environmental
10 conditions that would allow eelgrass to survive
11 and propagate should be maintained. Those
12 environmental conditions would include sufficient
13 light penetration in these areas that we're
14 talking about to allow eelgrass to survive and
15 propagate. And our analysis that we did leads us
16 to conclude that that would result in the
17 limitation of median annual nitrogen concentration
18 in those areas.
19 Q. Let's just break this down a little bit more
20 thoroughly. I'm on the Squamscott River. My
21 transparency is poor regardless of the nitrogen
22 level present because of colored dissolved organic
23 matter and turbidity. Do I still have to meet the

1 we're implementing. The fact that eelgrass were
2 historically present in an area and no longer are
3 historically present, that doesn't mean nitrogen
4 caused the impairment, does it?
5 A. No.
6 Q. No. I mean, there would have to be some
7 demonstration or some analysis of what caused that
8 to occur, right? Correct, before you would --
9 A. Yes.
10 Q. -- conclude nitrogen should be regulated to
11 restore these eelgrass?
12 A. Well, not exactly. And let me use the -- a
13 similar situation. We have a number of rivers
14 that are, where Atlantic salmon are the, are part
15 of the fish population that's included in the
16 designated use. They don't exist. They haven't
17 for a long time.
18 Q. Okay.
19 A. Nevertheless, our application of the narrative
20 standard would include environmental conditions
21 suitable for salmon life and propagation. If,
22 because it's been decided that salmon ought to be
23 restored, or at least -- so therefore, the

1 numeric nutrient criteria?
2 A. And this -- again, this is my line of reasoning,
3 but I think it's one that corresponds to others.
4 If eelgrass were once there, then the light
5 penetration conditions that would allow eelgrass
6 to grow were once there and CDOM and turbidity are
7 components of that.
8 Q. All right.
9 A. So if the conditions once existed and if they
10 don't now exist, if the light penetration is
11 insufficient for eelgrass in these areas --
12 Q. Only related to nitrogen is what I said.
13 A. Related to whatever.
14 Q. Okay.
15 A. That is, if we have -- and you notice that if
16 we -- we have, and I believe this is a true
17 statement, in this list of things that we listed,
18 there are some areas that are impaired for
19 eelgrass but not for nitrogen -- I believe that's
20 true -- you could -- we could make that
21 determination.
22 Q. So you could -- so let me separate it out. If the
23 situation were transparency were poor but it

1 wasn't caused by the nitrogen component --
2 A. Right.
3 Q. -- you could say you've got an eelgrass
4 impairment, but you wouldn't put it down as a
5 nitrogen-caused eelgrass impairment?
6 A. That's correct.
7 Q. I should have just sliced it a little more
8 carefully.
9 A. And you would have to do -- you would have to do
10 further causation analysis to figure out what was
11 causing the lack of eelgrass.
12 Q. And do you know if anybody ever demonstrated that
13 regulating nitrogen on either the Lamprey,
14 Squamscott, Cocheco, or upper Piscataqua River
15 could even possibly result in a significant
16 improvement in the transparency levels in those
17 areas?
18 A. Well, as I mentioned, and as it says here, our
19 suggestion is that DO be the end point in those
20 areas.
21 Q. Well, let me -- but answer my question first.
22 We'll get to DO second. I mean, in those areas
23 that appear to be controlled by colored dissolved

1 the municipalities throughout the bay. The
2 wasteload allocation had nothing to do with the --
3 Q. Is it really controlling the transparency?
4 A. That's right. This was a number-crunching
5 exercise.
6 Q. Can I, can I just make a statement and see if you
7 agree with this? That the wasteload allocation
8 and the 2009 criteria have a presumption that the
9 nitrogen level does significantly control the
10 transparency that's occurring in various areas,
11 correct?
12 A. Yes. That it -- yes. That assumption is made in
13 the, or that -- it's an assumption that is based
14 on, I would claim, based on very substantial
15 scientific evidence. But it is an assumption.
16 And it is the, the data and the analyses that are
17 used to develop in the June 2009 document are then
18 applied, without further analysis as to whether --
19 you know, without further causation analysis to
20 the individual assessment units. That is true.
21 Q. So then the reply proffer -- so if I have analyses
22 or data that shows that connection is not correct
23 for a particular area, then those criteria should

1 organic matter and turbidity and that have --
2 well, let's leave it -- colored dissolved organic
3 matter and turbidity, in those areas that the
4 transparency is controlled by that, have you ever
5 seen an analysis that says nitrogen regulation
6 will significantly improve transparency in those
7 areas?
8 A. Let me, let me clarify. The purpose of the
9 wasteload allocation exercise was to run scenarios
10 based on the numbers in the June guidance document
11 that would allow decision-makers and
12 municipalities and EPA to understand the
13 ramifications of the numbers in the June 2009
14 guidance document. The wasteload allocation was
15 basically an exercise in, a modeling exercise in
16 applying these numbers, and some other assumptions
17 about how the -- about, or about production in the
18 watersheds of nitrogen and the various flushing
19 rates, communication with the sea, and to apply a
20 simplified model to get some, some rough numbers
21 that would allow decision-makers to understand how
22 the application of these numbers to the assessment
23 units in Great Bay would affect permit limits for

1 not be applied, right?
2 A. That's correct. And there is a process for that
3 in EPA regulations called site-specific criteria.
4 Q. It's only a site-specific criteria process if you
5 formally adopt it as a regulation?
6 A. Yes. I suppose that's true.
7 Q. Thank you. Let's mark this as --
8 A. The mechanism would be the same.
9 MR. HALL: Let's mark this as Exhibit 40.
10 Thank you.
11 (Exhibit 40 marked.)
12 Q. Back to my last question, though. Have you ever
13 seen an analysis that shows regulating nitrogen
14 for the tidal rivers, and I'll say upper
15 Piscataqua, Squamscott and Lamprey will, in fact,
16 result in a significant improvement in the
17 transparency such that eelgrass can be restored?
18 Has anybody ever showed you a site-specific
19 analysis of the data for those sections that shows
20 that?
21 A. No.
22 Q. Okay. I hadn't seen it either. That's why I
23 thought you might have seen it.

1 A. I'm fairly sure it doesn't exist.
2 Q. Okay. Here's one of these pretty colored charts
3 that you had with the wasteload allocation
4 options. I show you this. I'm showing you some
5 e-mails. They're dated around September 14, 2010
6 and there's a table attached that's a matrix.
7 This was the matrix you were discussing about
8 earlier, right? And this matrix has different
9 nitrogen levels for the wastewater plants
10 depending upon how much nonpoint source reduction
11 gets achieved elsewhere in the system, right?
12 A. Right.
13 Q. Okay. In each of the cases evaluated does the
14 application of the June 2009 numeric criteria
15 result in the imposition of a nitrogen limitation
16 for the wastewater plants?
17 A. Let me take a minute to recall how we used this.
18 This matrix, there is no, there is no column here
19 for current levels of nitrogen.
20 Q. Because all these, all of the analyses that were
21 done indicated current levels of nitrogen were too
22 high, right?
23 A. That's correct.

1 municipalities and EPA about what level of
2 nonpoint source reduction would be, would be
3 considered as appropriate.
4 Q. Okay. That's fine, that clarification. Can we
5 just mark that as Exhibit 41.
6 A. I've got two of them here.
7 Q. Yeah, we do. A question regarding that. Even if
8 we call this a numeric or, rather, a narrative
9 translator, the 2009 document, if it's a narrative
10 translator, it's a new narrative translator,
11 right? I mean, the public --
12 A. Yes.
13 Q. I mean, there's no -- it's not in any prior DES
14 criteria publications, right?
15 A. No. There are lots of publications and we talked
16 about some of them that precede this in the
17 process of developing this.
18 Q. How many other narrative criteria translators has
19 the department developed prior to this one?
20 A. We have the multi-metric biological criteria
21 for -- oh, we have several of them now.
22 Q. Oh, I need to --
23 A. Rivers, lakes. We actually have one for

1 Q. So they all had to be reduced. Okay. So that --
2 and just as I'm pointing out on page 2, the
3 limitations of the wastewater plants could range
4 anywhere from 8 milligrams down to 3 milligrams
5 depending upon the amount of nonpoint source
6 reduction that was attained, correct?
7 A. Yes. Or let's say the scenarios were run with the
8 treatment plants at 8 milligrams per liter -- and,
9 again, that's an annual median -- 5 and 3.
10 Q. And I'd like you to go back to the first page,
11 where it's your e-mail where you're saying, "Hi
12 Carl and Brian. Attached is a draft of the
13 wasteload allocation." It's the very first thing.
14 "I hope it will be useful in our consideration of
15 the Exeter and subsequent permits."
16 Was it -- one of the purposes of developing
17 this wasteload allocation was that it could be
18 considered as a basis for setting the, whatever
19 more restrictive permit limitations might be
20 necessary in the next round of permitting?
21 A. Yes.
22 Q. Okay.
23 A. Yes. And as a basis for conversations amongst the

1 phosphorus for lakes.
2 Q. You've got a phosphorus one for lakes now?
3 A. (Deponent nodded.)
4 Q. And so in terms of the only narrative translators
5 that establish numeric pollutant values, are they,
6 are they only the nutrient-related translators?
7 A. Yes. I believe so.
8 (Exhibit 41 marked.)
9 Q. I'd like to show you -- and this, this is an
10 exhibit that's a document that was exchanged
11 between you and EPA and I suppose, primarily. And
12 it's a timeline of scenarios of Great Bay nitrogen
13 reduction implementation. It's from you to Carl
14 DeLoi. Who is Carl DeLoi?
15 A. He was my counterpart at EPA.
16 Q. Okay. And this document provides a timeline of
17 activities that's going to be conducted by the
18 state and, I guess, by EPA. Do you recall
19 preparing -- or who prepared this document for
20 you?
21 A. Yes. It was me.
22 Q. You did it.
23 A. It was a collaborative effort, but I was the

1 primary author.
2 Q. You were the primary author. Okay. Fine. And
3 this document shows -- and I'll ask, draw your
4 attention to the pages with the, you know, with
5 the chart.
6 A. Yeah.
7 Q. And, actually, I think I have one question in
8 advance of that page. You give some options for
9 implementation on the prior page, and they talk
10 about a collaborative effort with New Hampshire,
11 Maine, POTWs, and it says, "New Hampshire and
12 Maine would coordinate closely and work with EPA
13 on watershed-based NPDES permitting." I mean,
14 that's kind of what was ongoing all along, right?
15 You were trying to work closely with EPA as to
16 what the requirements need to be on the permits?
17 A. Right. Although, a watershed-based approach
18 would, is not something that EPA was doing or is
19 doing at this point.
20 Q. Right. They switched over to a -- they took your
21 wasteload allocation analyses and switched over to
22 a permit-by-permit approach, right?
23 A. Right.

1 Q. Okay. Let's go to the prior -- I'm sorry -- the
2 chart. And I just want to get a feeling for the
3 timeline while we're here. The first thing in the
4 timeline is this nutrient criteria development in
5 303(d) assessment. Okay. There's six points
6 listed under here, going -- everything from, we've
7 got our task force in '05 to, you know, developing
8 the nutrient criteria, look at adding the
9 impairments to the list, then peer review the
10 criteria, then change the impairment lists, then
11 finalize the criteria and then incorporate the
12 final criteria into surface water quality
13 standards rules. Is that the sequence you had
14 understood the state was going to follow on
15 adoption of these numeric nutrient criteria?
16 A. That was -- yes. That was what was understood as
17 of whatever this was.
18 Q. To your knowledge -- I'm sorry.
19 A. 6/2010.
20 Q. To your knowledge has the state, did the state
21 decide to not adopt the numeric nutrient criteria
22 formally into state law as of the date you had
23 left your position?

1 A. No. I believe that it was indefinitely postponed
2 by the subsequent action of municipalities.
3 Q. Oh. Now, it says there was going to be a peer
4 review. So a peer review was supposed to occur
5 with regard to the draft, the June 2009 numeric
6 criteria?
7 A. (Deponent nodded.)
8 Q. Okay. Do you know if the public was supposed to
9 be involved or excluded from that peer review?
10 A. That peer review was through the EPA N-STEPS
11 process. And I am not familiar with the details
12 of it, but that's what happened.
13 Q. Well, did DES ask for the public to be excluded
14 from the peer review process?
15 A. No.
16 Q. No. Did you ask for the public to be included in
17 the peer review process as a result of the
18 comments and questions submitted by, I think
19 primarily through Tupper Kinder's offices to DES?
20 A. We certainly transmitted all of that to EPA and
21 did our best to accommodate the concerns.
22 Q. But it just didn't happen, right?
23 A. Again, EPA has this N-STEPS process which they

1 offered to us basically free as an independent
2 peer review, and we took advantage of it.
3 Q. Did EPA ever tell you that they didn't want to
4 deal with the questions raised by the Great Bay
5 Municipal Coalition or others with regard to the
6 numeric nutrient criteria via the N-STEPS process?
7 A. Not that I recall.
8 Q. Did you have any discussions with Carl DeLoi, who
9 I imagine was the decision-maker, on excluding the
10 municipalities in the peer review process?
11 A. No.
12 Q. Do you know why EPA excluded them?
13 A. I -- well --
14 Q. I'm not asking you to -- I'm not asking you to
15 speculate. I'm asking you like in your
16 discussions do you know what happened?
17 A. No, no. My understanding is that the N-STEPS
18 process was already fairly well along when the
19 municipalities' concerns were put forward, and
20 that was a factor.
21 Q. Do you recall who prepared the charge questions
22 for the N-STEPS process?
23 A. No, I don't.

1 Q. Did DES do it?
2 A. No.
3 Q. Hmm.
4 A. We certainly -- we had input. We had input.
5 Q. Going further down in this list, then it says,
6 "Preliminary Modeling and Allocations. Develop
7 first draft of wasteload -- of watershed nitrogen
8 loading model," under point one under Preliminary
9 Modeling and Allocations. That's consistent with
10 the e-mails that we're seeing back and forth,
11 right? That's the analysis being done by Phil
12 Trowbridge?
13 A. I'd have to -- let's see, there's two things going
14 on. One is the examination of the nonpoint source
15 loads in the watershed, and the other is the
16 wasteload allocation. And they were going on in
17 parallel tracks, and I don't remember which the
18 black dots referred to.
19 Q. Okay. All right. Going back to the nutrient
20 criteria development, there's a line that says
21 that you finalize numeric nutrient criteria based
22 on the peer review. So if the, if the peer review
23 had come back and said the graph that you're

1 Q. And I'm just looking at the big picture timing on
2 where you've got adoption of -- incorporate the
3 final nutrient criteria into water quality
4 standards rules. You were looking at like mid
5 2011. And then when I go down to permitting on
6 implementation, the permits weren't supposed to
7 come out until 2012. Or, in other words, the
8 original -- and I'm under Implementation. That
9 says, "Issue or reopen permits" -- yada, yada,
10 yada -- "a watershed general permit if training is
11 successful." And that's all the way over in the
12 third and fourth quarters of 2012, right?
13 A. Right. Although, the idea, it would be -- I think
14 the idea of this, my recollection it would be an
15 ongoing process, you know, beginning in mid 2010.
16 Q. Okay. But the idea was to get the standards
17 adopted before things started ending up in
18 permits, right, I mean, based on this chart?
19 A. Yes, because we had envisioned adoption in, yeah,
20 mid 2012. So actually it looks like we had
21 envisioned starting the NPDES permit process in
22 Exeter in that mid 2010.
23 Q. Right. And that would take a good number of

1 using -- and this is, this is Short Exhibit 26,
2 the chart that was used to develop the numeric
3 nitrogen values with the light attenuation -- if
4 they had said, you know, "This is just a
5 correlation. It doesn't show causation. You need
6 to work on the other factors that are actually
7 affecting transparency in the various locations
8 that are plotted on this graph," if they had said
9 that to DES, what would you have done?
10 A. We would have reworked the criteria.
11 Q. Okay.
12 A. And I think that's on here. It was a -- yeah.
13 "Revise." Let's --
14 Q. Yeah. Actually, it's in several places.
15 A. "Revise watershed loading model if nutrient
16 criteria change based on peer review," so yes.
17 Q. So the peer review was considered a pretty
18 critical part of the process. You wanted to make
19 sure you got it right before you rolled it forward
20 into --
21 A. Right.
22 Q. -- the regulatory process. Okay.
23 A. Yes.

1 months to complete, right? So you could have had
2 the criteria finalized before the permit came out,
3 right?
4 A. Yes. Although my recollection is that there
5 was -- those two were never tied together.
6 Q. Subsequent to the issuance of this they weren't
7 tied together?
8 A. There was -- obviously, there was an expectation
9 when this was written that there would be
10 rulemaking.
11 MR. HALL: Let's just mark that as
12 Exhibit 42.
13 (Exhibit 42 marked.)
14 Q. Okay. I don't need to go through that. I'm going
15 to just -- Mr. Currier, were you involved much in
16 the back and forth on the draft Exeter permit with
17 regard to the staff comments?
18 A. No.
19 Q. No. Do you know if the staff, did the staff ever
20 inform you that you needed, that the state needed
21 to object to any provisions of the Exeter permit?
22 A. Not that I recall.
23 Q. Okay. To your understanding was the department

1 satisfied or pleased with the draft Exeter permit
2 and the limitations it was intending to impose?
3 A. I don't recall.
4 Q. The department, do you know if the department had
5 a position on it?
6 A. Again, I...
7 Q. Okay. This might be our last document.
8 A. That would be okay.
9 Q. I didn't say it was the last question, but it will
10 be the last document. And this is one I think
11 that's near and dear to all of us, the Memorandum
12 of Agreement with Great Bay Municipal Coalition.
13 And --
14 A. Yes, yes. Many whereases.
15 Q. Yes, many whereases. Can you -- the document
16 that's in front of you, have you seen it before?
17 A. Yes, I have.
18 Q. Okay. Can you please tell us what it is?
19 A. It's a memorandum of agreement between the Great
20 Bay Municipal Coalition and New Hampshire DES
21 relative to reducing uncertainty in nutrient
22 criteria for Great Bay and Piscataqua River
23 estuary.

1 Q. Okay. Did you, did you have any hand in authoring
2 or reviewing this document?
3 A. Yes. I participated in this development.
4 Q. Do you know who the primary -- was there any
5 primary author of this document, or was it a
6 collaborative --
7 A. It was pretty collaborative.
8 Q. Can you tell me who was involved in the
9 development of it within the department?
10 A. Myself and my staff, Harry Stewart, and the
11 commissioner, Tom Burack.
12 Q. Was Ted Diers involved at all?
13 A. Yes, he was.
14 Q. With regard to some of the whereas clauses, I'd
15 like to just get your understanding of the clauses
16 and what appears to be an agreement on this. Can
17 you tell me why this memorandum of agreement was
18 developed and signed by the parties?
19 A. It was an attempt to work collaboratively with the
20 municipalities to resolve the issues that were
21 important to them.
22 Q. Right. And the development of this MOA followed
23 two technical meetings, didn't it, where the

1 communities --
2 A. Yes.
3 Q. -- who did not get their chance to present the
4 information in the peer review brought certain
5 information to the department's attention
6 regarding the transparency nitrogen connection?
7 A. Yes. That's correct.
8 Q. And the department looked at that information and
9 then based on that information decided that
10 proceeding with the memorandum of agreement was a
11 reasonable course of action?
12 A. Right, right.
13 Q. Okay. I'd like to show you, bring your attention
14 to the one, two, three, the four -- let's go to
15 the third whereas clause, one that talks about DO.
16 During the technical meetings we discussed, that
17 we just discussed, the coalition's experts
18 presented some information showing it was not a
19 good connection between chlorophyll-a levels and
20 low DO in the tidal rivers, correct? Do you
21 recall that?
22 A. I certainly recall the discussions, yes.
23 Q. And I think the statement might have been that it

1 would be physically impossible for the level of
2 chlorophyll-a occurring in the Squamscott or
3 Lamprey to be caused by the chlorophyll-a levels
4 occurring in those systems; do you recall that?
5 A. Vaguely, yes.
6 Q. Okay. And so based on that information, I mean,
7 we've got -- and other information I guess
8 discussed there, we've got this whereas clause
9 which says, "The coalition agrees relative to the
10 impairments in the 2010 list attributed to DO and
11 nitrogen there is uncertainty to the extent of
12 nitrogen as a causative factor relative to other
13 factors." And it talks about the need to develop
14 a dynamic hydrodynamic model. Can you tell me
15 what your recollection was regarding what the
16 uncertainty was? It's an uncertainty of a causal
17 connection, right?
18 A. Yes.
19 Q. And so it was -- was the department acknowledging
20 at this point you weren't sure just how much the
21 low DO was really caused by nitrogen?
22 A. I'm certain that the municipalities weren't sure.
23 Yes, yes. There was -- we -- I think it was

1 mutually recognized that there was uncertainty in
2 the analysis and that there was a greater level --
3 and we had known this from the beginning -- a
4 greater level of uncertainty than if we, if an
5 analysis had been done using a hydrodynamic model,
6 a calibrated hydrodynamic model.
7 Q. Regarding -- the next whereas clause is somewhat
8 similar. "The coalition and DES agree first that
9 a weight-of-evidence approach is reasonable." But
10 then it goes on to say, "As relates to impairments
11 of eelgrass loss, there is uncertainty in the line
12 of evidence for eutrophication as the causative
13 factor." Do you know -- do you recall why that
14 statement was agreed upon?
15 A. For the same things we've been talking about, the
16 connection between chlorophyll-a production and
17 light attenuation.
18 Q. And didn't -- do you recall that the coalition's
19 experts presented information showing that the
20 transparency levels in Great Bay apparently had
21 not declined over the period of record of concern?
22 A. Yes.
23 Q. Okay. And do you recall the coalition's experts

1 right? That's the essential piece of information,
2 correct?
3 A. (Deponent nodded.)
4 Q. And that piece of information, shall we say the
5 information did not demonstrate that as you and I
6 have both looked at it across the table that day
7 in April, right?
8 A. We were -- back to the 2009 document. And as a
9 result of lots of, lots of discussion, you know,
10 with you and others, internally, and we were
11 satisfied with the connection, with the, with the
12 demonstrable change in conditions in the bay
13 relative to chlorophyll-a.
14 Q. Are you telling me that that 2009 document
15 contains an analysis confirming that the
16 chlorophyll-a significantly increased over the
17 period of record? I mean, I just want to know if
18 that's what you're claiming is in that document.
19 A. I don't recall. But I do recall that being
20 satisfied that eutrophication, chlorophyll-a
21 production was a significant causative factor.
22 Q. But if the chlorophyll-a -- we'll go back to it.
23 If the chlorophyll-a had not increased, that could

1 having presented information indicating that
2 chlorophyll-a had apparently not significantly
3 increased over the period of eelgrass decline?
4 A. I do recall, and I'm sure you have them, a series
5 of correspondence in which we commented on those
6 things. And I don't recall that we ever concluded
7 that series of correspondence.
8 Q. But, I mean, that was actually -- those
9 observations were actually consistent with the
10 observations that we had on the State of the
11 Estuaries Reports earlier, where we showed
12 nitrogen levels changing but the chlorophyll-a
13 levels hadn't changed; I mean, that's consistent
14 with that information discussed earlier, correct?
15 A. My recollection is that the coalition hired the
16 University of New Hampshire to conduct some
17 specific analyses.
18 Q. Well, I guess this is a different point. This is
19 whether or not the chlorophyll -- I mean, if one
20 were claiming the transparency was reduced as a
21 result of nitrogen, you would have needed to
22 demonstrate that the chlorophyll-a levels had
23 increased significantly over the period of record,

1 not be true, correct?
2 A. Yes.
3 Q. We'll leave it there.
4 A. Yeah.
5 Q. We'll just -- we'll leave it there. Let's keep
6 rolling on to the end.
7 A. I would need to defer to the experts.
8 Q. Okay. This MOA also has an agreement that the
9 communities complete a detailed hydrodynamic model
10 for the Squamscott River, correct?
11 A. Yes. I believe so.
12 Q. And was the intention that the results of that
13 model would control the need for nitrogen removal
14 relative to the Squamscott River?
15 A. That's correct.
16 Q. Okay. So at this point in time DES was still not
17 believing or asserting that the eelgrass values
18 were what was controlling nitrogen requirements
19 for the Squamscott; it was the DO values that
20 should be controlling it, correct?
21 A. Yes. As in a previous exhibit, it was our opinion
22 that that would be the appropriate end point for
23 the Squamscott River, the DO values.

1 Q. Were you aware that shortly after this document
2 was signed and the communities began their work on
3 the Squamscott River on the DO model that DES sent
4 a letter to EPA telling them to apply the eelgrass
5 numbers in the Squamscott?
6 A. No. I don't recall that.
7 Q. Wouldn't -- if that occurred, wouldn't that have
8 rendered the DO modeling effort pretty much
9 irrelevant?
10 A. Yes.
11 MR. HALL: Off the record.
12 (Discussion off the record.)
13 MR. MULHOLLAND: Are we back on the record?
14 MR. HALL: Back on the record.
15 Q. I'd like to ask you a couple of other questions
16 also regarding the things that are mutually agreed
17 upon and resolved; that the second clause talks
18 about not finalizing any of these permits or other
19 draft permits until this collaborative process can
20 be completed. And that was your understanding
21 that the permitting process should be slowed down
22 to try to get the science right?
23 A. Yes.

1 Q. Okay. And the next line, the next whereas also
2 talks about looking at these additional lines of
3 evidence related to eelgrass. So, you know, there
4 was an intent that there should be further
5 investigation to confirm that you either got it
6 right or didn't on the eelgrass nitrogen
7 connection, right?
8 A. Right. And as it says, specifically that there
9 would be additional work done on macroalgae and
10 epiphyte growth.
11 Q. I'd like you to go down to, it's under what the
12 coalition -- actually, no. Let's go to what the
13 DES agrees to do on the last page. The DES --
14 with regard to numbers, number II, where it talks
15 about publish site-specific nitrogen criteria for
16 each assessment unit, was it -- what was your
17 understanding as to what was supposed to happen
18 there? Because the communities I guess more or
19 less complained rather vociferously about the,
20 what I'll call the generic kind of, I'll call
21 estuary-wide analyses that we use in that document
22 to develop the numeric values. And we were
23 concerned that you really needed to take a closer

1 look into the individual units, individual
2 assessment units to see what was needed. Was
3 it -- that's correct, right?
4 A. Right.
5 Q. So was it your understanding that the department
6 agreed with that approach, that, you know, a more
7 careful assessment of the needs of the individual
8 assessment units would be done and then
9 site-specific numbers would be adopted for each
10 one of those?
11 A. Yes. My recollection is that was the intent; that
12 we were, mutually agreed that the hydrodynamic
13 model would generate numbers with greater
14 certainty and identify -- and the model would
15 identify causative factors with greater precision
16 than what we had done.
17 Q. So, if you will, however the new science came out,
18 the chips would fall; the communities could have
19 ended up with a more restrictive number or a less
20 restrictive number, but the updated science would
21 have dictated what it should have been, correct?
22 A. Yes. And the updated science and the selected
23 model in which the physical, chemical and

1 biological processes driving the, either eelgrass
2 or DO would be identified using, using the best
3 science incorporated into a model.
4 MR. HALL: Okay. Can we have a break for
5 just two minutes? I don't think I have another
6 question. I just want -- and I know -- Evan, I
7 think we've run our three and half hours. And
8 Paul has been extraordinarily good about just
9 responding to the questions as well and quickly as
10 he can, so I just didn't know if the --
11 MR. MULHOLLAND: That's fine.
12 MR. HALL: -- rest of the crew had any
13 other questions. Thanks very much, Paul.
14 (Recess taken; 12:43-12:44 p.m.)
15 MR. HALL: Back on the record. We'd just
16 like to mark the memorandum of understanding as
17 Exhibit 43. And I'd like to thank Mr. Currier for
18 his time and attention to addressing these
19 important issues. We really appreciate hearing
20 from him. And I think he shed a lot of light as
21 to the background and history of how we got to
22 where we are today.
23 A. Thank you. I thought about things that I haven't

1 thought about much in a whole year.
2 Q. And I wish I were on retirement myself, so I hope
3 you enjoy --
4 MR. MULHOLLAND: We can go off the record.
5 (Discussion off the record.)
6 (Exhibit 43 marked.)
7 (12:45 p.m.)

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ERRATA SHEET AND CERTIFICATE OF WITNESS/DEPONENT

In accordance with the rules of procedure governing depositions, you are entitled to read and correct your transcript. Please read your transcript and on this errata sheet make any necessary corrections or changes, either in form or substance. Identify those corrections/changes by page and line number, stating the change and the reason. Please do not mark the actual transcript. When completed, date and sign the errata sheet and have your signature notarized. (Make extra copies of this sheet if you need to indicate more changes or corrections than will fit on this one page)
I, _____ do hereby certify that I have read the foregoing transcript of my testimony and further certify that it is a true and accurate record of same given on _____ (with the exception of the following corrections listed below):
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STATE OF: _____
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Subscribed and sworn to before me on this _____ day
of _____, 20____.

Justice of the Peace/Notary Public
My commission expires: _____

C E R T I F I C A T E

I, Megan M. Hefler, a Licensed Shorthand Court Reporter (License #61) and Notary Public of the State of New Hampshire, do hereby certify that the foregoing, to the best of my knowledge, skill and ability, is a true and accurate transcript of my computer-aided electronic stenographic notes of the deposition of PAUL M. CURRIER, who was duly sworn, taken at the place and under the circumstances present on the date hereinbefore set forth.

I further certify that I am neither attorney or counsel for, nor related to or employed by any of the parties to the action in which this deposition was taken, and further that I am not a relative or employee of any attorney or counsel employed in this case, nor am I financially interested in this action.

Megan M. Hefler, LCR, RDR
Signed this 20th day of June 2012

N.H. LCR No. 61 (RSA 310-A)
My NH Notary Commission expires February 2, 2016

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STATE OF NEW HAMPSHIRE

MERRIMACK, SS

SUPERIOR COURT

No. 217-2012-cv-212

CITY OF DOVER, TOWN OF EXETER, TOWN OF NEWMARKET,
CITY OF PORTSMOUTH, and CITY OF ROCHESTER

vs.

STATE OF NEW HAMPSHIRE and NEW HAMPSHIRE DEPARTMENT
OF ENVIRONMENTAL SERVICES

DEPOSITION OF PHILIP TROBRIDGE
Volume 1

Deposition taken by agreement of
counsel at the law offices of Sheehan, Phinney, Bass
+ Green, 1000 Elm Street, Manchester, New Hampshire,
on Thursday, June 21, 2012, commencing at 9:13 a.m.

Court Reporter:

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LCR No. 104

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STIPULATIONS

It is agreed that the deposition shall be taken in the first instance in stenotype and, when transcribed, may be used for all purposes for which depositions are competent under New Hampshire practice.

Notice, filing, caption, and all other formalities are waived. All objections except as to form are reserved and may be taken in court at the time of trial.

It is further agreed that if the deposition is not signed within thirty (30) days after submission to counsel, the signature of the deponent is waived.

I N D E X

WITNESS: PHILIP TROWBRIDGE

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By Mr. Hall 7

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1 to --

2 Evan, you wanted to say something on
3 the record about some documents, and I know local
4 counsel wants to say something about the document
5 production.

6 MR. MULHOLLAND: Okay. Two things.

7 First is there is a subpoena duces
8 tecum along with the appearance. You know, kind of
9 in response, we produced a disc to Drew Serell with
10 the responsive emails. In addition, there were
11 notebook pages from Mr. Trowbridge that we copied in
12 response to the -- to the document request. There's
13 one point on the disc there are 11 emails that the
14 file name was too long, so they couldn't be copied.
15 My staff has tried to figure out which weren't copied
16 and hopefully we'll get them today or tomorrow.

17 The other thing is that Phil Trowbridge
18 has brought some documents for his reference that he
19 may need during the deposition and he's made copies
20 of them. You probably have all of them, but they're
21 there --

22 MR. HALL: Okay.

23 MR. MULHOLLAND: -- in case he needs to

1 look at something to answer a question.

2 MR. PELTONEN: We received the
3 documents yesterday. The disc contains, I think
4 by our count last night, 1,057 emails with
5 attachments --

6 MR. MULHOLLAND: Yes.

7 MR. PELTONEN: -- and there were
8 five books of handwritten meeting notes that
9 Mr. Trowbridge has kept in the course of his -- of
10 his duties. We obviously have not had a chance to
11 review those and so what we propose is to proceed
12 with the deposition as far as we can, probably do a
13 few hours, four hours, whatever we can do, and then
14 suspend and resume later in time, pick a date later
15 once we've had a chance to review all these
16 documents, and resume the deposition at a date later
17 on that we'll set and agree to. And once we've
18 reviewed them, we can calculate or have a better
19 calculation about how much additional time we'll need
20 for the continued deposition.

21 MR. MULHOLLAND: That seems reasonable.

22 MR. PELTONEN: Okay.

23 BY MR. HALL:

1 Q. Could I take a very quick look at just
2 what your list of documents that you brought along
3 with you, Phil?

4 MR. MULHOLLAND: Yeah.

5 A. Yeah.

6 Q. Just hand me the whole stack. I
7 probably have all the same ones anyway.

8 A. There's three copies, so I should keep
9 one?

10 Q. Oh, no. Just give me the whole thing.
11 I'm going to hand the whole thing back to you?

12 A. Oh, okay. Here you go.

13 MR. MULHOLLAND: Off the record just
14 for a second?

15 MR. HALL: Please.

16 (Off-the-record discussion.)

17 BY MR. HALL:

18 Q. Okay. Mr. Trowbridge, could you please
19 tell us when you started work -- well, actually,
20 first, give us your educational background, starting
21 college, and then advanced degrees after that.

22 A. Yeah. I received my Bachelor of
23 Science from the University of Washington in Seattle

1 in geological sciences in 1993 and I received my
2 Master's of Science in civil and environmental
3 engineering at the Massachusetts Institute of
4 Technology in 1995.

5 Q. Can you tell me -- could you please
6 give me your -- your employment history since 1995.

7 A. Uh-huh. I worked at the Massachusetts
8 Department of Public Health from 1996 to 1999 and
9 then for the State of New Hampshire Office of
10 Community and Public Health from 1999 to 2001, and
11 then for the Department of Environmental Services
12 since 2001.

13 Q. Okay. Could you just generally
14 describe how long that you have been involved in
15 analyzing water quality issues for Great Bay and
16 just generally what kind of, you know -- what kind
17 of activities you've undertaken in that area.

18 A. I was hired at the Department of
19 Environmental Services to be the coastal scientist.
20 Duties included analyzing water quality in the Great
21 Bay Estuary since 2001.

22 Q. And what kind of activities and
23 analyses did you -- have you undertaken in evaluating

1 Great Bay water quality issues? And I'm just saying
2 generally, can you just describe what you do?

3 A. I guess I don't understand the
4 question.

5 Q. Have you done data assessments, have
6 you done -- you know, trend analyses, just -- just
7 generally the type of scientific analyses you did for
8 Great Bay.

9 A. I am responsible generally for 303(d)
10 impairment determinations. I work under a memorandum
11 agreement with the Estuaries Partnership to analyze
12 data for State of the Estuaries reports and develop
13 environmental indicators. Both of those tasks
14 require many different types of data analysis.

15 Q. Did you complete any water quality
16 modeling for the Great Bay Estuary?

17 A. What do you mean by modeling?

18 Q. Fate and transport of pollutants,
19 wasteload allocation evaluations.

20 A. Fate and transport of which pollutants.

21 Q. Any pollutant. Pick one.

22 A. Any pollutant?

23 Q. Yeah. Have you done fate and transport

1 modeling for any pollutant in the Great Bay Estuary?

2 A. Are you talking about being transported
3 within the estuary or within the watershed?

4 Q. Let's start within the watershed first
5 and then let's go to the estuary.

6 A. So for environmental assessments, we
7 have determined or we have done assessments of
8 pollutant loading from the watershed for nitrogen,
9 sediment -- yeah, nitrogen and sediment.

10 Q. What about any wasteload allocation
11 analysis or evaluation for the estuary as to -- as to
12 any limitations that are recommended to be placed on
13 wastewater facilities in the system?

14 A. What do you mean by wasteload
15 allocation?

16 Q. Do you know what the term wasteload
17 allocation means?

18 A. I do know what the term means legally.

19 Q. Okay. Then that's -- you know what a
20 wasteload allocation is, so have you done any
21 analyses associated with developing wasteload
22 allocations for the Great Bay Estuary?

23 A. We've done analyses of nitrogen loading

1 under different loading scenarios.

2 Q. Can you describe those analyses for me,
3 please.

4 A. How much detail would you like?

5 Q. That's up to you. Just try to answer
6 the question and we'll see if we need any more detail
7 after that.

8 A. All right.

9 Analyses of loading of nitrogen from
10 the watershed for three different -- for several
11 different year periods. The year periods that I've
12 analyzed were 2002 to 2004 for one report, 2006 to
13 2009 for another report, and then 2003 to 2004 for
14 some -- another report, 2005 -- no, 2005 to 2006 for
15 another report, and 2007 to 2008.

16 Q. Did any of these reports contain
17 recommendations with -- regarding point source
18 nitrogen limitations for discharges to the system?

19 A. The -- their -- the -- our analysis
20 related to the 2003 through 2008 period --

21 Q. Uh-huh.

22 A. -- contained a matrix of options --

23 Q. Okay. Okay.

1 A. -- for what the nutrient loading might
2 be under different scenarios. It made no specific
3 recommendations in the final report.

4 Q. Okay. Was that information provided to
5 EPA at any time?

6 A. EPA was a reviewer, along with others,
7 on that report.

8 Q. So that would be a yes?

9 A. If they reviewed the report, then it
10 was provided to them.

11 Q. Okay. Didn't you specifically provide
12 it to them via email?

13 A. I provided the report to a whole group
14 of people via email.

15 Q. Okay. I'd like you to answer the
16 question.

17 Didn't you specifically provide your
18 report to EPA as a basis for considering appropriate
19 permit limitations for the discharges?

20 A. You have two questions there.

21 MR. HALL: Could you read back the
22 question, please?

23 (The question was read by the

1 reporter.)

2 MR. MULHOLLAND: I'll object to the
3 question as compound.

4 MR. HALL: I think it's single
5 question, quite frankly, but please answer it.

6 A. I provided the report to EPA for their
7 review and for their information.

8 BY MR. HALL:

9 Q. When did you first start writing State
10 of the Estuaries reports, do you recall?

11 A. The first State of the Estuaries report
12 that I worked on was the one that was published in
13 2003.

14 Q. 2003? Okay. And who else -- are you
15 a primary author of those entire reports or partial
16 sections of those reports? Who -- who are the people
17 that write those reports other than yourself?

18 A. The report is a PREP document or an
19 Estuaries Partnership document. In 2003, it was
20 called the New Hampshire Estuaries Project and it's
21 written by the PREP staff.

22 Q. Okay. And who else -- so there's --
23 so there's sections of this report are, shall we say,

1 divvied up, different staff members write different
2 sections of the report; is that how it works?

3 A. Not always. It's a group effort.

4 Q. Okay. Can you tell me whether or not
5 you had any particular responsibility for any
6 specific sections of the 2003 report? Let's start
7 with 2003.

8 A. My duties related to the environmental
9 indicators --

10 Q. Okay.

11 A. -- and the production of the technical
12 material.

13 Q. Okay. So which environmental
14 indicators, which sections of the report on
15 environmental indicators, did you write? Can you
16 be a little more specific, please?

17 A. Do you have the report there?

18 Q. Sure. I've got a copy. This was Short
19 Exhibit 16. It's State of New Hampshire Estuaries --
20 this might be -- this is 2000. I'm sorry.

21 MR. KINDER: 17 is 2003.

22 MR. HALL: Yeah, 17 is 2003.

23 A. So what was the question again?

1 BY MR. HALL:

2 Q. Can you be a little more specific as to
3 which sections of the report that you provided the
4 analysis in?

5 A. Are you looking for things that I did
6 exclusively?

7 Q. No, any section -- well, let's start
8 with exclusively and then you can tell me what other
9 sections you had input on.

10 A. I would say nothing was done
11 exclusively.

12 Q. Okay. Well, then, thank you for
13 providing that clarification for us.

14 A. All right.

15 Q. Which sections did you provide primary
16 input on?

17 A. Yeah, I don't understand what you mean
18 by primary, but ...

19 Q. Do you understand the -- do you not
20 understand the term lead author or -- who had the
21 lead responsibility -- did you have the lead
22 responsibility for drafting any section in that
23 report?

1 A. This is a report that's produced by
2 New Hampshire Estuaries Project as a group. There's
3 no lead author. There's no author listed
4 specifically on the report.

5 Q. Okay. You really need to start
6 answering my questions, Mr. Trowbridge. I'm going
7 to be about fed up with this in about another five
8 minutes and we'll get the judge on the line.

9 MR. MULHOLLAND: Is that a question?

10 MR. HALL: No, that's a statement.

11 Could you please read back the last
12 question I gave and answer the question that I
13 stated.

14 (The question was read by the
15 reporter.)

16 A. I -- I don't know how to answer this
17 question. There are many sections of the report.
18 All of the sections were worked on as a group.

19 BY MR. HALL:

20 Q. Did you provide the initial drafts of
21 any sections of these reports?

22 A. I provided drafts of environmental
23 indicators.

1 Q. Specifically, which ones?

2 A. Let's start at the beginning then.

3 The cover page and graphic design was
4 not my lead.

5 Introduction was -- no.

6 Q. Regarding the indicators sections --

7 A. Indicators sections?

8 Q. -- which you said you had the
9 responsibility -- you had input and responsibility
10 on, which of the indicators did you provide the
11 initial drafts on?

12 A. So bacteria, the bacteria indicator, I
13 produced the graphs.

14 Q. Did you write any of the text
15 initially?

16 A. Some. Concentrations of toxic
17 contaminants in the tissues of shellfish, I provided
18 the graphs and analysis and some of the text.

19 Q. Did you provide the initial draft of
20 that section, to your recollection?

21 A. Probably. Nitrogen concentrations in
22 Great Bay, I provided the graphs and analysis and
23 some of the text.

1 Q. Okay. Let's stop right at that
2 section.

3 Were you the one that provided the
4 statement -- if you look on page 8, to the right
5 of the graph, the statement that says, despite
6 increasing concentrations of nitrite -- nitrate,
7 nitrite in the estuary, there have not been any
8 significant trends for typical indicators of
9 eutrophication, dissolved oxygen and chlorophyll-a
10 concentrations. Therefore, the load of nitrate,
11 nitrite to the bay appears to have not yet reached
12 the level at which undesirable effects of
13 eutrophication occur.

14 Were you the one that produced that
15 statement?

16 A. This statement was produced through a
17 group effort through PREP staff and also input from
18 our advisory committee.

19 Q. Okay. Do you agree with the conclusion
20 of that statement?

21 A. I agree that that's what that statement
22 says --

23 Q. Do you agree that --

1 A. -- in 2003.

2 Q. Do you agree that that was a
3 technically correct statement in 2003?

4 A. That's what the report says.

5 Q. No.

6 MR. SERELL: You know, can we go off
7 the record? That is -- that is such a direct
8 question.

9 (Off-the-record discussion.)

10 MR. MULHOLLAND: You can answer that
11 question if you can put yourself in a 2003 mindset, I
12 guess.

13 A. So you're asking did I agree with this
14 statement in 2003?

15 MR. MULHOLLAND: I think he says is
16 this a -- in 2003, was that a technically accurate
17 question.

18 MR. HALL: Technically correct --

19 MR. MULHOLLAND: Technically correct.

20 MR. HALL: -- statement.

21 THE WITNESS: It was what was agreed
22 upon as the answer.

23 MR. MULHOLLAND: I think that's a

1 fair --

2 MR. HALL: Can you read the question
3 back? I didn't ask whether or not it was agreed
4 upon; I asked whether or not you concurred.

5 MR. MULHOLLAND: Are we back on the
6 record?

7 MR. HALL: Yes, we're back on the
8 record. I asked whether or not you concurred, since
9 you had major input on this section, you drew the
10 graph, whether or not you concurred that that is a
11 technically correct statement in that document on
12 that page, on page 8. Yes or no.

13 THE WITNESS: I think that's not a
14 simple question, you know. This is a report that's
15 written by many people, with input from many people,
16 and it reflects what the group decided the report
17 should say and what I think about it is irrelevant.

18 MR. SERELL: We think it's relevant.
19 So answer the question.

20 MR. MULHOLLAND: I --

21 MR. HALL: Evan, do you want --

22 MR. MULHOLLAND: Can we go off on the
23 record?

1 MR. HALL: No, back on the record.

2 BY MR. HALL:

3 Q. Mr. Trowbridge, have you ever been
4 deposed before?

5 A. No.

6 MR. HALL: Okay. Evan, could you --
7 could you please explain to your witness what he's
8 supposed to do in a deposition when a question is
9 asked.

10 MR. MULHOLLAND: Yeah. We're still on
11 the record. You have to answer the question. I
12 mean, if it's a question that I don't object to, you
13 have to do your best to answer it. If you can't
14 answer it, you can't answer it, but if you can, you
15 have to.

16 THE WITNESS: Right.

17 MR. MULHOLLAND: Okay.

18 THE WITNESS: Well, I can't answer it
19 because I don't remember what I thought in 2003.

20 BY MR. HALL:

21 Q. Do you have an opinion as to -- today
22 whether or not that's a technically correct
23 statement?

1 A. Based on the information that's
2 available in -- for this report, for the 2003 report?

3 Q. That up through 2003, the estuary
4 had no significant indications of excessive
5 eutrophication -- of eutrophication occurring.
6 That's what it says. Typical indicators of
7 eutrophication are not occurring.

8 A. Uh-huh.

9 Q. Was that a correct statement in 2003?

10 A. It's hard to go back in time on this.
11 You know, there's a lot of information that was --
12 there's only limited information that was available
13 at that time.

14 Q. Based on information you have today, is
15 that statement made in 2003 in error?

16 A. I don't know.

17 Q. You have no idea?

18 A. There's just too many assumptions
19 involved in this question about what I --

20 Q. Name one.

21 A. -- about what I might know and what
22 I might -- what information you have and you don't
23 have.

1 Q. Name a single assumption that's in this
2 question.

3 A. The question -- the assumption is that
4 we only know what we knew in 2002. It's hard to go
5 backwards --

6 Q. No --

7 A. -- and erase --

8 Q. -- my question is knowing what you know
9 today, was that statement made in 2003 in error, yes
10 or no.

11 A. I don't believe it was made in error.

12 Q. Well, that was a fairly straightforward
13 answer. Thank you.

14 Now let's go -- let's keep going.
15 Let's see what other sections of the report that
16 you've written and whether or not you agree or
17 disagree with the conclusions today.

18 A. Okay. Indicator 4, dissolved oxygen
19 levels, I produced graphs, tables, some of the text.

20 Q. And who else was responsible for
21 writing -- did you produce the initial draft of
22 this text, to your knowledge?

23 A. Some of it.

1 Q. No, well -- oh, so when an initial
2 draft is done, what do you do? Who had the lead role
3 in writing the initial draft that you then circulate?
4 Did you have that lead role?

5 A. There were different -- in each
6 indicator, there's different text blocks. We have
7 questions, answers, why this is important,
8 explanation, possible reasons --

9 Q. Did you write the --

10 A. -- goals --

11 Q. Did you write the Explanations section?

12 A. Yes, the explanations section.

13 Q. Did you write the why this is important
14 section?

15 A. I don't recall.

16 Q. Did you write the possible reasons
17 section?

18 A. I don't recall.

19 Q. I'd like you -- to draw your attention
20 to the statement of the possible reasons. The causes
21 of sporadic -- and we're on page 10 of Exhibit?

22 MR. KINDER: 17.

23 MR. HALL: 17. Thank you.

1 BY MR. HALL:

2 Q. The causes of sporadic load dissolved
3 oxygen concentration are not known. Blooms of algae,
4 respiration of vented organisms, oxygen in demand
5 from wastewater treatment plants' effluent can
6 deplete oxygen in the water. In some cases, the low
7 concentrations may be a natural phenomenon.

8 Did you write that statement?

9 A. I'm not sure because this final text
10 had been -- had been subject to revisions by PREP
11 staff as well as our advisory committee. So the
12 exact wording, I don't know if I wrote it first or
13 if it was what was written as part of a group effort.

14 Q. Is the statement there accurate
15 technically? Is there anything with that statement
16 that is in error, in your opinion?

17 MR. MULHOLLAND: Objection. Currently
18 or then?

19 MR. HALL: Let's start with then and
20 then I'll ask currently.

21 MR. MULHOLLAND: Okay.

22 A. As I said, and for the previous
23 response, this final text was what was agreed upon at

1 the time. I do not believe it was in error at the
2 time.

3 BY MR. HALL:

4 Q. Do you believe it's in error today?

5 A. I would say that in some areas of the
6 estuary there's been more detailed study that allows
7 us to be more detailed.

8 Q. Okay. Can you explain that answer,
9 please.

10 A. There's been a recent study done by
11 HydroQual on the Squamscott River that had some more
12 specific recommendations about the causes of
13 dissolved oxygen impairments in the Squamscott River.

14 Q. And were the causes described as
15 anything different than what is contained in that
16 statement?

17 MR. MULHOLLAND: Objection.

18 BY MR. HALL:

19 Q. To your recollection.

20 MR. MULHOLLAND: Which statement?

21 There's three questions.

22 MR. HALL: The HydroQual.

23 MR. MULHOLLAND: Which statement in the

1 document?

2 MR. HALL: The one with possible
3 reasons that I just read out, the causes of sporadic
4 low DO are not known.

5 MR. MULHOLLAND: That's it.

6 A. So, right. There's a -- their study
7 has information about what is known about the causes,
8 so the statement that they are not known is not
9 accurate.

10 BY MR. HALL:

11 Q. Do you agree with the conclusions of
12 the HydroQual study that was provided to DES?

13 MR. MULHOLLAND: Objection. Which
14 study?

15 MR. HALL: The very study that
16 Mr. Trowbridge is referring to.

17 A. To which conclusions?

18 BY MR. HALL:

19 Q. The conclusions presented in the
20 HydroQual report.

21 A. All of them?

22 Q. Yes.

23 A. I don't agree with all of them.

1 Q. Which ones don't you agree with?

2 A. I'd need to see the report to tell you
3 that.

4 Q. From your recollection, which ones
5 don't you agree with?

6 A. The data from the HydroQual study is
7 still undergoing quality assurance checks.

8 Q. All right. Is data a conclusion?

9 A. So we haven't completed our full
10 review, but there are conclusions in there that we
11 don't agree with.

12 Q. Okay. The HydroQual report
13 specifically concluded that the load DO in the system
14 was not directly related to high algal levels.

15 Did you disagree with that conclusion?

16 A. That's not my recollection of their
17 conclusions.

18 Q. Well, what is your recollection of the
19 conclusion?

20 A. That there was conclusions in that
21 report about nutrient-related algal growth in the
22 river relating -- leading to dissolved oxygen
23 depletion.

1 Q. The specific conclusion I was pointing
2 to is whether or not high algal levels were
3 responsible for the low DO conditions in the
4 Squamscott. The report, I know, specifically
5 concluded there was no direct relationship and that
6 the data showed the lowest DOs occurred with the
7 lowest algal levels and the high DOs occurred with
8 the higher algal levels. Do you understand that
9 report to have told you something different than
10 that?

11 A. There's a lot of information in that
12 report and I -- I think there are other conclusions
13 that can be drawn from it.

14 Q. Well, we'll get back to this point when
15 we redo this deposition, when we restart this
16 deposition, after we get a chance to look at that
17 report so we can walk you through page by page and
18 find out precisely which conclusions you agree and
19 don't agree with.

20 Let's -- what about the Lamprey River?
21 Do you have information showing that this statement
22 is incorrect as it applies to the Lamprey River?

23 MR. MULHOLLAND: Objection. Which

1 statement?

2 MR. HALL: The possible reasons or
3 causes of sporadically low DO concentrations are not
4 known and, in some cases, the low concentrations may
5 be a natural phenomenon.

6 A. Uh-huh. Yes, there's been some more
7 recent studies on the Lamprey River that indicate
8 that there is a -- some salinity stratification that
9 affects dissolved oxygen in the Lamprey River.

10 Q. Is that directly caused by algal
11 blooms, that salinity stratification?

12 A. The stratification itself is not caused
13 by algal blooms.

14 Q. Is the stratification a natural
15 condition in that system?

16 A. Do you consider a dam to be a natural
17 condition?

18 Q. It's part of the existing setting.
19 Yeah, let's leave the dam as part of the natural
20 condition.

21 A. I would argue that's not natural, it's
22 the existing condition. I guess flushing is an
23 important consideration related to salinity.

1 Q. So you're telling me that the dam on
2 the Lamprey River causes the stratification in the
3 system?

4 A. No. I'm asking for clarification on
5 what you mean by natural.

6 Q. Mr. Trowbridge, I asked you whether or
7 not the stratification was a natural condition, then
8 you said what about the dam. That's not natural.
9 Then I asked you if the dam causes the
10 stratification. You said, no, not really. So do
11 you want to tell me why you brought up the dam as a
12 relevant point to my question when you knew the dam
13 did not have an effect on stratification?

14 MR. MULHOLLAND: Objection to the
15 question.

16 MR. HALL: I'd like to know.

17 MR. MULHOLLAND: If you can answer, you
18 have to.

19 A. I -- I was asking you for clarification
20 of what you meant by natural condition.

21 MR. KINDER: Wait. Can I just say
22 something for the record?

23 We -- we've spent a lot of time on

1 questions where Mr. Trowbridge has ultimately agreed
2 that none of his concerns had anything to do with the
3 answer. So in terms of the timing of this
4 deposition, I just want to put you on notice that
5 we can't be held to a limitation when there's an
6 uncooperative witness.

7 MR. HALL: I'll -- for the record,
8 given the questions I have, this is probably going to
9 go for four days. So I'll be back up for -- I'll be
10 back up for a solid week and I hope we can put the
11 block of time in it'll take as necessary to get to
12 the bottom of the answers.

13 BY MR. HALL:

14 Q. Now, let's go back to my question.

15 Is the stratification condition in the
16 Lamprey River a natural condition? Yes or no.

17 A. As I asked before, what are you
18 considering to be natural? Is it natural that
19 there's a dam there?

20 MR. KINDER: Didn't we just do this?

21 Q. What part of -- you just told me that
22 was an irrelevant point to the question did you
23 not -- what are you missing, Mr. Trowbridge? Let's

1 try it one more time.

2 What specifically affects
3 stratification in the Lamprey River, do you know?

4 A. Stratification --

5 Q. Yeah.

6 A. -- is affected by flushing, it's
7 affected by topography and --

8 Q. Let's go one at a time. Every single
9 time you -- stratification. Is flushing -- is that a
10 natural condition? The amount of tidal exchange into
11 the system, is that natural?

12 A. The amount of tidal exchange is
13 natural.

14 Q. Okay. Let's go to the next one,
15 topography. The topography where the stratification
16 occurs, is it natural?

17 A. Uh-huh.

18 Q. What else? What other things affect
19 the stratification in that system?

20 A. The freshwater inflow.

21 Q. And that comes down through the system?

22 A. Uh-huh.

23 Q. Okay. And you have data showing

1 that the freshwater inflow to this system controls
2 whether and how the stratification will occur under
3 typical conditions in the Lamprey River?

4 A. I am saying that, in general,
5 freshwater inflow is an important factor in terms
6 of stratification.

7 Q. I'm asking for this particular system.
8 Under the conditions where we've got the low DO
9 occurring in the Lamprey River, are you telling me
10 that the freshwater flow is what's controlling that
11 low DO occurring?

12 A. What I'm saying is that's a factor
13 that's part of the answer.

14 Q. Okay. Now, which of these things,
15 which nonnatural factor, is causing the
16 stratification to occur in the Lamprey River, which
17 is causing the low DOs to occur in the Lamprey River,
18 which nonnatural factor?

19 A. Are you asking about the stratification
20 or about the low DO?

21 Q. A combination. Let's start with
22 stratification.

23 A. Okay.

1 Q. Which nonnatural factor is controlling
2 the stratification in the system?

3 A. I don't know.

4 Q. Do you know if any nonnatural factor is
5 controlling stratification?

6 A. I don't know. I -- the reason I'm
7 raising the issue of flushing is that it's just a
8 factor that needs to be considered related to
9 stratification.

10 Q. So when you're raising this issue,
11 you're just guessing because you just told me --

12 A. No.

13 Q. -- you don't know, right?

14 A. I am explaining the factors that are
15 involved in making that kind of assessment.

16 MR. MULHOLLAND: Can we take a short
17 break?

18 MR. HALL: Absolutely.

19 MR. KINDER: Yup.

20 (Recess taken from 9:50 a.m. until
21 9:54 a.m.)

22 MR. HALL: We're back on the record.

23 Where were we on the last question?

1 (The question and answer were read by
2 the reporter.)

3 BY MR. HALL:

4 Q. Regarding the statement that some of
5 the DO conditions in these tidal rivers, I presume,
6 may be caused by natural conditions, can you provide
7 a little more explanation as to what -- what was
8 meant by that statement, if you know?

9 A. Yeah, I don't know.

10 Q. Can you tell me what kind of natural --
11 what type of natural condition could cause low DO in
12 the system?

13 A. I think there are many, but I'm not
14 sure exactly.

15 Q. Well, tell me what they are. I mean,
16 you were very happy to give us the list of all these
17 other things that you thought were impacted, the
18 stratification in the system, so you're the scientist
19 that they hired to do the analysis of the technical
20 data. Give me an idea of what you know on natural
21 conditions that can cause low DO in a tidal estuary.

22 A. There can be low DO in some salt
23 marshes.

1 Q. And how can that affect the DO in the
2 rivers?

3 A. It can affect the river in some cases.

4 Q. How does that happen? I mean, what --
5 what allows a marsh to affect the river?

6 A. Tidal interchange.

7 Q. Okay. And when you say tidal
8 interchange, you mean the water flows into the marsh
9 at a higher DO, the marsh causes the DO to drop, and
10 then when the water ebbs back out of the marsh, the
11 water exiting the marsh is then -- has low dissolved
12 oxygen and that drops the DO in the river, correct?

13 A. That's one pathway that that can
14 happen.

15 Q. Okay. Can you give me another pathway?

16 A. Groundwater.

17 Q. Okay. Could you explain how that
18 happens?

19 A. Water moves through the ground or the
20 vadose zone and then enters the estuary through
21 subtidal exchange.

22 Q. Okay. Anything else that you can
23 think of that can cause a -- how and why does

1 stratification trigger a low DO condition in a
2 tidal system? Can you explain that to us?

3 A. Stratification results in stagnant
4 water in which the oxygen can be depleted without
5 being refreshed.

6 Q. Okay. And where -- where does this
7 oxygen deletion occur? Does it occur through the
8 entire water column in the river or does it just
9 occur in the area where the stratification is
10 occurring?

11 A. It occurs in the area where the
12 stratification exists.

13 Q. Okay. Which of the tidal rivers
14 experience significant stratification, do you know?
15 I mean, when I talk about tidal rivers -- let's go
16 one by one.

17 Do you know if the Squamscott River
18 experiences any significant stratification?

19 A. I don't know.

20 Q. Okay. What about the Lamprey?

21 A. The Lamprey does experience
22 stratification under certain conditions.

23 Q. Okay. Oyster, Oyster River?

1 A. I don't know.

2 Q. Bellamy?

3 A. I don't know.

4 Q. Winnicut?

5 A. I don't know.

6 Q. Cocheco?

7 A. I don't know.

8 Q. Upper Piscataqua?

9 A. I don't know.

10 Q. Okay. Is the -- can you explain the
11 reason you don't know? Is it -- is it because
12 research hasn't been done on that issue for those
13 rivers or you're just not familiar with what research
14 has been done for the area on that question?

15 A. To my knowledge, detailed studies of
16 stratification have not been done on those other
17 rivers.

18 Q. Okay. Is -- the only river with
19 the detailed study on stratification is the Lamprey?

20 A. Yes.

21 Q. Okay. In terms of factors affecting
22 oxygen loss in a river system, are some of those
23 factors that can -- one of them is sediment oxygen

1 demands, correct?

2 A. Yes.

3 Q. Okay. Is sediment oxygen demand
4 affected by natural as well as manmade sources?

5 A. It can be.

6 Q. Okay. For -- let's go river by river.
7 For the Squamscott River, do you know
8 how much of the sediment oxygen demand in that
9 river -- well, first question is do you know how
10 much the sediment oxygen demand is in that river?

11 A. No.

12 Q. Okay. This will be an easy one. Have
13 sediment oxygen demand studies been done on any of
14 the major tidal rivers to the estuary, to your
15 knowledge?

16 A. Not to my knowledge.

17 Q. Okay. And -- all right. So we don't
18 have sediment oxygen demand studies.

19 Do we have any idea of how much
20 sediment oxygen demand could be caused by algal
21 growth in those systems at this time?

22 A. No.

23 Q. No. Do we know how much sediment

1 oxygen demand is caused by the -- what I'll say the
2 natural runoff, leaf material and other things that
3 happen in these systems from the watershed?

4 A. No.

5 Q. Okay. So it -- if you don't know the
6 sediment oxygen demand and you -- and we don't --
7 let's take the Squamscott as an example. If we don't
8 know the sediment oxygen demand and we don't know the
9 stratification question, how do you determine the
10 Squamscott River, how much of the low DO is caused by
11 algal growth versus other natural factors -- or other
12 factors, just make it, natural or not.

13 A. Uh-huh. You're asking to determine the
14 causes of the low DO?

15 Q. No. Yeah. There's low DO in the
16 Squamscott River, right?

17 A. Yes.

18 Q. And it can be caused by a number of
19 factors, correct?

20 A. Yes.

21 Q. All right. How can we know at this
22 point in time how much of that low DO is caused by
23 algal growth versus other factors if we haven't

1 analyzed the other factors that affect DO in the
2 system?

3 A. We don't have the information to do
4 that analysis.

5 Q. All right. That's what I thought. I
6 mean, it's -- and that was one of the reasons why the
7 HydroQual study was initiated, right, to try to gain
8 some further insight as to what was affecting the DO
9 regime in the Squamscott River?

10 A. I don't know why that study was done.
11 I mean, I know it was part of a plan for the
12 Squamscott River, but I don't know the exact
13 motivation.

14 MR. HALL: Evan, could we go outside
15 for one more minute?

16 MR. MULHOLLAND: Okay.

17 MR. HALL: Off the record.

18 (Off-the-record discussion.)

19 MR. HALL: We're back on the record. I
20 think counsel for Mr. Trowbridge may have refreshed
21 his recollection as to the -- what may have occurred
22 for the -- on the last question.

23 Could you please read that question

1 back and let's -- and let's see if we have a somewhat
2 more enhanced response from Mr. Trowbridge.

3 (The question was read by the
4 reporter.)

5 THE WITNESS: I would say it was not
6 my report, but that's my understanding that was the
7 purpose of the study.

8 BY MR. HALL:

9 Q. Okay. Thank you.

10 Can I ask you another couple questions
11 about the 2003 report that go back to -- is that
12 Exhibit 17?

13 MR. KINDER: It's Short 17.

14 MR. HALL: 17, yeah.

15 BY MR. HALL:

16 Q. Did you flip to the -- actually, let me
17 ask you one more question about the HydroQual.

18 Has DES completed any review or
19 critique of the HydroQual report yet?

20 A. Are you referring to the Squamscott?

21 Q. Yeah, Squamscott River, the same one,
22 yeah.

23 A. No, we have not.

1 Q. Do you have any idea when -- when
2 such analysis or feedback on that report might be
3 completed?

4 A. I don't know.

5 Q. Okay. Have you been asked to complete
6 an analysis or review of that report?

7 A. No.

8 Q. Who -- who would need to -- I should
9 have asked you this earlier, Mr. Trowbridge, and I
10 apologize. Who's your direct supervisor?

11 A. Gregg Comstock.

12 Q. Okay. And who does he answer to?

13 A. Ted Diers.

14 Q. And who does Ted Diers answer to?

15 A. Harry Stewart.

16 Q. Okay. Has either Ted Diers,
17 Harry Stewart, or Mr. Comstock asked you to complete
18 a review of the HydroQual report that was submitted?

19 A. We have been asked to -- or I have been
20 asked to review the report and we completed a review
21 of it from a data quality perspective.

22 Q. Okay.

23 A. And we have just recently received

1 some new data from Dean Pechel, but I have not done
2 anything with that and I've not been asked to follow
3 up yet.

4 Q. All right. Do you expect to be asked
5 to follow up on the conclusions of the report as to
6 whether or not they're appropriate or reasonable?

7 A. I expect to be asked to follow up and
8 complete a review of the report.

9 Q. Okay. And once that's done, I would
10 expect that the results of that would be released to
11 the -- to HydroQual and the coalition members, right?

12 A. Yes.

13 Q. Thank you.

14 Can I draw your attention to -- let's
15 go to the eelgrass. That's indicator 7. Can you
16 tell me what your role was in writing that section.

17 A. As with other sections, I produced the
18 graph and some of the text.

19 Q. Okay. Did you get much input on that
20 section from Dr. Short, to your recollection?

21 A. The -- Dr. Fred Short provided the
22 data --

23 Q. Okay.

1 A. -- for the graph and he was part of the
2 advisory committee that reviewed the report.

3 Q. Okay. At this point in time, based on
4 that graph, are the eelgrass meadows in Great Bay
5 considered in a healthy condition, an unhealthy
6 condition? The statement is the eelgrass covering
7 Great Bay has been relatively constant for the past
8 ten years at approximately 2,000 acres, and I guess
9 it talks about an earlier dramatic decline in 1989
10 due to wasting disease.

11 A. Uh-huh.

12 Q. What -- do you have any recollection as
13 to whether or not the eelgrass beds in Great Bay were
14 considered healthy at this point?

15 A. I think the statement in the report
16 that it's -- that the cover has been relatively
17 constant over the last ten years and that there's
18 been a recovery is an accurate statement based on the
19 data that was available at the time.

20 Q. Okay. So, well, I guess back to my
21 question. Do you know whether or not this was
22 considered -- the condition in the estuary at this
23 point this time for eelgrass was -- now, when I say

1 estuary, I need to be careful because there's a lot
2 of different areas --

3 A. Yeah.

4 Q. -- for Great Bay, that the eelgrass
5 populations in Great Bay were considered to be in a
6 healthy condition at this point?

7 A. The data on this graph is only for
8 Great Bay itself.

9 Q. Right --

10 A. Yeah.

11 Q. -- which is why I was only asking about
12 Great Bay. You can't ask about Little Bay or
13 something like this for this graph.

14 A. I think the only information we had for
15 this graph was the extent of the -- of the resource
16 and so that's why the statements are about how far --
17 how many acres of eelgrass there were. So there are
18 no statements regarding the health.

19 Q. Yeah, but I'm -- on this indicator,
20 doesn't -- isn't this indicator saying that the
21 eelgrass population in the bay at this point is
22 considered in good condition? I mean, it's to your
23 knowledge. This is an indicator report.

1 A. Yeah.

2 Q. What's it indicating?

3 A. Right. It's indicating that the amount
4 of eelgrass in the bay has been relatively constant.

5 Q. All right.

6 A. That's what it --

7 Q. So it hasn't declined?

8 A. Right.

9 Q. And if it had declined, it could be
10 unhealthy; if it hasn't declined, it's staying in
11 whatever condition it's been in for quite a while?

12 A. I -- I can only really say what the
13 indicator shows us, which is how much eelgrass there
14 is. The health of the eelgrass is something that's a
15 different type of information that you get from like
16 more detailed field studies which are not part of
17 this indicator.

18 Q. Wasn't this the basic purpose of this
19 report, to give you an idea whether or not you were
20 having impacts or adverse impacts on the bay
21 resources?

22 A. I guess I draw your attention to the
23 question of the indicator which is has the habitat

1 changed over the past ten years. We're saying no.
2 The eelgrass cover has remained relatively constant.

3 Q. Okay. To your knowledge, do you know
4 if -- if PREP or DES considered the eelgrass resource
5 impaired at this time?

6 A. Impaired in a 303(d) listing sense?

7 Q. Let's use that as -- yes, in a 303(d)
8 listing sense. Let's try that.

9 A. No.

10 Q. Okay. Actually that's the same
11 answer Fred Short gave and everyone else that's
12 looked at the graph, so you're in good company
13 with that response. And that is my testimony, not
14 Mr. Trowbridge's, just giving a little feedback on
15 that.

16 Could I have that document back,
17 please? Just -- I don't think you need that any
18 longer. Appreciate it.

19 With regard to, let's see, your
20 responsibilities, we've talked about PREP a little
21 bit and you mentioned, of course, you've been working
22 with DES since 2001. Were you also part of any
23 technical advisory committees with regard to

1 Great Bay?

2 A. PREP has a Technical Advisory
3 Committee --

4 Q. Uh-huh.

5 A. -- and I serve as staff to that
6 committee.

7 Q. Okay. Are you the primary technical
8 staff assigned to that committee? I mean, who are
9 the technical staff assigned to that committee?

10 A. I am the -- I am -- you know, I'm the
11 technical staff. Other PREP staff do come to that
12 committee and provide input as relevant.

13 Q. Okay. But would you describe yourself
14 as the lead technical person from DES on that
15 committee?

16 A. From DES or from PREP?

17 Q. You know, it -- it's so confusing
18 because you're both.

19 Let's --

20 A. Because --

21 Q. The lead -- who, other than yourself,
22 is the primary technical person on -- on the PREP
23 TAC?

1 A. No one. I'm the primary person for
2 PREP.

3 Q. Okay. There, that's -- and at DES, in
4 terms of Great Bay technical issues and evaluations,
5 are you the lead person that basically gets the
6 technical evaluations done for what's -- for the
7 various reports that are done?

8 A. In this case, for the 303(d) listings,
9 I do the 303(d) determinations for the tidal waters,
10 which includes Great Bay, Hampton-Seabrook Harbor,
11 Rye Harbor, and the Atlantic Ocean.

12 Q. And data analysis, I know that you've
13 mentioned that you're responsible for preparing
14 numerous graphs which, by the way, a lot of work goes
15 into those, in the State of the Estuaries report.
16 Are you the one that's responsible for doing the data
17 analysis from the information collected on Great Bay
18 or is this at DES or is this someone else who has
19 that primary responsibility?

20 A. Where I have trouble with these
21 questions is about primary responsibility because I
22 do those analyses, but I work with a number of people
23 at DES and at PREP and with the advisory committee on

1 these analyses and I don't feel that it's fair to say
2 that I do them primarily or exclusively.

3 Q. And I think maybe you're -- we're
4 having a problem with some of the terms.

5 I'm not suggesting you're the
6 only person providing the input or reaching the
7 conclusions or any of that, but on numerous documents
8 that we've looked at, and there's a lot of them, your
9 name is the one that appears on them?

10 A. Uh-huh.

11 Q. And so I gather that you had the
12 primary responsibility for the development, you know,
13 you're not responsible for every single word that's
14 in there, I know that, but I'm trying to understand
15 who else at DES is doing the detailed technical
16 analysis other than you on Great Bay.

17 A. I would say that I am the primary
18 person --

19 Q. Okay.

20 A. -- as you defined it. I do need to
21 emphasize that I work with lots of other people.

22 Q. No, I -- I appreciate that. No one --
23 no one is -- at least in any agency that I was ever

1 familiar with -- is the sole person writing something
2 and getting something out. They take info from a lot
3 of people. But I was -- I was trying to make sure
4 that we shouldn't have somebody else here for a
5 deposition also that, you know, is there another
6 person that if I were looking at these PREP reports,
7 someone else prepared these graphs or had the data
8 analysis and I should ask that person about it. But
9 it sounds like when it comes to data analyses for
10 Great Bay, you're the person we should start with, at
11 least in terms of asking questions as to basis and
12 background for the information in the report. Does
13 that sound fair?

14 A. Yes.

15 Q. Okay. With regard to the -- so you
16 were involved with the TAC committee. Were you --
17 did you have any lead responsibility on numeric
18 nutrient criteria development for Great Bay?

19 A. Yes.

20 Q. Okay. What about -- and the impairment
21 lists for Great Bay Estuary, was that your lead
22 responsibility also?

23 A. Yes.

1 Q. Peer review, interesting question
2 that's come up. You know that the -- after the
3 nutrient criteria documents came out, there was
4 supposed to be a peer review developed on -- or
5 conducted for that document, correct?

6 A. I think there's been several different
7 peer reviews.

8 Q. Well, a peer review was planned with
9 some outside scientists and EPA was going to let the
10 contract forward, correct?

11 A. Oh, this is -- you're talking about the
12 peer review that was organized by EPA?

13 Q. Hmm, yes.

14 A. Through Tetra Tech.

15 Q. Right. Okay. Were you involved in any
16 of the back-and-forth with the communities asking to
17 be involved in that peer review process, the one that
18 EPA --

19 A. You mean like correspondence?

20 Q. Well, let me be more specific. That's
21 too general a question.

22 You know that the communities requested
23 to be directly involved in that peer review, correct?

1 A. There is letters to that effect.

2 Q. Yeah. Okay. Did you have any
3 discussions with anybody at EPA Region 1 regarding
4 the communities' request to be directly involved in
5 that peer review?

6 A. I don't recall.

7 Q. Do you have -- do you recall any
8 discussions -- and they don't have to be direct ones
9 that you had with EPA -- that would explain why EPA
10 did not allow the communities to be involved in that
11 peer review?

12 MR. MULHOLLAND: Objection. That's a
13 confusing question.

14 Q. If you can answer. Do you know why EPA
15 did not allow the communities to be involved in that
16 peer review?

17 A. No.

18 Q. Who do you think might have information
19 on that question? Was that -- was that issue that
20 was being dealt with, shall we say, above your pay
21 grade?

22 A. I -- yeah, I don't know.

23 Q. Do you know if Ted Diers was involved

1 in those discussions?

2 A. I don't know.

3 Q. Do you know if Harry Stewart was?

4 A. I don't know.

5 Q. What -- and, of course, you wouldn't
6 know if Commissioner Burack were involved in those
7 discussions, right?

8 A. No.

9 Q. Paul Currier?

10 A. (Shrugging shoulders.)

11 Q. You don't know. I mean, you were
12 basically out of that group, shall we say --

13 A. In terms of final discussions, yes.

14 Q. What about in terms of preliminary
15 decisions, any part of the decision? Did you
16 recommend that the communities be allowed to
17 participate in the peer review? Do you recall if
18 you --

19 A. My involvement was in setting up
20 the -- arrangement for a peer review with EPA --

21 Q. Okay.

22 A. And trying to obtain the resources for
23 that.

1 Q. Okay. And after that, the letters came
2 in and you weren't in the middle of that discussion,
3 I gather?

4 A. Yeah, I don't recall.

5 Q. Okay. Well, thank you.

6 I need to ask you, in terms of -- you
7 mentioned you're the lead person in several areas on
8 several documents. In terms of other -- other key
9 people you took input from, was Dr. Fred Short a
10 person that provided a lot of input on the eelgrass
11 impairment and the nutrient criteria issue?

12 A. Dr. Fred Short as a member of our
13 advisory committee, so he provided input in that
14 capacity. He also provided data on eelgrass.

15 Q. Was he involved more than other TAC
16 members? In other words, did you have more frequent
17 input from Dr. Short than you did from, say,
18 Dr. Jones or Dr. Langan or Dr. Pennock?

19 A. That's hard to say. There's a -- it
20 was a very large advisory committee and some people
21 were more engaged than others and some members who
22 provide data, we need to have greater input and
23 interaction with them about the data.

1 So I would say that Fred Short was a
2 very active participant and we've had a fair amount
3 of contact with him.

4 Q. Did you rely on Dr. Short's claims
5 regarding the causes of eelgrass decline for the
6 estuary?

7 A. In -- in --

8 Q. Let me qualify.

9 A. -- a context --

10 Q. Let me qualify. We've got dozens of
11 emails --

12 A. Uh-huh.

13 Q. -- and I could look through them, and I
14 will end up going through a few of them with you, but
15 the emails -- Dr. Short, in his emails, is repeatedly
16 telling you that nitrogen is the primary cause of the
17 eelgrass declines in the estuary. I never saw any
18 data that he actually provided you showing or
19 analyses of data for Great Bay that showed that that
20 was the case, but he repeatedly sent emails to you
21 on that regard and I guess my question is were you
22 relying in your analyses on Dr. Short's assertion
23 that nitrogen was the cause of the eelgrass decline

1 in Great Bay and in the system?

2 MR. MULHOLLAND: Objection. Relying
3 for what?

4 MR. HALL: Relying for -- in preparing
5 impairment reports, in nutrient criteria documents,
6 either of those.

7 A. What I would say in response to that
8 question is that we received data from Fred Short, we
9 received literature citations from Fred Short, and we
10 received his personal opinions as an eelgrass expert,
11 but we made our own decisions.

12 BY MR. HALL:

13 Q. How much input did you get from CLF
14 regarding the nutrient criteria document and the
15 impairment listing?

16 A. Are you talking about like written
17 things or --

18 Q. Written, verbal, calls, emails.

19 A. Okay.

20 Q. How much input did you get from them?

21 A. Well, CLF is not a member of our
22 advisory committee, but they were -- we expanded
23 our advisory committee when we were working on the

1 nutrient thresholds to include interested parties,
2 which were many of the municipal -- municipalities.
3 It also included CLF, and so they participated in
4 those meetings and provided comments like other
5 members of the advisory committee and we received
6 written comments on our 303(d) -- draft 303(d) list
7 from CLF.

8 Q. Okay. Did other -- did other
9 participant -- any other participant threaten either
10 the State or EPA with legal action if you didn't make
11 the changes they wanted?

12 MR. MULHOLLAND: Objection. Other
13 than?

14 MR. HALL: Other than CLF. Thank you.

15 A. I -- I don't -- I don't know.

16 BY MR. HALL:

17 Q. You are aware that CLF threatened EPA
18 that they needed to change the impairment designation
19 of Great Bay to nitrogen-impaired or they would sue
20 them, right? You're aware of that?

21 A. Yes, I am aware of that.

22 Q. And you're aware that you sent an email
23 back that said, sure, we'll make that change, we were

1 planning on making it in 2010, but we'll make it now?

2 A. Do you have something you can show me
3 about that?

4 Q. Certainly.

5 Actually, before I show it to you, were
6 you aware that EPA called up the State and indicated
7 that the -- that they wanted you to change an
8 impairment listing to nitrogen-impaired because of a
9 threatened CLF lawsuit?

10 MR. MULHOLLAND: Objection. Could you
11 be a little more specific? Maybe date, time.

12 MR. HALL: In November of 2008.

13 A. I don't recall. There's been a lot of
14 phone calls and emails.

15 BY MR. HALL:

16 Q. This is Deposition Exhibit 34 from
17 Currier.

18 To avoid a lawsuit -- this is from
19 Gregg Comstock to Currier, to you. It says, hi all,
20 Al Basile just called. To avoid a potential with
21 CLF, EPA has decided that Great Bay should be listed
22 for N.

23 Trowbridge response at the top, we

1 would most certainly list Great Bay as impaired in
2 2010, so this really is just a timing issue.

3 Do you recall that?

4 MR. MULHOLLAND: Take your time.

5 MR. HALL: And, please, take your time,
6 yes.

7 A. So what are you saying, this is Gregg's
8 email?

9 BY MR. HALL:

10 Q. Right. The email on the bottom is
11 Gregg saying he got a call and then the email on the
12 top is, yeah, and then saying, so what do we do, and
13 then your response is up at the top. We weren't
14 provided with anybody else's responses, so yours is
15 the only one I have.

16 A. It does appear that I wrote this email
17 in 2008. I guess I've forgotten what the original
18 question was.

19 Q. Okay. I'd like this marked as Exhibit
20 56.

21 Mr. Trowbridge, do you recognize that
22 document?

23 A. Yes, I do.

1 Q. Okay. Can you -- for the record, can
2 you tell us what that document is?

3 A. Yes. This is an amendment to the
4 New Hampshire 2008 section 303(d) list related to
5 nitrogen in eelgrass in the Great Bay Estuary --

6 Q. Okay.

7 A. -- done by the State of New Hampshire
8 dated August 13th, 2009.

9 Q. And it indicates it was prepared by
10 you, right?

11 A. Correct.

12 Q. Okay. Did that document identify
13 Great Bay as impaired for eelgrass?

14 A. Let me double-check.

15 Sorry. One point of clarification.
16 For eelgrass, you mean estuarine bioassessments?

17 Q. Yes.

18 A. Yes.

19 Q. And did it identify nitrogen as the
20 cause for the eelgrass impairment?

21 A. Let me answer the first question first.
22 There's a lot of things in this report.

23 Q. Yeah, but I think you know the answer.

1 The answer is yes. It certainly did this.

2 A. There are several drafts of this
3 report. I just want to be clear.

4 MR. MULHOLLAND: Take your time.

5 THE WITNESS: Yeah.

6 BY MR. HALL:

7 Q. I can direct your attention, page 38,
8 Table 4D.

9 A. Yeah. For the Great Bay, the category
10 for estuarine bioassessments was 5-P, which is
11 impaired.

12 Q. What about for nitrogen? Did it
13 identify Great Bay as impaired for nitrogen? That's
14 similarly on page 38.

15 A. Oh, you're looking at those summaries.

16 Q. Yeah, those summaries are sometimes
17 easier to look at, I find.

18 A. Nitrogen related to the biological and
19 aquatic community integrity standard was listed as
20 5-M, which is impaired.

21 Q. So yes it lists it as impaired for
22 nitrogen, correct?

23 A. Listed as impaired for nitrogen.

1 (Trowbridge Exhibit No. 56 was marked
2 for identification.)

3 BY MR. HALL:

4 Q. So CLF sends in a letter to EPA
5 threatening a lawsuit unless Great Bay is listed
6 as nitrogen-impaired on November 26th, 2008 and
7 by August 2009, Great Bay is listed as
8 nitrogen-impaired, correct?

9 A. That's correct.

10 Q. Did the impairment evaluation issued by
11 DES for Great Bay a mere one year earlier identify
12 Great Bay as either nitrogen-impaired or impaired for
13 eelgrass?

14 A. Is that the --

15 Q. And that would be -- that's Exhibit --
16 that would be Exhibit 19 from the Short deposition.

17 A. So the -- can you repeat the question?
18 Is it --

19 Q. Did the impairment evaluation that you
20 prepared a mere 12 months earlier, almost to the
21 date, indicate that Great Bay was impaired for
22 eelgrass or impaired due to nitrogen?

23 A. On -- on page 20 of that report,

1 conclusion number 2 states that the Great Bay should
2 be listed as threatened for significant eelgrass
3 loss, which is a Category 5-T, which is treated the
4 same as impaired.

5 Q. Excuse me? Do you want to -- do you
6 want to rephrase that response? I'm going to ask you
7 whether or not -- first of all, I'm going to ask you
8 whether or not it was listed as impaired, and then
9 if you want, then I can show you the table that you
10 yourself put in there that says it wasn't an
11 impairment.

12 So let's try it first. Was Great Bay
13 listed as impaired for eelgrass in 2008?

14 A. The -- I'm saying the conclusion page
15 here, page 20, second conclusion, is Great Bay should
16 be listed as threatened for significant eelgrass
17 loss. And what I'm trying to explain is that in a --
18 a 303(d) listing scenario, threatened is also
19 Category 5.

20 So it's a -- it's a somewhat confusing
21 thing in that threatened, you are supposed to assess
22 whether or not it will be meeting water quality
23 standards in the next two years.

1 Q. Okay. Are you telling me threatened is
2 the same as impaired? Let's go to -- so answer my
3 question first. Is it listed as an impaired water?

4 A. What I --

5 Q. The answer is no, it's listed as
6 threatened. Let's take them one at a time and then
7 you can give me an explanation after I ask another
8 question.

9 A. Okay.

10 Q. Is it listed as impaired?

11 A. What I'm trying to explain is that,
12 yes, it's listed as threatened, but within the
13 categories within that -- within the 303(d) listing,
14 that's also Category 5, which is an impaired
15 category. It's a semantics of the 303(d) listing
16 process. So in conversational language, we would
17 call it threatened; in 303(d) database language, it's
18 still Category 5.

19 Q. So it's listed as threatened, but
20 not -- is there a separate category for listing as
21 impaired in Category 5?

22 A. This is where I'm not entirely clear
23 because I don't do all of the databases work with

1 this, so I -- I'm -- but I -- I know that if I look
2 at page 53 of the -- of -- I guess I call it
3 Exhibit 56; is that correct?

4 Q. Yeah.

5 MR. MULHOLLAND: Uh-huh.

6 A. When it talks about old category and
7 new category for Great Bay for estuarine
8 bioassessments, the old category is 5-T; the new
9 category is 5-P. They're both Category 5.

10 Q. Right. Okay. I'm going to direct your
11 attention to page 26 of the 2008 -- August 11, 2008
12 document.

13 A. 26. Okay.

14 Q. Read across the bottom and tell me
15 whether or not Great Bay is listed as impaired, yes
16 or no.

17 A. Uh-huh. The -- in this document -- in
18 this table, the bottom line lists whether or not
19 different areas of the estuary were impaired, meeting
20 the standards for impairment, and Great Bay is not
21 listed there.

22 Q. Right.

23 A. The --

1 Q. Now, next question.

2 A. Yeah, if I could elaborate --

3 Q. Please.

4 A. -- on that and -- doesn't -- there's
5 no indication here in terms of threatened. I think
6 there was discussion in the text.

7 Q. But it's -- that specifically says it
8 is not listed as impaired on that page, correct?

9 Now, let's stay on that page. I'm
10 saying that page specifically states that, correct?

11 A. Yes, that's what this page says.

12 Q. Now, look under the column for Great
13 Bay.

14 A. Uh-huh.

15 Q. Does it say that there is a loss of
16 eelgrass in the system up through 2005?

17 MR. MULHOLLAND: On this page?

18 MR. HALL: On this page.

19 BY MR. HALL:

20 Q. Look under the percent change for
21 historic.

22 A. Right.

23 Q. It says there's a 68 percent increase

1 from an historic level.

2 Does that analysis show that there's a
3 loss of eelgrass in the system?

4 A. No.

5 Q. Okay. Now, look at the data for 2005.
6 On that same column --

7 A. Uh-huh.

8 Q. -- did the eelgrass acreage go up or
9 down from 2004?

10 A. It went up --

11 Q. Okay.

12 A. -- by a small amount. Okay.

13 Q. Okay.

14 A. So does this --

15 MR. MULHOLLAND: Shh.

16 THE WITNESS: All right.

17 BY MR. HALL:

18 Q. So the eelgrass acreages have increased
19 from historic, the most -- 2005 level increased from
20 2004, and it's listed as no impairment on this page.

21 Now, do you want to rephrase your
22 response as to whether or not Great Bay was listed as
23 impaired for eelgrass in this document on April --

1 prepared by you on April 11, 2008?

2 A. Just a minute. I'd like to look at the
3 two reports to understand which data was involved in
4 both.

5 MR. MULHOLLAND: One other objection.
6 It's August.

7 MR. HALL: Did I say April?

8 MR. MULHOLLAND: Yeah.

9 MR. HALL: You're right. That should
10 have been August.

11 THE WITNESS: Okay. I just had to
12 review a section of that report.

13 MR. HALL: Could you read back the
14 question, and if the witness will please answer the
15 question that's presented.

16 (The question was read by the
17 reporter.)

18 THE WITNESS: It was not listed as
19 impaired. It was listed as threatened.

20 BY MR. HALL:

21 Q. Okay. Wasn't it EPA that requested
22 that you list it as threatened?

23 A. I -- I don't recall.

1 Q. Did EPA provide you with -- do you
2 recall if EPA provided you with any technical basis
3 for declaring Great Bay threatened?

4 A. I don't recall besides what's in the --

5 Q. Okay.

6 A. -- regulations.

7 Q. I'd like you to -- I'd like you to
8 compare, because I have a question, in -- it's under
9 that same table.

10 Do you see the -- we're looking at
11 Table 2 from the August 11, 2008 document, that one,
12 versus the table that you've got in front of you from
13 2009, which is Table 3 from the 2009.

14 The historic eelgrass acres listed for
15 1980-81, in Table 2 in the 1988 document -- in the
16 2008 document is 1,217 acres, correct?

17 A. That's correct.

18 Q. Okay.

19 A. That's the same.

20 Q. Now look at the -- look at the table on
21 Table 3 on -- on the 2009 document. And it says the
22 1981 -- '80-81, it's still 1,217, but the 1981 level
23 is 2,131.

1 Can you please tell me why the 2009
2 document switched from using the 1,217 eelgrass acres
3 as the historical amounts and switched it to the
4 single reading occurring on 1981, which is 2,131
5 acres?

6 A. Because the 1981 data was not available
7 for the 2008 report and the 1981 data was mapped
8 using aerial photography, which is more accurate than
9 what was done for the 1980-81 survey.

10 Q. How is it that you picked the single --
11 the single year of 1981 to be the basis for the
12 historical value versus some type of multiyear
13 average as to what the condition was in the estuary?

14 A. Because 1981 is the best information.
15 It was mapped using aerial photography and used
16 consistent methods with the current mapping program.

17 Q. That doesn't really answer my question.
18 I'm asking how you picked a single year
19 to be the baseline of what the -- what the expected
20 eelgrass level is in Great Bay.

21 A. Because --

22 Q. Who decided that that was the single
23 year that should be picked? Why not 1986? Why not

1 1987?

2 MR. MULHOLLAND: Objection. You've got
3 a lot of questions there.

4 MR. HALL: I'm just -- you get my
5 point.

6 BY MR. HALL:

7 Q. Why was that single year picked as the
8 baseline in this -- in this subsequent report which
9 changes the baseline from 1,200 acres to 2,100 acres?

10 A. Because it's the best available
11 information.

12 Q. Are you telling me the data from 1986
13 and '87 are not good information?

14 A. They were not estuarywide. They were
15 only mapped in Great Bay.

16 Q. But we're talking about Great Bay. I'm
17 talking about the eelgrass acreage that was used as
18 the baseline for Great Bay. It doesn't matter that
19 they're done areawide; it matters that they're done
20 for Great Bay, correct?

21 A. What matters is to treat the bay, the
22 whole estuary, as consistently as possible using the
23 same data set wherever we can as baseline.

1 Q. Okay. Let's try this again.

2 In the 2009 document, I believe
3 you used a baseline of 408 acres for Little Bay --

4 A. Uh-huh.

5 Q. -- which is related to that two-year
6 average, 1980 to '81, but the actual 1981 value was
7 only 252 acres.

8 So for Great Bay, you picked the higher
9 value of 2,100 acres based solely on '81, but for
10 Little Bay, you picked the higher value based on the
11 two-year average, 408 acres.

12 Do you want to tell me why we're
13 switching back and forth and simply picking -- it
14 seems like we're just picking the higher value.

15 A. I'm not sure that's what I did.

16 Well, I guess I would draw your
17 attention to page 14.

18 MR. MULHOLLAND: Of which document?

19 THE WITNESS: Of the 2009 document,
20 which says that the historic maps of eelgrass in the
21 Little Bay show -- show -- sorry. I'll go slower.

22 BY MR. HALL:

23 Q. Which page are you on? We're on page

1 14?

2 A. Page 14, at the first sentence under
3 Little Bay.

4 Q. Uh-huh.

5 A. Historic maps of eelgrass in Little Bay
6 showed 252 acres in 1,981.

7 That's the lower number.

8 Q. Okay. So that -- okay. So you picked
9 the lower number there. I stand corrected. Thank
10 you.

11 A. Yeah.

12 Q. Can I draw your attention to the
13 same -- the statement within that same paragraph
14 where it says, for Little Bay, the cause of eelgrass
15 loss is unknown.

16 A. Let me see. Where is it?

17 Q. It says the trend was evaluated for
18 1990-2008. It says, the cause of eelgrass loss is
19 unknown.

20 Do you want to tell me why, if the
21 cause of eelgrass loss is stated to be unknown in
22 the 2009 update to the impairment listings, you
23 identify eelgrass cause of the -- the cause of loss

1 of eelgrass in Great -- in Little Bay as nitrogen?

2 A. I think there's something I need to
3 explain in terms of the term "cause" in a 303(d)
4 listing environment.

5 When an impairment is added, there is a
6 field in the database where you can add a source, if
7 you know the source of the impairment, and those
8 sources are generally listed as things like
9 wastewater treatment plants, combined sewer
10 overflows, concentrated animal feeding operations,
11 those type of things. And in -- traditionally for
12 our 303(d) listing, we -- unless we have a very
13 specific known source, we list that source as
14 unknown.

15 So that's the -- the source of the --
16 this language in the text.

17 Q. Do you want to answer my question?

18 A. Well, I -- I bring that up to explain
19 that having an impairment -- having nitrogen be
20 impaired is also listed as source unknown. In all
21 cases, these are listed as source unknown.

22 Q. It says, the cause of the nitrogen --
23 of the eelgrass loss is unknown.

1 A. Uh-huh.

2 Q. And then you list light attenuation and
3 nitrogen as the cause in this document, correct?

4 MR. MULHOLLAND: He just answered that.

5 MR. HALL: No. No, that's right. And,
6 actually, he didn't answer it. What he gave me was a
7 dissembling response that had nothing --

8 MR. MULHOLLAND: Objection.

9 MR. HALL: -- to do with the question
10 that I -- I -- I posed.

11 MR. MULHOLLAND: Objection. He
12 answered the question. You don't like the answer.
13 You don't have to criticize it. Just ask the
14 questions and he'll try --

15 MR. SERELL: No, I disagree that he
16 answered the question.

17 MR. MULHOLLAND: You can disagree. I
18 can also disagree.

19 MR. SERELL: Okay. We're stating our
20 position on the record.

21 MR. MULHOLLAND: Fine.

22 BY MR. HALL:

23 Q. Didn't the 2009 document indicate the

1 cause of the eelgrass loss in Little Bay was light
2 attenuation and nitrogen and did not list any other
3 possible causes?

4 MR. MULHOLLAND: Objection. He
5 explained that there's a difference in meaning to the
6 word "cause" that he just tried to explain.

7 MR. HALL: He can answer the question.

8 MR. MULHOLLAND: You can answer the
9 question if you understand it.

10 THE WITNESS: Yeah, I don't totally
11 understand.

12 BY MR. HALL:

13 Q. What do the words "the cause of the
14 eelgrass loss is unknown" mean on page 14?

15 A. That means viewed independently, we
16 don't have a specific known source for the eelgrass
17 loss.

18 Q. So you don't know what caused the -- a
19 violation of narrative criteria in Little Bay?

20 A. Which narrative criteria?

21 Q. The narrative criteria for eelgrass.

22 A. Okay. The biological --

23 Q. Biological.

1 A. -- community integrity.

2 Q. Right.

3 A. Correct, we're not attributing that to
4 a source.

5 Q. I didn't say source; I said cause.

6 A. Uh-huh.

7 Q. There's a difference between the word
8 "source" and "cause," and that's why there's two
9 words for it in the English language.

10 The cause of eelgrass loss is not
11 known, right?

12 A. That's what the report says.

13 Q. And that means you don't know what --
14 what was the cause of any narrative criteria
15 violation associated with the biological indicator,
16 correct?

17 A. Correct.

18 Q. Now, when we go to page 40, on Table F,
19 4F, in this 2009 document, do you want to tell me
20 that you did not identify the cause of the eelgrass
21 loss as light attenuation and nitrogen on this page?

22 A. I think you're looking at this
23 backwards. I brought -- I draw your attention to the

1 stressor-response matrix on page 33. Okay?

2 So in determining whether there is a
3 nitrogen impairment, we look at whether there's both
4 nitrogen concentrations above thresholds and
5 responses related to that that would be expected,
6 either light attenuation above thresholds or loss of
7 eelgrass, and if those two things are -- occur, you
8 have both high nitrogen and the responses of that,
9 then we would add a nitrogen impairment to --

10 Q. As the cause of the eelgrass loss,
11 correct?

12 A. That's not correct.

13 Q. Okay. Let me -- let's try to get
14 this -- so let me see if I understand this.

15 This 2009 document, the impairment
16 listing, it applied the numeric nutrient criteria
17 from the June 2009 document that's in front of you,
18 correct?

19 A. Yes.

20 Q. Yes, right?

21 A. Those were used in the
22 stressor-response assessment, yes.

23 Q. And if those values were exceeded from

1 that document, you identified nitrogen as a reason
2 why the eelgrass are not present in Little Bay,
3 correct?

4 A. As I've tried to explain, we used a
5 stressor-response matrix to determine whether our
6 narrative criteria for nutrients are being violated.
7 And that process looks at whether you have both high
8 concentrations of nitrogen and the responses in the
9 system that would be expected with high nitrogen.
10 And that is how we make a determination for a
11 nitrogen impairment.

12 Q. So a stressor-response is a
13 cause-and-effect, isn't it? Yes or no?

14 A. This -- this stressor-response matrix
15 is a way we make decisions in the --

16 Q. No, I didn't ask you about your
17 stressor-response matrix and how you made decisions.
18 I said your stressor-response analysis is a
19 cause-and-effect analysis, correct?

20 MR. MULHOLLAND: Objection. He didn't
21 say he did a stressor-response analysis. You're
22 mixing terms.

23 MR. KINDER: He can answer the

1 question.

2 Read it back.

3 A. You mean like in a laboratory
4 experiment where you -- I mean, there are
5 stressor-response analyses that are done, yes. What
6 I'm talking about is the stressor-response matrix we
7 use for our decision-making process in the CALM.

8 Q. And that's -- a stressor-response is a
9 cause-and-effect relationship or are you telling me
10 that your stressor-response really doesn't mean
11 nitrogen was the cause of any eelgrass loss in this
12 system? Is that what you're telling me?

13 A. What I'm -- the way I'm trying to
14 explain it is the way we go about this is opposite
15 of the way you think about it; that we identify an
16 impairment for eelgrass and then identify a cause of
17 that.

18 The fact that you have high nitrogen
19 and the responses that would be expected is how we
20 make the determination of whether there's a nitrogen
21 impairment in -- for that assessment unit.

22 Q. Would you need a -- would you identify
23 nitrogen in this table if you did not believe it

1 needed to be reduced in order to allow the eelgrass
2 to be restored?

3 A. That's not really the point of the --

4 Q. No, answer the -- no, no, you're going
5 to answer the question that's presented to you.
6 Let's get -- you know, we're back to the same stuff,
7 Evan, and I'm telling you, when I went outside last
8 time and I said he lied about a response and you came
9 back and got him to fix it --

10 MR. MULHOLLAND: Objection.

11 MR. HALL: -- you know --

12 MR. MULHOLLAND: Objection.

13 MR. HALL: Well, you know --

14 MR. MULHOLLAND: What are you talking
15 about?

16 MR. HALL: All right. And now --

17 MR. MULHOLLAND: Are you going to put
18 on the record that he's lying? He hasn't lied.

19 MR. HALL: And now I'm back -- we're
20 back on the record where we get a 303(d) impairment
21 assessment. The entire purpose of this assessment is
22 to decide what's causing the impairment --

23 MR. MULHOLLAND: Objection. Who are we

1 deposing? Am I deposing you or are you deposing --
2 you ask the questions, he answers the questions.

3 Go ahead.

4 MR. HALL: I've got to tell you. He
5 needs to answer the questions and he needs to have a
6 level of truthfulness associated with the answer to
7 his questions.

8 BY MR. HALL:

9 Q. Now, let's try it again.

10 A stressor-response, which you
11 said you've got a stressor-response matrix,
12 Mr. Trowbridge, is a cause-and-effect analysis,
13 correct; stressor-response, cause-effect, correct?
14 If you want to say you just don't even know whether
15 it says cause and effect, you can say that also.

16 A. I think the problem we're having is I'm
17 talking about a very specific application and you're
18 talking about a more general relationship between
19 different variables.

20 Q. Not in the least. I'm asking you to
21 answer my general question first, because I asked you
22 a specific question and you sent me off on a general
23 wild goose chase. So now let's go back to the

1 general point.

2 You said you use a stressor-response
3 matrix to identify the pollutant that's the indicator
4 of why the eelgrass are missing.

5 MR. MULHOLLAND: Objection. He didn't
6 say that.

7 A. That's not -- yeah.

8 Q. All right. You said stressor-response.
9 Is a stressor-response analysis a cause-and-effect
10 analysis, yes or no?

11 A. It relates causes and effects.

12 MR. KINDER: Wow.

13 MR. HALL: I'm going to take a
14 five-minute break because I want to decide whether
15 or not we just want to have the judge on the line.

16 MR. MULHOLLAND: That's fine. Call the
17 judge.

18 MR. HALL: And just -- and, you know --

19 MR. KINDER: Let's take a five-minute
20 break.

21 (Recess taken from 11:00 a.m. until
22 11:06 a.m.)

23 MR. HALL: Could the record reflect

1 that we need to remove the prior interchange between
2 Evan and I regarding the veracity of an earlier
3 response by Mr. Trowbridge.

4 So --

5 MR. MULHOLLAND: Okay.

6 MR. HALL: -- that'll be off.

7 BY MR. HALL:

8 Q. Mr. Trowbridge, regarding the 2009
9 impairment listing, does the identification of
10 nitrogen on page 40 in Table 4F as a 5-M category
11 require that nitrogen be reduced in order to protect
12 eelgrass in Little Bay?

13 A. I'm trying just to find it.

14 MR. MULHOLLAND: 4F.

15 THE WITNESS: Oh, 4F?

16 MR. MULHOLLAND: Yeah.

17 A. Does the -- okay.

18 So the question is does the impairment
19 require that nitrogen be reduced?

20 Q. Yes.

21 A. All right. No.

22 Q. Then why is it identified in this table
23 and why did CLF ask EPA to have it incorporated as

1 the identified cause of impairment?

2 MR. MULHOLLAND: Objection; compound.

3 Q. Okay. Well, you're -- why do you say
4 it doesn't require nitrogen to be reduced?

5 A. Because putting a water body on the
6 303(d) list, which is Category 5, just requires that
7 a pollutant loading study or a TMDL be completed.

8 Q. For what purpose?

9 A. To determine how to remove the
10 impairment.

11 Q. To determine how to reduce the
12 pollutant that was identified on the list, correct?

13 A. That's one outcome. In some cases, the
14 studies determine other reasons, other factors, that
15 can be taken into account.

16 Q. Are you telling me that you don't
17 know -- no, you didn't know in listing nitrogen as
18 the impairment for Little Bay, Great Bay, and the
19 other areas, quite frankly, that you didn't know that
20 that was going to require a reduction in nitrogen
21 loading throughout the system?

22 Now -- and I will tell you to answer
23 that question very carefully because -- answer that

1 one very carefully.

2 THE WITNESS: Can you read back the
3 question, please.

4 (The question was read by the
5 reporter.)

6 A. I'm sorry. I just forgot the beginning
7 part of the question, but I think I understand what
8 you're getting at.

9 And, obviously, when you do a TMDL for
10 a pollutant, you're most likely going to be talking
11 about reductions in the loading for that pollutant.

12 BY MR. HALL:

13 Q. All right. I am not -- now -- now,
14 let's try to answer it accurately. I didn't ask you
15 about generically what might happen on a TMDL. I'm
16 saying specifically for this estuary with this
17 listing where you identified .3 milligrams as the
18 nitrogen criteria, that this listing was going to
19 mandate a major reduction of nitrogen loads
20 throughout the system. Are you telling me you didn't
21 know that?

22 A. You're talking about mandate as in
23 permitting or are you talking about just loading in

1 general?

2 Q. Pick one.

3 A. All -- when we make a listing
4 determination, we determine that the water body is
5 not meeting water quality standards for the State and
6 that a TMDL is required and that will most likely
7 require a reduction in the loading of that pollutant.

8 In this case, the pollutant is nitrogen
9 and so for this water body, it would most likely
10 require a reduction in the loading for nitrogen.

11 Q. You knew it was going to require a
12 reduction in nitrogen loading to the system to meet
13 the .3 standard, didn't you?

14 A. Well, I guess I need to correct that.
15 There's no standard. We have guidance thresholds.

16 Q. The nitrogen -- the .3 nitrogen
17 criteria?

18 A. Yeah, which is guidance. And if your
19 concentrations are higher than that, then you
20 obviously need to reduce your loads to get down to
21 that level.

22 Q. Does the document in front of you show
23 you that the concentration is higher than your

1 nitrogen criterion, the existing concentration in
2 Little Bay?

3 A. Little Bay, yes. Little Bay says .4
4 milligrams per liter for total nitrogen.

5 Q. So then the answer is yes, you knew
6 that designating nitrogen in this list would require
7 a significant reduction in nitrogen loads for the
8 system, correct?

9 A. I knew that it would require a
10 reduction in loads. I don't know what that means --
11 whether it's significant. I mean, I don't know how
12 much it would --

13 Q. You did separately do an analysis of
14 how much you needed to reduce it by then, didn't you?

15 A. Yes, but after this document.

16 Q. You weren't working on that analysis
17 at the same time this document was being undertaken?
18 Look at the date.

19 A. Yup. Yup.

20 Q. Weren't you working on your wasteload
21 allocation evaluation at the same time this analysis
22 was being undertaken?

23 A. Yes, I was, but it wasn't complete.

1 Q. Did --

2 A. Actually, I'm not even -- I'm actually
3 not sure, though. I'd have to check when the
4 earliest drafts are.

5 Q. Hmm.

6 The 2009 numeric nutrient criteria
7 document, which is Exhibit 27, which you have in
8 front of you, does that document demonstrate that
9 nitrogen and transparency are the causes of eelgrass
10 loss for the Great Bay Estuary system?

11 A. In the -- in all areas of the Great Bay
12 Estuary.

13 Q. Any places where eelgrass were
14 historically located.

15 A. Uh-huh. This does contains a lot of
16 different information. There's areas where we show
17 that eelgrass has been lost and areas where the
18 transparency is too high or too low, I guess,
19 depending on how you want to describe it.

20 Q. Could you -- can you read back my
21 question? And please answer the question. It's --
22 it's a question that's been phrased in English.

23 A. Uh-huh.

1 Q. All right? And you've already answered
2 five versions of that question, so I can't imagine
3 your -- you don't understand what I had said. I'd
4 like you to answer the question.

5 Could you please read it back.

6 (The question was read by the
7 reporter.)

8 A. I'd say it demonstrates that nitrogen
9 and transparency are causes of eelgrass loss in some
10 areas of the Great Bay Estuary and that there are
11 other causes for eelgrass loss as well related to
12 nitrogen.

13 BY MR. HALL:

14 Q. Does that document constitute a
15 demonstration that nitrogen and transparency
16 levels constitute a violation of your State narrative
17 criteria for areas where eelgrass were historically
18 present in the Great Bay system?

19 A. So do you -- so you're asking does this
20 document demonstrate the standard that the narrative
21 standard is not being met?

22 Q. Uh-huh.

23 A. I would say the more appropriate

1 document to refer that to is the 2009 amendment to
2 the 303(d) list where the thresholds established in
3 this report -- and "this" meaning the 2009 guidance
4 document -- were applied to a stressor-response
5 decision-maker to make determinations of whether or
6 not the state water quality were met in certain
7 segments of the Great Bay Estuary.

8 MR. HALL: Read back my question. And
9 please answer it.

10 (The question was read by the
11 reporter.)

12 THE WITNESS: Okay. Having explained
13 that, I'd say no, this does not make an assessment of
14 whether water quality standards are being met in
15 certain areas.

16 BY MR. HALL:

17 Q. Does that document constitute the level
18 of transparency and nitrogen that must be present in
19 the Great Bay system in order to avoid violating
20 narrative criteria that the State has established?

21 A. This report establishes thresholds that
22 we would then use through a decision response --
23 sorry, stressor-response decision matrix to make that

1 determination.

2 Q. When you say establishes thresholds,
3 what are those thresholds? What do those thresholds
4 mean?

5 A. These were thresholds above which
6 nitrogen, water clarity, chlorophyll would constitute
7 a -- well, how do I say it -- indicate a response in
8 the system.

9 Q. No, actually, you were going to say
10 concentrate a violation of the narrative standard if
11 they were exceeded, correct?

12 A. That wasn't what I was going to say.

13 Q. I was thinking those were the words
14 that were just going to come out of your mouth
15 because that's the words in the document. Hmm.
16 Let's see. Let's go back for one second, onto the --
17 your -- this threshold -- this stressor-response
18 matrix.

19 What factors -- other than historical
20 eelgrass presence and the nitrogen and transparency
21 levels that are contained in the 2009 document, what
22 factors other than that tell you whether or not the
23 level of nitrogen and transparency is acceptable to

1 protect eelgrass?

2 A. Just for the eelgrass, the biological
3 and aquatic integrity aspect --

4 Q. Uh-huh.

5 A. -- the thresholds for nitrogen, water
6 clarity and eelgrass assessments.

7 I'm sorry. I just sort of forgot --

8 Q. I'm trying to decide what other than
9 the numbers in the 2009 document and the fact that
10 eelgrass is significantly less than historical
11 levels, what factors other than those control a
12 decision to identify an area as impaired for eelgrass
13 and that the causes are nitrogen and transparency.

14 A. I guess what I would say to that is for
15 this decision response -- stressor-response decision
16 matrix, we do reserve the right to use -- to consider
17 other factors if they come up and we did review --

18 Q. First answer the question. What
19 factors other than that are listed as relevant to the
20 decision-making?

21 A. None.

22 Q. Okay. And what other factors do you
23 think -- okay.

1 So what specific factors would you
2 consider to decide you shouldn't apply the nitrogen
3 and transparency levels from the 2009 document? Can
4 you tell me what they are?

5 A. One factor that we're considering is
6 dredging and also boat traffic.

7 Q. Is that -- why is that factor
8 important?

9 A. Dredging would obviously remove
10 eelgrass habitat directly; boat traffic can damage
11 eelgrass --

12 Q. Okay.

13 A. -- and moorings can damage eelgrass
14 through dragging their anchor chains.

15 Q. So if I have data on a tidal river
16 that shows that nitrogen components' effect on
17 transparency is negligible, but the transparency's
18 poor in the -- in the tidal river, do you still list
19 it as impaired related to nitrogen for that system?

20 A. Are we speaking hypothetically or are
21 we speaking in specific terms?

22 Q. First hypothetical.

23 A. Yeah. Yes, our approach is flexible so

1 that if there is evidence that shows that the loss of
2 the eelgrass is not related to nitrogen, we would not
3 list it.

4 Q. Okay. I'm going to ask you, the need
5 to develop the numeric nutrient criteria, are you
6 familiar with -- well, actually, why -- why did the
7 State believe it needed to develop numeric nutrient
8 criteria? Was this a request from EPA or where did
9 this come from?

10 A. There was guidance from EPA or, you
11 know, to work on that with the -- for the states to
12 work on that.

13 Q. Can I -- can I give you a copy of a
14 memo?

15 A. Yes.

16 Q. It's called Nutrient Pollution and
17 Numeric Water Quality Standards. It's May 25th, 2007
18 from Ben Grumbles. It went to State directors,
19 various State associations. Now, is this one of --
20 have you ever seen this document?

21 A. I believe so, but I didn't -- I am
22 not --

23 Q. Okay.

1 A. -- deeply familiar with it.

2 Q. Is this like one of the types of
3 documents that was coming from EPA saying, states,
4 please develop numeric nutrient criteria?

5 A. Yes.

6 MR. HALL: Okay. Let's just mark that
7 as Exhibit 57.

8 (Trowbridge Exhibit No. 57 was marked
9 for identification.)

10 (Off-the-record discussion.)

11 BY MR. HALL:

12 Q. One of the issues that's identified in
13 the 2009 numeric criteria document is macroalgae
14 growth, right?

15 A. In this document?

16 Q. Yes.

17 A. Yes, one of the -- one of the subjects
18 mentioned.

19 Q. Did that document indicate that the
20 nitrogen levels in that macroalgae growth needed to
21 be restrictive to prevent or reduce macroalgae growth
22 as they needed to be for protecting for transparency?

23 A. Let me see.

1 The -- I think the answer is no.

2 Q. That's -- okay.

3 The issues associated with
4 macroalgae -- let's see. I'm going to show you a few
5 emails that go to this question on macroalgae and
6 when did they become a concern.

7 Do you -- you've mentioned that you've
8 been involved in a number of these State of the
9 Estuaries reports. Do you recall when concerns over
10 excessive macroalgae growth were first brought to the
11 attention of the Technical Advisory Committee? Do
12 you remember about the time frame?

13 A. I don't remember exactly, but it was
14 early on. It might have been for the 2003 report.
15 I'm not sure. This was always an issue that the
16 group discussed as an important factor, but there
17 was -- there was not a good data set that would allow
18 us to develop an indicator for it.

19 Q. All right. Regarding the data sets, as
20 I recall, there were some data sets from the early
21 '80s, I think developed by Art Mathieson, correct?

22 A. '70s or '80s, correct.

23 Q. '70s or '80s. And then there's a

1 pretty good gap in the macroalgae data and it wasn't
2 until 2006, 2007 or after that time frame that more
3 attention was paid to that issue, correct?

4 A. Right. More data was collected, I
5 believe, starting in 2008.

6 Q. Okay.

7 A. Yes.

8 Q. All right. I'd like to show you,
9 it's an email from Fred Short to you and it's got a
10 whole -- a pile of emails attached to it and I didn't
11 exclude the ones that -- that are not relevant to our
12 discussion.

13 I'd like to bring your attention to
14 under .3 -- and it's from Fred. It's talking about
15 Great Bay and, I guess, in part, macroalgae. It
16 says, Re: Pre-proposal on macroalgae. It's dated
17 November 30th, 2007.

18 It says, and since we have not found
19 any areas of nuisance macroalgae overgrowing eelgrass
20 beds as we have documented in areas like Waquoit Bay,
21 Massachusetts, for example, the results of our
22 analysis are only applicable where nuisance
23 macroalgae has proliferated to the extent to prevent

1 the reestablishment of eelgrass from seed.

2 Do you have any reason to doubt the
3 accuracy of Fred Short's statement that they have not
4 found -- as of this time frame, they have not found
5 areas of nuisance macroalgae overgrowing eelgrass
6 beds?

7 A. I don't know. I mean, I don't know
8 what he was thinking when he wrote this.

9 Q. But do you have any reason to doubt the
10 accuracy of the statement? I mean, Fred Short's the
11 person that goes out and looks at the eelgrass beds
12 every year, right?

13 A. Yes.

14 Q. Okay. So he's the one that's out there
15 looking at the situation and then he says, we have
16 not found any areas of nuisance macroalgae
17 overgrowing eelgrass beds.

18 Again, any reason to believe that
19 that's an inaccurate statement from Dr. Short?

20 A. No.

21 Q. No.

22 Was Dr. Short's main concern, and I
23 think he's got it stated below, that he was only

1 concerned about nuisance macroalgae to the degree
2 that it prevented eelgrass restoration; was that the
3 main concern over macroalgae that was being raised at
4 this time?

5 A. I'm not sure exactly. This is one of
6 many emails on the topic. But that is -- so are you
7 asking is that the main concern?

8 Q. Yeah, the main concern with macroalgae
9 as specifically also identified in your 2009 numeric
10 nutrient criteria document?

11 A. Uh-huh.

12 Q. Isn't the main concern that macroalgae
13 are taking over or could be taking over areas where
14 eelgrass had been growing?

15 A. Yeah. That is a main concern. That is
16 the main concern.

17 Q. Okay.

18 A. However, I would say that the presence
19 of macroalgae itself is an issue.

20 Q. Even aside from whether or not it's
21 adversely impacting eelgrass?

22 A. In some estuaries, particularly
23 Tampa Bay, the presence of macroalgae created a

1 nuisance.

2 Q. Well, let's -- we're not in Tampa Bay.
3 It's a lovely location. My aunt lives down there.
4 It's very pretty.

5 But for Great Bay, is the macroalgae
6 concern in Great Bay just the fact that they could be
7 growing anywhere or is it that they could be growing
8 in places that adversely affect the ability of
9 eelgrass to regrow and colonize areas?

10 A. I would say it's both.

11 Q. Can you tell me where there's any
12 analysis that you're familiar with as to adverse
13 impacts of macroalgae on the system in areas
14 unrelated to eelgrass growth? I mean, I'm wondering
15 where the ecological impact assessment of that is,
16 just because I don't believe I've seen it.

17 A. I believe Art Mathieson has done some
18 work related to impacts on the intertidal zone, where
19 eelgrass wouldn't be living, and effects on the
20 benthos.

21 Q. Okay. And has that adversely affected
22 the ecology of the system, to your knowledge, do you
23 know?

1 A. I mean, I'm not sure.

2 Q. I'd like to also draw your attention
3 to the second page, which I guess this has got an
4 attached -- you're trying to get funding for mapping
5 of a macroalgae and eelgrass survey. And, really,
6 it's just the second page is all I'm going to ask you
7 about.

8 Why were you requesting funding for
9 macroalgae mapping at this point in time, in -- well,
10 what's this all about?

11 A. As I mentioned in one of my responses,
12 this had been an issue that the -- that I've
13 discussed with our advisory committee for years, but
14 we always lacked good data on it and this was an
15 effort to get that data.

16 Q. Okay. And was there a particular
17 reason that people believed we needed to look at
18 macroalgae more closely in the system at this point
19 in time versus other things that had been evaluated
20 prior to this time? I mean, were you switching
21 directions?

22 A. I believe it's better to characterize
23 it as filling a data gap.

1 Q. Okay. Well, why don't we look at the
2 next paragraph going down.

3 A. Okay.

4 Q. Well, look at the second paragraph,
5 general summary of project goal and justification.

6 A. Which --

7 Q. I'm looking at the second paragraph on
8 the second page.

9 A. Okay.

10 Q. I'm sorry. That first page, look at
11 the second paragraph, the one that starts,
12 preliminary analysis.

13 A. Okay.

14 Q. I draw your attention to the second
15 question, the second line, the challenge is that
16 chlorophyll-a only accounts for eight percent of the
17 light attenuation in the estuary. This finding does
18 not support a hypothesis that nitrogen enrichment is
19 causing phytoplankton blooms which include water
20 clarity to any great degree.

21 Who wrote that statement?

22 A. You mean the original statement or the
23 edits to the statement?

1 Q. Well, both, the original statement --

2 MR. MULHOLLAND: If you know.

3 A. Yeah, I don't -- I don't know.

4 Q. All right. Isn't it -- is it an
5 accurate statement?

6 A. It --

7 Q. At that point in time, is it an
8 accurate statement?

9 A. At that point in time, it was accurate
10 because we were putting it into a grant proposal.

11 Q. Okay. So who was submitting this grant
12 proposal? Were you submitting it or was Fred Short
13 submitting it?

14 A. This was -- this grant -- hang on.

15 Yeah, this grant was submitted by the
16 NHEP, which is now called PREP.

17 Q. Which is you, right?

18 A. Me and others, yes.

19 Q. Okay. So do you recall writing this
20 draft document?

21 A. Yes, I recall working on this document.
22 I didn't write everything in it.

23 Q. Did you -- were you the original

1 author? Did you write the first draft of this? If
2 you don't -- if you don't recall, you can say you
3 don't recall.

4 A. Yeah, I mean, I -- yeah, I don't
5 recall.

6 Q. Okay. With regard to that statement
7 that chlorophyll-a only accounts for eight percent of
8 the light attenuation and, therefore, it does not
9 support a hypothesis that nitrogen enrichment is
10 causing phytoplankton blooms which reduce water
11 clarity -- and I think Fred Short's the one that
12 edited it to a great degree.

13 Did you have subsequent information
14 that showed that that statement was in error?

15 A. You mean relative to this study or like
16 just in general?

17 Q. This specific statement, I believe you
18 said it was accurate at that time.

19 A. Uh-huh.

20 Q. And I'm asking whether or not there
21 was subsequent data and analyses collected that
22 demonstrated the statement was actually in error.

23 A. I feel like "error" is a strong term.

1 I think it's not entirely correct, no.

2 Q. In what way is it not entirely correct?

3 A. The percent of the light attenuation
4 attributed to chlorophyll is not what we've seen in
5 some of the other -- in the more detailed study for
6 which we got the funding to do.

7 Q. And did it change such that the
8 conclusion was incorrect, that the finding -- if the
9 percent changed to 12 percent, this finding does not
10 support a hypothesis that nitrogen enrichment is
11 causing phytoplankton blooms which reduce water
12 clarity to any great degree, did any subsequent
13 information show that that final statement was
14 incorrect?

15 A. This report -- this was written in
16 when? This is 2007? Yeah. Okay.

17 Yeah, I'd say there was subsequently
18 quite a bit of analysis that was done that was
19 documented in this 2009 guidance document --

20 Q. That demonstrated that --

21 A. -- that went beyond what was in this --

22 Q. No.

23 A. -- this grant application in 2007.

1 Q. You are not answering my question.

2 A. Yeah.

3 MR. HALL: Read my question back and
4 please answer it.

5 (The question was read by the
6 reporter.)

7 THE WITNESS: I would say that the
8 final report for this study went into that thing --
9 that hypothesis question in great detail and had a
10 much more detailed answer.

11 I guess I'm having trouble with the
12 frame of the question; like, you know, that we
13 weren't doing a statistical test there and did we --

14 MR. MULHOLLAND: You've got to answer
15 the question.

16 THE WITNESS: I'm not clear what the
17 question is. I'm just having trouble with the
18 framing of it. Can you restate it in a different
19 way?

20 BY MR. HALL:

21 Q. Read the second sentence aloud --

22 A. Yeah.

23 Q. -- and tell me if you had data or

1 information submitted after the date of this report
2 that confirmed that sentence was, in fact, in error.
3 Read the sentence aloud for us so we know what --
4 well, you wrote the words.

5 A. This finding does not support a
6 hypothesis that nitrogen enrichment is causing
7 phytoplankton blooms which reduce water clarity --

8 Q. Do any great extent.

9 A. -- to any great extent.

10 Q. Great degree.

11 A. Great degree.

12 Q. Right?

13 A. So the question is after 1997, did we
14 have any information --

15 Q. 2007.

16 A. -- sorry, 2007 -- that made us change
17 that statement or would make us change that
18 statement?

19 Q. That demonstrated that statement was in
20 error.

21 A. Uh-huh. What I'm having trouble with
22 with this question is it's based on some limited
23 information and then in our more detailed analysis,

1 we started looking more detailed into other areas of
2 the estuary and there's some areas where that
3 hypothesis is true and there's other areas where
4 it's not. So as a general statement about the whole
5 estuary, it's a hard one to say yes or no to.

6 Q. Go segment by segment, starting at the
7 mouth of the estuary.

8 A. Uh-huh.

9 Q. And you can -- you can name each
10 segment and tell me whether the statement is true
11 for each segment.

12 A. I can do it in a more general sense in
13 that in the deeper areas of the estuary, the
14 hypothesis is not true in that we -- that light
15 attenuation through the water column is a responsible
16 factor.

17 Q. That's not what the sentence says.
18 Read the sentence and tell me whether the facts of
19 that sentence are true for the mouth, the Lower
20 Piscataqua, Great Bay, Little Bay. March segment by
21 segment. Tell me where nitrogen enrichment is
22 causing phytoplankton blooms that are causing --
23 which reduce water quality to a great degree. Tell

1 me where that's occurring.

2 Evan --

3 MR. MULHOLLAND: Go ahead.

4 MR. HALL: -- the sentence could not be
5 clearer.

6 MR. MULHOLLAND: I was just going to
7 say that's a very clear question. I appreciate it.

8 Please answer it.

9 A. Okay. I'd say in -- starting at the
10 mouth of the harbor, right, Portsmouth Harbor, where
11 we have declining water clarity and declining
12 eelgrass beds, that hypothesis is not true.

13 BY MR. HALL:

14 Q. Okay.

15 A. I mean, I --

16 Q. You're --

17 A. I --

18 Q. Let --

19 A. You're trying -- there's not
20 necessarily enough information to answer this
21 question in every segment.

22 Q. No, I'm not. You're just not answering
23 the question. It says phytoplankton blooms. It

1 doesn't say transparency generally. It says nitrogen
2 causes X causes Y and you've been in five or ten
3 meetings where the same issue has to come up. So to
4 sit here and to say you don't understand the question
5 is ludicrous.

6 A. I can't --

7 Q. Now, answer the question.

8 MR. MULHOLLAND: Can we go off the
9 record just for one second? This will help, I assure
10 you. One second.

11 MR. KINDER: Yeah.

12 (Off-the-record discussion.)

13 A. And I can give a very general answer.
14 We don't know.

15 BY MR. HALL:

16 Q. Actually, that's a lie. That is an
17 absolute, unmitigated lie. You have collected
18 chlorophyll-a data at the mouth of the estuary,
19 correct?

20 A. Yes.

21 Q. You collected it on the Piscataqua
22 River, right?

23 A. Some, yes.

1 Q. You collected it in Great Bay, correct?

2 A. Yes.

3 Q. So you've collected chlorophyll-a data
4 all over the system and you're telling me -- and you
5 analyzed whether -- how much that chlorophyll-a
6 impacted transparency, correct? Correct?

7 A. There's only a few areas where we have
8 all of that information that affects transparency
9 that allows us to do the analysis of how much
10 chlorophyll-a relates to the light attenuation.
11 Okay? There's some areas where we just have
12 chlorophyll-a data. You know, it -- we don't -- and
13 we don't have the color data. I mean, it's -- in
14 the --

15 Q. You really need to be answering these
16 questions. I mean, basically at this point you're
17 fabricating responses and, you know, I've got a dozen
18 emails, including presentations that you yourself
19 did, that said this was exactly correct, two separate
20 presentations.

21 A. Uh-huh.

22 Q. Now, you're under oath. Answer the
23 question I presented based on the best of your

1 knowledge to the information that's available for
2 the estuary.

3 A. Okay. I'm trying to think of a way I
4 can do this.

5 Q. I'll make it even simpler.

6 Do you have data anywhere in the system
7 showing algal levels are causing -- that nitrogen is
8 causing algal blooms greatly decreasing transparency
9 in this system? Do you have that information
10 anywhere for the system, showing that? And if you
11 say yes, I'm going to ask you to produce it. And you
12 when you don't produce it, I'm going to have the
13 judge do a contempt citation. That's the sequence.

14 So tell me where you have it in this
15 estuary.

16 A. Where we have algal blooms that cause
17 low transparency?

18 Q. That cause substantial decreases in
19 transparency that would significantly -- that would
20 materially affect eelgrass growth. Because this is
21 all about eelgrass, right?

22 A. And so an area where the chlorophyll
23 gets to be a hundred micrograms per liter, would you

1 consider that to be significant?

2 Q. You know, I'm not the one answering the
3 questions, Mr. Trowbridge. You're the dedicated
4 scientist to this system. You've been analyzing,
5 since 2001 --

6 A. Uh-huh.

7 Q. -- every little nook and cranny of this
8 entire system. You produced some amazing reports and
9 charts which show all of your data, including all of
10 your chlorophyll-a data, including equations for how
11 much chlorophyll-a impacts transparency, and I'm
12 asking you to answer the question given all data and
13 information that you've gone through.

14 A. All right I'm trying to -- can I just
15 have a second to get my head straight?

16 MR. MULHOLLAND: Sure, take your time.

17 THE WITNESS: I'm not really --

18 MR. MULHOLLAND: Take your time to
19 answer the question.

20 MR. KINDER: Why don't you restate the
21 question or have it read back.

22 MR. HALL: Which one, is there data
23 anywhere in this system?

1 MR. KINDER: Yeah.

2 BY MR. HALL:

3 Q. As I said, start at the mouth. Start
4 at the mouth and work your way up. Tell me where you
5 got the information showing nitrogen has caused
6 elevated algal growth that significantly affected
7 water clarity in that area of the system. Start at
8 the mouth.

9 A. Uh-huh.

10 Q. Now. Please.

11 Did it happen at the mouth, at
12 Portsmouth Harbor?

13 THE WITNESS: I -- all right. Can I --
14 can I talk to you because I need to figure out how
15 to --

16 MR. HALL: You can certainly take a --

17 THE WITNESS: I'm having a technical
18 issue with this.

19 MR. MULHOLLAND: Okay.

20 (Recess taken from 11:48 a.m. until
21 11:54 a.m.)

22 THE WITNESS: All right.

23 MR. MULHOLLAND: Back on the record.

1 Do you remember the question?

2 THE WITNESS: Yes, I remember the
3 question.

4 A. So you asked for areas where we have
5 data showing chlorophyll affecting light attenuation.
6 And the other area where we have definitive data on
7 that is at the Great Bay coastal buoy, which was the
8 study that -- or the report that was written either
9 with this grant or with a related grant.

10 MR. HALL: Can you read back my
11 question, please.

12 (The question was read by the
13 reporter.)

14 BY MR. HALL:

15 Q. Answer the question. Start at the
16 mouth.

17 A. Start at the mouth?

18 Q. I don't care where your only other data
19 set is. Answer the question. Start at the mouth.

20 A. Okay. So at the mouth we don't have
21 that information.

22 Q. So at the mouth, you do not have data
23 showing that increased nitrogen levels caused

1 phytoplankton blooms which reduced water clarity,
2 right?

3 A. Correct.

4 Q. Lower Piscataqua River, do you have
5 data showing it there?

6 A. No.

7 Q. Do you have data showing it in the
8 Upper Piscataqua River?

9 A. No.

10 Q. Do you have data showing it occurred in
11 the Lamprey River?

12 A. No.

13 Q. Do you have data showing that it
14 occurred in the Cocheco River?

15 A. No.

16 Q. Do you have data that show that
17 occurred in Little Bay?

18 A. No.

19 Q. And where you do have data, in
20 Great Bay, do you have data showing increased
21 nitrogen levels caused phytoplankton blooms which
22 reduced water clarity in Great Bay?

23 A. There's two aspects to that question.

1 We have the data that shows that
2 phytoplankton blooms are a significant component of
3 the light attenuation, which is what we have from the
4 Great Bay buoy study, and total nitrogen was not
5 measured as part of that study.

6 Q. Answer the question that I posed.

7 A. Can we read it again?

8 Q. You like to answer the piece of the
9 question that you want to answer and don't want to
10 answer the piece of the question that you don't want
11 to answer.

12 Answer the full question, please.

13 MR. MULHOLLAND: I'll object to the
14 extent it's a compound question. He tried to answer
15 the part --

16 MR. HALL: He answered it ten times
17 before. Not -- I'm sorry, that's an over -- seven
18 times before. I suspect he can answer it the eighth
19 time.

20 MR. MULHOLLAND: Go ahead.

21 A. All right. I explained the information
22 that we have. We don't have that information related
23 to nitrogen causing phytoplankton blooms in the Great

1 Bay Estuary.

2 BY MR. HALL:

3 Q. You don't have that information or do
4 you have information that confirms nitrogen did not
5 cause significant increase in algal levels in Great
6 Bay?

7 A. I have information that it did not
8 cause it?

9 Q. Yeah.

10 A. I don't have that information either.

11 MR. HALL: I want to break because I
12 want to ask the judge to hold the witness in contempt
13 because I've got a dozen documents written by him
14 that says that's exactly what the data show.

15 MR. MULHOLLAND: All right.

16 MR. KINDER: Let's take a break for
17 lunch and come back.

18 MR. MULHOLLAND: Good luck finding the
19 judge.

20 MR. PELTONEN: We have --

21 MR. HALL: Let me submit the documents
22 into the record first.

23 MR. KINDER: Wait, wait, wait, wait,

1 John. Let's come back.

2 MR. MULHOLLAND: Are we on the record
3 or off the record?

4 MR. KINDER: Let's take a break for
5 lunch and come back.

6 MR. MULHOLLAND: All right. So off the
7 record?

8 MR. KINDER: Yup.

9 MR. MULHOLLAND: Thank you.

10 (Lunch recess taken from 11:58 a.m.
11 until 1:03 p.m.)

12 BY MR. HALL:

13 Q. Okay. So we're back on the record.
14 We're trying to cover the issue on Great Bay. And,
15 Mr. Trowbridge, you indicated that there were
16 significant chlorophyll-a data for Great Bay and I
17 was asking you whether or not those data and other --
18 whether or not there's any data that you've collected
19 on Great Bay that show that the statement made in
20 exhibit -- have we marked that exhibit yet? Why
21 don't we mark it now before I forget to do it.

22 (Trowbridge Exhibit No. 58 was marked
23 for identification.)

1 BY MR. HALL:

2 Q. Okay. Mr. Trowbridge, doesn't the
3 available data for Great Bay also confirm that that
4 statement is true?

5 A. I guess one point of clarification.

6 Are we talking about trend type data or
7 are we talking about site-specific, I guess, detailed
8 analysis data.

9 Q. Let's go for -- let's do both.

10 A. Okay. For trend data in Great Bay,
11 depending on how you analyze for chlorophyll, you
12 either see no trend or you'd see some trends. You'll
13 see an increasing trend, depending on what
14 statistical test you do.

15 Q. Okay. But let's -- for the data that
16 are available, does it support the hypothesis that
17 nitrogen is causing phytoplankton blooms which are
18 reducing water clarity to a great degree? Do the
19 data show that?

20 A. The data -- the trend analysis, which
21 doesn't show any kind of increased trend, does not
22 support that hypothesis.

23 Q. We may just have a -- does not

1 support -- is the statement accurate, based on the
2 trend data?

3 A. Yes.

4 Q. Okay. Based on what data would you --
5 other than the trend data, would you indicate --
6 confirm the statement is incorrect?

7 A. I'm trying to decide how to answer this
8 since we're still working on the trend analysis.

9 Depending on how you do the trend
10 analysis, in some instances you see an increase of
11 a trend. So that would be inconsistent with this
12 hypothesis.

13 Q. Seeing an increase in a trend is the
14 same as it's causing phytoplankton blooms which are
15 reducing water clarity to a great degree? You've
16 got -- I'll be really clear.

17 Do you have data anywhere in Great Bay
18 for any period showing nitrogen enrichment caused
19 phytoplankton blooms which reduced water clarity to
20 a great degree, anywhere in the Great Bay system?

21 A. The Great Bay buoy study showed that
22 nitrogen was taken up to fuel a chlorophyll bloom
23 or a phytoplankton bloom and that chlorophyll was a

1 significant component of the light attenuation in the
2 bay. That is a detailed study that was done.

3 MR. HALL: I'm going to certify that
4 one for the judge.

5 Q. I'm going to show you -- this is
6 Exhibit 31 in the Currier deposition.

7 Mr. Trowbridge, do you recognize that
8 document?

9 Actually, before we look at this
10 document, isn't the study you're talking about that
11 you're saying shows nitrogen -- chlorophyll-a is a
12 significant component, isn't that the very same --
13 the results of the very same study that we're talking
14 about that is discussed in this paragraph?

15 A. The -- it's a -- it's -- I don't
16 remember the sequence of the studies, whether the
17 buoy study was done before the macroalgae study or
18 not and if this eight percent was from that study or
19 for a different one.

20 Q. When you say the buoy study, you're
21 talking about the Morrison report, correct?

22 A. Right.

23 Q. That was the buoy study?

1 A. Uh-huh.

2 Q. That's where the eight percent came
3 from?

4 A. Uh-huh.

5 Q. So are you -- is there another study
6 you're talking about that's not the one that's
7 discussed here, assuming this is Morrison, there's
8 some -- well --

9 A. I'm not sure.

10 MR. HALL: Let's -- we would like a
11 copy, Evan, of the document Mr. Trowbridge is
12 claiming shows nitrogen enrichment, meaning increases
13 in nitrogen, caused phytoplankton blooms which
14 significantly reduced water quality in Great Bay.
15 We'd like that specific document provided to us.

16 MR. MULHOLLAND: Could I ask him which
17 one it is? Maybe you have it already.

18 MR. HALL: I couldn't possibly have it
19 already because I don't have a study that shows that.

20 MR. MULHOLLAND: Okay.

21 MR. HALL: Well, what is it?

22 MR. MULHOLLAND: What study is it?
23 What study were you just talking about?

1 THE WITNESS: Yeah, I'm referring to
2 the Morrison 2008 study.

3 MR. MULHOLLAND: Do you have a copy of
4 that?

5 MR. HALL: We certainly do.

6 MR. MULHOLLAND: Okay. Good.

7 BY MR. HALL:

8 Q. And you're saying the Morrison -- so
9 it's your testimony that the Morrison 2008 study
10 confirmed nitrogen enrichment caused phytoplankton
11 blooms which significantly reduced water quality in
12 Great Bay?

13 A. Can we break that into several pieces?

14 Q. No. It's one enchilada, one whole
15 document.

16 A. What that study had information on is
17 it showed that during a chlorophyll bloom that
18 nitrate was taken out of the water column so that
19 demonstrated that the chlorophyll bloom was being
20 fueled by nitrate, a form of nitrogen. And it also
21 showed, I believe, a higher percent of the light
22 attenuation related to chlorophyll in that the amount
23 of the light attenuation that was attributed to

1 turbidity was a combination of both organic and
2 inorganic particles.

3 So it's a -- so the actual contribution
4 from phytoplankton is probably higher than what was
5 attributed to just straight chlorophyll.

6 Q. Are you guessing at that or do you have
7 data and analyses showing that?

8 A. If you have that report, I can show you
9 where it has all that information.

10 Q. Look at the document that I've handed
11 to you, which is Currier Exhibit 31. Do you
12 recognize that analysis?

13 A. Yes.

14 Q. Okay. I'd like to direct your
15 attention to page 1, 2 -- did you -- did you develop
16 this analysis?

17 A. This is a summary of the State of the
18 Estuaries report, right? I haven't looked at this in
19 a long time.

20 Q. Did you develop that PowerPoint
21 analysis?

22 A. Yes.

23 Q. Okay. To the best of your knowledge,

1 are the statements that are contained in this
2 analysis true and accurate?

3 MR. MULHOLLAND: Objection. At the
4 time or now?

5 MR. HALL: At the time and now.

6 A. At the time, I can say that this was
7 accurate. I --

8 BY MR. HALL:

9 Q. Okay.

10 A. -- have not reviewed it to determine --

11 Q. Well, let's stop there.

12 A. -- what it would mean now.

13 Q. So at the time this was accurate,
14 I'd like to draw your attention to this page
15 (indicating), the one that says any increase in
16 nitrogen concentration --

17 A. (Witness complied.)

18 Q. Could you please read it into the
19 record.

20 A. Yeah. Any increase in nitrogen
21 concentration has apparently not resulted in
22 increased phytoplankton blooms. The only increasing
23 trend for chlorophyll was observed at a station with

1 very low concentrations already. Moreover, a
2 probabilistic survey of the estuary in 2002 to 2003
3 found only 1.6 percent of the estuary to have
4 chlorophyll-a concentrations greater than 20 percent
5 of 20 micrograms per liter.

6 Q. Is that an accurate statement, the
7 first statement, any increase in nitrogen
8 concentration has apparently not resulted in
9 increased phytoplankton blooms?

10 MR. MULHOLLAND: Objection to the form.
11 It's unclear what date. Now or then?

12 MR. HALL: In 2006, June 2006.

13 A. In 2006, that was correct.

14 BY MR. HALL:

15 Q. And are you saying that you have data
16 showing now in post-2006 that nitrogen concentrations
17 have resulted in increased phytoplankton blooms in
18 the system?

19 A. In the system or in Great Bay?

20 Q. In Great Bay.

21 A. Yeah, I believe the 2009 State of
22 the Estuaries report has an increasing trend for
23 chlorophyll along with an increasing trend for

1 nitrogen.

2 Q. Do you know if that difference in
3 chlorophyll substantially -- significantly impacted
4 light transmission in the system?

5 A. I don't know.

6 Q. How could we determine whether or not
7 it did or didn't? What analysis would we use to do
8 that?

9 A. Well, it's a different type of test
10 that you'd need to do. You need a much better data
11 set going back to much further -- going back into the
12 past.

13 Q. Is there any available studies or
14 information that you've used in the past to determine
15 the effect of chlorophyll-a on light transmission in
16 the system?

17 A. The -- when we talk about this, I'm
18 answering in relation to the studies that figure out
19 what percent of the light attenuation is attributable
20 to chlorophyll. There's really only been one
21 detailed study on that, and that was the Morrison,
22 et al, study in 2008.

23 Q. Okay. I'd like you to look at the

1 summary page on this document where it says,
2 dissolved inorganic nitrogen has increased by 59
3 percent over the past 25 years, and then two bullets
4 down, no evidence for elevated chlorophyll-a.

5 Is that, to your knowledge, an accurate
6 statement in 2006?

7 A. Yes.

8 Q. Okay. So nitrogen -- the organic
9 nitrogen levels had already increased by 59 percent
10 in 2006 and then you're saying they increased a
11 little bit more, we don't know how much, but they
12 increased a little bit more after that, that's what
13 you're saying, right, chlorophyll-a levels went up
14 after 2006?

15 A. What I'm saying is when you do the
16 statistical test to compare historical measurements
17 of chlorophyll to the most recent measurements, it
18 was statistically significant when we did the 2009
19 State of the Estuaries report.

20 Q. "Statistically significant," does that
21 mean it greatly impacted the transparency level, that
22 change?

23 MR. MULHOLLAND: Objection to the form.

1 Q. Significantly impacted.

2 A. No.

3 Q. Do you know how much -- I think I asked
4 this question; I just want to make sure.

5 Do you know how much the change
6 in chlorophyll-a did impact transparency?

7 A. No.

8 Q. But the Morrison report would be the
9 only analysis -- the only detailed analysis that
10 you know of that one could look at to answer that
11 question at this point?

12 A. The only other information that we have
13 on it is some -- in our response to comments on the
14 2012 CALM, we did some regressions relating light
15 attenuation to different factors.

16 Q. So are you saying we should use your
17 Response to Comments to the 2012 CALM or one should
18 use the Morrison study to answer that question?

19 A. I'm saying there's -- those are both --
20 there's -- both those sources of information are
21 relevant to the question.

22 Q. Do you know if your response to
23 comments in 2012 relied on the Morrison study?

1 A. No, they did not.

2 Q. Can you tell me why it didn't?

3 A. Because it was a different type of
4 analysis. It wasn't an analysis of buoy data. It
5 was an analysis of grab sample data.

6 Q. So you're saying the Morrison --
7 the equations from the Morrison study are only
8 appropriate to be used if their data were collected
9 by a buoy?

10 A. Yeah. I mean, the -- the measurements
11 in there are specific to a buoy's sensor output and
12 they also -- the conclusions of the study were
13 limited to the area right around the buoy.

14 Q. So then you have no other basis for
15 predicting the impacts on light transmission anywhere
16 else in the system because we don't have buoys all
17 over the system?

18 A. Correct. We don't have that level of
19 detail everywhere.

20 Q. How does grab sample data compare to
21 the kind of data that were collected in the Morrison
22 study from the buoy? I mean, is one more frequent,
23 less frequent? What's the difference between these

1 data sets?

2 A. Right. Sure. Buoy data is generally
3 collected very frequently. A sample is collected
4 every 15 minutes or 30 minutes for a limited amount
5 of time. I think the buoy was deployed for a few
6 months. And grab sample data are samples that are
7 collected monthly and span over multiple years.

8 Q. Which data would you consider more
9 reliable in trying to come up with a relationship
10 between transparency and the various factors that can
11 impact it in the bay, grab sample data or the
12 continuous monitoring data from the buoy?

13 A. Well, I think there's questions of
14 representativeness in terms of how many samples are
15 collected because you can get more measurements with
16 a buoy, but you have less certainty in those
17 measurements because they're collected by sensors and
18 not measured in a laboratory with quality assurance
19 procedures.

20 Q. Did the grab sample data allow you to
21 develop the kind of equations that were developed in
22 the Morrison report?

23 A. Why don't I give it to you.

1 I would say they are similar equations.
2 They aren't exactly the same. They're not -- we did
3 not develop a multiple linear regression; it's
4 individual linear regressions.

5 Q. Individual linear regressions?

6 A. Uh-huh.

7 MR. MULHOLLAND: John, do you want a
8 copy of what he's looking at? We have a copy.

9 MR. HALL: Yes, I'd like a copy of
10 that, actually.

11 Great.

12 BY MR. HALL:

13 Q. I'd like to bring your attention to
14 a report you prepared in February of 2007. It's
15 Currier Exhibit 32.

16 MR. MULHOLLAND: Thanks.

17 A. Uh-huh.

18 Q. Do you recall preparing that set of --
19 I guess a PowerPoint presentation called Summary of
20 Light Availability and Light Attenuation Factors to
21 the Great Bay Estuary?

22 A. Yes.

23 Q. Okay. I'd like you to look at --

1 there's an analysis of univariate regressions of K_d
2 versus water quality parameters. You're on the page.

3 A. Yeah.

4 Q. Okay. Can you tell me what regressions
5 were prepared for that?

6 A. These are regressions between K_d , which
7 is light attenuation versus chlorophyll, and K_d
8 versus total suspended solids, and K_d versus
9 salinity.

10 Q. Okay. And which of the factors shows
11 the greatest effect on light attenuation in the bay?

12 A. The greatest effect -- the most amount
13 of variability is accounted for by the salinity.

14 Q. And salinity is -- is representing
15 what -- what component of factors that affect
16 transparency? It's right there on the chart.

17 A. In this case, we were using it as a
18 proxy for colored dissolved organic matter.

19 Q. Okay. Which is the next most important
20 variable affecting transparency in the system, based
21 on this --

22 A. Based on these graphs is total
23 suspended solids.

1 Q. Which factor has the least impact on
2 transparency in the system based on this analysis?

3 A. Based on these graphs, chlorophyll.

4 Q. Okay. Did any subsequent analysis that
5 you prepared show that these regressions were in
6 error and that somehow chlorophyll, chlorophyll-a,
7 had a far greater effect on transparency than
8 otherwise indicated in these regressions?

9 A. Excuse me. I'm just trying to remember
10 what data was used for these regressions, whether it
11 was from a specific location or from multiple
12 locations. I don't know that I -- the presentation
13 tells me, so I cannot -- I don't know which -- how
14 those were done.

15 So I'd say the next time I did this
16 analysis was for our response to comments on the CALM
17 and we have a Figure 4, which is on page 12 of that
18 document, and -- and in that, those -- those
19 regressions regress light attenuation versus
20 suspended particulate organic matter and we regress
21 light attenuation against colored dissolved organic
22 matter and regress light attenuation versus inorganic
23 particulate matter.

1 So what we had done here is gotten
2 actual measurements of colored dissolved organic
3 matter so we didn't have to rely on salinity and we
4 had separated the total suspended solids into the
5 organic particles and chlorophyll and -- versus the
6 inorganic particles.

7 And so when we did that analysis, the
8 factor that had the highest accounted for the
9 greatest amount of the variability in light
10 attenuation was the organic matter followed by the
11 colored dissolved organic matter, and the factor that
12 had the least effect on the light attenuation was the
13 inorganic particulate matter.

14 Q. All right. I'll ask the question
15 again.

16 Does this analysis show that
17 chlorophyll-a does not have the least impact on --
18 on light attenuation?

19 A. In the new analysis, we didn't separate
20 chlorophyll-a from organic matter because organic
21 matter is part of -- you know, chlorophyll-a is part
22 of organic matter, so it's not a direct --

23 Q. So these things are not directly

1 comparable. We can't say one can be used to dispute
2 the other?

3 A. Correct.

4 Q. Okay. Thank you.

5 MR. KINDER: We should have that
6 marked.

7 MR. HALL: Let's mark the Response to
8 Comments for the Draft 2012 Consolidated Assessment
9 and Listing Methodology as the next exhibit, please.

10 (Trowbridge Exhibit No. 59 was marked
11 for identification.)

12 BY MR. HALL:

13 Q. Mr. Trowbridge, one or two more
14 questions regarding this analysis.

15 The -- when you were talking about the
16 new analysis where you did regressions, you were
17 referring to the regressions in Exhibit 59, correct?

18 A. Yes.

19 Q. Okay. And with these samples that you
20 did for light attenuation and -- versus these various
21 parameters, the ones that you're discussing in
22 Figure 4, were those data only taken from Great Bay?

23 A. I don't believe so.

1 Q. Why did you mix data from different
2 parts of the estuary in this analysis?

3 A. Because it's all data that's relevant
4 to the estuary.

5 Q. But isn't the impact on light
6 attenuation from colored dissolved organic matter
7 different in the Squamscott River than it is down at
8 the mouth of the estuary?

9 A. All of these samples were taken within
10 a few miles of each other.

11 Q. I didn't ask that question. I asked
12 whether or not you were comparing data from
13 significantly different physical settings in
14 developing this chart. Are they all from Great Bay
15 or no?

16 A. They're not all from Great Bay proper.

17 Q. Okay. Where were they from?

18 A. They're from the Great Bay, they're
19 from -- some from Little Bay, some from the
20 Piscataqua River, some from the tidal rivers, some
21 from Portsmouth Harbor. They're all from the Great
22 Bay Estuary system.

23 Q. Isn't the proportion -- isn't the

1 effect of each of these different parameters
2 different in each of those locations in the system?
3 They have a different proportional effect on light
4 attenuation in each of those sections of the system?
5 And if you don't know, you can just say you don't
6 know.

7 A. I don't know that that's true.

8 Q. Okay. Back to our macroalgae, you
9 were --

10 MR. KINDER: Excuse me, John, did you
11 want this?

12 MR. HALL: No. I know exactly what's
13 in there.

14 MR. KINDER: Okay.

15 MR. HALL: That's okay.

16 BY MR. HALL:

17 Q. We were -- when we were talking earlier
18 about this November 30th -- and why don't we clear
19 some of the papers out in front of you so we don't
20 get any more confused as to what we're looking at and
21 what we're not. Okay?

22 A. We're back on this one?

23 Q. We're back on that one.

1 The purpose of that was to try to, in
2 part, get some funding to figure out where nuisance
3 macroalgae might be occurring, correct?

4 A. Yes.

5 Q. Okay. There's a -- do you know when
6 you finally got the grant for the macroalgae mapping?

7 A. I don't know the exact date.

8 Q. Is it sometime in 2008?

9 A. (Shakes head.)

10 Q. I mean, this went in in 2007, so ...

11 A. Yeah. Yeah, I don't know exactly, but
12 around that time.

13 Q. Okay. Well, let me just -- this is
14 just an email that you sent to Al Basile.

15 When can we expect to hear back about
16 our 104(b)(3) grant award? We applied for 15,000 for
17 macroalgae mapping.

18 That's in May of 2008. Were you -- I
19 guess at that time you were in contact with EPA to
20 try to get them to provide the grant award?

21 A. Yes, it's an EPA grant.

22 MR. HALL: Okay. The stuff that's
23 attached to that, Evan, was just attached to the

1 email. So there's no question on that.

2 MR. MULHOLLAND: Okay.

3 BY MR. HALL:

4 Q. Let's -- here's another -- I presume
5 this was done after the macroalgae maps were
6 completed. I'd like to show you an email.

7 MR. KINDER: Do you want to mark these,
8 John?

9 MR. HALL: And we're going to mark this
10 as Exhibit 60.

11 Evan, here you go.

12 MR. MULHOLLAND: Thank you.

13 BY MR. HALL:

14 Q. It's got a question that you've
15 posed -- that you're proposing to Fred Short. It
16 says, one perplexing issue is that macroalgae covers
17 a 137 acres in Great Bay and zero acres in Little
18 Bay, but the TN concentrations in Great Bay and
19 Little Bay are almost the same.

20 And you're asking, can somebody explain
21 why macroalgae are occurring in Great Bay, but not
22 in Little Bay. Do you recall sending that email?

23 A. I don't recall doing it, but it's -- I

1 can read it here.

2 Q. Okay. Do you recall whether or not
3 Dr. Short was -- or anyone else was able to give you
4 an answer as to why macroalgae were being found in
5 Great Bay but not in Little Bay, being right next
6 door to each other?

7 A. I don't recall an answer from
8 Fred Short, but I do recall that the ultimate maps
9 of macroalgae were limited to Great Bay because
10 that's where the data had been able to be ground
11 truthed.

12 Q. So we just didn't have any macroalgae
13 data for Little Bay or anywhere else in the system?

14 A. No ground truth data, no.

15 Q. No ground truth data. So they did try
16 to do some -- what was this, area mapping again that
17 they were using?

18 A. The macroalgae was mapped using
19 hydrospectral aerial photography and needed to be
20 ground truthed.

21 Q. What about macroalgae impairments? Are
22 they -- are they documented in the Squamscott River,
23 excessive macroalgae in the Squamscott, have you seen

1 a report on that?

2 A. No.

3 Q. How about the Lamprey?

4 A. No.

5 Q. Oyster?

6 A. Oyster, there's been studies done.

7 Q. So there's some excessive macroalgae in
8 the Oyster River?

9 A. There were some studies done in the
10 '70s and '80s by Art Mathieson and his students and I
11 believe those studies were followed up in more recent
12 years by Art Mathieson and his students.

13 Q. Are you guessing that it covered the
14 Oyster River or are you thinking that as part of the
15 river where the Oyster comes into Little Bay? Do you
16 recall?

17 A. I don't know exactly where it is, but I
18 think it is part of the Oyster River.

19 Q. What about the Cocheco; any data on
20 excessive macroalgae in the Cocheco River?

21 A. No.

22 Q. What about the Piscataqua, Upper or
23 Lower, excessive macroalgae?

1 A. I'm not sure.

2 Q. What about the harbor?

3 A. Again, I'm not sure, because there's
4 different types of studies that are done by different
5 people and I know there's a lot of monitoring in the
6 mouth of the harbor related to invasive species
7 colonization and macroalgae data may be collected as
8 part of that.

9 Q. In the 2009 nutrient criteria document,
10 the only area for concern of macroalgae, I believe,
11 was Great Bay; is that correct?

12 A. That's the only area where we had
13 information for macroalgae for that report.

14 Q. Do you know if the physical conditions
15 of the tidal rivers allowed for the growth of
16 macroalgae to occur, given the tidal velocities that
17 go through there?

18 A. I don't know.

19 Q. Okay. Who would you go to if you had
20 to ask that question?

21 A. I would consult with Art Mathieson.

22 Q. Okay. Has Art Mathieson ever told you
23 that any of the Squamscott, Lamprey, Upper or Lower

1 Piscataqua, Cocheco, the harbor, has he ever told you
2 that any of those areas are suffering from excessive
3 macroalgae growth?

4 A. I don't recall every conversation I've
5 had with him, so I'm not sure.

6 Q. It doesn't ring a bell, though?

7 A. Art has provided us some written
8 comments relating to macroalgae particularly in
9 Great Bay, so that's what I'm most familiar with.

10 Q. But that's what I was asking. You
11 know, you're -- you're on the PREP group and, of
12 course, you work for DES. You do these indicator
13 reports. Have any of the indicator reports ever
14 addressed the extent of macroalgae growth in the
15 system and whether or not it's causing an impairment?

16 A. No.

17 Q. Okay. Do you know why?

18 A. Lack of data.

19 Q. I guess this is an obvious question.
20 Is there information from 1990 to 2000 for Great Bay
21 showing that macroalgae is adversely impacting
22 eelgrass growth in Great Bay?

23 A. No studies that I'm aware of.

1 Q. Do you know if there's any data showing
2 that macroalgae are preventing eelgrass from re --
3 reestablishing themselves in any area of Great Bay?

4 A. You're asking if there are studies --

5 Q. Yeah.

6 A. -- of that?

7 Q. Studies or information showing that
8 it's preventing the eelgrass from reestablishing
9 itself in Great Bay.

10 A. The maps that were made in 2007 showed
11 pretty significant areas that had been converted to
12 macroalgae which would prevent the recolonization of
13 eelgrass.

14 Q. You think that prevents the
15 recolonization by eelgrass? Do you have data or
16 studies that would tell us that that would prevent
17 it?

18 A. The review papers on this topic show
19 that as a cause or a -- show that as a way macroalgae
20 affects eelgrass.

21 Q. Don't -- I guess I'm asking for Great
22 Bay. And go a little bit from your recollection full
23 on this one.

1 In 2007, the eelgrass populations had
2 declined significantly from 2005, hadn't they? We
3 could go through the individual data. I think it was
4 somewhere around 1,200 -- 1,200 acres might be the
5 number for 2007?

6 A. Yeah, I don't recall exactly.

7 Q. Okay. Do you want me to show you a
8 document that will refresh your recollection?

9 A. Well, why don't we just go on with the
10 question.

11 Q. All right. What's the eelgrass
12 population in Great Bay as of 2010, 2011, do you
13 know? It's higher, right?

14 A. Let's just look at the table.

15 Q. And which report are you looking at?

16 A. I'm looking at the 2012 303(d)
17 technical support document which has eelgrass data
18 through 2010.

19 Q. That's -- he is looking at Exhibit 47.
20 And, okay, so we've got it through 2010. And have
21 the eel -- what page are you looking on of this
22 report?

23 A. Page 14.

1 Q. Page 14. And can you please tell us
2 from 2007 to 2010, what was the change in the
3 eelgrass acreage?

4 A. From 2007 to 2010. So in 2007 -- in
5 Great Bay you're talking about?

6 Q. Yeah, because that's where you had the
7 eelgrass maps, correct? I'm sorry, the macroalgae
8 maps.

9 A. So in 2007, 1,245 acres.

10 Q. Uh-huh?

11 A. In 2010, 1,722 acres.

12 Q. So, roughly, it increased by 500
13 acres -- I said roughly because it's a little bit
14 less than 500, between 2007 and 2010. Do you have
15 any -- you had eel -- you had macroalgae data from
16 2007?

17 A. Uh-huh.

18 Q. Do you have any macroalgae data since
19 then that shows the macroalgae prevented the eelgrass
20 from restoring themselves in areas where the
21 macroalgae previously had been?

22 A. No. 2007 was the only data we had for
23 macroalgae.

1 Q. Okay. Question on macroalgae. Do
2 the macroalgae cause the loss of eelgrass or do the
3 eelgrass decline and then macroalgae fill in the
4 habitat that the eelgrass had been in? How does it
5 work, do you know?

6 MR. MULHOLLAND: Objection; compound.

7 Q. And I realize, you know, you're not a
8 biologist, so I'm just curious in terms of your --
9 what you've been informed about that topic and then
10 maybe you can tell me who's informed you about it.

11 MR. MULHOLLAND: I just want to make an
12 objection. Compound question.

13 Go ahead.

14 A. The best information we have about that
15 is from the review papers on the topic, which would
16 be Burkholder, et al, from 2007, McGlathery, et al, I
17 think it's 2008, where they talk about the sequence
18 of eutrophication in shallow estuaries where there's
19 a growth of macroalgae which affects the eelgrass and
20 then leads to the eelgrass loss.

21 Q. Okay. Do you know if in this system
22 the growth of macroalgae is what caused the eelgrass
23 loss?

1 A. No.

2 Q. Okay. And whatever macroalgae were
3 growing, they apparently did not prevent 500 acres of
4 eelgrass from recovering, did it?

5 A. No.

6 Q. Okay. I'd like to show you -- you
7 prepared a macroalgae literature survey in, I
8 believe, December of -- I'll get an exact date,
9 December of 2011. It's noted as Diers Exhibit 51.

10 MR. MULHOLLAND: Here you go.

11 THE WITNESS: Thank you.

12 BY MR. HALL:

13 Q. Is that -- do you recognize that
14 document?

15 A. Yes.

16 Q. Okay. Can you please tell me why it
17 was prepared?

18 A. Right at the beginning we described the
19 purpose. The purpose of this literature view --
20 sorry.

21 The purpose of this literature review
22 was to compile the -- sorry, the draft stamp is on
23 it -- compile the -- I can't read it, something

1 studies on macroalgae and epiphytes population in the
2 Great Bay Estuary.

3 Q. What is the use of that -- what
4 document -- what use is that document being put to
5 today, do you know?

6 A. As far as I know, none.

7 Q. Was one of the purposes of this
8 document to identify what you believed was the
9 necessary level of nitrogen control to limit
10 excessive macroalgae growth in the system, do you
11 recall?

12 A. No, the purpose was just to summarize
13 the available information.

14 MR. HALL:

15 Q. Okay. Then I'd like this marked as
16 exhibit --

17 (Trowbridge Exhibits No. 60, 61, and 62
18 were marked for identification.)

19 BY MR. HALL:

20 Q. Exhibit 62 is a letter from Great Bay
21 Municipal Coalition to Harry Stewart and it's
22 commenting on the literature review that -- that
23 Mr. Trowbridge developed as a draft dated

1 December 2011, which is Exhibit 51.

2 Mr. Trowbridge, are you -- have you
3 seen these comments before?

4 A. Yes.

5 Q. Okay. Have you been asked to prepare a
6 response to those comments?

7 A. No.

8 Q. Do you know what -- what, if anything,
9 is being done with regard to the question over the
10 nitrogen level necessary to limit macroalgae growth,
11 anything at this point in time?

12 A. Not that I'm aware of.

13 MR. HALL: Okay. I'd like to show
14 you -- we'll mark this as exhibit.

15 (Trowbridge Exhibit No. 63 was marked
16 for identification.)

17 BY MR. HALL:

18 Q. You mentioned earlier that you have
19 received some type of comments from Art Mathieson
20 regarding macroalgae issues. Is this the comment
21 letter you were referencing?

22 A. Yes.

23 Q. Okay. Does that letter indicate or

1 provide any -- any data on the level of macroalgae
2 present in the system during the 1990s when eelgrass
3 were fairly extensive in Great Bay?

4 MR. MULHOLLAND: Feel free to read it.

5 A. Yeah, it's been a while since I looked
6 at this.

7 Q. Okay.

8 THE WITNESS: Okay. Can you reread me
9 the question again, please?

10 (The question was read by the
11 reporter.)

12 A. I don't believe so.

13 BY MR. HALL:

14 Q. Now, macroalgae -- strike that.

15 Mr. Trowbridge, you were present at
16 some work -- what we'll call the MOA work group
17 meetings when Dr. Mathieson was present and he was
18 discussing macroalgae; do you recall that?

19 A. Yes.

20 Q. Okay. Do you recall whether
21 Dr. Mathieson stated that -- whether or not he knew
22 the level of nutrient control that was needed to
23 limit macroalgae growth in Great Bay or anywhere else

1 in the system?

2 A. I don't recall exactly what he said.

3 Q. Assuming that Dr. Mathieson said he did
4 not know the level of macroalgae control -- the level
5 of nutrient control needed to restrict macroalgae
6 growth, would you have any technical basis for
7 disputing that position?

8 MR. MULHOLLAND: Objection to form.
9 Excuse me.

10 A. Are you saying that that's what he said
11 or are you saying --

12 Q. I'm saying assuming that's what he
13 said --

14 A. Uh-huh.

15 Q. -- would you have -- would you have a
16 basis for disputing that position?

17 MR. MULHOLLAND: Repeat the objection.

18 A. I guess I -- I don't have enough
19 information to answer that.

20 Q. When you say you don't have enough
21 information, I just gave you the information.

22 Assuming that's what Dr. Mathieson
23 said, do you have a basis for disputing that

1 position?

2 MR. MULHOLLAND: Objection as to form.
3 I think the position -- it's an unclear question. So
4 it's my objection, to form.

5 MR. KINDER: Let's go off the record
6 for a second.

7 (Off-the-record discussion.)

8 MR. KINDER: Back on the record.

9 BY MR. HALL:

10 Q. Back on the record.

11 Mr. Trowbridge, it's our position
12 that Dr. Mathieson, at the -- I guess it was the
13 September 2011 MOA group meeting, stated he did not
14 know the degree of nitrogen control needed to
15 restrict macroalgae growth.

16 Do you have any basis to dispute that
17 statement or, in short, do you have data showing the
18 level of nutrient control necessary to restrict
19 macroalgae growth?

20 A. Okay. I think I'm understanding the
21 confusion.

22 So you're not asking me to dispute
23 whether or not Art should know.

1 Q. Of course not.

2 A. You're asking me whether I have
3 different information or a different opinion.

4 Q. Right.

5 A. Okay. I think the -- yeah, the exact
6 level is not known.

7 Q. That's a fair answer.

8 What about -- I believe Dr. Mathieson
9 also stated that if you wanted to control macroalgae,
10 the most important form of nitrogen to control was
11 dissolved inorganic nitrogen. Is that your
12 understanding also?

13 A. In terms of the most important form,
14 not exclusively, but yes, dissolved inorganic
15 nitrogen is the most reactive form of nitrogen.

16 Q. That's the form that directly
17 stimulates or could directly stimulate macroalgae
18 growth, correct?

19 MR. MULHOLLAND: Objection to form.

20 A. All forms of nitrogen can fuel growth
21 over enough time. DIN is the most -- the one that
22 can be -- reacts on the shortest time scale.

23 Q. In order for other forms of nitrogen

1 to stimulate macroalgae growth, and I guess we'll say
2 organic nitrogen --

3 A. Uh-huh.

4 Q. -- does that have to be converted to
5 inorganic nitrogen for it to fuel macroalgae growth?

6 A. Correct.

7 Q. Okay. Do you have -- have you done any
8 analysis of Great Bay or any of its tidal rivers
9 indicating the degree to which organic nitrogen is
10 converting to inorganic nitrogen within the system?

11 A. There have been no studies of kinetics
12 for a modification within the estuary. So those
13 studies have not been done.

14 Q. So the short answer is no, you don't
15 have any studies -- well, no studies have been done,
16 so you don't have any studies, right?

17 A. Right. There's been no studies of the
18 kinetics of that reaction.

19 Q. And do you know whether or not the
20 detention time in the system is sufficient to allow
21 for significant conversion of inorganic nitrogen
22 forms to -- I'm sorry -- organic nitrogen forms to
23 inorganic nitrogen forms within Great Bay?

1 A. I -- I don't know.

2 Q. I believe at the -- at the work group
3 meeting -- and when I say work group meeting, I mean
4 the September 11th work group meeting that you were
5 in attendance, Dr. Mathieson as well as several
6 others, you indicated that the level of nitrogen that
7 needed to be achieved to restrict macroalgae growth
8 was .3 milligrams of nitrogen; isn't that correct?

9 A. Which -- sorry. The September 11th,
10 what year?

11 Q. September 11th.

12 A. No, what --

13 Q. Oh, 2011. The MOA work group meeting
14 on macroalgae.

15 A. Uh-huh. I -- I believe I shared some
16 information related to the -- what we had for the
17 literature review for macroalgae that we were working
18 on at the time that was consistent with that, yes.

19 Q. Is it -- to your knowledge, is it the
20 department's position that a .3 milligram total
21 nitrogen level needs to be achieved in order to limit
22 macroalgae in a system?

23 A. I don't know.

1 Q. You haven't heard that as a position
2 that's been stated publicly by the department then?

3 A. No.

4 Q. Okay. I'm going to ask you a few
5 questions about -- actually, I'm going to jump ahead.

6 Off the record.

7 (Off-the-record discussion.)

8 BY MR. HALL:

9 Q. I've got a question for you regarding
10 the use of biomass as an indicator of eelgrass health
11 in the system.

12 Do you recall sending any emails to
13 Dr. Short and asking that he provide you with
14 information that could be used to understand the
15 magnitude of the error -- error bars in biomass
16 estimates of Great Bay?

17 Let's mark this as Exhibit -- I'm
18 handing the witness a June 20th, 2008 email to
19 Fred Short from Phil Trowbridge; Dear Fred, as we
20 discussed at the TAC meeting, DES needs to understand
21 the magnitude of the error bars on the biomass
22 estimates of Great Bay.

23 We'll mark that as Exhibit 64.

1 (Trowbridge Exhibit No. 64 was marked
2 for identification.)

3 BY MR. HALL:

4 Q. Do you recall sending that information
5 request to Dr. Short?

6 A. Yes.

7 Q. Can you tell me why it was sent?

8 A. Well, I don't remember exactly, but
9 the -- the email states that we would discuss this
10 topic at the TAC and we need to better understand the
11 magnitude of error related to biomass estimates.

12 Q. Do you recall telling Dr. Short these
13 biomass estimates could not be used as a reliable
14 indicator unless you produced the information showing
15 how reliable the indicator was?

16 A. Do you have an email or something?

17 Q. Yeah, there's more emails.

18 A. We've had a lot of conversations
19 related to this topic, so ...

20 Q. All right. That's Exhibit 15 from
21 Dr. Short's deposition in which -- in which you
22 subsequently, on November 13th, 2011 -- let's see if
23 you remember this -- you informed the group that

1 Dr. Short, in fact, could not produce the information
2 and, therefore, the analysis cannot be completed and
3 DES cannot consider eelgrass biomass as an indicator
4 of 305(b) or 303(d) assessments since quality
5 assurance cannot be confirmed.

6 A. Uh-huh.

7 MR. MULHOLLAND: Is that a question?

8 MR. HALL: There will be.

9 BY MR. HALL:

10 Q. Do you recall that email, that
11 response?

12 A. Yes.

13 Q. Okay. So that email says you're not
14 going to use -- may I have it -- not going to use
15 biomass as an indicator because you can't be
16 assured -- since quality assurance can't be
17 confirmed.

18 Can you please tell me why biomass
19 keeps showing up in State of the Estuaries reports
20 and 305(b) reports after you confirmed -- after Dr.
21 Short could not confirm the reliability of that
22 indicator?

23 MR. MULHOLLAND: Objection to form;

1 compound.

2 You can answer.

3 A. Okay. Maybe I'll answer it in two
4 pieces. For the 305(b) reporting to start, the
5 biomass is used as some supplemental information,
6 it's not used as a separate indicator, and so that's
7 what these emails are about, is about the use of
8 biomass in a 305(b) 303(d) listing process. It
9 doesn't have bearing on the State of the Estuaries
10 report.

11 Q. And it doesn't have a bearing on
12 whether or not you declare an area as impaired for
13 eelgrass loss based on acreage?

14 A. Right. The impairment determinations
15 are based exclusively on acreage and biomass is only
16 mentioned as supplemental information because it is
17 an important consideration, but it can't be taken
18 quantitatively.

19 Q. Because you don't know the reliability
20 of the measurement, right?

21 A. Correct.

22 Q. Okay. On -- with regard to biomass, do
23 you have any idea with regard to the error margin

1 that is associated with the measurement?

2 A. You mean like the error bars?

3 Q. Yeah, the error bars. Has anybody ever
4 tried to -- plus or minus a hundred percent, 200
5 percent, what? Do you have any idea.

6 A. No, that was the information we were
7 seeking.

8 Q. Okay. What about the error bars for
9 eelgrass acreage? Do you have an idea as to what
10 those are?

11 A. I don't know exactly, but we do have a
12 quality assurance plan for the eelgrass mapping that
13 includes a ground truthing component. And I don't
14 remember the exact date of quality objective, but
15 it -- the boundaries have to be accurate to within a
16 few meters.

17 Q. Okay. So --

18 A. So I expect the error bars to be quite
19 small.

20 Q. And, actually, while I'm on the subject
21 of eelgrass mapping, Dr. Short gave you a final
22 report on eelgrass mapping for 2010, correct?

23 A. Yes.

1 Q. Did you subsequently change the acreage
2 of eelgrass that Dr. Short had found from those
3 documents -- in that document?

4 A. In collaboration with Dr. Short, we
5 found errors in the GIS files that was overestimating
6 the eelgrass in Great Bay and maybe some other areas,
7 I can't remember exactly, that needed to be removed
8 so that they weren't being double counted.

9 Q. With regard to eelgrass in Little Bay,
10 there's -- or actually, let's go back to -- let's go
11 to 2011 eelgrass mapping.

12 Are the results of the 2011 eelgrass
13 mapping publicly available yet?

14 A. There's not been a final report
15 produced by Fred Short, but we have put the final
16 shape files for GIS onto the FPT site for -- as part
17 of the document request --

18 Q. Okay.

19 A. -- for this lawsuit.

20 MR. HALL: Evan, I'd like to request a
21 paper copy of those GIS files. I cannot convert them
22 because I do not have the program that one does that.
23 So documentation is put up there, but you -- I

1 personally can't access it because I don't have
2 the -- I don't have the program. So if we could have
3 a copy of whatever those files are and whatever --

4 Q. Has Dr. Short given you a draft report
5 yet --

6 A. No.

7 Q. -- or anything in writing other than
8 the data itself?

9 A. No, we just have the GIS files and
10 that's something that I'll be following up with him
11 about.

12 Q. Just something else to confirm for you,
13 it's something that I covered with Dr. Short, when he
14 did the eelgrass mapping surveys, the purpose or
15 intent of those eelgrass mapping surveys was not to
16 evaluate the cause of changing eelgrass populations,
17 was it?

18 A. No.

19 Q. No. And that kind of data actually
20 wasn't collected, right, it was just, here's the
21 physical extent of eelgrass; he didn't collect any
22 other relevant water quality data along with that to
23 try to understand what may be causing the eelgrass

1 populations to ebb and flow with that study?

2 A. There's a ground truthing component
3 where Dr. Short or his technicians look at the
4 eelgrass to determine the health of the eelgrass,
5 whether -- by that I mean whether they're covered
6 with epiphytes or some other things.

7 So there is some information collected,
8 but water quality information is not collected.

9 Q. Okay. At one of the MOA group
10 meetings, now that you mention epiphytes, didn't
11 Dr. Short state that he did not believe that
12 epiphytes were causing significant adverse impacts
13 on eelgrass health in Great Bay? Do you recall that?

14 A. I -- I don't recall exactly what he
15 said at that meeting.

16 Q. Has Dr. Short ever told you that
17 epiphytes were causing major impacts on eelgrass
18 health in Great Bay?

19 A. I believe so. I can't remember. I've
20 had a lot of different conversations with Dr. Short.

21 Q. So the best person to ask whether
22 epiphytes were a problem would have been Dr. Short
23 directly, right?

1 A. Correct.

2 MR. MULHOLLAND: Can we take a short
3 break?

4 MR. HALL: Absolutely.

5 (Recess taken from 2:10 p.m. until
6 2:16 p.m.)

7 BY MR. HALL:

8 Q. Mr. Trowbridge, earlier you were
9 talking about that there had been this study with a
10 moor put out -- a buoy put out in Great Bay to try to
11 determine the level of different factors affecting
12 transparency in Great Bay. Is this the report you
13 were talking about?

14 A. Yes.

15 MR. HALL: Please note that the witness
16 has said yes to the -- it's Exhibit 25 from the Short
17 deposition.

18 Q. Okay. All right. I'd like to ask you
19 a few questions regarding Great Bay itself and what's
20 affecting the eelgrass in Great Bay as to -- making
21 it vary over time.

22 Have -- do you know whether or not --
23 let me ask it differently.

1 Are you an expert on eelgrass ecology?

2 A. No.

3 Q. Okay. And who -- who was the expert
4 you were taking most of your advice from -- or
5 what -- what experts were you taking advice from as
6 to the factors influencing eelgrass populations in
7 Great Bay and other tidal rivers?

8 A. Fred Short -- are you talking just
9 about eelgrass experts?

10 Q. (Shrugs shoulders.)

11 A. Yeah.

12 Q. Phil Colarusso, do you consider him an
13 eelgrass expert or --

14 A. Yes, he provided some input.

15 Q. And was Phil Colarusso one of Fred's
16 graduate students or did he -- do you recall whether
17 or not that was the case?

18 A. I'm not sure.

19 Q. Okay. Any other experts on eelgrass
20 for Great Bay?

21 A. Well, I consider Art Mathieson also to
22 be an expert in that area.

23 Q. More macroalgae, though, right, I think

1 Art would probably say?

2 A. More so, but I think he can say -- he's
3 also an excellent biologist.

4 Q. I'd like to show you some emails that
5 you received, mostly, I believe, from Dr. Short,
6 regarding how light is affecting or not eelgrass in
7 Great Bay.

8 Here's a -- and, I'm sorry, let's mark
9 this as Exhibit 65.

10 (Trowbridge Exhibit No. 65 was marked
11 for identification.)

12 BY MR. HALL:

13 Q. With regard to light impacts on Great
14 Bay, Great Bay is the area that has most of the
15 eelgrass meadows in the entire system, correct?

16 A. Currently, yes.

17 Q. Okay. Historically, was there any
18 other part of the system that had more eelgrass than
19 Great Bay?

20 MR. MULHOLLAND: Objection to form.

21 Q. If you know.

22 A. It -- I don't know.

23 Q. Okay. In this email, I took it

1 Dr. Short is trying to give you some insight as to
2 what's happening in these type locations and why.

3 It says, I think monitoring eelgrass
4 in the system would be a good indicator for habitat
5 assessment, but we have got to be careful to look at
6 the conditions in Great Bay itself differently than
7 those in Little Bay and Piscataqua River.

8 Quote, Great Bay is dominated by
9 extensive eelgrass meadows that are intertidal that
10 receive enough light at low tide to satisfy their
11 light requirements.

12 Do you have any reason to disagree with
13 that observation made by Dr. Short?

14 Do you have -- no, let's -- let's let
15 the question stand. Do you have a basis, a
16 scientific basis, to disagree with that position
17 expressed by Dr. Short?

18 A. No. I will say that I think the term
19 intertidal here is used incorrectly because I think
20 what he means here is these are beds that are --
21 where the eelgrass reaches the surface at low tide.
22 True intertidal would be beds that are rooted between
23 the low tide line and the high tide line.

1 Q. And, in fact, eelgrass can't grow in
2 that area, right, it's because -- they can't grow in
3 an area where they get I'll call it desiccated at low
4 tide, right?

5 A. That's my understanding.

6 Q. Yeah. I believe your understanding to
7 be correct.

8 All right. Let's leave that as marked
9 as Exhibit 65.

10 Let me send another one your way.
11 Here's an email a couple days later from Jim Latimer
12 to Phil Colarusso, actually, and copied you and --
13 well, let me see. Just strike that. I may not need
14 this.

15 Hmm. Okay. No, we'll use that.
16 Here's an email from EPA. We'll mark this as Exhibit
17 66.

18 (Trowbridge Exhibit No. 66 was marked
19 for identification.)

20 BY MR. HALL:

21 Q. Now, Jim Latimer is saying that the --
22 oh, first off, do you recall receiving this email and
23 can you first tell me, one, if you recall receiving

1 it and, two, who Jim Latimer is.

2 A. Yes, I recall receiving this email, and
3 Jim Latimer is a research scientist with EPA in
4 Narragansett, Rhode Island.

5 Q. Okay. And, I'm sorry, was -- the first
6 answer to your question was yes, you recall receiving
7 it?

8 A. Yes.

9 Q. All right. Good. It's dated
10 December 10th, 2007, and Hey Phil and Fred -- I'll
11 skip over.

12 It seems there are three questions that
13 need to be answered to persuade Rich L -- who's Rich
14 L, do you know? Is that Rich Lanney?

15 A. It could be. I'm not sure exactly.

16 Q. That eelgrass is a suitable indicator.

17 So I guess the earlier email we just
18 looked at, Fred Short was saying eelgrass is a
19 suitable indicator, I think we should use it.

20 It says, one, is eelgrass declining
21 in what might be called water quality control areas
22 of Great Bay, deeper systems of Little Bay and
23 Piscataqua River; two, is it due to water clarity

1 decline; three, is the water clarity mainly or
2 significantly caused by nutrients, phytoplankton,
3 epiphytes?

4 Do you recall those three questions
5 being posed for your -- your evaluation or evaluation
6 by anyone associated with you?

7 A. I recall receiving the email, yes.

8 Q. Okay. Do you recall whether or not you
9 sought to answer those questions with any evaluation
10 that you developed?

11 A. Not specifically.

12 Q. Okay. I'll refresh your recollection
13 on that in a moment.

14 The -- let's go to Little Bay now in
15 2012. The most recent Piscataqua River PREP report,
16 does it note a substantial increase in eelgrass in
17 Little Bay compared to prior years?

18 A. Yes, the draft report shows that.

19 Q. How much did it increase, do you
20 recall?

21 A. I don't recall. Maybe 40 acres.

22 Q. I think the total is 48 acres. Let's
23 put into -- we'll mark this. First off, let's mark

1 that one as exhibit -- is it already marked?

2 Okay. Let's mark this one as Exhibit
3 67.

4 (Trowbridge Exhibit No. 67 was marked
5 for identification.)

6 BY MR. HALL:

7 Q. Mr. Trowbridge, do you recognize this
8 document?

9 A. Yes.

10 Q. Okay. Is there a table you can point
11 us to to let us know how the acreage of eelgrass had
12 been doing in Little Bay and other areas?

13 A. Yes. Table HAB 2-1.

14 Q. Very good. Okay. So what's the amount
15 of eelgrass found present in Little Bay in 2011?

16 A. 48.2 acres.

17 Q. Is that the greatest amount of eelgrass
18 that's been found in Little Bay since 1996?

19 A. Yes.

20 Q. Is that greater than the amount of
21 eelgrass that were present in 1996?

22 A. Yes.

23 Q. About how much greater percentwise?

1 A. I can't do that calculation in my head.

2 Q. Oh, I'll do it for you. 50 percent.

3 A. All right.

4 Q. 16 acres, 32 acres, jumping to 48
5 acres, 16 acres, 16 over 32 is 50, so it's a 50
6 percent increase.

7 A. Okay.

8 Q. Does this information indicate that the
9 water quality in Little Bay is insufficient to allow
10 eelgrass restoration to occur? The existing
11 transparency, does it indicate that it's preventing
12 the eelgrass from being restored?

13 A. The -- I'm sorry. I need to think
14 through this question. The eelgrass is -- this is a
15 one-year increase. We're not sure what it means in
16 terms of a long-term survival. So it's premature to
17 say anything about restoration.

18 Q. Does this information indicate that the
19 current water quality is preventing eelgrass from
20 reinhabiting Little Bay?

21 A. No.

22 Q. Here's an information question. 48
23 acres, that's a pretty big area, don't you think?

1 MR. MULHOLLAND: Objection; form.

2 Q. Just in --

3 A. Not compared to the 252 acres that were
4 there in 1981.

5 Q. Oh, I'm just saying generally. You
6 know, Fred Short's out mapping Little Bay year after
7 year and the prior three years before that he has
8 zero eelgrass acreage in the bay, correct --

9 A. Yes.

10 Q. -- in Little Bay?

11 A. In some years, yes.

12 Q. .1 acre in 2007, zero in 2008, zero in
13 2009, .3 in 2010, and then 48 acres spring up in
14 2011. Is that physically possible? Do you know if
15 that's physically possible, for 48 acres of eelgrass
16 to just appear in a single year without -- in Little
17 Bay?

18 A. I have no reason to doubt the number.

19 Q. Oh, I didn't -- I'm not saying you
20 doubt that number. I'm saying it went from zero
21 to 48. Is it very possible that Dr. Short has
22 inadvertently underreported the eelgrass populations
23 in Little Bay in prior years?

1 A. I don't believe so.

2 Q. Has anyone given you an explanation how
3 it went from zero to 48 acres in one year?

4 A. I've spoken to several people who've
5 seen the bed and they've said it's a very low density
6 bed that was developed around the wrack line. So --
7 and it's an area where eelgrass seeds might be
8 collected. Aside from that, I don't know.

9 Q. Okay. Did you receive any
10 correspondence from Fish & Game or anyone else
11 indicating that Dr. Short -- that they find eelgrass
12 beds in places where Dr. Short has been reporting
13 there are none?

14 A. I've had some conversations with
15 Fish & Game about this topic and the issue seems to
16 be different mapping methods. If you're mapping
17 eelgrass -- Fish & Game has got divers and they're
18 mapping certain areas, very small areas, and the
19 mapping that was done for the estuary was all done
20 in a consistent way so it could be reported
21 consistently. So it's two different methods.

22 Q. Oh, okay. So this might be simply
23 explainable that the overflight method fails to pick

1 up the number of actual eelgrass acres that are there
2 whereas when you dive down, you find more because the
3 method for -- what do you call it, hyperspectral --
4 what's the term?

5 A. Hyperspectral imagery. But that was
6 only done in 2007.

7 Q. Hmm.

8 A. The rest is just normal photography.

9 Q. Normal photography. So apparently
10 normal photography isn't picking up all the eelgrass
11 beds?

12 A. With any kind of mapping technique, if
13 you go from a large scale mapping to a fine scale
14 mapping, you'll have more detail on the fine scale
15 mapping.

16 Q. Okay. But you can see, Mr. Trowbridge,
17 why this would be a pretty important question.

18 Did the nitrogen levels in Little Bay
19 change dramatically from 2010 to 2011, to your
20 knowledge? I mean, you're the one that's analyzing
21 data. Do you recall any major change in nitrogen
22 levels?

23 A. In the draft indicators report, we're

1 showing a decline in nitrogen levels in recent years.
2 Changes over year to year, there's too much
3 variability to show statistical significance.

4 Q. I mean, it went from zero to something
5 else, so what -- what changed to allow the eelgrass
6 in Little Bay to spring back?

7 A. I think it's premature to have a
8 discussion about this until we see whether that bed
9 persists or whether it was a one time thing.

10 Q. So if that bed persists, suppose that
11 bed persists. Let's see. This was 2011. It's 2012,
12 right? Suppose we go out there next month and that
13 bed persists and we've got two years that bed is
14 there and the nitrogen levels are above the numbers
15 that are in your numeric criteria document and the
16 transparency levels are -- fail to meet the
17 transparency targets that's in your document. Which
18 is the accurate indicator, the actual presence of the
19 eelgrass beds or the numeric value which is telling
20 you they shouldn't exist because you're above my
21 number? Which is the more reliable indicator?

22 A. Are we talking about like for PREP
23 indicators or are we talking about 303(d)

1 impairments?

2 Q. Pick either.

3 A. Uh-huh. Okay. For our impairment
4 determinations, our ultimate goal is restoration
5 of the resource and that's why we use a
6 stressor-response decision matrix in our CALM, so
7 that if we do not have a -- so if the eelgrass were
8 restored and the nitrogen and light attenuation
9 numbers were still above their thresholds, then
10 the impairment would no longer be valid.

11 Q. Okay. Let's be real -- let's --
12 instead of dancing around the question, let's just
13 answer it.

14 I go to this eelgrass bed, I measure
15 the nitrogen level where the eelgrass bed is, it's
16 .4. I measure the light attenuation number, it's 1.
17 The eelgrass bed is there. Those numbers don't meet
18 the numeric criteria right there. Are you telling me
19 that the numeric criteria should still be applied as
20 the basis for saying you have to have these met in
21 order to restore eelgrass in Little Bay when we have
22 actual site-specific data showing it's not necessary?

23 A. Well, I think what you have to do is

1 you have to approach it like the analysis, which is
2 to say, relative to what was in Little Bay, it's only
3 about 20 percent of what was there. So that would be
4 part of the response.

5 Q. How does that have anything to do with
6 whether the nitrogen level and the light attenuation
7 value is necessary to restore the eelgrass? What
8 historically existed doesn't tell me you need that
9 number to -- I'm saying you have actual -- before you
10 had said to me, you know, those numbers are just
11 guidance, I'm just using those as guidance values to
12 decide whether or not there's an impairment. And I
13 said, well, suppose we have site-specific information
14 showing they weren't needed. Earlier I believe you
15 said, well, then that would show we don't need to
16 apply those numbers.

17 MR. MULHOLLAND: Objection. Just --

18 MR. HALL: I'm saying -- I'm
19 characterizing. This is just what I'm remembering
20 the testimony to be.

21 BY MR. HALL:

22 Q. And now we're in Little Bay and we find
23 areas where the eelgrass are restoring themselves,

1 I'll -- I'll go for two years running, but we're not
2 meeting the numeric values you claimed were necessary
3 to allow the restoration to occur. Which is the more
4 accurate indicator of what's necessary, the actual
5 recovery of the eelgrass in areas or the theoretical
6 calculations contained in the 2009 criteria document?

7 MR. MULHOLLAND: Objection. He
8 answered the question.

9 Q. Do you use that information -- you can
10 object, but he's got to answer the question. Which
11 is the more accurate indicator?

12 A. We use the eelgrass as the ultimate
13 indicator of the response.

14 Q. But are you telling me that ultimate
15 indicator isn't used as a response until I fully
16 restore it back to 252 acres?

17 A. What I'm saying is when we do an
18 assessment in the CALM, the protocol is to look at
19 comparisons to what was there historically. You
20 know, if you go from five acres to ten acres in an
21 area where you've lost 500 acres, that doesn't mean
22 that the system is restored.

23 Q. So your answer to my question is yes;

1 what you look at is whether or not you restored the
2 historical value and it doesn't matter whether or not
3 it is, in fact, being restored even though the
4 numeric criteria are not being achieved; the
5 controlling value is whether or not you've met the
6 historical number.

7 A. That's our protocol for the assessment.

8 Q. Okay. So when did you adopt the
9 historical value as part of your nutrient -- as
10 your -- as what constitutes an impairment for this
11 system and that unless that historical value is left,
12 the numeric nutrient criteria have to be achieved? I
13 mean, it's -- I know it's in the CALM, but can you
14 tell me where that's been adopted as some kind of
15 State rule or some explanation to the public of how
16 this works? Do you know?

17 A. Can I see the 2008 August 303(d) list.

18 MR. MULHOLLAND: Are you looking for
19 this?

20 THE WITNESS: Yes, this.

21 MR. MULHOLLAND: Okay.

22 THE WITNESS: Okay. So on this
23 document, which is the August 11th, 2008 methodology

1 and assessment results related to eelgrass and
2 nitrogen in the Great Bay Estuary for compliance with
3 water quality standards, I don't know what the
4 exhibit is, page 5, we talk about use support
5 criteria for eelgrass indicator and in that there's
6 two different methods, and the first one is on page
7 6; if there are reliable, historic and current maps
8 of eelgrass cover, DES will use the percent decline
9 from the historic level to determine impairments.

10 Q. But I didn't say that. I know you're
11 using historic lines to determine impairment. I'm
12 talking about that the cause of the impairment is the
13 failure to meet the numbers that are contained in
14 your 2009 criteria document. That's what you're
15 doing; you're taking -- right? You're taking a
16 historical number and you're saying, if you're less
17 than the historical number, the cause is the values
18 that are contained in the 2009 criteria document,
19 right?

20 A. Not exactly. Because if the nitrogen
21 concentrations are not higher than those thresholds,
22 you know, we're still going to assess the eelgrass
23 loss as a separate parameter.

1 Q. But if the nitrogen concentrations are
2 above, you presume the cause was the nitrogen
3 concentration, correct?

4 A. As we had the conversation earlier
5 about the stressor-response matrix; if we've got
6 higher nitrogen -- nitrogen above the thresholds from
7 the 2009 guidance document and we have a negative
8 response in eelgrass or light attenuation, then we
9 would have a nitrogen impairment, a violation of the
10 narrative standard for nitrogen.

11 Q. Okay. When you say negative response,
12 you mean a number less than the numeric value based
13 in the 2009 criteria document, right?

14 A. Yeah, a number.

15 Q. Right.

16 A. Yeah.

17 Q. All right. But we just discussed for
18 Little Bay you've got a positive response.

19 A. Uh-huh.

20 Q. You've got 48 acres, more than what was
21 even existing in 1996, 50 percent more, coming up, a
22 positive response even though the nitrogen and
23 transparency numbers are not achieved. And you're

1 saying, just so I understand this, that that doesn't
2 matter; it's the -- it's -- the fact that the total
3 acres are still less than historical still means it's
4 impaired due to those values, due to nitrogen and
5 transparency?

6 MR. MULHOLLAND: Objection to form.

7 MR. HALL: I mean, I've been trying to
8 ask this question five different ways.

9 MR. MULHOLLAND: Can we go off the
10 record for a second?

11 MR. HALL: Yes.

12 (Off-the-record discussion.)

13 BY MR. HALL:

14 Q. Okay. Can you answer? Is the answer
15 to the question yes, that you still apply -- you
16 still conclude that the water body is
17 nitrogen-impaired and transparency impaired even if
18 there's a 48-acre increase in eelgrass because the
19 total eelgrass level is still not up to historical
20 values?

21 A. What you've described is the way we
22 would do our assessments as we've described them in
23 the CALM.

1 Q. And here's the question I keep asking
2 where you have -- because you said it was a guidance
3 document.

4 A. Uh-huh.

5 Q. Where you have actual data showing the
6 eelgrass are being restored, even though the nitrogen
7 and transparency levels are not met, you still
8 conclude that you must meet the nitrogen and
9 transparency levels to allow restoration?

10 A. So can I speak hypothetically since
11 we don't have data into the future?

12 MR. KINDER: Why don't you answer the
13 question first and then explain.

14 THE WITNESS: All right. Because I
15 think part of my answer is saying one year of a
16 rebound in Little Bay, we're waiting to see if
17 there's actually -- if that bed persists. Should
18 that bed persist and maybe continue to grow, we
19 might have more evidence that would allow us to be
20 comfortable with the idea that there is actual
21 restoration occurring and not a one-off thing. Then
22 we have the flexibility, through our CALM, to make a
23 determination that the -- to deviate from the

1 stressor-response decision matrix in our CALM.

2 Q. Now, I realize you're not the commander
3 in chief of EPA or DES, but given the 48-acre rebound
4 in Little Bay, wouldn't it make sense to wait at
5 least until we see what happens in 2012 as
6 to those eelgrass before people start issuing
7 stringent permits claiming that particular
8 transparency level and that particular nitrogen level
9 is essential to the recovery of the eelgrass sources?

10 A. I think you're correct; that is a
11 decision that is not mine.

12 Q. No, but what do you think? What's your
13 opinion?

14 A. That's not my decision.

15 Q. Okay. Did we -- we marked -- I'd like
16 to show you yet another email. This one's from Matt
17 Leibman to you. We're back to -- I'm sorry for
18 switching time frames on you. I know it can get
19 confusing.

20 We're back to December of -- 21st now
21 of 2007, kind of this chain of emails as to whether
22 or not Great Bay has a transparency issue or not.

23 And let's mark this as Exhibit --

1 (Trowbridge Exhibit No. 68 was marked
2 for identification.)

3 BY MR. HALL:

4 Q. I'd like to draw your attention to --
5 apparently you must have had some type of edgy
6 meeting. Who's Matt Liebman?

7 A. Matt Liebman works for EPA. I don't
8 know his actual title.

9 Q. All right. Was he providing input on
10 what was the appropriate numeric nutrient criteria
11 for Great Bay?

12 A. I believe Matt was responsible for
13 nutrient criteria within the region.

14 Q. Okay. Let's look at the first
15 paragraph. As discussed at the meeting, since the
16 Great Bay eelgrass community is mostly intertidal,
17 the response is different than the water clarity
18 conceptual model you were applying.

19 Can you please tell me what he was
20 talking about when he's trying to tell you may have
21 the wrong conceptual model that you were applying to
22 Great Bay?

23 A. I'm sorry. I don't know what he was --

1 what he meant by this.

2 Q. Oh, well, let's read the next sentence.
3 A better conceptual model may be coastal ponds, where
4 macrophytic benthic algae, such as Ulva, are
5 replacing eelgrass. I think Art Mathieson was
6 getting at that.

7 Does that refresh your recollection?
8 Does that refresh your recollection?

9 A. This was in 2007, correct?

10 Q. Yes.

11 A. So this was pretty early in the process
12 then.

13 MR. MULHOLLAND: If you know, answer.

14 THE WITNESS: I think his point was
15 that when we started the process, we started with a
16 conceptual model that was appropriate to deeper areas
17 and that given that Great Bay has many shallow areas,
18 we might want to consider a different conceptual
19 model that relates to shallow areas.

20 BY MR. HALL:

21 Q. And relates to macroalgae, right?

22 A. That's one of the issues in shallow
23 areas.

1 Q. Isn't that one of the reasons why you
2 were asking for additional research dollars, to
3 evaluate macroalgae because you needed to switch
4 over to a macroalgae model for Great Bay?

5 A. We needed that information. It's also
6 something that my advising committee had been asking
7 for for several years.

8 Q. Do you have a basis to agree with
9 Mr. Liebman that since Great Bay eelgrass community
10 is mostly intertidal, the response is different than
11 the water quality conceptual model that you were
12 applying -- I'm sorry -- water clarity conceptual
13 model you were applying?

14 A. Do I have a reason to object to that?
15 Is that --

16 Q. Is that a -- is the statement wrong?

17 A. I think it's valid.

18 MR. HALL: Okay. Let's mark that.

19 Okay. I'd like to show you a -- let's
20 mark this as 69. It's another email within the same
21 kind of train.

22 (Trowbridge Exhibit No. 69 was marked
23 for identification.)

1 BY MR. HALL:

2 Q. It's an email -- this -- do you
3 recall -- this is an email from you to Jim Latimer,
4 nitrogen criteria. And do you recall this email?

5 MR. MULHOLLAND: Take your time.

6 A. So this is a different email chain from
7 what we've been talking about, correct?

8 Q. Well, it's -- no. It's part of -- if
9 you go to the last pages, it has Fred Short's earlier
10 statement that I covered with you where he repeats
11 again, as I said at the meeting, because of the
12 intertidal nature of Great Bay, it has the ability to
13 support eelgrass, parens, despite the worst water
14 quality in the estuary as the plants get adequate
15 light at low tide.

16 So it's one in a series of dealing with
17 the same question.

18 A. Okay. So is the question do I remember
19 this email?

20 Q. Yeah.

21 A. I don't remember it in detail, but ...

22 Q. Well, I'm going to ask you a question
23 about point two on the first page. It says, dividing

1 Great Bay into subestuaries makes sense because by
2 doing so one better isolates the major factors
3 controlling the eelgrass, thus simplifying the
4 regulatory task, end quote.

5 Your response, I presume, because the
6 email's from you, I agree with you. My only concern
7 is with lumping Little Bay in with Lower Piscataqua
8 River. These are fundamentally different areas.
9 They should be split.

10 Okay. What is the point that people
11 are trying to get at with these emails, that you
12 shouldn't treat Great Bay and Little Bay and the
13 Piscataqua River as all having the same factors
14 influencing the eelgrass bed? Isn't that the point
15 of it?

16 A. I think that's one of the main points,
17 yes.

18 Q. Okay. Let's -- we've got that one
19 marked. And then I'd like to show you one last
20 email. I'm sorry, it's not an email. It's meeting
21 minutes on Transparency, Macroalgae, and Epiphyte
22 impacts to eelgrass. This is part of the MOA group
23 meetings. It's the July 29th, 2011 meeting and

1 it's -- I'll ask you whether or not you recall
2 being at that meeting.

3 A. Yes, I was at that meeting.

4 Q. Okay. The part that I highlighted is
5 where it says because -- Dr. Short was at that
6 meeting, right, as I recall?

7 A. He's in the meeting minutes.

8 Q. Yeah. And the meeting minutes indicate
9 Fred Short explained that in Great Bay, transparency
10 is not a major cause impacting eelgrass. When the
11 tide is out, the eelgrass is exposed and receives
12 sufficient light for growth.

13 Do you recall Fred Short making a
14 statement along those lines and isn't that statement
15 consistent with those we just discussed in the prior
16 emails regarding Great Bay?

17 MR. MULHOLLAND: Objection as to form,
18 compound.

19 MR. HALL: Yeah, it is compound.

20 BY MR. HALL:

21 Well, first, do you recall Dr. Short
22 making that statement.

23 A. I don't remember exactly.

1 Q. Okay. Assuming Dr. Short did make that
2 statement, transparency is not a major issue
3 impacting eelgrass. When the tide is out, eelgrass
4 is exposed and receives sufficient light for growth.

5 Isn't that statement if -- almost
6 identical, but, at a minimum, consistent with the
7 2007 emails that you received from EPA and Dr. Short
8 explaining that same situation?

9 A. Yes.

10 Q. Okay. I'll direct your attention a
11 little bit further down where it talks about -- on
12 the topic of epiphytes. Fred Short commented that
13 epiphytes are not and, to his knowledge, never have
14 been a significant problem to eelgrass in the
15 estuary.

16 Do you recall Dr. Short making that
17 statement?

18 A. Again, I don't recall exactly what
19 Fred Short said at that meeting.

20 Q. All right. And it's back to my
21 question of did Dr. Short ever tell you that
22 eelgrass -- that epiphytes were a significant problem
23 in the estuary and, if so, did he provide you any

1 information, independent information, that could
2 actually confirm it?

3 A. I think I responded to that the first
4 time you asked that that I'm not sure. I've had lots
5 of conversations with Fred and I think he may have
6 mentioned it in some of his conversations.

7 Second question, I do not have any
8 independent measurements of epiphytes.

9 Q. Dr. Short never gave you any
10 information that shows, here's the amount of
11 epiphytes growing and these are a problem; you never
12 saw that from him?

13 A. Except for the mesocosm studies.

14 Q. The mesocosm studies weren't actually
15 in the bay itself, were they?

16 A. Right. They were using water from the
17 bay, but they were not in the bay.

18 Q. And do you know what year those
19 mesocosm studies were done?

20 A. It was the 1990s. I don't remember the
21 exact year.

22 Q. All right. It was 1990, 1991, but
23 let's assume pre-'95. Was there any indication that

1 Great Bay had a macroalgae problem in the '90s when
2 eelgrass beds were thriving in the bay?

3 A. There's no information about macroalgae
4 at that time.

5 MR. HALL:

6 Q. All right. Let's mark that as
7 Exhibit 70.

8 (Trowbridge Exhibit No. 70 was marked
9 for identification.)

10 BY MR. HALL:

11 Q. So here's a question, Mr. Trowbridge.
12 You've got all these emails from Fred Short, EPA and
13 others saying Great Bay is not a transparency issue,
14 they get enough light. Why did you develop a
15 transparency criteria for Great Bay that specified a
16 specific amount of light was needed in order to have
17 healthy eelgrass in that system when the experts kept
18 telling you that that system is not a light-limited
19 system?

20 MR. MULHOLLAND: Objection to form.

21 You can answer.

22 A. Are there -- was the -- was there
23 multiple questions?

1 Q. You understand the question, right?
2 Whether or not there's multiple questions, you
3 understand the question I'm asking --

4 A. Uh-huh.

5 Q. -- right?

6 A. (Shakes head.)

7 Q. It's pretty straightforward.

8 A. Can we just read it again, please?

9 (The question was read by the
10 reporter.)

11 THE WITNESS: The thresholds that we
12 developed were for the whole estuary, so not just
13 Great Bay, but for all areas, and they were based on
14 the best available information we had and they were
15 also based on a weight of evidence approach that
16 accounted for other conceptual models besides the
17 light transparency model.

18 BY MR. HALL:

19 Q. So let me see if I understand your
20 answer.

21 You had some generalized information
22 that indicated transparency can be a problem for
23 eelgrass. You call that weight of evidence, even

1 though the experts on the system told you this system
2 is not light-limited? Where most all the eelgrass
3 are growing in the system, they told you it was not
4 light-limited, and you decided to not follow that
5 expert advice, but instead use some weight of
6 evidence?

7 A. The weight of evidence considered our
8 expert advice in looking at the macroalgae growth in
9 the Great Bay system, in the Great Bay itself.

10 Q. I didn't ask you about macroalgae. I
11 asked you about why you set a light transparency
12 value that had to -- during the period of the '90s,
13 when eelgrass were extensively growing in Great Bay,
14 did the bay meet the transparency value you
15 established -- that was established in the 2009
16 criteria document, yes or no?

17 A. We don't know because we didn't have --

18 Q. You don't know?

19 A. -- measurements at that time.

20 Q. Okay. Do you know if transparency has
21 changed over time?

22 A. We don't have measurements of light
23 attenuation coefficient over a very long time.

1 Q. I said do you know if the transparency
2 in the system has changed over time. And this is
3 going to be another one of those that he needs to
4 answer very carefully because I have a specific
5 document from him that says he evaluated and
6 concluded they did not.

7 So do you know if light transparency
8 changed in Great Bay over time?

9 MR. MULHOLLAND: Objection as to form.
10 Which time?

11 MR. HALL: Huh?

12 MR. MULHOLLAND: Which time? That's
13 unclear.

14 MR. HALL: During the period from when
15 the mid-'90s to the 2005.

16 A. So is there a specific document you
17 want me to review?

18 BY MR. HALL:

19 Q. No, I want you to answer the question
20 first and see whether or not you can recollect what
21 you did.

22 A. And are you talking about light
23 attenuation coefficient as measured by par or are you

1 talking about Secchi disk or are you talking about
2 something else?

3 Q. Don't both measure the amount of light
4 transmission in the system?

5 A. One is more accurate than another.

6 Q. I didn't ask you that question. I
7 asked you whether or not both measure light
8 transmission in the system.

9 A. They do, but light attenuation
10 measurements are more accurate. The Secchi disk
11 measurements are made by volunteers.

12 Q. Okay. So let's go back over it again
13 and then we'll loop back to your analysis of light
14 attenuation.

15 A. Uh-huh.

16 Q. In Great Bay, did you set a light
17 attenuation value that could not be currently met in
18 the system?

19 A. The light attenuation threshold that
20 was set for all areas of that -- with the same
21 restoration depth is, I believe, lower than what
22 the current light attenuation is in Great Bay.

23 Q. Okay. And the experts had just said

1 Great Bay is not a light attenuation problem.

2 A. Uh-huh.

3 Q. They said it gets enough light under
4 low -- under low tide conditions.

5 What information did you have that
6 confirmed that was incorrect, that that -- that the
7 repeated expert advice -- expert advice that you got
8 was wrong?

9 A. As we summarized in that report at the
10 end, the information that we had on macroalgae
11 proliferation gave us similar numbers in terms of
12 nitrogen protection -- the nitrogen threshold that we
13 needed to prevent proliferation of macroalgae in
14 Great Bay, so that addresses that question.

15 Q. What report?

16 A. In the 2009 guidance document.

17 Q. No, it doesn't. You covered that with
18 me earlier. You said the macroalgae numbers, which,
19 by the way, are expressly written in that report as
20 .38, I think, you previously said you knew the
21 macroalgae numbers were less restrictive than the
22 numbers needed to meet the light attenuation value.
23 Did you not remember what you have written in that

1 report, which is your current document that you're
2 using throughout the system?

3 MR. MULHOLLAND: I don't know what
4 question's pending before you answer. I'm not sure
5 which one's pending.

6 MR. HALL: The question that's pending
7 is --

8 MR. MULHOLLAND: There are a couple.

9 MR. HALL: -- what information did he
10 have that showed the advice from the experts was
11 wrong, that it wasn't a light-limited system.

12 MR. MULHOLLAND: That's the question.

13 A. The evidence I had that they were
14 wrong?

15 BY MR. HALL:

16 Q. Yeah.

17 A. I guess I would interpret -- I mean, I
18 think of it as we incorporate comments from people as
19 we develop the report and part of those comments was
20 to add in macroalgae information into the report,
21 which we did, and then we incorporate that into our
22 final answer of what we feel were the appropriate
23 thresholds for assessments throughout the CALM.

1 MR. HALL: You know, Evan, he's not
2 just not answering the question again. And I know he
3 hates to answer questions when he can't answer them
4 other than to say, you're right, I had no information
5 that showed the experts were wrong. That we've gone
6 through several times. But we're going to ask the
7 question or I'll just certify this one to the judge.

8 BY MR. HALL:

9 Q. You said you were not an expert on
10 eelgrass ecology, right?

11 A. That's correct.

12 Q. All right. You said Dr. Short was an
13 expert on eelgrass ecology, right?

14 A. That's correct.

15 Q. You said Phil Colarusso was an expert,
16 some type of expert on eelgrass ecology, right?

17 A. That's correct.

18 Q. You've got emails from Dr. Short,
19 Phil Colarusso, Jim Latimer, I don't know what he's
20 an expert on, all saying the same thing, the system
21 is not a light-limited system, Great Bay. What
22 information did you have that demonstrated that
23 expert advice was incorrect?

1 MR. MULHOLLAND: Just that specific
2 question.

3 A. None.

4 MR. HALL: Thank you. We've got about
5 half an hour.

6 MR. MULHOLLAND: That's great.

7 MR. HALL: I'd like to bring to your
8 attention some evaluations you yourself did on this
9 question of transparency and its effect on the
10 system.

11 Let's mark this as Exhibit 71.

12 (Trowbridge Exhibit No. 71 was marked
13 for identification.)

14 BY MR. HALL:

15 Q. Mr. Trowbridge, I've given you an
16 email, this is a little bit of an email chain, and
17 then there's an attached -- it looks like it's a
18 PowerPoint that was done for the New Hampshire
19 Estuaries Project. It's a PowerPoint that's dated
20 November 8th, 2007 and entitled Toward a New
21 Conceptual Model for Nutrient Criteria Development in
22 a New Hampshire Macrotidal Estuary. Phil Trowbridge,
23 Ru Morrison, Jim Latimer, John Pennock, Rich Langan

1 and Fred Short.

2 Do you recall this group of emails in
3 preparing this PowerPoint presentation?

4 A. I remember the presentation. I don't
5 have a specific memory of the emails.

6 Q. Okay. I'm surprised you don't remember
7 them, because apparently Fred Short was very upset
8 about the presentation you did. This was already
9 marked as Exhibit 71.

10 On page 2, Hi Fred, so you were upset
11 by the talk. I don't think we have a different
12 opinion regarding nutrients in the Great Bay system.

13 And then Fred's email on the front
14 page, November 14th, 2007, thanks for getting back to
15 me. I think there were some fundamental major
16 misconceptions we need to talk about.

17 You don't remember having this
18 discussion with Fred Short that you've got
19 fundamental misconceptions about what's going on
20 in the bay ecology?

21 A. I do remember emailing him back and
22 forth about this topic, but not the details.

23 Q. Okay. Well, let's -- let's flip

1 through this presentation.

2 The first page talks about positive
3 motivation. I guess this is motivation for what, the
4 development of a new model or a numeric criteria for
5 the system?

6 A. I'm not sure. This was 2007.

7 MR. MULHOLLAND: Would it help if you
8 read the whole thing?

9 THE WITNESS: Sure.

10 BY MR. HALL:

11 Q. Well, that was a minor question. Let's
12 just go to the chart. Let's go to the chart. Do you
13 see the chart that says Recent Eelgrass Trends in
14 Great Bay?

15 A. Uh-huh.

16 MR. HALL: Harry, would you like one of
17 these?

18 MR. STEWART: If you have a spare.

19 MR. HALL: I've got a couple of these
20 and you'll want to look at all these charts.

21 BY MR. HALL:

22 Q. Okay. Recent Eelgrass Trends in Great
23 Bay. We've got this thing about -- on Motivation it

1 talks about current thinning of eelgrass biomass and
2 then we show this trend chart and that's got eelgrass
3 acres which look fine to me by 2005, but we've got
4 this biomass number.

5 So as of this time, the biomass number
6 is still being used as a basis to say, even if the
7 habitat acres is still looking good, we're concerned
8 about the biomass trend in any event?

9 A. Uh-huh.

10 Q. Okay. You hadn't yet asked Fred to
11 produce the backup documents as to his biomass
12 calculations, right? I believe that came -- that
13 came in June of 2008, I think is when that -- all
14 right.

15 Let's go and let's see what you're
16 looking at here. You've got measured bulk light
17 attenuation through water in Great Bay.

18 Okay. Here we've got light attenuation
19 data for Great Bay. It says there's a median K_d of
20 1, right? Is that the light attenuation coefficient
21 you were talking about, the one that's more accurate?

22 A. Yes.

23 Q. All right. Now, let's go back to the

1 prior graph on the eelgrass trends of Great Bay.
2 That light attenuation value apparently didn't
3 prevent the bay from having eelgrass habitat in
4 excess of 2,000 acres, did it?

5 A. No. The -- the concern was for the
6 thinning of the beds.

7 Q. A concern that you later on told me is
8 discarded as a controlling basis for making
9 decisions, right?

10 A. I wouldn't say it's discarded. As an
11 issue, it's an important one. The issue is about how
12 accurate are the data.

13 Q. Well, if you don't know how accurate
14 are the data, how can you use it?

15 A. There's some fairly large signals, so
16 sometimes if you have a large enough signal, even if
17 you have large error bars, it's still useful
18 information.

19 Q. In response to the HydroQual's analysis
20 of this same data in 2010, didn't you tell HydroQual
21 that it was inappropriate to use the eelgrass biomass
22 data because DES had not been able to confirm its
23 reliability? Don't you recall sending that email

1 response to them?

2 A. I don't.

3 Q. Don't you think it's likely you might
4 have because of your decision that you shouldn't rely
5 on biomass?

6 A. There would be something we would say
7 if it's related to our 303(d), yes.

8 Q. So the median Kd value, is that better
9 or worse than the value that you suggested in the
10 2009 criteria document for Great Bay?

11 A. That is worse.

12 Q. Okay. So under your decision for -- if
13 we applied that to Great Bay, to this data set, even
14 though we had over 2,000 acres of eelgrass throughout
15 this period, there was one downturn, but it came back
16 up, you could conclude that, what, transparency was
17 insufficient and it needs to be improved based on the
18 2009 criteria or not?

19 A. Well, we're looking at a presentation
20 from 2007, right?

21 Q. (Shakes head.)

22 A. So I'm answering from my perspective in
23 2007 or --

1 Q. Absolutely. Like if I applied that
2 criteria in 2007, would you conclude the Great Bay
3 impaired for eelgrass and its transparency?

4 A. We didn't -- I mean, in the -- as
5 you'll see in this presentation, we're just
6 presenting the information about transparency. We're
7 not saying that it's impaired.

8 Q. No, I'm asking you if you applied that
9 2009 criteria document in this data set, would you
10 have determined that Great Bay was impaired for
11 eelgrass and causes transparency?

12 MR. MULHOLLAND: Objection to form.

13 A. It depends on whether the eelgrass
14 number was more than 20 percent down from historic
15 levels. It's -- we'd have to do the assessment.

16 Q. Ah, so you might not if the eelgrass
17 was up in historic levels --

18 A. Yeah.

19 Q. -- within 20 percent?

20 A. Yeah.

21 Q. But if it were below 20 percent,
22 you would conclude that would be a cause for --

23 A. Through our stressor-response matrix.

1 Q. Okay. Just trying to make sure I
2 understand completely how all this works.

3 Now, you go to water quality parameters
4 influencing light attenuation, there are several
5 listed here that you're evaluating, correct?

6 A. Uh-huh.

7 Q. Phytoplankton, suspended solids,
8 turbidity, colored dissolved organic matter,
9 sometimes just called CDOM for short, and water
10 itself. Are those the primary factors that influence
11 light attenuation?

12 A. Yes.

13 Q. Okay. And the next page, here are the
14 regressions; these are the same regressions I showed
15 you before, I suppose, a version thereof, and these
16 regressions indicate chlorophyll-a is a minor
17 component and CDOM is the major component affecting
18 light transmission?

19 A. That's what these regressions show.

20 Q. Okay. And now -- and then you've got
21 something about nitrogen loading rates at Great Bay?

22 A. Uh-huh.

23 Q. Let's look at this. You've got that

1 Great Bay has got apparently a much higher nitrogen
2 loading rate per area or per volume, right, than what
3 others are recommending to protect the system; is
4 that?

5 A. Correct, yeah. This is comparison of
6 normalized loading rates.

7 Q. But the eelgrass data, the acreage
8 data -- the acreage data -- if the acreage data is
9 saying, I'm averaging 2,000 acres and that's within
10 20 percent of the historical eelgrass level, it
11 wouldn't matter that the loading levels are higher
12 than what they are in some other systems; what would
13 control is how the eelgrass have responded, right?

14 A. Right.

15 Q. Okay. So let's look at this. It says
16 Conclusions, we need to move to a new conceptual
17 model. Suspended sediments as important as nitrogen
18 inputs. Macroalgae as a primary producer.

19 So this is leading you to a -- some
20 conclusion that you need to do, what, a more detailed
21 assessment of the system and what's affecting
22 transparency? Is that where this is all leading to?

23 A. And that we need to study macroalgae

1 more and we may need different ways to analyze the
2 data.

3 Q. And, now, who was the gentleman that --
4 because it talks about high frequency monitoring of
5 light attenuation and water quality from a moored
6 array.

7 That's -- that's the Morrison report,
8 right, that short Exhibit 25, this one?

9 A. Correct.

10 Q. And when we flip through the next
11 couple charts, these are charts from Dr. Morrison
12 that you're presenting and I -- well, actually, I
13 believe you're -- you're listed as a coauthor on that
14 report, too, but light transparency, the different
15 factors of chlorophyll-a versus other things, these
16 are -- these are all from Dr. Morrison, right --

17 A. Yes.

18 Q. -- that winds and turbidity is
19 affecting light attenuation in this system, right?
20 As you would expect, of course, on a windy day,
21 things get a little turbid, right? That's not a
22 chlorophyll-a issue, right? That's stirring up the
23 bottom, correct?

1 A. That can happen, yes.

2 Q. Yeah. Okay. So Conclusions, let's
3 look at the conclusions.

4 Traditional concepts for nitrogen
5 eelgrass relationships do not work for Great Bay.

6 By the way, who wrote these
7 conclusions? Was this a collaborative effort between
8 you -- between the folks listed on this presentation
9 or was it -- were these just your conclusions?

10 A. This was certain -- certainly
11 collaborative. It wouldn't have everyone's name on
12 it if they didn't review it.

13 Q. Okay. Just checking.

14 So the traditional conceptual models
15 for nitrogen eelgrass relationships do not work for
16 Great Bay.

17 Which models were you talking about?
18 Was it the loading model or was it the ...

19 A. Those were -- I can't remember exactly,
20 but it would -- I think the loading models were one
21 that was in this presentation, some of the other
22 research that's been done in the Chesapeake Bay, for
23 instance.

1 Q. Was it also the model that says
2 phytoplankton -- excessive phytoplankton growth
3 is going to lead to significant decreases in
4 transparency when you increase nutrient loads? Isn't
5 that also one of the conceptual models you're talking
6 about there?

7 A. Yes.

8 Q. Okay. So you need to do something
9 different. So you said we need a different model
10 which includes tidal amplitude, sediment resuspension
11 and macroalgae. So you needed something a little bit
12 more complex than just a light attenuation value,
13 right? That's what this is implying.

14 A. Yes. There's also information -- yes.

15 Q. Okay. I'd like to show you another
16 email -- now, I understand Fred was a little bit
17 upset. I'm not quite sure why he was a little upset
18 at what you said, but you did some further analysis
19 after that. Do you recall being invited by Phil
20 Colarusso to some kind of eelgrass meeting to do a
21 presentation in March of 2008?

22 A. Yes.

23 Q. Can you tell me, what was that meeting

1 all about? I think it might have been some kind of
2 annual meeting on eelgrass, things affecting
3 eelgrass.

4 A. My recollection, this was just a -- an
5 annual meeting where people in the region presented
6 their research on eelgrass.

7 Q. Okay. Eelgrass is a major concern in
8 Region 1 area in several different --

9 A. Yes.

10 Q. -- systems?

11 Okay. I'm sorry, Phil. So apparently
12 eelgrass was a significant concern in a number of
13 estuarine systems in Region 1.

14 A. I believe so.

15 Q. We don't have to mark that one as an
16 exhibit. I'll just have it back. I'm just trying to
17 make sure it was the meeting I was thinking it was.

18 I'd like to give you a copy of your
19 presentation at that meeting. You send it off to
20 Phil Colarusso on March 20th, 2008. Here it is. Let
21 me know if you receive it and if it looks good.

22 MR. MULHOLLAND: Thanks.

23 MR. HALL: I apologize.

1 Off the record.

2 (Off-the-record discussion.)

3 MR. HALL: Let's mark this as Exhibit
4 72.

5 (Trowbridge Exhibit No. 72 was marked
6 for identification.)

7 BY MR. HALL:

8 Okay. Do you recall making this
9 presentation?

10 A. I'm sure I did.

11 Q. Okay. Can you tell me -- the title of
12 the presentation is Nutrient Criteria Development for
13 the Protection of Eelgrass in New Hampshire
14 Estuaries. What was -- what was the purpose of this
15 presentation? What were you trying to do with this?

16 A. I don't recall. I was just invited to
17 give a presentation.

18 Q. You were kind of giving a status report
19 of the results of your research to date, weren't you?

20 A. Again, I don't remember, but ...

21 Q. All right. Well, let's walk through
22 it. Let's see what you informed EPA as to what was
23 going on in Great Bay.

1 A lot of the -- a lot of the same
2 pictures, motivation chart, same information on
3 Great Bay Estuary surface area, salinity, some of
4 the same pictures.

5 MR. MULHOLLAND: John, are these
6 questions?

7 MR. HALL: No, I'm just walking
8 through.

9 BY MR. HALL:

10 Q. This looks quite a bit like the prior
11 presentation we were just looking at, right, the same
12 type of slides, we've got the eelgrass trends in
13 Great Bay?

14 A. There's a lot of similar slides.

15 Q. Okay. But now there are some new ones.
16 Water clarity in Great Bay. You
17 plotted the water clarity in Great Bay going from
18 January 1993 all the way through January 2007. Okay?
19 Right?

20 A. Uh-huh.

21 Q. You plotted it for Adams Point and you
22 plotted it at GB CW-15. Where is GB CW-15?

23 A. It's in the Piscataqua River.

1 Q. Do you know about where?

2 A. I don't recall.

3 Q. Okay. All right. So you plotted the
4 water quality -- water clarity data over time and
5 then you showed some of the same regressions. And
6 you showed the preliminary results, the Ru Morrison
7 study, that chlorophyll-a is only eight percent of
8 the transparency affecting the system.

9 Now let's go to the conclusions. Can
10 you read that first conclusion?

11 A. Eelgrass biomass declining in Great Bay
12 but no apparent decline in water clarity.

13 Q. There was an earlier email where EPA
14 said, you know, you really ought to check in to
15 answer three questions: One was look at your model;
16 two, I believe, was check to see that the nutrients
17 are stimulating excessive chlorophyll-a growth; and,
18 C, see if you have information showing transparency
19 actually changed over time. Do you know why they
20 asked those questions for you to evaluate? Why don't
21 you tell us why they asked you to evaluate those
22 questions?

23 A. Are you asking me why they asked me --

1 Q. Yeah.

2 A. -- the question?

3 Q. Why did they ask you to evaluate those
4 questions?

5 A. I don't know why they asked me to
6 evaluate those questions.

7 MR. HALL: Let's certify that question
8 for the judge.

9 Q. Eelgrass biomass declining in Great Bay
10 but no apparent decline in water clarity.

11 MR. MULHOLLAND: Point -- one point
12 before you go on to the next one.

13 What does that mean? I'm unfamiliar
14 with that. I've never heard anyone certify anything.

15 MR. HALL: Well, if you want to -- if
16 you want to file a motion with the judge that the
17 witness is being uncooperative, because I've got the
18 back-and-forth emails where he fully understands the
19 reason those questions are being asked and, in fact,
20 they're obvious. This I don't understand is -- we'll
21 try to get a better answer from that.

22 MR. MULHOLLAND: So certifying means?

23 MR. KINDER: We'll present the question

1 to the judge and --

2 MR. HALL: On a motion to compel.

3 MR. KINDER: -- and you and I or John
4 will argue about whether that shows this witness --

5 MR. MULHOLLAND: So if you don't say
6 it's certified, you can't do that? Is that some
7 magic word?

8 MR. KINDER: No, he's just --

9 MR. HALL: I'm just giving you warning,
10 marking it for the record.

11 MR. MULHOLLAND: Okay.

12 BY MR. HALL:

13 Q. If there was no apparent decline in
14 water clarity in Great Bay all the way through 2007,
15 how is it that somebody's now claiming that
16 transparency is a primary factor affecting eelgrass
17 growth in Great Bay?

18 A. The thresholds that we developed were
19 for the whole estuary. I mean, this is part of the
20 problem of answering the question. We developed a
21 regression based on data from the whole estuary, not
22 from a specific -- one specific location. The data
23 presented in this presentation is from one specific

1 location. So they're kind of a mixture.

2 Q. No, it's not. It's in two locations?

3 A. All right. Well --

4 Q. You've got water on the Piscataqua
5 River which showed it didn't change over time. The
6 only available data -- do you have any other
7 available data other than these data showing whether
8 water clarity changed over this 15-year period in the
9 Piscataqua River and Great Bay where most of your
10 eelgrass resources were?

11 A. No.

12 Q. Okay.

13 A. There was some data collected in
14 Portsmouth Harbor, same -- it's the same group, the
15 same volunteer group.

16 Q. So the only available data you have
17 shows water clarity didn't change in the Piscataqua
18 River and in Great Bay, right?

19 A. Right.

20 Q. All right. Why did you ignore that
21 result in issuing the 2009 criteria documents in
22 claiming that transparency needed to be improved in
23 Great Bay and in the Piscataqua River and in Little

1 Bay when you knew that during this entire period, in
2 fact, the transparency had not ever changed?

3 MR. MULHOLLAND: Objection as to form.

4 Q. Why did you do it?

5 A. The -- the data presented here from the
6 Secchi disk had -- was collected by volunteers,
7 didn't have much confidence in this data as some
8 of the other data we were considering for the
9 assessment.

10 Q. What other data from Great Bay did
11 you have that showed water clarity changed over the
12 period of record and, therefore, was a primary cause
13 of eelgrass loss anywhere in this system?

14 A. We didn't have other data on -- over
15 that long record of water clarity. We were looking
16 at the system differently in that we were looking
17 at a space per time substitution to give us that
18 information and develop the regressions we needed to
19 develop the thresholds.

20 Q. Based on this information, the
21 information contained in this report and this
22 presentation, you're saying macroalgae is a more
23 important factor, is more of a factor in losses than

1 phytoplankton. How is the transparency criteria that
2 you presented in the 2009 document a macroalgae
3 criteria?

4 A. Can I point to a section?

5 Q. Are you telling me macroalgae -- never
6 mind. Go ahead. Point me to a section. Go ahead.

7 A. Page 66, which is the final bit of the
8 discussion, talks about using a weight of evidence
9 approach that was not just regressions, but also uses
10 a reference concentration approach as well as looking
11 at the information we had on macroalgae as well as
12 the information that we had from our states for
13 thresholds that were being set for nitrogen and that
14 all of those pieces of information combined or the
15 combination of these various pieces of information
16 strongly support the nitrogen thresholds of .25, .27
17 and .3 milligrams per liter that were derived from
18 the regression from total nitrogen light attenuation
19 for restoration depths of 3, 2.5 and three meters
20 respectively. That's where we have other
21 information.

22 Q. So let me see if I understand this.
23 You had specific data on Great Bay that said experts

1 are telling you Great Bay's not a transparency issue,
2 you have specific -- the only data set you have for
3 the entire system saying transparency didn't even
4 change over time, you have other information
5 confirming that the nitrogen loads did not even cause
6 a significant change in phytoplankton growth, and you
7 ignored all of that information and simply claimed
8 you had a weight of evidence of something else
9 unrelated to this system that said you needed to have
10 these stringent numbers in place? Is that what
11 you're telling me? I mean, I just need to understand
12 because you've got specific data and analysis and you
13 did it repeatedly --

14 A. Hmm.

15 Q. -- and it doesn't show up in that
16 statement.

17 A. Uh-huh.

18 Q. And you just told me these loading
19 models don't apply to Great Bay if the -- if the
20 eelgrass levels are fine and the eelgrass levels were
21 fine. So you -- up through 2007 -- so you ignored
22 all of that specific information and claimed you
23 needed a stringent -- more stringent nitrogen number

1 anyway?

2 A. The -- the regressions that we did used
3 all of the information from the estuary; not the
4 Secchi disk information, but all the information on
5 nitrogen and light attenuation.

6 Q. Is this the regression you're talking
7 about, light attenuation versus nitrogen?

8 A. Yes.

9 Q. Okay. Didn't this analysis just
10 determine that this regression is false? Well, first
11 question: Does that regression prove nitrogen caused
12 that change in light attenuation?

13 A. Does it prove it?

14 Q. Does that regression prove causation?

15 A. It does not prove causation.

16 Q. Right. Didn't you just finish
17 individual studies analyzing whether the algal growth
18 components, whether water clarity had changed, how
19 colored dissolved organic matter was completing the
20 system, you completed detailed study on every one of
21 those things and you then ignored those and used this
22 regression that gives you the opposite answer that
23 nitrogen is controlling transparency when the other

1 studies confirmed it does not?

2 MR. MULHOLLAND: Objection. That's
3 argumentative. Just ask him a straight question.
4 You're arguing.

5 MR. KINDER: You can answer.

6 BY MR. HALL:

7 Q. Yeah. He can answer that question.

8 MR. MULHOLLAND: Go ahead.

9 A. I would say all of these studies in
10 these presentations we did in 2007 and 2008 and 2006,
11 they were all part of a long -- a long process to
12 develop this final 2009 document. And they all
13 informed are the way we went about that and the way
14 that we approached it that would be appropriate for
15 the estuary as a whole, you know, with certain -- and
16 this was the best approach that we felt to take in
17 the final report.

18 Q. Okay. Was this moored array report
19 part of the studies that you considered in order to
20 determine what was affecting transparency in the
21 system and why?

22 A. Yes.

23 Q. Did you include this as a reference in

1 that 2009 criteria document?

2 A. Yes.

3 Q. Okay. I'm going to read it. Are you
4 an author on this study?

5 A. Yes.

6 Q. I'm going to read you a quote from the
7 report, page 51.

8 The results of the -- the results
9 suggest that water clarity in Great Bay, Little Bay,
10 and Lower Piscataqua River were sufficient for
11 eelgrass growth. The virtual absence of eelgrass
12 from all but Great Bay suggests that other processes
13 apart from light restricted growth and are important
14 for limiting eelgrass survival.

15 Is that a false statement in this
16 report?

17 A. No.

18 Q. Okay. This report concludes light was
19 sufficient; your experts told you light was
20 sufficient; your 2009 document says light is not
21 sufficient. What data from the Great Bay system
22 do you have that confirm light is insufficient for
23 eelgrass growth in this system that contradicts the

1 various recommendations and statements on these
2 site-specific reports?

3 A. The accepted amount of light that
4 eelgrass needs to survive is 22 percent of incident
5 light and that's been stated for several estuaries
6 and it was also supported by the eelgrass experts
7 for Great Bay where they said that that was not
8 sufficient to -- to actually thrive, but it would
9 only keep eelgrass alive, it wouldn't have enough
10 light to actually reproduce. And if you use that
11 number for a two-meter restoration depth, you get a
12 light attenuation threshold of .7.

13 Q. Okay. So you took results from
14 elsewhere that said 22 percent was needed, even
15 though the specific results for Great Bay said it
16 wasn't, right? Yes?

17 A. I took information about eelgrass
18 that's been accepted for other locations and was
19 validated by the eelgrass experts for Great Bay.

20 MR. HALL: Can you read back his
21 response to me on what he concluded on 22 percent
22 light, what it was necessary for?

23 (The answer was read by the reporter.)

1 BY MR. HALL:

2 Q. Wouldn't have enough light to
3 reproduce. Really? Do you want to tell me how that
4 statement lines up with the actual data for Little
5 Bay where 48 acres of eelgrass sprung up in that
6 system even though it doesn't have 22 percent
7 incident light in that area? Which is correct? Are
8 the eelgrass idiots and they don't know they should
9 not be able to survive and grow or is there something
10 wrong with the 22 percent number?

11 MR. MULHOLLAND: If you know the
12 answer, you can answer.

13 A. All right. I think it's too early to
14 see whether that bed is going to survive.

15 Q. No, you just said they couldn't even
16 grow. You said they couldn't reproduce.

17 MR. MULHOLLAND: Objection. That's not
18 what he said.

19 Q. No. What do you call it? The
20 statement that was read back said survive and
21 reproduce. Apparently they have reproduced in that
22 area.

23 Now, does that data indicate the 22

1 percent number may be incorrect?

2 A. I don't know. It's too early to say.

3 Q. Back to the question I started with.
4 What specific data for Great Bay -- I'm not asking
5 you what they concluded on Chesapeake Bay or how they
6 came up with the 22 percent elsewhere. What specific
7 data for Great Bay confirmed that without 22 percent
8 light, the eelgrass are not going to be able to grow
9 and reproduce in Great Bay?

10 A. There are no specific studies on that.

11 Q. Yeah. And aren't there specific data
12 that show that that is not a necessary level in Great
13 Bay?

14 A. I -- I don't know. I don't know if I
15 agree with that.

16 Q. Didn't you just tell me what the
17 transparency number in Great Bay is -- is over
18 one Kd -- is over a one Kd in that system? Isn't
19 that what your analysis showed in this evaluation, in
20 both of these evaluations you did? It's above one,
21 right?

22 A. Uh-huh.

23 Q. Does above one allow for 22 percent

1 light in the system where it's needed?

2 A. No.

3 Q. Are the eelgrass still present in Great
4 Bay and are they, in fact, rebounding in Great Bay?

5 MR. MULHOLLAND: Objection; compound.

6 A. The grass is still present in Great Bay
7 and it has declined and in recent years it's held
8 steady.

9 Q. From 2005 -- 7 through 2011, didn't it
10 increase by almost 50 percent?

11 A. In Great Bay?

12 Q. Yeah. Acres.

13 A. 1,200 acres to over 1,700 acres.

14 From 2005?

15 Q. -7.

16 A. -7. 1,245 acres --

17 Q. Yup.

18 A. -- to 2010, 1,722.

19 Q. All right. That's -- we'll rough that
20 out as about a 40 percent increase in eelgrass acres.

21 A. Uh-huh.

22 Q. Okay. So in the past four years, we've
23 gotten a 40 percent increase in eelgrass acres even

1 though the light transmission in that system is less
2 than 22 percent as projected by your 2009 criteria
3 document, right?

4 A. Correct.

5 Q. Does that data indicate the 22 percent
6 is not essential for eelgrass to be able to
7 repopulate and rebound in the system?

8 A. Some of the -- you had similar
9 questions for Dr. Short about this and his response
10 to me was that eelgrass is expanding in order to deal
11 with the -- is expanding in response to the
12 challenges it's facing. I'm not an expert myself.

13 Q. How does that -- please answer the
14 question I posed.

15 A. Uh-huh.

16 MR. HALL: Read it back, if you could.

17 (The question was read by the
18 reporter.)

19 THE WITNESS: I agree that the eelgrass
20 numbers have increased under light attenuation that
21 is less than 22 percent.

22 MR. HALL: Okay. On that happy note, I
23 think we'll break.

1 MR. KINDER: Let's just note for the
2 record that the deposition is suspending --

3 MR. MULHOLLAND: Fine.

4 MR. KINDER: -- pending our opportunity
5 to go through the documents that have been produced
6 and we expect to reconvene at a mutually agreeable
7 time.

8 MR. MULHOLLAND: I just also want to
9 put on the record the documents were requested to be
10 produced today and I got them to you yesterday.

11 MR. HALL: Did we mark this last
12 exhibit, the one that was the March 25th
13 presentation?

14 Thank you very much.

15 (Deposition of Philip Trowbridge
16 adjourned at 3:46 p.m.)

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ERRATA SHEET and CERTIFICATE OF WITNESS

In accordance with the rules of procedure governing depositions, you are entitled to read and correct your deposition transcript. Please read your deposition and on this errata sheet make any necessary corrections or changes, either in form or substance. Identify those corrections/changes by page and line number, stating the change and the reason. Please do not mark the actual transcript. (Make extra copies of this sheet if you need to indicate more changes or corrections than will fit on this one page.) When completed, date and sign the errata sheet and have your signature notarized.

I, Philip Trowbridge, do hereby certify that I have read the foregoing transcript of my testimony, and further certify that it is a true and accurate record of my testimony given on June 21, 2012 (with the exception of the corrections listed below):

Page	Line	Correction and Reason for Correction
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PHILIP TROWBRIDGE

STATE OF _____

COUNTY OF _____

Subscribed and sworn to before me this _____ day of _____, 2012.

Notary Public _____ J.P. _____
My Commission Expires: _____

1 C E R T I F I C A T E

2 I, Liza W. Dubois, a Licensed Court Reporter,
3 Certified Realtime Reporter, and Registered Merit
4 Reporter in the State of New Hampshire, hereby
5 certify that Philip Trowbridge was duly sworn to
6 testify in the aforementioned cause of action.

7 I further certify that the deposition was
8 stenographically reported by me and later reduced to
9 print through computer-aided transcription, and the
10 foregoing is a full and true record of the testimony
11 given by the deponent.

12 I further certify that I am a disinterested person
13 in the event or outcome of this cause of action.

14 THE FOREGOING CERTIFICATION OF THIS TRANSCRIPT DOES
15 NOT APPLY TO ANY REPRODUCTION OF THE SAME BY ANY
16 MEANS UNLESS UNDER THE DIRECT CONTROL AND/OR
17 DIRECTION OF THE CERTIFYING COURT REPORTER.

18 IN WITNESS WHEREOF, I subscribe my hand and affix
19 my Licensed Court Reporter seal this 30th day of June
20 2012.

21

22

23

LIZA W. DUBOIS, LCR, CRR, RMR
LCR No. 104

STATE OF NEW HAMPSHIRE

MERRIMACK, SS.

SUPERIOR COURT

* * * * *

CITY OF DOVER, TOWN OF EXETER,
TOWN OF NEWMARKET, CITY OF
PORTSMOUTH, and CITY OF
ROCHESTER

v.

217-2012-CV-212

STATE OF NEW HAMPSHIRE and NEW
HAMPSHIRE DEPARTMENT OF
ENVIRONMENTAL SERVICES

* * * * *

DEPOSITION OF PHILIP TROWBRIDGE

This deposition taken at the offices
of Sheehan, Phinney, Bass & Green, 1000 Elm Street,
Manchester, New Hampshire, on Wednesday, July 11,
2012, commencing at 9:00 a.m.

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22 STIPULATIONS

23 It is agreed that the deposition shall
be taken in the first instance in stenotype
and when transcribed may be used for all
purposes for which depositions are competent
under New Hampshire practice.Notice, filing, caption and all other
formalities are waived. All objections
except as to form are reserved and may be
taken in court at time of trial.It is further agreed that if the
deposition is not signed within thirty (30)
days after submission to counsel, the
signature of the deponent is waived.

I N D E X

1
2 Witness:

3 Philip Trowbridge

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of Evidence document

1 PHILIP TROWBRIDGE,
2 having first been duly sworn by the court reporter, was
3 deposed and testified as follows:

4 EXAMINATION

5 BY MR. HALL:

6 Q. This is the continuation of the deposition of
7 Philip Trowbridge.

8 Mr. Trowbridge, good day. Could you, again,
9 just please state your full name, for the record?

10 A. Yes. Philip Trowbridge.

11 Q. And, Mr. Trowbridge, did you get an
12 opportunity to read your deposition transcript since our
13 last deposition?

14 A. I received the transcript. I reviewed some of
15 it.

16 Q. Okay. Did you get an opportunity to read Fred
17 Short's deposition transcript?

18 A. Again, I received it. I haven't read the
19 whole thing.

20 Q. You've read some of it?

21 A. A few pages; yes.

22 Q. Okay. But what about Mr. Diers' deposition,
23 did you take a look at that?

1 A. Again, the same. I did look, review some of
2 it, but not all.

3 Q. Okay. And lastly, Mr. Currier's; did you get
4 a chance to look at Paul Currier's deposition?

5 A. I received it. I don't think I read any of
6 it.

7 Q. Okay. All right. Did your attorney, since
8 the last deposition, discuss with you the need to fully
9 and completely respond to the questions presented?

10 MR. MULHOLLAND: Objection. What I told
11 him is privileged. He can't answer that.

12 Q. Okay. Okay. Well, let's see if we can just
13 start, Mr. Trowbridge. I'm going to kind of go back
14 over some of the things that we covered in the last
15 deposition because we had a lot of back and forth, and
16 sometimes it's a little bit to get things out on paper.
17 So most of these should be fairly straightforward
18 questions, and I hope you wouldn't have any difficulty
19 or complications in answering them.

20 All right. Are you the primary technical
21 staff person for both PREP and DES regarding the
22 evaluation of Great Bay scientific issues?

23 A. Yes.

1 Q. Is there -- do you have any other assistants
2 at PREP or DES that provide you help on completing those
3 scientific analyses for Great Bay?

4 A. Yes.

5 Q. Okay. Could you just tell me who their names
6 are?

7 A. At PREP, I'm assisted by Derek Sowers, and the
8 director, who is currently Rachel Rouillard, previously
9 Jennifer Hunter, before that Cynthia Lay.

10 Q. And at DES, with regard to the analysis of
11 technical issues for Great Bay, who at DES assists you
12 in, you know, preparing your analyses?

13 A. At DES there's a number of people. We work as
14 a group. Primary people would be Ken Edwardson, Matthew
15 Wood, Ted Diers. Before that, Paul Currier, and like I
16 said, there's other people in the bureau who help out,
17 as needed, on different things, but I think to name them
18 all would be kind of counterproductive.

19 Q. We don't need to do that. Just trying to get
20 an idea of who you work with on these issues.

21 We're going to -- with regard to nutrient
22 criteria, you've been involved in the nutrient criteria
23 development process for Great Bay for a number of years;

1 correct?

2 A. Yes.

3 Q. I'd just like to show you a couple documents.
4 I think we're up to Exhibit 73. This is an e-mail from
5 you to a group of people dated December 21st, 2007.
6 It's attaches a meeting agenda and some handouts. Do
7 you recognize that exhibit?

8 A. Yes.

9 Q. Can you tell me what the content of the
10 exhibit is?

11 A. Well, the first page is a e-mail that -- it
12 has the agenda or has a link to an agenda, and
13 presentations from a meeting of the NHEP Technical
14 Advisory Committee. And the attachment must have been
15 one of the handouts from the meeting.

16 Q. Okay. But what is the attachment?

17 A. The top of the attachment says, "Options for
18 Developing Numeric Nutrient Criteria for New Hampshire's
19 Estuaries."

20 Q. Did you develop this attachment?

21 A. Yes. But it was a long time ago.

22 Q. And the -- so within this attachment you're
23 looking at different ways to come up with nutrient

1 criteria for Great Bay; correct?

2 A. Right. This is a list of options that we
3 thought might work at the time.

4 Q. Can you tell me which option was eventually
5 selected for the development of the nutrient criteria?
6 Is it on this list; do you know?

7 A. Let me think. This was -- I need a few
8 minutes to look at this.

9 Q. I'm just looking in terms of major, major
10 headings, like the, "Develop a long-term trend of
11 nitrogen and sediment loads and compare them to trends
12 in eelgrass." Was that option used?

13 A. Let me just review the options.

14 Q. I'm sorry, go ahead. While you're looking,
15 we'll have that marked as Exhibit 73.

16

17 (Trowbridge Exhibit 73 marked for
18 identification.)

18

19 A. So are you asking is there a specific option
20 that we chose? Because some of the elements of these
21 options were included in the final report, but not any
22 one exclusively.

23 Q. Okay. That's fine. I don't have any further

1 questions on that exhibit.

2 There's another follow-up e-mail, it's dated
3 January 18th. Let's see, this one was December 7th,
4 2007, this one's January 18th, 2008. It's an e-mail
5 from you to Jim Latimer, Fred Short, Jennifer Hunter,
6 Phil Colarusso, regarding nitrogen criteria. And do you
7 recall this e-mail related to nutrient criteria
8 development?

9 A. Did we discuss this e-mail at the last
10 deposition?

11 Q. Uhm, I believe we had a -- we had this e-mail
12 in for other reasons.

13 A. I'm just trying to understand whether we've
14 already looked at it or not.

15 Q. We did. It was, I forget which exhibit
16 number, but I know it was something that we looked at.

17 A. Okay. So then since we've already talked
18 about it, I mean, yes, I recall it.

19 Q. Can you look under number one. I'm trying to
20 understand the nutrient criteria development process.
21 You're providing -- it looks to me like you're providing
22 comments back to some earlier -- some observations that
23 are being made by others. You were presenting some

1 questions, you say, "I agree much of what you said" --
2 "I agree with much of what you have said but I have some
3 questions." And then you go on. And within quotes at
4 the top, can you read the -- it says "nitrogen," a quote
5 that starts "nitrogen plays." Can you read that for us?

6 A. The quote says, "Nitrogen plays a significant
7 role (both direct and indirect) on in the demise of
8 eelgrass (particularly in the deeper sub-estuaries.)"

9 Q. Do you know if that, if at this time DES had
10 determined that nitrogen actually was the cause of
11 eelgrass declines in the system or is this -- where did
12 this statement come from?

13 A. I guess I don't really know where that
14 statement came from in this e-mail. I can't tell if I'm
15 quoting from someone else's e-mail or what.

16 Q. Do you, to your knowledge, do you know if
17 anybody for the Great Bay has ever demonstrated that
18 nitrogen played a -- is playing a significant role in
19 the demise of eelgrass in the system?

20 A. Well, I'd say that there's been some studies
21 done at Jackson Lab that show that nitrogen affects
22 eelgrass growth in mesocosms.

23 Q. Again, this is why you have to listen

1 carefully to the question. I know there's mesocosm
2 studies. I'm saying in this system, where the eelgrass
3 had been lost, has anybody presented you with a
4 demonstration that nitrogen was the cause of the
5 eelgrass loss?

6 A. Uhm, the only way to prove that one way or the
7 other conclusively is to have multiple Great Bays that
8 you experiment on with nitrogen. So we rely on
9 information from mesocosm studies and also studies from
10 other systems that have looked at eelgrass loss related
11 to nitrogen.

12 Q. Okay.

13 A. I don't know how you would prove one thing --
14 something one way or the other at a specific location if
15 you can't conduct some kind of laboratory experiment on
16 it.

17 Q. Okay. This is back to the question, the point
18 of answering the question. I'm asking you whether or
19 not in this system anybody has provided you a
20 demonstration that nitrogen is the cause of the change
21 in eelgrass populations?

22 MR. MULHOLLAND: I object to that
23 question. He just answered it the best he could.

1 Because you don't like the answer doesn't give you the
2 right to keep asking the same question again and again.

3 MR. KINDER: That's incorrect.

4 MR. MULHOLLAND: I have a case for that,
5 if you like.

6 MR. HALL: He did not answer the
7 question.

8 MR. KINDER: He can answer the question
9 and explain his answer. He can say yes or no, but in
10 his opinion, you know. That's what he said.

11 MR. MULHOLLAND: He answered the
12 question.

13 MR. KINDER: No, he didn't answer it.

14 MR. MULHOLLAND: He answered the
15 question.

16 MR. KINDER: I think he's entitled to a
17 yes-or-no answer.

18 MR. MULHOLLAND: I disagree. I'm going
19 to instruct him not to answer that question. He already
20 did.

21 MR. KINDER: All right. Then let's call
22 the judge.

23 (Discussion held off the record.)

1 (Trowbridge Exhibit 74 marked for
2 identification.

3
4 BY MR. HALL:

5 Q. Mr. Trowbridge, if Dr. Short has indicated to
6 us that he has not completed studies showing nitrogen
7 caused the loss of eelgrass anywhere in the system,
8 would you have any other information other than what
9 Dr. Short may have provided to you or to us?

10 A. Maybe information from Dr. Mathieson.

11 Q. Dr. Mathieson completed studies showing
12 nitrogen caused eelgrass losses in Great Bay?

13 A. He's provided information about nitrogen
14 causing macroalgae, which affects eelgrass.

15 Q. I didn't ask that question. I asked whether
16 Dr. Mathieson provided you studies showing nitrogen
17 caused eelgrass losses in Great Bay; yes or no?

18 A. Can I ask a clarifying question? When you're
19 talking about nitrogen impact, are you talking about
20 direct effects of just the nitrogen without its effect
21 only anything else, just nitrogen alone affecting
22 eelgrass? Or nitrogen affecting something else, like
23 macroalgae, that affects eelgrass?

1 Q. In any manner, form, any way that
2 Dr. Mathieson gave you data or gave you an analysis that
3 showed the increase in nitrogen in the system caused
4 eelgrass declines, direct or indirect?

5 A. We've just received comments from
6 Dr. Mathieson on our 303d list talking about how
7 increases in nitrogen have caused increases of
8 macroalgae, which affect eelgrass. So I guess the
9 answer would be yes.

10 Q. Do you know that we covered that exact
11 document in your last deposition and I asked you whether
12 or not that document confirmed macroalgae caused
13 eelgrass losses and you said no, it didn't? Do you
14 want -- would you like to change your answer or am I
15 going to have to certify that -- would you like to alter
16 your answer?

17 MR. MULHOLLAND: Which answer?

18 MR. HALL: That Dr. Mathieson's comments
19 have confirmed that nitrogen caused eelgrass losses in
20 Great Bay by stimulating macroalgae?

21 A. I'm just reporting what his thing said to us.
22 It's his report. It's not --

23 Q. That's what you believe his report said to

1 you?

2 A. Well, maybe we should look at his report. Do
3 you have it?

4 Q. This is Exhibit --

5 MR. MULHOLLAND: Sixty-three.

6 Q. -- 63.

7 Do you want to tell me where in that document
8 it confirms nitrogen caused macroalgae changes which
9 caused eelgrass losses in Great Bay?

10 A. Well, here's one section. It's the first
11 bullet, bullet number 1. It says -- I'll read it
12 slowly.

13 MR. SERELL: Are you on a certain page
14 number? I'm sorry.

15 THE WITNESS: I'm on the first page.

16 Extensive ovoid green algae, *Ulva* species, or
17 green tides have begun to dominate many of these
18 estuarine areas during the past 15 to 20 years,
19 particularly within Great Bay proper, which is the
20 citation for Nettleton, et al, 2011. Such massive
21 blooms of foliose green algae can entangle, smother and
22 cause the death of eelgrass.

23 Q. Hold it. Stop right there. Can entangle.

1 Does it say did entangle, have entangled? It says can.
2 Are you telling me that statement says eelgrass demise
3 has been caused by macroalgae growth in Great Bay?

4 MR. MULHOLLAND: Could I have a second
5 with my witness? Could we a short break? Thirty
6 seconds.

7 (Recess.)

8 MR. MULHOLLAND: Thank you.

9 MR. HALL: Okay. Could you read back my
10 question and would you please answer it?

11 (Record read as requested.)

12 MR. MULHOLLAND: That's a yes-or-no
13 question.

14 THE WITNESS: I'm sorry, I was going to
15 answer differently. Can you read it back again? Sorry.

16 (Record read as requested.)

17 MR. MULHOLLAND: Objection; compound.

18 THE WITNESS: Yes. No, it does not -- it
19 says "can entangle," it does not say that it did
20 entangle. It does not prove causation.

21 BY MR. HALL:

22 Q. So this document does not provide a basis for
23 concluding that macroalgae have caused eelgrass losses

1 in Great Bay; correct?

2 A. Correct.

3 Q. Okay. Enough. Let's stop there.

4 Now, a moment ago you mentioned something
5 about needing to do -- looking at studies from other
6 estuaries to see what caused eelgrass loss; correct?

7 A. Yes.

8 Q. Okay. Those other studies, in other
9 estuaries, they have confirmed, they have analyzed that
10 certain water quality caused eelgrass losses; correct?
11 I mean, how could those studies have concluded that the
12 water quality caused eelgrass loss? They must have done
13 something to evaluate that; right?

14 A. Yes.

15 Q. Okay. Was that same evaluation done for Great
16 Bay?

17 A. Uhm, I would say the evaluations done in some
18 of these other studies, just observational, that if you
19 have areas of eelgrass that are completely smothered by
20 macroalgae, then that is the cause of the eelgrass loss.
21 So I think we have done some of those observations in
22 Great Bay. Just not, maybe, to the same degree in some
23 areas.

1 Q. Usually in these other studies you look for
2 some type of changing water quality parameter; right?
3 Something that's changing that causes an impact; right?

4 MR. MULHOLLAND: Objection. I don't know
5 if you've established which studies we're talking about.

6 MR. HALL: Well --

7 MR. MULHOLLAND: In the other studies --

8 MR. HALL: I have no idea. He's the one
9 that said there were other studies.

10 Q. What other studies are we talking about,
11 Mr. Trowbridge?

12 A. One of the places that we've used papers from
13 is Waquoit Bay in Cape Cod.

14 Q. And in that bay there were certain things that
15 changed that caused the eelgrass loss; right? They went
16 and documented certain impacts?

17 A. Right. I don't remember exactly, but there
18 were studies of changes; yes.

19 Q. Within the e-mails that you've received from
20 Dr. Short and others, didn't they expressly tell you
21 that the kind of effects they saw in Waquoit Bay they
22 did not find in Great Bay?

23 A. Is that in this e-mail?

1 Q. No. Don't -- well, I'll ask you the question:
2 Haven't you received e-mails that said the kind of
3 effects that they're finding in Waquoit Bay they are not
4 finding in Great Bay?

5 A. I'm not sure. I'd have to see the e-mails.

6 Q. Okay. And if there was an e-mail that said
7 that, then the Waquoit Bay studies wouldn't apply to
8 Great Bay, now, would they?

9 A. I'm sorry. I just -- I have to understand the
10 context of the e-mail in the question.

11 Q. All right. Let me -- let's go back over that
12 again.

13 My understanding is that you have e-mails that
14 expressly say the kind of impacts from macroalgae growth
15 occurring in Waquoit Bay you're not finding in Great
16 Bay. You have no recollection of receiving that e-mail?

17 A. No. Do you have a document --

18 Q. Let me have -- no, this.

19 (Handing.)

20 (Counsel conferred with the witness.)

21 Q. It's Trowbridge Exhibit 58, from Fred Short to
22 Phil Trowbridge, and I quote, "Since we have not found
23 any areas of nuisance macroalgae overgrowing eelgrass

1 beds, as we have documented in places like Waquoit Bay,
2 Massachusetts, the results of our analysis are only
3 applicable where nuisance macroalgae have proliferated
4 to the extent it prevents the reestablishment of
5 eelgrass from seed."

6 Okay. You received that e-mail from Fred
7 Short. Now, do you want to tell me that the -- this
8 data in Great Bay showing macroalgae have caused
9 eelgrass demise, and that you can base that on the
10 Waquoit Bay experience?

11 A. You want me -- there's two questions there.

12 Q. Okay. Let's take it in pieces. Does this
13 e-mail indicate that there's information for Great Bay
14 confirming macroalgae are smothering eelgrass and
15 causing the demise?

16 A. No. This e-mail written in 2007 does not
17 confirm that.

18 Q. And that's from Fred Short?

19 A. Right.

20 Q. Would you have any basis to disagree with that
21 answer -- with what Fred Short has told you?

22 MR. MULHOLLAND: Objection; it's unclear.
23 Would he disagree then or disagree now?

1 Q. Do you have any basis to disagree either then
2 or now with what Fred Short has told you?

3 A. Uhm, where is the exhibit we were just looking
4 at, the one from Art Mathieson? What number is that?

5 Q. Exhibit Number -- that's also in --

6 MR. MULHOLLAND: In the binder.

7 Q. It's Exhibit 63. Well, let's take it in
8 pieces.

9 In 2007, up to -- whatever impacts occurred to
10 eelgrass through 2007, would you have any basis to have
11 disagreed with what Dr. Short was saying at that time?

12 A. Uhm, I can't recall what communications I had
13 with Art Mathieson at that time that might have been a
14 basis but I don't recall. This document from Art
15 Mathieson here in 2012 would seem to contradict somewhat
16 that statement from Fred Short's e-mail.

17 Q. Would seem to contradict? There's something
18 in there that says he's documented that eelgrass are
19 being smothered by macroalgae in Great Bay. I thought
20 we just went through that, that that document doesn't
21 say that?

22 MR. MULHOLLAND: Objection. The document
23 speaks for itself. It's the best evidence rule. Go

1 ahead.

2 MR. HALL: He's characterizing what the
3 document is saying and he's telling me it conflicts with
4 the other document.

5 Q. We just went through that the word "can" does
6 not mean does or did or has or is doing. So you want to
7 tell me that that document conflicts with what Fred
8 Short had said?

9 A. It does not prove that eelgrass is being
10 smothered by macroalgae. It provides information that
11 macroalgae can smother the eelgrass and that
12 observations have been made of expanding macroalgae
13 within the Great Bay proper.

14 Q. And do you know if those, in the locations
15 where those observations are made are areas where they
16 are smothering eelgrass or are they up on the tidal
17 grass where eelgrass do not exist?

18 A. I do not know.

19 Q. Okay. We'll cover that later.

20 So if you don't know whether or not the
21 reference that's being made here is to areas where
22 eelgrass inhabit, you can't reach any technical
23 conclusion as to the relevance of this statement to

1 eelgrass loss, now, can you; of Dr. Mathieson's
2 statements to eelgrass loss, can you?

3 A. The areas that we have macroalgae have
4 coincided with areas where eelgrass has existed.

5 Q. Hold it. Hold it. I did not ask that
6 question.

7 You just told me you did not know whether or
8 not the -- whether or not the macroalgae being discussed
9 in Dr. Mathieson's letter, Exhibit 63, you did not know
10 if any -- if this was located in areas where eelgrass
11 inhabit; correct?

12 MR. MULHOLLAND: Objection. The word
13 "this" is very unclear. It's an ambiguous question.
14 But you can answer.

15 I'm just putting my objections on the record,
16 John. Go ahead.

17 MR. LUCIC: And you can object to the
18 form of the question, but the additional information
19 that you're putting in there, that's improper. You can
20 say, Object to the form of the question. If he asks you
21 what the basis is, you can go on. But to characterize
22 the objection is improper in the context of a
23 deposition.

1 Q. Just answer the question, please,
2 Mr. Trowbridge.

3 A. So the question was if it -- we -- if we don't
4 know where the macroalgae is relative to eelgrass, or do
5 we not know?

6 Q. You just told me you don't know.

7 A. Yeah, yeah.

8 Q. Correct?

9 A. Right. I don't know, based on that report.

10 Q. So if you don't know that, you cannot draw any
11 scientific conclusion that this letter demonstrates
12 macroalgae are causing adverse impacts on eelgrass;
13 correct?

14 A. Correct. We've already established that this
15 letter cannot prove that. It's impossible to prove
16 this -- anything, really, in one system.

17 Q. Hold it. We didn't -- we didn't answer this
18 by saying that it's impossible to prove anything in one
19 system, we're talking about something very specific.
20 We're talking about this system, we're talking about
21 macroalgae, and we're talking about eelgrass loss.

22 Now, let's just get one straight answer from
23 you. One: You don't know where the macroalgae are

1 growing based on this letter; correct?

2 A. That's correct.

3 Q. Two: Therefore, you cannot render any
4 defensible scientific conclusion as to whether these
5 macroalgae growth reported in this Mathieson letter is
6 adversely impacting eelgrass; correct?

7 A. Well, what -- I mean, defensible scientific
8 conclusion, is that a statement of proof or is that a
9 statement of data supporting a theory that we have?

10 Q. Either.

11 A. I would say it supports a theory that we have
12 based on the scientific literature about how nutrients
13 affect shallow estuaries.

14 Q. I didn't ask you that question. I asked
15 you -- will you answer the question presented to you,
16 please?

17 MR. HALL: Will you please read back my
18 second one where I said, Correct, you can't reach a
19 conclusion based on this?

20 (Record read as requested.)

21 A. I'm going to say yes, with the explanation
22 that we're not proving. It does not prove it; it has
23 information that supports a theory.

1 MR. KINDER: Can we take a short break
2 among us? Would you guys mind?

3 (Recess.)

4 (Whereupon, Mr. Bisbee left the deposition
5 proceedings.)

6 MR. MULHOLLAND: Back on the record.

7 MR. HALL: Back on the record.

8 BY MR. HALL:

9 Q. Mr. Trowbridge, I'd like to show you one other
10 letter regarding the nutrient criteria development.

11 It's the New Hampshire Estuary Project, dated
12 February 7, 2008. And it's -- basically, I just want to
13 bring you -- your attention to the statement about
14 there's a deadline for nutrient criteria development.

15 Are you familiar with this letter, first off?

16 A. Yes.

17 Q. Okay. Do you know who -- did you draft the
18 letter, or did somebody else draft it or --

19 A. I'm not sure.

20 Q. All right. It talked about there's a deadline
21 for nutrient criteria development. Where did this
22 deadline come from?

23 A. This letter was from 2008. As I recall, we

1 had been working on the nutrient criteria issue since
2 2005, and it required a lot of staff time. And there
3 was -- I think there was an interest in trying to
4 conclude the project.

5 Q. So at this point in time, one way or another,
6 there was a decision that a nutrient criteria was going
7 to be -- a numeric nutrient criteria was going to be
8 developed for the estuary?

9 A. I think that decision was made when, in 2005,
10 when we started. This is just -- this letter is just
11 setting --

12 Q. Just confirming it?

13 A. Yeah; confirming that issue.

14 MR. HALL: Okay. Let's mark that as
15 Exhibit 75.

16 (Trowbridge Exhibit 75 marked for
17 identification.)

18
19 Q. I don't want to risk going backward to the
20 Exhibit 74, but I need to ask you the question again
21 where it talks about nitrogen plays a significant role
22 on the demise of eelgrass.

23 Now, to your knowledge, is that just a general

1 statement of, you know, nitrogen can play a significant
2 role in eelgrass demise, is that what that statement is
3 meant to infer; or had somebody at this point in time,
4 to your knowledge, proved that nitrogen was playing a
5 significant role in eelgrass demise in the estuary?

6 MR. MULHOLLAND: Objection as to form.

7 A. I do not recall exactly. I believe it's just
8 a statement of general information.

9 Q. Okay. That's what I had the feeling. So
10 we've already marked that as Exhibit 74.

11 And just for my -- just so I understand the
12 timeline right, this is in January of 2008. At this
13 point in time the numeric criteria hadn't been developed
14 yet, and the support document; right?

15 A. Right.

16 Q. Okay. And that would be the document that
17 describes whether or how nitrogen plays a significant
18 role in impacting eelgrass?

19 A. That was -- yeah. The final document is the
20 summary of all the research.

21 Q. Okay. Thank you.

22 Easy question: You were the primary person
23 responsible for the development of the 2009 numeric

1 criteria at DES?

2 A. Yes.

3 Q. You also developed the impairment listings for
4 Great Bay, both before and after the 2009 criteria
5 development?

6 A. Yes. Although we do work as a team at DES.

7 Q. Certainly. And again, this is all by way of
8 recap, these are things that we covered in the last
9 deposition.

10 A. Uhm-hmm.

11 Q. For 2008, Great Bay was not listed as impaired
12 for eelgrass, it was only listed as threatened; correct?

13 A. Are you talking about on the final 2008 list?

14 Q. Yeah, the final 2008 list.

15 A. It was listed as threatened, which is -- which
16 is also category 5, which is the same category as
17 impairments.

18 Q. And in that 2008 listing, the final one, total
19 nitrogen was not identified as a cause or an indicator
20 of eelgrass loss anywhere in the system; correct?

21 A. I just want to be clear. We have this issue
22 with the source or the cause that we list in the 303d
23 database. Are we talking about that or are we talking

1 about, like, a more --

2 Q. Nitrogen was not identified as the impairment
3 associated with eelgrass loss in 2008?

4 A. In 2008, okay. I think I would answer that by
5 saying -- are we talking about in Great Bay?

6 Q. In Great Bay.

7 A. The proper Great Bay?

8 Q. Great Bay, Piscataqua, Lower Piscataqua. I
9 could show you the exhibit but --

10 A. Maybe we should look at that.

11 (Pause in proceedings.)

12 MR. KINDER: Can I help, John?

13 MR. HALL: There it is.

14 Q. Here, this was an exhibit used in Fred Short's
15 deposition. It's the 2008 impairment listing.

16 A. Right. This would be the, uhm, the draft or
17 one of the drafts of the 2009 303d list.

18 Q. And that's the August one; that's the final
19 one that was submitted to EPA?

20 A. Yes. Submitted, uhm, right.

21 Q. And that one did not have impairments listed
22 for nitrogen associated with eelgrass; correct?

23 A. That is correct.

1 Q. It also did not have light attenuation
2 associated with eelgrass; correct?

3 A. Yes.

4 Q. Okay. And in that 2008 document, the areas
5 where eelgrass losses occurred, and they, I believe they
6 occurred in many areas in the system; right? I mean,
7 there were eelgrass declines in many of the tidal
8 rivers?

9 A. Yes.

10 Q. Okay. That document indicated that the cause
11 of eelgrass loss was unknown in 2008; correct?

12 A. That is right. And that's a standard practice
13 for all our impairments, to list the cause as unknown.

14 Q. And with regard to, just so I understand how
15 an eelgrass impairment was determined, it was based on a
16 20 percent difference from baseline, whatever that
17 baseline was for the particular assessment area?

18 A. Uhm, I'm just going to check the methodology
19 in this report. So on page 5 of this report it talks
20 about the methodology.

21 Q. Okay.

22 A. So it's from page 5 to page 6, and the
23 methodology -- there's two methods that are used. The

1 first is if there's reliable historic concurrent maps of
2 eelgrass cover for an area, DES will use the percent
3 decline from the historic level to determine
4 impairments, and a region will be considered to have
5 significant eelgrass loss if the change from historic
6 levels is greater than 20 percent.

7 Q. Okay. And --

8 A. Then there's a second --

9 Q. Okay.

10 A. -- assessment that's done, which is the second
11 bullet. DES will evaluate recent trends in the eelgrass
12 cover indicator. Trends will be evaluated using linear
13 regression of eelgrass cover in a zone versus year.

14 I mean, I could read this paragraph or -- but
15 the point is, if there's more than a 20 percent change
16 using a certain statistical method, then that would,
17 would be a violation. And then DES would look at these
18 two assessments and consider a zone to be impaired if
19 either of the two methods indicates significant eelgrass
20 loss.

21 Q. Okay. With regard to the State of the
22 Estuaries reports, since 2003 you were the primary
23 person responsible for the technical analysis of --

1 related to nutrient issues?

2 A. Yes.

3 Q. You also developed a wasteload allocation
4 analysis, I believe in 2009 through 2010, to predict how
5 much nutrients would need to be reduced from point to
6 nonpoint sources to meet the new numeric criteria;
7 correct?

8 A. Yes. And the final report was called a
9 nitrogen loading analysis. It was not a formal
10 wasteload analysis. So in that report we provided
11 information about options for nutrient loading
12 reductions, but we did not set a formal wasteload
13 allocation, which has a specific meaning as part of a
14 TMDL.

15 Q. The analysis that you did for the wasteload
16 allocation document you're talking about, that was an
17 analysis that was similar to a TMDL assessment; correct?

18 A. Yes. It's similar, but it was not a TMDL.

19 Q. Right. And you provided that wasteload
20 allocation analysis to EPA for permitting purposes;
21 correct?

22 A. We provided the information to EPA and others
23 for them to use however they saw fit.

1 Q. Could you answer the question, please?

2 A. I'm sorry, can we --

3 Q. Did you provide the wasteload allocation
4 analysis to EPA for permitting purposes?

5 A. Yes.

6 Q. Thank you. I'm going to show you a series of
7 e-mails, all associated with the wasteload allocation
8 documentation and evaluations, just so we understand
9 what the time frame is. Let's mark this --

10 A. Could I just ask, I mean, I understand you're
11 asking questions about a report that is like a wasteload
12 allocation, but it is not a wasteload allocation, so
13 maybe we should refer to it as the nitrogen loading
14 analysis.

15 Q. I'd like to call it the wasteload allocation
16 because that's what you had, the methodology to
17 determine wasteload allocations for wastewater treatment
18 facilities. I mean, this is what you're calling it, so
19 we will call it what it's titled.

20 Did somebody ask you to not refer to this as a
21 wasteload allocation in your deposition?

22 A. No.

23 Q. Then why do you not want to call it a

1 wasteload allocation when you, yourself, have repeatedly
2 called it a wasteload allocation? I mean, I've got
3 dozens of e-mails where you're calling it a wasteload
4 allocation for nitrogen. Why don't you want to call it
5 a wasteload allocation now, Mr. Trowbridge?

6 A. Because these were all -- what you're looking
7 at are drafts of the final report, and the final report
8 was called a nitrogen loading analysis. In my mind, I
9 think of it as the nitrogen loading analysis. It's just
10 confusing to me to keep referring to it by its old name.

11 Q. Sorry for the confusion, but we're going to
12 keep calling it what you've discussed it -- what you've
13 called it in the e-mails all along.

14 All right. Let me show you, here's an e-mail.
15 We'll mark this as Exhibit 76. And it has to do with
16 the Cocheco River, which is a March 17th, 2009 e-mail
17 from you to Brian Pitt, a group of people at EPA. And
18 it's attaching a draft proposal for analysis of the
19 Cocheco River.

20 Are you familiar with that e-mail?

21

22 (Trowbridge Exhibit 76 marked for
23 identification.)

1 A. Yes.

2 Q. Okay. Can you tell us, can you look at the
3 first page of the attachment, the one that says
4 "Purpose." Can you read that into the record for a
5 moment, please, just that first sentence?

6 A. The first sentence under, "Purpose"?

7 Q. Yeah.

8 A. "The purpose of this methodology is to
9 determine total nitrogen loading targets and wasteload
10 allocations for the Cocheco River subestuary such that
11 nitrogen concentrations in this subestuary meet the
12 water quality criteria that had been proposed by DES."

13 Q. Okay. What water quality criteria are we
14 talking about?

15 A. Let's look at the citation then. So the
16 citation is for a 2008 report from DES, which is the
17 Nutrient Criteria for the Great Bay Estuary, Public
18 Comment Review Draft.

19 Q. Had those been adopted into rule at this point
20 in time?

21 A. No.

22 Q. But you're trying to determine the loading
23 targets and wasteload allocations such that those

1 numeric criteria will be achieved; correct?

2 A. Yes.

3 Q. Okay. Can you look at page 2 and tell me
4 which numeric targets you decided to use for this
5 wasteload allocation? I think it's under estimating,
6 under, "Estimating Nitrogen Loading Targets"?

7 A. Uhm-hmm.

8 Q. It says: No eelgrass has been mapped in this
9 subestuary so the applicable water quality criterion
10 would be 0.5 milligrams of nitrogen per liter for the
11 prevention of low dissolved oxygen?

12 A. Right.

13 Q. So you were applying some nitrogen criteria
14 for protection of DO, dissolved oxygen; correct?

15 A. I think so. I haven't gone through all of it,
16 but I think that's true.

17 Q. And why wasn't eelgrass criteria not applied
18 in this segment?

19 A. Well, it says, "No eelgrass has been mapped in
20 this subestuary," so that the eelgrass threshold would
21 not apply.

22 Q. Okay. So the other numeric nitrogen number
23 for eelgrass, that one only applies in areas where

1 eelgrass previously existed; correct?

2 A. Yes.

3 Q. Okay. And, again, were either the -- were
4 either of these numeric nitrogen criteria ever adopted
5 into state regs?

6 A. No.

7 Q. But you're doing a -- the purpose of this
8 analysis is to say what the nitrogen limitations must be
9 to meet those numbers; correct?

10 A. Yes.

11 Q. And you're sending this to EPA; correct?

12 A. Yes.

13 Q. What's EPA going to do with this; do you know?
14 Why -- let me ask you, why are you sending this to EPA?

15 A. We were getting questions from EPA and others
16 about what the impact of the thresholds would be.

17 Q. Okay. So you -- were you sending this to them
18 so they could consider this in their permitting of the
19 facilities?

20 A. I was sending it in response to their
21 questions, and I'm sure that has to do with part of
22 their duties to write permits.

23 Q. Okay. I would draw your attention to page 9,

1 "Several scenarios are presented to show the expected
2 nitrogen loading to the subestuary under different
3 permit conditions for Rochester and Farmington's
4 wastewater plants"?

5 A. Uhm-hmm.

6 Q. I mean, this is a basic wasteload allocation
7 analysis that's done for almost any type of numeric
8 criteria; correct? Is it any different?

9 A. I've never -- I mean, this is the only project
10 like this that I've been involved with, so I don't have
11 another thing to compare it to.

12 Q. Okay. Let's leave that marked as Exhibit 76.

13 Okay. Now, here's another e-mail. They're
14 all kind of similar. They're all related to the
15 wasteload allocation report that you developed. It's
16 November 3rd, 2009, from yourself, Phil Trowbridge, to
17 Jennifer Hunter. And then below that is an e-mail on
18 October 30th, 2009, which is from you to, I guess I'll
19 call it a cast of thousands; EPA, UNH professors, and
20 others.

21 MR. HALL: Let's mark this as Exhibit 77.

22
23 (Trowbridge Exhibit 77 marked for
identification.)

1 Q. I just want to bring your attention to the
2 paragraph at the bottom of the first page, the one that
3 starts, "In 2009." Okay.

4 The paragraph talks about first that a numeric
5 nutrient criteria has been developed, and then the last
6 sentence that says: Following this report, DES has
7 prepared a model to predict how much the watershed
8 nitrogen loads would need to be reduced to meet the new
9 criteria. Are you familiar with this e-mail?

10 A. Yes.

11 Q. So the, again, the purpose of the wasteload
12 allocation report was to determine how much reductions
13 in nitrogen would be needed to meet the 2009 criteria?

14 A. Yes.

15 Q. Okay. So when you -- when the 2009 criteria
16 were issued, it was, if you will, rather obvious that
17 they would trigger nitrogen reductions if they were
18 applied to the wastewater facilities?

19 A. Yes.

20 Q. Okay. I don't have any further questions on
21 that. Thanks.

22 The wasteload allocation documents, I mean, I
23 can show you this, it was submitted to EPA in draft;

1 right? And then you sought EPA's comments back on the
2 wasteload allocation documents; do you recall?

3 A. We went through several rounds of comments on
4 that report. So, and some with EPA and with others.
5 So, and we received comments from EPA certainly.

6 Q. Okay. I'll just pass that.

7 I think this is the report you were talking
8 about. This is December 10 -- I'm sorry, December 2010.
9 It's a report still marked Draft, at least the copy I
10 have, and it's entitled: Analysis of Nitrogen Loading
11 Reductions for Wastewater Treatment Facilities and
12 Nonpoint Sources for the Great Bay Watershed.

13 A. Uhm-hmm.

14 Q. Is this the final report that you were talking
15 about that we had previously been calling the wasteload
16 allocation report?

17 A. Yes.

18 Q. Okay.

19 MR. HALL: Let's mark this as Exhibit 78.

20 (Trowbridge Exhibit 78 marked for
21 identification.)

22

23 Q. And Mr. Trowbridge, in this document do the

1 analyses show that nitrogen must be reduced at the
2 wastewater plants in order to attain compliance with the
3 draft numeric nutrient criteria?

4 A. Uhm, for the most part, yes. But we did
5 assess different areas, so I'm just -- not having looked
6 at it in a few years, I'm not sure whether there were
7 any areas where that was not necessary.

8 Q. I could just draw your attention maybe to
9 the -- well, four -- let's name them. To meet the
10 numeric nutrient criteria would Rochester need to reduce
11 its nitrogen loadings to the system.

12 A. Do you have the appendices to this report?

13 Q. Not with me. They were voluminous.

14 A. That would be the easier thing for me to look
15 at.

16 Q. Well, I'll just ask you, to your knowledge,
17 would Rochester be required to reduce its nitrogen
18 loading to the system in order to meet the numeric
19 nutrient criteria?

20 A. I believe so.

21 Q. Okay. What about Dover; would they be
22 required to reduce their nutrient loading?

23 A. This is where it gets a little tricky, because

1 Dover is downstream from Rochester. So depending on the
2 amount of reductions at Rochester, not sure what the
3 reductions would be at Dover. The report laid out
4 options; it didn't specify what each plant needed to do.

5 Q. But there wasn't, as I recall -- I mean, I
6 could show you the page. The only options that you
7 looked at for the wastewater plants were either 8
8 milligrams per liter, 5 milligrams, or 3 milligrams per
9 liter of nitrogen; correct?

10 A. We also looked at current loadings as well.
11 But like I said, if I had the appendices I could give
12 you a better answer.

13 Q. Why don't we go to page 19.

14 A. Okay.

15 Q. Page 18, page 19, up at the top. It says:
16 There are 18 wastewater treatment plants that discharge
17 into the watershed or otherwise contribute nitrogen.
18 The four largest are Rochester, Dover, Exeter,
19 Newmarket. And then below that is a listing of
20 load-reduction scenarios.

21 Do any of those load-reduction scenarios
22 indicate no load reduction for any of the major
23 facilities?

1 A. No.

2 Q. So all of the evaluations that are done in
3 this report indicate that they would -- it -- depending
4 on which criteria is applied, and where it's applied, as
5 I understand the numbers are sensitive to that; correct?

6 A. Yes.

7 Q. Okay. That either the limits would be
8 8 milligrams per liter, 5 milligrams per liter, or
9 3 milligrams per liter total nitrogen; correct?

10 A. Correct. Those were the scenarios that we
11 looked at in this report.

12 Q. Okay. And then I'll just draw your attention
13 back up to the executive summary, which says, "Both
14 wastewater" -- I'm looking at the second bullet. It
15 says, "Both wastewater treatment facilities" -- and it's
16 on page 1, sorry. "Both wastewater treatment facilities
17 and nonpoint sources will need to reduce nitrogen loads
18 to attain the numeric nutrient criteria." Is that a
19 accurate statement of what's put forth in this document?

20 A. Yes.

21 Q. Okay. What about the statement that the,
22 "Wastewater treatment facility upgrades to remove
23 nitrogen will be costly." Is that an accurate statement

1 regarding the requirements that are set forth in this
2 document?

3 A. Yes.

4 Q. And this analysis, this, what we're now
5 calling the loading reductions for wastewater facilities
6 and nonpoint sources, for all practical purposes this is
7 a TMDL analysis; right? Because it's -- well, correct?

8 A. Uhm, no. I mean, TMDL has a very specific
9 meaning and you'd have to have some other things in it.
10 It was a -- an attempt to answer the questions people
11 had about what loading reductions will be needed to have
12 the water quality meet the thresholds that we had
13 accomplished in the 2009 guidance document.

14 Q. Isn't that what a TMDL does?

15 A. It does that plus other things.

16 Q. What other things does it do?

17 A. Specifically, TMDL has to specifically call
18 out a wasteload and load allocation; has to have a, what
19 is it called, reasonable assurance related to nonpoint
20 source reductions; it has to have a margin of safety; it
21 has to have a number of things in a certain format.

22 Q. Okay. So the TMDL might only be more
23 restrictive than what you put forth in this document?

1 MR. MULHOLLAND: Objection as to form.

2 Sorry.

3 A. I'm not --

4 Q. Do you know if a TMDL would likely be more
5 restrictive?

6 A. No, I don't know. I mean, I'm not sure.

7 Q. Is it possible the TMDL could have been less
8 restrictive, you know, do something that doesn't meet
9 the nutrient criteria?

10 A. I think the reason I'm having trouble
11 answering the question is that, you know, we don't have
12 a TMDL we're looking at. We don't have a methodology of
13 how the TMDL would have to be done. The TMDL was done
14 using exactly the same methods and it would probably
15 come up with the same answer. I don't know. We're sort
16 of talking about a hypothetical document.

17 Q. It wouldn't be possible for a TMDL to come up
18 with a conclusion that no load reductions would be
19 required for the system given the numeric criteria that
20 are being used; correct?

21 A. I believe so.

22 Q. You believe it wouldn't be possible; right?

23 A. Right.

1 Q. Okay. I don't have any further questions on
2 that document. Thank you.

3 Oh, why hasn't a TMDL been done for this
4 estuary; do you know?

5 A. I'm not sure.

6 Q. Have you had any discussions with EPA over the
7 need to do a TMDL?

8 A. There's been some discussions, yes.

9 Q. And what was the conclusion of those
10 discussions?

11 A. I wasn't involved with all of the discussion.
12 The ones I was involved with are just that we didn't
13 need to do it at this time.

14 Q. Did anybody explain why?

15 A. I think there were concerns about how long it
16 takes to do a TMDL.

17 Q. Did people -- did anybody say they were going
18 to use a permitting approach to reduce, an individual
19 permit-by-permit approach to reduce the loads to achieve
20 the numeric treatment criteria instead of doing a TMDL?
21 Do you recall that discussion?

22 A. Not particularly. I just recall talking about
23 how TMDLs are very lengthy processes, and there was

1 already a fair amount of information available.

2 Q. After the numeric nutrient criteria document
3 was completed in, I guess it was June of 2009, that's
4 the time frame, the numeric document?

5 A. Yes.

6 Q. Okay.

7 A. We are talking about --

8 Q. We're talking about Short Deposition Exhibit
9 Number 27.

10 A. Yes. June 2009.

11 Q. Okay. After June 2009, you drafted an
12 amendment to the 2009 303d listing that applied to 2009
13 criteria; correct?

14 A. Yes.

15 Q. That application of that criteria increased
16 the number of waters identified as nutrient-impaired;
17 correct?

18 A. Yes. In the Great Bay estuary; I'm assuming
19 that's your question?

20 Q. Yeah. In the Great Bay estuary.

21 It identified both transparency -- for the
22 first time it identified both transparency and nitrogen
23 as associated with eelgrass declines; correct?

1 A. Yes.

2 Q. Okay.

3 A. And I would just say "as associated," I'm
4 interpreting that as within the stressor response matrix
5 that we use in the CALM.

6 Q. But that was a new listing at that time;
7 right?

8 A. Yes.

9 Q. All right. Additional DO impairments are also
10 identified for some of the tidal rivers based on the
11 chlorophyll-a numeric criteria from the 2009 document;
12 correct?

13 A. Yes.

14 Q. I'm going to just show you a couple of e-mails
15 that say all of those same things that you just said yes
16 to. So we'll be able to breeze through those quickly.

17 Here's an e-mail from you to Ru Morrison and a
18 group of others. It looks like it's the -- it's -- oh,
19 it is. It's the PREP Technical Advisory Committee. And
20 it describes pretty much exactly what we're talking
21 about.

22 MR. HALL: Let's mark this as Exhibit 79.

23

(Trowbridge Exhibit 79 marked for

1 identification.)

2
3 Q. Just drawing your attention to the second line
4 in the first paragraph -- actually, let me ask you
5 first: Are you familiar with this e-mail? Do you
6 recall sending it? I know you've sent hundreds of
7 e-mails to the PREP advisory committee.

8 A. Yes.

9 Q. Okay. The statement -- can you read the
10 statement in the second line of the first sentence, the
11 one that starts with, "These criteria"?

12 A. So the second line says, "These criteria were
13 promptly used by DES to make impairment determinations
14 for the estuary on New Hampshire's 303d list."

15 Q. Okay. That's an accurate statement; correct?

16 A. Yes.

17 Q. Okay. No further questions on that.

18 I'm going to test your recollection of some of
19 the issues associated with the change in the impairment
20 listing. When I'm talking about the modified impairment
21 listing --

22 THE WITNESS: I'm sorry. Could we take a
23 break?

1 MR. HALL: Oh, certainly, Phil.

2 (Recess.)

3 MR. HALL: We're back on the record.

4 Do we want to look at that question now, or do
5 you want to look at it over lunch?

6 MR. MULHOLLAND: I'd like to look at it
7 with Phil either on a break or lunch.

8 MR. KINDER: Yes. Let's do it over
9 lunch.

10 MR. HALL: Yeah, over lunch.

11 The earlier question that we were going to
12 have the judge weigh in on, if we could get that printed
13 out.

14 BY MR. HALL:

15 Q. Mr. Trowbridge, prior to the break we were
16 talking about the 2009 impairment listings and how those
17 were modified to apply the 2009 numeric nutrient
18 criteria. And we were talking about some changes
19 regarding nitrogen and transparency that were listed in
20 the 2009 303d amendment. I'd like to show you an e-mail
21 from -- here we go.

22 MR. HALL: If we could mark this as
23 Exhibit 80, and I've highlighted a portion of this.

1 (Trowbridge Exhibit 80 marked for
2 identification.)

3
4 Q. First off, do you recall receiving this
5 e-mail? It's September 28th, 2009. It's from Al Basile
6 to Ken Edwardson. You're cc'd on it. It's part of an
7 e-mail string that where Al is asking that you assign an
8 impairment for light attenuation, and that it's, quote,
9 very important that we acknowledge this parameter as the
10 cause of impairment, impairment to eelgrass. And the
11 re: line is, Add to Cause.

12 Do you recall having this discussion with EPA,
13 that they wanted to make sure you identified
14 transparency as the cause of eelgrass impairments in the
15 updated or amended August 2009 impairment listing?

16 A. I remember this issue; yes.

17 Q. Okay. And did the document eventually
18 identify light attenuation as a factor related to the
19 impairment of eelgrass in the system?

20 A. Yes.

21 Q. Do you know if it's DES's position that light
22 attenuation is the cause of eelgrass loss in the system?

23 A. The position is that there's a number of

1 factors affecting eelgrass. Can I -- actually, can I do
2 some clarification on this e-mail?

3 Q. Oh, certainly. After we --

4 A. Sorry. Okay --

5 Q. We'll loop back and then --

6 A. I thought you were going to ask more about
7 this question, and there's some context I need to
8 provide.

9 Q. Okay. Is it DES's position that light
10 attenuation is what's limiting eelgrass regrowth in
11 Great Bay? Or explain to me, when you say it's yes, DES
12 believes it's one of the factors, explain that to me.

13 A. Yeah. I think the best statement we have in
14 terms of the DES position on this issue is in the
15 response to public comment on the draft 2012 CALM, and I
16 think we gave you this at the last deposition. I don't
17 know what the number is. Do you know -- you know what
18 I'm talking about; right?

19 Q. Yes. I know the difference.

20 Do your impairment listings identify anything
21 else other than nitrogen and transparency as the reasons
22 for eelgrass loss anywhere in the Great Bay system?

23 A. On the 303d list we only have impairments for

1 eelgrass, nitrogen and light attenuation.

2 Q. So related to eelgrass, there are no other
3 factors, other than nitrogen and light attenuation, that
4 are identified as the causes of why the eelgrass aren't
5 at the level you'd like to see them at; correct?

6 MR. MULHOLLAND: Objection as to form.
7 You mean on the 303d list?

8 MR. HALL: On the 303d list, yes. Sorry.

9 A. I think in answering that question, we had
10 this discussion at the last time about the cause issue.
11 We look at the nitrogen and the light atten -- we look
12 at the -- use a stressor response matrix, decision
13 matrix for the 303d listing where you have the stressor
14 being nitrogen, and some of the responses being light
15 attenuation and eelgrass.

16 So they're all evaluated together; they're not
17 necessarily evaluated as one causes the other.

18 Q. Did you want to give another clarification
19 regarding the memo that's in front of you?

20 A. Yes, I would, if I could. I just want to
21 clarify that this e-mail is correspondence with some of
22 the database managers at EPA, and so this was really a
23 technical discussion about adding a -- adding something

1 to the database, as opposed to a substantive discussion
2 of, you know, of science. It was more of just a
3 technical one of we needed to add a new parameter to the
4 database, and the person who we were corresponding with
5 was confused, and we needed to -- I think this is where
6 Al Basile then provided some clarity or some information
7 to that person to allow them to move forward with making
8 that change to the database.

9 Q. The clarity that -- the position Al Basile is
10 stating, right, is that it's very important we
11 acknowledge this parameter as the cause of impairment,
12 and that parameter is light attenuation; correct?

13 A. Right.

14 Q. Okay.

15 A. I guess I think when I read this he's just
16 saying it's very important that we get this information
17 into the database.

18 Q. Why is it so very important that we get that
19 information in the database?

20 A. Because the state has already established
21 these thresholds that we're using, so that it should be
22 able -- whatever we're using should be able to be
23 recorded in the database.

1 Q. When you're saying establish these thresholds,
2 you're talking about the thresholds established in the
3 June 2009 numeric nutrient criteria document?

4 A. Yes. And further expanded upon in the CALM.

5 Q. Did the CALM change the way the numeric
6 nutrient criteria apply?

7 A. The CALM has the stressor response decision
8 matrix, which is a key part of how the assessments are
9 done.

10 Q. But I asked, I said did it change the way that
11 numeric nutrient criteria would be applied, and did it
12 make any modifications? Did it make any additions to
13 it?

14 MR. MULHOLLAND: Objection; compound, and
15 form.

16 Q. Make any changes to it?

17 A. Yes. I'd say there are changes.

18 Q. Okay. What are they?

19 A. The changes are using that stressor response
20 decision matrix. That's not part of the 2009 document.

21 Q. When you say stressor response, you're saying
22 eelgrass, connect eelgrass to the values, correct; to
23 the nitrogen and the transparency values, correct?

1 A. Right. I'm saying that --

2 Q. Okay.

3 A. -- if you are going to -- you're only going to
4 add an impairment if you have both a high stressor,
5 nitrogen, and some evidence of a response, either low
6 light attenuation or loss of eelgrass.

7 Q. Isn't that the typical way EPA have
8 recommended that states develop numeric nutrient
9 criteria, that they have a response variable and a
10 causal variable? Isn't that what they have always
11 recommended for numeric nutrient criteria?

12 A. I think you're confusing the criteria with the
13 assessment process. What I'm talking about is the
14 assessment process for 303d listing.

15 Q. Let's just move on. That's marked as
16 Exhibit 80.

17 In our prior deposition I handed you an e-mail
18 that CLF had sent to EPA. It was in the Currier -- it
19 was Currier Exhibit Number 34. That said one of the
20 reasons that EPA asked you to amend the 303d impairment
21 listing for August 2009 was to avoid a potential lawsuit
22 with CLF. Do you remember that?

23 A. May I see that? Yes, we discussed this.

1 Q. Okay. So one of EPA's requests, in addition
2 to add transparency as an impairment factor, one of them
3 was also to amend the list so they could avoid a
4 lawsuit; correct?

5 A. I'm sorry. I'm a little confused. So the --
6 you're asking about why -- I'm sorry. Can you just say
7 that again? I'm confused.

8 Q. I'm just saying EPA asked you to amend the
9 list so they could avoid a lawsuit with CLF; correct?

10 A. That's my understanding.

11 Q. Okay. Thank you.

12 And here's just one last e-mail regarding the
13 303d listings and what the effect of them would be.
14 It's an e-mail from you to Michelle Daley, June 15th,
15 2009.

16 MR. HALL: We'll mark that as Exhibit 81.

17 (Trowbridge Exhibit 81 marked for
18 identification.)

19

20 Q. And can you tell me who -- do you recall this
21 e-mail, Mr. Trowbridge?

22 A. Yes.

23 Q. This e-mail confirms that, again, that you're

1 going to use the numeric nutrient criteria to develop
2 the revised 303d list; correct?

3 A. Right. They were going to be incorporated
4 into our assessment methodology.

5 Q. Okay. And then now Michelle -- by the way,
6 who is Michelle Daley?

7 A. Michelle Daley is a researcher at UNH.

8 Q. Okay. She asks the question -- I'm going to
9 just draw your attention to that paragraph. That's
10 where it says: Phil, thanks for the updated info. So
11 EPA doesn't have to approve the numeric nutrient
12 criteria before they become part of the 305b/303d
13 assessment?

14 Do you recall your discussion with Michelle on
15 that issue?

16 A. It's part of this e-mail. Sure.

17 Q. Okay. Did you inform Michelle that EPA
18 doesn't have to approve the criteria before they're used
19 for impairment listing purposes?

20 A. I don't see anything about that in my
21 response.

22 Q. Okay. Do you know if EPA has to approve, or
23 has EPA ever said to you whether or not they need to

1 approve the numeric nutrient criteria before they're
2 used for impairment listing purposes?

3 A. EPA has to approve the 303d list. That is
4 their -- it's ultimately EPA's list.

5 Q. Oh, no, no. I'm saying the criteria. So EPA
6 doesn't have to approve the nutrient criteria? I'm
7 saying before you use the nutrient criteria, doesn't EPA
8 have to approve them?

9 MR. MULHOLLAND: Objection; calls for a
10 legal conclusion.

11 MR. HALL: Seeing if he knows the answer.

12 Q. Or do you know if EPA has to approve them
13 before you use them?

14 A. I think the question is best answered in terms
15 of the CALM that we put a together for the assessments.
16 EPA does not approve the CALM. That's put together to
17 describe the process used by the state, and then EPA has
18 to approve the list.

19 Q. I'm just asking you, do you know whether or
20 not EPA has to approve a numeric nutrient criteria
21 before you use it for 303d listing purposes?

22 MR. MULHOLLAND: Same objection.

23 Q. Do you know?

1 A. I don't think so.

2 Q. You don't think they have to approve it or --
3 sorry.

4 A. I'm confused.

5 Q. Do you know whether or not EPA has to approve
6 a numeric nutrient criteria before -- a numeric criteria
7 before you use it for 303d listing purposes?

8 MR. MULHOLLAND: Same objection; calls
9 for a legal conclusion. You can answer, if you know.

10 A. I thought I did answer already, but they don't
11 have to -- EPA does not need to approve numeric
12 thresholds that we use in the CALM. We do not approve
13 the CALM.

14 Q. So it's your understanding that so long as you
15 include any new numeric threshold in a CALM, that that
16 doesn't require any kind of official EPA approval prior
17 to its application to identify impaired waters?

18 MR. MULHOLLAND: Same objection. You can
19 answer if you know.

20 MR. HALL: Just trying to make sure I
21 understand.

22 A. The way the process works is we, we the state,
23 EPA, develop an assessment methodology, and then use

1 that assessment model. And that includes the numeric
2 thresholds that are relevant in this case. And we come
3 up with a proposed 303d list, which we send to EPA for
4 approval. They can look at that methodology and say if
5 they don't like the methodology, they don't approve the
6 list.

7 So the approval happening and the review by
8 EPA happens when we send them the list for review.

9 Q. I'm just trying to break out the two parts.

10 You applied a new numeric nutrient criteria
11 in -- to develop the 303d list in 2009; correct?

12 A. Right. We developed guidance on that; yes.

13 Q. Okay. And so those numeric values ended up in
14 your CALM document; correct?

15 A. Yes.

16 Q. Okay. It's your understanding EPA does not
17 have to approve the numeric values before they are used
18 in a CALM document; correct?

19 A. Yes.

20 Q. So in the next impairment listing that's done
21 for Great Bay, suppose you just decide to take those
22 numeric listing -- numeric values that you used in 2009
23 and cut them in half?

1 A. Uhm-hmm.

2 Q. EPA doesn't have to approve that either?

3 MR. MULHOLLAND: Objection; calls for a
4 legal conclusion. If you know.

5 A. So you're asking hypothetically?

6 Q. Yeah, hypothetically.

7 A. They would not have to approve it before we
8 made any assessments. They ultimately would have to
9 approve the list, and if they disagree with the list,
10 they would have to disapprove.

11 Q. I'm just trying to understand what you believe
12 the state's position is, all right, or how it works;
13 that the state is free to make any change in the numeric
14 criteria target value it wants in a CALM document in
15 setting up a 303d listing?

16 MR. MULHOLLAND: Objection; calls for a
17 legal conclusion.

18 A. Perhaps it's best to talk about, you know,
19 criteria as in officially adopted criteria. I mean,
20 obviously those cannot be changed.

21 Q. Okay.

22 A. Whereas, thresholds that are used in guidance,
23 these are, these are thresholds used by the state in

1 interpreting either narrative or some other type of
2 criteria.

3 Q. So, now, this is entitle -- this isn't
4 entitled, "Thresholds for Guidance." What I'm saying is
5 this isn't entitled -- I'm talking about the June 2009
6 document. It's entitled, "Numeric Nutrient Criteria."

7 A. Uhm-hmm.

8 Q. So what you're saying is if you develop a
9 numeric nutrient criteria, but you don't yet adopt it,
10 you can change that number anytime you want in a CALM
11 document as it's applied for identifying impaired
12 waters?

13 MR. MULHOLLAND: Can we take a short
14 break? I feel like we're stuck here.

15 MR. HALL: Yeah, I mean --

16 MR. KINDER: Yeah. I don't care. It's
17 unusual to have a break while a question's pending.

18 MR. MULHOLLAND: It's the same question
19 five times.

20 MR. HALL: Well, you know what? Let's
21 withdraw the question.

22 MR. MULHOLLAND: Okay. Give me a second.

23 (Recess.)

1 BY MR. HALL:

2 Q. Phil, I just need to ask you one further
3 question about the document you have in front of you,
4 which is Exhibit 81.

5 A. This is the one?

6 Q. The same exhibit we were talking about.

7 Looking at your response, you have, "Once a
8 water body is put on the 303d list, it is scheduled for
9 a TMDL." Is that a, to your knowledge, is that an
10 accurate response?

11 A. Yes.

12 Q. Okay. So what kind of TMDLs now must be
13 scheduled for Great Bay; do they have to schedule a
14 nitrogen TMDL?

15 A. Yes.

16 Q. Do they have to schedule a TMDL that ensures a
17 transparency target is met?

18 A. Yes. For every parameter on the list it's
19 got -- it's got its own TMDL schedule.

20 Q. Okay. And has the TMDL been yet scheduled for
21 nitrogen and transparency for Great Bay, to your
22 knowledge?

23 A. I don't know what it is, but each impairment

1 on the list gets assigned a date, and I don't remember
2 what it is.

3 Q. Okay. So we'd have to look to the list to see
4 what the date would be?

5 A. Correct.

6 Q. But it will get a TMDL eventually for these
7 parameters?

8 A. That's what a category 5 means; it is a water
9 body in need of a TMDL.

10 Q. Okay. Thank you.

11 All right. And we covered this point, but I
12 just want to kind of close out where we were on the 303d
13 list. So applying the draft numeric nutrient criteria
14 in 2009 and thereafter using this CALM stressor response
15 matrix, that resulted in a different set of impairment
16 listings than existed prior to the numeric nutrient
17 development; correct?

18 A. Yes, and also the addition of newer data as
19 well.

20 Q. Okay. The post-2009 impairment listings,
21 would they be the same if the numeric nutrient criteria
22 were actually adopted into water quality criteria?

23 MR. MULHOLLAND: Objection; calls for a

1 legal conclusion.

2 Q. Do you know?

3 A. I'm sorry, the -- you're talking about the,
4 you say post-2009 --

5 Q. When I -- post-2009 there were some changes to
6 the impairment listings; correct?

7 A. So these would be amendments to the 2009 303d
8 list.

9 Q. Yeah. These were the amendments that we were
10 just talking about, the 2009. And I realize when we say
11 2009, a lot of things happened in 2009: The draft
12 numeric criteria, and then the 303d list that applied to
13 the draft numeric criteria.

14 A. Which was the 2008 list, officially.

15 Q. Submitted in 2009. Right. This is where the
16 confusion sometimes lies. What I'm saying is, once
17 these numeric nutrient criteria are adopted --

18 A. Adopted into rule?

19 Q. Adopted into rule, how would that -- do you
20 know if that would change the impairment listings for
21 nitrogen or transparency in Great Bay as they currently
22 stand?

23 MR. MULHOLLAND: Same objection.

1 A. So you're saying the thresholds that were
2 published in the guidance document, if they were
3 officially promulgated, and assuming our methodology in
4 the CALM remain the same, there would be no difference.

5 Q. Okay. That's what I thought. Thanks.

6 I'm going to show you a PowerPoint
7 presentation. I suspect you may have been the one that
8 helped put it together. It was something that Harry
9 Stewart presented.

10 MR. HALL: We're going to mark this as
11 Exhibit 82.

12 (Trowbridge Exhibit 82 marked for
13 identification.)

14
15 Q. This was -- let me see. This was a
16 presentation done by Harry Stewart on January 25th,
17 2011, to the New England Water Environment Association,
18 Government Affairs Session, and it's a PowerPoint
19 presentation regarding the nutrient requirements and
20 program for Great Bay.

21 Mr. Trowbridge, do you recognize this
22 PowerPoint presentation?

23 A. Yes. Some of it, at least.

1 Q. Do you recall whether or not you may have
2 helped Mr. Stewart in putting it together so he could do
3 his presentation?

4 A. Uhm, yes.

5 Q. Perfect. I'm going to just ask you a couple
6 of questions from his presentation. It's kind of, if
7 you will, by way of summarizing all of which we have
8 talked about this morning, because I think most of the
9 main points are just, from one slide to the next, listed
10 in the presentation.

11 THE WITNESS: Sorry, can I have another
12 water, please?

13 MR. LUCIC: Sure.

14 (Handing.)

15 Q. Let's just flip through a couple slides.
16 Here, I'm sorry, these are not -- there's no page number
17 on them because they were slides. So let's try to go
18 into -- yeah, you've got the page, yeah. That's great.

19 Let's look at the bullets over on the
20 left-hand side. The one that says, "In 2009, DES
21 developed numeric nutrient criteria to protect eelgrass
22 habitat and prevent low dissolved oxygen in the
23 estuary." When we're talking about that, we're talking

1 about Short Exhibit 27, the nitrogen nutrient criteria;
2 correct?

3 A. Correct.

4 Q. It says a weight of evidence approach was
5 used, in that document. Is that accurate?

6 A. Yes.

7 Q. Okay. I'm going to ask you some questions
8 later as to what weight of evidence means, but we'll get
9 to that later.

10 A. Uhm-hmm.

11 Q. It says it was approved by EPA. Did EPA ever
12 officially approve this document; or what's meant by
13 "Approved by EPA"?

14 A. Yeah, I'm not sure.

15 Q. Okay. Let's flip forward, the one that
16 starts, "Nitrogen Impairments." It says that, "Nutrient
17 criteria resulted in the addition of most of the estuary
18 to the 303d list for nitrogen impairments in 2009."
19 That's a correct statement; right?

20 A. Yes.

21 Q. Okay. "The impairments triggered a TMDL
22 process." Correct statement; right?

23 A. Yes.

1 Q. Then the next page, it says the state
2 completed a Great Bay nitrogen loading analysis that set
3 preliminary loading thresholds. That was the document
4 you and I were talking about earlier; right? I was
5 calling it the wasteload allocation, and it eventually
6 was called -- it eventually was called Analysis of
7 Nitrogen Loading Reductions for Wastewater Treatment
8 Facilities and Nonpoint Sources in Great Bay; right?

9 A. Right.

10 Q. And that was Exhibit -- what was it? -- 78.

11 Now, go to the next page. That top bullet:
12 Most of Great Bay estuary is impaired for nitrogen as
13 shown by persistent low DO in the tributaries and
14 eelgrass loss.

15 Is that a correct statement?

16 A. This is a good summation of the
17 stressor-response approach, where you have the high
18 nitrogen in addition to these response variables, which
19 is dissolved oxygen and eelgrass loss, that we discussed
20 in this bullet.

21 Q. Does this bullet indicate that the nitrogen
22 caused the eelgrass loss, in your mind? Is that what
23 it's intended to indicate?

1 A. I'm sorry, I don't know what's wrong with my
2 throat.

3 What I think this bullet is intended to
4 summarize is the stressor-response approach, where we're
5 saying we added a nitrogen impairment because of the
6 high nitrogen, as well as -- and the fact that we have
7 these evidence of a response or a negative response for
8 low dissolve oxygen and the eelgrass loss. I mean,
9 that's the way I would summarize it.

10 Q. But I'm asking the word "cause." So if you
11 could just --

12 A. If -- so you're asking me does it show that
13 it caused, that nitrogen is causing the DO and eelgrass
14 loss?

15 Q. Yeah.

16 A. It does not show that it caused it.

17 Q. Do you know if the prior analyses that you
18 developed showed that it caused it?

19 A. No.

20 Q. But you used a weight-of-evidence approach to
21 come to a conclusion that you needed to regulate
22 nitrogen; right?

23 A. Correct.

1 Q. Okay. And I guess, similarly, you used a
2 weight-of-evidence approach to decide that the current
3 transparency level in the system was inadequate for
4 eelgrass protection?

5 A. Uhm, I think all -- and scientific evaluation
6 doesn't use weight of evidence to some degree, so for
7 light attenuation, we use the weight of available
8 scientific evidence about what the light requirements
9 for eelgrass is.

10 Q. Let's flip forward, the point, nonpoint. Just
11 flip forward to a couple more charts. Actually, let's
12 stop at that prior one. Phil, that chart that looks
13 like a, I guess you might call it a matrix, that's the
14 one that puts what the load reduction requirements need
15 to be for the wastewater plants and nonpoint source,
16 from the wasteload allocation analyses that you had
17 done; right?

18 A. Yes.

19 Q. Okay. And -- okay. And that chart is
20 entitled, "Evaluation of Wastewater Treatment Plant
21 Permitting Scenarios on Nitrogen Loads." And all of
22 those permitting -- all of the permitting scenarios
23 presented in this chart, they all require load

1 reductions in the wastewater plants; right? We've got
2 8, 5 and 3?

3 A. Right.

4 Q. I'm going the wrong way. Let's go to the
5 preliminary cost impact ones, right there.

6 We've got something that's entitled, Very
7 Preliminary Costs for Upgrading eight plants. Do you
8 recall who did this preliminary cost-reduction analysis?

9 A. This is done by DES.

10 Q. Okay. Do you recall who at -- did you do it
11 or did you get somebody else at the department to do it?

12 A. I had Ken Kessler, who is in our Wastewater
13 Engineering Bureau --

14 Q. Okay.

15 A. -- do the work.

16 Q. And the preliminary estimates for meeting the
17 new nutrient criteria, numeric nutrient criteria, they
18 range, depending on the effluent limits for the plant,
19 anywhere from around \$200 million to \$350 million in
20 capital costs? That's what that chart indicates?

21 A. Yes.

22 Q. Okay. And these are numbers that are -- to
23 your knowledge, are these numbers similar to more recent

1 numbers that you've seen for the cost impact associated
2 with compliance of the numeric nutrient criteria?

3 MR. MULHOLLAND: Objection as to form.
4 Go ahead.

5 A. I've seen a pretty wide range of estimates.
6 This is inside the range.

7 Q. Okay.

8 A. And our approach to this analysis was to try
9 and not underestimate the cost.

10 Q. Okay. So are these still considered as a
11 reasonable cost estimate by DES; do you know?

12 A. Uhm --

13 Q. I mean, you may not have information on it --

14 A. Yeah.

15 Q. I'd like to bring your attention to the chart
16 that's called, "DES Perspective." It's near the end. I
17 guess the prior charts were going through what we'll
18 call the controversy of who's saying the numbers need to
19 be higher or lower, and they had some charts on, oh, the
20 environmental community perspective, municipality
21 perspective, EPA's perspective, everybody's perspective.
22 And now this is DES's perspective.

23 I'd like to bring your attention to the third

1 bullet, on a independent peer review. It says, bullet:
2 An "independent peer review" (details to be determined)
3 could help to bring long-term consensus.

4 Do you know what independent peer review was
5 being referenced in this bullet?

6 A. No.

7 Q. Do you know if DES supports the coalition's
8 request for an independent peer review of the science
9 behind the 2009, June 2009 numeric nutrient criteria for
10 Great Bay?

11 MR. MULHOLLAND: I object to the
12 question.

13 A. That's really a decision that needs to be made
14 above my level.

15 Q. Oh, I know. I guess I'm just asking for your
16 current knowledge. Do you know whether -- because the
17 communities have been asking for an independent peer
18 review for going on two years at this point; correct?

19 A. I'm not sure of the exact dates.

20 Q. But for a while?

21 A. Yeah.

22 Q. Yeah. So do you -- I can't imagine it hasn't
23 been a topic of discussion within the department, given

1 the outstanding request?

2 A. Right. But it's -- I don't know what the --
3 what my management would like to -- what their current
4 thinking is on this right now.

5 Q. So you don't know what the current thinking
6 is?

7 A. Yeah.

8 Q. Okay.

9 MR. KINDER: Did you want to mark that,
10 John?

11 MR. HALL: I think we marked it as 82, I
12 believe. It's already been marked.

13 Q. Okay. So I'm just going to give a little
14 summary of what I now -- what I think is the impact on
15 the regulated community from application of the
16 June 2009 numeric criteria and the changed impairment
17 listing that was done in August of 2009, and then
18 thereafter. I think the impairment listings stay pretty
19 much the same after August 2009; correct?

20 A. Uhm, for nitrogen?

21 Q. Yeah.

22 A. Yes.

23 Q. And transparency?

1 A. There's been some changes to the transparency
2 listings.

3 Q. All right. See if you agree that this is what
4 the -- because they've talked about several hundred
5 million dollars -- \$200 million to \$350 million of
6 impacts on the wastewater plants. So the application of
7 the numeric nutrient criteria means that the wastewater
8 plants must reduce their nutrient loads to the impaired
9 waters; correct?

10 MR. MULHOLLAND: John, I object to this
11 line of questioning as asked and answered. You've done
12 this already. It's recapitulation. Also object as to
13 form of that question, as to the who's applying it. I
14 think I cut you off, so sorry.

15 Q. The impact of applying the numeric nutrient
16 criteria is that the communities must reduce their
17 nutrient loads to the impaired waters; correct?

18 A. Uhm --

19 MR. MULHOLLAND: Same objection.

20 THE WITNESS: So do I have to -- I'm
21 confused.

22 Q. Yeah, you have to answer.

23 MR. MULHOLLAND: You have to answer if

1 you can, if you understand the question.

2 A. Uhm, all right. Can you say it again, please?

3 Q. The impact of applying the numeric nutrient
4 criteria for the Great Bay estuary to the impaired
5 waters listings is that now the wastewater plants must
6 reduce their nutrient loads to the impaired waters;
7 correct?

8 A. Uhm, I think I'm having a little trouble with
9 the term "apply" here because the criteria or the
10 thresholds are just guidance that are used to determine
11 impairments, and impairments are a description of the
12 available data. It doesn't then require anyone to do
13 anything.

14 Q. I'm going to say that they're going to have to
15 do this as a result of this; correct?

16 MR. MULHOLLAND: Same objection.

17 A. I mean, not necessarily. That's not
18 something -- this document doesn't make anyone do
19 anything.

20 MR. HALL: I want to take a three-minute
21 break.

22 (Recess.)

23

1 BY MR. HALL:

2 Q. I wanted to ask you some questions,
3 Mr. Trowbridge, regarding your understanding of how your
4 narrative criteria work. You're familiar with the New
5 Hampshire's narrative criteria for nutrients and aquatic
6 life impairments?

7 A. Yes.

8 Q. Okay. Can you give me an idea of what you're
9 looking at to --

10 A. I'm just looking at the same document.

11 Q. You're looking at 2009 numeric nutrient
12 criteria document; right?

13 A. Uhm-hmm.

14 Q. I think it's got the wording of the narrative
15 criteria in the document?

16 A. Perhaps not. A place to look may be the --

17 Q. It is. It's on page -- well, go ahead.

18 A. What page is it?

19 Q. I'm sorry. It's got one. The narrative
20 standards for estuarine waters are Class B. Quote,
21 Class B waters shall contain no phosphorus and
22 nitrogen -- I'm on page 2 at the bottom -- no nitrogen
23 and such concentrations that would impair any existing

1 designated use unless naturally occurring.

2 You see where that phrase is in that document?

3 A. Yes.

4 Q. Okay. Is it your understanding that a
5 narrative criteria violation for nutrients only occurs
6 if the nutrients are causing some demonstrated adverse
7 effect?

8 A. Yes.

9 Q. Okay. The -- your nutrient document or your
10 standards also employ the term cultural eutrophication.
11 It says, "Where existing discharges encourage cultural
12 eutrophication, you remove the nitrogen and phosphorus
13 to ensure attainment and maintenance of standards." Are
14 you familiar with that statement, cultural
15 eutrophication, in your regs?

16 A. Yes, I'm familiar with it. What number is it?

17 Q. It's in 1703.14. I'll read you what the
18 definition says: Cultural eutrophication is defined as,
19 quote, the human-induced addition of waste-containing
20 nutrients to surface waters which results in excessive
21 plant growth or a decrease in dissolved oxygen.

22 Does that refresh your recollection as to what
23 cultural eutrophication means?

1 A. Yes. I just didn't -- I'd like to have -- I
2 just didn't have the exact wording in front of me.

3 Q. No, I understand.

4 So for -- so to decide you've got to regulate
5 nutrients, you need, under the narrative standard, you
6 connect them to some type of, what, excessive plant
7 growth or some kind of impairment of the use; right?
8 You say the nutrients caused X to occur?

9 A. Uhm, right. I mean, you're supposed to be
10 saying that you don't have so much phosphorus or
11 nitrogen such that you would impair any existing or
12 designated uses.

13 Q. Okay. My understanding, and maybe -- you'll
14 correct me if I'm wrong, okay?

15 A. Uhm-hmm.

16 Q. I understood that the DES is saying the
17 numeric nutrient criteria from 2009 constitute a
18 narrative criteria implementation method or a narrative
19 translator; is that your understanding?

20 A. Do you mean a numeric translator of the
21 narrative criteria?

22 Q. Yeah.

23 A. Right. That's how we're using it.

1 Q. So you've kind of translated the narrative
2 into a numeric value; is that --

3 A. For the purpose of 303 -- sorry, for the
4 purpose of 303d assessments in the CALM.

5 Q. Okay.

6 A. It does not replace the narrative standard.

7 Q. It doesn't replace -- so this is a new
8 narrative translator, right; this document, the 2009
9 document?

10 A. Ah --

11 Q. There wasn't one before?

12 A. For the estuary. There's other -- obviously,
13 we do assessments for lakes and rivers and everything
14 else, and we have to interpret the narrative standard
15 for assessments in those water bodies as well.

16 Q. So I think the short answer is yes, this is a
17 new one for the estuary; right?

18 A. Yes, a new -- yes.

19 Q. Okay. And that document, the 2009 document,
20 the numeric translator, the numeric values contained
21 therein were based on what I'll call, I'll call them new
22 scientific and regulatory assumptions. I mean,
23 regarding what the connection for nitrogen is to

1 impacting transparency and things like that; correct?

2 MR. MULHOLLAND: Objection to form.

3 That's a complex question.

4 Q. It certainly is. I'm sorry. There was no
5 easy way to ask it.

6 A. So could you --

7 Q. Yeah. Is the 2009, June 2009 document based
8 on new scientific and regulatory assumptions regarding
9 how nutrients impact Great Bay and the estuary?

10 A. I wouldn't say that. I would say it's based
11 on scientific information that's been published for a
12 long time.

13 Q. Oh. When I'm saying new, I'm meaning new in
14 its application to Great Bay?

15 A. Oh, like -- you just -- specifically in Great
16 Bay?

17 Q. Yeah. Like applied -- this is the first time
18 this information's been applied to Great Bay and the
19 estuary, right, to develop a numeric value?

20 A. Oh, it's the first time we've done that; yes.

21 Q. There's some correspondence back and forth
22 through EPA indicating that the 2009 document, the
23 numeric criteria document should be called a narrative

1 translator. Were you involved in any of those
2 discussions where the EPA was recommending the, instead
3 of calling it a new numeric criteria, that you should
4 just call it a new narrative translator; do you recall
5 any of that?

6 A. Do you mean, sorry, numeric translator of the
7 narrative standard?

8 Q. Yeah.

9 A. There's been a lot of discussions about that
10 type of issue. I don't recall anything specific.

11 Q. Okay. Do you know who first raised that that
12 was an important issue; did DES raise that as a concern
13 or did EPA?

14 A. I don't recall.

15 Q. What's the difference in effect, and I'll say
16 in regulatory usage, by calling this a numeric
17 translator of a narrative criteria, or just a numeric
18 nutrient criteria?

19 MR. MULHOLLAND: Objection; calls for a
20 legal conclusion.

21 Q. Would it have any different regulatory effect
22 in your 303d listing process?

23 A. In the -- you're just talking about 303d now,

1 and not, like, enforcement actions and other legal
2 matters?

3 Q. Or permitting.

4 A. We don't -- DE -- sorry. Can we answer --

5 Q. Let me withdraw the question. Let me just
6 withdraw the question.

7 Did EPA, to your knowledge, did EPA ever
8 explain to DES that you needed to adopt the numeric
9 nutrient criteria as a numeric criteria in your state
10 water quality standards?

11 A. You mean, like, go through official
12 rulemaking? So you're asking did EPA tell us we needed
13 to do that?

14 Q. Yep.

15 A. I don't recall.

16 Q. Okay. I'm going to ask -- that question that
17 I withdrew, I'm going to try to rephrase it.

18 Can you explain to me what the difference is
19 between calling this document a narrative translator
20 versus calling it a numeric criteria?

21 A. Calling -- just calling the same document two
22 different things?

23 Q. Yeah. Yeah. What's the regulatory

1 difference; do you know?

2 A. Well, there's a difference in terms of
3 enforcement authority and in terms of going through
4 rulemaking.

5 Q. What about in terms of 303d listing?

6 A. I think we already covered this. In terms of
7 303d listing there is no difference.

8 Q. There is no difference. Right. Okay.

9 Do you know if there's a difference with
10 respect to permitting?

11 A. I don't know, because we don't -- we, DES,
12 don't write the permits.

13 Q. Okay. But you didn't -- your wasteload
14 allocation analyses didn't treat it any differently for
15 the purposes of permitting, did it?

16 A. Treat it any differently than what?

17 Q. Well, than any other typically adopted numeric
18 criteria?

19 A. No. I've only done that once. I never --

20 Q. That's right, I'm sorry. You've only done it
21 once. Okay.

22 Does this numeric nutrient criteria document
23 from June 2009, is it DES's position that this document

1 constitutes a demonstration that the narrative criteria
2 for nutrients have been violated within the Great Bay
3 estuary?

4 A. Does that document?

5 Q. Uhm-hmm.

6 A. Demonstrate a violation?

7 Q. Yeah; of the narrative standard?

8 A. No.

9 Q. Okay. With regard to the -- let's switch to
10 permits for a minute. You're not the permitting person
11 for the department, for DES, right, that coordinates
12 usually with EPA?

13 A. Right. I'm not that person.

14 Q. Who is that person?

15 A. Uhm, Stergios Spanos.

16 Q. Do you know if DES and EPA have been
17 coordinating on the reopening of the permits for the
18 towns of Exeter, Newmarket, Rochester, Dover and
19 Portsmouth?

20 MR. MULHOLLAND: Objection; compound.

21 A. You mean reopening as in issuing new permits?
22 Yes, there's been coordination.

23 Q. And the main focus of those permits have been

1 implementations of the numeric nutrient criteria that
2 were developed in June 2009?

3 A. I haven't been involved with the full part in
4 all of the permits.

5 Q. Do you know if DES has reviewed any draft
6 permits that EPA has sent over, like, for Exeter or
7 Newmarket or Dover?

8 A. Yes.

9 Q. And there's a lot of e-mails back and forth,
10 so you're copied on some, but do you know if anybody at
11 DES has objected to the -- to EPA's establishment of a
12 3-milligram per liter total nitrogen limit for -- in any
13 of those permits?

14 MR. MULHOLLAND: Objection as to form.
15 Just the word "objection." Do you mean formal
16 objections or informal objections?

17 MR. HALL: Has he either formally or
18 informally objected. Thank you. That's a good point.

19 Q. Have they told EPA that it's improper to give
20 these facilities a 3-milligram per liter total nitrogen
21 limit as the means for meeting the numeric nutrient
22 criteria for Great Bay?

23 A. I don't think so.

1 Q. Okay. Are you responsible at all for 401
2 certifications on those permits; do you provide input on
3 that?

4 A. 401 certifications on permits are done by the
5 wastewater engineering branch. So we would provide some
6 input but they're the lead for those type of
7 certifications.

8 Q. Okay. Do you know if they -- any 401
9 certifications have been sent out on Exeter, Newmarket
10 or Dover permits?

11 A. I don't believe so. You're talking about the
12 new permits; right?

13 Q. Yes, the new permits. Yes, I'm not talking
14 about the old ones.

15 A. Yes. I don't believe so.

16 MR. HALL: Why don't we break for lunch.

17 MR. MULHOLLAND: Sure.

18

19 (Luncheon recess.)

20

21 MR. HALL: Back on the record.

22 I understand that Mr. Trowbridge would like to
23 give an answer to the question that we had on whether

1 anybody has presented him with a demonstration that
2 nitrogen was the cause of eelgrass losses in the Great
3 Bay estuary system?

4 MR. MULHOLLAND: Yes.

5 THE WITNESS: So before we do that, we
6 just wanted to change an answer.

7 BY MR. HALL:

8 Q. No. I think I'd like you to answer the
9 question first, and if we want to change an answer,
10 that's fine.

11 A. All right. So the answer would be no, because
12 you cannot prove causation because there's no control
13 for the Great Bay.

14 MR. MULHOLLAND: And then Mr. Trowbridge
15 has to change an answer that he realized he answered
16 incorrectly.

17 Q. Okay. And do you recall what the question
18 was?

19 A. It was a question related to the cause of
20 eelgrass decline in Waquoit Bay. I think the question
21 was has eelgrass loss been -- the cause of eelgrass loss
22 been proven there, or something to that effect. So I
23 think a more appropriate answer would be, as far as I

1 know, there have -- they have not proven the cause of
2 eelgrass loss there.

3 Q. Okay. That's fine.

4 What I'd like to do is kind of go back to an
5 earlier line of questioning that we had in a prior
6 deposition. And it's related to how the numeric
7 criteria for transparency were derived. Let's see if we
8 can work our way through this.

9 I believe you indicated in your prior
10 deposition that the 2009 numeric criteria were based on
11 the assumption that attaining a 22 percent light
12 transmission level was needed to protect eelgrass growth
13 and survival?

14 A. Yes. I believe that's correct.

15 Q. And that was based on some studies that, I
16 believe, were used in the Chesapeake Bay program. Is
17 that your recollection also?

18 A. Yes.

19 Q. Okay. And then the nitrogen criteria from the
20 2009 document, they were based on achieving that -- the
21 level of nitrogen that was necessary to achieve that
22 particular level of transparency; right?

23 A. You're talking about the nitrogen ones or the

1 light attenuation?

2 Q. Well, the nitrogen were based on -- were based
3 on the light attenuation target; correct?

4 A. Just making sure I understand the one you're
5 talking about. The ones on this table?

6 Q. Yes. We're looking at page 68 for Document
7 Number 27 from the Short deposition.

8 A. And within that table, we're talking about
9 these numbers here.

10 (Indicating.)

11 Q. When you're pointing and saying "these
12 numbers," can you please tell us --

13 A. The numbers related for total nitrogen and
14 light attenuation coefficient.

15 Q. Correct.

16 A. Okay. Yes. These numbers were derived using
17 the light-attenuation model.

18 Q. And the light-attenuation model used the
19 22 percent light transmission level; right?

20 A. Yes.

21 Q. Okay. Does not meeting a 22 percent light
22 transmission level in areas where eelgrass growth is now
23 below expected levels, does that constitute a narrative

1 criteria violation now?

2 A. Uhm, can you just say that again?

3 Q. I'm trying to ask a question as to what the
4 22 percent -- not achieving the 22 percent target does
5 in the system at this point in time.

6 If I'm in an area where eelgrass are currently
7 less than, 20 percent less than historical levels, if
8 the light transmission in that area is not at
9 22 percent, on average --

10 A. Above or below?

11 Q. Is below 22 percent, on average, does that
12 constitute a narrative criteria violation?

13 A. Uhm, it -- and what would be the nitrogen
14 concentration?

15 Q. Nitrogen concentration would be --

16 A. Actually, sorry. Are you talking about
17 violation of the aquatic -- the biological aquatic
18 community integrity standard or of the narrative
19 standard for nutrients?

20 Q. Let's do the biological integrity one first.

21 A. Okay. Biological integrity, the assessment
22 protocol only looks at the change in the eelgrass cover,
23 so it does not look at the light attenuation.

1 Q. Okay. For the one that looks at light
2 attenuation, would it be considered a narrative criteria
3 violation?

4 A. So when we're talking about evaluation, I
5 guess what I'd say is about the nutrient narrative
6 standard.

7 Q. Uhm-hmm.

8 A. The issue is what is the nitrogen
9 concentration relative to its threshold. Because the
10 eelgrass, change in eelgrass and the light attenuation
11 parameter are both response parameters.

12 Q. Well, let's take them one at a time. There's
13 a light -- there's a light-attenuation value that's in
14 the 2009 criteria document; right?

15 A. Yes.

16 Q. And you've used that to set light attenuation
17 impairment listings; correct?

18 A. Yes.

19 Q. So if I'm in an area where eelgrass population
20 is less than 20 percent of historical levels --

21 A. Uhm-hmm.

22 Q. -- and my light attenuation level is less than
23 the 22 percent target level, does that constitute a

1 narrative criteria violation for light attenuation?

2 A. Uhm, where I'm getting confused is there isn't
3 a narrative standard for light attenuation. It's -- the
4 narrative standards we're talking about are the ones for
5 nutrients, and the ones for biological and aquatic
6 community integrity. So I'm just having a hard time
7 understanding this.

8 Q. Then you've confused me even more,
9 Mr. Trowbridge, with that response because didn't the
10 impairment listing document for 2009 and thereafter
11 identify light attenuation as an impairment?

12 A. Right. So are you asking, then, if you have
13 light attenuation, just independent of anything else --

14 Q. Hmm.

15 A. -- it's less than 22 percent, or the
16 equivalent value for K_d , is that going to be an
17 impairment on the 303d list?

18 Q. Well, I know it's an impairment on the 303d
19 list; right? I mean, you've listed it as an impairment.
20 So does that mean it's a narrative criteria violation is
21 occurring there?

22 A. Yes. I think that would be -- this is not a
23 way we have thought about it, but this would be, I

1 think, under the biological and aquatic community
2 integrity narrative standard, in this particular area,
3 which is the -- which is the estuary, where eelgrass has
4 historically existed.

5 Q. Okay. So the new way of implementing the
6 narrative criteria -- I'll just try to say it simply --
7 presumes that you need to have a 22 percent light
8 transmission level to protect eelgrass resources?

9 A. Yes.

10 Q. Okay. Do you know if the historical data for
11 the estuary support that a 22 percent light level is
12 necessary for stable and healthy eelgrass populations to
13 exist, for example, in Great Bay?

14 A. Are you talking about, like, historical
15 records of light attenuation?

16 Q. Historical record of the amount of light
17 that's occurring in the system.

18 A. And I think we covered some of these questions
19 in the previous deposition.

20 Q. Right.

21 A. And the light attenuation, the information we
22 have has not changed very much.

23 Q. Okay.

1 A. In areas where we have long-term records.

2 Q. Right. But I agree it hasn't changed. I
3 mean, that's something that I think the long-term
4 records have borne out. But the level that hasn't
5 changed, was that level above or below the 22 percent
6 light transmission level?

7 A. I'm not sure, because the old measurements
8 were made with Secchi disks, so the relationship between
9 that and the 22 percent is hard to say.

10 Q. Okay. Let's walk through some of the
11 impairment findings that happened before the numeric
12 nutrient criteria were put together. The State of the
13 Estuaries reports, you were responsible for preparing a
14 number of them. I believe we covered last time that the
15 State of the Estuaries reports, I'll say at least up
16 through 2006, confirm that algal growth in the system
17 did not change significantly in response to a 59 percent
18 increase in inorganic and total nitrogen levels in the
19 bay; correct?

20 A. We're talking about through 2006?

21 Q. Yeah.

22 A. I don't recall exactly, but certainly the
23 levels of chlorophyll or phytoplankton have not

1 increased dramatically. I don't know by other types of
2 algae, like macroalgae.

3 Q. I'm only talking about phytoplankton. The
4 nitrogen went up but the phytoplankton levels didn't
5 change?

6 A. In the place where we have long-term records,
7 which is Adams Point.

8 Q. So if the phytoplankton levels didn't change,
9 phytoplankton could not have caused a change in
10 transparency; correct?

11 A. Uhm, yes.

12 Q. "Yes," meaning correct; right?

13 A. Yes.

14 Q. Okay. So back to the -- remember we used the
15 term "cultural eutrophication" before about causing,
16 something about causing excessive or increased aquatic
17 plant growth; right? I think that's how the term's
18 used?

19 A. I believe so.

20 Q. So with regard to, and I'll just say
21 phytoplankton, up through 2006 at least, there wasn't
22 any indication that narrative criteria were being
23 violated for nutrients; right?

1 A. I'd say based on the information we had in
2 2006, that's correct.

3 Q. Okay. There was a noted suspended solids
4 increase, and I covered this also with Mr. Currier.
5 There was a suspended solids increase reported in the
6 2006 State of the Estuaries report, which is Short
7 Exhibit 18. Do you recall that analysis? And I'm
8 pointing at the graphs. It's called -- is that figure
9 7?

10 MR. MULHOLLAND: Figure 7.

11 Q. Yeah, figure 7 on page 13. And that was from
12 the -- that 2006 State of the Estuaries report. So the
13 suspended solids had gone up how much between the two
14 assessment periods that you're looking at for that
15 report?

16 A. I think I'm looking in the right spot here.
17 It says, on page 12, "During the same period suspended
18 solids concentrations increased by 81 percent."

19 Q. Okay. So up to 2006 the chlorophyll-a didn't
20 change materially as a result of changing nitrogen loads
21 but the suspended solids went up. Did you ever have
22 a -- an explanation for what caused that to occur?
23 What -- if the chlorophyll-a didn't go up, that couldn't

1 have caused the suspended solids to go up, obviously;
2 right?

3 A. Yes.

4 Q. Okay. So do we know what caused the suspended
5 solids to increase in the system if it wasn't algae?

6 A. Are we talking about what we knew in 2007 or
7 2006 or 2005 or what we know now?

8 Q. What you knew at that time. I don't know if
9 you know anything different today but...

10 A. I don't think we drew any strong conclusions
11 in this report.

12 Q. Okay. But it apparently wasn't caused by the
13 nutrients because the nutrients hadn't changed
14 chlorophyll-a?

15 A. According to this report, no.

16 Q. Did you have any subsequent analysis that
17 would have indicated that the nutrients were the cause
18 of the change in suspended solids in the system or do
19 you know if there were any subsequent reports that
20 concluded nutrients were the cause of the change to
21 suspended solids in the system?

22 A. I believe we did an appendix to the 2009
23 report, 2009 guidance document where we looked at some

1 patterns of eelgrass loss relative to suspended solids
2 concentrations.

3 Q. Uhm-hmm. Okay. And what would that
4 conclusion be?

5 A. I'll get it exactly. So there's, in this
6 appendix B, I don't know what exhibit this is, but 2009
7 guidance document, appendix B page B3.

8 Q. Uhm-hmm.

9 A. There's a paragraph near the bottom that
10 summarizes the result of that, or the observations.

11 Q. Okay. Can you tell me what that observation
12 was?

13 A. Okay. So it says, "As expected, the suspended
14 sediment concentrations in the estuary have increased as
15 a result of eelgrass loss. Figure 2 shows that
16 suspended solids concentration spiked in 1990 to 1992,
17 following a period when eelgrass died off due to wasting
18 disease.

19 "In the years following, the eelgrass
20 population rebounded and suspended solids concentration
21 returned to normal levels. Later, after the eelgrass
22 populations in the Great Bay had been declining for
23 several years, the suspended solids concentrations again

1 became elevated. This pattern of increasing suspended
2 solids concentrations following eelgrass loss is a
3 negative feedback cycle that has been documented in the
4 scientific literature, Burkholder 2007. The increased
5 turbidity from destabilized sediments decreases light
6 availability for eelgrass."

7 Q. Okay. So that explains, you believe, that
8 some eelgrass loss may be the root cause of why the TSS
9 level went up?

10 A. Yes.

11 Q. Okay. I'll take that back now.

12 (Hanging.)

13 Q. In your last deposition we had discussed
14 whether or not there was information on whether epiphyte
15 growth was expansive in the system. So I guess the
16 question is, and there was some information from Fred
17 Short, I think you may recall what Fred had said, he had
18 not really seen that epiphyte growth was excessive. So
19 with regard to epiphyte growth, do you know if there's a
20 current basis to claim there's a narrative criteria
21 violation associated with that form of plant growth in
22 Great Bay or in the tidal rivers?

23 A. So the form of the question is do I know if

1 there's any information or -- sorry. It's just a
2 complicated question.

3 Q. I'm asking about is there any information
4 showing that epiphyte growth is currently in violation
5 of narrative criteria?

6 A. Not that I'm aware of.

7 Q. Okay. In your -- in our prior deposition you
8 and I also talked about that eelgrass impairment status
9 between the early '90s and 2005. Do you recall us
10 talking about that?

11 A. About 303d impairments?

12 Q. Yes.

13 A. Yes.

14 Q. And you recall that the waters were not
15 considered impaired -- when I say "the waters," I think
16 it was Great Bay and Portsmouth Harbor were not
17 considered impaired for eelgrass from, I'll say, the
18 1990s through 2005; is that correct?

19 A. Uhm, yes. Those waters were not on the 303d
20 list between those two years.

21 Q. Okay. So during that period, there was no
22 narrative criteria violation for ecological impacts
23 associated with eelgrass in those areas; right?

1 A. Uhm, we only started to make assessments of
2 eelgrass after that period of time, so it's hard for me
3 to say whether there was a violation or not. Because we
4 weren't looking at the data for 303d purposes.

5 Q. Okay. But I mean, in terms of the actual
6 data, I mean, I could give you the --

7 A. In terms of what the levels were.

8 Q. Yeah, the actual acreages. So they were all
9 within 20 percent of historical during that timeframe;
10 correct?

11 A. That's a different question than talking about
12 an impairment determination.

13 Q. But isn't within 20 percent of historical the
14 basis of an eelgrass determination; right?

15 A. That's the threshold we use for the protocol;
16 yes.

17 Q. So if they -- I'll show you the -- we can use
18 the -- let's use Exhibit 67, which is the eelgrass
19 acreage charts that you've put together for PREP. You
20 recall that document, of course; correct?

21 A. Yes.

22 Q. And between, I guess we'll call it 1990 and
23 2005, is there -- was Great Bay less than the, you know,

1 the 20 percent, 20 percent of baseline?

2 A. I just, you know, not having done the
3 calculation exactly, I can't say for sure. But, uhm, I
4 mean, aren't we just looking to eyeball it or --

5 Q. Yeah. I mean, I can assure you, the 2006
6 estuary report actually had that stuff, as did the -- we
7 could look at your 2008 impairment listing.

8 A. Sure.

9 Q. That said no, it wasn't.

10 A. I just am sensitive to saying a specific
11 number when I haven't done the --

12 Q. Would you like me to give you another document
13 that actually had the calculation in it?

14 A. Sure.

15 Q. I think we've got that. Let me have that
16 back. Let's look at the -- what I'm going to give you a
17 copy of is the August 2008 Impaired Waters document.

18 (Handing.)

19 Q. If you look at the table there, that indicates
20 that the eelgrass population, I believe, was somewhere
21 around an average of -- a little over 2,000 acres in
22 Great Bay.

23 A. Okay. I mean, the section that I was -- would

1 turn to to answer this question is on page 6 of that
2 document.

3 Q. Uhm-hmm.

4 A. And it's the second full paragraph, and says,
5 "For the period between 1990 and 1999, eelgrass cover in
6 Great Bay was relatively healthy and stable. The
7 relative standard deviation of eelgrass during this
8 period was 6.5 percent." That's sort of the assessment
9 we did. And we go on to say, "Assuming that the
10 variability of eelgrass cover in Great Bay is
11 represented by the locations, DES shows three relative
12 standard deviations, which is 20 percent, as the
13 appropriate threshold for nonrandom change from
14 reference conditions."

15 Q. That's what the -- and what I'm saying is the
16 values that are in that table in the back don't show
17 more than a 20 percent change in the reference
18 condition. I mean, that was the point; right?

19 A. Okay.

20 Q. I mean --

21 A. No, I understand your point. I just --

22 Q. I'm just saying, so that's the question:

23 Those don't show -- those data indicate that there was

1 no impaired -- impairment listing for Great Bay through
2 2005? I mean, this is something we covered in the prior
3 deposition.

4 A. I'm just wanting to be precise about numbers.
5 But, I mean, if we're talking in general, yes, I agree.

6 Q. And then looking at Portsmouth, the Portsmouth
7 Harbor area, I think it was the answer was the same
8 there; that the values down in Portsmouth Harbor are
9 within the same range as --

10 A. Oh, so you're talking about the assessment
11 made using data through 2005?

12 Q. Yeah. That's all.

13 A. Okay. You're not -- okay. I was mis--

14 Q. I'm just saying -- I'm just trying to set up
15 what the -- what were the conditions occurring in Great
16 Bay prior to -- 2005 and prior.

17 A. Okay. So -- so I understand better now.

18 So, yeah. This was the assessment we made
19 using the protocol that we have with all the data
20 available through 2005.

21 Q. Right.

22 A. Right.

23 Q. And up through 2005, not listed as impaired?

1 A. For Great Bay and for Portsmouth Harbor.

2 Q. Okay. Right. So up through 2005 there's no
3 narrative criteria violation for what -- I guess what
4 you call ecological impacts for Great Bay or Portsmouth
5 Harbor; right?

6 A. Correct.

7 Q. Okay.

8 A. And I think it's important to -- for Great
9 Bay, that report did conclude that Great Bay was
10 determined to be threatened, but based on, I guess,
11 preliminary data for eelgrass in 2006 and 2007.

12 Q. Right. That's why I'm just -- I'm just
13 sticking with what happened. I'm trying to ask
14 ourselves, just so you get the idea where we're going on
15 this, Mr. Trowbridge, I'm asking ourselves what did we
16 know about the system prior to 2005.

17 A. Sure. All right.

18 Q. Eelgrass not impaired, and not listed as
19 impaired in Great Bay; right?

20 A. Correct.

21 Q. Eelgrass not listed as impaired in Portsmouth
22 Harbor?

23 A. Correct.

1 Q. No significant change in chlorophyll levels in
2 these areas up through this period?

3 A. Uhm-hmm.

4 Q. Right?

5 A. Right.

6 Q. There was a change in suspended solids, which
7 you've explained is maybe related to some eelgrass
8 thinning in the system; right?

9 A. Yes.

10 Q. Okay. And as far as we know, there was no
11 change in transparency throughout this time frame of
12 1990 to 2005, to the degree we have data or information
13 available on that; right?

14 A. Right. In the few locations where we have
15 long-term records.

16 Q. Right. Okay.

17 All right. So I guess with regard to
18 transparency, at this point in time, to the degree we've
19 got the records, there's no indication that transparency
20 is suffering as a result of cultural eutrophication,
21 right, because it hasn't changed?

22 A. You're talking specifically about Great Bay;
23 right?

1 Q. Yeah, Great Bay. And Portsmouth Harbor, I
2 guess. I mean, I suppose. There's not that many
3 readings in Portsmouth Harbor; right?

4 A. Very few.

5 Q. Very few. But there's quite a bit of data on,
6 really on transparency for Great Bay; right?

7 A. There's been Secchi depth measurements for a
8 while, but not very many of the actual measurements of
9 light attenuation. I'm sorry, I forgot the original
10 question.

11 Q. Oh. I was asking whether or not there was any
12 indication that transparency had suffered as a result of
13 cultural eutrophication up through 2005?

14 A. Not in Great Bay.

15 Q. Okay. So here's the question: We've got a --
16 let's see, how many years are we looking at? The
17 eelgrass rebounded in 1989 or something? When did the
18 eelgrass rebound after the -- after the wasting disease
19 event? What was the first year the acreage started
20 looking pretty good?

21 A. Around 1990.

22 Q. Around 1990, okay. That's fair enough.

23 So from 1990 to 2005 we've got this long

1 period of stable eelgrass acreage, within the
2 20 percent, it goes up and down, but that's why you have
3 a 20 percent variation. During this same period, these,
4 the waters in Great Bay did not meet the 22 percent
5 incident light requirement, did they? I mean, based on
6 the best available information you have, they did not
7 meet that 22 percent level; correct?

8 A. Well, we only started measuring the light
9 attenuation in 2004, I think, you know.

10 Q. I'm just saying, based on the best available
11 information you have, the light attenuation level was
12 not met; right? That 22 percent level was not met in
13 Great Bay?

14 A. I -- I guess I'm having trouble because the
15 data that I have to assess that is the light attenuation
16 measurements, and they started in 2004.

17 Q. Didn't meet it in 2004, did it?

18 A. Uhm, I don't recall. We've been looking at
19 the data in aggregate.

20 Q. Okay. Well, the transparency levels haven't
21 changed, right, not materially, as far as we know, in
22 Great Bay?

23 MR. MULHOLLAND: Objection; form. It's

1 unclear when.

2 Q. Just period. Over, in 20 years, from 1990 to
3 present, they have not materially changed in Great Bay;
4 correct?

5 A. I think if you're talking about the Secchi
6 depth readings.

7 Q. Which is a measure of transparency; correct?

8 A. It's a measure of transparency, yeah.

9 Q. Hasn't changed?

10 A. The data that's from Adams Point has not
11 changed, no.

12 Q. Okay. And the Kd readings that you have at
13 Adams Point indicate the 22 percent light level is not
14 being met in that area; correct? I mean, I could show
15 you your own analyses that did that. Correct?

16 A. Yes.

17 Q. So --

18 A. I'm just not sure of how good a translator or
19 how good the connection is between Secchi depth and
20 measured light attenuation by photosynthetic active
21 radiation. That's my hesitation in the answer.

22 Q. Well, I could go into asking you why would
23 that make a difference if the Secchi depth numbers

1 haven't changed materially? Whatever is being measured
2 for light attenuation hasn't really changed, right; it's
3 just another way of measuring light attenuation?

4 A. Right. I just say it's a less accurate way.

5 Q. Pretty -- what, Secchi depth?

6 A. Uhm-hmm.

7 Q. It's a pretty simple measurement, isn't it?

8 A. Yes.

9 Q. I mean, very simple measurement; right?

10 A. It's simple, but it's also somewhat subjective
11 to the vision of the person taking the measurement.

12 Q. But these were quality -- these were data that
13 were supposedly quality assured and put into your
14 database?

15 A. Yeah. These were measurements made by
16 volunteers. They had a quality assurance plan.

17 Q. Okay. And these were data that you, yourself,
18 had relied on in doing presentations to EPA as to what
19 was affecting the eelgrass in the system; right? I
20 mean, you used them yourself?

21 A. I certainly have looked at the data; yes.

22 Q. And you presented the results of those data,
23 too; right?

1 A. Yes.

2 Q. Did you present the results because you
3 thought it was unreliable? When you were presenting the
4 results, did you tell people, I'm giving you information
5 that's not reliable?

6 A. I don't remember if I said that in my
7 presentation.

8 Q. All right. You didn't likely say that in your
9 presentations, did you?

10 A. I don't know.

11 Q. You don't know?

12 A. I don't know what I said in presentations that
13 long ago.

14 Q. Okay. Assume, for the purpose of this
15 question, that the transparency level prior to 2005 did
16 not meet, in Great Bay, did not meet the 22 percent
17 incident light level. Assume that for the basis of this
18 question. Wouldn't this 16-year run of acceptable
19 eelgrass acreage indicate that a 22 percent light level
20 is not necessary in Great Bay to support an unimpaired
21 eelgrass status?

22 A. Unless the eelgrass is getting light during
23 periods of low tide when it's exposed to the surface.

1 You know, there's -- this is a shallow system, and so
2 the eelgrass, some of the eelgrass can be exposed
3 directly to sunlight at low tide. And so that's one of
4 the ways that it can get light that would be not
5 explained by a 22 percent-light-transmission-
6 through-the-water model.

7 Q. So the answer to the question is yes? I mean,
8 could you read it back? I mean, you explained to me why
9 the answer is -- why 22 percent wouldn't apply, but I
10 think a simple answer to the question first, and then if
11 you want to explain it later.

12 MR. HALL: I think if you read back,
13 wouldn't this 16-year...

14 (Record read as requested.)

15 A. So I think the answer is, I think, yes, with
16 the explanation I provided.

17 Q. With the explanation of why that's occurring?

18 A. Yes.

19 Q. Okay. That's fine. I mean, that, quite
20 frankly, that's the same explanation that Fred Short has
21 repeatedly given, right, why Great Bay isn't -- he
22 doesn't consider it to be a transparency-limited area,
23 because the eelgrass get enough light at low tide;

1 right?

2 A. In the shallow areas. There are deeper areas
3 of Great Bay.

4 Q. Does your impairment status insist that you've
5 got, for 303d listing, say that something's considered
6 impaired, if you still meet the acreage requirements but
7 the eelgrass are not growing to some level in the deeper
8 areas?

9 A. No. Our protocol just looks at the overall
10 area.

11 Q. Okay. So the fact that some eelgrass may or
12 may not be growing in some of the deepest areas is not a
13 basis for to claim impaired; correct?

14 A. That's correct. That's not the way our
15 protocol works.

16 Q. Okay. Just checking.

17 Doesn't this same 16-year run of unimpaired
18 eelgrass status also confirm that whatever level of
19 nitrogen or inorganic nitrogen that was occurring in
20 this system is not at a level that's toxic to eelgrass?

21 A. I think you might want to clarify the question
22 in terms of toxic to eelgrass in Great Bay or in all
23 areas?

1 Q. In Great Bay. I could only refer this
2 question to the specific area where the eelgrass were
3 fine. I mean, I --

4 A. Uhm-hmm.

5 Q. You couldn't draw an answer to an area where
6 the eelgrass aren't there; right?

7 A. Correct.

8 Q. So we're only talking about Great Bay. I
9 mean, and you understand what the question is; right?
10 There's this theory that nitrogen is toxic, inorganic
11 nitrogen forms are toxic to eelgrass. So doesn't --
12 whatever inorganic nitrogen levels occurring at that
13 time is not toxic to eelgrass because it's maintaining
14 its acreage requirements; right?

15 A. Uhm, I would say yes, with the explanation
16 that sometimes it takes a while for effects to be seen.
17 This is a fairly long run of data. And during the same
18 period there was a thinning of the beds. So there has
19 been some effects that aren't evident in this metric of
20 the eelgrass.

21 Q. Right. The thinning of the beds is not a
22 basis for declaring an impairment, correct, at this
23 point?

1 A. That is correct.

2 Q. All right. So this is kind of like the
3 closeout question in this whole run of questions on
4 22 percent light and all of that. Is there any Great
5 Bay-specific information that you have or that's been
6 presented to you confirming that a 22 percent light
7 level is necessary to ensure the health and survival of
8 eelgrass anywhere in this system?

9 A. Anywhere in the Great Bay estuary system? So
10 you're asking has any evidence been or any information
11 been provided to me?

12 Q. Great Bay-specific information.

13 A. Great Bay-specific. No.

14 Q. Now, the source of the 22 percent, as we
15 discussed earlier, was a Chesapeake Bay analyses that
16 was done; correct?

17 A. Yes.

18 Q. Did you know that the Chesapeake Bay analysis
19 on 22 percent assumed that there was a significant level
20 of epiphyte growth occurring on the eelgrass?

21 A. Not that I'm aware of.

22 Q. Did you know that the Chesapeake Bay analysis
23 considered that a chlorophyll-a level in the range of 10

1 to 13 micrograms was consistent with meeting the
2 transparency level that they had set in that system?

3 A. I'm sure I read that at some point, but it's a
4 totally different system in terms of its tidal range and
5 things.

6 Q. Right. So that means we probably shouldn't be
7 using Chesapeake Bay without accounting for all the
8 differences in this system; correct?

9 A. Well, when you look at any of these things you
10 have to account for changes between systems, and
11 22 percent was chosen as the minimal level for eelgrass
12 survival. It was not -- there was information or
13 reports that people gave us saying that the percentage
14 should be higher.

15 Q. I know what was chosen, Mr. Trowbridge. What
16 I'm asking is, we just covered the epiphyte point. If
17 Fred Short said epiphyte growth was not significant in
18 this system, then the 22 percent target that was
19 considered necessary and appropriate for Chesapeake Bay
20 would need to be adjusted for this system, wouldn't it,
21 if epiphyte growth was not significant?

22 A. Yeah. I think the way to phrase it is if you
23 had better site-specific information you could adjust

1 that.

2 Q. I think that's a good response. And we do
3 have some information from the eelgrass expert as to
4 whether epiphytes are prevalent and causing a problem;
5 right?

6 A. Yes.

7 Q. Okay. And that would be relevant
8 site-specific information; right?

9 A. I guess what I meant by that is some sort of
10 information on the degree to which the number might be
11 changed.

12 Q. Ah. One could probably find that out by
13 looking at the basis of the Chesapeake Bay program
14 number, now, couldn't they?

15 A. I don't follow it.

16 Q. Chesapeake Bay program number was altered to
17 account for additional epiphytes. One can find out how
18 much it was altered to account for that; right?

19 A. Uhm, it's been a while since I looked at the
20 Chesapeake Bay program numbers. And as I recall, the
21 22 percent was the amount of light that the plant needed
22 to receive, and that amount was the light attenuation,
23 so it was a combination of the light attenuation through

1 the water as well as the light attenuation through
2 epiphytes on the leaf.

3 Q. Uhm-hmm.

4 A. So the ultimate number, the 22 percent, was
5 what the plant needed to survive. It's not that the --
6 you know, I --

7 Q. Can I explore that with you a little bit
8 further? Because, I mean, Mr. Trowbridge, I hope you
9 understand that all the people that are involved in the
10 litigation are really interested in just trying to make
11 sure we get to an answer that's necessary, appropriate,
12 and reasonable for the bay. We're not trying to find
13 out a way to kill eelgrass and not protect eelgrass or
14 anything like that.

15 If the 22 percent number was the amount that
16 accounted for light loss with an epiphyte coating, and
17 you did not have that epiphyte coating, you could use a
18 lower light-penetration value, couldn't you, because you
19 don't have the coating of epiphytes on the leaves?

20 A. Right. I just -- my recollection of their
21 report is a little different, and I just think without
22 looking at it I'm hesitant to offer an --

23 Q. I'm not asking you to agree to my

1 characterizations of the report, I'm just suggesting
2 that the -- that if there was a difference, and it was
3 due to epiphytes, on the amount of light penetration
4 people thought was needed, that would be something we
5 could check and look at the reports to figure out
6 whether a different number was appropriate. That also
7 might very well explain why these eelgrass in Great Bay
8 seem to be doing so well with less than 22 percent and
9 also might explain why the eelgrass in Portsmouth
10 Harbor, which also doesn't meet the light attenuation
11 numbers that you want achieved, why they were doing so
12 well all the way up through 2005 with a lesser level of
13 light coming in. Simply might be the explanation,
14 that's all. Okay?

15 MR. HALL: The witness nodded.

16 A. I mean, is there a question?

17 Q. No. I'm just explaining --

18 A. Yeah, right.

19 Q. -- as to why it's important and why we're
20 exploring some of these issues. It's not a case of
21 gotcha, it's a case of trying to get to the bottom of,
22 you know, how we get to reasonable answers on this case.

23 MR. HALL: Okay. You're looking like you

1 wanted to --

2 MR. MULHOLLAND: I was going to say
3 that -- I was just going to say that there wasn't a
4 question pending so he shouldn't answer the nonquestion,
5 but you're beyond that.

6 MR. HALL: Okay.

7 Q. Now, let's go to after 2005 in the system.
8 Let me have that back so it's not in front of you.

9 (Handing.)

10 Q. After 2005 there was a major decrease in
11 eelgrass growth in the system; right? I think you could
12 look at, for example, the table from your 2013 PREP,
13 draft PREP report, and I will give us a document number,
14 bear with me, so we all know what we're looking at.
15 It's Exhibit 67.

16 There was a major decrease in eelgrass
17 populations in Great Bay; right?

18 A. You mean in 2006, 2007 and 2008?

19 Q. Yeah. Big drop-off?

20 A. Yes.

21 Q. I mean, actually, would you describe that as a
22 relatively dramatic drop-off?

23 A. It was a -- I just say it's a large change.

1 It was a large decrease.

2 Q. A large decrease that happened quickly; right?

3 A. Uhm-hmm.

4 Q. Okay. That decline in eelgrass was basically
5 used as the basis for updating the impairment listings
6 for 2009 and thereafter to call Great Bay eelgrass --
7 impaired for eelgrass; correct?

8 A. Yes. And I'd say it's, you know, we just use
9 the same protocol that we used for the previous version,
10 but with updated data and that showed an impairment.

11 Q. Right. Certainly. And then in 2008, '9, '10,
12 I'll say -- no, I'll say 2009, '10 and '11, the eelgrass
13 rebounded back, and you and I covered that; right?

14 It --

15 A. Yes. It increased.

16 Q. Okay. What caused this major rapid decline
17 and then subsequent rebound in eelgrass acreage to
18 occur; do you know?

19 A. I don't know.

20 Q. Okay.

21 A. I will say that when you look at it plotted as
22 it is on figure HAB 2-1, it is a decline and then an
23 increase, but it's all part of a longer period of

1 decline.

2 Q. Longer period of decline from when?

3 A. The regression on this graph was done from
4 1990. You know, really start to see it drop off after
5 the '90s.

6 Q. After 2005 it dropped off. It was back up
7 over 2,000 acres in 2005, wasn't it?

8 A. I'm just talking about the assessment protocol
9 that we use. We use this regression --

10 Q. But, I mean, if I took off those last five or
11 six years with the drop and the bounce back up, I mean,
12 that line would have come through those data virtually
13 flat? I mean, that's what your -- we don't need to go
14 there.

15 A. Yeah.

16 Q. Here's the question: That major decline, you
17 don't know what caused that in 2006, '7 and '8; right?

18 A. Uhm-hmm. Yes. We do not know.

19 Q. Okay. And then this, I'll go down to
20 Portsmouth Harbor because we've got a decline occurring,
21 I guess. I don't know, maybe it's starting in 2007.
22 It's dropping off a little bit and then coming down and
23 then bounce -- do we know what caused the decline in

1 Portsmouth Harbor?

2 A. No.

3 Q. Okay. Do we have data showing that there's
4 major increases in algal growth in Great Bay or the
5 Portsmouth Harbor area occurring during this time? I
6 suppose the answer's no, or we might have tagged that as
7 a indicator of what was happening; right?

8 A. You're referring to phytoplankton?

9 Q. Phytoplankton, yeah.

10 A. For phytoplankton, no, there's no information.

11 Q. That really didn't change. Do we have data
12 showing that there was a major transparency decrease
13 from -- from before -- data from 2004, 2005 on
14 transparency? I know that the transparency plummeted in
15 2006, '7, '8, '9 in Great Bay. Do we have data that
16 shows that?

17 A. I haven't looked at the transparency data that
18 way, so I don't -- I'm not sure.

19 Q. Okay. What about the total nitrogen levels?
20 That was considered acceptable for 15 years prior to
21 2005. Did the total nitrogen levels increase
22 significantly after 2005 such that the nitrogen somehow
23 caused a toxic effect or some other effect on the

1 eelgrass?

2 A. Uhm, we started measuring total nitrogen
3 either in 2003 or 2004. The concentrations, I'm not
4 sure exactly when, but concentrations were higher in
5 2006, 2007, 2008, compared to 2009, 2010, and 2011.

6 Q. Okay.

7 MR. HALL: I'm going to mark this as
8 Exhibit 83.

9 (Trowbridge Exhibit 83 marked for
10 identification.)

11

12 Q. This is your PREP 2003 nutrient document --
13 I'm sorry, 2013 --

14 A. This is the draft.

15 Q. Draft, correct. I'd like to draw your
16 attention to, this may clarify your recollection on
17 nutrient concentrations that you just testified on. The
18 dissolved -- looking at page 3, which lists dissolved
19 inorganic nitrogen, which had the higher dissolved
20 inorganic nitrogen level, the period when the
21 eelgrass -- the period before 2004 or the period after
22 2004?

23 A. In this analysis the higher DIN concentration

1 was in the period before.

2 Q. Okay. So during the period when the, I'll
3 say, when the eelgrass were particularly healthy, 1993
4 to 2000, we have a DIN level of above .15. It might be
5 .16, who knows. You might be able to eyeball it better
6 than me because it's your graph. And then from 2004 to
7 2011, when the eelgrass populations were a fair amount
8 lower, the inorganic nitrogen concentrations were below
9 .15, and .14, so that the nitrogen concentrations don't
10 explain these changes in eelgrass, now, do they, the
11 ones -- the rapid decline that we saw after the
12 2004/2005 time frame, at least not based on this
13 analysis?

14 A. Yeah. This analysis is for dissolved
15 inorganic nitrogen. And what I was referring to is that
16 I was asked, as part of comments on this, to break the
17 data out by year.

18 Q. Uhm-hmm.

19 A. And I had been working on those calculations.
20 And when you break them out by year, the most recent
21 three-year period has lower nitrogen concentrations than
22 the previous one.

23 Q. Okay.

1 A. And I'm talking about total nitrogen.

2 Q. Total nitrogen. Right.

3 In terms of threatened toxicity to eelgrass,
4 it's dissolved inorganic nitrogen that's supposed to
5 have the potential toxic effect; right?

6 A. That's my understanding.

7 Q. Yeah, okay. And -- all right. So here we are
8 with this big decline in eelgrass, we don't know, or
9 we're not sure what caused it, so what's the basis for
10 thinking that either nitrogen or transparency caused
11 that eelgrass decline in the system? I mean, other
12 than, other than the draft numeric criteria document
13 which, by the way, I know you're looking at the CALM
14 report. The explanation you have in the CALM report is
15 all the same data and information that's in the numeric
16 criteria document. That's not new stuff; right?

17 MR. MULHOLLAND: Objection. Do you want
18 him to answer the question?

19 Q. I'd like him to answer the question; what's
20 the basis?

21 A. What I'd like to point out is, in this
22 response to comments on the CALM, I don't know what
23 number it is, we added some information in there to talk

1 about how -- our understanding of the way that nitrogen
2 affects eelgrass. And so it's on -- do you have this --

3 Q. I should. I certainly have it.

4 A. It's page 8 of that report, of the response to
5 comments on the CALM.

6 Q. I was going to walk you through those comments
7 in detail a little bit later. So which cause, that's
8 either -- this is marked as a double exhibit somehow.
9 It's either Exhibit 59 or Exhibit 60.

10 So it's not transparency changing, it's not
11 algae changing, we don't have an indication that the
12 nitrogen is toxic in this system, because the higher
13 nitrogen, inorganic nitrogen levels were present when
14 the eelgrass were the healthiest. How do -- how do we
15 conclude that transparency and nitrogen is the cause of
16 the eelgrass decline? Or flip it the other way, will
17 restore the eelgrass to the prior levels?

18 A. In response to that, I'd say part of our
19 response here is that in shallower areas overgrowth and
20 smothering by macroalgae and/or cellular disruption may
21 be the immediate cause of eelgrass loss. And so based
22 on the information that was provided us by Dr. Mathieson
23 and Jeremy Nettleton showing that there's been a

1 dramatic increase in the macroalgae in this system
2 somewhere between the early measurements in the '70s and
3 '80s, and the repeat of those studies in 2009, 2010,
4 that that may be the more immediate cause in the shallow
5 areas of Great Bay.

6 Q. Do the eelgrass only decline in the shallow
7 areas of Great Bay?

8 A. Well, most of Great Bay is shallow.

9 Q. No, I'm asking the question. Does the
10 eelgrass -- okay. Let's back up a bit.

11 So we're back to pointing to the possible
12 answer is the Nettleton report and Art Mathieson's
13 e-mail to you, which we covered earlier, doesn't show,
14 for the Great Bay system, that macroalgae actually
15 caused the problem? I mean, it says it might have;
16 right?

17 A. It says it can; yes.

18 Q. But it doesn't say it did, and there's no
19 information that even shows that it was likely it did,
20 right; nothing in those reports?

21 A. I think we're, again, at this issue of can you
22 prove causation at a specific location. And we have --
23 there's conceptual models of how shallow estuaries

1 respond to eutrophication. In a shallow estuary you
2 expect a proliferation of macroalgae which will affect
3 eelgrass. When you have a decline of eelgrass, and
4 evidence of a proliferation of macroalgae, you can put
5 those two together in terms of a scientific theory that
6 one is affecting the other.

7 Q. Scientific theory that's not proven for this
8 estuary with any specific data; correct?

9 A. Correct; not proven.

10 Q. Not even demonstrated; right? I mean, explain
11 the area of Great Bay where it's been -- any area of
12 Great Bay where it's been demonstrated that the
13 macroalgae are preventing eelgrass growth, regrowth,
14 colonization. Name one area in the bay where that was
15 demonstrated?

16 A. Would photographs of eelgrass with Gracilaria
17 and Ulva mixed in among them be demonstration?

18 Q. No. Why would that be a demonstration that it
19 caused it, that --

20 A. It's very difficult in this case. Without a
21 control for Great Bay, you can't prove it.

22 Q. But you could have gone out to Great Bay to
23 see whether or not we now had excessive macroalgae

1 growth all throughout the system where the eelgrass
2 previously were, right, and nobody did that?

3 A. We did the study with the hyperspectral
4 mapping, which was mapping in the whole Great Bay. That
5 was a very good study.

6 Q. You had one data point then, as you and I
7 covered from the last -- I mean, we went through this
8 already in detail, Mr. Trowbridge -- that the eelgrass
9 rebounded after this decline, and that apparently
10 macroalgae and light transmission and nothing else
11 stopped the eelgrass from increasing about 50 percent
12 from their low point; right?

13 A. It did increase. It didn't come up to its
14 full level, but it did increase.

15 Q. So, again, so what information in Great Bay do
16 you have that shows macroalgae either caused the
17 eelgrass decline or prevented any eelgrass from
18 regrowing?

19 A. Again, in terms -- if the burden of proof is
20 to prove causation, since we do not have a control Great
21 Bay where we can run an experiment with or without
22 macroalgae or with our without nitrogen, we don't have
23 that information.

1 Q. You could do several additional surveys
2 though, right, in the areas where the eelgrass were and
3 weren't? I mean, that's certainly doable?

4 A. Right. And the hyperspectral imagery study
5 was a very big study, very expensive, and then that was
6 followed on by the research done by Mathieson and
7 Nettleton.

8 Q. Okay. Well, the eelgrass also declined in the
9 harbor. Is somebody saying that the macroalgae are an
10 issue in the harbor?

11 A. It's less of an issue, just because of the
12 depth of beds there.

13 Q. Have you ever had anybody say that macroalgae
14 is a significant issue in the Piscataqua River, anywhere
15 in the Piscataqua? I didn't say less of an issue, I
16 said anyone ever given you any information showing you
17 that it is even remotely of concern in those areas?

18 A. With such a caveated question, I have to say I
19 don't know. I mean, whether someone has given me any
20 information about anything that it might be remotely of
21 concern.

22 Q. Okay. Has anybody given you any information
23 showing macroalgae are a concern in the Piscataqua

1 River?

2 A. I don't think so.

3 Q. Okay. There was one significant change,
4 right, that happened after 2005 in this system. Didn't
5 the rainfall pattern increase significantly in the
6 system?

7 A. We had a few years of very wet weather. I
8 don't know. I haven't done an analysis of some kind of
9 change in the climate pattern.

10 Q. I didn't say change in the climate pattern, I
11 just said there's a number of years of much greater
12 rainfall and it coincided with the eelgrass decline;
13 right?

14 A. Uhm, certain years of greater rainfall; I
15 don't know if they exactly coincide.

16 Q. Did you ever check it?

17 A. It depends on the -- we're having trouble
18 figuring out what's the best weather station to use for
19 this area.

20 Q. Did you check the flow stations on the rivers
21 leading into Great Bay in the Upper Piscataqua to see if
22 the river flows increased during the period of eelgrass
23 decline?

1 A. I did look at the river flows, but I don't
2 remember if they looked -- if they corresponded to those
3 three years. Is that what you're talking about, 2006,
4 2007, 2008?

5 Q. We actually submitted -- HydroQual developed
6 that analysis and submitted that information to you.

7 A. Yeah.

8 Q. Did you not look at it?

9 A. I probably did. I don't recall right now
10 whether it coincides.

11 Q. If increased -- would increased tributary
12 flows, could that be a direct and immediate cause, a
13 direct and immediate adverse effect on eelgrass growth?

14 A. It could.

15 Q. Can you tell me why?

16 A. There's a number of reasons: Increased
17 nitrogen loads, increased sediment loads, increased --

18 Q. Dissolved organic matter?

19 A. Yes.

20 Q. And that increase could have reduced the
21 transparency, possibly, very rapidly in the system;
22 right?

23 A. Are you talking about the color-dissolved

1 organic matter or --

2 Q. No, turbidity. I mean, the turbidity and
3 color-dissolved organic matter would have an immediate
4 effect on the transparency in the system, wouldn't it?

5 A. Yes.

6 Q. And is that due to nitrogen loads, or is that
7 just due to the turbidity and the color-dissolved
8 organic matter coming in with the tributaries?

9 A. The -- I'm sorry, I don't quite understand the
10 question.

11 Q. The question is: Is that a nitrogen problem
12 or is that a turbidity color-dissolved organic matter
13 issue? In other words, you wouldn't control -- you
14 can't control the turbidity and color-dissolved organic
15 matter by regulating nitrogen in the system, can you?

16 A. Okay. So the last question is can you control
17 those things, and the answer's no, you can't control
18 color-dissolved organic matter or turbidity by
19 controlling nitrogen.

20 Q. And, Mr. Trowbridge, I guess that's part of
21 the point of why we're concerned where these analyses
22 have gone. And I realize one only takes them to a
23 certain point, but if the cause was due to a change in

1 transparency due to turbidity and color-dissolved
2 organic matter, then all of the money we're talking
3 about spending on nitrogen control wouldn't change that
4 condition, would it, for the wastewater plants?

5 A. So speaking hypothetically?

6 Q. Uhm-hmm.

7 A. Yes.

8 Q. Yes, it wouldn't change it; right?

9 A. Yes, it wouldn't change it.

10 Q. Okay.

11 THE WITNESS: Can we take a break?

12 MR. HALL: Oh, certainly.

13 THE WITNESS: Are we at a breaking point?

14 MR. HALL: Phil, whenever you need a
15 break we're at a breaking point. Okay?

16 (Recess.)

17 MR. HALL: Back on the record.

18 BY MR. HALL:

19 Q. Phil, related to -- or Mr. Trowbridge, related
20 to the question of things that affect light transmission
21 and whether it's nitrogen and other factors, in our
22 earlier deposition we had talked about the Morrison
23 report, which you're familiar with; correct?

1 A. Yes.

2 Q. Okay. I'd like to show you an e-mail that was
3 from you to a Henry Walker and a couple other people at
4 the EPA, regarding from March 14th, 2007. Do you recall
5 this e-mail?

6 MR. HALL: And I'd like to mark it as
7 Exhibit 84.

8 (Trowbridge Exhibit 84 marked for
9 identification.)

10

11 A. I recall it now that you show it to me.

12 Q. Okay. Was this e-mail discussing what was
13 going on with regard to the Morrison study, to your
14 knowledge?

15 A. The e-mail refers to receiving grant funds to
16 add this instrumentation to a buoy in 2008.

17 Q. Uhm-hmm.

18 A. And that was data collected for the Morrison,
19 et al, study.

20 Q. Okay. Now, the sentence I'd like to draw your
21 attention to is: We need this data stream to get enough
22 measurements to tease out the relationship between Kd
23 and water quality parameters.

1 That was the purpose of the Morrison study,
2 right, to get enough information so you could develop a
3 relationship on the factors that are affecting
4 transparency in the system? Right?

5 A. Uhm, yes.

6 Q. Okay. And I'd like to show you another one.
7 We'll mark this as Exhibit 85. And this is an e-mail
8 that's December 9th, 2008, and it's discussing where
9 color-dissolved organic matter comes from. And this is
10 an e-mail from Bill McDowell back to yourself and, I
11 guess I'll call it a cast of thousands. Looks like it's
12 the folks on whatever PREP committee you have. Do you
13 recall this e-mail?

14 (Trowbridge Exhibit 85 marked for
15 identification.)

16
17 A. Yes.

18 Q. Okay. The e-mail says that -- I'll just read
19 you a couple quotes from it, see if there's any -- if
20 you have any further input on this: CDOM in the bay is
21 very tightly correlated with measured dissolved organic
22 carbon in the Lamprey River by Packers Falls.

23 Is that consistent with your understanding

1 that the color-dissolved organic matter originates in
2 the watershed and then comes down the tidal rivers?

3 A. Yes.

4 Q. Okay. And, let's see. I'll read, with regard
5 to dissolved organic carbon, I'm just going to read you
6 the next sentence that kind of -- where they're
7 starting: DOC in the sub-basins of the Lamprey River is
8 tightly correlated with wetland coverage in the basin
9 and shows no effects at all from population density,
10 road work, soils, or anything else we have measured.

11 That's kind of consistent with the source of
12 the dissolved organic matter being leaf decay and
13 wetlands; correct?

14 A. Yes.

15 Q. Okay. And do you agree with the statement in
16 the next sentence that it seems very likely that the DOC
17 delivered to the bay, at least at present human
18 populations, is driven by wetlands and not people?

19 A. I'm not sure.

20 Q. Okay. Do you have any information -- now,
21 when I'm talking about DOC, I'm talking about the
22 component that's associated with color-dissolved organic
23 matter, that it's driven by wetlands and not people?

1 A. I think the dissolved organic carbon pool is a
2 very complex situation, and just not comfortable making
3 a broadbrush statement about it.

4 Q. Do you have a -- any data that would say --
5 hmm.

6 Can you tell me why you might think
7 color-dissolved organic matter is originating from
8 people and not wetlands, or that's not what you're
9 trying to say? I mean, I'm not trying to put words in
10 your mouth. I'm trying to understand.

11 A. I'm not trying to say that. I'm just trying
12 to say that I don't want to -- I don't necessarily agree
13 with this statement that you pointed out.

14 Q. Okay. Did you ever tell him you don't agree
15 with it? When I say "tell him," I'm talking about
16 Dr. McDowell, who was a professor of water resources
17 management and presidential chair for the Department of
18 Natural Resources and Environment?

19 A. I don't think so.

20 Q. Could you flip to the back of the next page?
21 I just have a question on the composition of organic
22 matter in Great Bay.

23 Let's see. You've got a table there, it's --

1 and I'm talking about your e-mail dated December 8th,
2 2008, and it's back to Ru Morrison and everyone else.
3 Why is the composition of organic matter in Great Bay
4 important? Why are you assessing it?

5 A. Uhm, I think in this instance we're trying to
6 figure out how nitrogen is partitioned between the
7 different species.

8 Q. Okay. And so that would be like looking at
9 the little table where it says particulate, and then you
10 have "in phytoplankton" and "in organic matter." Is
11 that -- so 1 percent of it is in phytoplankton,
12 22 percent is in the rest of the organic matter? Is
13 that the -- what is that -- what do those percentages
14 mean in that table, can you please explain that to me?

15 A. Sure. This table, I don't know if it was the
16 final one, it certainly looks like it was a draft, but
17 it was saying, you know, in a -- in Great Bay in, let's
18 say, a typical water sample, if you collected it and
19 tried to say how much of the nitrogen in that sample was
20 in the ammonia form, you'd say 13 percent, typically;
21 24 percent in the nitrate/nitrite form; 39 percent in
22 dissolved organic matter; 1 percent --

23 Q. Oh, so you were apportioning out where the

1 nitrogen is in a sample?

2 A. Yeah.

3 Q. Okay. All right. And that was marked as
4 Exhibit 85.

5 There was a follow-up e-mail that came out of
6 this same series, and it's an e-mail from you to Jim
7 Latimer dated December 15th, 2008.

8 MR. HALL: Can we mark that as 86?

9
10 (Trowbridge Exhibit 86 marked for
11 identification.)

12 Q. And it looks like people are trying to -- do
13 you recall this e-mail where people are trying to pose
14 some type of question to a gentleman named Walter? They
15 need to tap his wisdom again?

16 A. Vaguely.

17 Q. Is that "Walter" Walter Bonyton; do you know?

18 A. I don't remember.

19 Q. Well, there's this question. It says:
20 Presumably, most of the particular organic nitrogen from
21 the -- is from the watershed or wetlands and, therefore,
22 the question is if turbidity is the main issue in Great
23 Bay --

1 A. I'm sorry, where are you reading from?

2 Q. Right down in the -- the question: If
3 turbidity is the main issue in Great Bay estuary related
4 to seagrass health, what will the reduction of nitrogen
5 loading to the estuary, from point and nonpoint sources,
6 do to aid water clarity?

7 Did anybody ever give you an answer to that
8 question?

9 A. I don't remember this.

10 Q. Okay. Do you know the answer to that
11 question? If most of turbidity in the system is
12 originating from the watershed or wetlands, how will
13 reducing nitrogen loadings to the system control that
14 aspect, impacting water clarity?

15 A. Sorry. Can I just take a minute to read this?

16 Q. Oh, please. Take your time.

17 (Witness reviewed document.)

18 A. I don't really understand the way this
19 question is worded in Jim's e-mail.

20 Q. Really?

21 A. Well, it just seemed to mix a couple of
22 issues.

23 Q. Well, let's go back over this. What are the

1 factors affecting transparency in the system; can you
2 name them?

3 A. You mean transparency and water clarity?

4 Q. Yeah.

5 A. Uhm, turbidity -- well, a -- yeah. Inorganic
6 particles, organic particles, CDOM, and water itself.

7 Q. And the organic particles are broken up into
8 two sets of organic particles: stuff that's washing down
9 the system from the watershed, and the algae that are
10 growing in the system; right?

11 A. Yeah. I don't know that it's exclusively
12 stuff washing in versus algae growing, but sort of
13 living versus dead algae, and also organic matter that's
14 been washed into the system or has broken off from other
15 types of plants in the system.

16 Q. Right. Kind of like the eelgrass losing their
17 leaves and that breaking up?

18 A. Yeah, or Ulva losing its leaves, or Spartinas,
19 or whatnot.

20 Q. But the point of that, if it were true that
21 95 percent, is that -- I think the number we're using, I
22 think it came from your earlier analysis. If 95 percent
23 of the particulate organic nitrogen is organic --

1 95 percent of the particulate nitrogen is organic
2 nitrogen, and only a very small amount is in
3 phytoplankton -- or, in other words, it's -- I guess
4 they're replying it's not from an algal source. How
5 will regulating nitrogen in the system reduce that
6 source of particulate matter that's affecting
7 transparency? I mean, it wouldn't, right, if those
8 numbers were accurate?

9 A. Right. I just think the question was a little
10 different, and I can't -- I'm having a hard time
11 understand --

12 Q. That's all right. We'll just move on, on that
13 one. Thank you. I know sometimes looking at a document
14 from almost four years ago is -- can be a challenging
15 point. It was kind of an important point though.

16 Let's move on to the tidal rivers, if we can.
17 There were a series of e-mails. I showed them to Paul
18 Currier. You might recall them. I could pull them all
19 back out. Let's see if you -- wasn't there a point in
20 time where it was uncertain as to whether or not the
21 eelgrass restoration should be considered appropriate or
22 reasonable for tidal rivers? And when I mean tidal
23 rivers, I'll say like Squamscott and Lamprey, that it

1 was uncertain whether or not the eelgrass could really
2 grow there anymore; right?

3 A. We've had, yeah, lots of discussion about that
4 issue.

5 Q. And that was an issue that was up in the air
6 for a while; right?

7 A. You mean like within DES or within a broader
8 discussion?

9 Q. Within DES.

10 A. Yes.

11 Q. Okay. And I guess I can show you an e-mail --
12 well, what the heck, it may as well get it in and mark
13 it. Let's call it Exhibit 87.

14 (Trowbridge Exhibit 87 marked for
15 identification.)

16
17 Q. This has to do with whether or not the
18 eelgrass-related transparency TM criteria should be
19 applied in the Squamscott and Lamprey Rivers. It's an
20 e-mail from Phil Trowbridge, June 3rd, 2011 to Ted
21 Diers. And re: Request for Clarification Regarding
22 Application of Eelgrass Transparency-based TN Criteria
23 in the Tidal Rivers.

1 Do you recall this series of e-mails?

2 A. Some of these -- are they all the same? This
3 seems like there's some e-mails here that are different.
4 It's a combination of an e-mail from 2008.

5 Q. Oh, did we get bad copying? Yeah, it was
6 attached to a -- no, what it should have been was -- no,
7 it -- you should have the same one I got. Oh. Yeah,
8 this other 2008 one probably ought not be on there.
9 Don't worry about it. I'm not going to ask you about
10 the 2008 one.

11 I'm just talking about the 2011 e-mail, which
12 I guess was prepared in response to our request that you
13 clarify that it's inappropriate to apply the
14 transparency-based nitrogen numbers in the tidal rivers.
15 Do you recall this e-mail exchange?

16 A. Uhm, yes.

17 Q. Okay. And I draw your attention that -- to
18 the paragraph, the one that's highlighted, the first one
19 in yellow that's highlighted. It says: DES has made it
20 abundantly clear that we feel managing for DO in the
21 rivers is the appropriate next step. And our plan is to
22 eventually roll out the splits in the assessment units
23 when the time is right.

1 Can you tell me what that's -- what that
2 statement is all about that you made to Ted Diers in
3 this e-mail exchange?

4 A. Uhm-hmm. What I'm referring to there is
5 splitting the assessment units for some of the tidal
6 rivers to distinguish areas where eelgrass has existed
7 historically and from those that where it has not.

8 Q. Okay. But at this point in time DES hadn't
9 made that decision, and you're still implying that we
10 should focus on the DO aspect, right, in the tidal
11 river?

12 A. I'm not sure exactly. I mean, clearly we have
13 not done the splits by that time.

14 Q. Okay. When you said where eelgrass had
15 historically existed, is that the basis that DES is
16 using for where the eelgrass transparency nitrogen
17 related criteria should apply, wherever eelgrass
18 historically existed?

19 A. Uhm, be sure we said that explicitly in this
20 report. Yeah. So you go to page 68 of this report --

21 Q. When you say "this report," oh, the numeric
22 nutrient. Okay.

23 A. So page 68, footnote number 4, the criteria to

1 protect eelgrass supply in sections of the Great Bay
2 estuary where eelgrass has historically existed, which
3 is some or all of each of the tidal rivers, Great Bay,
4 Little Bay, Piscataqua River, Portsmouth Harbor, Little
5 Harbor, Back Channel, and Sagamore Creek.

6 Q. Okay. Just because something historically
7 existed in a location, does that mean it can presently
8 exist in that location naturally?

9 MR. MULHOLLAND: Objection as to form.
10 It's pretty vague.

11 MR. HALL: I'll see if he can answer.

12 A. In general, you mean?

13 Q. Yeah.

14 A. No.

15 Q. Okay. Now, I'm going to ask you to think
16 about narrative criteria application.

17 A. Uhm-hmm.

18 Q. The mere fact that historically eelgrass
19 existed in a location, but now presently does not, does
20 that mean you automatically declare that area as an
21 impairment for eelgrass under your narrative criteria?

22 A. Yes. So you're talking narrative. Do you
23 have the narrative criteria for the --

1 Q. Ecology criteria; right? Is that the one
2 you're talking about?

3 A. Do you have that one? It's 1703.19? It's
4 probably in one of the 303d --

5 Q. I know it's somewhere, yeah. I'm thinking
6 it's in one of the 303d reports. I've got a 303d report
7 handy. So why don't we -- yeah, I think it's in the
8 303d report. That's a good memory. But then again you
9 wrote those reports, so you ought to know.

10 Regulatory authority, biological integrity, do
11 you want me to --

12 A. If I could just look at it.

13 Q. Why don't you take a look at it, read it into
14 the record so people know which one you're talking
15 about.

16 A. Sure. Okay. All right. So the Narrative
17 Criteria for Biological and Aquatic Community Integrity,
18 which is ENV-WQ 1703.19, states, "Surface waters shall
19 support and maintain a balanced, integrated and adaptive
20 community of organisms having a species composition,
21 diversity and functional organization comparable to that
22 of similar natural habitats of a region."

23 It goes on to say, "Differences from naturally

1 occurring conditions shall be limited to nondetrimental
2 differences in community structure and function."

3 Q. Okay. So back to the question: Does the mere
4 fact that something existed in one location and does
5 not -- no longer exists there, mean that that narrative
6 criteria is violated?

7 MR. MULHOLLAND: Objection to the form;
8 it's vague.

9 A. The -- are we speaking generally, now, or
10 speaking about eelgrass?

11 Q. Generally first, and --

12 A. Generally, it's not necessarily.

13 Q. Okay. Well, let's talk specifically for
14 eelgrass. Eelgrass existed once upon a time --

15 A. Uhm-hmm.

16 Q. -- in the Squamscott and Lamprey River; right?

17 A. Yes.

18 Q. And as discussed in your various, I guess you
19 could pick up almost any of them, 303d impairment
20 listing documents, the reason for the eelgrass loss --
21 and now there's no eelgrass at all in those areas;
22 right? I mean there's, like, none?

23 A. I think in 2011 there was a little bit in the

1 mouth of the Lamprey.

2 Q. Okay. But further up in the river there's
3 none; right? And there's none in the Squamscott; right?

4 A. Our maps --

5 Q. As far as we know?

6 A. Our maps show none.

7 Q. Okay. So in those areas where there's no
8 eelgrass present in the Squamscott and Lamprey, does
9 that narrative criteria say that you should presume that
10 they're violated because the eelgrass are no longer
11 present?

12 A. I'm sorry, could I have the August 2008
13 investigation of this report? I think you have it in
14 one of those folders.

15 Q. I probably do. Didn't bring your own?

16 MR. KINDER: I thought we had that out.

17 MR. HALL: I had the 2009 one out because
18 I thought that's the one we would end up with.

19 Q. Here you go.

20 (Handing.)

21 A. Thank you. Just give me a minute. We
22 addressed this question in here.

23 Okay. So on page 3 of this report --

1 Q. Uhm-hmm. When you say "this report," we're
2 talking about the August --

3 A. -- 11, 2008 Methodology and Assessment Results
4 Related to Eelgrass.

5 Q. And that was one of the Fred Short deposition
6 exhibits. I don't know which one at this point.

7 A. So on page 3 of this report we addressed the
8 question by saying that, "Eelgrass is the base of the
9 estuarine food web of the Great Bay estuary. While
10 eelgrass is only one species in the estuarine community,
11 the presence of eelgrass is critical for the survival of
12 many species. Maintenance of eelgrass habitat should be
13 considered critical in order to 'maintain a balanced,
14 integrated and adaptive community of organisms.' Loss of
15 eelgrass habitat would change the species composition of
16 the estuary resulting in a detrimental difference in
17 community structure and function. In particular, if
18 eelgrass habitat is lost, the estuary will likely be
19 colonized by macroalgae species, which do not provide
20 the same habitat functions as eelgrass. Therefore, DES
21 believes that significant losses of eelgrass habitat
22 would not meet the narrative standard of ENVWS 1703.19
23 and create a water quality standard violation for

1 biological integrity."

2 Q. Okay. No, I know you listed them, I'm just
3 trying to get to the question of is the mere fact that
4 eelgrass existed in a place at one point, and they're no
5 longer there, looking at the narrative criteria, does
6 that mean the narrative criteria have been violated?

7 A. I think we answered that by saying --

8 Q. So your answer would be yes?

9 A. Yes. The answer is yes.

10 Q. Okay.

11 A. Sorry. I didn't realize it was that --

12 Q. No. I'm just -- because the narrative
13 criteria, which you've got in front of you, did the
14 narrative criteria give any indication that whenever --
15 and I think you have it in front of you; right?

16 A. This one.

17 (Indicating.)

18 Q. Does that criteria give you an indication that
19 whenever an organism is lost you must declare something
20 to be in impairment regardless of why it was lost?

21 A. No. And that was why I pulled out that
22 document, because we were provided that explanation of
23 why we were considering the loss of eelgrass to be a

1 violation of this standard. Because it's more than just
2 one species, that it's the cornerstone of the estuarine
3 ecology and lots of organisms depend on it.

4 Q. I think the problem is the answer I got back
5 was kind of a non sequitur to my question. I wasn't
6 disputing whether eelgrass are important. Eelgrass are
7 important. And but if their loss was due to natural
8 causes, would that be a violation of the narrative
9 criteria?

10 A. Oh, if it was -- if this was naturally
11 occurring?

12 Q. Yeah. If it occurred -- there was a huge
13 flood, there was a major eelgrass bed in the Squamscott,
14 the flood tore out the eelgrass bed and dumped huge
15 amounts of dirt and debris in that area.

16 A. Right.

17 Q. Would that be considered a narrative criteria
18 violation?

19 A. No, because it talks about differences from
20 naturally occurring conditions which is -- specific --
21 naturally occurring has a specific definition in the
22 water quality standards.

23 Q. Exactly. That's why I was trying to get at,

1 does something automatically occur, but not if you
2 believe it may be naturally occurring; right?

3 A. Right.

4 Q. Okay. Let's talk more about the Squamscott
5 and Lamprey River. You're familiar with the restoration
6 compendium that was done to identify where eelgrass
7 could be restored in the system?

8 A. Yes.

9 Q. Okay. You're familiar that it -- you're
10 familiar with the result of it, that it did not identify
11 either the Squamscott or Lamprey Rivers as areas that
12 were susceptible to eelgrass restoration?

13 A. Yes. And that was because of the current
14 water quality.

15 Q. Oh, really?

16 A. Uhm-hmm.

17 Q. Caused by what?

18 A. This was part -- that was part of their model
19 was to look at the current water quality.

20 Q. Right. But I'm -- the current water quality,
21 but do we know if the current water quality was caused
22 by natural conditions or do we know if the current water
23 quality that's insufficient was caused by man-induced

1 conditions?

2 A. We don't know.

3 Q. I wanted to -- there was a document that I
4 presented to Mr. Currier, and again in an effort to not
5 spend a lot of time shuffling paper, I think it's one
6 that you're readily familiar with. It talked about the
7 need to do more research before deciding whether or not
8 to apply the transparency-based eelgrass criteria in the
9 tidal rivers. It was from November of 2009.

10 Do you recall that discussion at that point in
11 time?

12 A. No. Do you have a document you want to show
13 me?

14 Q. Yeah. Okay. This is Currier Exhibit 39.
15 It's a series of e-mails from Paul Currier, and it's
16 part of the e-mail chain that transmitted what we keep
17 calling a wasteload allocation analysis. Okay?

18 And I'm going to draw your attention to, it's
19 a executive summary that you, yourself, wrote and you
20 transmitted to everybody. And I'm going to show you on
21 page, unmarked page 4 of this exhibit, it's right
22 yonder.

23 (Handing.)

1 MR. MULHOLLAND: Feel free to orient
2 yourself.

3 Q. Yes, please.

4 A. There's been a lot of reports, haven't there?

5 Q. Yes, there have been.

6 Do you recognize that e-mail that you
7 apparently sent out to -- this is another cast of
8 thousands. And if you could just read the part with the
9 arrow.

10 A. Right here?

11 (Indicating.)

12 Q. Yeah, the --

13 A. This e-mail's undated, so I'm a little
14 confused.

15 Q. It's probably going from the top of -- I don't
16 know how it got stuck on that. It was attached to that.

17 A. Oh. So this is -- it's attached to this
18 e-mail from 2007? How can that be possible? Because
19 this report wasn't written until 2010.

20 Q. Well, they are somehow together in my
21 documents. That's how they came to me. But let's just
22 go --

23 A. So this one's sort of irrelevant.

1 (Indicating.)

2 Q. Yeah, that's irrelevant.

3 A. Just this one, which we're not sure of the
4 date.

5 Q. Right.

6 A. Draft for review and comment. Okay. All
7 right.

8 Q. The executive summary, and that's, I believe,
9 the executive summary to the wasteload allocation
10 report.

11 A. Right. It looks like, based on the heading,
12 that it's draft for review and comments. So this is
13 something previous to the final version.

14 Q. Right.

15 A. We're seeking comments from this list of
16 people. Okay.

17 Q. Okay. Can you read that one highlighted
18 sentence then?

19 A. Sure. The sentence is, "This decision is
20 supported by the scientific consensus that eelgrass
21 should be present in Great Bay, Little Bay, and the
22 Upper Piscataqua River, but more research is needed to
23 determine whether eelgrass restoration is an appropriate

1 or feasible goal for the tidal rivers."

2 Q. Okay. Do you remember writing that document?

3 A. It would help me if I had a date, but
4 obviously I did write it. I'm just not sure which
5 version of the document it is.

6 Q. The only thing I can tell you, sometime in
7 2009, but I guess the question really goes to do you
8 know if more research was done to confirm -- what's the
9 last part of the sentence, if I may read it -- to
10 confirm whether eelgrass restoration is an appropriate
11 or feasible goal for the tidal rivers?

12 A. If more research was done --

13 Q. If -- yeah. It says more research is needed?

14 A. Yeah.

15 Q. So do you know whether more research was ever
16 done to determine whether eelgrass restoration is an
17 appropriate or feasible goal for the tidal rivers?

18 A. Not knowing the date of that, it's hard for me
19 to answer. Uhm --

20 Q. From 2009 forward do you know if any more
21 research was done to show if it was an appropriate or
22 feasible goal for the tidal rivers?

23 A. I don't believe so.

1 Q. Okay. Can you explain to me why, then, in
2 August of 2011, DES sent a letter to EPA saying it was
3 appropriate to apply the eelgrass criteria in the lower
4 sections of the Squamscott and Lamprey River if the
5 research wasn't done to show it was either appropriate
6 or feasible to have eelgrass in those areas?

7 A. I guess I may be getting tripped up on the
8 term "research." If research means a field study,
9 something was not done, but if research means to review
10 the data that we had and to discuss it more thoroughly
11 amongst ourselves, then we certainly did that.

12 Q. You -- you have data showing it's reasonable,
13 feasible, and/or appropriate to apply the nutrient
14 criteria for eelgrass restoration in those segments of
15 the rivers? If there's such an analysis, we did not
16 receive it under discovery so I'd like to know.

17 A. Well, what I'm referring to there is
18 discussions about what could have changed and the
19 parameters around, like, color-dissolved organic matter
20 that shouldn't have changed. There's been no change in,
21 or there should be no change in that. So it was deemed
22 that it was feasible to restore.

23 Q. Do you have an analysis demonstrating that

1 nitrogen control will dramatically improve transparency
2 in either the Lamprey or the Squamscott River?

3 MR. MULHOLLAND: Objection to form.

4 A. We do not have such analysis.

5 Q. Then why would you put nitrogen criteria
6 applicable in those areas? I mean, I'm trying to
7 understand this because it's pretty clear that eelgrass
8 is gone. And it's pretty clear people understood that
9 there were water quality factors that were preventing
10 it, but you picked out nitrogen as the one to control.

11 A. Uhm-hmm.

12 Q. Why?

13 A. And you're asking about the impairment
14 determinations? Because I thought your first question
15 was about permits or --

16 Q. No. The water quality numbers. Why did you
17 pick nitrogen as the basis for controlling transparency
18 in the tidal rivers?

19 A. Because of our review of the scientific
20 literature on this topic that there -- based on that, we
21 have a conceptual model of what's affecting eelgrass in
22 the system, and nitrogen is the dominant factor.

23 Q. You're saying nitrogen is the dominant factor

1 controlling light transmission in the Squamscott and
2 Lamprey Rivers?

3 A. In the tidal rivers, this is -- I'm looking at
4 the graph from our response to comments -- there is a
5 statistically significant relationship between light
6 attenuation and total nitrogen as well as in all samples
7 in other eelgrass areas.

8 Q. Okay. I'll say it again. You're telling me
9 controlling nitrogen, that means that you should control
10 nitrogen to control transparency? Are you saying that
11 that's a cause-and-effect relationship?

12 A. It's a correlation.

13 Q. Right. And as a matter of fact, it's a
14 correlation you know is incorrect; right? CDOM is the
15 major factor controlling -- let's back up for a second.

16 MR. MULHOLLAND: Objection. One question
17 at a time.

18 MR. HALL: You can strike that question.

19 MR. MULHOLLAND: Thanks.

20 Q. Let me show you another exhibit. I'm going to
21 mark this as Exhibit 88. Did we mark that, the -- Phil,
22 the exhibit you have in front of you, is that your CALM
23 thing?

1 A. Yeah.

2 Q. Okay. Here's 88.

3 (Trowbridge Exhibit 88 marked for
4 identification.)

5

6 Q. Mr. Trowbridge, do you recall receiving this
7 e-mail dated -- it's an e-mail from you to Jim
8 Latimer -- or doing it, creating this e-mail dated
9 November 19th, 2008? And it says: Comments on New
10 Hampshire estuary nitrogen criteria document.

11 Are you familiar with this e-mail?

12 A. Vaguely.

13 Q. Only vaguely?

14 A. It's from 2008.

15 Q. All right. Because it's a pretty critical
16 question, isn't it? You're sending an e-mail to EPA
17 saying: The comment that seems the hardest to refute is
18 that nitrogen is correlated with light attenuation.
19 Nitrogen was not proven to be the causative agent for
20 light attenuation. Moreover, nitrogen is a component of
21 all the factors causing light attenuation
22 (phytoplankton, CDOM, particulate organic matter) so a
23 correlation would be expected."

1 So you knew that nitrogen was related to
2 transparency, but not because nitrogen was controlling
3 transparency, simply because there was an inherent
4 correlation; correct?

5 A. There was, uhm, a challenging question.
6 Because, obviously, if you reduce the nitrogen, you're
7 also going to reduce all of the factors affecting the
8 light attenuation.

9 Q. Oh, really? You just covered with me that you
10 can't reduce CDOM by controlling nitrogen before, didn't
11 we?

12 A. Well --

13 Q. I would like an answer, yes, on that one.
14 Didn't you say to me before that controlling nitrogen
15 will not control CDOM?

16 A. Oh, okay. I'm sorry. I must have -- I was
17 thinking about point source controls in that question.
18 Because CDOM is a nonpoint source factor.

19 Q. Can you answer the question I just asked you?

20 A. Can you say it again, please?

21 MR. HALL: Can you read it back, please?

22 (Record read as requested.)

23 A. The question is didn't I say that before?

1 Q. Uhm-hmm.

2 A. Yes, I said that.

3 Q. Okay. And with regard to particulate organic
4 matter that's coming down the system as a result of leaf
5 material or just the watershed, didn't you say before
6 that controlling nitrogen is not going to control that
7 factor also?

8 A. Uhm, I'm not sure. Can we -- did you ask that
9 question?

10 Q. Uhm-hmm.

11 A. That's -- that would be part of the nonpoint
12 source, so I guess that's how I was answering that
13 question. But -- I'm sorry.

14 Q. Nonpoint source.

15 A. I'm just confused. Is the question did I say
16 it before or are you asking a new question?

17 Q. The point is, Mr. Trowbridge, and let's not
18 beat around the bush. You already knew that
19 transparency was controlled by color-dissolved organic
20 matter, particulate matter, phytoplankton, and the
21 water. And the only thing that the nitrogen is going to
22 control in the tidal rivers is phytoplankton growth.
23 It's not going to control CDOM or particulate organic

1 matter that's otherwise coming down into the system.

2 So you knew that nitrogen was not going to
3 control that, and yet you produced a graph that said,
4 Look, nitrogen's going to control transparency, when you
5 knew it wasn't going to control major factors affecting
6 transparency. Why did you do that?

7 A. Why did I produce a graph showing nitrogen
8 related to light attenuation?

9 Q. Why did you produce a relationship you knew
10 was false; that nitrogen did not, in fact, control
11 transparency?

12 MR. MULHOLLAND: Objection.

13 A. Yeah, I don't believe it's false.

14 Q. Explain why not. Explain how nitrogen control
15 is going to control CDOM coming from wetlands?

16 MR. MULHOLLAND: There's two questions
17 there, compound. Objection. One at a time.

18 A. The CDOM, is our understanding is that it
19 won't change very much. So changes in light attenuation
20 have more to do with other factors. So it's a
21 background. And that's actually one of the conclusions
22 in the Morrison report.

23 Q. And if CDOM is controlling the light

1 transmission level in the tidal rivers, then you can't
2 materially improve the light transmission level in the
3 tidal river, now, can you, assuming it's the major
4 factor?

5 A. If it's a major factor and it is providing a
6 baseline, as your other factors go up and down you
7 adjust that baseline.

8 Q. Hold it. You didn't answer my question. I
9 didn't ask you about whether you were adjusting
10 baselines.

11 MR. HALL: Could you read my question
12 back?

13 Q. And will you please answer it?

14 (Record read as requested.)

15 A. Yes; assuming it's the major factor.

16 Q. Assuming it's the major factor you can't
17 improve it significantly; correct? Right?

18 A. Yes.

19 Q. Okay. Did you determine whether CDOM was the
20 major factor controlling light transmission in the tidal
21 rivers?

22 A. No.

23 Q. Okay. Let's mark that -- that's marked as

1 Exhibit -- whatever we're up to. 88.

2 I'd like to show you some graphs from the
3 tidal rivers. Just to go back, and the purpose of the
4 Morrison study, right, was to figure out how much CDOM
5 and particulate organic matter and inorganic particles
6 and algae and water, how much each of those factors
7 influenced transparency; right? That was the purpose of
8 that study?

9 A. Yes.

10 Q. And it's the most detailed study done to date
11 on that issue?

12 A. Yes. And one of the things we have to
13 remember about that study is the conclusions are limited
14 to optically deep areas in Great Bay.

15 Q. Where's the -- where does the study say that?

16 A. Give me the report and I'll point it out.

17 Q. So you're telling me the equation in the
18 Morrison report only applies to optically deep areas?

19 A. It's in the conclusions section.

20 Q. This is one of the exhibits from Dr. Short's
21 deposition. Is this the document you're talking about,
22 using more to raise, and hyperspectral imagery?

23 A. Yep.

1 Q. Okay.

2 A. Okay. So, on page 51, the determination of
3 water clarity was limited to optically deep water due to
4 the complexities associated with the inclusion of
5 remotely detectable bottom reflection.

6 Q. How does that mean that the equation he
7 developed was not applicable to anywhere else? That's
8 just telling you that the data was limited to a certain
9 area so they wouldn't get information on the data sets,
10 isn't it?

11 A. It's saying that this is what the -- where
12 they had data, so it's limited to the optically deep
13 water areas.

14 Q. Are you telling me that the factors affecting
15 transparency change, based on the depth of the water?
16 You want to tell me what treatise would give you --

17 A. What I'm saying is that the conclusions of
18 this study are limited.

19 Q. Where does that study say -- point to the page
20 in the study where it says you should not apply the
21 equation to any other area that's not otherwise deep?

22 A. Oh, I mean, I showed you right here. I mean,
23 I --

1 Q. What page are you reading from?

2 A. Fifty-one.

3 Q. Can I have it, please?

4 A. There's other sections that talk about its
5 limitations at Great Bay or around the buoy.

6 Q. It just says recommendation for future work.
7 It's not in the conclusion section.

8 A. It's the same page.

9 Q. That wasn't a conclusion.

10 MR. MULHOLLAND: That's not a question.

11 Objection.

12 Q. All right. Just for the record, we're on
13 page 51, Mr. Trowbridge. Did you read from the
14 conclusion section or did you read from recommendations
15 for future work?

16 A. I read from the recommendations for future
17 work or management strategies.

18 Q. And does the conclusions section anywhere say
19 that you should not apply the equation that was
20 developed, which you asked EPA for a grant to develop so
21 you could make this analysis for the system, that that
22 equation should not be applied in other areas of the
23 system?

1 A. Oh. Right. It says, "A novel technique for
2 estimating water turbidity and Kd power from the
3 available hyperspectral wavelengths in optically deep
4 waters was developed." It doesn't say you can't apply
5 it, it just talked about what it was developed for.

6 Q. Thank you.

7 A. There's one other section, I guess.

8 MR. MULHOLLAND: You don't need to --

9 THE WITNESS: All right.

10 Q. Didn't that report also include data taken
11 from the various rivers, various tidal rivers? You can
12 look at the table at the tail end. It took data from
13 every major tidal river?

14 A. Yes, it did. But the regression was based on
15 the data at the buoy.

16 Q. Did the report show that the regression
17 doesn't work for the tidal rivers?

18 A. I don't recall.

19 Q. Right. Because it doesn't, it's not in there.

20 All right. I'm going to show you some data
21 for Squamscott and Lamprey Rivers. This is data that
22 you should be quite familiar with because it was
23 presented in each of the hearings that applied your

1 numeric criteria on the permits.

2 (Counsel conferred with the witness.)

3 Q. Mr. Trowbridge, are you aware that Dr. Short
4 testified that he never recommended applying the numeric
5 nutrient criteria in the tidal rivers?

6 A. No.

7 Q. This is Short Exhibit 20. That's a graph of
8 Kd transparency measurement versus chlorophyll-a. Okay.
9 Have you seen that grant before, Mr. Trowbridge?

10 A. I think so.

11 Q. Doesn't that graph demonstrate that regulating
12 nitrogen to control chlorophyll-a levels in the
13 Squamscott River will not and cannot assure attainment
14 of the transparency level contained in the June 2009
15 numeric criteria document?

16 A. I'm not sure. So the graph is light
17 attenuation measured at these two stations versus
18 chlorophyll?

19 Q. Uhm-hmm. Does, first off, does the graph show
20 that the light attenuation values claimed necessary in
21 the numeric criteria document are attained in the
22 Squamscott River, at either Chapman's Landing or the
23 further downstream station?

1 A. No.

2 Q. It's not even close; right?

3 A. Right.

4 Q. These are large exceedences of that value?

5 A. Yes.

6 Q. Okay. Does the analysis show that controlling
7 chlorophyll-a will bring, even if you take the
8 chlorophyll-a down to near zero in Squamscott River,
9 that that will allow this system to attain the
10 nutrient -- the transparency targets set in the 2009
11 criteria document?

12 MR. MULHOLLAND: Object to form. I don't
13 understand it, but maybe Phil does.

14 Q. Look at the lower panel.

15 A. The lower panel.

16 Q. The one you just --

17 A. And this is a -- these box and whisker plots
18 on the lower panel, what are they?

19 Q. They're the data averaged from the plot above.

20 A. Oh.

21 Q. Same type of thing you've done.

22 A. Yeah, okay. This graph doesn't show a
23 relationship with chlorophyll and light attenuation.

1 Q. Right. So controlling nitrogen to control
2 chlorophyll in this system will not allow this water
3 body to even come close to attaining the transparency
4 level that is contained in the 2009 criteria; right?

5 A. Based on this analysis, no.

6 Q. All right. This data had been submitted to
7 you and to EPA. Is there any basis that you know for
8 claiming that the analysis presented in this graph is
9 incorrect?

10 A. I'm not sure.

11 Q. You've not seen any analysis that shows it's
12 incorrect, have you?

13 A. No.

14 Q. Okay. Doesn't this analysis tell you it's
15 something else other than chlorophyll controlling the
16 transparency level in the Squamscott River?

17 A. Based on this data, yes; this graph, yes.

18 Q. Okay. Do you know if these other factors that
19 are controlling -- if it's not chlorophyll, there's only
20 two other factors that it can be, other than the water
21 itself. It's color-dissolved organic matter or it's
22 nonalgal-related turbidity; right?

23 A. Or it's organic matter that's not chlorophyll.

1 Q. Right. Well, when I -- I said nonalgal
2 turbidity, so anything that could cause turbidity but
3 not related to algae?

4 A. Not related to living phytoplankton, you mean,
5 because that's what chlorophyll measures. There's other
6 types of organic matter that's in the water.

7 Q. Right. Correct.

8 A. You know, that's pieces of macroalgae, that's
9 dead phytoplankton, it's --

10 Q. In the Squamscott River, pieces of macroalgae?
11 I mean, let's stop talking theoretical, what this could
12 be. I'm talking about the Squamscott River,
13 Mr. Trowbridge. So let's not just go off on things that
14 we know don't even exist in the Squamscott River. These
15 data say it's one of those two other factors: something
16 turbidity-related or something color-dissolved organic
17 matter; right?

18 A. Right. And what I'm trying to distinguish is
19 turbidity can include organic matter as well as
20 inorganic matter.

21 Q. So reducing the Exeter discharge to zero
22 nitrogen, is that going to allow this water body to
23 attain the transparency level you're claiming is

1 necessary to allow eelgrass to inhabit that system?

2 A. Uhm, I'm not sure.

3 Q. What do you mean you're not sure?

4 A. I'm not sure. There's a lot of factors.

5 Q. And you're telling me there's something else
6 in the Exeter discharge that's causing transparency
7 impacts?

8 A. Like I said, I am not sure. Eelgrass existed
9 in this system at some time in the past.

10 Q. What does that have to do with whether or not
11 the nitrogen is going to improve the transparency level?

12 A. Because the CDOM levels probably have not
13 changed. And if that's -- so one factor that has
14 changed is the nitrogen.

15 Q. Okay. Look, you're under oath,
16 Mr. Trowbridge. You've already testified I don't know
17 how many times that there's only four factors affecting
18 light transmission. Nitrogen is not one of those
19 factors; right? Nitrogen does not directly affect light
20 transmission; right?

21 A. Yeah. Nitrogen molecule does not directly
22 affect light transmission.

23 Q. Okay. So we've determined, from this graph,

1 and there are two more just like it, that it's
2 chlorophyll -- chlorophyll-a control in this system will
3 not allow the transparency level to be improved to where
4 it can support eelgrass; right?

5 A. I've already said that.

6 Q. Okay. So how is it that regulating nitrogen
7 from the Exeter discharge, which is almost all dissolved
8 inorganic, is going to bring this system into compliance
9 with the transparency levels you claim are needed for
10 eelgrass growth?

11 A. Give me a minute to think about this. I think
12 I go back to the fact that the criteria we use for our
13 assessments or the thresholds we use for our assessments
14 are based on a variety of different mechanisms in which
15 nitrogen affects eelgrass. It's different in different
16 parts of the estuary, and it's different at different
17 times. Light attenuation is one of those factors but
18 it's not the only one. Shallowing, and shallower areas
19 overcomes --

20 Q. Can you stop. You're not answering my
21 question. I'm asking about transparency. I'm not
22 asking about overgrowth of the macroalgae, I'm not
23 asking about toxicity of nitrogen, which you throw into

1 your CALM response. I'm asking about transparency. How
2 is controlling Exeter going to significantly improve the
3 transparency in the Squamscott River, based on this
4 graph?

5 A. Based on this graph, it would not.

6 Q. It's not. Thank you. Based on the Morrison
7 report you know CDOM is originating from the tidal
8 rivers; right?

9 A. Yes.

10 Q. Okay. Are the CDOM concentrations much higher
11 in the tidal rivers than they are in the bay?

12 A. Yes.

13 Q. They have to be, right, because that's where
14 they're coming from and they're not yet diluted into the
15 rest of the bay. Do you know if the tidal rivers tend
16 to be turbid because of the high exchange of saltwater
17 into the system?

18 A. Sometimes, yes.

19 Q. If the turbidity -- I'm sorry, if the poor
20 light levels in the Squamscott River are due to, one,
21 the CDOM coming down the system and, two, the turbidity
22 caused by the tidal exchange, isn't that a natural
23 condition, regardless of what the light transmission

1 level is in that system?

2 A. Correct; that's a natural condition. The
3 question I have is why was eelgrass there earlier.

4 Q. Well, you know, Mr. Trowbridge, that, to me,
5 is an extraordinarily interesting question. I think the
6 data for the -- wasn't the data on eelgrass being
7 present in the Squamscott, that was based on some
8 anecdotal chat that Fred Short had with a Mr. Chapman;
9 right?

10 A. No. It was based on maps made by a UNH
11 masters student who did a survey of the tidal rivers and
12 portions of Great Bay and portions of the Piscataqua
13 River.

14 Q. I'm thinking of the earlier one, the 1948
15 extent, I believe, was claimed to be based on a
16 discussion with Mr. Chapman?

17 A. No. The 1948 was the masters thesis that was
18 published by UNH.

19 Q. Is it conceivable that some kind of physical
20 conditions in the tidal rivers have changed since 1948?

21 A. I don't know.

22 Q. Do you know if they filled in at all?

23 A. Uhm, hard -- it's hard to say. Sediment

1 budgets is a complicated thing that we've been trying to
2 study.

3 Q. Okay. Do you know if any of the tidal rivers
4 have filled in? I thought a number of them had.

5 A. Well, the Oyster has had some sedimentation
6 issues because there's been discussions about dredging.

7 Q. Do you know if the level of the sea has
8 changed since 1948?

9 A. According to -- yes, it has changed, but I
10 don't know by how much.

11 Q. All right. So, but here's the point:
12 Regardless of why the eelgrass are not there at this
13 point in time, the transparency data shows it cannot
14 possibly support eelgrass at this time; right? That's
15 what this data indicates?

16 A. Uhm, at a -- yes. What that data indicates is
17 that at a two-meter restoration depth, that would be too
18 deep. So the question is, there maybe shallower areas
19 where it could survive. That's another way of looking
20 at it.

21 Q. Well, we don't have any eelgrass anywhere in
22 this system; right?

23 A. Correct.

1 Q. So if you can't fix this via nitrogen control,
2 why would it be considered a nitrogen-impaired system?
3 If my statement is true, if you can't fix it via
4 nitrogen control, that there's other factors that you
5 cannot change because they're naturally occurring at
6 this point, would it still be considered a
7 nitrogen-impaired system?

8 A. So you're asking if we were to do a new 303d
9 assessment and it was conclusively proven that the
10 eelgrass loss in this system was not due to nitrogen
11 would it still be impaired for nitrogen?

12 Q. Why would one have to conclusively prove
13 something's not caused by nitrogen when you know the
14 transparency is insufficient to allow eelgrass growth
15 regardless of the nitrogen controls put on the system?

16 A. I think we're mixing issues. There's the
17 issue of an assessment versus the issue of permitting.

18 Q. I'm talking about a narrative criteria
19 violation. If that transparency level is natural, can't
20 be controlled --

21 A. Oh, so you're talking about as naturally
22 occurs?

23 Q. Yeah.

1 A. In terms of the narrative standard of "as
2 naturally," if it was determined this was naturally
3 occurring, then it would not be an impairment.

4 Q. And there would be no point in regulating
5 nitrogen, right, because you wouldn't be able to change
6 it; right?

7 A. Yeah. That's not really our call, because we
8 don't write the permits, but the point would be -- the
9 question related to us is the "as naturally occurs"
10 clause of our standard.

11 Q. All right. I'm going to show you Exhibit 21
12 from Fred Short, Fred Short's deposition, Lamprey River.
13 Does this, in Lamprey River, with Kd versus transparency
14 level versus nitrogen -- I'm sorry, versus
15 chlorophyll-a, does this data show a similar pattern as
16 the Squamscott River, that transparency levels are poor
17 in this system even at very low levels of chlorophyll-a
18 content?

19 A. For the most part; yes.

20 Q. So will regulating nitrogen to control
21 chlorophyll-a in this system ensure that the
22 transparency level is achieved in the Lamprey River?
23 When I say "transparency level," that's the level

1 necessary to support eelgrass?

2 A. Based on this data, no.

3 Q. Okay. Do you have -- oh, this is -- when we
4 say "this data," this is data that came out of your
5 system.

6 Do you know if there's any, any data that
7 shows, for the Lamprey River, that nitrogen control can
8 assure a sufficient transparency level is attained to
9 allow eelgrass to be restored?

10 A. And you're talking about data from the Lamprey
11 River?

12 Q. Oh, yeah.

13 A. Uhm, sorry. Can you say the question again,
14 please?

15 MR. HALL: Could you repeat that back,
16 please?

17 (Record read as requested.)

18 A. All right. So I think what you're asking is:
19 Are there any other data besides these?

20 Q. Data or analyses that show you control
21 nitrogen, you're going to fix that transparency problem,
22 transparency issue in the Lamprey River?

23 A. The answer is I don't believe so. It's the

1 same issue as with the Squamscott.

2 Q. Okay. Could I have both of those back,
3 please? And I just want to say, shock of shocks, we've
4 got one more of these which is the Upper Piscataqua
5 River. This is Fred Short Exhibit 22.

6 A. Yes.

7 Q. I bring your attention to two things. First,
8 look at chlorophyll-a levels, annual median, in the
9 Piscataqua River, Upper Piscataqua. Does that level of
10 chlorophyll-a occurring in the Upper Piscataqua indicate
11 to you that there's cultural eutrophication occurring in
12 the Piscataqua?

13 A. We haven't defined cultural eutrophication in
14 terms of chlorophyll-a level.

15 Q. That's a pretty low chlorophyll-a level,
16 though; right? I mean, it's -- other than there's 2003
17 data that average above five, the rest of the time we're
18 in the one and a half to three range. That's not much
19 chlorophyll growth, is it?

20 A. As an annual median, yeah. I don't know what
21 the individual points look like here.

22 Q. But your transparency criteria is based on
23 annual median considerations; right?

1 A. Yes.

2 Q. Okay. Look at the Kd chart right below there,
3 same thing. Kd measurements. Do those, from this
4 chart, do they indicate that they're significantly
5 affected by the chlorophyll-a level in the Upper
6 Piscataqua River?

7 A. They're not well-correlated.

8 Q. There's a minimal impact; right?

9 A. Uhm, based on this analysis; yes.

10 Q. Okay. That's the same conclusion that the
11 Morrison report came to, right; that chlorophyll had a
12 minimal impact on the water transparency, right?

13 A. Well, it had a -- it said it was a smaller
14 factor. It didn't say minimum, I don't think.

15 Q. I think somewhere around 12 percent is, I
16 think, what Morrison had; right?

17 A. Somewhere around there.

18 Q. Okay. Does this data indicate that if you
19 regulate nitrogen to control chlorophyll-a you will meet
20 the transparency target that is being applied to the
21 Upper Piscataqua River?

22 A. Not based on this analysis.

23 Q. By the way, look at 2006. Did the

1 transparency get worse after 2006? Got particularly bad
2 that year.

3 A. In 2006 or in 2007?

4 Q. I think the high bar is associated with 2006.

5 A. It is, okay. It's kind of labeled in a funny
6 way.

7 Q. And that coincides with the -- that poorer
8 transparency, at least at this location, coincides with
9 the higher rainfall levels in 2006; right?

10 A. Uhm, I believe 2006 was one of the flood
11 years.

12 Q. Wasn't the Mother's Day flood, didn't that
13 happen in 2006?

14 A. I think so.

15 Q. Do you think that could have had a significant
16 impact on the eelgrass beds everywhere in the system,
17 given how large the flood was, how much debris and
18 material are brought down into the system?

19 A. It could have had an impact.

20 Q. Can I have that one back, please?

21 (Handing.)

22 MR. HALL: Thank you. Do you mind if we
23 take a two-minute break?

1 (Recess.)

2 BY MR. HALL:

3 Q. Mr. Trowbridge, I've got a few more questions
4 about the 2009 criteria document, and then ask you some
5 weight-of-evidence questions, hopefully, and then we
6 will go on from there. That should be pretty much
7 closing.

8 2009 criteria document that you developed,
9 that's a -- you said you used a weight-of-evidence
10 analysis to come up with the criteria in that report;
11 right?

12 A. Yes.

13 Q. Did you include in that report the evidence
14 that indicated that transparency was not the cause of
15 eelgrass loss in the system that you had developed in
16 any of your earlier analyses?

17 A. What are you referring to for an earlier
18 analysis?

19 Q. That transparency, or analysis of transparency
20 had not changed over time; was that included anywhere in
21 that report?

22 A. No.

23 Q. What about all the statements that Great Bay

1 is not a transparency-controlled system, from EPA and
2 Dr. Short, and those are the ones you and I walked
3 through in your first round of the deposition. Did you
4 include the statements that Great Bay was not
5 transparency-controlled?

6 A. I'm not sure; I don't believe so.

7 Q. Okay. What about the -- did you include the
8 statements that the cause of eelgrass losses and changes
9 in the system were unknown, statements that were
10 contained in the various 303d listing documents?

11 A. Uhm, I have to look through. I'm not sure.
12 I'm not seeing it here.

13 Q. Did you include any of Morrison's conclusions
14 that the major factors controlling transparency in the
15 system were, in fact, turbidity and color-dissolved
16 organic matter, and not chlorophyll?

17 A. I believe we included equations from the
18 Morrison study.

19 Q. Did you highlight the Morrison study concluded
20 that the transparency level of Great Bay was acceptable,
21 and that you needed to look at something else as the
22 cause of eelgrass demise?

23 A. I'm not sure if we have that statement in

1 here.

2 Q. It's a pretty important statement, isn't it?
3 It made your report.

4 Did you -- well, did you include any
5 discussion about how the primary graphs that you were
6 using to develop the transparency and nitrogen
7 relationships were merely correlations and did not
8 demonstrate causation?

9 A. I don't believe so.

10 Q. Actually, let me ask you a quick question on
11 that. With regard to the low DO relationship to
12 chlorophyll-a, and your transparency relationship to
13 total nitrogen, both of those graphs are just
14 correlations, right; they do not show causation?

15 A. That is correct.

16 Q. Is there anywhere in that document that you
17 assessed the other factors, other confounding factors
18 that impact the DO regime, such as sediment, oxygen
19 demand, river flow, low DO coming in from swamp areas?
20 Did you assess that anywhere in this analysis?

21 A. No.

22 Q. What about the factors that are controllable
23 in tidal rivers; did you assess whether or not CDOM,

1 turbidity or any of the other factors that are
2 significantly influencing the transparency level in the
3 tidal rivers, is there any assessment of that anywhere
4 in that document?

5 A. Uhm, can you clarify? Assessment of what?

6 Q. Of how those factors influence and control
7 transparency in the tidal rivers?

8 A. So in the tidal rivers specifically.

9 Q. In the tidal rivers specifically.

10 A. No.

11 Q. Is there any assessment about how the change
12 in rainfall patterns could have influenced the eelgrass
13 losses or the transparency occurring in the system
14 anywhere in that document?

15 A. Sorry. You said rainfall and what?

16 Q. Just how rainfall patterns influenced
17 transparency in eelgrass populations in the system?

18 A. I don't believe so.

19 Q. Okay. Does that report include any of the
20 case-specific analyses you did and evaluations that
21 confirmed TN did not cause any excessive algal growth in
22 the system or alter transparency in the system over
23 time?

1 identification.)

2

3 Q. Mr. Trowbridge, are you familiar with this
4 document?

5 A. Yes.

6 Q. Okay. Oh, I need to ask you, before I get
7 into this document, I just need to ask you one question
8 about application of the 2009 criteria, how you apply
9 them from a regulatory perspective.

10 The 2009 criteria, they represent some type of
11 long-term annual average or median conditions that need
12 to be attained; correct? I'm talking about transparency
13 and nitrogen.

14 A. And you're referring, when you talk about
15 "apply," are you talking about use in the CALM or 303d
16 assessments?

17 Q. Yeah.

18 A. So the question is what is the metric we use?

19 Q. No. Those are long-term annual average levels
20 that you're trying to attain; right?

21 A. Yes. It's actually medians.

22 Q. Medians. Is it appropriate to mandate
23 compliance of those criteria under one-in-ten-year job

1 flow conditions?

2 MR. MULHOLLAND: Objection.

3 A. I'm sorry, I'm not understanding.

4 Q. When you develop wasteload allocation, which
5 you did in 2009, was it -- was that analysis developed
6 to achieve compliance with those numeric criteria under
7 once-in-ten-year low flow conditions?

8 A. Like 7Q10?

9 Q. Yeah, like 7Q10.

10 A. So, was that -- I'm sorry. Are you asking did
11 we do the analysis for 7Q10 or was it appropriate to do
12 it when it's not 7Q10?

13 Q. Is it appropriate to apply that number at a
14 7Q10 condition?

15 A. We only apply this number in our CALM for
16 assessments, and we did that nitrogen loading analysis
17 to provide some general information about loading
18 thresholds. It was not, like, a wasteload allocation
19 for permitting.

20 Q. I'm asking you a technical question. For a
21 wasteload allocation for permitting, is it appropriate
22 to apply those criteria to mandate compliance under
23 7Q -- once-in-ten-year low flow conditions?

1 A. I don't know because I'm not a permit writer.

2 Q. I'm asking a technical question. From a
3 scientific perspective, is that the appropriate
4 condition under which to apply the criteria?

5 A. I'm having trouble with it because we use the
6 criteria, we look backwards at the last five years of
7 data. And I don't --

8 Q. Look, Mr. Trowbridge. You spent a year and a
9 half doing a wasteload allocation report. You came up
10 with recommended nitrogen load reductions for point
11 sources and nonpoint sources, correct, in that document?

12 A. Yes; in that document.

13 Q. When you derived and developed that document,
14 did you set those wasteload allocations based on
15 one-in-ten-year low flow conditions; yes or no?

16 A. No, we did not.

17 Q. Next question: Do you think it's
18 scientifically proper to apply the long-term annual
19 average median criteria from that 2009 document under
20 7Q10 conditions?

21 MR. MULHOLLAND: Objection. Apply to
22 what? That's totally vague.

23 MR. HALL: No. He knows the answer to

1 the question because it's a regulatory question that
2 gets applied in the state all the time.

3 A. Right. But we don't do -- I mean, I think
4 I'm -- we don't do the permits. So --

5 Q. I didn't ask if you did the permit, I asked
6 you whether or not you knew it was technically proper to
7 do that?

8 A. I don't know, because I haven't done that.

9 Q. Is it proper to apply these criteria inside a
10 mixing zone?

11 MR. MULHOLLAND: Objection. Apply to
12 what? It's a vague question. Objection to form.

13 A. Inside a mixing zone?

14 Q. To derive permit requirements?

15 A. This really is not my area of expertise. I'm
16 not a permit writer.

17 Q. All right. Simple question: Can the
18 nutrients in the discharge that's being regulated cause
19 a significant transparency impact in a mixing zone; yes
20 or no?

21 MR. MULHOLLAND: If you know.

22 THE WITNESS: Yeah. I don't know.

23 Q. You don't know the answer to that question?

1 A. I'm not quite understanding the question. I
2 mean, are we talking about a big mixing zone, little
3 mixing zone? I don't -- what are you asking --

4 Q. The mixing zones that are being used for the
5 Exeter and Lamprey River, which are small.

6 A. Okay.

7 Q. Is it proper to -- it -- will the nitrogen
8 cause an impact within the mixing zone, impacting
9 transparency; yes or no?

10 A. I'm not sure, but I don't believe so.

11 Q. Okay. Let's talk about this multiple line of
12 evidence chart.

13 Do you recall developing this document?

14 A. Yes.

15 Q. Okay. Multiple lines of evidence, is this the
16 same approach that was used to develop the 2009
17 criteria?

18 A. Uhm, it's similar. It's a little bit expanded
19 from what we had in the 2009 document.

20 Q. Okay. I'd like you to draw your attention to
21 the third bullet that says, "Literature review for
22 macroalgae proliferation."

23 A. Oh, okay. This one.

1 Q. You're saying that a -- this document is
2 saying that DES has determined that a .3, something in
3 the range of a .3 total nitrogen level is necessary to
4 control macroalgae?

5 A. That was the information we had in a draft
6 document. It's -- and it was included on this graph.

7 Q. Oh, so that's just the information from the
8 draft document?

9 A. Correct.

10 Q. Okay. So you've not rendered -- the DES
11 hasn't rendered any final decision that you have to have
12 a .3 total nitrogen to control macroalgae; right?

13 A. Right.

14 Q. Okay. Do any of the values plotted in the
15 data plotted on this graph provide a basis for
16 concluding that the nitrogen -- that the cause of
17 eelgrass loss in Great Bay was transparency?

18 A. No.

19 Q. Okay. I don't have any further questions on
20 that.

21 I'll just ask one last question, and it's
22 related to the CALM analysis. Do you have the CALM
23 analysis?

1 A. Which one?

2 Q. Uhm, oh, I'm sorry. The CALM Response to
3 Comments?

4 A. Yes.

5 Q. And that would be Trowbridge Exhibit 59.

6 I'd like to draw your attention to page 12 of
7 16 where you've got those three charts on factors
8 affecting light attenuation. The chart in the middle,
9 you're indicating that color -- based on this chart,
10 you're indicating that color-dissolved organic matter is
11 less important than other factors affecting light
12 attenuation in the Great Bay system; right?

13 A. Yes.

14 Q. Does that chart use the same data that the
15 charts above it and below do?

16 A. They -- each of these charts was made with all
17 of the available data for each of the parameters. So
18 they're a little different, but there is a lot of
19 overlap.

20 Q. So the answer is no, it doesn't use the same
21 data?

22 A. Right. The answer is no.

23 Q. Okay.

1 A. Just explaining why "no."

2 Q. Do you know that the data set used in that
3 middle chart is, primarily from 2010 during August and
4 September?

5 A. I just used all of the measurements that we
6 had that had both Kd and CDOM.

7 Q. So you didn't actually check when the data was
8 collected?

9 A. I know it was collected between 2003 and 2010.

10 Q. Okay. Did you know that the data that was
11 presented in that chart was from a period when CDOM
12 influences on the system were minimal, based on your
13 long-term recording in this system?

14 A. I'm not aware of that. I'd have to look at
15 the data.

16 Q. Okay. So you really didn't check the data
17 very carefully before you came up with this analysis to
18 conclude CDOM is not the major component you thought it
19 was?

20 MR. MULHOLLAND: Objection.

21 Q. Based on prior studies?

22 MR. MULHOLLAND: Objection. That
23 mischaracterizes what he said.

1 A. In this analysis we used all of the data we
2 had.

3 Q. Again, you did not -- it's not the same data
4 sets on the two different -- on the three different
5 charts, and you didn't check the time periods from which
6 the data were being pulled; right?

7 A. It's not the same data sets because we're
8 trying to use all of the cases where you had the two
9 variables for the regressions. So we were trying to be
10 inclusive of all data, and we just pulled all of the
11 data that we had.

12 Q. Okay. You'll notice that your light
13 attenuation readings are much lower in your middle chart
14 of the figures, correct, than they are in the other
15 ones?

16 A. Yes.

17 Q. Wouldn't that mean that they are mainly from
18 the bay and not from the tidal rivers? Or did you not
19 check that?

20 A. We did not check that.

21 MR. HALL: Okay. I don't have any
22 further questions. Do you have anything else, guys?

23 MR. KINDER: No.

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MR. LUCIC: No.

MR. SERELL: No. I think we're good.

(Thereupon, the deposition was concluded at
3:50 p.m.)

C E R T I F I C A T E

I, Cheryl B. Palanchian, a Certified Shorthand Reporter and Notary Public of the State of New Hampshire, do hereby certify that the foregoing is a true and accurate transcript of the testimony of Philip Trowbridge, who was by me duly sworn, taken at the place and on the date hereinbefore set forth and under the conditions present.

I further certify that I am neither attorney or counsel for, nor related to or employed by any of the parties to the action in which this deposition was taken, and further that I am not a relative or employee of any attorney or counsel employed in this case, nor am I financially interested in this action.

THE FOREGOING CERTIFICATION OF THIS TRANSCRIPT DOES NOT APPLY TO ANY REPRODUCTION OF THE SAME BY ANY MEANS UNLESS UNDER THE DIRECT CONTROL AND/OR DIRECTION OF THE CERTIFYING COURT REPORTER.



Cheryl B. Palanchian
Certified Shorthand Reporter
Registered Professional Reporter
Registered Merit Reporter
Certified Realtime Reporter
NH LCR No. 60

E R R A T A S H E E T

IN RE: City of Dover, et al v. State of NH, et al
Court Reporter: Cheryl B. Palanchian
DEPOSITION OF: Philip Trowbridge
TAKEN: 7/11/12

DO NOT WRITE ON TRANSCRIPT - ENTER CHANGES HERE

PAGE #	LINE #	CHANGE	REASON

Deponent

THE STATE OF _____
COUNTY OF _____, SS.

Subscribed and sworn to before me this
_____ day of _____, 20__.

Justice of the Peace/Notary Public
My Commission expires:_____

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2 PAGES: 245-452

3 STATE OF NEW HAMPSHIRE
4 MERRIMACK, SS. SUPERIOR COURT

5

6 * * * * *

7 CITY OF DOVER, TOWN OF EXETER,
8 TOWN OF NEWMARKET, CITY OF
9 PORTSMOUTH, and CITY OF
10 ROCHESTER

11 v. 217-2012-CV-212

12 STATE OF NEW HAMPSHIRE and NEW
13 HAMPSHIRE DEPARTMENT OF
14 ENVIRONMENTAL SERVICES

15 * * * * *

16 DEPOSITION OF PHILIP TROWBRIDGE

17 This deposition taken at the offices
18 of Sheehan, Phinney, Bass & Green, 1000 Elm Street,
19 Manchester, New Hampshire, on Wednesday, July 11,
20 2012, commencing at 9:00 a.m.

21

22 CONNELLY REPORTING & VIDEO SERVICES
23 32 Gault Road
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22 STIPULATIONS

23 It is agreed that the deposition shall
be taken in the first instance in stenotype
and when transcribed may be used for all
purposes for which depositions are competent
under New Hampshire practice.
Notice, filing, caption and all other
formalities are waived. All objections
except as to form are reserved and may be
taken in court at time of trial.
It is further agreed that if the
deposition is not signed within thirty (30)
days after submission to counsel, the
signature of the deponent is waived.

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2 Witness:
3 Philip Trowbridge

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1 PHILIP TROWBRIDGE,
 2 having first been duly sworn by the court reporter, was
 3 deposed and testified as follows:
 4 EXAMINATION
 5 BY MR. HALL:
 6 **Q. This is the continuation of the deposition of**
 7 **Philip Trowbridge.**
 8 **Mr. Trowbridge, good day. Could you, again,**
 9 **just please state your full name, for the record?**
 10 A. Yes. Philip Trowbridge.
 11 **Q. And, Mr. Trowbridge, did you get an**
 12 **opportunity to read your deposition transcript since our**
 13 **last deposition?**
 14 A. I received the transcript. I reviewed some of
 15 it.
 16 **Q. Okay. Did you get an opportunity to read Fred**
 17 **Short's deposition transcript?**
 18 A. Again, I received it. I haven't read the
 19 whole thing.
 20 **Q. You've read some of it?**
 21 A. A few pages; yes.
 22 **Q. Okay. But what about Mr. Diers' deposition,**
 23 **did you take a look at that?**

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1 A. Again, the same. I did look, review some of
 2 it, but not all.
 3 **Q. Okay. And lastly, Mr. Currier's; did you get**
 4 **a chance to look at Paul Currier's deposition?**
 5 A. I received it. I don't think I read any of
 6 it.
 7 **Q. Okay. All right. Did your attorney, since**
 8 **the last deposition, discuss with you the need to fully**
 9 **and completely respond to the questions presented?**
 10 MR. MULHOLLAND: Objection. What I told
 11 him is privileged. He can't answer that.
 12 **Q. Okay. Okay. Well, let's see if we can just**
 13 **start, Mr. Trowbridge. I'm going to kind of go back**
 14 **over some of the things that we covered in the last**
 15 **deposition because we had a lot of back and forth, and**
 16 **sometimes it's a little bit to get things out on paper.**
 17 **So most of these should be fairly straightforward**
 18 **questions, and I hope you wouldn't have any difficulty**
 19 **or complications in answering them.**
 20 **All right. Are you the primary technical**
 21 **staff person for both PREP and DES regarding the**
 22 **evaluation of Great Bay scientific issues?**
 23 A. Yes.

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1 **Q. Is there -- do you have any other assistants**
 2 **at PREP or DES that provide you help on completing those**
 3 **scientific analyses for Great Bay?**
 4 A. Yes.
 5 **Q. Okay. Could you just tell me who their names**
 6 **are?**
 7 A. At PREP, I'm assisted by Derek Sowers, and the
 8 director, who is currently Rachel Rouillard, previously
 9 Jennifer Hunter, before that Cynthia Lay.
 10 **Q. And at DES, with regard to the analysis of**
 11 **technical issues for Great Bay, who at DES assists you**
 12 **in, you know, preparing your analyses?**
 13 A. At DES there's a number of people. We work as
 14 a group. Primary people would be Ken Edwardson, Matthew
 15 Wood, Ted Diers. Before that, Paul Currier, and like I
 16 said, there's other people in the bureau who help out,
 17 as needed, on different things, but I think to name them
 18 all would be kind of counterproductive.
 19 **Q. We don't need to do that. Just trying to get**
 20 **an idea of who you work with on these issues.**
 21 **We're going to -- with regard to nutrient**
 22 **criteria, you've been involved in the nutrient criteria**
 23 **development process for Great Bay for a number of years;**

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1 **correct?**
 2 A. Yes.
 3 **Q. I'd just like to show you a couple documents.**
 4 **I think we're up to Exhibit 73. This is an e-mail from**
 5 **you to a group of people dated December 21st, 2007.**
 6 **It's attaches a meeting agenda and some handouts. Do**
 7 **you recognize that exhibit?**
 8 A. Yes.
 9 **Q. Can you tell me what the content of the**
 10 **exhibit is?**
 11 A. Well, the first page is a e-mail that -- it
 12 has the agenda or has a link to an agenda, and
 13 presentations from a meeting of the NHEP Technical
 14 Advisory Committee. And the attachment must have been
 15 one of the handouts from the meeting.
 16 **Q. Okay. But what is the attachment?**
 17 A. The top of the attachment says, "Options for
 18 Developing Numeric Nutrient Criteria for New Hampshire's
 19 Estuaries."
 20 **Q. Did you develop this attachment?**
 21 A. Yes. But it was a long time ago.
 22 **Q. And the -- so within this attachment you're**
 23 **looking at different ways to come up with nutrient**

<p style="text-align: right;">253</p> <p>1 criteria for Great Bay; correct?</p> <p>2 A. Right. This is a list of options that we</p> <p>3 thought might work at the time.</p> <p>4 Q. Can you tell me which option was eventually</p> <p>5 selected for the development of the nutrient criteria?</p> <p>6 Is it on this list; do you know?</p> <p>7 A. Let me think. This was -- I need a few</p> <p>8 minutes to look at this.</p> <p>9 Q. I'm just looking in terms of major, major</p> <p>10 headings, like the, "Develop a long-term trend of</p> <p>11 nitrogen and sediment loads and compare them to trends</p> <p>12 in eelgrass." Was that option used?</p> <p>13 A. Let me just review the options.</p> <p>14 Q. I'm sorry, go ahead. While you're looking,</p> <p>15 we'll have that marked as Exhibit 73.</p> <p>16</p> <p>17 (Trowbridge Exhibit 73 marked for</p> <p>18 identification.)</p> <p>19 A. So are you asking is there a specific option</p> <p>20 that we chose? Because some of the elements of these</p> <p>21 options were included in the final report, but not any</p> <p>22 one exclusively.</p> <p>23 Q. Okay. That's fine. I don't have any further</p>	<p style="text-align: right;">255</p> <p>1 questions, you say, "I agree much of what you said" --</p> <p>2 "I agree with much of what you have said but I have some</p> <p>3 questions." And then you go on. And within quotes at</p> <p>4 the top, can you read the -- it says "nitrogen," a quote</p> <p>5 that starts "nitrogen plays." Can you read that for us?</p> <p>6 A. The quote says, "Nitrogen plays a significant</p> <p>7 role (both direct and indirect) on in the demise of</p> <p>8 eelgrass (particularly in the deeper sub-estuaries.)"</p> <p>9 Q. Do you know if that, if at this time DES had</p> <p>10 determined that nitrogen actually was the cause of</p> <p>11 eelgrass declines in the system or is this -- where did</p> <p>12 this statement come from?</p> <p>13 A. I guess I don't really know where that</p> <p>14 statement came from in this e-mail. I can't tell if I'm</p> <p>15 quoting from someone else's e-mail or what.</p> <p>16 Q. Do you, to your knowledge, do you know if</p> <p>17 anybody for the Great Bay has ever demonstrated that</p> <p>18 nitrogen played a -- is playing a significant role in</p> <p>19 the demise of eelgrass in the system?</p> <p>20 A. Well, I'd say that there's been some studies</p> <p>21 done at Jackson Lab that show that nitrogen affects</p> <p>22 eelgrass growth in mesocosms.</p> <p>23 Q. Again, this is why you have to listen</p>
<p style="text-align: right;">254</p> <p>1 questions on that exhibit.</p> <p>2 There's another follow-up e-mail, it's dated</p> <p>3 January 18th. Let's see, this one was December 7th,</p> <p>4 2007, this one's January 18th, 2008. It's an e-mail</p> <p>5 from you to Jim Latimer, Fred Short, Jennifer Hunter,</p> <p>6 Phil Colarusso, regarding nitrogen criteria. And do you</p> <p>7 recall this e-mail related to nutrient criteria</p> <p>8 development?</p> <p>9 A. Did we discuss this e-mail at the last</p> <p>10 deposition?</p> <p>11 Q. Uhm, I believe we had a -- we had this e-mail</p> <p>12 in for other reasons.</p> <p>13 A. I'm just trying to understand whether we've</p> <p>14 already looked at it or not.</p> <p>15 Q. We did. It was, I forget which exhibit</p> <p>16 number, but I know it was something that we looked at.</p> <p>17 A. Okay. So then since we've already talked</p> <p>18 about it, I mean, yes, I recall it.</p> <p>19 Q. Can you look under number one. I'm trying to</p> <p>20 understand the nutrient criteria development process.</p> <p>21 You're providing -- it looks to me like you're providing</p> <p>22 comments back to some earlier -- some observations that</p> <p>23 are being made by others. You were presenting some</p>	<p style="text-align: right;">256</p> <p>1 carefully to the question. I know there's mesocosm</p> <p>2 studies. I'm saying in this system, where the eelgrass</p> <p>3 had been lost, has anybody presented you with a</p> <p>4 demonstration that nitrogen was the cause of the</p> <p>5 eelgrass loss?</p> <p>6 A. Uhm, the only way to prove that one way or the</p> <p>7 other conclusively is to have multiple Great Bays that</p> <p>8 you experiment on with nitrogen. So we rely on</p> <p>9 information from mesocosm studies and also studies from</p> <p>10 other systems that have looked at eelgrass loss related</p> <p>11 to nitrogen.</p> <p>12 Q. Okay.</p> <p>13 A. I don't know how you would prove one thing --</p> <p>14 something one way or the other at a specific location if</p> <p>15 you can't conduct some kind of laboratory experiment on</p> <p>16 it.</p> <p>17 Q. Okay. This is back to the question, the point</p> <p>18 of answering the question. I'm asking you whether or</p> <p>19 not in this system anybody has provided you a</p> <p>20 demonstration that nitrogen is the cause of the change</p> <p>21 in eelgrass populations?</p> <p>22 MR. MULHOLLAND: I object to that</p> <p>23 question. He just answered it the best he could.</p>

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1 Because you don't like the answer doesn't give you the
 2 right to keep asking the same question again and again.
 3 MR. KINDER: That's incorrect.
 4 MR. MULHOLLAND: I have a case for that,
 5 if you like.
 6 MR. HALL: He did not answer the
 7 question.
 8 MR. KINDER: He can answer the question
 9 and explain his answer. He can say yes or no, but in
 10 his opinion, you know. That's what he said.
 11 MR. MULHOLLAND: He answered the
 12 question.
 13 MR. KINDER: No, he didn't answer it.
 14 MR. MULHOLLAND: He answered the
 15 question.
 16 MR. KINDER: I think he's entitled to a
 17 yes-or-no answer.
 18 MR. MULHOLLAND: I disagree. I'm going
 19 to instruct him not to answer that question. He already
 20 did.
 21 MR. KINDER: All right. Then let's call
 22 the judge.
 23 (Discussion held off the record.)

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1
 2 (Trowbridge Exhibit 74 marked for
 3 identification.
 4 BY MR. HALL:
 5 Q. Mr. Trowbridge, if Dr. Short has indicated to
 6 us that he has not completed studies showing nitrogen
 7 caused the loss of eelgrass anywhere in the system,
 8 would you have any other information other than what
 9 Dr. Short may have provided to you or to us?
 10 A. Maybe information from Dr. Mathieson.
 11 Q. Dr. Mathieson completed studies showing
 12 nitrogen caused eelgrass losses in Great Bay?
 13 A. He's provided information about nitrogen
 14 causing macroalgae, which affects eelgrass.
 15 Q. I didn't ask that question. I asked whether
 16 Dr. Mathieson provided you studies showing nitrogen
 17 caused eelgrass losses in Great Bay; yes or no?
 18 A. Can I ask a clarifying question? When you're
 19 talking about nitrogen impact, are you talking about
 20 direct effects of just the nitrogen without its effect
 21 only anything else, just nitrogen alone affecting
 22 eelgrass? Or nitrogen affecting something else, like
 23 macroalgae, that affects eelgrass?

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1 **Q. In any manner, form, any way that**
 2 **Dr. Mathieson gave you data or gave you an analysis that**
 3 **showed the increase in nitrogen in the system caused**
 4 **eelgrass declines, direct or indirect?**
 5 A. We've just received comments from
 6 Dr. Mathieson on our 303d list talking about how
 7 increases in nitrogen have caused increases of
 8 macroalgae, which affect eelgrass. So I guess the
 9 answer would be yes.
 10 **Q. Do you know that we covered that exact**
 11 **document in your last deposition and I asked you whether**
 12 **or not that document confirmed macroalgae caused**
 13 **eelgrass losses and you said no, it didn't? Do you**
 14 **want -- would you like to change your answer or am I**
 15 **going to have to certify that -- would you like to alter**
 16 **your answer?**
 17 MR. MULHOLLAND: Which answer?
 18 MR. HALL: That Dr. Mathieson's comments
 19 have confirmed that nitrogen caused eelgrass losses in
 20 Great Bay by stimulating macroalgae?
 21 A. I'm just reporting what his thing said to us.
 22 It's his report. It's not --
 23 **Q. That's what you believe his report said to**

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1 **you?**
 2 A. Well, maybe we should look at his report. Do
 3 you have it?
 4 **Q. This is Exhibit --**
 5 MR. MULHOLLAND: Sixty-three.
 6 **Q. -- 63.**
 7 **Do you want to tell me where in that document**
 8 **it confirms nitrogen caused macroalgae changes which**
 9 **caused eelgrass losses in Great Bay?**
 10 A. Well, here's one section. It's the first
 11 bullet, bullet number 1. It says -- I'll read it
 12 slowly.
 13 MR. SERELL: Are you on a certain page
 14 number? I'm sorry.
 15 THE WITNESS: I'm on the first page.
 16 Extensive ovoid green algae, Ulva species, or
 17 green tides have begun to dominate many of these
 18 estuarine areas during the past 15 to 20 years,
 19 particularly within Great Bay proper, which is the
 20 citation for Nettleton, et al, 2011. Such massive
 21 blooms of foliose green algae can entangle, smother and
 22 cause the death of eelgrass.
 23 **Q. Hold it. Stop right there. Can entangle.**

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1 **Does it say did entangle, have entangled? It says can.**
 2 **Are you telling me that statement says eelgrass demise**
 3 **has been caused by macroalgae growth in Great Bay?**
 4 MR. MULHOLLAND: Could I have a second
 5 with my witness? Could we a short break? Thirty
 6 seconds.
 7 (Recess.)
 8 MR. MULHOLLAND: Thank you.
 9 MR. HALL: Okay. Could you read back my
 10 question and would you please answer it?
 11 (Record read as requested.)
 12 MR. MULHOLLAND: That's a yes-or-no
 13 question.
 14 THE WITNESS: I'm sorry, I was going to
 15 answer differently. Can you read it back again? Sorry.
 16 (Record read as requested.)
 17 MR. MULHOLLAND: Objection; compound.
 18 THE WITNESS: Yes. No, it does not -- it
 19 says "can entangle," it does not say that it did
 20 entangle. It does not prove causation.
 21 BY MR. HALL:
 22 **Q. So this document does not provide a basis for**
 23 **concluding that macroalgae have caused eelgrass losses**

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1 **in Great Bay; correct?**
 2 A. Correct.
 3 **Q. Okay. Enough. Let's stop there.**
 4 **Now, a moment ago you mentioned something**
 5 **about needing to do -- looking at studies from other**
 6 **estuaries to see what caused eelgrass loss; correct?**
 7 A. Yes.
 8 **Q. Okay. Those other studies, in other**
 9 **estuaries, they have confirmed, they have analyzed that**
 10 **certain water quality caused eelgrass losses; correct?**
 11 **I mean, how could those studies have concluded that the**
 12 **water quality caused eelgrass loss? They must have done**
 13 **something to evaluate that; right?**
 14 A. Yes.
 15 **Q. Okay. Was that same evaluation done for Great**
 16 **Bay?**
 17 A. Uhm, I would say the evaluations done in some
 18 of these other studies, just observational, that if you
 19 have areas of eelgrass that are completely smothered by
 20 macroalgae, then that is the cause of the eelgrass loss.
 21 So I think we have done some of those observations in
 22 Great Bay. Just not, maybe, to the same degree in some
 23 areas.

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1 **Q. Usually in these other studies you look for**
 2 **some type of changing water quality parameter; right?**
 3 **Something that's changing that causes an impact; right?**
 4 MR. MULHOLLAND: Objection. I don't know
 5 if you've established which studies we're talking about.
 6 MR. HALL: Well --
 7 MR. MULHOLLAND: In the other studies --
 8 MR. HALL: I have no idea. He's the one
 9 that said there were other studies.
 10 **Q. What other studies are we talking about,**
 11 **Mr. Trowbridge?**
 12 A. One of the places that we've used papers from
 13 is Waquoit Bay in Cape Cod.
 14 **Q. And in that bay there were certain things that**
 15 **changed that caused the eelgrass loss; right? They went**
 16 **and documented certain impacts?**
 17 A. Right. I don't remember exactly, but there
 18 were studies of changes; yes.
 19 **Q. Within the e-mails that you've received from**
 20 **Dr. Short and others, didn't they expressly tell you**
 21 **that the kind of effects they saw in Waquoit Bay they**
 22 **did not find in Great Bay?**
 23 A. Is that in this e-mail?

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1 **Q. No. Don't -- well, I'll ask you the question:**
 2 **Haven't you received e-mails that said the kind of**
 3 **effects that they're finding in Waquoit Bay they are not**
 4 **finding in Great Bay?**
 5 A. I'm not sure. I'd have to see the e-mails.
 6 **Q. Okay. And if there was an e-mail that said**
 7 **that, then the Waquoit Bay studies wouldn't apply to**
 8 **Great Bay, now, would they?**
 9 A. I'm sorry. I just -- I have to understand the
 10 context of the e-mail in the question.
 11 **Q. All right. Let me -- let's go back over that**
 12 **again.**
 13 **My understanding is that you have e-mails that**
 14 **expressly say the kind of impacts from macroalgae growth**
 15 **occurring in Waquoit Bay you're not finding in Great**
 16 **Bay. You have no recollection of receiving that e-mail?**
 17 A. No. Do you have a document --
 18 **Q. Let me have -- no, this.**
 19 (Handing.)
 20 (Counsel conferred with the witness.)
 21 **Q. It's Trowbridge Exhibit 58, from Fred Short to**
 22 **Phil Trowbridge, and I quote, "Since we have not found**
 23 **any areas of nuisance macroalgae overgrowing eelgrass**

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1 **beds, as we have documented in places like Waquoit Bay,**
 2 **Massachusetts, the results of our analysis are only**
 3 **applicable where nuisance macroalgae have proliferated**
 4 **to the extent it prevents the reestablishment of**
 5 **eelgrass from seed."**
 6 **Okay. You received that e-mail from Fred**
 7 **Short. Now, do you want to tell me that the -- this**
 8 **data in Great Bay showing macroalgae have caused**
 9 **eelgrass demise, and that you can base that on the**
 10 **Waquoit Bay experience?**
 11 A. You want me -- there's two questions there.
 12 **Q. Okay. Let's take it in pieces. Does this**
 13 **e-mail indicate that there's information for Great Bay**
 14 **confirming macroalgae are smothering eelgrass and**
 15 **causing the demise?**
 16 A. No. This e-mail written in 2007 does not
 17 confirm that.
 18 **Q. And that's from Fred Short?**
 19 A. Right.
 20 **Q. Would you have any basis to disagree with that**
 21 **answer -- with what Fred Short has told you?**
 22 MR. MULHOLLAND: Objection; it's unclear.
 23 Would he disagree then or disagree now?

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1 **Q. Do you have any basis to disagree either then**
 2 **or now with what Fred Short has told you?**
 3 A. Uhm, where is the exhibit we were just looking
 4 at, the one from Art Mathieson? What number is that?
 5 **Q. Exhibit Number -- that's also in --**
 6 MR. MULHOLLAND: In the binder.
 7 **Q. It's Exhibit 63. Well, let's take it in**
 8 **pieces.**
 9 **In 2007, up to -- whatever impacts occurred to**
 10 **eelgrass through 2007, would you have any basis to have**
 11 **disagreed with what Dr. Short was saying at that time?**
 12 A. Uhm, I can't recall what communications I had
 13 with Art Mathieson at that time that might have been a
 14 basis but I don't recall. This document from Art
 15 Mathieson here in 2012 would seem to contradict somewhat
 16 that statement from Fred Short's e-mail.
 17 **Q. Would seem to contradict? There's something**
 18 **in there that says he's documented that eelgrass are**
 19 **being smothered by macroalgae in Great Bay. I thought**
 20 **we just went through that, that that document doesn't**
 21 **say that?**
 22 MR. MULHOLLAND: Objection. The document
 23 speaks for itself. It's the best evidence rule. Go

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1 ahead.
 2 MR. HALL: He's characterizing what the
 3 document is saying and he's telling me it conflicts with
 4 the other document.
 5 **Q. We just went through that the word "can" does**
 6 **not mean does or did or has or is doing. So you want to**
 7 **tell me that that document conflicts with what Fred**
 8 **Short had said?**
 9 A. It does not prove that eelgrass is being
 10 smothered by macroalgae. It provides information that
 11 macroalgae can smother the eelgrass and that
 12 observations have been made of expanding macroalgae
 13 within the Great Bay proper.
 14 **Q. And do you know if those, in the locations**
 15 **where those observations are made are areas where they**
 16 **are smothering eelgrass or are they up on the tidal**
 17 **grass where eelgrass do not exist?**
 18 A. I do not know.
 19 **Q. Okay. We'll cover that later.**
 20 **So if you don't know whether or not the**
 21 **reference that's being made here is to areas where**
 22 **eelgrass inhabit, you can't reach any technical**
 23 **conclusion as to the relevance of this statement to**

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1 **eelgrass loss, now, can you; of Dr. Mathieson's**
 2 **statements to eelgrass loss, can you?**
 3 A. The areas that we have macroalgae have
 4 coincided with areas where eelgrass has existed.
 5 **Q. Hold it. Hold it. I did not ask that**
 6 **question.**
 7 **You just told me you did not know whether or**
 8 **not the -- whether or not the macroalgae being discussed**
 9 **in Dr. Mathieson's letter, Exhibit 63, you did not know**
 10 **if any -- if this was located in areas where eelgrass**
 11 **inhabit; correct?**
 12 MR. MULHOLLAND: Objection. The word
 13 "this" is very unclear. It's an ambiguous question.
 14 But you can answer.
 15 I'm just putting my objections on the record,
 16 John. Go ahead.
 17 MR. LUCIC: And you can object to the
 18 form of the question, but the additional information
 19 that you're putting in there, that's improper. You can
 20 say, Object to the form of the question. If he asks you
 21 what the basis is, you can go on. But to characterize
 22 the objection is improper in the context of a
 23 deposition.

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<p>1 Q. Just answer the question, please, 2 Mr. Trowbridge. 3 A. So the question was if it -- we -- if we don't 4 know where the macroalgae is relative to eelgrass, or do 5 we not know? 6 Q. You just told me you don't know. 7 A. Yeah, yeah. 8 Q. Correct? 9 A. Right. I don't know, based on that report. 10 Q. So if you don't know that, you cannot draw any 11 scientific conclusion that this letter demonstrates 12 macroalgae are causing adverse impacts on eelgrass; 13 correct? 14 A. Correct. We've already established that this 15 letter cannot prove that. It's impossible to prove 16 this -- anything, really, in one system. 17 Q. Hold it. We didn't -- we didn't answer this 18 by saying that it's impossible to prove anything in one 19 system, we're talking about something very specific. 20 We're talking about this system, we're talking about 21 macroalgae, and we're talking about eelgrass loss. 22 Now, let's just get one straight answer from 23 you. One: You don't know where the macroalgae are</p>	<p>1 MR. KINDER: Can we take a short break 2 among us? Would you guys mind? 3 (Recess.) 4 (Whereupon, Mr. Bisbee left the deposition 5 proceedings.) 6 MR. MULHOLLAND: Back on the record. 7 MR. HALL: Back on the record. 8 BY MR. HALL: 9 Q. Mr. Trowbridge, I'd like to show you one other 10 letter regarding the nutrient criteria development. 11 It's the New Hampshire Estuary Project, dated 12 February 7, 2008. And it's -- basically, I just want to 13 bring you -- your attention to the statement about 14 there's a deadline for nutrient criteria development. 15 Are you familiar with this letter, first off? 16 A. Yes. 17 Q. Okay. Do you know who -- did you draft the 18 letter, or did somebody else draft it or -- 19 A. I'm not sure. 20 Q. All right. It talked about there's a deadline 21 for nutrient criteria development. Where did this 22 deadline come from? 23 A. This letter was from 2008. As I recall, we</p>
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<p>1 growing based on this letter; correct? 2 A. That's correct. 3 Q. Two: Therefore, you cannot render any 4 defensible scientific conclusion as to whether these 5 macroalgae growth reported in this Mathieson letter is 6 adversely impacting eelgrass; correct? 7 A. Well, what -- I mean, defensible scientific 8 conclusion, is that a statement of proof or is that a 9 statement of data supporting a theory that we have? 10 Q. Either. 11 A. I would say it supports a theory that we have 12 based on the scientific literature about how nutrients 13 affect shallow estuaries. 14 Q. I didn't ask you that question. I asked 15 you -- will you answer the question presented to you, 16 please? 17 MR. HALL: Will you please read back my 18 second one where I said, Correct, you can't reach a 19 conclusion based on this? 20 (Record read as requested.) 21 A. I'm going to say yes, with the explanation 22 that we're not proving. It does not prove it; it has 23 information that supports a theory.</p>	<p>1 had been working on the nutrient criteria issue since 2 2005, and it required a lot of staff time. And there 3 was -- I think there was an interest in trying to 4 conclude the project. 5 Q. So at this point in time, one way or another, 6 there was a decision that a nutrient criteria was going 7 to be -- a numeric nutrient criteria was going to be 8 developed for the estuary? 9 A. I think that decision was made when, in 2005, 10 when we started. This is just -- this letter is just 11 setting -- 12 Q. Just confirming it? 13 A. Yeah; confirming that issue. 14 MR. HALL: Okay. Let's mark that as 15 Exhibit 75. 16 17 (Trowbridge Exhibit 75 marked for 18 identification.) 19 Q. I don't want to risk going backward to the 20 Exhibit 74, but I need to ask you the question again 21 where it talks about nitrogen plays a significant role 22 on the demise of eelgrass. 23 Now, to your knowledge, is that just a general</p>

<p style="text-align: right;">273</p> <p>1 statement of, you know, nitrogen can play a significant 2 role in eelgrass demise, is that what that statement is 3 meant to infer; or had somebody at this point in time, 4 to your knowledge, proved that nitrogen was playing a 5 significant role in eelgrass demise in the estuary? 6 MR. MULHOLLAND: Objection as to form. 7 A. I do not recall exactly. I believe it's just 8 a statement of general information. 9 Q. Okay. That's what I had the feeling. So 10 we've already marked that as Exhibit 74. 11 And just for my -- just so I understand the 12 timeline right, this is in January of 2008. At this 13 point in time the numeric criteria hadn't been developed 14 yet, and the support document; right? 15 A. Right. 16 Q. Okay. And that would be the document that 17 describes whether or how nitrogen plays a significant 18 role in impacting eelgrass? 19 A. That was -- yeah. The final document is the 20 summary of all the research. 21 Q. Okay. Thank you. 22 Easy question: You were the primary person 23 responsible for the development of the 2009 numeric</p>	<p style="text-align: right;">275</p> <p>1 about, like, a more -- 2 Q. Nitrogen was not identified as the impairment 3 associated with eelgrass loss in 2008? 4 A. In 2008, okay. I think I would answer that by 5 saying -- are we talking about in Great Bay? 6 Q. In Great Bay. 7 A. The proper Great Bay? 8 Q. Great Bay, Piscataqua, Lower Piscataqua. I 9 could show you the exhibit but -- 10 A. Maybe we should look at that. 11 (Pause in proceedings.) 12 MR. KINDER: Can I help, John? 13 MR. HALL: There it is. 14 Q. Here, this was an exhibit used in Fred Short's 15 deposition. It's the 2008 impairment listing. 16 A. Right. This would be the, uhm, the draft or 17 one of the drafts of the 2009 303d list. 18 Q. And that's the August one; that's the final 19 one that was submitted to EPA? 20 A. Yes. Submitted, uhm, right. 21 Q. And that one did not have impairments listed 22 for nitrogen associated with eelgrass; correct? 23 A. That is correct.</p>
<p style="text-align: right;">274</p> <p>1 criteria at DES? 2 A. Yes. 3 Q. You also developed the impairment listings for 4 Great Bay, both before and after the 2009 criteria 5 development? 6 A. Yes. Although we do work as a team at DES. 7 Q. Certainly. And again, this is all by way of 8 recap, these are things that we covered in the last 9 deposition. 10 A. Uhm-hmm. 11 Q. For 2008, Great Bay was not listed as impaired 12 for eelgrass, it was only listed as threatened; correct? 13 A. Are you talking about on the final 2008 list? 14 Q. Yeah, the final 2008 list. 15 A. It was listed as threatened, which is -- which 16 is also category 5, which is the same category as 17 impairments. 18 Q. And in that 2008 listing, the final one, total 19 nitrogen was not identified as a cause or an indicator 20 of eelgrass loss anywhere in the system; correct? 21 A. I just want to be clear. We have this issue 22 with the source or the cause that we list in the 303d 23 database. Are we talking about that or are we talking</p>	<p style="text-align: right;">276</p> <p>1 Q. It also did not have light attenuation 2 associated with eelgrass; correct? 3 A. Yes. 4 Q. Okay. And in that 2008 document, the areas 5 where eelgrass losses occurred, and they, I believe they 6 occurred in many areas in the system; right? I mean, 7 there were eelgrass declines in many of the tidal 8 ivers? 9 A. Yes. 10 Q. Okay. That document indicated that the cause 11 of eelgrass loss was unknown in 2008; correct? 12 A. That is right. And that's a standard practice 13 for all our impairments, to list the cause as unknown. 14 Q. And with regard to, just so I understand how 15 an eelgrass impairment was determined, it was based on a 16 20 percent difference from baseline, whatever that 17 baseline was for the particular assessment area? 18 A. Uhm, I'm just going to check the methodology 19 in this report. So on page 5 of this report it talks 20 about the methodology. 21 Q. Okay. 22 A. So it's from page 5 to page 6, and the 23 methodology -- there's two methods that are used. The</p>

277	<p>1 first is if there's reliable historic concurrent maps of</p> <p>2 eelgrass cover for an area, DES will use the percent</p> <p>3 decline from the historic level to determine</p> <p>4 impairments, and a region will be considered to have</p> <p>5 significant eelgrass loss if the change from historic</p> <p>6 levels is greater than 20 percent.</p> <p>7 Q. Okay. And --</p> <p>8 A. Then there's a second --</p> <p>9 Q. Okay.</p> <p>10 A. -- assessment that's done, which is the second</p> <p>11 bullet. DES will evaluate recent trends in the eelgrass</p> <p>12 cover indicator. Trends will be evaluated using linear</p> <p>13 regression of eelgrass cover in a zone versus year.</p> <p>14 I mean, I could read this paragraph or -- but</p> <p>15 the point is, if there's more than a 20 percent change</p> <p>16 using a certain statistical method, then that would,</p> <p>17 would be a violation. And then DES would look at these</p> <p>18 two assessments and consider a zone to be impaired if</p> <p>19 either of the two methods indicates significant eelgrass</p> <p>20 loss.</p> <p>21 Q. Okay. With regard to the State of the</p> <p>22 Estuaries reports, since 2003 you were the primary</p> <p>23 person responsible for the technical analysis of --</p>	279	<p>1 Q. Could you answer the question, please?</p> <p>2 A. I'm sorry, can we --</p> <p>3 Q. Did you provide the wasteload allocation</p> <p>4 analysis to EPA for permitting purposes?</p> <p>5 A. Yes.</p> <p>6 Q. Thank you. I'm going to show you a series of</p> <p>7 e-mails, all associated with the wasteload allocation</p> <p>8 documentation and evaluations, just so we understand</p> <p>9 what the time frame is. Let's mark this --</p> <p>10 A. Could I just ask, I mean, I understand you're</p> <p>11 asking questions about a report that is like a wasteload</p> <p>12 allocation, but it is not a wasteload allocation, so</p> <p>13 maybe we should refer to it as the nitrogen loading</p> <p>14 analysis.</p> <p>15 Q. I'd like to call it the wasteload allocation</p> <p>16 because that's what you had, the methodology to</p> <p>17 determine wasteload allocations for wastewater treatment</p> <p>18 facilities. I mean, this is what you're calling it, so</p> <p>19 we will call it what it's titled.</p> <p>20 Did somebody ask you to not refer to this as a</p> <p>21 wasteload allocation in your deposition?</p> <p>22 A. No.</p> <p>23 Q. Then why do you not want to call it a</p>
278	<p>1 related to nutrient issues?</p> <p>2 A. Yes.</p> <p>3 Q. You also developed a wasteload allocation</p> <p>4 analysis, I believe in 2009 through 2010, to predict how</p> <p>5 much nutrients would need to be reduced from point to</p> <p>6 nonpoint sources to meet the new numeric criteria;</p> <p>7 correct?</p> <p>8 A. Yes. And the final report was called a</p> <p>9 nitrogen loading analysis. It was not a formal</p> <p>10 wasteload analysis. So in that report we provided</p> <p>11 information about options for nutrient loading</p> <p>12 reductions, but we did not set a formal wasteload</p> <p>13 allocation, which has a specific meaning as part of a</p> <p>14 TMDL.</p> <p>15 Q. The analysis that you did for the wasteload</p> <p>16 allocation document you're talking about, that was an</p> <p>17 analysis that was similar to a TMDL assessment; correct?</p> <p>18 A. Yes. It's similar, but it was not a TMDL.</p> <p>19 Q. Right. And you provided that wasteload</p> <p>20 allocation analysis to EPA for permitting purposes;</p> <p>21 correct?</p> <p>22 A. We provided the information to EPA and others</p> <p>23 for them to use however they saw fit.</p>	280	<p>1 wasteload allocation when you, yourself, have repeatedly</p> <p>2 called it a wasteload allocation? I mean, I've got</p> <p>3 dozens of e-mails where you're calling it a wasteload</p> <p>4 allocation for nitrogen. Why don't you want to call it</p> <p>5 a wasteload allocation now, Mr. Trowbridge?</p> <p>6 A. Because these were all -- what you're looking</p> <p>7 at are drafts of the final report, and the final report</p> <p>8 was called a nitrogen loading analysis. In my mind, I</p> <p>9 think of it as the nitrogen loading analysis. It's just</p> <p>10 confusing to me to keep referring to it by its old name.</p> <p>11 Q. Sorry for the confusion, but we're going to</p> <p>12 keep calling it what you've discussed it -- what you've</p> <p>13 called it in the e-mails all along.</p> <p>14 All right. Let me show you, here's an e-mail.</p> <p>15 We'll mark this as Exhibit 76. And it has to do with</p> <p>16 the Cocheco River, which is a March 17th, 2009 e-mail</p> <p>17 from you to Brian Pitt, a group of people at EPA. And</p> <p>18 it's attaching a draft proposal for analysis of the</p> <p>19 Cocheco River.</p> <p>20 Are you familiar with that e-mail?</p> <p>21</p> <p>22 (Trowbridge Exhibit 76 marked for</p> <p>23 identification.)</p>

281	<p>1 A. Yes.</p> <p>2 Q. Okay. Can you tell us, can you look at the</p> <p>3 first page of the attachment, the one that says</p> <p>4 "Purpose." Can you read that into the record for a</p> <p>5 moment, please, just that first sentence?</p> <p>6 A. The first sentence under, "Purpose"?</p> <p>7 Q. Yeah.</p> <p>8 A. "The purpose of this methodology is to</p> <p>9 determine total nitrogen loading targets and wasteload</p> <p>10 allocations for the Coheco River subestuary such that</p> <p>11 nitrogen concentrations in this subestuary meet the</p> <p>12 water quality criteria that had been proposed by DES."</p> <p>13 Q. Okay. What water quality criteria are we</p> <p>14 talking about?</p> <p>15 A. Let's look at the citation then. So the</p> <p>16 citation is for a 2008 report from DES, which is the</p> <p>17 Nutrient Criteria for the Great Bay Estuary, Public</p> <p>18 Comment Review Draft.</p> <p>19 Q. Had those been adopted into rule at this point</p> <p>20 in time?</p> <p>21 A. No.</p> <p>22 Q. But you're trying to determine the loading</p> <p>23 targets and wasteload allocations such that those</p>	283	<p>1 eelgrass previously existed; correct?</p> <p>2 A. Yes.</p> <p>3 Q. Okay. And, again, were either the -- were</p> <p>4 either of these numeric nitrogen criteria ever adopted</p> <p>5 into state regs?</p> <p>6 A. No.</p> <p>7 Q. But you're doing a -- the purpose of this</p> <p>8 analysis is to say what the nitrogen limitations must be</p> <p>9 to meet those numbers; correct?</p> <p>10 A. Yes.</p> <p>11 Q. And you're sending this to EPA; correct?</p> <p>12 A. Yes.</p> <p>13 Q. What's EPA going to do with this; do you know?</p> <p>14 Why -- let me ask you, why are you sending this to EPA?</p> <p>15 A. We were getting questions from EPA and others</p> <p>16 about what the impact of the thresholds would be.</p> <p>17 Q. Okay. So you -- were you sending this to them</p> <p>18 so they could consider this in their permitting of the</p> <p>19 facilities?</p> <p>20 A. I was sending it in response to their</p> <p>21 questions, and I'm sure that has to do with part of</p> <p>22 their duties to write permits.</p> <p>23 Q. Okay. I would draw your attention to page 9,</p>
282	<p>1 numeric criteria will be achieved; correct?</p> <p>2 A. Yes.</p> <p>3 Q. Okay. Can you look at page 2 and tell me</p> <p>4 which numeric targets you decided to use for this</p> <p>5 wasteload allocation? I think it's under estimating,</p> <p>6 under, "Estimating Nitrogen Loading Targets"?</p> <p>7 A. Uhm-hmm.</p> <p>8 Q. It says: No eelgrass has been mapped in this</p> <p>9 subestuary so the applicable water quality criterion</p> <p>10 would be 0.5 milligrams of nitrogen per liter for the</p> <p>11 prevention of low dissolved oxygen?</p> <p>12 A. Right.</p> <p>13 Q. So you were applying some nitrogen criteria</p> <p>14 for protection of DO, dissolved oxygen; correct?</p> <p>15 A. I think so. I haven't gone through all of it,</p> <p>16 but I think that's true.</p> <p>17 Q. And why wasn't eelgrass criteria not applied</p> <p>18 in this segment?</p> <p>19 A. Well, it says, "No eelgrass has been mapped in</p> <p>20 this subestuary," so that the eelgrass threshold would</p> <p>21 not apply.</p> <p>22 Q. Okay. So the other numeric nitrogen number</p> <p>23 for eelgrass, that one only applies in areas where</p>	284	<p>1 "Several scenarios are presented to show the expected</p> <p>2 nitrogen loading to the subestuary under different</p> <p>3 permit conditions for Rochester and Farmington's</p> <p>4 wastewater plants"?</p> <p>5 A. Uhm-hmm.</p> <p>6 Q. I mean, this is a basic wasteload allocation</p> <p>7 analysis that's done for almost any type of numeric</p> <p>8 criteria; correct? Is it any different?</p> <p>9 A. I've never -- I mean, this is the only project</p> <p>10 like this that I've been involved with, so I don't have</p> <p>11 another thing to compare it to.</p> <p>12 Q. Okay. Let's leave that marked as Exhibit 76.</p> <p>13 Okay. Now, here's another e-mail. They're</p> <p>14 all kind of similar. They're all related to the</p> <p>15 wasteload allocation report that you developed. It's</p> <p>16 November 3rd, 2009, from yourself, Phil Trowbridge, to</p> <p>17 Jennifer Hunter. And then below that is an e-mail on</p> <p>18 October 30th, 2009, which is from you to, I guess I'll</p> <p>19 call it a cast of thousands; EPA, UNH professors, and</p> <p>20 others.</p> <p>21 MR. HALL: Let's mark this as Exhibit 77.</p> <p>22</p> <p>23 (Trowbridge Exhibit 77 marked for identification.)</p>

285	<p>1 Q. I just want to bring your attention to the</p> <p>2 paragraph at the bottom of the first page, the one that</p> <p>3 starts, "In 2009." Okay.</p> <p>4 The paragraph talks about first that a numeric</p> <p>5 nutrient criteria has been developed, and then the last</p> <p>6 sentence that says: Following this report, DES has</p> <p>7 prepared a model to predict how much the watershed</p> <p>8 nitrogen loads would need to be reduced to meet the new</p> <p>9 criteria. Are you familiar with this e-mail?</p> <p>10 A. Yes.</p> <p>11 Q. So the, again, the purpose of the wasteload</p> <p>12 allocation report was to determine how much reductions</p> <p>13 in nitrogen would be needed to meet the 2009 criteria?</p> <p>14 A. Yes.</p> <p>15 Q. Okay. So when you -- when the 2009 criteria</p> <p>16 were issued, it was, if you will, rather obvious that</p> <p>17 they would trigger nitrogen reductions if they were</p> <p>18 applied to the wastewater facilities?</p> <p>19 A. Yes.</p> <p>20 Q. Okay. I don't have any further questions on</p> <p>21 that. Thanks.</p> <p>22 The wasteload allocation documents, I mean, I</p> <p>23 can show you this, it was submitted to EPA in draft;</p>	287	<p>1 analyses show that nitrogen must be reduced at the</p> <p>2 wastewater plants in order to attain compliance with the</p> <p>3 draft numeric nutrient criteria?</p> <p>4 A. Uhm, for the most part, yes. But we did</p> <p>5 assess different areas, so I'm just -- not having looked</p> <p>6 at it in a few years, I'm not sure whether there were</p> <p>7 any areas where that was not necessary.</p> <p>8 Q. I could just draw your attention maybe to</p> <p>9 the -- well, four -- let's name them. To meet the</p> <p>10 numeric nutrient criteria would Rochester need to reduce</p> <p>11 its nitrogen loadings to the system.</p> <p>12 A. Do you have the appendices to this report?</p> <p>13 Q. Not with me. They were voluminous.</p> <p>14 A. That would be the easier thing for me to look</p> <p>15 at.</p> <p>16 Q. Well, I'll just ask you, to your knowledge,</p> <p>17 would Rochester be required to reduce its nitrogen</p> <p>18 loading to the system in order to meet the numeric</p> <p>19 nutrient criteria?</p> <p>20 A. I believe so.</p> <p>21 Q. Okay. What about Dover; would they be</p> <p>22 required to reduce their nutrient loading?</p> <p>23 A. This is where it gets a little tricky, because</p>
286	<p>1 right? And then you sought EPA's comments back on the</p> <p>2 wasteload allocation documents; do you recall?</p> <p>3 A. We went through several rounds of comments on</p> <p>4 that report. So, and some with EPA and with others.</p> <p>5 So, and we received comments from EPA certainly.</p> <p>6 Q. Okay. I'll just pass that.</p> <p>7 I think this is the report you were talking</p> <p>8 about. This is December 10 -- I'm sorry, December 2010.</p> <p>9 It's a report still marked Draft, at least the copy I</p> <p>10 have, and it's entitled: Analysis of Nitrogen Loading</p> <p>11 Reductions for Wastewater Treatment Facilities and</p> <p>12 Nonpoint Sources for the Great Bay Watershed.</p> <p>13 A. Uhm-hmm.</p> <p>14 Q. Is this the final report that you were talking</p> <p>15 about that we had previously been calling the wasteload</p> <p>16 allocation report?</p> <p>17 A. Yes.</p> <p>18 Q. Okay.</p> <p>19 MR. HALL: Let's mark this as Exhibit 78.</p> <p>20</p> <p>21 (Trowbridge Exhibit 78 marked for</p> <p>22 identification.)</p> <p>23 Q. And Mr. Trowbridge, in this document do the</p>	288	<p>1 Dover is downstream from Rochester. So depending on the</p> <p>2 amount of reductions at Rochester, not sure what the</p> <p>3 reductions would be at Dover. The report laid out</p> <p>4 options; it didn't specify what each plant needed to do.</p> <p>5 Q. But there wasn't, as I recall -- I mean, I</p> <p>6 could show you the page. The only options that you</p> <p>7 looked at for the wastewater plants were either 8</p> <p>8 milligrams per liter, 5 milligrams, or 3 milligrams per</p> <p>9 liter of nitrogen; correct?</p> <p>10 A. We also looked at current loadings as well.</p> <p>11 But like I said, if I had the appendices I could give</p> <p>12 you a better answer.</p> <p>13 Q. Why don't we go to page 19.</p> <p>14 A. Okay.</p> <p>15 Q. Page 18, page 19, up at the top. It says:</p> <p>16 There are 18 wastewater treatment plants that discharge</p> <p>17 into the watershed or otherwise contribute nitrogen.</p> <p>18 The four largest are Rochester, Dover, Exeter,</p> <p>19 Newmarket. And then below that is a listing of</p> <p>20 load-reduction scenarios.</p> <p>21 Do any of those load-reduction scenarios</p> <p>22 indicate no load reduction for any of the major</p> <p>23 facilities?</p>

289	<p>1 A. No.</p> <p>2 Q. So all of the evaluations that are done in</p> <p>3 this report indicate that they would -- it -- depending</p> <p>4 on which criteria is applied, and where it's applied, as</p> <p>5 I understand the numbers are sensitive to that; correct?</p> <p>6 A. Yes.</p> <p>7 Q. Okay. That either the limits would be</p> <p>8 8 milligrams per liter, 5 milligrams per liter, or</p> <p>9 3 milligrams per liter total nitrogen; correct?</p> <p>10 A. Correct. Those were the scenarios that we</p> <p>11 looked at in this report.</p> <p>12 Q. Okay. And then I'll just draw your attention</p> <p>13 back up to the executive summary, which says, "Both</p> <p>14 wastewater" -- I'm looking at the second bullet. It</p> <p>15 says, "Both wastewater treatment facilities" -- and it's</p> <p>16 on page 1, sorry. "Both wastewater treatment facilities</p> <p>17 and nonpoint sources will need to reduce nitrogen loads</p> <p>18 to attain the numeric nutrient criteria." Is that a</p> <p>19 accurate statement of what's put forth in this document?</p> <p>20 A. Yes.</p> <p>21 Q. Okay. What about the statement that the,</p> <p>22 "Wastewater treatment facility upgrades to remove</p> <p>23 nitrogen will be costly." Is that an accurate statement</p>	291	<p>1 MR. MULHOLLAND: Objection as to form.</p> <p>2 Sorry.</p> <p>3 A. I'm not --</p> <p>4 Q. Do you know if a TMDL would likely be more</p> <p>5 restrictive?</p> <p>6 A. No, I don't know. I mean, I'm not sure.</p> <p>7 Q. Is it possible the TMDL could have been less</p> <p>8 restrictive, you know, do something that doesn't meet</p> <p>9 the nutrient criteria?</p> <p>10 A. I think the reason I'm having trouble</p> <p>11 answering the question is that, you know, we don't have</p> <p>12 a TMDL we're looking at. We don't have a methodology of</p> <p>13 how the TMDL would have to be done. The TMDL was done</p> <p>14 using exactly the same methods and it would probably</p> <p>15 come up with the same answer. I don't know. We're sort</p> <p>16 of talking about a hypothetical document.</p> <p>17 Q. It wouldn't be possible for a TMDL to come up</p> <p>18 with a conclusion that no load reductions would be</p> <p>19 required for the system given the numeric criteria that</p> <p>20 are being used; correct?</p> <p>21 A. I believe so.</p> <p>22 Q. You believe it wouldn't be possible; right?</p> <p>23 A. Right.</p>
290	<p>1 regarding the requirements that are set forth in this</p> <p>2 document?</p> <p>3 A. Yes.</p> <p>4 Q. And this analysis, this, what we're now</p> <p>5 calling the loading reductions for wastewater facilities</p> <p>6 and nonpoint sources, for all practical purposes this is</p> <p>7 a TMDL analysis; right? Because it's -- well, correct?</p> <p>8 A. Uhm, no. I mean, TMDL has a very specific</p> <p>9 meaning and you'd have to have some other things in it.</p> <p>10 It was a -- an attempt to answer the questions people</p> <p>11 had about what loading reductions will be needed to have</p> <p>12 the water quality meet the thresholds that we had</p> <p>13 accomplished in the 2009 guidance document.</p> <p>14 Q. Isn't that what a TMDL does?</p> <p>15 A. It does that plus other things.</p> <p>16 Q. What other things does it do?</p> <p>17 A. Specifically, TMDL has to specifically call</p> <p>18 out a wasteload and load allocation; has to have a, what</p> <p>19 is it called, reasonable assurance related to nonpoint</p> <p>20 source reductions; it has to have a margin of safety; it</p> <p>21 has to have a number of things in a certain format.</p> <p>22 Q. Okay. So the TMDL might only be more</p> <p>23 restrictive than what you put forth in this document?</p>	292	<p>1 Q. Okay. I don't have any further questions on</p> <p>2 that document. Thank you.</p> <p>3 Oh, why hasn't a TMDL been done for this</p> <p>4 estuary; do you know?</p> <p>5 A. I'm not sure.</p> <p>6 Q. Have you had any discussions with EPA over the</p> <p>7 need to do a TMDL?</p> <p>8 A. There's been some discussions, yes.</p> <p>9 Q. And what was the conclusion of those</p> <p>10 discussions?</p> <p>11 A. I wasn't involved with all of the discussion.</p> <p>12 The ones I was involved with are just that we didn't</p> <p>13 need to do it at this time.</p> <p>14 Q. Did anybody explain why?</p> <p>15 A. I think there were concerns about how long it</p> <p>16 takes to do a TMDL.</p> <p>17 Q. Did people -- did anybody say they were going</p> <p>18 to use a permitting approach to reduce, an individual</p> <p>19 permit-by-permit approach to reduce the loads to achieve</p> <p>20 the numeric treatment criteria instead of doing a TMDL?</p> <p>21 Do you recall that discussion?</p> <p>22 A. Not particularly. I just recall talking about</p> <p>23 how TMDLs are very lengthy processes, and there was</p>

293	<p>1 already a fair amount of information available.</p> <p>2 Q. After the numeric nutrient criteria document</p> <p>3 was completed in, I guess it was June of 2009, that's</p> <p>4 the time frame, the numeric document?</p> <p>5 A. Yes.</p> <p>6 Q. Okay.</p> <p>7 A. We are talking about --</p> <p>8 Q. We're talking about Short Deposition Exhibit</p> <p>9 Number 27.</p> <p>10 A. Yes. June 2009.</p> <p>11 Q. Okay. After June 2009, you drafted an</p> <p>12 amendment to the 2009 303d listing that applied to 2009</p> <p>13 criteria; correct?</p> <p>14 A. Yes.</p> <p>15 Q. That application of that criteria increased</p> <p>16 the number of waters identified as nutrient-impaired;</p> <p>17 correct?</p> <p>18 A. Yes. In the Great Bay estuary; I'm assuming</p> <p>19 that's your question?</p> <p>20 Q. Yeah. In the Great Bay estuary.</p> <p>21 It identified both transparency -- for the</p> <p>22 first time it identified both transparency and nitrogen</p> <p>23 as associated with eelgrass declines; correct?</p>	295	<p>1 identification.)</p> <p>2</p> <p>3 Q. Just drawing your attention to the second line</p> <p>4 in the first paragraph -- actually, let me ask you</p> <p>5 first: Are you familiar with this e-mail? Do you</p> <p>6 recall sending it? I know you've sent hundreds of</p> <p>7 e-mails to the PREP advisory committee.</p> <p>8 A. Yes.</p> <p>9 Q. Okay. The statement -- can you read the</p> <p>10 statement in the second line of the first sentence, the</p> <p>11 one that starts with, "These criteria"?</p> <p>12 A. So the second line says, "These criteria were</p> <p>13 promptly used by DES to make impairment determinations</p> <p>14 for the estuary on New Hampshire's 303d list."</p> <p>15 Q. Okay. That's an accurate statement; correct?</p> <p>16 A. Yes.</p> <p>17 Q. Okay. No further questions on that.</p> <p>18 I'm going to test your recollection of some of</p> <p>19 the issues associated with the change in the impairment</p> <p>20 listing. When I'm talking about the modified impairment</p> <p>21 listing --</p> <p>22 THE WITNESS: I'm sorry. Could we take a</p> <p>23 break?</p>
294	<p>1 A. Yes.</p> <p>2 Q. Okay.</p> <p>3 A. And I would just say "as associated," I'm</p> <p>4 interpreting that as within the stressor response matrix</p> <p>5 that we use in the CALM.</p> <p>6 Q. But that was a new listing at that time;</p> <p>7 right?</p> <p>8 A. Yes.</p> <p>9 Q. All right. Additional DO impairments are also</p> <p>10 identified for some of the tidal rivers based on the</p> <p>11 chlorophyll-a numeric criteria from the 2009 document;</p> <p>12 correct?</p> <p>13 A. Yes.</p> <p>14 Q. I'm going to just show you a couple of e-mails</p> <p>15 that say all of those same things that you just said yes</p> <p>16 to. So we'll be able to breeze through those quickly.</p> <p>17 Here's an e-mail from you to Ru Morrison and a</p> <p>18 group of others. It looks like it's the -- it's -- oh,</p> <p>19 it is. It's the PREP Technical Advisory Committee. And</p> <p>20 it describes pretty much exactly what we're talking</p> <p>21 about.</p> <p>22 MR. HALL: Let's mark this as Exhibit 79.</p> <p>23 (Trowbridge Exhibit 79 marked for</p>	296	<p>1 MR. HALL: Oh, certainly, Phil.</p> <p>2 (Recess.)</p> <p>3 MR. HALL: We're back on the record.</p> <p>4 Do we want to look at that question now, or do</p> <p>5 you want to look at it over lunch?</p> <p>6 MR. MULHOLLAND: I'd like to look at it</p> <p>7 with Phil either on a break or lunch.</p> <p>8 MR. KINDER: Yes. Let's do it over</p> <p>9 lunch.</p> <p>10 MR. HALL: Yeah, over lunch.</p> <p>11 The earlier question that we were going to</p> <p>12 have the judge weigh in on, if we could get that printed</p> <p>13 out.</p> <p>14 BY MR. HALL:</p> <p>15 Q. Mr. Trowbridge, prior to the break we were</p> <p>16 talking about the 2009 impairment listings and how those</p> <p>17 were modified to apply the 2009 numeric nutrient</p> <p>18 criteria. And we were talking about some changes</p> <p>19 regarding nitrogen and transparency that were listed in</p> <p>20 the 2009 303d amendment. I'd like to show you an e-mail</p> <p>21 from -- here we go.</p> <p>22 MR. HALL: If we could mark this as</p> <p>23 Exhibit 80, and I've highlighted a portion of this.</p>

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<p>1 (Trowbridge Exhibit 80 marked for 2 identification.) 3 4 Q. First off, do you recall receiving this 5 e-mail? It's September 28th, 2009. It's from Al Basile 6 to Ken Edwardson. You're cc'd on it. It's part of an 7 e-mail string that where Al is asking that you assign an 8 impairment for light attenuation, and that it's, quote, 9 very important that we acknowledge this parameter as the 10 cause of impairment, impairment to eelgrass. And the 11 re: line is, Add to Cause. 12 Do you recall having this discussion with EPA, 13 that they wanted to make sure you identified 14 transparency as the cause of eelgrass impairments in the 15 updated or amended August 2009 impairment listing? 16 A. I remember this issue; yes. 17 Q. Okay. And did the document eventually 18 identify light attenuation as a factor related to the 19 impairment of eelgrass in the system? 20 A. Yes. 21 Q. Do you know if it's DES's position that light 22 attenuation is the cause of eelgrass loss in the system? 23 A. The position is that there's a number of</p>	<p>1 eelgrass, nitrogen and light attenuation. 2 Q. So related to eelgrass, there are no other 3 factors, other than nitrogen and light attenuation, that 4 are identified as the causes of why the eelgrass aren't 5 at the level you'd like to see them at; correct? 6 MR. MULHOLLAND: Objection as to form. 7 You mean on the 303d list? 8 MR. HALL: On the 303d list, yes. Sorry. 9 A. I think in answering that question, we had 10 this discussion at the last time about the cause issue. 11 We look at the nitrogen and the light atten -- we look 12 at the -- use a stressor response matrix, decision 13 matrix for the 303d listing where you have the stressor 14 being nitrogen, and some of the responses being light 15 attenuation and eelgrass. 16 So they're all evaluated together; they're not 17 necessarily evaluated as one causes the other. 18 Q. Did you want to give another clarification 19 regarding the memo that's in front of you? 20 A. Yes, I would, if I could. I just want to 21 clarify that this e-mail is correspondence with some of 22 the database managers at EPA, and so this was really a 23 technical discussion about adding a -- adding something</p>
298	300
<p>1 factors affecting eelgrass. Can I -- actually, can I do 2 some clarification on this e-mail? 3 Q. Oh, certainly. After we -- 4 A. Sorry. Okay -- 5 Q. We'll loop back and then -- 6 A. I thought you were going to ask more about 7 this question, and there's some context I need to 8 provide. 9 Q. Okay. Is it DES's position that light 10 attenuation is what's limiting eelgrass regrowth in 11 Great Bay? Or explain to me, when you say it's yes, DES 12 believes it's one of the factors, explain that to me. 13 A. Yeah. I think the best statement we have in 14 terms of the DES position on this issue is in the 15 response to public comment on the draft 2012 CALM, and I 16 think we gave you this at the last deposition. I don't 17 know what the number is. Do you know -- you know what 18 I'm talking about; right? 19 Q. Yes. I know the difference. 20 Do your impairment listings identify anything 21 else other than nitrogen and transparency as the reasons 22 for eelgrass loss anywhere in the Great Bay system? 23 A. On the 303d list we only have impairments for</p>	<p>1 to the database, as opposed to a substantive discussion 2 of, you know, of science. It was more of just a 3 technical one of we needed to add a new parameter to the 4 database, and the person who we were corresponding with 5 was confused, and we needed to -- I think this is where 6 Al Basile then provided some clarity or some information 7 to that person to allow them to move forward with making 8 that change to the database. 9 Q. The clarity that -- the position Al Basile is 10 stating, right, is that it's very important we 11 acknowledge this parameter as the cause of impairment, 12 and that parameter is light attenuation; correct? 13 A. Right. 14 Q. Okay. 15 A. I guess I think when I read this he's just 16 saying it's very important that we get this information 17 into the database. 18 Q. Why is it so very important that we get that 19 information in the database? 20 A. Because the state has already established 21 these thresholds that we're using, so that it should be 22 able -- whatever we're using should be able to be 23 recorded in the database.</p>

301	<p>1 Q. When you're saying establish these thresholds,</p> <p>2 you're talking about the thresholds established in the</p> <p>3 June 2009 numeric nutrient criteria document?</p> <p>4 A. Yes. And further expanded upon in the CALM.</p> <p>5 Q. Did the CALM change the way the numeric</p> <p>6 nutrient criteria apply?</p> <p>7 A. The CALM has the stressor response decision</p> <p>8 matrix, which is a key part of how the assessments are</p> <p>9 done.</p> <p>10 Q. But I asked, I said did it change the way that</p> <p>11 numeric nutrient criteria would be applied, and did it</p> <p>12 make any modifications? Did it make any additions to</p> <p>13 it?</p> <p>14 MR. MULHOLLAND: Objection; compound, and</p> <p>15 form.</p> <p>16 Q. Make any changes to it?</p> <p>17 A. Yes. I'd say there are changes.</p> <p>18 Q. Okay. What are they?</p> <p>19 A. The changes are using that stressor response</p> <p>20 decision matrix. That's not part of the 2009 document.</p> <p>21 Q. When you say stressor response, you're saying</p> <p>22 eelgrass, connect eelgrass to the values, correct; to</p> <p>23 the nitrogen and the transparency values, correct?</p>	303	<p>1 Q. Okay. So one of EPA's requests, in addition</p> <p>2 to add transparency as an impairment factor, one of them</p> <p>3 was also to amend the list so they could avoid a</p> <p>4 lawsuit; correct?</p> <p>5 A. I'm sorry. I'm a little confused. So the --</p> <p>6 you're asking about why -- I'm sorry. Can you just say</p> <p>7 that again? I'm confused.</p> <p>8 Q. I'm just saying EPA asked you to amend the</p> <p>9 list so they could avoid a lawsuit with CLF; correct?</p> <p>10 A. That's my understanding.</p> <p>11 Q. Okay. Thank you.</p> <p>12 And here's just one last e-mail regarding the</p> <p>13 303d listings and what the effect of them would be.</p> <p>14 It's an e-mail from you to Michelle Daley, June 15th,</p> <p>15 2009.</p> <p>16 MR. HALL: We'll mark that as Exhibit 81.</p> <p>17</p> <p>18 (Trowbridge Exhibit 81 marked for</p> <p>19 identification.)</p> <p>20 Q. And can you tell me who -- do you recall this</p> <p>21 e-mail, Mr. Trowbridge?</p> <p>22 A. Yes.</p> <p>23 Q. This e-mail confirms that, again, that you're</p>
302	<p>1 A. Right. I'm saying that --</p> <p>2 Q. Okay.</p> <p>3 A. -- if you are going to -- you're only going to</p> <p>4 add an impairment if you have both a high stressor,</p> <p>5 nitrogen, and some evidence of a response, either low</p> <p>6 light attenuation or loss of eelgrass.</p> <p>7 Q. Isn't that the typical way EPA have</p> <p>8 recommended that states develop numeric nutrient</p> <p>9 criteria, that they have a response variable and a</p> <p>10 causal variable? Isn't that what they have always</p> <p>11 recommended for numeric nutrient criteria?</p> <p>12 A. I think you're confusing the criteria with the</p> <p>13 assessment process. What I'm talking about is the</p> <p>14 assessment process for 303d listing.</p> <p>15 Q. Let's just move on. That's marked as</p> <p>16 Exhibit 80.</p> <p>17 In our prior deposition I handed you an e-mail</p> <p>18 that CLF had sent to EPA. It was in the Currier -- it</p> <p>19 was Currier Exhibit Number 34. That said one of the</p> <p>20 reasons that EPA asked you to amend the 303d impairment</p> <p>21 listing for August 2009 was to avoid a potential lawsuit</p> <p>22 with CLF. Do you remember that?</p> <p>23 A. May I see that? Yes, we discussed this.</p>	304	<p>1 going to use the numeric nutrient criteria to develop</p> <p>2 the revised 303d list; correct?</p> <p>3 A. Right. They were going to be incorporated</p> <p>4 into our assessment methodology.</p> <p>5 Q. Okay. And then now Michelle -- by the way,</p> <p>6 who is Michelle Daley?</p> <p>7 A. Michelle Daley is a researcher at UNH.</p> <p>8 Q. Okay. She asks the question -- I'm going to</p> <p>9 just draw your attention to that paragraph. That's</p> <p>10 where it says: Phil, thanks for the updated info. So</p> <p>11 EPA doesn't have to approve the numeric nutrient</p> <p>12 criteria before they become part of the 305b/303d</p> <p>13 assessment?</p> <p>14 Do you recall your discussion with Michelle on</p> <p>15 that issue?</p> <p>16 A. It's part of this e-mail. Sure.</p> <p>17 Q. Okay. Did you inform Michelle that EPA</p> <p>18 doesn't have to approve the criteria before they're used</p> <p>19 for impairment listing purposes?</p> <p>20 A. I don't see anything about that in my</p> <p>21 response.</p> <p>22 Q. Okay. Do you know if EPA has to approve, or</p> <p>23 has EPA ever said to you whether or not they need to</p>

<p style="text-align: right;">305</p> <p>1 approve the numeric nutrient criteria before they're 2 used for impairment listing purposes? 3 A. EPA has to approve the 303d list. That is 4 their -- it's ultimately EPA's list. 5 Q. Oh, no, no. I'm saying the criteria. So EPA 6 doesn't have to approve the nutrient criteria? I'm 7 saying before you use the nutrient criteria, doesn't EPA 8 have to approve them? 9 MR. MULHOLLAND: Objection; calls for a 10 legal conclusion. 11 MR. HALL: Seeing if he knows the answer. 12 Q. Or do you know if EPA has to approve them 13 before you use them? 14 A. I think the question is best answered in terms 15 of the CALM that we put a together for the assessments. 16 EPA does not approve the CALM. That's put together to 17 describe the process used by the state, and then EPA has 18 to approve the list. 19 Q. I'm just asking you, do you know whether or 20 not EPA has to approve a numeric nutrient criteria 21 before you use it for 303d listing purposes? 22 MR. MULHOLLAND: Same objection. 23 Q. Do you know?</p>	<p style="text-align: right;">307</p> <p>1 that assessment model. And that includes the numeric 2 thresholds that are relevant in this case. And we come 3 up with a proposed 303d list, which we send to EPA for 4 approval. They can look at that methodology and say if 5 they don't like the methodology, they don't approve the 6 list. 7 So the approval happening and the review by 8 EPA happens when we send them the list for review. 9 Q. I'm just trying to break out the two parts. 10 You applied a new numeric nutrient criteria 11 in -- to develop the 303d list in 2009; correct? 12 A. Right. We developed guidance on that; yes. 13 Q. Okay. And so those numeric values ended up in 14 your CALM document; correct? 15 A. Yes. 16 Q. Okay. It's your understanding EPA does not 17 have to approve the numeric values before they are used 18 in a CALM document; correct? 19 A. Yes. 20 Q. So in the next impairment listing that's done 21 for Great Bay, suppose you just decide to take those 22 numeric listing -- numeric values that you used in 2009 23 and cut them in half?</p>
<p style="text-align: right;">306</p> <p>1 A. I don't think so. 2 Q. You don't think they have to approve it or -- 3 sorry. 4 A. I'm confused. 5 Q. Do you know whether or not EPA has to approve 6 a numeric nutrient criteria before -- a numeric criteria 7 before you use it for 303d listing purposes? 8 MR. MULHOLLAND: Same objection; calls 9 for a legal conclusion. You can answer, if you know. 10 A. I thought I did answer already, but they don't 11 have to -- EPA does not need to approve numeric 12 thresholds that we use in the CALM. We do not approve 13 the CALM. 14 Q. So it's your understanding that so long as you 15 include any new numeric threshold in a CALM, that that 16 doesn't require any kind of official EPA approval prior 17 to its application to identify impaired waters? 18 MR. MULHOLLAND: Same objection. You can 19 answer if you know. 20 MR. HALL: Just trying to make sure I 21 understand. 22 A. The way the process works is we, we the state, 23 EPA, develop an assessment methodology, and then use</p>	<p style="text-align: right;">308</p> <p>1 A. Uhm-hmm. 2 Q. EPA doesn't have to approve that either? 3 MR. MULHOLLAND: Objection; calls for a 4 legal conclusion. If you know. 5 A. So you're asking hypothetically? 6 Q. Yeah, hypothetically. 7 A. They would not have to approve it before we 8 made any assessments. They ultimately would have to 9 approve the list, and if they disagree with the list, 10 they would have to disapprove. 11 Q. I'm just trying to understand what you believe 12 the state's position is, all right, or how it works; 13 that the state is free to make any change in the numeric 14 criteria target value it wants in a CALM document in 15 setting up a 303d listing? 16 MR. MULHOLLAND: Objection; calls for a 17 legal conclusion. 18 A. Perhaps it's best to talk about, you know, 19 criteria as in officially adopted criteria. I mean, 20 obviously those cannot be changed. 21 Q. Okay. 22 A. Whereas, thresholds that are used in guidance, 23 these are, these are thresholds used by the state in</p>

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<p>1 interpreting either narrative or some other type of 2 criteria. 3 Q. So, now, this is entitle -- this isn't 4 entitled, "Thresholds for Guidance." What I'm saying is 5 this isn't entitled -- I'm talking about the June 2009 6 document. It's entitled, "Numeric Nutrient Criteria." 7 A. Uhm-hmm. 8 Q. So what you're saying is if you develop a 9 numeric nutrient criteria, but you don't yet adopt it, 10 you can change that number anytime you want in a CALM 11 document as it's applied for identifying impaired 12 waters? 13 MR. MULHOLLAND: Can we take a short 14 break? I feel like we're stuck here. 15 MR. HALL: Yeah, I mean -- 16 MR. KINDER: Yeah. I don't care. It's 17 unusual to have a break while a question's pending. 18 MR. MULHOLLAND: It's the same question 19 five times. 20 MR. HALL: Well, you know what? Let's 21 withdraw the question. 22 MR. MULHOLLAND: Okay. Give me a second. 23 (Recess.)</p>	<p>1 on the list gets assigned a date, and I don't remember 2 what it is. 3 Q. Okay. So we'd have to look to the list to see 4 what the date would be? 5 A. Correct. 6 Q. But it will get a TMDL eventually for these 7 parameters? 8 A. That's what a category 5 means; it is a water 9 body in need of a TMDL. 10 Q. Okay. Thank you. 11 All right. And we covered this point, but I 12 just want to kind of close out where we were on the 303d 13 list. So applying the draft numeric nutrient criteria 14 in 2009 and thereafter using this CALM stressor response 15 matrix, that resulted in a different set of impairment 16 listings than existed prior to the numeric nutrient 17 development; correct? 18 A. Yes, and also the addition of newer data as 19 well. 20 Q. Okay. The post-2009 impairment listings, 21 would they be the same if the numeric nutrient criteria 22 were actually adopted into water quality criteria? 23 MR. MULHOLLAND: Objection; calls for a</p>
310	312
<p>1 BY MR. HALL: 2 Q. Phil, I just need to ask you one further 3 question about the document you have in front of you, 4 which is Exhibit 81. 5 A. This is the one? 6 Q. The same exhibit we were talking about. 7 Looking at your response, you have, "Once a 8 water body is put on the 303d list, it is scheduled for 9 a TMDL." Is that a, to your knowledge, is that an 10 accurate response? 11 A. Yes. 12 Q. Okay. So what kind of TMDLs now must be 13 scheduled for Great Bay; do they have to schedule a 14 nitrogen TMDL? 15 A. Yes. 16 Q. Do they have to schedule a TMDL that ensures a 17 transparency target is met? 18 A. Yes. For every parameter on the list it's 19 got -- it's got its own TMDL schedule. 20 Q. Okay. And has the TMDL been yet scheduled for 21 nitrogen and transparency for Great Bay, to your 22 knowledge? 23 A. I don't know what it is, but each impairment</p>	<p>1 legal conclusion. 2 Q. Do you know? 3 A. I'm sorry, the -- you're talking about the, 4 you say post-2009 -- 5 Q. When I -- post-2009 there were some changes to 6 the impairment listings; correct? 7 A. So these would be amendments to the 2009 303d 8 list. 9 Q. Yeah. These were the amendments that we were 10 just talking about, the 2009. And I realize when we say 11 2009, a lot of things happened in 2009: The draft 12 numeric criteria, and then the 303d list that applied to 13 the draft numeric criteria. 14 A. Which was the 2008 list, officially. 15 Q. Submitted in 2009. Right. This is where the 16 confusion sometimes lies. What I'm saying is, once 17 these numeric nutrient criteria are adopted -- 18 A. Adopted into rule? 19 Q. Adopted into rule, how would that -- do you 20 know if that would change the impairment listings for 21 nitrogen or transparency in Great Bay as they currently 22 stand? 23 MR. MULHOLLAND: Same objection.</p>

313	<p>1 A. So you're saying the thresholds that were</p> <p>2 published in the guidance document, if they were</p> <p>3 officially promulgated, and assuming our methodology in</p> <p>4 the CALM remain the same, there would be no difference.</p> <p>5 Q. Okay. That's what I thought. Thanks.</p> <p>6 I'm going to show you a PowerPoint</p> <p>7 presentation. I suspect you may have been the one that</p> <p>8 helped put it together. It was something that Harry</p> <p>9 Stewart presented.</p> <p>10 MR. HALL: We're going to mark this as</p> <p>11 Exhibit 82.</p> <p>12</p> <p>13 (Trowbridge Exhibit 82 marked for</p> <p>14 identification.)</p> <p>15 Q. This was -- let me see. This was a</p> <p>16 presentation done by Harry Stewart on January 25th,</p> <p>17 2011, to the New England Water Environment Association,</p> <p>18 Government Affairs Session, and it's a PowerPoint</p> <p>19 presentation regarding the nutrient requirements and</p> <p>20 program for Great Bay.</p> <p>21 Mr. Trowbridge, do you recognize this</p> <p>22 PowerPoint presentation?</p> <p>23 A. Yes. Some of it, at least.</p>	315	<p>1 about Short Exhibit 27, the nitrogen nutrient criteria;</p> <p>2 correct?</p> <p>3 A. Correct.</p> <p>4 Q. It says a weight of evidence approach was</p> <p>5 used, in that document. Is that accurate?</p> <p>6 A. Yes.</p> <p>7 Q. Okay. I'm going to ask you some questions</p> <p>8 later as to what weight of evidence means, but we'll get</p> <p>9 to that later.</p> <p>10 A. Uhm-hmm.</p> <p>11 Q. It says it was approved by EPA. Did EPA ever</p> <p>12 officially approve this document; or what's meant by</p> <p>13 "Approved by EPA"?</p> <p>14 A. Yeah, I'm not sure.</p> <p>15 Q. Okay. Let's flip forward, the one that</p> <p>16 starts, "Nitrogen Impairments." It says that, "Nutrient</p> <p>17 criteria resulted in the addition of most of the estuary</p> <p>18 to the 303d list for nitrogen impairments in 2009."</p> <p>19 That's a correct statement; right?</p> <p>20 A. Yes.</p> <p>21 Q. Okay. "The impairments triggered a TMDL</p> <p>22 process." Correct statement; right?</p> <p>23 A. Yes.</p>
314	<p>1 Q. Do you recall whether or not you may have</p> <p>2 helped Mr. Stewart in putting it together so he could do</p> <p>3 his presentation?</p> <p>4 A. Uhm, yes.</p> <p>5 Q. Perfect. I'm going to just ask you a couple</p> <p>6 of questions from his presentation. It's kind of, if</p> <p>7 you will, by way of summarizing all of which we have</p> <p>8 talked about this morning, because I think most of the</p> <p>9 main points are just, from one slide to the next, listed</p> <p>10 in the presentation.</p> <p>11 THE WITNESS: Sorry, can I have another</p> <p>12 water, please?</p> <p>13 MR. LUCIC: Sure.</p> <p>14 (Handing.)</p> <p>15 Q. Let's just flip through a couple slides.</p> <p>16 Here, I'm sorry, these are not -- there's no page number</p> <p>17 on them because they were slides. So let's try to go</p> <p>18 into -- yeah, you've got the page, yeah. That's great.</p> <p>19 Let's look at the bullets over on the</p> <p>20 left-hand side. The one that says, "In 2009, DES</p> <p>21 developed numeric nutrient criteria to protect eelgrass</p> <p>22 habitat and prevent low dissolved oxygen in the</p> <p>23 estuary." When we're talking about that, we're talking</p>	316	<p>1 Q. Then the next page, it says the state</p> <p>2 completed a Great Bay nitrogen loading analysis that set</p> <p>3 preliminary loading thresholds. That was the document</p> <p>4 you and I were talking about earlier; right? I was</p> <p>5 calling it the wasteload allocation, and it eventually</p> <p>6 was called -- it eventually was called Analysis of</p> <p>7 Nitrogen Loading Reductions for Wastewater Treatment</p> <p>8 Facilities and Nonpoint Sources in Great Bay; right?</p> <p>9 A. Right.</p> <p>10 Q. And that was Exhibit -- what was it? -- 78.</p> <p>11 Now, go to the next page. That top bullet:</p> <p>12 Most of Great Bay estuary is impaired for nitrogen as</p> <p>13 shown by persistent low DO in the tributaries and</p> <p>14 eelgrass loss.</p> <p>15 Is that a correct statement?</p> <p>16 A. This is a good summation of the</p> <p>17 stressor-response approach, where you have the high</p> <p>18 nitrogen in addition to these response variables, which</p> <p>19 is dissolved oxygen and eelgrass loss, that we discussed</p> <p>20 in this bullet.</p> <p>21 Q. Does this bullet indicate that the nitrogen</p> <p>22 caused the eelgrass loss, in your mind? Is that what</p> <p>23 it's intended to indicate?</p>

317	<p>1 A. I'm sorry, I don't know what's wrong with my 2 throat.</p> <p>3 What I think this bullet is intended to 4 summarize is the stressor-response approach, where we're 5 saying we added a nitrogen impairment because of the 6 high nitrogen, as well as -- and the fact that we have 7 these evidence of a response or a negative response for 8 low dissolve oxygen and the eelgrass loss. I mean, 9 that's the way I would summarize it.</p> <p>10 Q. But I'm asking the word "cause." So if you 11 could just --</p> <p>12 A. If -- so you're asking me does it show that 13 it caused, that nitrogen is causing the DO and eelgrass 14 loss?</p> <p>15 Q. Yeah.</p> <p>16 A. It does not show that it caused it.</p> <p>17 Q. Do you know if the prior analyses that you 18 developed showed that it caused it?</p> <p>19 A. No.</p> <p>20 Q. But you used a weight-of-evidence approach to 21 come to a conclusion that you needed to regulate 22 nitrogen; right?</p> <p>23 A. Correct.</p>	319	<p>1 reductions in the wastewater plants; right? We've got 2 8, 5 and 3?</p> <p>3 A. Right.</p> <p>4 Q. I'm going the wrong way. Let's go to the 5 preliminary cost impact ones, right there.</p> <p>6 We've got something that's entitled, Very 7 Preliminary Costs for Upgrading eight plants. Do you 8 recall who did this preliminary cost-reduction analysis?</p> <p>9 A. This is done by DES.</p> <p>10 Q. Okay. Do you recall who at -- did you do it 11 or did you get somebody else at the department to do it?</p> <p>12 A. I had Ken Kessler, who is in our Wastewater 13 Engineering Bureau --</p> <p>14 Q. Okay.</p> <p>15 A. -- do the work.</p> <p>16 Q. And the preliminary estimates for meeting the 17 new nutrient criteria, numeric nutrient criteria, they 18 range, depending on the effluent limits for the plant, 19 anywhere from around \$200 million to \$350 million in 20 capital costs? That's what that chart indicates?</p> <p>21 A. Yes.</p> <p>22 Q. Okay. And these are numbers that are -- to 23 your knowledge, are these numbers similar to more recent</p>
318	<p>1 Q. Okay. And I guess, similarly, you used a 2 weight-of-evidence approach to decide that the current 3 transparency level in the system was inadequate for 4 eelgrass protection?</p> <p>5 A. Uhm, I think all -- and scientific evaluation 6 doesn't use weight of evidence to some degree, so for 7 light attenuation, we use the weight of available 8 scientific evidence about what the light requirements 9 for eelgrass is.</p> <p>10 Q. Let's flip forward, the point, nonpoint. Just 11 flip forward to a couple more charts. Actually, let's 12 stop at that prior one. Phil, that chart that looks 13 like a, I guess you might call it a matrix, that's the 14 one that puts what the load reduction requirements need 15 to be for the wastewater plants and nonpoint source, 16 from the wasteload allocation analyses that you had 17 done; right?</p> <p>18 A. Yes.</p> <p>19 Q. Okay. And -- okay. And that chart is 20 entitled, "Evaluation of Wastewater Treatment Plant 21 Permitting Scenarios on Nitrogen Loads." And all of 22 those permitting -- all of the permitting scenarios 23 presented in this chart, they all require load</p>	320	<p>1 numbers that you've seen for the cost impact associated 2 with compliance of the numeric nutrient criteria?</p> <p>3 MR. MULHOLLAND: Objection as to form.</p> <p>4 Go ahead.</p> <p>5 A. I've seen a pretty wide range of estimates. 6 This is inside the range.</p> <p>7 Q. Okay.</p> <p>8 A. And our approach to this analysis was to try 9 and not underestimate the cost.</p> <p>10 Q. Okay. So are these still considered as a 11 reasonable cost estimate by DES; do you know?</p> <p>12 A. Uhm --</p> <p>13 Q. I mean, you may not have information on it --</p> <p>14 A. Yeah.</p> <p>15 Q. I'd like to bring your attention to the chart 16 that's called, "DES Perspective." It's near the end. I 17 guess the prior charts were going through what we'll 18 call the controversy of who's saying the numbers need to 19 be higher or lower, and they had some charts on, oh, the 20 environmental community perspective, municipality 21 perspective, EPA's perspective, everybody's perspective. 22 And now this is DES's perspective.</p> <p>23 I'd like to bring your attention to the third</p>

321	<p>1 bullet, on a independent peer review. It says, bullet:</p> <p>2 An "independent peer review" (details to be determined)</p> <p>3 could help to bring long-term consensus.</p> <p>4 Do you know what independent peer review was</p> <p>5 being referenced in this bullet?</p> <p>6 A. No.</p> <p>7 Q. Do you know if DES supports the coalition's</p> <p>8 request for an independent peer review of the science</p> <p>9 behind the 2009, June 2009 numeric nutrient criteria for</p> <p>10 Great Bay?</p> <p>11 MR. MULHOLLAND: I object to the</p> <p>12 question.</p> <p>13 A. That's really a decision that needs to be made</p> <p>14 above my level.</p> <p>15 Q. Oh, I know. I guess I'm just asking for your</p> <p>16 current knowledge. Do you know whether -- because the</p> <p>17 communities have been asking for an independent peer</p> <p>18 review for going on two years at this point; correct?</p> <p>19 A. I'm not sure of the exact dates.</p> <p>20 Q. But for a while?</p> <p>21 A. Yeah.</p> <p>22 Q. Yeah. So do you -- I can't imagine it hasn't</p> <p>23 been a topic of discussion within the department, given</p>	323	<p>1 A. There's been some changes to the transparency</p> <p>2 listings.</p> <p>3 Q. All right. See if you agree that this is what</p> <p>4 the -- because they've talked about several hundred</p> <p>5 million dollars -- \$200 million to \$350 million of</p> <p>6 impacts on the wastewater plants. So the application of</p> <p>7 the numeric nutrient criteria means that the wastewater</p> <p>8 plants must reduce their nutrient loads to the impaired</p> <p>9 waters; correct?</p> <p>10 MR. MULHOLLAND: John, I object to this</p> <p>11 line of questioning as asked and answered. You've done</p> <p>12 this already. It's recapitulation. Also object as to</p> <p>13 form of that question, as to the who's applying it. I</p> <p>14 think I cut you off, so sorry.</p> <p>15 Q. The impact of applying the numeric nutrient</p> <p>16 criteria is that the communities must reduce their</p> <p>17 nutrient loads to the impaired waters; correct?</p> <p>18 A. Uhm --</p> <p>19 MR. MULHOLLAND: Same objection.</p> <p>20 THE WITNESS: So do I have to -- I'm</p> <p>21 confused.</p> <p>22 Q. Yeah, you have to answer.</p> <p>23 MR. MULHOLLAND: You have to answer if</p>
322	<p>1 the outstanding request?</p> <p>2 A. Right. But it's -- I don't know what the --</p> <p>3 what my management would like to -- what their current</p> <p>4 thinking is on this right now.</p> <p>5 Q. So you don't know what the current thinking</p> <p>6 is?</p> <p>7 A. Yeah.</p> <p>8 Q. Okay.</p> <p>9 MR. KINDER: Did you want to mark that,</p> <p>10 John?</p> <p>11 MR. HALL: I think we marked it as 82, I</p> <p>12 believe. It's already been marked.</p> <p>13 Q. Okay. So I'm just going to give a little</p> <p>14 summary of what I now -- what I think is the impact on</p> <p>15 the regulated community from application of the</p> <p>16 June 2009 numeric criteria and the changed impairment</p> <p>17 listing that was done in August of 2009, and then</p> <p>18 thereafter. I think the impairment listings stay pretty</p> <p>19 much the same after August 2009; correct?</p> <p>20 A. Uhm, for nitrogen?</p> <p>21 Q. Yeah.</p> <p>22 A. Yes.</p> <p>23 Q. And transparency?</p>	324	<p>1 you can, if you understand the question.</p> <p>2 A. Uhm, all right. Can you say it again, please?</p> <p>3 Q. The impact of applying the numeric nutrient</p> <p>4 criteria for the Great Bay estuary to the impaired</p> <p>5 waters listings is that now the wastewater plants must</p> <p>6 reduce their nutrient loads to the impaired waters;</p> <p>7 correct?</p> <p>8 A. Uhm, I think I'm having a little trouble with</p> <p>9 the term "apply" here because the criteria or the</p> <p>10 thresholds are just guidance that are used to determine</p> <p>11 impairments, and impairments are a description of the</p> <p>12 available data. It doesn't then require anyone to do</p> <p>13 anything.</p> <p>14 Q. I'm going to say that they're going to have to</p> <p>15 do this as a result of this; correct?</p> <p>16 MR. MULHOLLAND: Same objection.</p> <p>17 A. I mean, not necessarily. That's not</p> <p>18 something -- this document doesn't make anyone do</p> <p>19 anything.</p> <p>20 MR. HALL: I want to take a three-minute</p> <p>21 break.</p> <p>22 (Recess.)</p> <p>23</p>

<p style="text-align: right;">325</p> <p>1 BY MR. HALL:</p> <p>2 Q. I wanted to ask you some questions,</p> <p>3 Mr. Trowbridge, regarding your understanding of how your</p> <p>4 narrative criteria work. You're familiar with the New</p> <p>5 Hampshire's narrative criteria for nutrients and aquatic</p> <p>6 life impairments?</p> <p>7 A. Yes.</p> <p>8 Q. Okay. Can you give me an idea of what you're</p> <p>9 looking at to --</p> <p>10 A. I'm just looking at the same document.</p> <p>11 Q. You're looking at 2009 numeric nutrient</p> <p>12 criteria document; right?</p> <p>13 A. Uhm-hmm.</p> <p>14 Q. I think it's got the wording of the narrative</p> <p>15 criteria in the document?</p> <p>16 A. Perhaps not. A place to look may be the --</p> <p>17 Q. It is. It's on page -- well, go ahead.</p> <p>18 A. What page is it?</p> <p>19 Q. I'm sorry. It's got one. The narrative</p> <p>20 standards for estuarine waters are Class B. Quote,</p> <p>21 Class B waters shall contain no phosphorus and</p> <p>22 nitrogen -- I'm on page 2 at the bottom -- no nitrogen</p> <p>23 and such concentrations that would impair any existing</p>	<p style="text-align: right;">327</p> <p>1 A. Yes. I just didn't -- I'd like to have -- I</p> <p>2 just didn't have the exact wording in front of me.</p> <p>3 Q. No, I understand.</p> <p>4 So for -- so to decide you've got to regulate</p> <p>5 nutrients, you need, under the narrative standard, you</p> <p>6 connect them to some type of, what, excessive plant</p> <p>7 growth or some kind of impairment of the use; right?</p> <p>8 You say the nutrients caused X to occur?</p> <p>9 A. Uhm, right. I mean, you're supposed to be</p> <p>10 saying that you don't have so much phosphorus or</p> <p>11 nitrogen such that you would impair any existing or</p> <p>12 designated uses.</p> <p>13 Q. Okay. My understanding, and maybe -- you'll</p> <p>14 correct me if I'm wrong, okay?</p> <p>15 A. Uhm-hmm.</p> <p>16 Q. I understood that the DES is saying the</p> <p>17 numeric nutrient criteria from 2009 constitute a</p> <p>18 narrative criteria implementation method or a narrative</p> <p>19 translator; is that your understanding?</p> <p>20 A. Do you mean a numeric translator of the</p> <p>21 narrative criteria?</p> <p>22 Q. Yeah.</p> <p>23 A. Right. That's how we're using it.</p>
<p style="text-align: right;">326</p> <p>1 designated use unless naturally occurring.</p> <p>2 You see where that phrase is in that document?</p> <p>3 A. Yes.</p> <p>4 Q. Okay. Is it your understanding that a</p> <p>5 narrative criteria violation for nutrients only occurs</p> <p>6 if the nutrients are causing some demonstrated adverse</p> <p>7 effect?</p> <p>8 A. Yes.</p> <p>9 Q. Okay. The -- your nutrient document or your</p> <p>10 standards also employ the term cultural eutrophication.</p> <p>11 It says, "Where existing discharges encourage cultural</p> <p>12 eutrophication, you remove the nitrogen and phosphorus</p> <p>13 to ensure attainment and maintenance of standards." Are</p> <p>14 you familiar with that statement, cultural</p> <p>15 eutrophication, in your regs?</p> <p>16 A. Yes, I'm familiar with it. What number is it?</p> <p>17 Q. It's in 1703.14. I'll read you what the</p> <p>18 definition says: Cultural eutrophication is defined as,</p> <p>19 quote, the human-induced addition of waste-containing</p> <p>20 nutrients to surface waters which results in excessive</p> <p>21 plant growth or a decrease in dissolved oxygen.</p> <p>22 Does that refresh your recollection as to what</p> <p>23 cultural eutrophication means?</p>	<p style="text-align: right;">328</p> <p>1 Q. So you've kind of translated the narrative</p> <p>2 into a numeric value; is that --</p> <p>3 A. For the purpose of 303 -- sorry, for the</p> <p>4 purpose of 303d assessments in the CALM.</p> <p>5 Q. Okay.</p> <p>6 A. It does not replace the narrative standard.</p> <p>7 Q. It doesn't replace -- so this is a new</p> <p>8 narrative translator, right; this document, the 2009</p> <p>9 document?</p> <p>10 A. Ah --</p> <p>11 Q. There wasn't one before?</p> <p>12 A. For the estuary. There's other -- obviously,</p> <p>13 we do assessments for lakes and rivers and everything</p> <p>14 else, and we have to interpret the narrative standard</p> <p>15 for assessments in those water bodies as well.</p> <p>16 Q. So I think the short answer is yes, this is a</p> <p>17 new one for the estuary; right?</p> <p>18 A. Yes, a new -- yes.</p> <p>19 Q. Okay. And that document, the 2009 document,</p> <p>20 the numeric translator, the numeric values contained</p> <p>21 therein were based on what I'll call, I'll call them new</p> <p>22 scientific and regulatory assumptions. I mean,</p> <p>23 regarding what the connection for nitrogen is to</p>

<p style="text-align: right;">329</p> <p>1 impacting transparency and things like that; correct? 2 MR. MULHOLLAND: Objection to form. 3 That's a complex question. 4 Q. It certainly is. I'm sorry. There was no 5 easy way to ask it. 6 A. So could you -- 7 Q. Yeah. Is the 2009, June 2009 document based 8 on new scientific and regulatory assumptions regarding 9 how nutrients impact Great Bay and the estuary? 10 A. I wouldn't say that. I would say it's based 11 on scientific information that's been published for a 12 long time. 13 Q. Oh. When I'm saying new, I'm meaning new in 14 its application to Great Bay? 15 A. Oh, like -- you just -- specifically in Great 16 Bay? 17 Q. Yeah. Like applied -- this is the first time 18 this information's been applied to Great Bay and the 19 estuary, right, to develop a numeric value? 20 A. Oh, it's the first time we've done that; yes. 21 Q. There's some correspondence back and forth 22 through EPA indicating that the 2009 document, the 23 numeric criteria document should be called a narrative</p>	<p style="text-align: right;">331</p> <p>1 and not, like, enforcement actions and other legal 2 matters? 3 Q. Or permitting. 4 A. We don't -- DE -- sorry. Can we answer -- 5 Q. Let me withdraw the question. Let me just 6 withdraw the question. 7 Did EPA, to your knowledge, did EPA ever 8 explain to DES that you needed to adopt the numeric 9 nutrient criteria as a numeric criteria in your state 10 water quality standards? 11 A. You mean, like, go through official 12 rulemaking? So you're asking did EPA tell us we needed 13 to do that? 14 Q. Yep. 15 A. I don't recall. 16 Q. Okay. I'm going to ask -- that question that 17 I withdrew, I'm going to try to rephrase it. 18 Can you explain to me what the difference is 19 between calling this document a narrative translator 20 versus calling it a numeric criteria? 21 A. Calling -- just calling the same document two 22 different things? 23 Q. Yeah. Yeah. What's the regulatory</p>
<p style="text-align: right;">330</p> <p>1 translator. Were you involved in any of those 2 discussions where the EPA was recommending the, instead 3 of calling it a new numeric criteria, that you should 4 just call it a new narrative translator; do you recall 5 any of that? 6 A. Do you mean, sorry, numeric translator of the 7 narrative standard? 8 Q. Yeah. 9 A. There's been a lot of discussions about that 10 type of issue. I don't recall anything specific. 11 Q. Okay. Do you know who first raised that that 12 was an important issue; did DES raise that as a concern 13 or did EPA? 14 A. I don't recall. 15 Q. What's the difference in effect, and I'll say 16 in regulatory usage, by calling this a numeric 17 translator of a narrative criteria, or just a numeric 18 nutrient criteria? 19 MR. MULHOLLAND: Objection; calls for a 20 legal conclusion. 21 Q. Would it have any different regulatory effect 22 in your 303d listing process? 23 A. In the -- you're just talking about 303d now,</p>	<p style="text-align: right;">332</p> <p>1 difference; do you know? 2 A. Well, there's a difference in terms of 3 enforcement authority and in terms of going through 4 rulemaking. 5 Q. What about in terms of 303d listing? 6 A. I think we already covered this. In terms of 7 303d listing there is no difference. 8 Q. There is no difference. Right. Okay. 9 Do you know if there's a difference with 10 respect to permitting? 11 A. I don't know, because we don't -- we, DES, 12 don't write the permits. 13 Q. Okay. But you didn't -- your wasteload 14 allocation analyses didn't treat it any differently for 15 the purposes of permitting, did it? 16 A. Treat it any differently than what? 17 Q. Well, than any other typically adopted numeric 18 criteria? 19 A. No. I've only done that once. I never -- 20 Q. That's right, I'm sorry. You've only done it 21 once. Okay. 22 Does this numeric nutrient criteria document 23 from June 2009, is it DES's position that this document</p>

333	<p>1 constitutes a demonstration that the narrative criteria</p> <p>2 for nutrients have been violated within the Great Bay</p> <p>3 estuary?</p> <p>4 A. Does that document?</p> <p>5 Q. Uhm-hmm.</p> <p>6 A. Demonstrate a violation?</p> <p>7 Q. Yeah; of the narrative standard?</p> <p>8 A. No.</p> <p>9 Q. Okay. With regard to the -- let's switch to</p> <p>10 permits for a minute. You're not the permitting person</p> <p>11 for the department, for DES, right, that coordinates</p> <p>12 usually with EPA?</p> <p>13 A. Right. I'm not that person.</p> <p>14 Q. Who is that person?</p> <p>15 A. Uhm, Stergios Spanos.</p> <p>16 Q. Do you know if DES and EPA have been</p> <p>17 coordinating on the reopening of the permits for the</p> <p>18 towns of Exeter, Newmarket, Rochester, Dover and</p> <p>19 Portsmouth?</p> <p>20 MR. MULHOLLAND: Objection; compound.</p> <p>21 A. You mean reopening as in issuing new permits?</p> <p>22 Yes, there's been coordination.</p> <p>23 Q. And the main focus of those permits have been</p>	335	<p>1 Q. Okay. Are you responsible at all for 401</p> <p>2 certifications on those permits; do you provide input on</p> <p>3 that?</p> <p>4 A. 401 certifications on permits are done by the</p> <p>5 wastewater engineering branch. So we would provide some</p> <p>6 input but they're the lead for those type of</p> <p>7 certifications.</p> <p>8 Q. Okay. Do you know if they -- any 401</p> <p>9 certifications have been sent out on Exeter, Newmarket</p> <p>10 or Dover permits?</p> <p>11 A. I don't believe so. You're talking about the</p> <p>12 new permits; right?</p> <p>13 Q. Yes, the new permits. Yes, I'm not talking</p> <p>14 about the old ones.</p> <p>15 A. Yes. I don't believe so.</p> <p>16 MR. HALL: Why don't we break for lunch.</p> <p>17 MR. MULHOLLAND: Sure.</p> <p>18</p> <p>19 (Luncheon recess.)</p> <p>20</p> <p>21 MR. HALL: Back on the record.</p> <p>22 I understand that Mr. Trowbridge would like to</p> <p>23 give an answer to the question that we had on whether</p>
334	<p>1 implementations of the numeric nutrient criteria that</p> <p>2 were developed in June 2009?</p> <p>3 A. I haven't been involved with the full part in</p> <p>4 all of the permits.</p> <p>5 Q. Do you know if DES has reviewed any draft</p> <p>6 permits that EPA has sent over, like, for Exeter or</p> <p>7 Newmarket or Dover?</p> <p>8 A. Yes.</p> <p>9 Q. And there's a lot of e-mails back and forth,</p> <p>10 so you're copied on some, but do you know if anybody at</p> <p>11 DES has objected to the -- to EPA's establishment of a</p> <p>12 3-milligram per liter total nitrogen limit for -- in any</p> <p>13 of those permits?</p> <p>14 MR. MULHOLLAND: Objection as to form.</p> <p>15 Just the word "objection." Do you mean formal</p> <p>16 objections or informal objections?</p> <p>17 MR. HALL: Has he either formally or</p> <p>18 informally objected. Thank you. That's a good point.</p> <p>19 Q. Have they told EPA that it's improper to give</p> <p>20 these facilities a 3-milligram per liter total nitrogen</p> <p>21 limit as the means for meeting the numeric nutrient</p> <p>22 criteria for Great Bay?</p> <p>23 A. I don't think so.</p>	336	<p>1 anybody has presented him with a demonstration that</p> <p>2 nitrogen was the cause of eelgrass losses in the Great</p> <p>3 Bay estuary system?</p> <p>4 MR. MULHOLLAND: Yes.</p> <p>5 THE WITNESS: So before we do that, we</p> <p>6 just wanted to change an answer.</p> <p>7 BY MR. HALL:</p> <p>8 Q. No. I think I'd like you to answer the</p> <p>9 question first, and if we want to change an answer,</p> <p>10 that's fine.</p> <p>11 A. All right. So the answer would be no, because</p> <p>12 you cannot prove causation because there's no control</p> <p>13 for the Great Bay.</p> <p>14 MR. MULHOLLAND: And then Mr. Trowbridge</p> <p>15 has to change an answer that he realized he answered</p> <p>16 incorrectly.</p> <p>17 Q. Okay. And do you recall what the question</p> <p>18 was?</p> <p>19 A. It was a question related to the cause of</p> <p>20 eelgrass decline in Waquoit Bay. I think the question</p> <p>21 was has eelgrass loss been -- the cause of eelgrass loss</p> <p>22 been proven there, or something to that effect. So I</p> <p>23 think a more appropriate answer would be, as far as I</p>

337	<p>1 know, there have -- they have not proven the cause of</p> <p>2 eelgrass loss there.</p> <p>3 Q. Okay. That's fine.</p> <p>4 What I'd like to do is kind of go back to an</p> <p>5 earlier line of questioning that we had in a prior</p> <p>6 deposition. And it's related to how the numeric</p> <p>7 criteria for transparency were derived. Let's see if we</p> <p>8 can work our way through this.</p> <p>9 I believe you indicated in your prior</p> <p>10 deposition that the 2009 numeric criteria were based on</p> <p>11 the assumption that attaining a 22 percent light</p> <p>12 transmission level was needed to protect eelgrass growth</p> <p>13 and survival?</p> <p>14 A. Yes. I believe that's correct.</p> <p>15 Q. And that was based on some studies that, I</p> <p>16 believe, were used in the Chesapeake Bay program. Is</p> <p>17 that your recollection also?</p> <p>18 A. Yes.</p> <p>19 Q. Okay. And then the nitrogen criteria from the</p> <p>20 2009 document, they were based on achieving that -- the</p> <p>21 level of nitrogen that was necessary to achieve that</p> <p>22 particular level of transparency; right?</p> <p>23 A. You're talking about the nitrogen ones or the</p>	339	<p>1 criteria violation now?</p> <p>2 A. Uhm, can you just say that again?</p> <p>3 Q. I'm trying to ask a question as to what the</p> <p>4 22 percent -- not achieving the 22 percent target does</p> <p>5 in the system at this point in time.</p> <p>6 If I'm in an area where eelgrass are currently</p> <p>7 less than, 20 percent less than historical levels, if</p> <p>8 the light transmission in that area is not at</p> <p>9 22 percent, on average --</p> <p>10 A. Above or below?</p> <p>11 Q. Is below 22 percent, on average, does that</p> <p>12 constitute a narrative criteria violation?</p> <p>13 A. Uhm, it -- and what would be the nitrogen</p> <p>14 concentration?</p> <p>15 Q. Nitrogen concentration would be --</p> <p>16 A. Actually, sorry. Are you talking about</p> <p>17 violation of the aquatic -- the biological aquatic</p> <p>18 community integrity standard or of the narrative</p> <p>19 standard for nutrients?</p> <p>20 Q. Let's do the biological integrity one first.</p> <p>21 A. Okay. Biological integrity, the assessment</p> <p>22 protocol only looks at the change in the eelgrass cover,</p> <p>23 so it does not look at the light attenuation.</p>
338	<p>1 light attenuation?</p> <p>2 Q. Well, the nitrogen were based on -- were based</p> <p>3 on the light attenuation target; correct?</p> <p>4 A. Just making sure I understand the one you're</p> <p>5 talking about. The ones on this table?</p> <p>6 Q. Yes. We're looking at page 68 for Document</p> <p>7 Number 27 from the Short deposition.</p> <p>8 A. And within that table, we're talking about</p> <p>9 these numbers here.</p> <p>10 (Indicating.)</p> <p>11 Q. When you're pointing and saying "these</p> <p>12 numbers," can you please tell us --</p> <p>13 A. The numbers related for total nitrogen and</p> <p>14 light attenuation coefficient.</p> <p>15 Q. Correct.</p> <p>16 A. Okay. Yes. These numbers were derived using</p> <p>17 the light-attenuation model.</p> <p>18 Q. And the light-attenuation model used the</p> <p>19 22 percent light transmission level; right?</p> <p>20 A. Yes.</p> <p>21 Q. Okay. Does not meeting a 22 percent light</p> <p>22 transmission level in areas where eelgrass growth is now</p> <p>23 below expected levels, does that constitute a narrative</p>	340	<p>1 Q. Okay. For the one that looks at light</p> <p>2 attenuation, would it be considered a narrative criteria</p> <p>3 violation?</p> <p>4 A. So when we're talking about evaluation, I</p> <p>5 guess what I'd say is about the nutrient narrative</p> <p>6 standard.</p> <p>7 Q. Uhm-hmm.</p> <p>8 A. The issue is what is the nitrogen</p> <p>9 concentration relative to its threshold. Because the</p> <p>10 eelgrass, change in eelgrass and the light attenuation</p> <p>11 parameter are both response parameters.</p> <p>12 Q. Well, let's take them one at a time. There's</p> <p>13 a light -- there's a light-attenuation value that's in</p> <p>14 the 2009 criteria document; right?</p> <p>15 A. Yes.</p> <p>16 Q. And you've used that to set light attenuation</p> <p>17 impairment listings; correct?</p> <p>18 A. Yes.</p> <p>19 Q. So if I'm in an area where eelgrass population</p> <p>20 is less than 20 percent of historical levels --</p> <p>21 A. Uhm-hmm.</p> <p>22 Q. -- and my light attenuation level is less than</p> <p>23 the 22 percent target level, does that constitute a</p>

<p style="text-align: right;">341</p> <p>1 narrative criteria violation for light attenuation? 2 A. Uhm, where I'm getting confused is there isn't 3 a narrative standard for light attenuation. It's -- the 4 narrative standards we're talking about are the ones for 5 nutrients, and the ones for biological and aquatic 6 community integrity. So I'm just having a hard time 7 understanding this. 8 Q. Then you've confused me even more, 9 Mr. Trowbridge, with that response because didn't the 10 impairment listing document for 2009 and thereafter 11 identify light attenuation as an impairment? 12 A. Right. So are you asking, then, if you have 13 light attenuation, just independent of anything else -- 14 Q. Hmm. 15 A. -- it's less than 22 percent, or the 16 equivalent value for Kd, is that going to be an 17 impairment on the 303d list? 18 Q. Well, I know it's an impairment on the 303d 19 list; right? I mean, you've listed it as an impairment. 20 So does that mean it's a narrative criteria violation is 21 occurring there? 22 A. Yes. I think that would be -- this is not a 23 way we have thought about it, but this would be, I</p>	<p style="text-align: right;">343</p> <p>1 A. In areas where we have long-term records. 2 Q. Right. But I agree it hasn't changed. I 3 mean, that's something that I think the long-term 4 records have borne out. But the level that hasn't 5 changed, was that level above or below the 22 percent 6 light transmission level? 7 A. I'm not sure, because the old measurements 8 were made with Secchi disks, so the relationship between 9 that and the 22 percent is hard to say. 10 Q. Okay. Let's walk through some of the 11 impairment findings that happened before the numeric 12 nutrient criteria were put together. The State of the 13 Estuaries reports, you were responsible for preparing a 14 number of them. I believe we covered last time that the 15 State of the Estuaries reports, I'll say at least up 16 through 2006, confirm that algal growth in the system 17 did not change significantly in response to a 59 percent 18 increase in inorganic and total nitrogen levels in the 19 bay; correct? 20 A. We're talking about through 2006? 21 Q. Yeah. 22 A. I don't recall exactly, but certainly the 23 levels of chlorophyll or phytoplankton have not</p>
<p style="text-align: right;">342</p> <p>1 think, under the biological and aquatic community 2 integrity narrative standard, in this particular area, 3 which is the -- which is the estuary, where eelgrass has 4 historically existed. 5 Q. Okay. So the new way of implementing the 6 narrative criteria -- I'll just try to say it simply -- 7 presumes that you need to have a 22 percent light 8 transmission level to protect eelgrass resources? 9 A. Yes. 10 Q. Okay. Do you know if the historical data for 11 the estuary support that a 22 percent light level is 12 necessary for stable and healthy eelgrass populations to 13 exist, for example, in Great Bay? 14 A. Are you talking about, like, historical 15 records of light attenuation? 16 Q. Historical record of the amount of light 17 that's occurring in the system. 18 A. And I think we covered some of these questions 19 in the previous deposition. 20 Q. Right. 21 A. And the light attenuation, the information we 22 have has not changed very much. 23 Q. Okay.</p>	<p style="text-align: right;">344</p> <p>1 increased dramatically. I don't know by other types of 2 algae, like macroalgae. 3 Q. I'm only talking about phytoplankton. The 4 nitrogen went up but the phytoplankton levels didn't 5 change? 6 A. In the place where we have long-term records, 7 which is Adams Point. 8 Q. So if the phytoplankton levels didn't change, 9 phytoplankton could not have caused a change in 10 transparency; correct? 11 A. Uhm, yes. 12 Q. "Yes," meaning correct; right? 13 A. Yes. 14 Q. Okay. So back to the -- remember we used the 15 term "cultural eutrophication" before about causing, 16 something about causing excessive or increased aquatic 17 plant growth; right? I think that's how the term's 18 used? 19 A. I believe so. 20 Q. So with regard to, and I'll just say 21 phytoplankton, up through 2006 at least, there wasn't 22 any indication that narrative criteria were being 23 violated for nutrients; right?</p>

<p style="text-align: right;">345</p> <p>1 A. I'd say based on the information we had in 2 2006, that's correct.</p> <p>3 Q. Okay. There was a noted suspended solids 4 increase, and I covered this also with Mr. Currier. 5 There was a suspended solids increase reported in the 6 2006 State of the Estuaries report, which is Short 7 Exhibit 18. Do you recall that analysis? And I'm 8 pointing at the graphs. It's called -- is that figure 9 7?</p> <p>10 MR. MULHOLLAND: Figure 7.</p> <p>11 Q. Yeah, figure 7 on page 13. And that was from 12 the -- that 2006 State of the Estuaries report. So the 13 suspended solids had gone up how much between the two 14 assessment periods that you're looking at for that 15 report?</p> <p>16 A. I think I'm looking in the right spot here. 17 It says, on page 12, "During the same period suspended 18 solids concentrations increased by 81 percent."</p> <p>19 Q. Okay. So up to 2006 the chlorophyll-a didn't 20 change materially as a result of changing nitrogen loads 21 but the suspended solids went up. Did you ever have 22 a -- an explanation for what caused that to occur? 23 What -- if the chlorophyll-a didn't go up, that couldn't</p>	<p style="text-align: right;">347</p> <p>1 patterns of eelgrass loss relative to suspended solids 2 concentrations.</p> <p>3 Q. Uhm-hmm. Okay. And what would that 4 conclusion be?</p> <p>5 A. I'll get it exactly. So there's, in this 6 appendix B, I don't know what exhibit this is, but 2009 7 guidance document, appendix B page B3.</p> <p>8 Q. Uhm-hmm.</p> <p>9 A. There's a paragraph near the bottom that 10 summarizes the result of that, or the observations.</p> <p>11 Q. Okay. Can you tell me what that observation 12 was?</p> <p>13 A. Okay. So it says, "As expected, the suspended 14 sediment concentrations in the estuary have increased as 15 a result of eelgrass loss. Figure 2 shows that 16 suspended solids concentration spiked in 1990 to 1992, 17 following a period when eelgrass died off due to wasting 18 disease.</p> <p>19 "In the years following, the eelgrass 20 population rebounded and suspended solids concentration 21 returned to normal levels. Later, after the eelgrass 22 populations in the Great Bay had been declining for 23 several years, the suspended solids concentrations again</p>
<p style="text-align: right;">346</p> <p>1 have caused the suspended solids to go up, obviously; 2 right?</p> <p>3 A. Yes.</p> <p>4 Q. Okay. So do we know what caused the suspended 5 solids to increase in the system if it wasn't algae?</p> <p>6 A. Are we talking about what we knew in 2007 or 7 2006 or 2005 or what we know now?</p> <p>8 Q. What you knew at that time. I don't know if 9 you know anything different today but...</p> <p>10 A. I don't think we drew any strong conclusions 11 in this report.</p> <p>12 Q. Okay. But it apparently wasn't caused by the 13 nutrients because the nutrients hadn't changed 14 chlorophyll-a?</p> <p>15 A. According to this report, no.</p> <p>16 Q. Did you have any subsequent analysis that 17 would have indicated that the nutrients were the cause 18 of the change in suspended solids in the system or do 19 you know if there were any subsequent reports that 20 concluded nutrients were the cause of the change to 21 suspended solids in the system?</p> <p>22 A. I believe we did an appendix to the 2009 23 report, 2009 guidance document where we looked at some</p>	<p style="text-align: right;">348</p> <p>1 became elevated. This pattern of increasing suspended 2 solids concentrations following eelgrass loss is a 3 negative feedback cycle that has been documented in the 4 scientific literature, Burkholder 2007. The increased 5 turbidity from destabilized sediments decreases light 6 availability for eelgrass."</p> <p>7 Q. Okay. So that explains, you believe, that 8 some eelgrass loss may be the root cause of why the TSS 9 level went up?</p> <p>10 A. Yes.</p> <p>11 Q. Okay. I'll take that back now. 12 (Handing.)</p> <p>13 Q. In your last deposition we had discussed 14 whether or not there was information on whether epiphyte 15 growth was expansive in the system. So I guess the 16 question is, and there was some information from Fred 17 Short, I think you may recall what Fred had said, he had 18 not really seen that epiphyte growth was excessive. So 19 with regard to epiphyte growth, do you know if there's a 20 current basis to claim there's a narrative criteria 21 violation associated with that form of plant growth in 22 Great Bay or in the tidal rivers?</p> <p>23 A. So the form of the question is do I know if</p>

<p style="text-align: right;">349</p> <p>1 there's any information or -- sorry. It's just a 2 complicated question.</p> <p>3 Q. I'm asking about is there any information 4 showing that epiphyte growth is currently in violation 5 of narrative criteria?</p> <p>6 A. Not that I'm aware of.</p> <p>7 Q. Okay. In your -- in our prior deposition you 8 and I also talked about that eelgrass impairment status 9 between the early '90s and 2005. Do you recall us 10 talking about that?</p> <p>11 A. About 303d impairments?</p> <p>12 Q. Yes.</p> <p>13 A. Yes.</p> <p>14 Q. And you recall that the waters were not 15 considered impaired -- when I say "the waters," I think 16 it was Great Bay and Portsmouth Harbor were not 17 considered impaired for eelgrass from, I'll say, the 18 1990s through 2005; is that correct?</p> <p>19 A. Uhm, yes. Those waters were not on the 303d 20 list between those two years.</p> <p>21 Q. Okay. So during that period, there was no 22 narrative criteria violation for ecological impacts 23 associated with eelgrass in those areas; right?</p>	<p style="text-align: right;">351</p> <p>1 the 20 percent, 20 percent of baseline?</p> <p>2 A. I just, you know, not having done the 3 calculation exactly, I can't say for sure. But, uhm, I 4 mean, aren't we just looking to eyeball it or --</p> <p>5 Q. Yeah. I mean, I can assure you, the 2006 6 estuary report actually had that stuff, as did the -- we 7 could look at your 2008 impairment listing.</p> <p>8 A. Sure.</p> <p>9 Q. That said no, it wasn't.</p> <p>10 A. I just am sensitive to saying a specific 11 number when I haven't done the --</p> <p>12 Q. Would you like me to give you another document 13 that actually had the calculation in it?</p> <p>14 A. Sure.</p> <p>15 Q. I think we've got that. Let me have that 16 back. Let's look at the -- what I'm going to give you a 17 copy of is the August 2008 Impaired Waters document. 18 (Handing.)</p> <p>19 Q. If you look at the table there, that indicates 20 that the eelgrass population, I believe, was somewhere 21 around an average of -- a little over 2,000 acres in 22 Great Bay.</p> <p>23 A. Okay. I mean, the section that I was -- would</p>
<p style="text-align: right;">350</p> <p>1 A. Uhm, we only started to make assessments of 2 eelgrass after that period of time, so it's hard for me 3 to say whether there was a violation or not. Because we 4 weren't looking at the data for 303d purposes.</p> <p>5 Q. Okay. But I mean, in terms of the actual 6 data, I mean, I could give you the --</p> <p>7 A. In terms of what the levels were.</p> <p>8 Q. Yeah, the actual acreages. So they were all 9 within 20 percent of historical during that timeframe; 10 correct?</p> <p>11 A. That's a different question than talking about 12 an impairment determination.</p> <p>13 Q. But isn't within 20 percent of historical the 14 basis of an eelgrass determination; right?</p> <p>15 A. That's the threshold we use for the protocol; 16 yes.</p> <p>17 Q. So if they -- I'll show you the -- we can use 18 the -- let's use Exhibit 67, which is the eelgrass 19 acreage charts that you've put together for PREP. You 20 recall that document, of course; correct?</p> <p>21 A. Yes.</p> <p>22 Q. And between, I guess we'll call it 1990 and 23 2005, is there -- was Great Bay less than the, you know,</p>	<p style="text-align: right;">352</p> <p>1 turn to to answer this question is on page 6 of that 2 document.</p> <p>3 Q. Uhm-hmm.</p> <p>4 A. And it's the second full paragraph, and says, 5 "For the period between 1990 and 1999, eelgrass cover in 6 Great Bay was relatively healthy and stable. The 7 relative standard deviation of eelgrass during this 8 period was 6.5 percent." That's sort of the assessment 9 we did. And we go on to say, "Assuming that the 10 variability of eelgrass cover in Great Bay is 11 represented by the locations, DES shows three relative 12 standard deviations, which is 20 percent, as the 13 appropriate threshold for nonrandom change from 14 reference conditions."</p> <p>15 Q. That's what the -- and what I'm saying is the 16 values that are in that table in the back don't show 17 more than a 20 percent change in the reference 18 condition. I mean, that was the point; right?</p> <p>19 A. Okay.</p> <p>20 Q. I mean --</p> <p>21 A. No, I understand your point. I just --</p> <p>22 Q. I'm just saying, so that's the question: 23 Those don't show -- those data indicate that there was</p>

<p style="text-align: right;">353</p> <p>1 no impaired -- impairment listing for Great Bay through 2 2005? I mean, this is something we covered in the prior 3 deposition. 4 A. I'm just wanting to be precise about numbers. 5 But, I mean, if we're talking in general, yes, I agree. 6 Q. And then looking at Portsmouth, the Portsmouth 7 Harbor area, I think it was the answer was the same 8 there; that the values down in Portsmouth Harbor are 9 within the same range as -- 10 A. Oh, so you're talking about the assessment 11 made using data through 2005? 12 Q. Yeah. That's all. 13 A. Okay. You're not -- okay. I was mis-- 14 Q. I'm just saying -- I'm just trying to set up 15 what the -- what were the conditions occurring in Great 16 Bay prior to -- 2005 and prior. 17 A. Okay. So -- so I understand better now. 18 So, yeah. This was the assessment we made 19 using the protocol that we have with all the data 20 available through 2005. 21 Q. Right. 22 A. Right. 23 Q. And up through 2005, not listed as impaired?</p>	<p style="text-align: right;">355</p> <p>1 Q. No significant change in chlorophyll levels in 2 these areas up through this period? 3 A. Uhm-hmm. 4 Q. Right? 5 A. Right. 6 Q. There was a change in suspended solids, which 7 you've explained is maybe related to some eelgrass 8 thinning in the system; right? 9 A. Yes. 10 Q. Okay. And as far as we know, there was no 11 change in transparency throughout this time frame of 12 1990 to 2005, to the degree we have data or information 13 available on that; right? 14 A. Right. In the few locations where we have 15 long-term records. 16 Q. Right. Okay. 17 All right. So I guess with regard to 18 transparency, at this point in time, to the degree we've 19 got the records, there's no indication that transparency 20 is suffering as a result of cultural eutrophication, 21 right, because it hasn't changed? 22 A. You're talking specifically about Great Bay; 23 right?</p>
<p style="text-align: right;">354</p> <p>1 A. For Great Bay and for Portsmouth Harbor. 2 Q. Okay. Right. So up through 2005 there's no 3 narrative criteria violation for what -- I guess what 4 you call ecological impacts for Great Bay or Portsmouth 5 Harbor; right? 6 A. Correct. 7 Q. Okay. 8 A. And I think it's important to -- for Great 9 Bay, that report did conclude that Great Bay was 10 determined to be threatened, but based on, I guess, 11 preliminary data for eelgrass in 2006 and 2007. 12 Q. Right. That's why I'm just -- I'm just 13 sticking with what happened. I'm trying to ask 14 ourselves, just so you get the idea where we're going on 15 this, Mr. Trowbridge, I'm asking ourselves what did we 16 know about the system prior to 2005. 17 A. Sure. All right. 18 Q. Eelgrass not impaired, and not listed as 19 impaired in Great Bay; right? 20 A. Correct. 21 Q. Eelgrass not listed as impaired in Portsmouth 22 Harbor? 23 A. Correct.</p>	<p style="text-align: right;">356</p> <p>1 Q. Yeah, Great Bay. And Portsmouth Harbor, I 2 guess. I mean, I suppose. There's not that many 3 readings in Portsmouth Harbor; right? 4 A. Very few. 5 Q. Very few. But there's quite a bit of data on, 6 really on transparency for Great Bay; right? 7 A. There's been Secchi depth measurements for a 8 while, but not very many of the actual measurements of 9 light attenuation. I'm sorry, I forgot the original 10 question. 11 Q. Oh. I was asking whether or not there was any 12 indication that transparency had suffered as a result of 13 cultural eutrophication up through 2005? 14 A. Not in Great Bay. 15 Q. Okay. So here's the question: We've got a -- 16 let's see, how many years are we looking at? The 17 eelgrass rebounded in 1989 or something? When did the 18 eelgrass rebound after the -- after the wasting disease 19 event? What was the first year the acreage started 20 looking pretty good? 21 A. Around 1990. 22 Q. Around 1990, okay. That's fair enough. 23 So from 1990 to 2005 we've got this long</p>

<p style="text-align: right;">357</p> <p>1 period of stable eelgrass acreage, within the 2 20 percent, it goes up and down, but that's why you have 3 a 20 percent variation. During this same period, these, 4 the waters in Great Bay did not meet the 22 percent 5 incident light requirement, did they? I mean, based on 6 the best available information you have, they did not 7 meet that 22 percent level; correct? 8 A. Well, we only started measuring the light 9 attenuation in 2004, I think, you know. 10 Q. I'm just saying, based on the best available 11 information you have, the light attenuation level was 12 not met; right? That 22 percent level was not met in 13 Great Bay? 14 A. I -- I guess I'm having trouble because the 15 data that I have to assess that is the light attenuation 16 measurements, and they started in 2004. 17 Q. Didn't meet it in 2004, did it? 18 A. Uhm, I don't recall. We've been looking at 19 the data in aggregate. 20 Q. Okay. Well, the transparency levels haven't 21 changed, right, not materially, as far as we know, in 22 Great Bay? 23 MR. MULHOLLAND: Objection; form. It's</p>	<p style="text-align: right;">359</p> <p>1 haven't changed materially? Whatever is being measured 2 for light attenuation hasn't really changed, right; it's 3 just another way of measuring light attenuation? 4 A. Right. I just say it's a less accurate way. 5 Q. Pretty -- what, Secchi depth? 6 A. Uhm-hmm. 7 Q. It's a pretty simple measurement, isn't it? 8 A. Yes. 9 Q. I mean, very simple measurement; right? 10 A. It's simple, but it's also somewhat subjective 11 to the vision of the person taking the measurement. 12 Q. But these were quality -- these were data that 13 were supposedly quality assured and put into your 14 database? 15 A. Yeah. These were measurements made by 16 volunteers. They had a quality assurance plan. 17 Q. Okay. And these were data that you, yourself, 18 had relied on in doing presentations to EPA as to what 19 was affecting the eelgrass in the system; right? I 20 mean, you used them yourself? 21 A. I certainly have looked at the data; yes. 22 Q. And you presented the results of those data, 23 too; right?</p>
<p style="text-align: right;">358</p> <p>1 unclear when. 2 Q. Just period. Over, in 20 years, from 1990 to 3 present, they have not materially changed in Great Bay; 4 correct? 5 A. I think if you're talking about the Secchi 6 depth readings. 7 Q. Which is a measure of transparency; correct? 8 A. It's a measure of transparency, yeah. 9 Q. Hasn't changed? 10 A. The data that's from Adams Point has not 11 changed, no. 12 Q. Okay. And the Kd readings that you have at 13 Adams Point indicate the 22 percent light level is not 14 being met in that area; correct? I mean, I could show 15 you your own analyses that did that. Correct? 16 A. Yes. 17 Q. So -- 18 A. I'm just not sure of how good a translator or 19 how good the connection is between Secchi depth and 20 measured light attenuation by photosynthetic active 21 radiation. That's my hesitation in the answer. 22 Q. Well, I could go into asking you why would 23 that make a difference if the Secchi depth numbers</p>	<p style="text-align: right;">360</p> <p>1 A. Yes. 2 Q. Did you present the results because you 3 thought it was unreliable? When you were presenting the 4 results, did you tell people, I'm giving you information 5 that's not reliable? 6 A. I don't remember if I said that in my 7 presentation. 8 Q. All right. You didn't likely say that in your 9 presentations, did you? 10 A. I don't know. 11 Q. You don't know? 12 A. I don't know what I said in presentations that 13 long ago. 14 Q. Okay. Assume, for the purpose of this 15 question, that the transparency level prior to 2005 did 16 not meet, in Great Bay, did not meet the 22 percent 17 incident light level. Assume that for the basis of this 18 question. Wouldn't this 16-year run of acceptable 19 eelgrass acreage indicate that a 22 percent light level 20 is not necessary in Great Bay to support an unimpaired 21 eelgrass status? 22 A. Unless the eelgrass is getting light during 23 periods of low tide when it's exposed to the surface.</p>

<p style="text-align: right;">361</p> <p>1 You know, there's -- this is a shallow system, and so 2 the eelgrass, some of the eelgrass can be exposed 3 directly to sunlight at low tide. And so that's one of 4 the ways that it can get light that would be not 5 explained by a 22 percent-light-transmission- 6 through-the-water model.</p> <p>7 Q. So the answer to the question is yes? I mean, 8 could you read it back? I mean, you explained to me why 9 the answer is -- why 22 percent wouldn't apply, but I 10 think a simple answer to the question first, and then if 11 you want to explain it later.</p> <p>12 MR. HALL: I think if you read back, 13 wouldn't this 16-year... 14 (Record read as requested.) 15 A. So I think the answer is, I think, yes, with 16 the explanation I provided.</p> <p>17 Q. With the explanation of why that's occurring? 18 A. Yes. 19 Q. Okay. That's fine. I mean, that, quite 20 frankly, that's the same explanation that Fred Short has 21 repeatedly given, right, why Great Bay isn't -- he 22 doesn't consider it to be a transparency-limited area, 23 because the eelgrass get enough light at low tide;</p>	<p style="text-align: right;">363</p> <p>1 Q. In Great Bay. I could only refer this 2 question to the specific area where the eelgrass were 3 fine. I mean, I -- 4 A. Uhm-hmm. 5 Q. You couldn't draw an answer to an area where 6 the eelgrass aren't there; right? 7 A. Correct. 8 Q. So we're only talking about Great Bay. I 9 mean, and you understand what the question is; right? 10 There's this theory that nitrogen is toxic, inorganic 11 nitrogen forms are toxic to eelgrass. So doesn't -- 12 whatever inorganic nitrogen levels occurring at that 13 time is not toxic to eelgrass because it's maintaining 14 its acreage requirements; right? 15 A. Uhm, I would say yes, with the explanation 16 that sometimes it takes a while for effects to be seen. 17 This is a fairly long run of data. And during the same 18 period there was a thinning of the beds. So there has 19 been some effects that aren't evident in this metric of 20 the eelgrass. 21 Q. Right. The thinning of the beds is not a 22 basis for declaring an impairment, correct, at this 23 point?</p>
<p style="text-align: right;">362</p> <p>1 right? 2 A. In the shallow areas. There are deeper areas 3 of Great Bay. 4 Q. Does your impairment status insist that you've 5 got, for 303d listing, say that something's considered 6 impaired, if you still meet the acreage requirements but 7 the eelgrass are not growing to some level in the deeper 8 areas? 9 A. No. Our protocol just looks at the overall 10 area. 11 Q. Okay. So the fact that some eelgrass may or 12 may not be growing in some of the deepest areas is not a 13 basis for to claim impaired; correct? 14 A. That's correct. That's not the way our 15 protocol works. 16 Q. Okay. Just checking. 17 Doesn't this same 16-year run of unimpaired 18 eelgrass status also confirm that whatever level of 19 nitrogen or inorganic nitrogen that was occurring in 20 this system is not at a level that's toxic to eelgrass? 21 A. I think you might want to clarify the question 22 in terms of toxic to eelgrass in Great Bay or in all 23 areas?</p>	<p style="text-align: right;">364</p> <p>1 A. That is correct. 2 Q. All right. So this is kind of like the 3 closeout question in this whole run of questions on 4 22 percent light and all of that. Is there any Great 5 Bay-specific information that you have or that's been 6 presented to you confirming that a 22 percent light 7 level is necessary to ensure the health and survival of 8 eelgrass anywhere in this system? 9 A. Anywhere in the Great Bay estuary system? So 10 you're asking has any evidence been or any information 11 been provided to me? 12 Q. Great Bay-specific information. 13 A. Great Bay-specific. No. 14 Q. Now, the source of the 22 percent, as we 15 discussed earlier, was a Chesapeake Bay analyses that 16 was done; correct? 17 A. Yes. 18 Q. Did you know that the Chesapeake Bay analysis 19 on 22 percent assumed that there was a significant level 20 of epiphyte growth occurring on the eelgrass? 21 A. Not that I'm aware of. 22 Q. Did you know that the Chesapeake Bay analysis 23 considered that a chlorophyll-a level in the range of 10</p>

<p style="text-align: right;">365</p> <p>1 to 13 micrograms was consistent with meeting the 2 transparency level that they had set in that system? 3 A. I'm sure I read that at some point, but it's a 4 totally different system in terms of its tidal range and 5 things. 6 Q. Right. So that means we probably shouldn't be 7 using Chesapeake Bay without accounting for all the 8 differences in this system; correct? 9 A. Well, when you look at any of these things you 10 have to account for changes between systems, and 11 22 percent was chosen as the minimal level for eelgrass 12 survival. It was not -- there was information or 13 reports that people gave us saying that the percentage 14 should be higher. 15 Q. I know what was chosen, Mr. Trowbridge. What 16 I'm asking is, we just covered the epiphyte point. If 17 Fred Short said epiphyte growth was not significant in 18 this system, then the 22 percent target that was 19 considered necessary and appropriate for Chesapeake Bay 20 would need to be adjusted for this system, wouldn't it, 21 if epiphyte growth was not significant? 22 A. Yeah. I think the way to phrase it is if you 23 had better site-specific information you could adjust</p>	<p style="text-align: right;">367</p> <p>1 the water as well as the light attenuation through 2 epiphytes on the leaf. 3 Q. Uhm-hmm. 4 A. So the ultimate number, the 22 percent, was 5 what the plant needed to survive. It's not that the -- 6 you know, I -- 7 Q. Can I explore that with you a little bit 8 further? Because, I mean, Mr. Trowbridge, I hope you 9 understand that all the people that are involved in the 10 litigation are really interested in just trying to make 11 sure we get to an answer that's necessary, appropriate, 12 and reasonable for the bay. We're not trying to find 13 out a way to kill eelgrass and not protect eelgrass or 14 anything like that. 15 If the 22 percent number was the amount that 16 accounted for light loss with an epiphyte coating, and 17 you did not have that epiphyte coating, you could use a 18 lower light-penetration value, couldn't you, because you 19 don't have the coating of epiphytes on the leaves? 20 A. Right. I just -- my recollection of their 21 report is a little different, and I just think without 22 looking at it I'm hesitant to offer an -- 23 Q. I'm not asking you to agree to my</p>
<p style="text-align: right;">366</p> <p>1 that. 2 Q. I think that's a good response. And we do 3 have some information from the eelgrass expert as to 4 whether epiphytes are prevalent and causing a problem; 5 right? 6 A. Yes. 7 Q. Okay. And that would be relevant 8 site-specific information; right? 9 A. I guess what I meant by that is some sort of 10 information on the degree to which the number might be 11 changed. 12 Q. Ah. One could probably find that out by 13 looking at the basis of the Chesapeake Bay program 14 number, now, couldn't they? 15 A. I don't follow it. 16 Q. Chesapeake Bay program number was altered to 17 account for additional epiphytes. One can find out how 18 much it was altered to account for that; right? 19 A. Uhm, it's been a while since I looked at the 20 Chesapeake Bay program numbers. And as I recall, the 21 22 percent was the amount of light that the plant needed 22 to receive, and that amount was the light attenuation, 23 so it was a combination of the light attenuation through</p>	<p style="text-align: right;">368</p> <p>1 characterizations of the report, I'm just suggesting 2 that the -- that if there was a difference, and it was 3 due to epiphytes, on the amount of light penetration 4 people thought was needed, that would be something we 5 could check and look at the reports to figure out 6 whether a different number was appropriate. That also 7 might very well explain why these eelgrass in Great Bay 8 seem to be doing so well with less than 22 percent and 9 also might explain why the eelgrass in Portsmouth 10 Harbor, which also doesn't meet the light attenuation 11 numbers that you want achieved, why they were doing so 12 well all the way up through 2005 with a lesser level of 13 light coming in. Simply might be the explanation, 14 that's all. Okay? 15 MR. HALL: The witness nodded. 16 A. I mean, is there a question? 17 Q. No. I'm just explaining -- 18 A. Yeah, right. 19 Q. -- as to why it's important and why we're 20 exploring some of these issues. It's not a case of 21 gotcha, it's a case of trying to get to the bottom of, 22 you know, how we get to reasonable answers on this case. 23 MR. HALL: Okay. You're looking like you</p>

<p style="text-align: right;">369</p> <p>1 wanted to --</p> <p>2 MR. MULHOLLAND: I was going to say</p> <p>3 that -- I was just going to say that there wasn't a</p> <p>4 question pending so he shouldn't answer the nonquestion,</p> <p>5 but you're beyond that.</p> <p>6 MR. HALL: Okay.</p> <p>7 Q. Now, let's go to after 2005 in the system.</p> <p>8 Let me have that back so it's not in front of you.</p> <p>9 (Handing.)</p> <p>10 Q. After 2005 there was a major decrease in</p> <p>11 eelgrass growth in the system; right? I think you could</p> <p>12 look at, for example, the table from your 2013 PREP,</p> <p>13 draft PREP report, and I will give us a document number,</p> <p>14 bear with me, so we all know what we're looking at.</p> <p>15 It's Exhibit 67.</p> <p>16 There was a major decrease in eelgrass</p> <p>17 populations in Great Bay; right?</p> <p>18 A. You mean in 2006, 2007 and 2008?</p> <p>19 Q. Yeah. Big drop-off?</p> <p>20 A. Yes.</p> <p>21 Q. I mean, actually, would you describe that as a</p> <p>22 relatively dramatic drop-off?</p> <p>23 A. It was a -- I just say it's a large change.</p>	<p style="text-align: right;">371</p> <p>1 decline.</p> <p>2 Q. Longer period of decline from when?</p> <p>3 A. The regression on this graph was done from</p> <p>4 1990. You know, really start to see it drop off after</p> <p>5 the '90s.</p> <p>6 Q. After 2005 it dropped off. It was back up</p> <p>7 over 2,000 acres in 2005, wasn't it?</p> <p>8 A. I'm just talking about the assessment protocol</p> <p>9 that we use. We use this regression --</p> <p>10 Q. But, I mean, if I took off those last five or</p> <p>11 six years with the drop and the bounce back up, I mean,</p> <p>12 that line would have come through those data virtually</p> <p>13 flat? I mean, that's what your -- we don't need to go</p> <p>14 there.</p> <p>15 A. Yeah.</p> <p>16 Q. Here's the question: That major decline, you</p> <p>17 don't know what caused that in 2006, '7 and '8; right?</p> <p>18 A. Uhm-hmm. Yes. We do not know.</p> <p>19 Q. Okay. And then this, I'll go down to</p> <p>20 Portsmouth Harbor because we've got a decline occurring,</p> <p>21 I guess. I don't know, maybe it's starting in 2007.</p> <p>22 It's dropping off a little bit and then coming down and</p> <p>23 then bounce -- do we know what caused the decline in</p>
<p style="text-align: right;">370</p> <p>1 It was a large decrease.</p> <p>2 Q. A large decrease that happened quickly; right?</p> <p>3 A. Uhm-hmm.</p> <p>4 Q. Okay. That decline in eelgrass was basically</p> <p>5 used as the basis for updating the impairment listings</p> <p>6 for 2009 and thereafter to call Great Bay eelgrass --</p> <p>7 impaired for eelgrass; correct?</p> <p>8 A. Yes. And I'd say it's, you know, we just use</p> <p>9 the same protocol that we used for the previous version,</p> <p>10 but with updated data and that showed an impairment.</p> <p>11 Q. Right. Certainly. And then in 2008, '9, '10,</p> <p>12 I'll say -- no, I'll say 2009, '10 and '11, the eelgrass</p> <p>13 rebounded back, and you and I covered that; right?</p> <p>14 It --</p> <p>15 A. Yes. It increased.</p> <p>16 Q. Okay. What caused this major rapid decline</p> <p>17 and then subsequent rebound in eelgrass acreage to</p> <p>18 occur; do you know?</p> <p>19 A. I don't know.</p> <p>20 Q. Okay.</p> <p>21 A. I will say that when you look at it plotted as</p> <p>22 it is on figure HAB 2-1, it is a decline and then an</p> <p>23 increase, but it's all part of a longer period of</p>	<p style="text-align: right;">372</p> <p>1 Portsmouth Harbor?</p> <p>2 A. No.</p> <p>3 Q. Okay. Do we have data showing that there's</p> <p>4 major increases in algal growth in Great Bay or the</p> <p>5 Portsmouth Harbor area occurring during this time? I</p> <p>6 suppose the answer's no, or we might have tagged that as</p> <p>7 a indicator of what was happening; right?</p> <p>8 A. You're referring to phytoplankton?</p> <p>9 Q. Phytoplankton, yeah.</p> <p>10 A. For phytoplankton, no, there's no information.</p> <p>11 Q. That really didn't change. Do we have data</p> <p>12 showing that there was a major transparency decrease</p> <p>13 from -- from before -- data from 2004, 2005 on</p> <p>14 transparency? I know that the transparency plummeted in</p> <p>15 2006, '7, '8, '9 in Great Bay. Do we have data that</p> <p>16 shows that?</p> <p>17 A. I haven't looked at the transparency data that</p> <p>18 way, so I don't -- I'm not sure.</p> <p>19 Q. Okay. What about the total nitrogen levels?</p> <p>20 That was considered acceptable for 15 years prior to</p> <p>21 2005. Did the total nitrogen levels increase</p> <p>22 significantly after 2005 such that the nitrogen somehow</p> <p>23 caused a toxic effect or some other effect on the</p>

<p style="text-align: right;">373</p> <p>1 eelgrass?</p> <p>2 A. Uhm, we started measuring total nitrogen</p> <p>3 either in 2003 or 2004. The concentrations, I'm not</p> <p>4 sure exactly when, but concentrations were higher in</p> <p>5 2006, 2007, 2008, compared to 2009, 2010, and 2011.</p> <p>6 Q. Okay.</p> <p>7 MR. HALL: I'm going to mark this as</p> <p>8 Exhibit 83.</p> <p>9</p> <p style="padding-left: 40px;">(Trowbridge Exhibit 83 marked for</p> <p>10 identification.)</p> <p>11</p> <p>12 Q. This is your PREP 2003 nutrient document --</p> <p>13 I'm sorry, 2013 --</p> <p>14 A. This is the draft.</p> <p>15 Q. Draft, correct. I'd like to draw your</p> <p>16 attention to, this may clarify your recollection on</p> <p>17 nutrient concentrations that you just testified on. The</p> <p>18 dissolved -- looking at page 3, which lists dissolved</p> <p>19 inorganic nitrogen, which had the higher dissolved</p> <p>20 inorganic nitrogen level, the period when the</p> <p>21 eelgrass -- the period before 2004 or the period after</p> <p>22 2004?</p> <p>23 A. In this analysis the higher DIN concentration</p>	<p style="text-align: right;">375</p> <p>1 A. And I'm talking about total nitrogen.</p> <p>2 Q. Total nitrogen. Right.</p> <p>3 In terms of threatened toxicity to eelgrass,</p> <p>4 it's dissolved inorganic nitrogen that's supposed to</p> <p>5 have the potential toxic effect; right?</p> <p>6 A. That's my understanding.</p> <p>7 Q. Yeah, okay. And -- all right. So here we are</p> <p>8 with this big decline in eelgrass, we don't know, or</p> <p>9 we're not sure what caused it, so what's the basis for</p> <p>10 thinking that either nitrogen or transparency caused</p> <p>11 that eelgrass decline in the system? I mean, other</p> <p>12 than, other than the draft numeric criteria document</p> <p>13 which, by the way, I know you're looking at the CALM</p> <p>14 report. The explanation you have in the CALM report is</p> <p>15 all the same data and information that's in the numeric</p> <p>16 criteria document. That's not new stuff; right?</p> <p>17 MR. MULHOLLAND: Objection. Do you want</p> <p>18 him to answer the question?</p> <p>19 Q. I'd like him to answer the question; what's</p> <p>20 the basis?</p> <p>21 A. What I'd like to point out is, in this</p> <p>22 response to comments on the CALM, I don't know what</p> <p>23 number it is, we added some information in there to talk</p>
<p style="text-align: right;">374</p> <p>1 was in the period before.</p> <p>2 Q. Okay. So during the period when the, I'll</p> <p>3 say, when the eelgrass were particularly healthy, 1993</p> <p>4 to 2000, we have a DIN level of above .15. It might be</p> <p>5 .16, who knows. You might be able to eyeball it better</p> <p>6 than me because it's your graph. And then from 2004 to</p> <p>7 2011, when the eelgrass populations were a fair amount</p> <p>8 lower, the inorganic nitrogen concentrations were below</p> <p>9 .15, and .14, so that the nitrogen concentrations don't</p> <p>10 explain these changes in eelgrass, now, do they, the</p> <p>11 ones -- the rapid decline that we saw after the</p> <p>12 2004/2005 time frame, at least not based on this</p> <p>13 analysis?</p> <p>14 A. Yeah. This analysis is for dissolved</p> <p>15 inorganic nitrogen. And what I was referring to is that</p> <p>16 I was asked, as part of comments on this, to break the</p> <p>17 data out by year.</p> <p>18 Q. Uhm-hmm.</p> <p>19 A. And I had been working on those calculations.</p> <p>20 And when you break them out by year, the most recent</p> <p>21 three-year period has lower nitrogen concentrations than</p> <p>22 the previous one.</p> <p>23 Q. Okay.</p>	<p style="text-align: right;">376</p> <p>1 about how -- our understanding of the way that nitrogen</p> <p>2 affects eelgrass. And so it's on -- do you have this --</p> <p>3 Q. I should. I certainly have it.</p> <p>4 A. It's page 8 of that report, of the response to</p> <p>5 comments on the CALM.</p> <p>6 Q. I was going to walk you through those comments</p> <p>7 in detail a little bit later. So which cause, that's</p> <p>8 either -- this is marked as a double exhibit somehow.</p> <p>9 It's either Exhibit 59 or Exhibit 60.</p> <p>10 So it's not transparency changing, it's not</p> <p>11 algae changing, we don't have an indication that the</p> <p>12 nitrogen is toxic in this system, because the higher</p> <p>13 nitrogen, inorganic nitrogen levels were present when</p> <p>14 the eelgrass were the healthiest. How do -- how do we</p> <p>15 conclude that transparency and nitrogen is the cause of</p> <p>16 the eelgrass decline? Or flip it the other way, will</p> <p>17 restore the eelgrass to the prior levels?</p> <p>18 A. In response to that, I'd say part of our</p> <p>19 response here is that in shallower areas overgrowth and</p> <p>20 smothering by macroalgae and/or cellular disruption may</p> <p>21 be the immediate cause of eelgrass loss. And so based</p> <p>22 on the information that was provided us by Dr. Mathieson</p> <p>23 and Jeremy Nettleton showing that there's been a</p>

<p style="text-align: right;">377</p> <p>1 dramatic increase in the macroalgae in this system 2 somewhere between the early measurements in the '70s and 3 '80s, and the repeat of those studies in 2009, 2010, 4 that that may be the more immediate cause in the shallow 5 areas of Great Bay.</p> <p>6 Q. Do the eelgrass only decline in the shallow 7 areas of Great Bay?</p> <p>8 A. Well, most of Great Bay is shallow.</p> <p>9 Q. No, I'm asking the question. Does the 10 eelgrass -- okay. Let's back up a bit.</p> <p>11 So we're back to pointing to the possible 12 answer is the Nettleton report and Art Mathieson's 13 e-mail to you, which we covered earlier, doesn't show, 14 for the Great Bay system, that macroalgae actually 15 caused the problem? I mean, it says it might have; 16 right?</p> <p>17 A. It says it can; yes.</p> <p>18 Q. But it doesn't say it did, and there's no 19 information that even shows that it was likely it did, 20 right; nothing in those reports?</p> <p>21 A. I think we're, again, at this issue of can you 22 prove causation at a specific location. And we have -- 23 there's conceptual models of how shallow estuaries</p>	<p style="text-align: right;">379</p> <p>1 growth all throughout the system where the eelgrass 2 previously were, right, and nobody did that?</p> <p>3 A. We did the study with the hyperspectral 4 mapping, which was mapping in the whole Great Bay. That 5 was a very good study.</p> <p>6 Q. You had one data point then, as you and I 7 covered from the last -- I mean, we went through this 8 already in detail, Mr. Trowbridge -- that the eelgrass 9 rebounded after this decline, and that apparently 10 macroalgae and light transmission and nothing else 11 stopped the eelgrass from increasing about 50 percent 12 from their low point; right?</p> <p>13 A. It did increase. It didn't come up to its 14 full level, but it did increase.</p> <p>15 Q. So, again, so what information in Great Bay do 16 you have that shows macroalgae either caused the 17 eelgrass decline or prevented any eelgrass from 18 regrowing?</p> <p>19 A. Again, in terms -- if the burden of proof is 20 to prove causation, since we do not have a control Great 21 Bay where we can run an experiment with or without 22 macroalgae or with our without nitrogen, we don't have 23 that information.</p>
<p style="text-align: right;">378</p> <p>1 respond to eutrophication. In a shallow estuary you 2 expect a proliferation of macroalgae which will affect 3 eelgrass. When you have a decline of eelgrass, and 4 evidence of a proliferation of macroalgae, you can put 5 those two together in terms of a scientific theory that 6 one is affecting the other.</p> <p>7 Q. Scientific theory that's not proven for this 8 estuary with any specific data; correct?</p> <p>9 A. Correct; not proven.</p> <p>10 Q. Not even demonstrated; right? I mean, explain 11 the area of Great Bay where it's been -- any area of 12 Great Bay where it's been demonstrated that the 13 macroalgae are preventing eelgrass growth, regrowth, 14 colonization. Name one area in the bay where that was 15 demonstrated?</p> <p>16 A. Would photographs of eelgrass with Gracilaria 17 and Ulva mixed in among them be demonstration?</p> <p>18 Q. No. Why would that be a demonstration that it 19 caused it, that --</p> <p>20 A. It's very difficult in this case. Without a 21 control for Great Bay, you can't prove it.</p> <p>22 Q. But you could have gone out to Great Bay to 23 see whether or not we now had excessive macroalgae</p>	<p style="text-align: right;">380</p> <p>1 Q. You could do several additional surveys 2 though, right, in the areas where the eelgrass were and 3 weren't? I mean, that's certainly doable?</p> <p>4 A. Right. And the hyperspectral imagery study 5 was a very big study, very expensive, and then that was 6 followed on by the research done by Mathieson and 7 Nettleton.</p> <p>8 Q. Okay. Well, the eelgrass also declined in the 9 harbor. Is somebody saying that the macroalgae are an 10 issue in the harbor?</p> <p>11 A. It's less of an issue, just because of the 12 depth of beds there.</p> <p>13 Q. Have you ever had anybody say that macroalgae 14 is a significant issue in the Piscataqua River, anywhere 15 in the Piscataqua? I didn't say less of an issue, I 16 said anyone ever given you any information showing you 17 that it is even remotely of concern in those areas?</p> <p>18 A. With such a caveated question, I have to say I 19 don't know. I mean, whether someone has given me any 20 information about anything that it might be remotely of 21 concern.</p> <p>22 Q. Okay. Has anybody given you any information 23 showing macroalgae are a concern in the Piscataqua</p>

381	<p>1 River?</p> <p>2 A. I don't think so.</p> <p>3 Q. Okay. There was one significant change,</p> <p>4 right, that happened after 2005 in this system. Didn't</p> <p>5 the rainfall pattern increase significantly in the</p> <p>6 system?</p> <p>7 A. We had a few years of very wet weather. I</p> <p>8 don't know. I haven't done an analysis of some kind of</p> <p>9 change in the climate pattern.</p> <p>10 Q. I didn't say change in the climate pattern, I</p> <p>11 just said there's a number of years of much greater</p> <p>12 rainfall and it coincided with the eelgrass decline;</p> <p>13 right?</p> <p>14 A. Uhm, certain years of greater rainfall; I</p> <p>15 don't know if they exactly coincide.</p> <p>16 Q. Did you ever check it?</p> <p>17 A. It depends on the -- we're having trouble</p> <p>18 figuring out what's the best weather station to use for</p> <p>19 this area.</p> <p>20 Q. Did you check the flow stations on the rivers</p> <p>21 leading into Great Bay in the Upper Piscataqua to see if</p> <p>22 the river flows increased during the period of eelgrass</p> <p>23 decline?</p>	383	<p>1 organic matter or --</p> <p>2 Q. No, turbidity. I mean, the turbidity and</p> <p>3 color-dissolved organic matter would have an immediate</p> <p>4 effect on the transparency in the system, wouldn't it?</p> <p>5 A. Yes.</p> <p>6 Q. And is that due to nitrogen loads, or is that</p> <p>7 just due to the turbidity and the color-dissolved</p> <p>8 organic matter coming in with the tributaries?</p> <p>9 A. The -- I'm sorry, I don't quite understand the</p> <p>10 question.</p> <p>11 Q. The question is: Is that a nitrogen problem</p> <p>12 or is that a turbidity color-dissolved organic matter</p> <p>13 issue? In other words, you wouldn't control -- you</p> <p>14 can't control the turbidity and color-dissolved organic</p> <p>15 matter by regulating nitrogen in the system, can you?</p> <p>16 A. Okay. So the last question is can you control</p> <p>17 those things, and the answer's no, you can't control</p> <p>18 color-dissolved organic matter or turbidity by</p> <p>19 controlling nitrogen.</p> <p>20 Q. And, Mr. Trowbridge, I guess that's part of</p> <p>21 the point of why we're concerned where these analyses</p> <p>22 have gone. And I realize one only takes them to a</p> <p>23 certain point, but if the cause was due to a change in</p>
382	<p>1 A. I did look at the river flows, but I don't</p> <p>2 remember if they looked -- if they corresponded to those</p> <p>3 three years. Is that what you're talking about, 2006,</p> <p>4 2007, 2008?</p> <p>5 Q. We actually submitted -- HydroQual developed</p> <p>6 that analysis and submitted that information to you.</p> <p>7 A. Yeah.</p> <p>8 Q. Did you not look at it?</p> <p>9 A. I probably did. I don't recall right now</p> <p>10 whether it coincides.</p> <p>11 Q. If increased -- would increased tributary</p> <p>12 flows, could that be a direct and immediate cause, a</p> <p>13 direct and immediate adverse effect on eelgrass growth?</p> <p>14 A. It could.</p> <p>15 Q. Can you tell me why?</p> <p>16 A. There's a number of reasons: Increased</p> <p>17 nitrogen loads, increased sediment loads, increased --</p> <p>18 Q. Dissolved organic matter?</p> <p>19 A. Yes.</p> <p>20 Q. And that increase could have reduced the</p> <p>21 transparency, possibly, very rapidly in the system;</p> <p>22 right?</p> <p>23 A. Are you talking about the color-dissolved</p>	384	<p>1 transparency due to turbidity and color-dissolved</p> <p>2 organic matter, then all of the money we're talking</p> <p>3 about spending on nitrogen control wouldn't change that</p> <p>4 condition, would it, for the wastewater plants?</p> <p>5 A. So speaking hypothetically?</p> <p>6 Q. Uhm-hmm.</p> <p>7 A. Yes.</p> <p>8 Q. Yes, it wouldn't change it; right?</p> <p>9 A. Yes, it wouldn't change it.</p> <p>10 Q. Okay.</p> <p>11 THE WITNESS: Can we take a break?</p> <p>12 MR. HALL: Oh, certainly.</p> <p>13 THE WITNESS: Are we at a breaking point?</p> <p>14 MR. HALL: Phil, whenever you need a</p> <p>15 break we're at a breaking point. Okay?</p> <p>16 (Recess.)</p> <p>17 MR. HALL: Back on the record.</p> <p>18 BY MR. HALL:</p> <p>19 Q. Phil, related to -- or Mr. Trowbridge, related</p> <p>20 to the question of things that affect light transmission</p> <p>21 and whether it's nitrogen and other factors, in our</p> <p>22 earlier deposition we had talked about the Morrison</p> <p>23 report, which you're familiar with; correct?</p>

385	<p>1 A. Yes.</p> <p>2 Q. Okay. I'd like to show you an e-mail that was</p> <p>3 from you to a Henry Walker and a couple other people at</p> <p>4 the EPA, regarding from March 14th, 2007. Do you recall</p> <p>5 this e-mail?</p> <p>6 MR. HALL: And I'd like to mark it as</p> <p>7 Exhibit 84.</p> <p>8</p> <p>9 (Trowbridge Exhibit 84 marked for</p> <p>10 identification.)</p> <p>11 A. I recall it now that you show it to me.</p> <p>12 Q. Okay. Was this e-mail discussing what was</p> <p>13 going on with regard to the Morrison study, to your</p> <p>14 knowledge?</p> <p>15 A. The e-mail refers to receiving grant funds to</p> <p>16 add this instrumentation to a buoy in 2008.</p> <p>17 Q. Uhm-hmm.</p> <p>18 A. And that was data collected for the Morrison,</p> <p>19 et al, study.</p> <p>20 Q. Okay. Now, the sentence I'd like to draw your</p> <p>21 attention to is: We need this data stream to get enough</p> <p>22 measurements to tease out the relationship between Kd</p> <p>23 and water quality parameters.</p>	387	<p>1 that the color-dissolved organic matter originates in</p> <p>2 the watershed and then comes down the tidal rivers?</p> <p>3 A. Yes.</p> <p>4 Q. Okay. And, let's see. I'll read, with regard</p> <p>5 to dissolved organic carbon, I'm just going to read you</p> <p>6 the next sentence that kind of -- where they're</p> <p>7 starting: DOC in the sub-basins of the Lamprey River is</p> <p>8 tightly correlated with wetland coverage in the basin</p> <p>9 and shows no effects at all from population density,</p> <p>10 road work, soils, or anything else we have measured.</p> <p>11 That's kind of consistent with the source of</p> <p>12 the dissolved organic matter being leaf decay and</p> <p>13 wetlands; correct?</p> <p>14 A. Yes.</p> <p>15 Q. Okay. And do you agree with the statement in</p> <p>16 the next sentence that it seems very likely that the DOC</p> <p>17 delivered to the bay, at least at present human</p> <p>18 populations, is driven by wetlands and not people?</p> <p>19 A. I'm not sure.</p> <p>20 Q. Okay. Do you have any information -- now,</p> <p>21 when I'm talking about DOC, I'm talking about the</p> <p>22 component that's associated with color-dissolved organic</p> <p>23 matter, that it's driven by wetlands and not people?</p>
386	<p>1 That was the purpose of the Morrison study,</p> <p>2 right, to get enough information so you could develop a</p> <p>3 relationship on the factors that are affecting</p> <p>4 transparency in the system? Right?</p> <p>5 A. Uhm, yes.</p> <p>6 Q. Okay. And I'd like to show you another one.</p> <p>7 We'll mark this as Exhibit 85. And this is an e-mail</p> <p>8 that's December 9th, 2008, and it's discussing where</p> <p>9 color-dissolved organic matter comes from. And this is</p> <p>10 an e-mail from Bill McDowell back to yourself and, I</p> <p>11 guess I'll call it a cast of thousands. Looks like it's</p> <p>12 the folks on whatever PREP committee you have. Do you</p> <p>13 recall this e-mail?</p> <p>14</p> <p>15 (Trowbridge Exhibit 85 marked for</p> <p>16 identification.)</p> <p>17 A. Yes.</p> <p>18 Q. Okay. The e-mail says that -- I'll just read</p> <p>19 you a couple quotes from it, see if there's any -- if</p> <p>20 you have any further input on this: CDOM in the bay is</p> <p>21 very tightly correlated with measured dissolved organic</p> <p>22 carbon in the Lamprey River by Packers Falls.</p> <p>23 Is that consistent with your understanding</p>	388	<p>1 A. I think the dissolved organic carbon pool is a</p> <p>2 very complex situation, and just not comfortable making</p> <p>3 a broadbrush statement about it.</p> <p>4 Q. Do you have a -- any data that would say --</p> <p>5 hmm.</p> <p>6 Can you tell me why you might think</p> <p>7 color-dissolved organic matter is originating from</p> <p>8 people and not wetlands, or that's not what you're</p> <p>9 trying to say? I mean, I'm not trying to put words in</p> <p>10 your mouth. I'm trying to understand.</p> <p>11 A. I'm not trying to say that. I'm just trying</p> <p>12 to say that I don't want to -- I don't necessarily agree</p> <p>13 with this statement that you pointed out.</p> <p>14 Q. Okay. Did you ever tell him you don't agree</p> <p>15 with it? When I say "tell him," I'm talking about</p> <p>16 Dr. McDowell, who was a professor of water resources</p> <p>17 management and presidential chair for the Department of</p> <p>18 Natural Resources and Environment?</p> <p>19 A. I don't think so.</p> <p>20 Q. Could you flip to the back of the next page?</p> <p>21 I just have a question on the composition of organic</p> <p>22 matter in Great Bay.</p> <p>23 Let's see. You've got a table there, it's --</p>

<p style="text-align: right;">389</p> <p>1 and I'm talking about your e-mail dated December 8th, 2 2008, and it's back to Ru Morrison and everyone else. 3 Why is the composition of organic matter in Great Bay 4 important? Why are you assessing it? 5 A. Uhm, I think in this instance we're trying to 6 figure out how nitrogen is partitioned between the 7 different species. 8 Q. Okay. And so that would be like looking at 9 the little table where it says particulate, and then you 10 have "in phytoplankton" and "in organic matter." Is 11 that -- so 1 percent of it is in phytoplankton, 12 22 percent is in the rest of the organic matter? Is 13 that the -- what is that -- what do those percentages 14 mean in that table, can you please explain that to me? 15 A. Sure. This table, I don't know if it was the 16 final one, it certainly looks like it was a draft, but 17 it was saying, you know, in a -- in Great Bay in, let's 18 say, a typical water sample, if you collected it and 19 tried to say how much of the nitrogen in that sample was 20 in the ammonia form, you'd say 13 percent, typically; 21 24 percent in the nitrate/nitrite form; 39 percent in 22 dissolved organic matter; 1 percent -- 23 Q. Oh, so you were apportioning out where the</p>	<p style="text-align: right;">391</p> <p>1 A. I'm sorry, where are you reading from? 2 Q. Right down in the -- the question: If 3 turbidity is the main issue in Great Bay estuary related 4 to seagrass health, what will the reduction of nitrogen 5 loading to the estuary, from point and nonpoint sources, 6 do to aid water clarity? 7 Did anybody ever give you an answer to that 8 question? 9 A. I don't remember this. 10 Q. Okay. Do you know the answer to that 11 question? If most of turbidity in the system is 12 originating from the watershed or wetlands, how will 13 reducing nitrogen loadings to the system control that 14 aspect, impacting water clarity? 15 A. Sorry. Can I just take a minute to read this? 16 Q. Oh, please. Take your time. 17 (Witness reviewed document.) 18 A. I don't really understand the way this 19 question is worded in Jim's e-mail. 20 Q. Really? 21 A. Well, it just seemed to mix a couple of 22 issues. 23 Q. Well, let's go back over this. What are the</p>
<p style="text-align: right;">390</p> <p>1 nitrogen is in a sample? 2 A. Yeah. 3 Q. Okay. All right. And that was marked as 4 Exhibit 85. 5 There was a follow-up e-mail that came out of 6 this same series, and it's an e-mail from you to Jim 7 Latimer dated December 15th, 2008. 8 MR. HALL: Can we mark that as 86? 9 10 (Trowbridge Exhibit 86 marked for 11 identification.) 12 Q. And it looks like people are trying to -- do 13 you recall this e-mail where people are trying to pose 14 some type of question to a gentleman named Walter? They 15 need to tap his wisdom again? 16 A. Vaguely. 17 Q. Is that "Walter" Walter Bonyton; do you know? 18 A. I don't remember. 19 Q. Well, there's this question. It says: 20 Presumably, most of the particular organic nitrogen from 21 the -- is from the watershed or wetlands and, therefore, 22 the question is if turbidity is the main issue in Great 23 Bay --</p>	<p style="text-align: right;">392</p> <p>1 factors affecting transparency in the system; can you 2 name them? 3 A. You mean transparency and water clarity? 4 Q. Yeah. 5 A. Uhm, turbidity -- well, a -- yeah. Inorganic 6 particles, organic particles, CDOM, and water itself. 7 Q. And the organic particles are broken up into 8 two sets of organic particles: stuff that's washing down 9 the system from the watershed, and the algae that are 10 growing in the system; right? 11 A. Yeah. I don't know that it's exclusively 12 stuff washing in versus algae growing, but sort of 13 living versus dead algae, and also organic matter that's 14 been washed into the system or has broken off from other 15 types of plants in the system. 16 Q. Right. Kind of like the eelgrass losing their 17 leaves and that breaking up? 18 A. Yeah, or Ulva losing its leaves, or Spartinas, 19 or whatnot. 20 Q. But the point of that, if it were true that 21 95 percent, is that -- I think the number we're using, I 22 think it came from your earlier analysis. If 95 percent 23 of the particulate organic nitrogen is organic --</p>

<p style="text-align: right;">393</p> <p>1 95 percent of the particulate nitrogen is organic 2 nitrogen, and only a very small amount is in 3 phytoplankton -- or, in other words, it's -- I guess 4 they're replying it's not from an algal source. How 5 will regulating nitrogen in the system reduce that 6 source of particulate matter that's affecting 7 transparency? I mean, it wouldn't, right, if those 8 numbers were accurate?</p> <p>9 A. Right. I just think the question was a little 10 different, and I can't -- I'm having a hard time 11 understand --</p> <p>12 Q. That's all right. We'll just move on, on that 13 one. Thank you. I know sometimes looking at a document 14 from almost four years ago is -- can be a challenging 15 point. It was kind of an important point though.</p> <p>16 Let's move on to the tidal rivers, if we can. 17 There were a series of e-mails. I showed them to Paul 18 Currier. You might recall them. I could pull them all 19 back out. Let's see if you -- wasn't there a point in 20 time where it was uncertain as to whether or not the 21 eelgrass restoration should be considered appropriate or 22 reasonable for tidal rivers? And when I mean tidal 23 rivers, I'll say like Squamscott and Lamprey, that it</p>	<p style="text-align: right;">395</p> <p>1 Do you recall this series of e-mails?</p> <p>2 A. Some of these -- are they all the same? This 3 seems like there's some e-mails here that are different. 4 It's a combination of an e-mail from 2008.</p> <p>5 Q. Oh, did we get bad copying? Yeah, it was 6 attached to a -- no, what it should have been was -- no, 7 it -- you should have the same one I got. Oh. Yeah, 8 this other 2008 one probably ought not be on there. 9 Don't worry about it. I'm not going to ask you about 10 the 2008 one.</p> <p>11 I'm just talking about the 2011 e-mail, which 12 I guess was prepared in response to our request that you 13 clarify that it's inappropriate to apply the 14 transparency-based nitrogen numbers in the tidal rivers. 15 Do you recall this e-mail exchange?</p> <p>16 A. Uhm, yes.</p> <p>17 Q. Okay. And I draw your attention that -- to 18 the paragraph, the one that's highlighted, the first one 19 in yellow that's highlighted. It says: DES has made it 20 abundantly clear that we feel managing for DO in the 21 rivers is the appropriate next step. And our plan is to 22 eventually roll out the splits in the assessment units 23 when the time is right.</p>
<p style="text-align: right;">394</p> <p>1 was uncertain whether or not the eelgrass could really 2 grow there anymore; right?</p> <p>3 A. We've had, yeah, lots of discussion about that 4 issue.</p> <p>5 Q. And that was an issue that was up in the air 6 for a while; right?</p> <p>7 A. You mean like within DES or within a broader 8 discussion?</p> <p>9 Q. Within DES.</p> <p>10 A. Yes.</p> <p>11 Q. Okay. And I guess I can show you an e-mail -- 12 well, what the heck, it may as well get it in and mark 13 it. Let's call it Exhibit 87.</p> <p>14 15 (Trowbridge Exhibit 87 marked for 16 identification.)</p> <p>17 Q. This has to do with whether or not the 18 eelgrass-related transparency TM criteria should be 19 applied in the Squamscott and Lamprey Rivers. It's an 20 e-mail from Phil Trowbridge, June 3rd, 2011 to Ted 21 Diers. And re: Request for Clarification Regarding 22 Application of Eelgrass Transparency-based TN Criteria 23 in the Tidal Rivers.</p>	<p style="text-align: right;">396</p> <p>1 Can you tell me what that's -- what that 2 statement is all about that you made to Ted Diers in 3 this e-mail exchange?</p> <p>4 A. Uhm-hmm. What I'm referring to there is 5 splitting the assessment units for some of the tidal 6 rivers to distinguish areas where eelgrass has existed 7 historically and from those that where it has not.</p> <p>8 Q. Okay. But at this point in time DES hadn't 9 made that decision, and you're still implying that we 10 should focus on the DO aspect, right, in the tidal 11 river?</p> <p>12 A. I'm not sure exactly. I mean, clearly we have 13 not done the splits by that time.</p> <p>14 Q. Okay. When you said where eelgrass had 15 historically existed, is that the basis that DES is 16 using for where the eelgrass transparency nitrogen 17 related criteria should apply, wherever eelgrass 18 historically existed?</p> <p>19 A. Uhm, be sure we said that explicitly in this 20 report. Yeah. So you go to page 68 of this report --</p> <p>21 Q. When you say "this report," oh, the numeric 22 nutrient. Okay.</p> <p>23 A. So page 68, footnote number 4, the criteria to</p>

397	<p>1 protect eelgrass supply in sections of the Great Bay 2 estuary where eelgrass has historically existed, which 3 is some or all of each of the tidal rivers, Great Bay, 4 Little Bay, Piscataqua River, Portsmouth Harbor, Little 5 Harbor, Back Channel, and Sagamore Creek. 6 Q. Okay. Just because something historically 7 existed in a location, does that mean it can presently 8 exist in that location naturally? 9 MR. MULHOLLAND: Objection as to form. 10 It's pretty vague. 11 MR. HALL: I'll see if he can answer. 12 A. In general, you mean? 13 Q. Yeah. 14 A. No. 15 Q. Okay. Now, I'm going to ask you to think 16 about narrative criteria application. 17 A. Uhm-hmm. 18 Q. The mere fact that historically eelgrass 19 existed in a location, but now presently does not, does 20 that mean you automatically declare that area as an 21 impairment for eelgrass under your narrative criteria? 22 A. Yes. So you're talking narrative. Do you 23 have the narrative criteria for the --</p>	399	<p>1 occurring conditions shall be limited to nondetrimental 2 differences in community structure and function." 3 Q. Okay. So back to the question: Does the mere 4 fact that something existed in one location and does 5 not -- no longer exists there, mean that that narrative 6 criteria is violated? 7 MR. MULHOLLAND: Objection to the form; 8 it's vague. 9 A. The -- are we speaking generally, now, or 10 speaking about eelgrass? 11 Q. Generally first, and -- 12 A. Generally, it's not necessarily. 13 Q. Okay. Well, let's talk specifically for 14 eelgrass. Eelgrass existed once upon a time -- 15 A. Uhm-hmm. 16 Q. -- in the Squamscott and Lamprey River; right? 17 A. Yes. 18 Q. And as discussed in your various, I guess you 19 could pick up almost any of them, 303d impairment 20 listing documents, the reason for the eelgrass loss -- 21 and now there's no eelgrass at all in those areas; 22 right? I mean there's, like, none? 23 A. I think in 2011 there was a little bit in the</p>
398	<p>1 Q. Ecology criteria; right? Is that the one 2 you're talking about? 3 A. Do you have that one? It's 1703.19? It's 4 probably in one of the 303d -- 5 Q. I know it's somewhere, yeah. I'm thinking 6 it's in one of the 303d reports. I've got a 303d report 7 handy. So why don't we -- yeah, I think it's in the 8 303d report. That's a good memory. But then again you 9 wrote those reports, so you ought to know. 10 Regulatory authority, biological integrity, do 11 you want me to -- 12 A. If I could just look at it. 13 Q. Why don't you take a look at it, read it into 14 the record so people know which one you're talking 15 about. 16 A. Sure. Okay. All right. So the Narrative 17 Criteria for Biological and Aquatic Community Integrity, 18 which is ENV-WQ 1703.19, states, "Surface waters shall 19 support and maintain a balanced, integrated and adaptive 20 community of organisms having a species composition, 21 diversity and functional organization comparable to that 22 of similar natural habitats of a region." 23 It goes on to say, "Differences from naturally</p>	400	<p>1 mouth of the Lamprey. 2 Q. Okay. But further up in the river there's 3 none; right? And there's none in the Squamscott; right? 4 A. Our maps -- 5 Q. As far as we know? 6 A. Our maps show none. 7 Q. Okay. So in those areas where there's no 8 eelgrass present in the Squamscott and Lamprey, does 9 that narrative criteria say that you should presume that 10 they're violated because the eelgrass are no longer 11 present? 12 A. I'm sorry, could I have the August 2008 13 investigation of this report? I think you have it in 14 one of those folders. 15 Q. I probably do. Didn't bring your own? 16 MR. KINDER: I thought we had that out. 17 MR. HALL: I had the 2009 one out because 18 I thought that's the one we would end up with. 19 Q. Here you go. 20 (Handing.) 21 A. Thank you. Just give me a minute. We 22 addressed this question in here. 23 Okay. So on page 3 of this report --</p>

<p style="text-align: right;">401</p> <p>1 Q. Uhm-hmm. When you say "this report," we're 2 talking about the August -- 3 A. -- 11, 2008 Methodology and Assessment Results 4 Related to Eelgrass. 5 Q. And that was one of the Fred Short deposition 6 exhibits. I don't know which one at this point. 7 A. So on page 3 of this report we addressed the 8 question by saying that, "Eelgrass is the base of the 9 estuarine food web of the Great Bay estuary. While 10 eelgrass is only one species in the estuarine community, 11 the presence of eelgrass is critical for the survival of 12 many species. Maintenance of eelgrass habitat should be 13 considered critical in order to 'maintain a balanced, 14 integrated and adaptive community of organisms.' Loss of 15 eelgrass habitat would change the species composition of 16 the estuary resulting in a detrimental difference in 17 community structure and function. In particular, if 18 eelgrass habitat is lost, the estuary will likely be 19 colonized by macroalgae species, which do not provide 20 the same habitat functions as eelgrass. Therefore, DES 21 believes that significant losses of eelgrass habitat 22 would not meet the narrative standard of ENVWS 1703.19 23 and create a water quality standard violation for</p>	<p style="text-align: right;">403</p> <p>1 violation of this standard. Because it's more than just 2 one species, that it's the cornerstone of the estuarine 3 ecology and lots of organisms depend on it. 4 Q. I think the problem is the answer I got back 5 was kind of a non sequitur to my question. I wasn't 6 disputing whether eelgrass are important. Eelgrass are 7 important. And but if their loss was due to natural 8 causes, would that be a violation of the narrative 9 criteria? 10 A. Oh, if it was -- if this was naturally 11 occurring? 12 Q. Yeah. If it occurred -- there was a huge 13 flood, there was a major eelgrass bed in the Squamscott, 14 the flood tore out the eelgrass bed and dumped huge 15 amounts of dirt and debris in that area. 16 A. Right. 17 Q. Would that be considered a narrative criteria 18 violation? 19 A. No, because it talks about differences from 20 naturally occurring conditions which is -- specific -- 21 naturally occurring has a specific definition in the 22 water quality standards. 23 Q. Exactly. That's why I was trying to get at,</p>
<p style="text-align: right;">402</p> <p>1 biological integrity." 2 Q. Okay. No, I know you listed them, I'm just 3 trying to get to the question of is the mere fact that 4 eelgrass existed in a place at one point, and they're no 5 longer there, looking at the narrative criteria, does 6 that mean the narrative criteria have been violated? 7 A. I think we answered that by saying -- 8 Q. So your answer would be yes? 9 A. Yes. The answer is yes. 10 Q. Okay. 11 A. Sorry. I didn't realize it was that -- 12 Q. No. I'm just -- because the narrative 13 criteria, which you've got in front of you, did the 14 narrative criteria give any indication that whenever -- 15 and I think you have it in front of you; right? 16 A. This one. 17 (Indicating.) 18 Q. Does that criteria give you an indication that 19 whenever an organism is lost you must declare something 20 to be in impairment regardless of why it was lost? 21 A. No. And that was why I pulled out that 22 document, because we were provided that explanation of 23 why we were considering the loss of eelgrass to be a</p>	<p style="text-align: right;">404</p> <p>1 does something automatically occur, but not if you 2 believe it may be naturally occurring; right? 3 A. Right. 4 Q. Okay. Let's talk more about the Squamscott 5 and Lamprey River. You're familiar with the restoration 6 compendium that was done to identify where eelgrass 7 could be restored in the system? 8 A. Yes. 9 Q. Okay. You're familiar that it -- you're 10 familiar with the result of it, that it did not identify 11 either the Squamscott or Lamprey Rivers as areas that 12 were susceptible to eelgrass restoration? 13 A. Yes. And that was because of the current 14 water quality. 15 Q. Oh, really? 16 A. Uhm-hmm. 17 Q. Caused by what? 18 A. This was part -- that was part of their model 19 was to look at the current water quality. 20 Q. Right. But I'm -- the current water quality, 21 but do we know if the current water quality was caused 22 by natural conditions or do we know if the current water 23 quality that's insufficient was caused by man-induced</p>

<p style="text-align: right;">405</p> <p>1 conditions?</p> <p>2 A. We don't know.</p> <p>3 Q. I wanted to -- there was a document that I</p> <p>4 presented to Mr. Currier, and again in an effort to not</p> <p>5 spend a lot of time shuffling paper, I think it's one</p> <p>6 that you're readily familiar with. It talked about the</p> <p>7 need to do more research before deciding whether or not</p> <p>8 to apply the transparency-based eelgrass criteria in the</p> <p>9 tidal rivers. It was from November of 2009.</p> <p>10 Do you recall that discussion at that point in</p> <p>11 time?</p> <p>12 A. No. Do you have a document you want to show</p> <p>13 me?</p> <p>14 Q. Yeah. Okay. This is Currier Exhibit 39.</p> <p>15 It's a series of e-mails from Paul Currier, and it's</p> <p>16 part of the e-mail chain that transmitted what we keep</p> <p>17 calling a wasteload allocation analysis. Okay?</p> <p>18 And I'm going to draw your attention to, it's</p> <p>19 a executive summary that you, yourself, wrote and you</p> <p>20 transmitted to everybody. And I'm going to show you on</p> <p>21 page, unmarked page 4 of this exhibit, it's right</p> <p>22 yonder.</p> <p>23 (Handing.)</p>	<p style="text-align: right;">407</p> <p>1 (Indicating.)</p> <p>2 Q. Yeah, that's irrelevant.</p> <p>3 A. Just this one, which we're not sure of the</p> <p>4 date.</p> <p>5 Q. Right.</p> <p>6 A. Draft for review and comment. Okay. All</p> <p>7 right.</p> <p>8 Q. The executive summary, and that's, I believe,</p> <p>9 the executive summary to the wasteload allocation</p> <p>10 report.</p> <p>11 A. Right. It looks like, based on the heading,</p> <p>12 that it's draft for review and comments. So this is</p> <p>13 something previous to the final version.</p> <p>14 Q. Right.</p> <p>15 A. We're seeking comments from this list of</p> <p>16 people. Okay.</p> <p>17 Q. Okay. Can you read that one highlighted</p> <p>18 sentence then?</p> <p>19 A. Sure. The sentence is, "This decision is</p> <p>20 supported by the scientific consensus that eelgrass</p> <p>21 should be present in Great Bay, Little Bay, and the</p> <p>22 Upper Piscataqua River, but more research is needed to</p> <p>23 determine whether eelgrass restoration is an appropriate</p>
<p style="text-align: right;">406</p> <p>1 MR. MULHOLLAND: Feel free to orient</p> <p>2 yourself.</p> <p>3 Q. Yes, please.</p> <p>4 A. There's been a lot of reports, haven't there?</p> <p>5 Q. Yes, there have been.</p> <p>6 Do you recognize that e-mail that you</p> <p>7 apparently sent out to -- this is another cast of</p> <p>8 thousands. And if you could just read the part with the</p> <p>9 arrow.</p> <p>10 A. Right here?</p> <p>11 (Indicating.)</p> <p>12 Q. Yeah, the --</p> <p>13 A. This e-mail's undated, so I'm a little</p> <p>14 confused.</p> <p>15 Q. It's probably going from the top of -- I don't</p> <p>16 know how it got stuck on that. It was attached to that.</p> <p>17 A. Oh. So this is -- it's attached to this</p> <p>18 e-mail from 2007? How can that be possible? Because</p> <p>19 this report wasn't written until 2010.</p> <p>20 Q. Well, they are somehow together in my</p> <p>21 documents. That's how they came to me. But let's just</p> <p>22 go --</p> <p>23 A. So this one's sort of irrelevant.</p>	<p style="text-align: right;">408</p> <p>1 or feasible goal for the tidal rivers."</p> <p>2 Q. Okay. Do you remember writing that document?</p> <p>3 A. It would help me if I had a date, but</p> <p>4 obviously I did write it. I'm just not sure which</p> <p>5 version of the document it is.</p> <p>6 Q. The only thing I can tell you, sometime in</p> <p>7 2009, but I guess the question really goes to do you</p> <p>8 know if more research was done to confirm -- what's the</p> <p>9 last part of the sentence, if I may read it -- to</p> <p>10 confirm whether eelgrass restoration is an appropriate</p> <p>11 or feasible goal for the tidal rivers?</p> <p>12 A. If more research was done --</p> <p>13 Q. If -- yeah. It says more research is needed?</p> <p>14 A. Yeah.</p> <p>15 Q. So do you know whether more research was ever</p> <p>16 done to determine whether eelgrass restoration is an</p> <p>17 appropriate or feasible goal for the tidal rivers?</p> <p>18 A. Not knowing the date of that, it's hard for me</p> <p>19 to answer. Uhm --</p> <p>20 Q. From 2009 forward do you know if any more</p> <p>21 research was done to show if it was an appropriate or</p> <p>22 feasible goal for the tidal rivers?</p> <p>23 A. I don't believe so.</p>

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<p>1 Q. Okay. Can you explain to me why, then, in 2 August of 2011, DES sent a letter to EPA saying it was 3 appropriate to apply the eelgrass criteria in the lower 4 sections of the Squamscott and Lamprey River if the 5 research wasn't done to show it was either appropriate 6 or feasible to have eelgrass in those areas? 7 A. I guess I may be getting tripped up on the 8 term "research." If research means a field study, 9 something was not done, but if research means to review 10 the data that we had and to discuss it more thoroughly 11 amongst ourselves, then we certainly did that. 12 Q. You -- you have data showing it's reasonable, 13 feasible, and/or appropriate to apply the nutrient 14 criteria for eelgrass restoration in those segments of 15 the rivers? If there's such an analysis, we did not 16 receive it under discovery so I'd like to know. 17 A. Well, what I'm referring to there is 18 discussions about what could have changed and the 19 parameters around, like, color-dissolved organic matter 20 that shouldn't have changed. There's been no change in, 21 or there should be no change in that. So it was deemed 22 that it was feasible to restore. 23 Q. Do you have an analysis demonstrating that</p>	<p>1 controlling light transmission in the Squamscott and 2 Lamprey Rivers? 3 A. In the tidal rivers, this is -- I'm looking at 4 the graph from our response to comments -- there is a 5 statistically significant relationship between light 6 attenuation and total nitrogen as well as in all samples 7 in other eelgrass areas. 8 Q. Okay. I'll say it again. You're telling me 9 controlling nitrogen, that means that you should control 10 nitrogen to control transparency? Are you saying that 11 that's a cause-and-effect relationship? 12 A. It's a correlation. 13 Q. Right. And as a matter of fact, it's a 14 correlation you know is incorrect; right? CDOM is the 15 major factor controlling -- let's back up for a second. 16 MR. MULHOLLAND: Objection. One question 17 at a time. 18 MR. HALL: You can strike that question. 19 MR. MULHOLLAND: Thanks. 20 Q. Let me show you another exhibit. I'm going to 21 mark this as Exhibit 88. Did we mark that, the -- Phil, 22 the exhibit you have in front of you, is that your CALM 23 thing?</p>
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<p>1 nitrogen control will dramatically improve transparency 2 in either the Lamprey or the Squamscott River? 3 MR. MULHOLLAND: Objection to form. 4 A. We do not have such analysis. 5 Q. Then why would you put nitrogen criteria 6 applicable in those areas? I mean, I'm trying to 7 understand this because it's pretty clear that eelgrass 8 is gone. And it's pretty clear people understood that 9 there were water quality factors that were preventing 10 it, but you picked out nitrogen as the one to control. 11 A. Uhm-hmm. 12 Q. Why? 13 A. And you're asking about the impairment 14 determinations? Because I thought your first question 15 was about permits or -- 16 Q. No. The water quality numbers. Why did you 17 pick nitrogen as the basis for controlling transparency 18 in the tidal rivers? 19 A. Because of our review of the scientific 20 literature on this topic that there -- based on that, we 21 have a conceptual model of what's affecting eelgrass in 22 the system, and nitrogen is the dominant factor. 23 Q. You're saying nitrogen is the dominant factor</p>	<p>1 A. Yeah. 2 Q. Okay. Here's 88. 3 4 (Trowbridge Exhibit 88 marked for 5 identification.) 6 Q. Mr. Trowbridge, do you recall receiving this 7 e-mail dated -- it's an e-mail from you to Jim 8 Latimer -- or doing it, creating this e-mail dated 9 November 19th, 2008? And it says: Comments on New 10 Hampshire estuary nitrogen criteria document. 11 Are you familiar with this e-mail? 12 A. Vaguely. 13 Q. Only vaguely? 14 A. It's from 2008. 15 Q. All right. Because it's a pretty critical 16 question, isn't it? You're sending an e-mail to EPA 17 saying: The comment that seems the hardest to refute is 18 that nitrogen is correlated with light attenuation. 19 Nitrogen was not proven to be the causative agent for 20 light attenuation. Moreover, nitrogen is a component of 21 all the factors causing light attenuation 22 (phytoplankton, CDOM, particulate organic matter) so a 23 correlation would be expected."</p>

413	<p>1 So you knew that nitrogen was related to</p> <p>2 transparency, but not because nitrogen was controlling</p> <p>3 transparency, simply because there was an inherent</p> <p>4 correlation; correct?</p> <p>5 A. There was, uhm, a challenging question.</p> <p>6 Because, obviously, if you reduce the nitrogen, you're</p> <p>7 also going to reduce all of the factors affecting the</p> <p>8 light attenuation.</p> <p>9 Q. Oh, really? You just covered with me that you</p> <p>10 can't reduce CDOM by controlling nitrogen before, didn't</p> <p>11 we?</p> <p>12 A. Well --</p> <p>13 Q. I would like an answer, yes, on that one.</p> <p>14 Didn't you say to me before that controlling nitrogen</p> <p>15 will not control CDOM?</p> <p>16 A. Oh, okay. I'm sorry. I must have -- I was</p> <p>17 thinking about point source controls in that question.</p> <p>18 Because CDOM is a nonpoint source factor.</p> <p>19 Q. Can you answer the question I just asked you?</p> <p>20 A. Can you say it again, please?</p> <p>21 MR. HALL: Can you read it back, please?</p> <p>22 (Record read as requested.)</p> <p>23 A. The question is didn't I say that before?</p>	415	<p>1 matter that's otherwise coming down into the system.</p> <p>2 So you knew that nitrogen was not going to</p> <p>3 control that, and yet you produced a graph that said,</p> <p>4 Look, nitrogen's going to control transparency, when you</p> <p>5 knew it wasn't going to control major factors affecting</p> <p>6 transparency. Why did you do that?</p> <p>7 A. Why did I produce a graph showing nitrogen</p> <p>8 related to light attenuation?</p> <p>9 Q. Why did you produce a relationship you knew</p> <p>10 was false; that nitrogen did not, in fact, control</p> <p>11 transparency?</p> <p>12 MR. MULHOLLAND: Objection.</p> <p>13 A. Yeah, I don't believe it's false.</p> <p>14 Q. Explain why not. Explain how nitrogen control</p> <p>15 is going to control CDOM coming from wetlands?</p> <p>16 MR. MULHOLLAND: There's two questions</p> <p>17 there, compound. Objection. One at a time.</p> <p>18 A. The CDOM, is our understanding is that it</p> <p>19 won't change very much. So changes in light attenuation</p> <p>20 have more to do with other factors. So it's a</p> <p>21 background. And that's actually one of the conclusions</p> <p>22 in the Morrison report.</p> <p>23 Q. And if CDOM is controlling the light</p>
414	<p>1 Q. Uhm-hmm.</p> <p>2 A. Yes, I said that.</p> <p>3 Q. Okay. And with regard to particulate organic</p> <p>4 matter that's coming down the system as a result of leaf</p> <p>5 material or just the watershed, didn't you say before</p> <p>6 that controlling nitrogen is not going to control that</p> <p>7 factor also?</p> <p>8 A. Uhm, I'm not sure. Can we -- did you ask that</p> <p>9 question?</p> <p>10 Q. Uhm-hmm.</p> <p>11 A. That's -- that would be part of the nonpoint</p> <p>12 source, so I guess that's how I was answering that</p> <p>13 question. But -- I'm sorry.</p> <p>14 Q. Nonpoint source.</p> <p>15 A. I'm just confused. Is the question did I say</p> <p>16 it before or are you asking a new question?</p> <p>17 Q. The point is, Mr. Trowbridge, and let's not</p> <p>18 beat around the bush. You already knew that</p> <p>19 transparency was controlled by color-dissolved organic</p> <p>20 matter, particulate matter, phytoplankton, and the</p> <p>21 water. And the only thing that the nitrogen is going to</p> <p>22 control in the tidal rivers is phytoplankton growth.</p> <p>23 It's not going to control CDOM or particulate organic</p>	416	<p>1 transmission level in the tidal rivers, then you can't</p> <p>2 materially improve the light transmission level in the</p> <p>3 tidal river, now, can you, assuming it's the major</p> <p>4 factor?</p> <p>5 A. If it's a major factor and it is providing a</p> <p>6 baseline, as your other factors go up and down you</p> <p>7 adjust that baseline.</p> <p>8 Q. Hold it. You didn't answer my question. I</p> <p>9 didn't ask you about whether you were adjusting</p> <p>10 baselines.</p> <p>11 MR. HALL: Could you read my question</p> <p>12 back?</p> <p>13 Q. And will you please answer it?</p> <p>14 (Record read as requested.)</p> <p>15 A. Yes; assuming it's the major factor.</p> <p>16 Q. Assuming it's the major factor you can't</p> <p>17 improve it significantly; correct? Right?</p> <p>18 A. Yes.</p> <p>19 Q. Okay. Did you determine whether CDOM was the</p> <p>20 major factor controlling light transmission in the tidal</p> <p>21 rivers?</p> <p>22 A. No.</p> <p>23 Q. Okay. Let's mark that -- that's marked as</p>

<p style="text-align: right;">417</p> <p>1 Exhibit -- whatever we're up to. 88. 2 I'd like to show you some graphs from the 3 tidal rivers. Just to go back, and the purpose of the 4 Morrison study, right, was to figure out how much CDOM 5 and particulate organic matter and inorganic particles 6 and algae and water, how much each of those factors 7 influenced transparency; right? That was the purpose of 8 that study? 9 A. Yes. 10 Q. And it's the most detailed study done to date 11 on that issue? 12 A. Yes. And one of the things we have to 13 remember about that study is the conclusions are limited 14 to optically deep areas in Great Bay. 15 Q. Where's the -- where does the study say that? 16 A. Give me the report and I'll point it out. 17 Q. So you're telling me the equation in the 18 Morrison report only applies to optically deep areas? 19 A. It's in the conclusions section. 20 Q. This is one of the exhibits from Dr. Short's 21 deposition. Is this the document you're talking about, 22 using more to raise, and hyperspectral imagery? 23 A. Yep.</p>	<p style="text-align: right;">419</p> <p>1 Q. What page are you reading from? 2 A. Fifty-one. 3 Q. Can I have it, please? 4 A. There's other sections that talk about its 5 limitations at Great Bay or around the buoy. 6 Q. It just says recommendation for future work. 7 It's not in the conclusion section. 8 A. It's the same page. 9 Q. That wasn't a conclusion. 10 MR. MULHOLLAND: That's not a question. 11 Objection. 12 Q. All right. Just for the record, we're on 13 page 51, Mr. Trowbridge. Did you read from the 14 conclusion section or did you read from recommendations 15 for future work? 16 A. I read from the recommendations for future 17 work or management strategies. 18 Q. And does the conclusions section anywhere say 19 that you should not apply the equation that was 20 developed, which you asked EPA for a grant to develop so 21 you could make this analysis for the system, that that 22 equation should not be applied in other areas of the 23 system?</p>
<p style="text-align: right;">418</p> <p>1 Q. Okay. 2 A. Okay. So, on page 51, the determination of 3 water clarity was limited to optically deep water due to 4 the complexities associated with the inclusion of 5 remotely detectable bottom reflection. 6 Q. How does that mean that the equation he 7 developed was not applicable to anywhere else? That's 8 just telling you that the data was limited to a certain 9 area so they wouldn't get information on the data sets, 10 isn't it? 11 A. It's saying that this is what the -- where 12 they had data, so it's limited to the optically deep 13 water areas. 14 Q. Are you telling me that the factors affecting 15 transparency change, based on the depth of the water? 16 You want to tell me what treatise would give you -- 17 A. What I'm saying is that the conclusions of 18 this study are limited. 19 Q. Where does that study say -- point to the page 20 in the study where it says you should not apply the 21 equation to any other area that's not otherwise deep? 22 A. Oh, I mean, I showed you right here. I mean, 23 I --</p>	<p style="text-align: right;">420</p> <p>1 A. Oh. Right. It says, "A novel technique for 2 estimating water turbidity and Kd power from the 3 available hyperspectral wavelengths in optically deep 4 waters was developed." It doesn't say you can't apply 5 it, it just talked about what it was developed for. 6 Q. Thank you. 7 A. There's one other section, I guess. 8 MR. MULHOLLAND: You don't need to -- 9 THE WITNESS: All right. 10 Q. Didn't that report also include data taken 11 from the various rivers, various tidal rivers? You can 12 look at the table at the tail end. It took data from 13 every major tidal river? 14 A. Yes, it did. But the regression was based on 15 the data at the buoy. 16 Q. Did the report show that the regression 17 doesn't work for the tidal rivers? 18 A. I don't recall. 19 Q. Right. Because it doesn't, it's not in there. 20 All right. I'm going to show you some data 21 for Squamscott and Lamprey Rivers. This is data that 22 you should be quite familiar with because it was 23 presented in each of the hearings that applied your</p>

421	<p>1 numeric criteria on the permits. 2 (Counsel conferred with the witness.) 3 Q. Mr. Trowbridge, are you aware that Dr. Short 4 testified that he never recommended applying the numeric 5 nutrient criteria in the tidal rivers? 6 A. No. 7 Q. This is Short Exhibit 20. That's a graph of 8 Kd transparency measurement versus chlorophyll-a. Okay. 9 Have you seen that grant before, Mr. Trowbridge? 10 A. I think so. 11 Q. Doesn't that graph demonstrate that regulating 12 nitrogen to control chlorophyll-a levels in the 13 Squamscott River will not and cannot assure attainment 14 of the transparency level contained in the June 2009 15 numeric criteria document? 16 A. I'm not sure. So the graph is light 17 attenuation measured at these two stations versus 18 chlorophyll? 19 Q. Uhm-hmm. Does, first off, does the graph show 20 that the light attenuation values claimed necessary in 21 the numeric criteria document are attained in the 22 Squamscott River, at either Chapman's Landing or the 23 further downstream station?</p>	423	<p>1 Q. Right. So controlling nitrogen to control 2 chlorophyll in this system will not allow this water 3 body to even come close to attaining the transparency 4 level that is contained in the 2009 criteria; right? 5 A. Based on this analysis, no. 6 Q. All right. This data had been submitted to 7 you and to EPA. Is there any basis that you know for 8 claiming that the analysis presented in this graph is 9 incorrect? 10 A. I'm not sure. 11 Q. You've not seen any analysis that shows it's 12 incorrect, have you? 13 A. No. 14 Q. Okay. Doesn't this analysis tell you it's 15 something else other than chlorophyll controlling the 16 transparency level in the Squamscott River? 17 A. Based on this data, yes; this graph, yes. 18 Q. Okay. Do you know if these other factors that 19 are controlling -- if it's not chlorophyll, there's only 20 two other factors that it can be, other than the water 21 itself. It's color-dissolved organic matter or it's 22 nonalgal-related turbidity; right? 23 A. Or it's organic matter that's not chlorophyll.</p>
422	<p>1 A. No. 2 Q. It's not even close; right? 3 A. Right. 4 Q. These are large exceedences of that value? 5 A. Yes. 6 Q. Okay. Does the analysis show that controlling 7 chlorophyll-a will bring, even if you take the 8 chlorophyll-a down to near zero in Squamscott River, 9 that that will allow this system to attain the 10 nutrient -- the transparency targets set in the 2009 11 criteria document? 12 MR. MULHOLLAND: Object to form. I don't 13 understand it, but maybe Phil does. 14 Q. Look at the lower panel. 15 A. The lower panel. 16 Q. The one you just -- 17 A. And this is a -- these box and whisker plots 18 on the lower panel, what are they? 19 Q. They're the data averaged from the plot above. 20 A. Oh. 21 Q. Same type of thing you've done. 22 A. Yeah, okay. This graph doesn't show a 23 relationship with chlorophyll and light attenuation.</p>	424	<p>1 Q. Right. Well, when I -- I said nonalgal 2 turbidity, so anything that could cause turbidity but 3 not related to algae? 4 A. Not related to living phytoplankton, you mean, 5 because that's what chlorophyll measures. There's other 6 types of organic matter that's in the water. 7 Q. Right. Correct. 8 A. You know, that's pieces of macroalgae, that's 9 dead phytoplankton, it's -- 10 Q. In the Squamscott River, pieces of macroalgae? 11 I mean, let's stop talking theoretical, what this could 12 be. I'm taking about the Squamscott River, 13 Mr. Trowbridge. So let's not just go off on things that 14 we know don't even exist in the Squamscott River. These 15 data say it's one of those two other factors: something 16 turbidity-related or something color-dissolved organic 17 matter; right? 18 A. Right. And what I'm trying to distinguish is 19 turbidity can include organic matter as well as 20 inorganic matter. 21 Q. So reducing the Exeter discharge to zero 22 nitrogen, is that going to allow this water body to 23 attain the transparency level you're claiming is</p>

<p style="text-align: right;">425</p> <p>1 necessary to allow eelgrass to inhabit that system?</p> <p>2 A. Uhm, I'm not sure.</p> <p>3 Q. What do you mean you're not sure?</p> <p>4 A. I'm not sure. There's a lot of factors.</p> <p>5 Q. And you're telling me there's something else</p> <p>6 in the Exeter discharge that's causing transparency</p> <p>7 impacts?</p> <p>8 A. Like I said, I am not sure. Eelgrass existed</p> <p>9 in this system at some time in the past.</p> <p>10 Q. What does that have to do with whether or not</p> <p>11 the nitrogen is going to improve the transparency level?</p> <p>12 A. Because the CDOM levels probably have not</p> <p>13 changed. And if that's -- so one factor that has</p> <p>14 changed is the nitrogen.</p> <p>15 Q. Okay. Look, you're under oath,</p> <p>16 Mr. Trowbridge. You've already testified I don't know</p> <p>17 how many times that there's only four factors affecting</p> <p>18 light transmission. Nitrogen is not one of those</p> <p>19 factors; right? Nitrogen does not directly affect light</p> <p>20 transmission; right?</p> <p>21 A. Yeah. Nitrogen molecule does not directly</p> <p>22 affect light transmission.</p> <p>23 Q. Okay. So we've determined, from this graph,</p>	<p style="text-align: right;">427</p> <p>1 your CALM response. I'm asking about transparency. How</p> <p>2 is controlling Exeter going to significantly improve the</p> <p>3 transparency in the Squamscott River, based on this</p> <p>4 graph?</p> <p>5 A. Based on this graph, it would not.</p> <p>6 Q. It's not. Thank you. Based on the Morrison</p> <p>7 report you know CDOM is originating from the tidal</p> <p>8 rivers; right?</p> <p>9 A. Yes.</p> <p>10 Q. Okay. Are the CDOM concentrations much higher</p> <p>11 in the tidal rivers than they are in the bay?</p> <p>12 A. Yes.</p> <p>13 Q. They have to be, right, because that's where</p> <p>14 they're coming from and they're not yet diluted into the</p> <p>15 rest of the bay. Do you know if the tidal rivers tend</p> <p>16 to be turbid because of the high exchange of saltwater</p> <p>17 into the system?</p> <p>18 A. Sometimes, yes.</p> <p>19 Q. If the turbidity -- I'm sorry, if the poor</p> <p>20 light levels in the Squamscott River are due to, one,</p> <p>21 the CDOM coming down the system and, two, the turbidity</p> <p>22 caused by the tidal exchange, isn't that a natural</p> <p>23 condition, regardless of what the light transmission</p>
<p style="text-align: right;">426</p> <p>1 and there are two more just like it, that it's</p> <p>2 chlorophyll -- chlorophyll-a control in this system will</p> <p>3 not allow the transparency level to be improved to where</p> <p>4 it can support eelgrass; right?</p> <p>5 A. I've already said that.</p> <p>6 Q. Okay. So how is it that regulating nitrogen</p> <p>7 from the Exeter discharge, which is almost all dissolved</p> <p>8 inorganic, is going to bring this system into compliance</p> <p>9 with the transparency levels you claim are needed for</p> <p>10 eelgrass growth?</p> <p>11 A. Give me a minute to think about this. I think</p> <p>12 I go back to the fact that the criteria we use for our</p> <p>13 assessments or the thresholds we use for our assessments</p> <p>14 are based on a variety of different mechanisms in which</p> <p>15 nitrogen affects eelgrass. It's different in different</p> <p>16 parts of the estuary, and it's different at different</p> <p>17 times. Light attenuation is one of those factors but</p> <p>18 it's not the only one. Shallowing, and shallower areas</p> <p>19 overcomes --</p> <p>20 Q. Can you stop. You're not answering my</p> <p>21 question. I'm asking about transparency. I'm not</p> <p>22 asking about overgrowth of the macroalgae, I'm not</p> <p>23 asking about toxicity of nitrogen, which you throw into</p>	<p style="text-align: right;">428</p> <p>1 level is in that system?</p> <p>2 A. Correct; that's a natural condition. The</p> <p>3 question I have is why was eelgrass there earlier.</p> <p>4 Q. Well, you know, Mr. Trowbridge, that, to me,</p> <p>5 is an extraordinarily interesting question. I think the</p> <p>6 data for the -- wasn't the data on eelgrass being</p> <p>7 present in the Squamscott, that was based on some</p> <p>8 anecdotal chat that Fred Short had with a Mr. Chapman;</p> <p>9 right?</p> <p>10 A. No. It was based on maps made by a UNH</p> <p>11 masters student who did a survey of the tidal rivers and</p> <p>12 portions of Great Bay and portions of the Piscataqua</p> <p>13 River.</p> <p>14 Q. I'm thinking of the earlier one, the 1948</p> <p>15 extent, I believe, was claimed to be based on a</p> <p>16 discussion with Mr. Chapman?</p> <p>17 A. No. The 1948 was the masters thesis that was</p> <p>18 published by UNH.</p> <p>19 Q. Is it conceivable that some kind of physical</p> <p>20 conditions in the tidal rivers have changed since 1948?</p> <p>21 A. I don't know.</p> <p>22 Q. Do you know if they filled in at all?</p> <p>23 A. Uhm, hard -- it's hard to say. Sediment</p>

<p style="text-align: right;">429</p> <p>1 budgets is a complicated thing that we've been trying to 2 study.</p> <p>3 Q. Okay. Do you know if any of the tidal rivers 4 have filled in? I thought a number of them had.</p> <p>5 A. Well, the Oyster has had some sedimentation 6 issues because there's been discussions about dredging.</p> <p>7 Q. Do you know if the level of the sea has 8 changed since 1948?</p> <p>9 A. According to -- yes, it has changed, but I 10 don't know by how much.</p> <p>11 Q. All right. So, but here's the point: 12 Regardless of why the eelgrass are not there at this 13 point in time, the transparency data shows it cannot 14 possibly support eelgrass at this time; right? That's 15 what this data indicates?</p> <p>16 A. Uhm, at a -- yes. What that data indicates is 17 that at a two-meter restoration depth, that would be too 18 deep. So the question is, there maybe shallower areas 19 where it could survive. That's another way of looking 20 at it.</p> <p>21 Q. Well, we don't have any eelgrass anywhere in 22 this system; right?</p> <p>23 A. Correct.</p>	<p style="text-align: right;">431</p> <p>1 A. In terms of the narrative standard of "as 2 naturally," if it was determined this was naturally 3 occurring, then it would not be an impairment.</p> <p>4 Q. And there would be no point in regulating 5 nitrogen, right, because you wouldn't be able to change 6 it; right?</p> <p>7 A. Yeah. That's not really our call, because we 8 don't write the permits, but the point would be -- the 9 question related to us is the "as naturally occurs" 10 clause of our standard.</p> <p>11 Q. All right. I'm going to show you Exhibit 21 12 from Fred Short, Fred Short's deposition, Lamprey River. 13 Does this, in Lamprey River, with Kd versus transparency 14 level versus nitrogen -- I'm sorry, versus 15 chlorophyll-a, does this data show a similar pattern as 16 the Squamscott River, that transparency levels are poor 17 in this system even at very low levels of chlorophyll-a 18 content?</p> <p>19 A. For the most part; yes.</p> <p>20 Q. So will regulating nitrogen to control 21 chlorophyll-a in this system ensure that the 22 transparency level is achieved in the Lamprey River? 23 When I say "transparency level," that's the level</p>
<p style="text-align: right;">430</p> <p>1 Q. So if you can't fix this via nitrogen control, 2 why would it be considered a nitrogen-impaired system? 3 If my statement is true, if you can't fix it via 4 nitrogen control, that there's other factors that you 5 cannot change because they're naturally occurring at 6 this point, would it still be considered a 7 nitrogen-impaired system?</p> <p>8 A. So you're asking if we were to do a new 303d 9 assessment and it was conclusively proven that the 10 eelgrass loss in this system was not due to nitrogen 11 would it still be impaired for nitrogen?</p> <p>12 Q. Why would one have to conclusively prove 13 something's not caused by nitrogen when you know the 14 transparency is insufficient to allow eelgrass growth 15 regardless of the nitrogen controls put on the system?</p> <p>16 A. I think we're mixing issues. There's the 17 issue of an assessment versus the issue of permitting.</p> <p>18 Q. I'm talking about a narrative criteria 19 violation. If that transparency level is natural, can't 20 be controlled --</p> <p>21 A. Oh, so you're talking about as naturally 22 occurs?</p> <p>23 Q. Yeah.</p>	<p style="text-align: right;">432</p> <p>1 necessary to support eelgrass?</p> <p>2 A. Based on this data, no.</p> <p>3 Q. Okay. Do you have -- oh, this is -- when we 4 say "this data," this is data that came out of your 5 system.</p> <p>6 Do you know if there's any, any data that 7 shows, for the Lamprey River, that nitrogen control can 8 assure a sufficient transparency level is attained to 9 allow eelgrass to be restored?</p> <p>10 A. And you're talking about data from the Lamprey 11 River?</p> <p>12 Q. Oh, yeah.</p> <p>13 A. Uhm, sorry. Can you say the question again, 14 please?</p> <p>15 MR. HALL: Could you repeat that back, 16 please?</p> <p>17 (Record read as requested.)</p> <p>18 A. All right. So I think what you're asking is: 19 Are there any other data besides these?</p> <p>20 Q. Data or analyses that show you control 21 nitrogen, you're going to fix that transparency problem, 22 transparency issue in the Lamprey River?</p> <p>23 A. The answer is I don't believe so. It's the</p>

433	<p>1 same issue as with the Squamscott.</p> <p>2 Q. Okay. Could I have both of those back,</p> <p>3 please? And I just want to say, shock of shocks, we've</p> <p>4 got one more of these which is the Upper Piscataqua</p> <p>5 River. This is Fred Short Exhibit 22.</p> <p>6 A. Yes.</p> <p>7 Q. I bring your attention to two things. First,</p> <p>8 look at chlorophyll-a levels, annual median, in the</p> <p>9 Piscataqua River, Upper Piscataqua. Does that level of</p> <p>10 chlorophyll-a occurring in the Upper Piscataqua indicate</p> <p>11 to you that there's cultural eutrophication occurring in</p> <p>12 the Piscataqua?</p> <p>13 A. We haven't defined cultural eutrophication in</p> <p>14 terms of chlorophyll-a level.</p> <p>15 Q. That's a pretty low chlorophyll-a level,</p> <p>16 though; right? I mean, it's -- other than there's 2003</p> <p>17 data that average above five, the rest of the time we're</p> <p>18 in the one and a half to three range. That's not much</p> <p>19 chlorophyll growth, is it?</p> <p>20 A. As an annual median, yeah. I don't know what</p> <p>21 the individual points look like here.</p> <p>22 Q. But your transparency criteria is based on</p> <p>23 annual median considerations; right?</p>
434	<p>1 A. Yes.</p> <p>2 Q. Okay. Look at the Kd chart right below there,</p> <p>3 same thing. Kd measurements. Do those, from this</p> <p>4 chart, do they indicate that they're significantly</p> <p>5 affected by the chlorophyll-a level in the Upper</p> <p>6 Piscataqua River?</p> <p>7 A. They're not well-correlated.</p> <p>8 Q. There's a minimal impact; right?</p> <p>9 A. Uhm, based on this analysis; yes.</p> <p>10 Q. Okay. That's the same conclusion that the</p> <p>11 Morrison report came to, right; that chlorophyll had a</p> <p>12 minimal impact on the water transparency, right?</p> <p>13 A. Well, it had a -- it said it was a smaller</p> <p>14 factor. It didn't say minimum, I don't think.</p> <p>15 Q. I think somewhere around 12 percent is, I</p> <p>16 think, what Morrison had; right?</p> <p>17 A. Somewhere around there.</p> <p>18 Q. Okay. Does this data indicate that if you</p> <p>19 regulate nitrogen to control chlorophyll-a you will meet</p> <p>20 the transparency target that is being applied to the</p> <p>21 Upper Piscataqua River?</p> <p>22 A. Not based on this analysis.</p> <p>23 Q. By the way, look at 2006. Did the</p>
435	<p>1 transparency get worse after 2006? Got particularly bad</p> <p>2 that year.</p> <p>3 A. In 2006 or in 2007?</p> <p>4 Q. I think the high bar is associated with 2006.</p> <p>5 A. It is, okay. It's kind of labeled in a funny</p> <p>6 way.</p> <p>7 Q. And that coincides with the -- that poorer</p> <p>8 transparency, at least at this location, coincides with</p> <p>9 the higher rainfall levels in 2006; right?</p> <p>10 A. Uhm, I believe 2006 was one of the flood</p> <p>11 years.</p> <p>12 Q. Wasn't the Mother's Day flood, didn't that</p> <p>13 happen in 2006?</p> <p>14 A. I think so.</p> <p>15 Q. Do you think that could have had a significant</p> <p>16 impact on the eelgrass beds everywhere in the system,</p> <p>17 given how large the flood was, how much debris and</p> <p>18 material are brought down into the system?</p> <p>19 A. It could have had an impact.</p> <p>20 Q. Can I have that one back, please?</p> <p>21 (Handing.)</p> <p>22 MR. HALL: Thank you. Do you mind if we</p> <p>23 take a two-minute break?</p>
436	<p>1 (Recess.)</p> <p>2 BY MR. HALL:</p> <p>3 Q. Mr. Trowbridge, I've got a few more questions</p> <p>4 about the 2009 criteria document, and then ask you some</p> <p>5 weight-of-evidence questions, hopefully, and then we</p> <p>6 will go on from there. That should be pretty much</p> <p>7 closing.</p> <p>8 2009 criteria document that you developed,</p> <p>9 that's a -- you said you used a weight-of-evidence</p> <p>10 analysis to come up with the criteria in that report;</p> <p>11 right?</p> <p>12 A. Yes.</p> <p>13 Q. Did you include in that report the evidence</p> <p>14 that indicated that transparency was not the cause of</p> <p>15 eelgrass loss in the system that you had developed in</p> <p>16 any of your earlier analyses?</p> <p>17 A. What are you referring to for an earlier</p> <p>18 analysis?</p> <p>19 Q. That transparency, or analysis of transparency</p> <p>20 had not changed over time; was that included anywhere in</p> <p>21 that report?</p> <p>22 A. No.</p> <p>23 Q. What about all the statements that Great Bay</p>

<p style="text-align: right;">437</p> <p>1 is not a transparency-controlled system, from EPA and 2 Dr. Short, and those are the ones you and I walked 3 through in your first round of the deposition. Did you 4 include the statements that Great Bay was not 5 transparency-controlled? 6 A. I'm not sure; I don't believe so. 7 Q. Okay. What about the -- did you include the 8 statements that the cause of eelgrass losses and changes 9 in the system were unknown, statements that were 10 contained in the various 303d listing documents? 11 A. Uhm, I have to look through. I'm not sure. 12 I'm not seeing it here. 13 Q. Did you include any of Morrison's conclusions 14 that the major factors controlling transparency in the 15 system were, in fact, turbidity and color-dissolved 16 organic matter, and not chlorophyll? 17 A. I believe we included equations from the 18 Morrison study. 19 Q. Did you highlight the Morrison study concluded 20 that the transparency level of Great Bay was acceptable, 21 and that you needed to look at something else as the 22 cause of eelgrass demise? 23 A. I'm not sure if we have that statement in</p>	<p style="text-align: right;">439</p> <p>1 turbidity or any of the other factors that are 2 significantly influencing the transparency level in the 3 tidal rivers, is there any assessment of that anywhere 4 in that document? 5 A. Uhm, can you clarify? Assessment of what? 6 Q. Of how those factors influence and control 7 transparency in the tidal rivers? 8 A. So in the tidal rivers specifically. 9 Q. In the tidal rivers specifically. 10 A. No. 11 Q. Is there any assessment about how the change 12 in rainfall patterns could have influenced the eelgrass 13 losses or the transparency occurring in the system 14 anywhere in that document? 15 A. Sorry. You said rainfall and what? 16 Q. Just how rainfall patterns influenced 17 transparency in eelgrass populations in the system? 18 A. I don't believe so. 19 Q. Okay. Does that report include any of the 20 case-specific analyses you did and evaluations that 21 confirmed TN did not cause any excessive algal growth in 22 the system or alter transparency in the system over 23 time?</p>
<p style="text-align: right;">438</p> <p>1 here. 2 Q. It's a pretty important statement, isn't it? 3 It made your report. 4 Did you -- well, did you include any 5 discussion about how the primary graphs that you were 6 using to develop the transparency and nitrogen 7 relationships were merely correlations and did not 8 demonstrate causation? 9 A. I don't believe so. 10 Q. Actually, let me ask you a quick question on 11 that. With regard to the low DO relationship to 12 chlorophyll-a, and your transparency relationship to 13 total nitrogen, both of those graphs are just 14 correlations, right; they do not show causation? 15 A. That is correct. 16 Q. Is there anywhere in that document that you 17 assessed the other factors, other confounding factors 18 that impact the DO regime, such as sediment, oxygen 19 demand, river flow, low DO coming in from swamp areas? 20 Did you assess that anywhere in this analysis? 21 A. No. 22 Q. What about the factors that are controllable 23 in tidal rivers; did you assess whether or not CDOM,</p>	<p style="text-align: right;">440</p> <p>1 A. You say case-specific analyses. What are 2 those? 3 Q. Your March 2008 presentation to EPA that said 4 it's not a transparency issue. Does that -- was that 5 analysis reflected in this assessment? 6 A. So you're talking about, like, the -- either 7 the presentations or the interim reports? 8 Q. Correct. 9 A. Were they reflected in this report? 10 Q. Uhm-hmm. 11 A. I would say the interim analyses are not 12 included in the report; no. They were not included in 13 the final report. What was included was the final 14 analyses. 15 Q. The final analysis which left out all of these 16 prior analyses that indicated transparency wasn't 17 controlled by chlorophyll-a or nitrogen. Hmm. Okay. 18 Let's talk weight of evidence for a moment. I 19 don't have any further questions on that. Here's a -- 20 darn it, what did I do with it? Ah, right here. 21 MR. HALL: Can we mark this as 22 Exhibit 89, please? 23 (Trowbridge Exhibit 89 marked for</p>

441	<p>1 identification.)</p> <p>2</p> <p>3 Q. Mr. Trowbridge, are you familiar with this</p> <p>4 document?</p> <p>5 A. Yes.</p> <p>6 Q. Okay. Oh, I need to ask you, before I get</p> <p>7 into this document, I just need to ask you one question</p> <p>8 about application of the 2009 criteria, how you apply</p> <p>9 them from a regulatory perspective.</p> <p>10 The 2009 criteria, they represent some type of</p> <p>11 long-term annual average or median conditions that need</p> <p>12 to be attained; correct? I'm talking about transparency</p> <p>13 and nitrogen.</p> <p>14 A. And you're referring, when you talk about</p> <p>15 "apply," are you talking about use in the CALM or 303d</p> <p>16 assessments?</p> <p>17 Q. Yeah.</p> <p>18 A. So the question is what is the metric we use?</p> <p>19 Q. No. Those are long-term annual average levels</p> <p>20 that you're trying to attain; right?</p> <p>21 A. Yes. It's actually medians.</p> <p>22 Q. Medians. Is it appropriate to mandate</p> <p>23 compliance of those criteria under one-in-ten-year job</p>	443	<p>1 A. I don't know because I'm not a permit writer.</p> <p>2 Q. I'm asking a technical question. From a</p> <p>3 scientific perspective, is that the appropriate</p> <p>4 condition under which to apply the criteria?</p> <p>5 A. I'm having trouble with it because we use the</p> <p>6 criteria, we look backwards at the last five years of</p> <p>7 data. And I don't --</p> <p>8 Q. Look, Mr. Trowbridge. You spent a year and a</p> <p>9 half doing a wasteload allocation report. You came up</p> <p>10 with recommended nitrogen load reductions for point</p> <p>11 sources and nonpoint sources, correct, in that document?</p> <p>12 A. Yes; in that document.</p> <p>13 Q. When you derived and developed that document,</p> <p>14 did you set those wasteload allocations based on</p> <p>15 one-in-ten-year low flow conditions; yes or no?</p> <p>16 A. No, we did not.</p> <p>17 Q. Next question: Do you think it's</p> <p>18 scientifically proper to apply the long-term annual</p> <p>19 average median criteria from that 2009 document under</p> <p>20 7Q10 conditions?</p> <p>21 MR. MULHOLLAND: Objection. Apply to</p> <p>22 what? That's totally vague.</p> <p>23 MR. HALL: No. He knows the answer to</p>
442	<p>1 flow conditions?</p> <p>2 MR. MULHOLLAND: Objection.</p> <p>3 A. I'm sorry, I'm not understanding.</p> <p>4 Q. When you develop wasteload allocation, which</p> <p>5 you did in 2009, was it -- was that analysis developed</p> <p>6 to achieve compliance with those numeric criteria under</p> <p>7 once-in-ten-year low flow conditions?</p> <p>8 A. Like 7Q10?</p> <p>9 Q. Yeah, like 7Q10.</p> <p>10 A. So, was that -- I'm sorry. Are you asking did</p> <p>11 we do the analysis for 7Q10 or was it appropriate to do</p> <p>12 it when it's not 7Q10?</p> <p>13 Q. Is it appropriate to apply that number at a</p> <p>14 7Q10 condition?</p> <p>15 A. We only apply this number in our CALM for</p> <p>16 assessments, and we did that nitrogen loading analysis</p> <p>17 to provide some general information about loading</p> <p>18 thresholds. It was not, like, a wasteload allocation</p> <p>19 for permitting.</p> <p>20 Q. I'm asking you a technical question. For a</p> <p>21 wasteload allocation for permitting, is it appropriate</p> <p>22 to apply those criteria to mandate compliance under</p> <p>23 7Q -- once-in-ten-year low flow conditions?</p>	444	<p>1 the question because it's a regulatory question that</p> <p>2 gets applied in the state all the time.</p> <p>3 A. Right. But we don't do -- I mean, I think</p> <p>4 I'm -- we don't do the permits. So --</p> <p>5 Q. I didn't ask if you did the permit, I asked</p> <p>6 you whether or not you knew it was technically proper to</p> <p>7 do that?</p> <p>8 A. I don't know, because I haven't done that.</p> <p>9 Q. Is it proper to apply these criteria inside a</p> <p>10 mixing zone?</p> <p>11 MR. MULHOLLAND: Objection. Apply to</p> <p>12 what? It's a vague question. Objection to form.</p> <p>13 A. Inside a mixing zone?</p> <p>14 Q. To derive permit requirements?</p> <p>15 A. This really is not my area of expertise. I'm</p> <p>16 not a permit writer.</p> <p>17 Q. All right. Simple question: Can the</p> <p>18 nutrients in the discharge that's being regulated cause</p> <p>19 a significant transparency impact in a mixing zone; yes</p> <p>20 or no?</p> <p>21 MR. MULHOLLAND: If you know.</p> <p>22 THE WITNESS: Yeah. I don't know.</p> <p>23 Q. You don't know the answer to that question?</p>

<p style="text-align: right;">445</p> <p>1 A. I'm not quite understanding the question. I 2 mean, are we talking about a big mixing zone, little 3 mixing zone? I don't -- what are you asking -- 4 Q. The mixing zones that are being used for the 5 Exeter and Lamprey River, which are small. 6 A. Okay. 7 Q. Is it proper to -- it -- will the nitrogen 8 cause an impact within the mixing zone, impacting 9 transparency; yes or no? 10 A. I'm not sure, but I don't believe so. 11 Q. Okay. Let's talk about this multiple line of 12 evidence chart. 13 Do you recall developing this document? 14 A. Yes. 15 Q. Okay. Multiple lines of evidence, is this the 16 same approach that was used to develop the 2009 17 criteria? 18 A. Uhm, it's similar. It's a little bit expanded 19 from what we had in the 2009 document. 20 Q. Okay. I'd like you to draw your attention to 21 the third bullet that says, "Literature review for 22 macroalgae proliferation." 23 A. Oh, okay. This one.</p>	<p style="text-align: right;">447</p> <p>1 A. Which one? 2 Q. Uhm, oh, I'm sorry. The CALM Response to 3 Comments? 4 A. Yes. 5 Q. And that would be Trowbridge Exhibit 59. 6 I'd like to draw your attention to page 12 of 7 16 where you've got those three charts on factors 8 affecting light attenuation. The chart in the middle, 9 you're indicating that color -- based on this chart, 10 you're indicating that color-dissolved organic matter is 11 less important than other factors affecting light 12 attenuation in the Great Bay system; right? 13 A. Yes. 14 Q. Does that chart use the same data that the 15 charts above it and below do? 16 A. They -- each of these charts was made with all 17 of the available data for each of the parameters. So 18 they're a little different, but there is a lot of 19 overlap. 20 Q. So the answer is no, it doesn't use the same 21 data? 22 A. Right. The answer is no. 23 Q. Okay.</p>
<p style="text-align: right;">446</p> <p>1 Q. You're saying that a -- this document is 2 saying that DES has determined that a .3, something in 3 the range of a .3 total nitrogen level is necessary to 4 control macroalgae? 5 A. That was the information we had in a draft 6 document. It's -- and it was included on this graph. 7 Q. Oh, so that's just the information from the 8 draft document? 9 A. Correct. 10 Q. Okay. So you've not rendered -- the DES 11 hasn't rendered any final decision that you have to have 12 a .3 total nitrogen to control macroalgae; right? 13 A. Right. 14 Q. Okay. Do any of the values plotted in the 15 data plotted on this graph provide a basis for 16 concluding that the nitrogen -- that the cause of 17 eelgrass loss in Great Bay was transparency? 18 A. No. 19 Q. Okay. I don't have any further questions on 20 that. 21 I'll just ask one last question, and it's 22 related to the CALM analysis. Do you have the CALM 23 analysis?</p>	<p style="text-align: right;">448</p> <p>1 A. Just explaining why "no." 2 Q. Do you know that the data set used in that 3 middle chart is, primarily from 2010 during August and 4 September? 5 A. I just used all of the measurements that we 6 had that had both Kd and CDOM. 7 Q. So you didn't actually check when the data was 8 collected? 9 A. I know it was collected between 2003 and 2010. 10 Q. Okay. Did you know that the data that was 11 presented in that chart was from a period when CDOM 12 influences on the system were minimal, based on your 13 long-term recording in this system? 14 A. I'm not aware of that. I'd have to look at 15 the data. 16 Q. Okay. So you really didn't check the data 17 very carefully before you came up with this analysis to 18 conclude CDOM is not the major component you thought it 19 was? 20 MR. MULHOLLAND: Objection. 21 Q. Based on prior studies? 22 MR. MULHOLLAND: Objection. That 23 mischaracterizes what he said.</p>

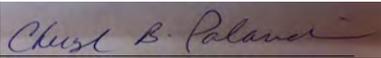
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1 A. In this analysis we used all of the data we
 2 had.
 3 **Q. Again, you did not -- it's not the same data**
 4 **sets on the two different -- on the three different**
 5 **charts, and you didn't check the time periods from which**
 6 **the data were being pulled; right?**
 7 A. It's not the same data sets because we're
 8 trying to use all of the cases where you had the two
 9 variables for the regressions. So we were trying to be
 10 inclusive of all data, and we just pulled all of the
 11 data that we had.
 12 **Q. Okay. You'll notice that your light**
 13 **attenuation readings are much lower in your middle chart**
 14 **of the figures, correct, than they are in the other**
 15 **ones?**
 16 A. Yes.
 17 **Q. Wouldn't that mean that they are mainly from**
 18 **the bay and not from the tidal rivers? Or did you not**
 19 **check that?**
 20 A. We did not check that.
 21 MR. HALL: Okay. I don't have any
 22 further questions. Do you have anything else, guys?
 23 MR. KINDER: No.

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1 MR. LUCIC: No.
 2 MR. SERELL: No. I think we're good.
 3 (Thereupon, the deposition was concluded at
 4 3:50 p.m.)
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1 CERTIFICATE
 2 I, Cheryl B. Palanchian, a Certified
 3 Shorthand Reporter and Notary Public of the State of
 4 New Hampshire, do hereby certify that the foregoing is
 5 a true and accurate transcript of the testimony of
 6 Philip Trowbridge, who was by me duly sworn, taken at
 7 the place and on the date hereinbefore set forth and
 8 under the conditions present.
 9 I further certify that I am neither attorney
 10 or counsel for, nor related to or employed by any of
 11 the parties to the action in which this deposition was
 12 taken, and further that I am not a relative or
 13 employee of any attorney or counsel employed in this
 14 case, nor am I financially interested in this action.
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1 ERRATA SHEET
 2 IN RE: City of Dover, et al v. State of NH, et al
 3 Court Reporter: Cheryl B. Palanchian
 4 DEPOSITION OF: Philip Trowbridge
 5 TAKEN: 7/11/12
 6
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 17 Deponent
 18 THE STATE OF _____
 19 COUNTY OF _____, SS.
 20
 21 Subscribed and sworn to before me this
 22 _____ day of _____, 20____.
 23 _____
 Justice of the Peace/Notary Public
 My Commission expires: _____

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3

STATE OF NEW HAMPSHIRE

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MERRIMACK, SS. SUPERIOR COURT

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7

CITY OF DOVER, TOWN OF EXETER,
TOWN OF NEWMARKET, CITY OF
PORTSMOUTH, and CITY OF
ROCHESTER

9

v. 217-2012-CV-212

10

STATE OF NEW HAMPSHIRE and NEW
HAMPSHIRE DEPARTMENT OF
ENVIRONMENTAL SERVICES

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14

DEPOSITION OF PHILIP TROWBRIDGE

15

This deposition taken at the offices

16

of Sheehan, Phinney, Bass & Green, 1000 Elm Street,
Manchester, New Hampshire, on Wednesday, July 11,
2012, commencing at 9:00 a.m.

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17 STIPULATIONS

18 It is agreed that the deposition shall
19 be taken in the first instance in stenotype
and when transcribed may be used for all
20 purposes for which depositions are competent
under New Hampshire practice.

21 Notice, filing, caption and all other
formalities are waived. All objections
except as to form are reserved and may be
taken in court at time of trial.

22 It is further agreed that if the
deposition is not signed within thirty (30)
23 days after submission to counsel, the
signature of the deponent is waived.

0248

1 I N D E X

2 Witness:

3 Philip Trowbridge

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1 PHILIP TROWBRIDGE,
2 having first been duly sworn by the court reporter, was
3 deposed and testified as follows:

4 EXAMINATION

5 BY MR. HALL:

6 Q. This is the continuation of the deposition of
7 Philip Trowbridge.

8 Mr. Trowbridge, good day. Could you, again,
9 just please state your full name, for the record?

10 A. Yes. Philip Trowbridge.

11 Q. And, Mr. Trowbridge, did you get an
12 opportunity to read your deposition transcript since our
13 last deposition?

14 A. I received the transcript. I reviewed some of

15 it.

16 Q. Okay. Did you get an opportunity to read Fred
17 Short's deposition transcript?

18 A. Again, I received it. I haven't read the
19 whole thing.

20 Q. You've read some of it?

21 A. A few pages; yes.

22 Q. Okay. But what about Mr. Diers' deposition,
23 did you take a look at that?

0250

1 A. Again, the same. I did look, review some of
2 it, but not all.

3 Q. Okay. And lastly, Mr. Currier's; did you get
4 a chance to look at Paul Currier's deposition?

5 A. I received it. I don't think I read any of
6 it.

7 Q. Okay. All right. Did your attorney, since
8 the last deposition, discuss with you the need to fully
9 and completely respond to the questions presented?

10 MR. MULHOLLAND: Objection. What I told
11 him is privileged. He can't answer that.

12 Q. Okay. Okay. Well, let's see if we can just
13 start, Mr. Trowbridge. I'm going to kind of go back
14 over some of the things that we covered in the last
15 deposition because we had a lot of back and forth, and
16 sometimes it's a little bit to get things out on paper.
17 So most of these should be fairly straightforward
18 questions, and I hope you wouldn't have any difficulty
19 or complications in answering them.

20 All right. Are you the primary technical
21 staff person for both PREP and DES regarding the
22 evaluation of Great Bay scientific issues?

23 A. Yes.

0251

1 Q. Is there -- do you have any other assistants
2 at PREP or DES that provide you help on completing those
3 scientific analyses for Great Bay?

4 A. Yes.

5 Q. Okay. Could you just tell me who their names
6 are?

7 A. At PREP, I'm assisted by Derek Sowers, and the
8 director, who is currently Rachel Rouillard, previously
9 Jennifer Hunter, before that Cynthia Lay.

10 Q. And at DES, with regard to the analysis of
11 technical issues for Great Bay, who at DES assists you
12 in, you know, preparing your analyses?

13 A. At DES there's a number of people. We work as
14 a group. Primary people would be Ken Edwardson, Matthew
15 Wood, Ted Diers. Before that, Paul Currier, and like I
16 said, there's other people in the bureau who help out,
17 as needed, on different things, but I think to name them
18 all would be kind of counterproductive.

19 Q. We don't need to do that. Just trying to get
20 an idea of who you work with on these issues.

21 We're going to -- with regard to nutrient
22 criteria, you've been involved in the nutrient criteria
23 development process for Great Bay for a number of years;
0252

1 correct?

2 A. Yes.

3 Q. I'd just like to show you a couple documents.

4 I think we're up to Exhibit 73. This is an e-mail from
5 you to a group of people dated December 21st, 2007.

6 It's attaches a meeting agenda and some handouts. Do
7 you recognize that exhibit?

8 A. Yes.

9 Q. Can you tell me what the content of the
10 exhibit is?

11 A. Well, the first page is a e-mail that -- it
12 has the agenda or has a link to an agenda, and
13 presentations from a meeting of the NHEP Technical
14 Advisory Committee. And the attachment must have been
15 one of the handouts from the meeting.

16 Q. Okay. But what is the attachment?

17 A. The top of the attachment says, "Options for
18 Developing Numeric Nutrient Criteria for New Hampshire's
19 Estuaries."

20 Q. Did you develop this attachment?

21 A. Yes. But it was a long time ago.

22 Q. And the -- so within this attachment you're
23 looking at different ways to come up with nutrient
0253

1 criteria for Great Bay; correct?

2 A. Right. This is a list of options that we
3 thought might work at the time.

4 Q. Can you tell me which option was eventually
5 selected for the development of the nutrient criteria?
6 Is it on this list; do you know?

7 A. Let me think. This was -- I need a few
8 minutes to look at this.

9 Q. I'm just looking in terms of major, major
10 headings, like the, "Develop a long-term trend of
11 nitrogen and sediment loads and compare them to trends
12 in eelgrass." Was that option used?

13 A. Let me just review the options.

14 Q. I'm sorry, go ahead. While you're looking,
15 we'll have that marked as Exhibit 73.

16
17 (Trowbridge Exhibit 73 marked for
identification.)

18
19 A. So are you asking is there a specific option
20 that we chose? Because some of the elements of these
21 options were included in the final report, but not any
22 one exclusively.

23 Q. Okay. That's fine. I don't have any further
0254

1 questions on that exhibit.

2 There's another follow-up e-mail, it's dated
3 January 18th. Let's see, this one was December 7th,
4 2007, this one's January 18th, 2008. It's an e-mail
5 from you to Jim Latimer, Fred Short, Jennifer Hunter,
6 Phil Colarusso, regarding nitrogen criteria. And do you
7 recall this e-mail related to nutrient criteria
8 development?

9 A. Did we discuss this e-mail at the last
10 deposition?

11 Q. Uhm, I believe we had a -- we had this e-mail
12 in for other reasons.

13 A. I'm just trying to understand whether we've
14 already looked at it or not.

15 Q. We did. It was, I forget which exhibit
16 number, but I know it was something that we looked at.

17 A. Okay. So then since we've already talked
18 about it, I mean, yes, I recall it.

19 Q. Can you look under number one. I'm trying to
20 understand the nutrient criteria development process.
21 You're providing -- it looks to me like you're providing
22 comments back to some earlier -- some observations that
23 are being made by others. You were presenting some
0255

1 questions, you say, "I agree much of what you said" --
2 "I agree with much of what you have said but I have some
3 questions." And then you go on. And within quotes at
4 the top, can you read the -- it says "nitrogen," a quote
5 that starts "nitrogen plays." Can you read that for us?

6 A. The quote says, "Nitrogen plays a significant
7 role (both direct and indirect) on in the demise of
8 eelgrass (particularly in the deeper sub-estuaries.)"

9 Q. Do you know if that, if at this time DES had
10 determined that nitrogen actually was the cause of
11 eelgrass declines in the system or is this -- where did
12 this statement come from?

13 A. I guess I don't really know where that
14 statement came from in this e-mail. I can't tell if I'm
15 quoting from someone else's e-mail or what.

16 Q. Do you, to your knowledge, do you know if
17 anybody for the Great Bay has ever demonstrated that
18 nitrogen played a -- is playing a significant role in
19 the demise of eelgrass in the system?

20 A. Well, I'd say that there's been some studies
21 done at Jackson Lab that show that nitrogen affects
22 eelgrass growth in mesocosms.

23 Q. Again, this is why you have to listen
0256

1 carefully to the question. I know there's mesocosm
2 studies. I'm saying in this system, where the eelgrass
3 had been lost, has anybody presented you with a
4 demonstration that nitrogen was the cause of the
5 eelgrass loss?

6 A. Uhm, the only way to prove that one way or the
7 other conclusively is to have multiple Great Bays that

8 you experiment on with nitrogen. So we rely on
9 information from mesocosm studies and also studies from
10 other systems that have looked at eelgrass loss related
11 to nitrogen.

12 Q. Okay.

13 A. I don't know how you would prove one thing --
14 something one way or the other at a specific location if
15 you can't conduct some kind of laboratory experiment on
16 it.

17 Q. Okay. This is back to the question, the point
18 of answering the question. I'm asking you whether or
19 not in this system anybody has provided you a
20 demonstration that nitrogen is the cause of the change
21 in eelgrass populations?

22 MR. MULHOLLAND: I object to that
23 question. He just answered it the best he could.

0257

1 Because you don't like the answer doesn't give you the
2 right to keep asking the same question again and again.

3 MR. KINDER: That's incorrect.

4 MR. MULHOLLAND: I have a case for that,
5 if you like.

6 MR. HALL: He did not answer the
7 question.

8 MR. KINDER: He can answer the question
9 and explain his answer. He can say yes or no, but in
10 his opinion, you know. That's what he said.

11 MR. MULHOLLAND: He answered the
12 question.

13 MR. KINDER: No, he didn't answer it.

14 MR. MULHOLLAND: He answered the
15 question.

16 MR. KINDER: I think he's entitled to a
17 yes-or-no answer.

18 MR. MULHOLLAND: I disagree. I'm going
19 to instruct him not to answer that question. He already
20 did.

21 MR. KINDER: All right. Then let's call
22 the judge.

23 (Discussion held off the record.)

0258

1
2 (Trowbridge Exhibit 74 marked for
3 identification.

4 BY MR. HALL:

5 Q. Mr. Trowbridge, if Dr. Short has indicated to
6 us that he has not completed studies showing nitrogen
7 caused the loss of eelgrass anywhere in the system,
8 would you have any other information other than what
9 Dr. Short may have provided to you or to us?

10 A. Maybe information from Dr. Mathieson.

11 Q. Dr. Mathieson completed studies showing
12 nitrogen caused eelgrass losses in Great Bay?

13 A. He's provided information about nitrogen
14 causing macroalgae, which affects eelgrass.

15 Q. I didn't ask that question. I asked whether
16 Dr. Mathieson provided you studies showing nitrogen
17 caused eelgrass losses in Great Bay; yes or no?

18 A. Can I ask a clarifying question? When you're
19 talking about nitrogen impact, are you talking about
20 direct effects of just the nitrogen without its effect
21 only anything else, just nitrogen alone affecting
22 eelgrass? Or nitrogen affecting something else, like
23 macroalgae, that affects eelgrass?

0259

1 Q. In any manner, form, any way that
2 Dr. Mathieson gave you data or gave you an analysis that
3 showed the increase in nitrogen in the system caused
4 eelgrass declines, direct or indirect?

5 A. We've just received comments from
6 Dr. Mathieson on our 303d list talking about how
7 increases in nitrogen have caused increases of
8 macroalgae, which affect eelgrass. So I guess the
9 answer would be yes.

10 Q. Do you know that we covered that exact
11 document in your last deposition and I asked you whether
12 or not that document confirmed macroalgae caused
13 eelgrass losses and you said no, it didn't? Do you
14 want -- would you like to change your answer or am I
15 going to have to certify that -- would you like to alter
16 your answer?

17 MR. MULHOLLAND: Which answer?

18 MR. HALL: That Dr. Mathieson's comments
19 have confirmed that nitrogen caused eelgrass losses in
20 Great Bay by stimulating macroalgae?

21 A. I'm just reporting what his thing said to us.
22 It's his report. It's not --

23 Q. That's what you believe his report said to
0260

1 you?

2 A. Well, maybe we should look at his report. Do
3 you have it?

4 Q. This is Exhibit --

5 MR. MULHOLLAND: Sixty-three.

6 Q. -- 63.

7 Do you want to tell me where in that document
8 it confirms nitrogen caused macroalgae changes which
9 caused eelgrass losses in Great Bay?

10 A. Well, here's one section. It's the first
11 bullet, bullet number 1. It says -- I'll read it
12 slowly.

13 MR. SERELL: Are you on a certain page
14 number? I'm sorry.

15 THE WITNESS: I'm on the first page.

16 Extensive ovoid green algae, Ulva species, or
17 green tides have begun to dominate many of these
18 estuarine areas during the past 15 to 20 years,

19 particularly within Great Bay proper, which is the
20 citation for Nettleton, et al, 2011. Such massive
21 blooms of foliose green algae can entangle, smother and
22 cause the death of eelgrass.

23 Q. Hold it. Stop right there. Can entangle.

0261

1 Does it say did entangle, have entangled? It says can.
2 Are you telling me that statement says eelgrass demise
3 has been caused by macroalgae growth in Great Bay?

4 MR. MULHOLLAND: Could I have a second
5 with my witness? Could we a short break? Thirty
6 seconds.

7 (Recess.)

8 MR. MULHOLLAND: Thank you.

9 MR. HALL: Okay. Could you read back my
10 question and would you please answer it?

11 (Record read as requested.)

12 MR. MULHOLLAND: That's a yes-or-no
13 question.

14 THE WITNESS: I'm sorry, I was going to
15 answer differently. Can you read it back again? Sorry.

16 (Record read as requested.)

17 MR. MULHOLLAND: Objection; compound.

18 THE WITNESS: Yes. No, it does not -- it
19 says "can entangle," it does not say that it did
20 entangle. It does not prove causation.

21 BY MR. HALL:

22 Q. So this document does not provide a basis for
23 concluding that macroalgae have caused eelgrass losses

0262

1 in Great Bay; correct?

2 A. Correct.

3 Q. Okay. Enough. Let's stop there.

4 Now, a moment ago you mentioned something
5 about needing to do -- looking at studies from other
6 estuaries to see what caused eelgrass loss; correct?

7 A. Yes.

8 Q. Okay. Those other studies, in other
9 estuaries, they have confirmed, they have analyzed that
10 certain water quality caused eelgrass losses; correct?

11 I mean, how could those studies have concluded that the
12 water quality caused eelgrass loss? They must have done
13 something to evaluate that; right?

14 A. Yes.

15 Q. Okay. Was that same evaluation done for Great
16 Bay?

17 A. Uhm, I would say the evaluations done in some
18 of these other studies, just observational, that if you
19 have areas of eelgrass that are completely smothered by
20 macroalgae, then that is the cause of the eelgrass loss.

21 So I think we have done some of those observations in
22 Great Bay. Just not, maybe, to the same degree in some
23 areas.

0263

1 Q. Usually in these other studies you look for
2 some type of changing water quality parameter; right?
3 Something that's changing that causes an impact; right?
4 MR. MULHOLLAND: Objection. I don't know
5 if you've established which studies we're talking about.

6 MR. HALL: Well --

7 MR. MULHOLLAND: In the other studies --

8 MR. HALL: I have no idea. He's the one
9 that said there were other studies.

10 Q. What other studies are we talking about,
11 Mr. Trowbridge?

12 A. One of the places that we've used papers from
13 is Waquoit Bay in Cape Cod.

14 Q. And in that bay there were certain things that
15 changed that caused the eelgrass loss; right? They went
16 and documented certain impacts?

17 A. Right. I don't remember exactly, but there
18 were studies of changes; yes.

19 Q. Within the e-mails that you've received from
20 Dr. Short and others, didn't they expressly tell you
21 that the kind of effects they saw in Waquoit Bay they
22 did not find in Great Bay?

23 A. Is that in this e-mail?

0264

1 Q. No. Don't -- well, I'll ask you the question:
2 Haven't you received e-mails that said the kind of
3 effects that they're finding in Waquoit Bay they are not
4 finding in Great Bay?

5 A. I'm not sure. I'd have to see the e-mails.

6 Q. Okay. And if there was an e-mail that said
7 that, then the Waquoit Bay studies wouldn't apply to
8 Great Bay, now, would they?

9 A. I'm sorry. I just -- I have to understand the
10 context of the e-mail in the question.

11 Q. All right. Let me -- let's go back over that
12 again.

13 My understanding is that you have e-mails that
14 expressly say the kind of impacts from macroalgae growth
15 occurring in Waquoit Bay you're not finding in Great
16 Bay. You have no recollection of receiving that e-mail?

17 A. No. Do you have a document --

18 Q. Let me have -- no, this.

19 (Handing.)

20 (Counsel conferred with the witness.)

21 Q. It's Trowbridge Exhibit 58, from Fred Short to
22 Phil Trowbridge, and I quote, "Since we have not found
23 any areas of nuisance macroalgae overgrowing eelgrass

0265

1 beds, as we have documented in places like Waquoit Bay,
2 Massachusetts, the results of our analysis are only
3 applicable where nuisance macroalgae have proliferated
4 to the extent it prevents the reestablishment of
5 eelgrass from seed."

6 Okay. You received that e-mail from Fred

7 Short. Now, do you want to tell me that the -- this
8 data in Great Bay showing macroalgae have caused
9 eelgrass demise, and that you can base that on the
10 Waquoit Bay experience?

11 A. You want me -- there's two questions there.

12 Q. Okay. Let's take it in pieces. Does this
13 e-mail indicate that there's information for Great Bay
14 confirming macroalgae are smothering eelgrass and
15 causing the demise?

16 A. No. This e-mail written in 2007 does not
17 confirm that.

18 Q. And that's from Fred Short?

19 A. Right.

20 Q. Would you have any basis to disagree with that
21 answer -- with what Fred Short has told you?

22 MR. MULHOLLAND: Objection; it's unclear.
23 Would he disagree then or disagree now?

0266

1 Q. Do you have any basis to disagree either then
2 or now with what Fred Short has told you?

3 A. Uhm, where is the exhibit we were just looking
4 at, the one from Art Mathieson? What number is that?

5 Q. Exhibit Number -- that's also in --

6 MR. MULHOLLAND: In the binder.

7 Q. It's Exhibit 63. Well, let's take it in
8 pieces.

9 In 2007, up to -- whatever impacts occurred to
10 eelgrass through 2007, would you have any basis to have
11 disagreed with what Dr. Short was saying at that time?

12 A. Uhm, I can't recall what communications I had
13 with Art Mathieson at that time that might have been a
14 basis but I don't recall. This document from Art
15 Mathieson here in 2012 would seem to contradict somewhat
16 that statement from Fred Short's e-mail.

17 Q. Would seem to contradict? There's something
18 in there that says he's documented that eelgrass are
19 being smothered by macroalgae in Great Bay. I thought
20 we just went through that, that that document doesn't
21 say that?

22 MR. MULHOLLAND: Objection. The document
23 speaks for itself. It's the best evidence rule. Go

0267

1 ahead.

2 MR. HALL: He's characterizing what the
3 document is saying and he's telling me it conflicts with
4 the other document.

5 Q. We just went through that the word "can" does
6 not mean does or did or has or is doing. So you want to
7 tell me that that document conflicts with what Fred
8 Short had said?

9 A. It does not prove that eelgrass is being
10 smothered by macroalgae. It provides information that
11 macroalgae can smother the eelgrass and that
12 observations have been made of expanding macroalgae

13 within the Great Bay proper.

14 Q. And do you know if those, in the locations
15 where those observations are made are areas where they
16 are smothering eelgrass or are they up on the tidal
17 grass where eelgrass do not exist?

18 A. I do not know.

19 Q. Okay. We'll cover that later.

20 So if you don't know whether or not the
21 reference that's being made here is to areas where
22 eelgrass inhabit, you can't reach any technical
23 conclusion as to the relevance of this statement to
0268

1 eelgrass loss, now, can you; of Dr. Mathieson's
2 statements to eelgrass loss, can you?

3 A. The areas that we have macroalgae have
4 coincided with areas where eelgrass has existed.

5 Q. Hold it. Hold it. I did not ask that
6 question.

7 You just told me you did not know whether or
8 not the -- whether or not the macroalgae being discussed
9 in Dr. Mathieson's letter, Exhibit 63, you did not know
10 if any -- if this was located in areas where eelgrass
11 inhabit; correct?

12 MR. MULHOLLAND: Objection. The word
13 "this" is very unclear. It's an ambiguous question.
14 But you can answer.

15 I'm just putting my objections on the record,
16 John. Go ahead.

17 MR. LUCIC: And you can object to the
18 form of the question, but the additional information
19 that you're putting in there, that's improper. You can
20 say, Object to the form of the question. If he asks you
21 what the basis is, you can go on. But to characterize
22 the objection is improper in the context of a
23 deposition.

0269

1 Q. Just answer the question, please,
2 Mr. Trowbridge.

3 A. So the question was if it -- we -- if we don't
4 know where the macroalgae is relative to eelgrass, or do
5 we not know?

6 Q. You just told me you don't know.

7 A. Yeah, yeah.

8 Q. Correct?

9 A. Right. I don't know, based on that report.

10 Q. So if you don't know that, you cannot draw any
11 scientific conclusion that this letter demonstrates
12 macroalgae are causing adverse impacts on eelgrass;
13 correct?

14 A. Correct. We've already established that this
15 letter cannot prove that. It's impossible to prove
16 this -- anything, really, in one system.

17 Q. Hold it. We didn't -- we didn't answer this
18 by saying that it's impossible to prove anything in one

19 system, we're talking about something very specific.
20 We're talking about this system, we're talking about
21 macroalgae, and we're talking about eelgrass loss.
22 Now, let's just get one straight answer from
23 you. One: You don't know where the macroalgae are
0270

1 growing based on this letter; correct?

2 A. That's correct.

3 Q. Two: Therefore, you cannot render any
4 defensible scientific conclusion as to whether these
5 macroalgae growth reported in this Mathieson letter is
6 adversely impacting eelgrass; correct?

7 A. Well, what -- I mean, defensible scientific
8 conclusion, is that a statement of proof or is that a
9 statement of data supporting a theory that we have?

10 Q. Either.

11 A. I would say it supports a theory that we have
12 based on the scientific literature about how nutrients
13 affect shallow estuaries.

14 Q. I didn't ask you that question. I asked
15 you -- will you answer the question presented to you,
16 please?

17 MR. HALL: Will you please read back my
18 second one where I said, Correct, you can't reach a
19 conclusion based on this?

20 (Record read as requested.)

21 A. I'm going to say yes, with the explanation
22 that we're not proving. It does not prove it; it has
23 information that supports a theory.

0271

1 MR. KINDER: Can we take a short break
2 among us? Would you guys mind?

3 (Recess.)

4 (Whereupon, Mr. Bisbee left the deposition
proceedings.)

5

6 MR. MULHOLLAND: Back on the record.

7 MR. HALL: Back on the record.

8 BY MR. HALL:

9 Q. Mr. Trowbridge, I'd like to show you one other
10 letter regarding the nutrient criteria development.

11 It's the New Hampshire Estuary Project, dated
12 February 7, 2008. And it's -- basically, I just want to
13 bring you -- your attention to the statement about
14 there's a deadline for nutrient criteria development.

15 Are you familiar with this letter, first off?

16 A. Yes.

17 Q. Okay. Do you know who -- did you draft the
18 letter, or did somebody else draft it or --

19 A. I'm not sure.

20 Q. All right. It talked about there's a deadline
21 for nutrient criteria development. Where did this
22 deadline come from?

23 A. This letter was from 2008. As I recall, we

0272

1 had been working on the nutrient criteria issue since
2 2005, and it required a lot of staff time. And there
3 was -- I think there was an interest in trying to
4 conclude the project.

5 Q. So at this point in time, one way or another,
6 there was a decision that a nutrient criteria was going
7 to be -- a numeric nutrient criteria was going to be
8 developed for the estuary?

9 A. I think that decision was made when, in 2005,
10 when we started. This is just -- this letter is just
11 setting --

12 Q. Just confirming it?

13 A. Yeah; confirming that issue.

14 MR. HALL: Okay. Let's mark that as
15 Exhibit 75.

16

(Trowbridge Exhibit 75 marked for
17 identification.)

18

19 Q. I don't want to risk going backward to the
20 Exhibit 74, but I need to ask you the question again
21 where it talks about nitrogen plays a significant role
22 on the demise of eelgrass.

23 Now, to your knowledge, is that just a general

0273

1 statement of, you know, nitrogen can play a significant
2 role in eelgrass demise, is that what that statement is
3 meant to infer; or had somebody at this point in time,
4 to your knowledge, proved that nitrogen was playing a
5 significant role in eelgrass demise in the estuary?

6 MR. MULHOLLAND: Objection as to form.

7 A. I do not recall exactly. I believe it's just
8 a statement of general information.

9 Q. Okay. That's what I had the feeling. So
10 we've already marked that as Exhibit 74.

11 And just for my -- just so I understand the
12 timeline right, this is in January of 2008. At this
13 point in time the numeric criteria hadn't been developed
14 yet, and the support document; right?

15 A. Right.

16 Q. Okay. And that would be the document that
17 describes whether or how nitrogen plays a significant
18 role in impacting eelgrass?

19 A. That was -- yeah. The final document is the
20 summary of all the research.

21 Q. Okay. Thank you.

22 Easy question: You were the primary person
23 responsible for the development of the 2009 numeric

0274

1 criteria at DES?

2 A. Yes.

3 Q. You also developed the impairment listings for
4 Great Bay, both before and after the 2009 criteria

5 development?

6 A. Yes. Although we do work as a team at DES.

7 Q. Certainly. And again, this is all by way of
8 recap, these are things that we covered in the last
9 deposition.

10 A. Uhm-hmm.

11 Q. For 2008, Great Bay was not listed as impaired
12 for eelgrass, it was only listed as threatened; correct?

13 A. Are you talking about on the final 2008 list?

14 Q. Yeah, the final 2008 list.

15 A. It was listed as threatened, which is -- which
16 is also category 5, which is the same category as
17 impairments.

18 Q. And in that 2008 listing, the final one, total
19 nitrogen was not identified as a cause or an indicator
20 of eelgrass loss anywhere in the system; correct?

21 A. I just want to be clear. We have this issue
22 with the source or the cause that we list in the 303d
23 database. Are we talking about that or are we talking
0275

1 about, like, a more --

2 Q. Nitrogen was not identified as the impairment
3 associated with eelgrass loss in 2008?

4 A. In 2008, okay. I think I would answer that by
5 saying -- are we talking about in Great Bay?

6 Q. In Great Bay.

7 A. The proper Great Bay?

8 Q. Great Bay, Piscataqua, Lower Piscataqua. I
9 could show you the exhibit but --

10 A. Maybe we should look at that.

11 (Pause in proceedings.)

12 MR. KINDER: Can I help, John?

13 MR. HALL: There it is.

14 Q. Here, this was an exhibit used in Fred Short's
15 deposition. It's the 2008 impairment listing.

16 A. Right. This would be the, uhm, the draft or
17 one of the drafts of the 2009 303d list.

18 Q. And that's the August one; that's the final
19 one that was submitted to EPA?

20 A. Yes. Submitted, uhm, right.

21 Q. And that one did not have impairments listed
22 for nitrogen associated with eelgrass; correct?

23 A. That is correct.

0276

1 Q. It also did not have light attenuation
2 associated with eelgrass; correct?

3 A. Yes.

4 Q. Okay. And in that 2008 document, the areas
5 where eelgrass losses occurred, and they, I believe they
6 occurred in many areas in the system; right? I mean,
7 there were eelgrass declines in many of the tidal
8 rivers?

9 A. Yes.

10 Q. Okay. That document indicated that the cause

11 of eelgrass loss was unknown in 2008; correct?

12 A. That is right. And that's a standard practice
13 for all our impairments, to list the cause as unknown.

14 Q. And with regard to, just so I understand how
15 an eelgrass impairment was determined, it was based on a
16 20 percent difference from baseline, whatever that
17 baseline was for the particular assessment area?

18 A. Uhm, I'm just going to check the methodology
19 in this report. So on page 5 of this report it talks
20 about the methodology.

21 Q. Okay.

22 A. So it's from page 5 to page 6, and the
23 methodology -- there's two methods that are used. The
0277

1 first is if there's reliable historic concurrent maps of
2 eelgrass cover for an area, DES will use the percent
3 decline from the historic level to determine
4 impairments, and a region will be considered to have
5 significant eelgrass loss if the change from historic
6 levels is greater than 20 percent.

7 Q. Okay. And --

8 A. Then there's a second --

9 Q. Okay.

10 A. -- assessment that's done, which is the second
11 bullet. DES will evaluate recent trends in the eelgrass
12 cover indicator. Trends will be evaluated using linear
13 regression of eelgrass cover in a zone versus year.

14 I mean, I could read this paragraph or -- but
15 the point is, if there's more than a 20 percent change
16 using a certain statistical method, then that would,
17 would be a violation. And then DES would look at these
18 two assessments and consider a zone to be impaired if
19 either of the two methods indicates significant eelgrass
20 loss.

21 Q. Okay. With regard to the State of the
22 Estuaries reports, since 2003 you were the primary
23 person responsible for the technical analysis of --
0278

1 related to nutrient issues?

2 A. Yes.

3 Q. You also developed a wasteload allocation
4 analysis, I believe in 2009 through 2010, to predict how
5 much nutrients would need to be reduced from point to
6 nonpoint sources to meet the new numeric criteria;
7 correct?

8 A. Yes. And the final report was called a
9 nitrogen loading analysis. It was not a formal
10 wasteload analysis. So in that report we provided
11 information about options for nutrient loading
12 reductions, but we did not set a formal wasteload
13 allocation, which has a specific meaning as part of a
14 TMDL.

15 Q. The analysis that you did for the wasteload
16 allocation document you're talking about, that was an

17 analysis that was similar to a TMDL assessment; correct?

18 A. Yes. It's similar, but it was not a TMDL.

19 Q. Right. And you provided that wasteload
20 allocation analysis to EPA for permitting purposes;
21 correct?

22 A. We provided the information to EPA and others
23 for them to use however they saw fit.

0279

1 Q. Could you answer the question, please?

2 A. I'm sorry, can we --

3 Q. Did you provide the wasteload allocation
4 analysis to EPA for permitting purposes?

5 A. Yes.

6 Q. Thank you. I'm going to show you a series of
7 e-mails, all associated with the wasteload allocation
8 documentation and evaluations, just so we understand
9 what the time frame is. Let's mark this --

10 A. Could I just ask, I mean, I understand you're
11 asking questions about a report that is like a wasteload
12 allocation, but it is not a wasteload allocation, so
13 maybe we should refer to it as the nitrogen loading
14 analysis.

15 Q. I'd like to call it the wasteload allocation
16 because that's what you had, the methodology to
17 determine wasteload allocations for wastewater treatment
18 facilities. I mean, this is what you're calling it, so
19 we will call it what it's titled.

20 Did somebody ask you to not refer to this as a
21 wasteload allocation in your deposition?

22 A. No.

23 Q. Then why do you not want to call it a

0280

1 wasteload allocation when you, yourself, have repeatedly
2 called it a wasteload allocation? I mean, I've got
3 dozens of e-mails where you're calling it a wasteload
4 allocation for nitrogen. Why don't you want to call it
5 a wasteload allocation now, Mr. Trowbridge?

6 A. Because these were all -- what you're looking
7 at are drafts of the final report, and the final report
8 was called a nitrogen loading analysis. In my mind, I
9 think of it as the nitrogen loading analysis. It's just
10 confusing to me to keep referring to it by its old name.

11 Q. Sorry for the confusion, but we're going to
12 keep calling it what you've discussed it -- what you've
13 called it in the e-mails all along.

14 All right. Let me show you, here's an e-mail.
15 We'll mark this as Exhibit 76. And it has to do with
16 the Cocheco River, which is a March 17th, 2009 e-mail
17 from you to Brian Pitt, a group of people at EPA. And
18 it's attaching a draft proposal for analysis of the
19 Cocheco River.

20 Are you familiar with that e-mail?

21

22 (Trowbridge Exhibit 76 marked for

identification.)

23

0281

1 A. Yes.

2 Q. Okay. Can you tell us, can you look at the
3 first page of the attachment, the one that says
4 "Purpose." Can you read that into the record for a
5 moment, please, just that first sentence?

6 A. The first sentence under, "Purpose"?

7 Q. Yeah.

8 A. "The purpose of this methodology is to
9 determine total nitrogen loading targets and wasteload
10 allocations for the Cochecho River subestuary such that
11 nitrogen concentrations in this subestuary meet the
12 water quality criteria that had been proposed by DES."

13 Q. Okay. What water quality criteria are we
14 talking about?

15 A. Let's look at the citation then. So the
16 citation is for a 2008 report from DES, which is the
17 Nutrient Criteria for the Great Bay Estuary, Public
18 Comment Review Draft.

19 Q. Had those been adopted into rule at this point
20 in time?

21 A. No.

22 Q. But you're trying to determine the loading
23 targets and wasteload allocations such that those

0282

1 numeric criteria will be achieved; correct?

2 A. Yes.

3 Q. Okay. Can you look at page 2 and tell me
4 which numeric targets you decided to use for this
5 wasteload allocation? I think it's under estimating,
6 under, "Estimating Nitrogen Loading Targets"?

7 A. Uhm-hmm.

8 Q. It says: No eelgrass has been mapped in this
9 subestuary so the applicable water quality criterion
10 would be 0.5 milligrams of nitrogen per liter for the
11 prevention of low dissolved oxygen?

12 A. Right.

13 Q. So you were applying some nitrogen criteria
14 for protection of DO, dissolved oxygen; correct?

15 A. I think so. I haven't gone through all of it,
16 but I think that's true.

17 Q. And why wasn't eelgrass criteria not applied
18 in this segment?

19 A. Well, it says, "No eelgrass has been mapped in
20 this subestuary," so that the eelgrass threshold would
21 not apply.

22 Q. Okay. So the other numeric nitrogen number
23 for eelgrass, that one only applies in areas where

0283

1 eelgrass previously existed; correct?

2 A. Yes.

3 Q. Okay. And, again, were either the -- were

4 either of these numeric nitrogen criteria ever adopted
5 into state regs?

6 A. No.

7 Q. But you're doing a -- the purpose of this
8 analysis is to say what the nitrogen limitations must be
9 to meet those numbers; correct?

10 A. Yes.

11 Q. And you're sending this to EPA; correct?

12 A. Yes.

13 Q. What's EPA going to do with this; do you know?
14 Why -- let me ask you, why are you sending this to EPA?

15 A. We were getting questions from EPA and others
16 about what the impact of the thresholds would be.

17 Q. Okay. So you -- were you sending this to them
18 so they could consider this in their permitting of the
19 facilities?

20 A. I was sending it in response to their
21 questions, and I'm sure that has to do with part of
22 their duties to write permits.

23 Q. Okay. I would draw your attention to page 9,
0284

1 "Several scenarios are presented to show the expected
2 nitrogen loading to the subestuary under different
3 permit conditions for Rochester and Farmington's
4 wastewater plants"?

5 A. Uhm-hmm.

6 Q. I mean, this is a basic wasteload allocation
7 analysis that's done for almost any type of numeric
8 criteria; correct? Is it any different?

9 A. I've never -- I mean, this is the only project
10 like this that I've been involved with, so I don't have
11 another thing to compare it to.

12 Q. Okay. Let's leave that marked as Exhibit 76.

13 Okay. Now, here's another e-mail. They're
14 all kind of similar. They're all related to the
15 wasteload allocation report that you developed. It's
16 November 3rd, 2009, from yourself, Phil Trowbridge, to
17 Jennifer Hunter. And then below that is an e-mail on
18 October 30th, 2009, which is from you to, I guess I'll
19 call it a cast of thousands; EPA, UNH professors, and
20 others.

21 MR. HALL: Let's mark this as Exhibit 77.

22

(Trowbridge Exhibit 77 marked for
23 identification.)

0285

1 Q. I just want to bring your attention to the
2 paragraph at the bottom of the first page, the one that
3 starts, "In 2009." Okay.

4 The paragraph talks about first that a numeric
5 nutrient criteria has been developed, and then the last
6 sentence that says: Following this report, DES has
7 prepared a model to predict how much the watershed
8 nitrogen loads would need to be reduced to meet the new

9 criteria. Are you familiar with this e-mail?

10 A. Yes.

11 Q. So the, again, the purpose of the wasteload
12 allocation report was to determine how much reductions
13 in nitrogen would be needed to meet the 2009 criteria?

14 A. Yes.

15 Q. Okay. So when you -- when the 2009 criteria
16 were issued, it was, if you will, rather obvious that
17 they would trigger nitrogen reductions if they were
18 applied to the wastewater facilities?

19 A. Yes.

20 Q. Okay. I don't have any further questions on
21 that. Thanks.

22 The wasteload allocation documents, I mean, I
23 can show you this, it was submitted to EPA in draft;

0286

1 right? And then you sought EPA's comments back on the
2 wasteload allocation documents; do you recall?

3 A. We went through several rounds of comments on
4 that report. So, and some with EPA and with others.

5 So, and we received comments from EPA certainly.

6 Q. Okay. I'll just pass that.

7 I think this is the report you were talking
8 about. This is December 10 -- I'm sorry, December 2010.

9 It's a report still marked Draft, at least the copy I
10 have, and it's entitled: Analysis of Nitrogen Loading
11 Reductions for Wastewater Treatment Facilities and
12 Nonpoint Sources for the Great Bay Watershed.

13 A. Uhm-hmm.

14 Q. Is this the final report that you were talking
15 about that we had previously been calling the wasteload
16 allocation report?

17 A. Yes.

18 Q. Okay.

19 MR. HALL: Let's mark this as Exhibit 78.

20

(Trowbridge Exhibit 78 marked for
21 identification.)

22

23 Q. And Mr. Trowbridge, in this document do the

0287

1 analyses show that nitrogen must be reduced at the
2 wastewater plants in order to attain compliance with the
3 draft numeric nutrient criteria?

4 A. Uhm, for the most part, yes. But we did
5 assess different areas, so I'm just -- not having looked
6 at it in a few years, I'm not sure whether there were
7 any areas where that was not necessary.

8 Q. I could just draw your attention maybe to
9 the -- well, four -- let's name them. To meet the
10 numeric nutrient criteria would Rochester need to reduce
11 its nitrogen loadings to the system.

12 A. Do you have the appendices to this report?

13 Q. Not with me. They were voluminous.

14 A. That would be the easier thing for me to look
15 at.

16 Q. Well, I'll just ask you, to your knowledge,
17 would Rochester be required to reduce its nitrogen
18 loading to the system in order to meet the numeric
19 nutrient criteria?

20 A. I believe so.

21 Q. Okay. What about Dover; would they be
22 required to reduce their nutrient loading?

23 A. This is where it gets a little tricky, because
0288

1 Dover is downstream from Rochester. So depending on the
2 amount of reductions at Rochester, not sure what the
3 reductions would be at Dover. The report laid out
4 options; it didn't specify what each plant needed to do.

5 Q. But there wasn't, as I recall -- I mean, I
6 could show you the page. The only options that you
7 looked at for the wastewater plants were either 8
8 milligrams per liter, 5 milligrams, or 3 milligrams per
9 liter of nitrogen; correct?

10 A. We also looked at current loadings as well.
11 But like I said, if I had the appendices I could give
12 you a better answer.

13 Q. Why don't we go to page 19.

14 A. Okay.

15 Q. Page 18, page 19, up at the top. It says:
16 There are 18 wastewater treatment plants that discharge
17 into the watershed or otherwise contribute nitrogen.
18 The four largest are Rochester, Dover, Exeter,
19 Newmarket. And then below that is a listing of
20 load-reduction scenarios.

21 Do any of those load-reduction scenarios
22 indicate no load reduction for any of the major
23 facilities?

0289

1 A. No.

2 Q. So all of the evaluations that are done in
3 this report indicate that they would -- it -- depending
4 on which criteria is applied, and where it's applied, as
5 I understand the numbers are sensitive to that; correct?

6 A. Yes.

7 Q. Okay. That either the limits would be
8 8 milligrams per liter, 5 milligrams per liter, or
9 3 milligrams per liter total nitrogen; correct?

10 A. Correct. Those were the scenarios that we
11 looked at in this report.

12 Q. Okay. And then I'll just draw your attention
13 back up to the executive summary, which says, "Both
14 wastewater" -- I'm looking at the second bullet. It
15 says, "Both wastewater treatment facilities" -- and it's
16 on page 1, sorry. "Both wastewater treatment facilities
17 and nonpoint sources will need to reduce nitrogen loads
18 to attain the numeric nutrient criteria." Is that a
19 accurate statement of what's put forth in this document?

20 A. Yes.

21 Q. Okay. What about the statement that the,
22 "Wastewater treatment facility upgrades to remove
23 nitrogen will be costly." Is that an accurate statement
0290

1 regarding the requirements that are set forth in this
2 document?

3 A. Yes.

4 Q. And this analysis, this, what we're now
5 calling the loading reductions for wastewater facilities
6 and nonpoint sources, for all practical purposes this is
7 a TMDL analysis; right? Because it's -- well, correct?

8 A. Uhm, no. I mean, TMDL has a very specific
9 meaning and you'd have to have some other things in it.
10 It was a -- an attempt to answer the questions people
11 had about what loading reductions will be needed to have
12 the water quality meet the thresholds that we had
13 accomplished in the 2009 guidance document.

14 Q. Isn't that what a TMDL does?

15 A. It does that plus other things.

16 Q. What other things does it do?

17 A. Specifically, TMDL has to specifically call
18 out a wasteload and load allocation; has to have a, what
19 is it called, reasonable assurance related to nonpoint
20 source reductions; it has to have a margin of safety; it
21 has to have a number of things in a certain format.

22 Q. Okay. So the TMDL might only be more
23 restrictive than what you put forth in this document?
0291

1 MR. MULHOLLAND: Objection as to form.

2 Sorry.

3 A. I'm not --

4 Q. Do you know if a TMDL would likely be more
5 restrictive?

6 A. No, I don't know. I mean, I'm not sure.

7 Q. Is it possible the TMDL could have been less
8 restrictive, you know, do something that doesn't meet
9 the nutrient criteria?

10 A. I think the reason I'm having trouble
11 answering the question is that, you know, we don't have
12 a TMDL we're looking at. We don't have a methodology of
13 how the TMDL would have to be done. The TMDL was done
14 using exactly the same methods and it would probably
15 come up with the same answer. I don't know. We're sort
16 of talking about a hypothetical document.

17 Q. It wouldn't be possible for a TMDL to come up
18 with a conclusion that no load reductions would be
19 required for the system given the numeric criteria that
20 are being used; correct?

21 A. I believe so.

22 Q. You believe it wouldn't be possible; right?

23 A. Right.
0292

1 Q. Okay. I don't have any further questions on

2 that document. Thank you.

3 Oh, why hasn't a TMDL been done for this
4 estuary; do you know?

5 A. I'm not sure.

6 Q. Have you had any discussions with EPA over the
7 need to do a TMDL?

8 A. There's been some discussions, yes.

9 Q. And what was the conclusion of those
10 discussions?

11 A. I wasn't involved with all of the discussion.
12 The ones I was involved with are just that we didn't
13 need to do it at this time.

14 Q. Did anybody explain why?

15 A. I think there were concerns about how long it
16 takes to do a TMDL.

17 Q. Did people -- did anybody say they were going
18 to use a permitting approach to reduce, an individual
19 permit-by-permit approach to reduce the loads to achieve
20 the numeric treatment criteria instead of doing a TMDL?
21 Do you recall that discussion?

22 A. Not particularly. I just recall talking about
23 how TMDLs are very lengthy processes, and there was
0293

1 already a fair amount of information available.

2 Q. After the numeric nutrient criteria document
3 was completed in, I guess it was June of 2009, that's
4 the time frame, the numeric document?

5 A. Yes.

6 Q. Okay.

7 A. We are talking about --

8 Q. We're talking about Short Deposition Exhibit
9 Number 27.

10 A. Yes. June 2009.

11 Q. Okay. After June 2009, you drafted an
12 amendment to the 2009 303d listing that applied to 2009
13 criteria; correct?

14 A. Yes.

15 Q. That application of that criteria increased
16 the number of waters identified as nutrient-impaired;
17 correct?

18 A. Yes. In the Great Bay estuary; I'm assuming
19 that's your question?

20 Q. Yeah. In the Great Bay estuary.

21 It identified both transparency -- for the
22 first time it identified both transparency and nitrogen
23 as associated with eelgrass declines; correct?
0294

1 A. Yes.

2 Q. Okay.

3 A. And I would just say "as associated," I'm
4 interpreting that as within the stressor response matrix
5 that we use in the CALM.

6 Q. But that was a new listing at that time;
7 right?

8 A. Yes.

9 Q. All right. Additional DO impairments are also
10 identified for some of the tidal rivers based on the
11 chlorophyll-a numeric criteria from the 2009 document;
12 correct?

13 A. Yes.

14 Q. I'm going to just show you a couple of e-mails
15 that say all of those same things that you just said yes
16 to. So we'll be able to breeze through those quickly.

17 Here's an e-mail from you to Ru Morrison and a
18 group of others. It looks like it's the -- it's -- oh,
19 it is. It's the PREP Technical Advisory Committee. And
20 it describes pretty much exactly what we're talking
21 about.

22 MR. HALL: Let's mark this as Exhibit 79.

23

(Trowbridge Exhibit 79 marked for

0295

1 identification.)

2

3 Q. Just drawing your attention to the second line
4 in the first paragraph -- actually, let me ask you
5 first: Are you familiar with this e-mail? Do you
6 recall sending it? I know you've sent hundreds of
7 e-mails to the PREP advisory committee.

8 A. Yes.

9 Q. Okay. The statement -- can you read the
10 statement in the second line of the first sentence, the
11 one that starts with, "These criteria"?

12 A. So the second line says, "These criteria were
13 promptly used by DES to make impairment determinations
14 for the estuary on New Hampshire's 303d list."

15 Q. Okay. That's an accurate statement; correct?

16 A. Yes.

17 Q. Okay. No further questions on that.

18 I'm going to test your recollection of some of
19 the issues associated with the change in the impairment
20 listing. When I'm talking about the modified impairment
21 listing --

22 THE WITNESS: I'm sorry. Could we take a
23 break?

0296

1 MR. HALL: Oh, certainly, Phil.

2 (Recess.)

3 MR. HALL: We're back on the record.

4 Do we want to look at that question now, or do
5 you want to look at it over lunch?

6 MR. MULHOLLAND: I'd like to look at it
7 with Phil either on a break or lunch.

8 MR. KINDER: Yes. Let's do it over
9 lunch.

10 MR. HALL: Yeah, over lunch.

11 The earlier question that we were going to
12 have the judge weigh in on, if we could get that printed

13 out.

14 BY MR. HALL:

15 Q. Mr. Trowbridge, prior to the break we were
16 talking about the 2009 impairment listings and how those
17 were modified to apply the 2009 numeric nutrient
18 criteria. And we were talking about some changes
19 regarding nitrogen and transparency that were listed in
20 the 2009 303d amendment. I'd like to show you an e-mail
21 from -- here we go.

22 MR. HALL: If we could mark this as
23 Exhibit 80, and I've highlighted a portion of this.

0297

1

(Trowbridge Exhibit 80 marked for
identification.)

2

3

4 Q. First off, do you recall receiving this
5 e-mail? It's September 28th, 2009. It's from Al Basile
6 to Ken Edwardson. You're cc'd on it. It's part of an
7 e-mail string that where Al is asking that you assign an
8 impairment for light attenuation, and that it's, quote,
9 very important that we acknowledge this parameter as the
10 cause of impairment, impairment to eelgrass. And the
11 re: line is, Add to Cause.

12 Do you recall having this discussion with EPA,
13 that they wanted to make sure you identified
14 transparency as the cause of eelgrass impairments in the
15 updated or amended August 2009 impairment listing?

16 A. I remember this issue; yes.

17 Q. Okay. And did the document eventually
18 identify light attenuation as a factor related to the
19 impairment of eelgrass in the system?

20 A. Yes.

21 Q. Do you know if it's DES's position that light
22 attenuation is the cause of eelgrass loss in the system?

23 A. The position is that there's a number of

0298

1 factors affecting eelgrass. Can I -- actually, can I do
2 some clarification on this e-mail?

3 Q. Oh, certainly. After we --

4 A. Sorry. Okay --

5 Q. We'll loop back and then --

6 A. I thought you were going to ask more about
7 this question, and there's some context I need to
8 provide.

9 Q. Okay. Is it DES's position that light
10 attenuation is what's limiting eelgrass regrowth in
11 Great Bay? Or explain to me, when you say it's yes, DES
12 believes it's one of the factors, explain that to me.

13 A. Yeah. I think the best statement we have in
14 terms of the DES position on this issue is in the
15 response to public comment on the draft 2012 CALM, and I
16 think we gave you this at the last deposition. I don't
17 know what the number is. Do you know -- you know what

18 I'm talking about; right?

19 Q. Yes. I know the difference.

20 Do your impairment listings identify anything
21 else other than nitrogen and transparency as the reasons
22 for eelgrass loss anywhere in the Great Bay system?

23 A. On the 303d list we only have impairments for
0299

1 eelgrass, nitrogen and light attenuation.

2 Q. So related to eelgrass, there are no other
3 factors, other than nitrogen and light attenuation, that
4 are identified as the causes of why the eelgrass aren't
5 at the level you'd like to see them at; correct?

6 MR. MULHOLLAND: Objection as to form.
7 You mean on the 303d list?

8 MR. HALL: On the 303d list, yes. Sorry.

9 A. I think in answering that question, we had
10 this discussion at the last time about the cause issue.
11 We look at the nitrogen and the light atten -- we look
12 at the -- use a stressor response matrix, decision
13 matrix for the 303d listing where you have the stressor
14 being nitrogen, and some of the responses being light
15 attenuation and eelgrass.

16 So they're all evaluated together; they're not
17 necessarily evaluated as one causes the other.

18 Q. Did you want to give another clarification
19 regarding the memo that's in front of you?

20 A. Yes, I would, if I could. I just want to
21 clarify that this e-mail is correspondence with some of
22 the database managers at EPA, and so this was really a
23 technical discussion about adding a -- adding something
0300

1 to the database, as opposed to a substantive discussion
2 of, you know, of science. It was more of just a
3 technical one of we needed to add a new parameter to the
4 database, and the person who we were corresponding with
5 was confused, and we needed to -- I think this is where
6 Al Basile then provided some clarity or some information
7 to that person to allow them to move forward with making
8 that change to the database.

9 Q. The clarity that -- the position Al Basile is
10 stating, right, is that it's very important we
11 acknowledge this parameter as the cause of impairment,
12 and that parameter is light attenuation; correct?

13 A. Right.

14 Q. Okay.

15 A. I guess I think when I read this he's just
16 saying it's very important that we get this information
17 into the database.

18 Q. Why is it so very important that we get that
19 information in the database?

20 A. Because the state has already established
21 these thresholds that we're using, so that it should be
22 able -- whatever we're using should be able to be
23 recorded in the database.

0301

1 Q. When you're saying establish these thresholds,
2 you're talking about the thresholds established in the
3 June 2009 numeric nutrient criteria document?

4 A. Yes. And further expanded upon in the CALM.

5 Q. Did the CALM change the way the numeric
6 nutrient criteria apply?

7 A. The CALM has the stressor response decision
8 matrix, which is a key part of how the assessments are
9 done.

10 Q. But I asked, I said did it change the way that
11 numeric nutrient criteria would be applied, and did it
12 make any modifications? Did it make any additions to
13 it?

14 MR. MULHOLLAND: Objection; compound, and
15 form.

16 Q. Make any changes to it?

17 A. Yes. I'd say there are changes.

18 Q. Okay. What are they?

19 A. The changes are using that stressor response
20 decision matrix. That's not part of the 2009 document.

21 Q. When you say stressor response, you're saying
22 eelgrass, connect eelgrass to the values, correct; to
23 the nitrogen and the transparency values, correct?

0302

1 A. Right. I'm saying that --

2 Q. Okay.

3 A. -- if you are going to -- you're only going to
4 add an impairment if you have both a high stressor,
5 nitrogen, and some evidence of a response, either low
6 light attenuation or loss of eelgrass.

7 Q. Isn't that the typical way EPA have
8 recommended that states develop numeric nutrient
9 criteria, that they have a response variable and a
10 causal variable? Isn't that what they have always
11 recommended for numeric nutrient criteria?

12 A. I think you're confusing the criteria with the
13 assessment process. What I'm talking about is the
14 assessment process for 303d listing.

15 Q. Let's just move on. That's marked as
16 Exhibit 80.

17 In our prior deposition I handed you an e-mail
18 that CLF had sent to EPA. It was in the Currier -- it
19 was Currier Exhibit Number 34. That said one of the
20 reasons that EPA asked you to amend the 303d impairment
21 listing for August 2009 was to avoid a potential lawsuit
22 with CLF. Do you remember that?

23 A. May I see that? Yes, we discussed this.

0303

1 Q. Okay. So one of EPA's requests, in addition
2 to add transparency as an impairment factor, one of them
3 was also to amend the list so they could avoid a
4 lawsuit; correct?

5 A. I'm sorry. I'm a little confused. So the --

6 you're asking about why -- I'm sorry. Can you just say
7 that again? I'm confused.

8 Q. I'm just saying EPA asked you to amend the
9 list so they could avoid a lawsuit with CLF; correct?

10 A. That's my understanding.

11 Q. Okay. Thank you.

12 And here's just one last e-mail regarding the
13 303d listings and what the effect of them would be.
14 It's an e-mail from you to Michelle Daley, June 15th,
15 2009.

16 MR. HALL: We'll mark that as Exhibit 81.

17
18 (Trowbridge Exhibit 81 marked for
19 identification.)

20 Q. And can you tell me who -- do you recall this
21 e-mail, Mr. Trowbridge?

22 A. Yes.

23 Q. This e-mail confirms that, again, that you're
0304

1 going to use the numeric nutrient criteria to develop
2 the revised 303d list; correct?

3 A. Right. They were going to be incorporated
4 into our assessment methodology.

5 Q. Okay. And then now Michelle -- by the way,
6 who is Michelle Daley?

7 A. Michelle Daley is a researcher at UNH.

8 Q. Okay. She asks the question -- I'm going to
9 just draw your attention to that paragraph. That's
10 where it says: Phil, thanks for the updated info. So
11 EPA doesn't have to approve the numeric nutrient
12 criteria before they become part of the 305b/303d
13 assessment?

14 Do you recall your discussion with Michelle on
15 that issue?

16 A. It's part of this e-mail. Sure.

17 Q. Okay. Did you inform Michelle that EPA
18 doesn't have to approve the criteria before they're used
19 for impairment listing purposes?

20 A. I don't see anything about that in my
21 response.

22 Q. Okay. Do you know if EPA has to approve, or
23 has EPA ever said to you whether or not they need to
0305

1 approve the numeric nutrient criteria before they're
2 used for impairment listing purposes?

3 A. EPA has to approve the 303d list. That is
4 their -- it's ultimately EPA's list.

5 Q. Oh, no, no. I'm saying the criteria. So EPA
6 doesn't have to approve the nutrient criteria? I'm
7 saying before you use the nutrient criteria, doesn't EPA
8 have to approve them?

9 MR. MULHOLLAND: Objection; calls for a
10 legal conclusion.

11 MR. HALL: Seeing if he knows the answer.

12 Q. Or do you know if EPA has to approve them
13 before you use them?

14 A. I think the question is best answered in terms
15 of the CALM that we put a together for the assessments.
16 EPA does not approve the CALM. That's put together to
17 describe the process used by the state, and then EPA has
18 to approve the list.

19 Q. I'm just asking you, do you know whether or
20 not EPA has to approve a numeric nutrient criteria
21 before you use it for 303d listing purposes?

22 MR. MULHOLLAND: Same objection.

23 Q. Do you know?

0306

1 A. I don't think so.

2 Q. You don't think they have to approve it or --
3 sorry.

4 A. I'm confused.

5 Q. Do you know whether or not EPA has to approve
6 a numeric nutrient criteria before -- a numeric criteria
7 before you use it for 303d listing purposes?

8 MR. MULHOLLAND: Same objection; calls
9 for a legal conclusion. You can answer, if you know.

10 A. I thought I did answer already, but they don't
11 have to -- EPA does not need to approve numeric
12 thresholds that we use in the CALM. We do not approve
13 the CALM.

14 Q. So it's your understanding that so long as you
15 include any new numeric threshold in a CALM, that that
16 doesn't require any kind of official EPA approval prior
17 to its application to identify impaired waters?

18 MR. MULHOLLAND: Same objection. You can
19 answer if you know.

20 MR. HALL: Just trying to make sure I
21 understand.

22 A. The way the process works is we, we the state,
23 EPA, develop an assessment methodology, and then use

0307

1 that assessment model. And that includes the numeric
2 thresholds that are relevant in this case. And we come
3 up with a proposed 303d list, which we send to EPA for
4 approval. They can look at that methodology and say if
5 they don't like the methodology, they don't approve the
6 list.

7 So the approval happening and the review by
8 EPA happens when we send them the list for review.

9 Q. I'm just trying to break out the two parts.

10 You applied a new numeric nutrient criteria
11 in -- to develop the 303d list in 2009; correct?

12 A. Right. We developed guidance on that; yes.

13 Q. Okay. And so those numeric values ended up in
14 your CALM document; correct?

15 A. Yes.

16 Q. Okay. It's your understanding EPA does not

17 have to approve the numeric values before they are used
18 in a CALM document; correct?

19 A. Yes.

20 Q. So in the next impairment listing that's done
21 for Great Bay, suppose you just decide to take those
22 numeric listing -- numeric values that you used in 2009
23 and cut them in half?

0308

1 A. Uhm-hmm.

2 Q. EPA doesn't have to approve that either?

3 MR. MULHOLLAND: Objection; calls for a
4 legal conclusion. If you know.

5 A. So you're asking hypothetically?

6 Q. Yeah, hypothetically.

7 A. They would not have to approve it before we
8 made any assessments. They ultimately would have to
9 approve the list, and if they disagree with the list,
10 they would have to disapprove.

11 Q. I'm just trying to understand what you believe
12 the state's position is, all right, or how it works;
13 that the state is free to make any change in the numeric
14 criteria target value it wants in a CALM document in
15 setting up a 303d listing?

16 MR. MULHOLLAND: Objection; calls for a
17 legal conclusion.

18 A. Perhaps it's best to talk about, you know,
19 criteria as in officially adopted criteria. I mean,
20 obviously those cannot be changed.

21 Q. Okay.

22 A. Whereas, thresholds that are used in guidance,
23 these are, these are thresholds used by the state in

0309

1 interpreting either narrative or some other type of
2 criteria.

3 Q. So, now, this is entitle -- this isn't
4 entitled, "Thresholds for Guidance." What I'm saying is
5 this isn't entitled -- I'm talking about the June 2009
6 document. It's entitled, "Numeric Nutrient Criteria."

7 A. Uhm-hmm.

8 Q. So what you're saying is if you develop a
9 numeric nutrient criteria, but you don't yet adopt it,
10 you can change that number anytime you want in a CALM
11 document as it's applied for identifying impaired
12 waters?

13 MR. MULHOLLAND: Can we take a short
14 break? I feel like we're stuck here.

15 MR. HALL: Yeah, I mean --

16 MR. KINDER: Yeah. I don't care. It's
17 unusual to have a break while a question's pending.

18 MR. MULHOLLAND: It's the same question
19 five times.

20 MR. HALL: Well, you know what? Let's
21 withdraw the question.

22 MR. MULHOLLAND: Okay. Give me a second.

23 (Recess.)

0310

1 BY MR. HALL:

2 Q. Phil, I just need to ask you one further
3 question about the document you have in front of you,
4 which is Exhibit 81.

5 A. This is the one?

6 Q. The same exhibit we were talking about.

7 Looking at your response, you have, "Once a
8 water body is put on the 303d list, it is scheduled for
9 a TMDL." Is that a, to your knowledge, is that an
10 accurate response?

11 A. Yes.

12 Q. Okay. So what kind of TMDLs now must be
13 scheduled for Great Bay; do they have to schedule a
14 nitrogen TMDL?

15 A. Yes.

16 Q. Do they have to schedule a TMDL that ensures a
17 transparency target is met?

18 A. Yes. For every parameter on the list it's
19 got -- it's got its own TMDL schedule.

20 Q. Okay. And has the TMDL been yet scheduled for
21 nitrogen and transparency for Great Bay, to your
22 knowledge?

23 A. I don't know what it is, but each impairment

0311

1 on the list gets assigned a date, and I don't remember
2 what it is.

3 Q. Okay. So we'd have to look to the list to see
4 what the date would be?

5 A. Correct.

6 Q. But it will get a TMDL eventually for these
7 parameters?

8 A. That's what a category 5 means; it is a water
9 body in need of a TMDL.

10 Q. Okay. Thank you.

11 All right. And we covered this point, but I
12 just want to kind of close out where we were on the 303d
13 list. So applying the draft numeric nutrient criteria
14 in 2009 and thereafter using this CALM stressor response
15 matrix, that resulted in a different set of impairment
16 listings than existed prior to the numeric nutrient
17 development; correct?

18 A. Yes, and also the addition of newer data as
19 well.

20 Q. Okay. The post-2009 impairment listings,
21 would they be the same if the numeric nutrient criteria
22 were actually adopted into water quality criteria?

23 MR. MULHOLLAND: Objection; calls for a

0312

1 legal conclusion.

2 Q. Do you know?

3 A. I'm sorry, the -- you're talking about the,
4 you say post-2009 --

5 Q. When I -- post-2009 there were some changes to
6 the impairment listings; correct?

7 A. So these would be amendments to the 2009 303d
8 list.

9 Q. Yeah. These were the amendments that we were
10 just talking about, the 2009. And I realize when we say
11 2009, a lot of things happened in 2009: The draft
12 numeric criteria, and then the 303d list that applied to
13 the draft numeric criteria.

14 A. Which was the 2008 list, officially.

15 Q. Submitted in 2009. Right. This is where the
16 confusion sometimes lies. What I'm saying is, once
17 these numeric nutrient criteria are adopted --

18 A. Adopted into rule?

19 Q. Adopted into rule, how would that -- do you
20 know if that would change the impairment listings for
21 nitrogen or transparency in Great Bay as they currently
22 stand?

23 MR. MULHOLLAND: Same objection.

0313

1 A. So you're saying the thresholds that were
2 published in the guidance document, if they were
3 officially promulgated, and assuming our methodology in
4 the CALM remain the same, there would be no difference.

5 Q. Okay. That's what I thought. Thanks.

6 I'm going to show you a PowerPoint
7 presentation. I suspect you may have been the one that
8 helped put it together. It was something that Harry
9 Stewart presented.

10 MR. HALL: We're going to mark this as
11 Exhibit 82.

12

(Trowbridge Exhibit 82 marked for
13 identification.)

14

15 Q. This was -- let me see. This was a
16 presentation done by Harry Stewart on January 25th,
17 2011, to the New England Water Environment Association,
18 Government Affairs Session, and it's a PowerPoint
19 presentation regarding the nutrient requirements and
20 program for Great Bay.

21 Mr. Trowbridge, do you recognize this
22 PowerPoint presentation?

23 A. Yes. Some of it, at least.

0314

1 Q. Do you recall whether or not you may have
2 helped Mr. Stewart in putting it together so he could do
3 his presentation?

4 A. Uhm, yes.

5 Q. Perfect. I'm going to just ask you a couple
6 of questions from his presentation. It's kind of, if
7 you will, by way of summarizing all of which we have
8 talked about this morning, because I think most of the
9 main points are just, from one slide to the next, listed

10 in the presentation.

11 THE WITNESS: Sorry, can I have another
12 water, please?

13 MR. LUCIC: Sure.

14 (Handing.)

15 Q. Let's just flip through a couple slides.

16 Here, I'm sorry, these are not -- there's no page number
17 on them because they were slides. So let's try to go
18 into -- yeah, you've got the page, yeah. That's great.

19 Let's look at the bullets over on the
20 left-hand side. The one that says, "In 2009, DES
21 developed numeric nutrient criteria to protect eelgrass
22 habitat and prevent low dissolved oxygen in the
23 estuary." When we're talking about that, we're talking

0315

1 about Short Exhibit 27, the nitrogen nutrient criteria;
2 correct?

3 A. Correct.

4 Q. It says a weight of evidence approach was
5 used, in that document. Is that accurate?

6 A. Yes.

7 Q. Okay. I'm going to ask you some questions
8 later as to what weight of evidence means, but we'll get
9 to that later.

10 A. Uhm-hmm.

11 Q. It says it was approved by EPA. Did EPA ever
12 officially approve this document; or what's meant by
13 "Approved by EPA"?

14 A. Yeah, I'm not sure.

15 Q. Okay. Let's flip forward, the one that
16 starts, "Nitrogen Impairments." It says that, "Nutrient
17 criteria resulted in the addition of most of the estuary
18 to the 303d list for nitrogen impairments in 2009."

19 That's a correct statement; right?

20 A. Yes.

21 Q. Okay. "The impairments triggered a TMDL
22 process." Correct statement; right?

23 A. Yes.

0316

1 Q. Then the next page, it says the state
2 completed a Great Bay nitrogen loading analysis that set
3 preliminary loading thresholds. That was the document
4 you and I were talking about earlier; right? I was
5 calling it the wasteload allocation, and it eventually
6 was called -- it eventually was called Analysis of
7 Nitrogen Loading Reductions for Wastewater Treatment
8 Facilities and Nonpoint Sources in Great Bay; right?

9 A. Right.

10 Q. And that was Exhibit -- what was it? -- 78.

11 Now, go to the next page. That top bullet:
12 Most of Great Bay estuary is impaired for nitrogen as
13 shown by persistent low DO in the tributaries and
14 eelgrass loss.

15 Is that a correct statement?

16 A. This is a good summation of the
17 stressor-response approach, where you have the high
18 nitrogen in addition to these response variables, which
19 is dissolved oxygen and eelgrass loss, that we discussed
20 in this bullet.

21 Q. Does this bullet indicate that the nitrogen
22 caused the eelgrass loss, in your mind? Is that what
23 it's intended to indicate?

0317

1 A. I'm sorry, I don't know what's wrong with my
2 throat.

3 What I think this bullet is intended to
4 summarize is the stressor-response approach, where we're
5 saying we added a nitrogen impairment because of the
6 high nitrogen, as well as -- and the fact that we have
7 these evidence of a response or a negative response for
8 low dissolve oxygen and the eelgrass loss. I mean,
9 that's the way I would summarize it.

10 Q. But I'm asking the word "cause." So if you
11 could just --

12 A. If -- so you're asking me does it show that
13 it caused, that nitrogen is causing the DO and eelgrass
14 loss?

15 Q. Yeah.

16 A. It does not show that it caused it.

17 Q. Do you know if the prior analyses that you
18 developed showed that it caused it?

19 A. No.

20 Q. But you used a weight-of-evidence approach to
21 come to a conclusion that you needed to regulate
22 nitrogen; right?

23 A. Correct.

0318

1 Q. Okay. And I guess, similarly, you used a
2 weight-of-evidence approach to decide that the current
3 transparency level in the system was inadequate for
4 eelgrass protection?

5 A. Uhm, I think all -- and scientific evaluation
6 doesn't use weight of evidence to some degree, so for
7 light attenuation, we use the weight of available
8 scientific evidence about what the light requirements
9 for eelgrass is.

10 Q. Let's flip forward, the point, nonpoint. Just
11 flip forward to a couple more charts. Actually, let's
12 stop at that prior one. Phil, that chart that looks
13 like a, I guess you might call it a matrix, that's the
14 one that puts what the load reduction requirements need
15 to be for the wastewater plants and nonpoint source,
16 from the wasteload allocation analyses that you had
17 done; right?

18 A. Yes.

19 Q. Okay. And -- okay. And that chart is
20 entitled, "Evaluation of Wastewater Treatment Plant
21 Permitting Scenarios on Nitrogen Loads." And all of

22 those permitting -- all of the permitting scenarios
23 presented in this chart, they all require load

0319

1 reductions in the wastewater plants; right? We've got
2 8, 5 and 3?

3 A. Right.

4 Q. I'm going the wrong way. Let's go to the
5 preliminary cost impact ones, right there.

6 We've got something that's entitled, Very
7 Preliminary Costs for Upgrading eight plants. Do you
8 recall who did this preliminary cost-reduction analysis?

9 A. This is done by DES.

10 Q. Okay. Do you recall who at -- did you do it
11 or did you get somebody else at the department to do it?

12 A. I had Ken Kessler, who is in our Wastewater
13 Engineering Bureau --

14 Q. Okay.

15 A. -- do the work.

16 Q. And the preliminary estimates for meeting the
17 new nutrient criteria, numeric nutrient criteria, they
18 range, depending on the effluent limits for the plant,
19 anywhere from around \$200 million to \$350 million in
20 capital costs? That's what that chart indicates?

21 A. Yes.

22 Q. Okay. And these are numbers that are -- to
23 your knowledge, are these numbers similar to more recent

0320

1 numbers that you've seen for the cost impact associated
2 with compliance of the numeric nutrient criteria?

3 MR. MULHOLLAND: Objection as to form.

4 Go ahead.

5 A. I've seen a pretty wide range of estimates.
6 This is inside the range.

7 Q. Okay.

8 A. And our approach to this analysis was to try
9 and not underestimate the cost.

10 Q. Okay. So are these still considered as a
11 reasonable cost estimate by DES; do you know?

12 A. Uhm --

13 Q. I mean, you may not have information on it --

14 A. Yeah.

15 Q. I'd like to bring your attention to the chart
16 that's called, "DES Perspective." It's near the end. I
17 guess the prior charts were going through what we'll
18 call the controversy of who's saying the numbers need to
19 be higher or lower, and they had some charts on, oh, the
20 environmental community perspective, municipality
21 perspective, EPA's perspective, everybody's perspective.
22 And now this is DES's perspective.

23 I'd like to bring your attention to the third

0321

1 bullet, on a independent peer review. It says, bullet:

2 An "independent peer review" (details to be determined)

3 could help to bring long-term consensus.

4 Do you know what independent peer review was
5 being referenced in this bullet?

6 A. No.

7 Q. Do you know if DES supports the coalition's
8 request for an independent peer review of the science
9 behind the 2009, June 2009 numeric nutrient criteria for
10 Great Bay?

11 MR. MULHOLLAND: I object to the
12 question.

13 A. That's really a decision that needs to be made
14 above my level.

15 Q. Oh, I know. I guess I'm just asking for your
16 current knowledge. Do you know whether -- because the
17 communities have been asking for an independent peer
18 review for going on two years at this point; correct?

19 A. I'm not sure of the exact dates.

20 Q. But for a while?

21 A. Yeah.

22 Q. Yeah. So do you -- I can't imagine it hasn't
23 been a topic of discussion within the department, given

0322

1 the outstanding request?

2 A. Right. But it's -- I don't know what the --
3 what my management would like to -- what their current
4 thinking is on this right now.

5 Q. So you don't know what the current thinking
6 is?

7 A. Yeah.

8 Q. Okay.

9 MR. KINDER: Did you want to mark that,
10 John?

11 MR. HALL: I think we marked it as 82, I
12 believe. It's already been marked.

13 Q. Okay. So I'm just going to give a little
14 summary of what I now -- what I think is the impact on
15 the regulated community from application of the
16 June 2009 numeric criteria and the changed impairment
17 listing that was done in August of 2009, and then
18 thereafter. I think the impairment listings stay pretty
19 much the same after August 2009; correct?

20 A. Uhm, for nitrogen?

21 Q. Yeah.

22 A. Yes.

23 Q. And transparency?

0323

1 A. There's been some changes to the transparency
2 listings.

3 Q. All right. See if you agree that this is what
4 the -- because they've talked about several hundred
5 million dollars -- \$200 million to \$350 million of
6 impacts on the wastewater plants. So the application of
7 the numeric nutrient criteria means that the wastewater
8 plants must reduce their nutrient loads to the impaired
9 waters; correct?

10 MR. MULHOLLAND: John, I object to this
11 line of questioning as asked and answered. You've done
12 this already. It's recapitulation. Also object as to
13 form of that question, as to the who's applying it. I
14 think I cut you off, so sorry.

15 Q. The impact of applying the numeric nutrient
16 criteria is that the communities must reduce their
17 nutrient loads to the impaired waters; correct?

18 A. Uhm --

19 MR. MULHOLLAND: Same objection.

20 THE WITNESS: So do I have to -- I'm
21 confused.

22 Q. Yeah, you have to answer.

23 MR. MULHOLLAND: You have to answer if
0324

1 you can, if you understand the question.

2 A. Uhm, all right. Can you say it again, please?

3 Q. The impact of applying the numeric nutrient
4 criteria for the Great Bay estuary to the impaired
5 waters listings is that now the wastewater plants must
6 reduce their nutrient loads to the impaired waters;
7 correct?

8 A. Uhm, I think I'm having a little trouble with
9 the term "apply" here because the criteria or the
10 thresholds are just guidance that are used to determine
11 impairments, and impairments are a description of the
12 available data. It doesn't then require anyone to do
13 anything.

14 Q. I'm going to say that they're going to have to
15 do this as a result of this; correct?

16 MR. MULHOLLAND: Same objection.

17 A. I mean, not necessarily. That's not
18 something -- this document doesn't make anyone do
19 anything.

20 MR. HALL: I want to take a three-minute
21 break.

22 (Recess.)

23

0325

1 BY MR. HALL:

2 Q. I wanted to ask you some questions,
3 Mr. Trowbridge, regarding your understanding of how your
4 narrative criteria work. You're familiar with the New
5 Hampshire's narrative criteria for nutrients and aquatic
6 life impairments?

7 A. Yes.

8 Q. Okay. Can you give me an idea of what you're
9 looking at to --

10 A. I'm just looking at the same document.

11 Q. You're looking at 2009 numeric nutrient
12 criteria document; right?

13 A. Uhm-hmm.

14 Q. I think it's got the wording of the narrative
15 criteria in the document?

16 A. Perhaps not. A place to look may be the --

17 Q. It is. It's on page -- well, go ahead.

18 A. What page is it?

19 Q. I'm sorry. It's got one. The narrative

20 standards for estuarine waters are Class B. Quote,

21 Class B waters shall contain no phosphorus and

22 nitrogen -- I'm on page 2 at the bottom -- no nitrogen

23 and such concentrations that would impair any existing

0326

1 designated use unless naturally occurring.

2 You see where that phrase is in that document?

3 A. Yes.

4 Q. Okay. Is it your understanding that a

5 narrative criteria violation for nutrients only occurs

6 if the nutrients are causing some demonstrated adverse

7 effect?

8 A. Yes.

9 Q. Okay. The -- your nutrient document or your

10 standards also employ the term cultural eutrophication.

11 It says, "Where existing discharges encourage cultural

12 eutrophication, you remove the nitrogen and phosphorus

13 to ensure attainment and maintenance of standards." Are

14 you familiar with that statement, cultural

15 eutrophication, in your regs?

16 A. Yes, I'm familiar with it. What number is it?

17 Q. It's in 1703.14. I'll read you what the

18 definition says: Cultural eutrophication is defined as,

19 quote, the human-induced addition of waste-containing

20 nutrients to surface waters which results in excessive

21 plant growth or a decrease in dissolved oxygen.

22 Does that refresh your recollection as to what

23 cultural eutrophication means?

0327

1 A. Yes. I just didn't -- I'd like to have -- I

2 just didn't have the exact wording in front of me.

3 Q. No, I understand.

4 So for -- so to decide you've got to regulate

5 nutrients, you need, under the narrative standard, you

6 connect them to some type of, what, excessive plant

7 growth or some kind of impairment of the use; right?

8 You say the nutrients caused X to occur?

9 A. Uhm, right. I mean, you're supposed to be

10 saying that you don't have so much phosphorus or

11 nitrogen such that you would impair any existing or

12 designated uses.

13 Q. Okay. My understanding, and maybe -- you'll

14 correct me if I'm wrong, okay?

15 A. Uhm-hmm.

16 Q. I understood that the DES is saying the

17 numeric nutrient criteria from 2009 constitute a

18 narrative criteria implementation method or a narrative

19 translator; is that your understanding?

20 A. Do you mean a numeric translator of the

21 narrative criteria?

22 Q. Yeah.

23 A. Right. That's how we're using it.

0328

1 Q. So you've kind of translated the narrative
2 into a numeric value; is that --

3 A. For the purpose of 303 -- sorry, for the
4 purpose of 303d assessments in the CALM.

5 Q. Okay.

6 A. It does not replace the narrative standard.

7 Q. It doesn't replace -- so this is a new
8 narrative translator, right; this document, the 2009
9 document?

10 A. Ah --

11 Q. There wasn't one before?

12 A. For the estuary. There's other -- obviously,
13 we do assessments for lakes and rivers and everything
14 else, and we have to interpret the narrative standard
15 for assessments in those water bodies as well.

16 Q. So I think the short answer is yes, this is a
17 new one for the estuary; right?

18 A. Yes, a new -- yes.

19 Q. Okay. And that document, the 2009 document,
20 the numeric translator, the numeric values contained
21 therein were based on what I'll call, I'll call them new
22 scientific and regulatory assumptions. I mean,
23 regarding what the connection for nitrogen is to

0329

1 impacting transparency and things like that; correct?

2 MR. MULHOLLAND: Objection to form.
3 That's a complex question.

4 Q. It certainly is. I'm sorry. There was no
5 easy way to ask it.

6 A. So could you --

7 Q. Yeah. Is the 2009, June 2009 document based
8 on new scientific and regulatory assumptions regarding
9 how nutrients impact Great Bay and the estuary?

10 A. I wouldn't say that. I would say it's based
11 on scientific information that's been published for a
12 long time.

13 Q. Oh. When I'm saying new, I'm meaning new in
14 its application to Great Bay?

15 A. Oh, like -- you just -- specifically in Great
16 Bay?

17 Q. Yeah. Like applied -- this is the first time
18 this information's been applied to Great Bay and the
19 estuary, right, to develop a numeric value?

20 A. Oh, it's the first time we've done that; yes.

21 Q. There's some correspondence back and forth
22 through EPA indicating that the 2009 document, the
23 numeric criteria document should be called a narrative

0330

1 translator. Were you involved in any of those
2 discussions where the EPA was recommending the, instead
3 of calling it a new numeric criteria, that you should

4 just call it a new narrative translator; do you recall
5 any of that?

6 A. Do you mean, sorry, numeric translator of the
7 narrative standard?

8 Q. Yeah.

9 A. There's been a lot of discussions about that
10 type of issue. I don't recall anything specific.

11 Q. Okay. Do you know who first raised that that
12 was an important issue; did DES raise that as a concern
13 or did EPA?

14 A. I don't recall.

15 Q. What's the difference in effect, and I'll say
16 in regulatory usage, by calling this a numeric
17 translator of a narrative criteria, or just a numeric
18 nutrient criteria?

19 MR. MULHOLLAND: Objection; calls for a
20 legal conclusion.

21 Q. Would it have any different regulatory effect
22 in your 303d listing process?

23 A. In the -- you're just talking about 303d now,
0331

1 and not, like, enforcement actions and other legal
2 matters?

3 Q. Or permitting.

4 A. We don't -- DE -- sorry. Can we answer --

5 Q. Let me withdraw the question. Let me just
6 withdraw the question.

7 Did EPA, to your knowledge, did EPA ever
8 explain to DES that you needed to adopt the numeric
9 nutrient criteria as a numeric criteria in your state
10 water quality standards?

11 A. You mean, like, go through official
12 rulemaking? So you're asking did EPA tell us we needed
13 to do that?

14 Q. Yep.

15 A. I don't recall.

16 Q. Okay. I'm going to ask -- that question that
17 I withdrew, I'm going to try to rephrase it.

18 Can you explain to me what the difference is
19 between calling this document a narrative translator
20 versus calling it a numeric criteria?

21 A. Calling -- just calling the same document two
22 different things?

23 Q. Yeah. Yeah. What's the regulatory
0332

1 difference; do you know?

2 A. Well, there's a difference in terms of
3 enforcement authority and in terms of going through
4 rulemaking.

5 Q. What about in terms of 303d listing?

6 A. I think we already covered this. In terms of
7 303d listing there is no difference.

8 Q. There is no difference. Right. Okay.

9 Do you know if there's a difference with

10 respect to permitting?

11 A. I don't know, because we don't -- we, DES,
12 don't write the permits.

13 Q. Okay. But you didn't -- your wasteload
14 allocation analyses didn't treat it any differently for
15 the purposes of permitting, did it?

16 A. Treat it any differently than what?

17 Q. Well, than any other typically adopted numeric
18 criteria?

19 A. No. I've only done that once. I never --

20 Q. That's right, I'm sorry. You've only done it
21 once. Okay.

22 Does this numeric nutrient criteria document
23 from June 2009, is it DES's position that this document
0333

1 constitutes a demonstration that the narrative criteria
2 for nutrients have been violated within the Great Bay
3 estuary?

4 A. Does that document?

5 Q. Uhm-hmm.

6 A. Demonstrate a violation?

7 Q. Yeah; of the narrative standard?

8 A. No.

9 Q. Okay. With regard to the -- let's switch to
10 permits for a minute. You're not the permitting person
11 for the department, for DES, right, that coordinates
12 usually with EPA?

13 A. Right. I'm not that person.

14 Q. Who is that person?

15 A. Uhm, Stergios Spanos.

16 Q. Do you know if DES and EPA have been
17 coordinating on the reopening of the permits for the
18 towns of Exeter, Newmarket, Rochester, Dover and
19 Portsmouth?

20 MR. MULHOLLAND: Objection; compound.

21 A. You mean reopening as in issuing new permits?
22 Yes, there's been coordination.

23 Q. And the main focus of those permits have been
0334

1 implementations of the numeric nutrient criteria that
2 were developed in June 2009?

3 A. I haven't been involved with the full part in
4 all of the permits.

5 Q. Do you know if DES has reviewed any draft
6 permits that EPA has sent over, like, for Exeter or
7 Newmarket or Dover?

8 A. Yes.

9 Q. And there's a lot of e-mails back and forth,
10 so you're copied on some, but do you know if anybody at
11 DES has objected to the -- to EPA's establishment of a
12 3-milligram per liter total nitrogen limit for -- in any
13 of those permits?

14 MR. MULHOLLAND: Objection as to form.
15 Just the word "objection." Do you mean formal

16 objections or informal objections?

17 MR. HALL: Has he either formally or
18 informally objected. Thank you. That's a good point.

19 Q. Have they told EPA that it's improper to give
20 these facilities a 3-milligram per liter total nitrogen
21 limit as the means for meeting the numeric nutrient
22 criteria for Great Bay?

23 A. I don't think so.

0335

1 Q. Okay. Are you responsible at all for 401
2 certifications on those permits; do you provide input on
3 that?

4 A. 401 certifications on permits are done by the
5 wastewater engineering branch. So we would provide some
6 input but they're the lead for those type of
7 certifications.

8 Q. Okay. Do you know if they -- any 401
9 certifications have been sent out on Exeter, Newmarket
10 or Dover permits?

11 A. I don't believe so. You're talking about the
12 new permits; right?

13 Q. Yes, the new permits. Yes, I'm not talking
14 about the old ones.

15 A. Yes. I don't believe so.

16 MR. HALL: Why don't we break for lunch.

17 MR. MULHOLLAND: Sure.

18

19 (Luncheon recess.)

20

21 MR. HALL: Back on the record.

22 I understand that Mr. Trowbridge would like to
23 give an answer to the question that we had on whether

0336

1 anybody has presented him with a demonstration that
2 nitrogen was the cause of eelgrass losses in the Great
3 Bay estuary system?

4 MR. MULHOLLAND: Yes.

5 THE WITNESS: So before we do that, we
6 just wanted to change an answer.

7 BY MR. HALL:

8 Q. No. I think I'd like you to answer the
9 question first, and if we want to change an answer,
10 that's fine.

11 A. All right. So the answer would be no, because
12 you cannot prove causation because there's no control
13 for the Great Bay.

14 MR. MULHOLLAND: And then Mr. Trowbridge
15 has to change an answer that he realized he answered
16 incorrectly.

17 Q. Okay. And do you recall what the question
18 was?

19 A. It was a question related to the cause of
20 eelgrass decline in Waquoit Bay. I think the question
21 was has eelgrass loss been -- the cause of eelgrass loss

22 been proven there, or something to that effect. So I
23 think a more appropriate answer would be, as far as I
0337

1 know, there have -- they have not proven the cause of
2 eelgrass loss there.

3 Q. Okay. That's fine.

4 What I'd like to do is kind of go back to an
5 earlier line of questioning that we had in a prior
6 deposition. And it's related to how the numeric
7 criteria for transparency were derived. Let's see if we
8 can work our way through this.

9 I believe you indicated in your prior
10 deposition that the 2009 numeric criteria were based on
11 the assumption that attaining a 22 percent light
12 transmission level was needed to protect eelgrass growth
13 and survival?

14 A. Yes. I believe that's correct.

15 Q. And that was based on some studies that, I
16 believe, were used in the Chesapeake Bay program. Is
17 that your recollection also?

18 A. Yes.

19 Q. Okay. And then the nitrogen criteria from the
20 2009 document, they were based on achieving that -- the
21 level of nitrogen that was necessary to achieve that
22 particular level of transparency; right?

23 A. You're talking about the nitrogen ones or the
0338

1 light attenuation?

2 Q. Well, the nitrogen were based on -- were based
3 on the light attenuation target; correct?

4 A. Just making sure I understand the one you're
5 talking about. The ones on this table?

6 Q. Yes. We're looking at page 68 for Document
7 Number 27 from the Short deposition.

8 A. And within that table, we're talking about
9 these numbers here.

10 (Indicating.)

11 Q. When you're pointing and saying "these
12 numbers," can you please tell us --

13 A. The numbers related for total nitrogen and
14 light attenuation coefficient.

15 Q. Correct.

16 A. Okay. Yes. These numbers were derived using
17 the light-attenuation model.

18 Q. And the light-attenuation model used the
19 22 percent light transmission level; right?

20 A. Yes.

21 Q. Okay. Does not meeting a 22 percent light
22 transmission level in areas where eelgrass growth is now
23 below expected levels, does that constitute a narrative
0339

1 criteria violation now?

2 A. Uhm, can you just say that again?

3 Q. I'm trying to ask a question as to what the

4 22 percent -- not achieving the 22 percent target does
5 in the system at this point in time.

6 If I'm in an area where eelgrass are currently
7 less than, 20 percent less than historical levels, if
8 the light transmission in that area is not at
9 22 percent, on average --

10 A. Above or below?

11 Q. Is below 22 percent, on average, does that
12 constitute a narrative criteria violation?

13 A. Uhm, it -- and what would be the nitrogen
14 concentration?

15 Q. Nitrogen concentration would be --

16 A. Actually, sorry. Are you talking about
17 violation of the aquatic -- the biological aquatic
18 community integrity standard or of the narrative
19 standard for nutrients?

20 Q. Let's do the biological integrity one first.

21 A. Okay. Biological integrity, the assessment
22 protocol only looks at the change in the eelgrass cover,
23 so it does not look at the light attenuation.

0340

1 Q. Okay. For the one that looks at light
2 attenuation, would it be considered a narrative criteria
3 violation?

4 A. So when we're talking about evaluation, I
5 guess what I'd say is about the nutrient narrative
6 standard.

7 Q. Uhm-hmm.

8 A. The issue is what is the nitrogen
9 concentration relative to its threshold. Because the
10 eelgrass, change in eelgrass and the light attenuation
11 parameter are both response parameters.

12 Q. Well, let's take them one at a time. There's
13 a light -- there's a light-attenuation value that's in
14 the 2009 criteria document; right?

15 A. Yes.

16 Q. And you've used that to set light attenuation
17 impairment listings; correct?

18 A. Yes.

19 Q. So if I'm in an area where eelgrass population
20 is less than 20 percent of historical levels --

21 A. Uhm-hmm.

22 Q. -- and my light attenuation level is less than
23 the 22 percent target level, does that constitute a

0341

1 narrative criteria violation for light attenuation?

2 A. Uhm, where I'm getting confused is there isn't
3 a narrative standard for light attenuation. It's -- the
4 narrative standards we're talking about are the ones for
5 nutrients, and the ones for biological and aquatic
6 community integrity. So I'm just having a hard time
7 understanding this.

8 Q. Then you've confused me even more,
9 Mr. Trowbridge, with that response because didn't the

10 impairment listing document for 2009 and thereafter
11 identify light attenuation as an impairment?

12 A. Right. So are you asking, then, if you have
13 light attenuation, just independent of anything else --

14 Q. Hmm.

15 A. -- it's less than 22 percent, or the
16 equivalent value for Kd, is that going to be an
17 impairment on the 303d list?

18 Q. Well, I know it's an impairment on the 303d
19 list; right? I mean, you've listed it as an impairment.
20 So does that mean it's a narrative criteria violation is
21 occurring there?

22 A. Yes. I think that would be -- this is not a
23 way we have thought about it, but this would be, I
0342

1 think, under the biological and aquatic community
2 integrity narrative standard, in this particular area,
3 which is the -- which is the estuary, where eelgrass has
4 historically existed.

5 Q. Okay. So the new way of implementing the
6 narrative criteria -- I'll just try to say it simply --
7 presumes that you need to have a 22 percent light
8 transmission level to protect eelgrass resources?

9 A. Yes.

10 Q. Okay. Do you know if the historical data for
11 the estuary support that a 22 percent light level is
12 necessary for stable and healthy eelgrass populations to
13 exist, for example, in Great Bay?

14 A. Are you talking about, like, historical
15 records of light attenuation?

16 Q. Historical record of the amount of light
17 that's occurring in the system.

18 A. And I think we covered some of these questions
19 in the previous deposition.

20 Q. Right.

21 A. And the light attenuation, the information we
22 have has not changed very much.

23 Q. Okay.

0343

1 A. In areas where we have long-term records.

2 Q. Right. But I agree it hasn't changed. I
3 mean, that's something that I think the long-term
4 records have borne out. But the level that hasn't
5 changed, was that level above or below the 22 percent
6 light transmission level?

7 A. I'm not sure, because the old measurements
8 were made with Secchi disks, so the relationship between
9 that and the 22 percent is hard to say.

10 Q. Okay. Let's walk through some of the
11 impairment findings that happened before the numeric
12 nutrient criteria were put together. The State of the
13 Estuaries reports, you were responsible for preparing a
14 number of them. I believe we covered last time that the
15 State of the Estuaries reports, I'll say at least up

16 through 2006, confirm that algal growth in the system
17 did not change significantly in response to a 59 percent
18 increase in inorganic and total nitrogen levels in the
19 bay; correct?

20 A. We're talking about through 2006?

21 Q. Yeah.

22 A. I don't recall exactly, but certainly the
23 levels of chlorophyll or phytoplankton have not

0344

1 increased dramatically. I don't know by other types of
2 algae, like macroalgae.

3 Q. I'm only talking about phytoplankton. The
4 nitrogen went up but the phytoplankton levels didn't
5 change?

6 A. In the place where we have long-term records,
7 which is Adams Point.

8 Q. So if the phytoplankton levels didn't change,
9 phytoplankton could not have caused a change in
10 transparency; correct?

11 A. Uhm, yes.

12 Q. "Yes," meaning correct; right?

13 A. Yes.

14 Q. Okay. So back to the -- remember we used the
15 term "cultural eutrophication" before about causing,
16 something about causing excessive or increased aquatic
17 plant growth; right? I think that's how the term's
18 used?

19 A. I believe so.

20 Q. So with regard to, and I'll just say
21 phytoplankton, up through 2006 at least, there wasn't
22 any indication that narrative criteria were being
23 violated for nutrients; right?

0345

1 A. I'd say based on the information we had in
2 2006, that's correct.

3 Q. Okay. There was a noted suspended solids
4 increase, and I covered this also with Mr. Currier.
5 There was a suspended solids increase reported in the
6 2006 State of the Estuaries report, which is Short
7 Exhibit 18. Do you recall that analysis? And I'm
8 pointing at the graphs. It's called -- is that figure
9 7?

10 MR. MULHOLLAND: Figure 7.

11 Q. Yeah, figure 7 on page 13. And that was from
12 the -- that 2006 State of the Estuaries report. So the
13 suspended solids had gone up how much between the two
14 assessment periods that you're looking at for that
15 report?

16 A. I think I'm looking in the right spot here.
17 It says, on page 12, "During the same period suspended
18 solids concentrations increased by 81 percent."

19 Q. Okay. So up to 2006 the chlorophyll-a didn't
20 change materially as a result of changing nitrogen loads
21 but the suspended solids went up. Did you ever have

22 a -- an explanation for what caused that to occur?

23 What -- if the chlorophyll-a didn't go up, that couldn't
0346

1 have caused the suspended solids to go up, obviously;
2 right?

3 A. Yes.

4 Q. Okay. So do we know what caused the suspended
5 solids to increase in the system if it wasn't algae?

6 A. Are we talking about what we knew in 2007 or
7 2006 or 2005 or what we know now?

8 Q. What you knew at that time. I don't know if
9 you know anything different today but...

10 A. I don't think we drew any strong conclusions
11 in this report.

12 Q. Okay. But it apparently wasn't caused by the
13 nutrients because the nutrients hadn't changed
14 chlorophyll-a?

15 A. According to this report, no.

16 Q. Did you have any subsequent analysis that
17 would have indicated that the nutrients were the cause
18 of the change in suspended solids in the system or do
19 you know if there were any subsequent reports that
20 concluded nutrients were the cause of the change to
21 suspended solids in the system?

22 A. I believe we did an appendix to the 2009
23 report, 2009 guidance document where we looked at some
0347

1 patterns of eelgrass loss relative to suspended solids
2 concentrations.

3 Q. Uhm-hmm. Okay. And what would that
4 conclusion be?

5 A. I'll get it exactly. So there's, in this
6 appendix B, I don't know what exhibit this is, but 2009
7 guidance document, appendix B page B3.

8 Q. Uhm-hmm.

9 A. There's a paragraph near the bottom that
10 summarizes the result of that, or the observations.

11 Q. Okay. Can you tell me what that observation
12 was?

13 A. Okay. So it says, "As expected, the suspended
14 sediment concentrations in the estuary have increased as
15 a result of eelgrass loss. Figure 2 shows that
16 suspended solids concentration spiked in 1990 to 1992,
17 following a period when eelgrass died off due to wasting
18 disease.

19 "In the years following, the eelgrass
20 population rebounded and suspended solids concentration
21 returned to normal levels. Later, after the eelgrass
22 populations in the Great Bay had been declining for
23 several years, the suspended solids concentrations again
0348

1 became elevated. This pattern of increasing suspended
2 solids concentrations following eelgrass loss is a
3 negative feedback cycle that has been documented in the

4 scientific literature, Burkholder 2007. The increased
5 turbidity from destabilized sediments decreases light
6 availability for eelgrass."

7 Q. Okay. So that explains, you believe, that
8 some eelgrass loss may be the root cause of why the TSS
9 level went up?

10 A. Yes.

11 Q. Okay. I'll take that back now.

12 (Handing.)

13 Q. In your last deposition we had discussed
14 whether or not there was information on whether epiphyte
15 growth was expansive in the system. So I guess the
16 question is, and there was some information from Fred
17 Short, I think you may recall what Fred had said, he had
18 not really seen that epiphyte growth was excessive. So
19 with regard to epiphyte growth, do you know if there's a
20 current basis to claim there's a narrative criteria
21 violation associated with that form of plant growth in
22 Great Bay or in the tidal rivers?

23 A. So the form of the question is do I know if

0349

1 there's any information or -- sorry. It's just a
2 complicated question.

3 Q. I'm asking about is there any information
4 showing that epiphyte growth is currently in violation
5 of narrative criteria?

6 A. Not that I'm aware of.

7 Q. Okay. In your -- in our prior deposition you
8 and I also talked about that eelgrass impairment status
9 between the early '90s and 2005. Do you recall us
10 talking about that?

11 A. About 303d impairments?

12 Q. Yes.

13 A. Yes.

14 Q. And you recall that the waters were not
15 considered impaired -- when I say "the waters," I think
16 it was Great Bay and Portsmouth Harbor were not
17 considered impaired for eelgrass from, I'll say, the
18 1990s through 2005; is that correct?

19 A. Uhm, yes. Those waters were not on the 303d
20 list between those two years.

21 Q. Okay. So during that period, there was no
22 narrative criteria violation for ecological impacts
23 associated with eelgrass in those areas; right?

0350

1 A. Uhm, we only started to make assessments of
2 eelgrass after that period of time, so it's hard for me
3 to say whether there was a violation or not. Because we
4 weren't looking at the data for 303d purposes.

5 Q. Okay. But I mean, in terms of the actual
6 data, I mean, I could give you the --

7 A. In terms of what the levels were.

8 Q. Yeah, the actual acreages. So they were all
9 within 20 percent of historical during that timeframe;

10 correct?

11 A. That's a different question than talking about
12 an impairment determination.

13 Q. But isn't within 20 percent of historical the
14 basis of an eelgrass determination; right?

15 A. That's the threshold we use for the protocol;
16 yes.

17 Q. So if they -- I'll show you the -- we can use
18 the -- let's use Exhibit 67, which is the eelgrass
19 acreage charts that you've put together for PREP. You
20 recall that document, of course; correct?

21 A. Yes.

22 Q. And between, I guess we'll call it 1990 and
23 2005, is there -- was Great Bay less than the, you know,
0351

1 the 20 percent, 20 percent of baseline?

2 A. I just, you know, not having done the
3 calculation exactly, I can't say for sure. But, uhm, I
4 mean, aren't we just looking to eyeball it or --

5 Q. Yeah. I mean, I can assure you, the 2006
6 estuary report actually had that stuff, as did the -- we
7 could look at your 2008 impairment listing.

8 A. Sure.

9 Q. That said no, it wasn't.

10 A. I just am sensitive to saying a specific
11 number when I haven't done the --

12 Q. Would you like me to give you another document
13 that actually had the calculation in it?

14 A. Sure.

15 Q. I think we've got that. Let me have that
16 back. Let's look at the -- what I'm going to give you a
17 copy of is the August 2008 Impaired Waters document.

18 (Handing.)

19 Q. If you look at the table there, that indicates
20 that the eelgrass population, I believe, was somewhere
21 around an average of -- a little over 2,000 acres in
22 Great Bay.

23 A. Okay. I mean, the section that I was -- would
0352

1 turn to to answer this question is on page 6 of that
2 document.

3 Q. Uhm-hmm.

4 A. And it's the second full paragraph, and says,
5 "For the period between 1990 and 1999, eelgrass cover in
6 Great Bay was relatively healthy and stable. The
7 relative standard deviation of eelgrass during this
8 period was 6.5 percent." That's sort of the assessment
9 we did. And we go on to say, "Assuming that the
10 variability of eelgrass cover in Great Bay is
11 represented by the locations, DES shows three relative
12 standard deviations, which is 20 percent, as the
13 appropriate threshold for nonrandom change from
14 reference conditions."

15 Q. That's what the -- and what I'm saying is the

16 values that are in that table in the back don't show
17 more than a 20 percent change in the reference
18 condition. I mean, that was the point; right?

19 A. Okay.

20 Q. I mean --

21 A. No, I understand your point. I just --

22 Q. I'm just saying, so that's the question:

23 Those don't show -- those data indicate that there was
0353

1 no impaired -- impairment listing for Great Bay through
2 2005? I mean, this is something we covered in the prior
3 deposition.

4 A. I'm just wanting to be precise about numbers.

5 But, I mean, if we're talking in general, yes, I agree.

6 Q. And then looking at Portsmouth, the Portsmouth
7 Harbor area, I think it was the answer was the same
8 there; that the values down in Portsmouth Harbor are
9 within the same range as --

10 A. Oh, so you're talking about the assessment
11 made using data through 2005?

12 Q. Yeah. That's all.

13 A. Okay. You're not -- okay. I was mis--

14 Q. I'm just saying -- I'm just trying to set up
15 what the -- what were the conditions occurring in Great
16 Bay prior to -- 2005 and prior.

17 A. Okay. So -- so I understand better now.

18 So, yeah. This was the assessment we made
19 using the protocol that we have with all the data
20 available through 2005.

21 Q. Right.

22 A. Right.

23 Q. And up through 2005, not listed as impaired?

0354

1 A. For Great Bay and for Portsmouth Harbor.

2 Q. Okay. Right. So up through 2005 there's no
3 narrative criteria violation for what -- I guess what
4 you call ecological impacts for Great Bay or Portsmouth
5 Harbor; right?

6 A. Correct.

7 Q. Okay.

8 A. And I think it's important to -- for Great
9 Bay, that report did conclude that Great Bay was
10 determined to be threatened, but based on, I guess,
11 preliminary data for eelgrass in 2006 and 2007.

12 Q. Right. That's why I'm just -- I'm just
13 sticking with what happened. I'm trying to ask
14 ourselves, just so you get the idea where we're going on
15 this, Mr. Trowbridge, I'm asking ourselves what did we
16 know about the system prior to 2005.

17 A. Sure. All right.

18 Q. Eelgrass not impaired, and not listed as
19 impaired in Great Bay; right?

20 A. Correct.

21 Q. Eelgrass not listed as impaired in Portsmouth

22 Harbor?

23 A. Correct.

0355

1 Q. No significant change in chlorophyll levels in
2 these areas up through this period?

3 A. Uhm-hmm.

4 Q. Right?

5 A. Right.

6 Q. There was a change in suspended solids, which
7 you've explained is maybe related to some eelgrass
8 thinning in the system; right?

9 A. Yes.

10 Q. Okay. And as far as we know, there was no
11 change in transparency throughout this time frame of
12 1990 to 2005, to the degree we have data or information
13 available on that; right?

14 A. Right. In the few locations where we have
15 long-term records.

16 Q. Right. Okay.

17 All right. So I guess with regard to
18 transparency, at this point in time, to the degree we've
19 got the records, there's no indication that transparency
20 is suffering as a result of cultural eutrophication,
21 right, because it hasn't changed?

22 A. You're talking specifically about Great Bay;
23 right?

0356

1 Q. Yeah, Great Bay. And Portsmouth Harbor, I
2 guess. I mean, I suppose. There's not that many
3 readings in Portsmouth Harbor; right?

4 A. Very few.

5 Q. Very few. But there's quite a bit of data on,
6 really on transparency for Great Bay; right?

7 A. There's been Secchi depth measurements for a
8 while, but not very many of the actual measurements of
9 light attenuation. I'm sorry, I forgot the original
10 question.

11 Q. Oh. I was asking whether or not there was any
12 indication that transparency had suffered as a result of
13 cultural eutrophication up through 2005?

14 A. Not in Great Bay.

15 Q. Okay. So here's the question: We've got a --
16 let's see, how many years are we looking at? The
17 eelgrass rebounded in 1989 or something? When did the
18 eelgrass rebound after the -- after the wasting disease
19 event? What was the first year the acreage started
20 looking pretty good?

21 A. Around 1990.

22 Q. Around 1990, okay. That's fair enough.

23 So from 1990 to 2005 we've got this long

0357

1 period of stable eelgrass acreage, within the
2 20 percent, it goes up and down, but that's why you have
3 a 20 percent variation. During this same period, these,

4 the waters in Great Bay did not meet the 22 percent
5 incident light requirement, did they? I mean, based on
6 the best available information you have, they did not
7 meet that 22 percent level; correct?

8 A. Well, we only started measuring the light
9 attenuation in 2004, I think, you know.

10 Q. I'm just saying, based on the best available
11 information you have, the light attenuation level was
12 not met; right? That 22 percent level was not met in
13 Great Bay?

14 A. I -- I guess I'm having trouble because the
15 data that I have to assess that is the light attenuation
16 measurements, and they started in 2004.

17 Q. Didn't meet it in 2004, did it?

18 A. Uhm, I don't recall. We've been looking at
19 the data in aggregate.

20 Q. Okay. Well, the transparency levels haven't
21 changed, right, not materially, as far as we know, in
22 Great Bay?

23 MR. MULHOLLAND: Objection; form. It's
0358

1 unclear when.

2 Q. Just period. Over, in 20 years, from 1990 to
3 present, they have not materially changed in Great Bay;
4 correct?

5 A. I think if you're talking about the Secchi
6 depth readings.

7 Q. Which is a measure of transparency; correct?

8 A. It's a measure of transparency, yeah.

9 Q. Hasn't changed?

10 A. The data that's from Adams Point has not
11 changed, no.

12 Q. Okay. And the Kd readings that you have at
13 Adams Point indicate the 22 percent light level is not
14 being met in that area; correct? I mean, I could show
15 you your own analyses that did that. Correct?

16 A. Yes.

17 Q. So --

18 A. I'm just not sure of how good a translator or
19 how good the connection is between Secchi depth and
20 measured light attenuation by photosynthetic active
21 radiation. That's my hesitation in the answer.

22 Q. Well, I could go into asking you why would
23 that make a difference if the Secchi depth numbers

0359

1 haven't changed materially? Whatever is being measured
2 for light attenuation hasn't really changed, right; it's
3 just another way of measuring light attenuation?

4 A. Right. I just say it's a less accurate way.

5 Q. Pretty -- what, Secchi depth?

6 A. Uhm-hmm.

7 Q. It's a pretty simple measurement, isn't it?

8 A. Yes.

9 Q. I mean, very simple measurement; right?

10 A. It's simple, but it's also somewhat subjective
11 to the vision of the person taking the measurement.

12 Q. But these were quality -- these were data that
13 were supposedly quality assured and put into your
14 database?

15 A. Yeah. These were measurements made by
16 volunteers. They had a quality assurance plan.

17 Q. Okay. And these were data that you, yourself,
18 had relied on in doing presentations to EPA as to what
19 was affecting the eelgrass in the system; right? I
20 mean, you used them yourself?

21 A. I certainly have looked at the data; yes.

22 Q. And you presented the results of those data,
23 too; right?

0360

1 A. Yes.

2 Q. Did you present the results because you
3 thought it was unreliable? When you were presenting the
4 results, did you tell people, I'm giving you information
5 that's not reliable?

6 A. I don't remember if I said that in my
7 presentation.

8 Q. All right. You didn't likely say that in your
9 presentations, did you?

10 A. I don't know.

11 Q. You don't know?

12 A. I don't know what I said in presentations that
13 long ago.

14 Q. Okay. Assume, for the purpose of this
15 question, that the transparency level prior to 2005 did
16 not meet, in Great Bay, did not meet the 22 percent
17 incident light level. Assume that for the basis of this
18 question. Wouldn't this 16-year run of acceptable
19 eelgrass acreage indicate that a 22 percent light level
20 is not necessary in Great Bay to support an unimpaired
21 eelgrass status?

22 A. Unless the eelgrass is getting light during
23 periods of low tide when it's exposed to the surface.

0361

1 You know, there's -- this is a shallow system, and so
2 the eelgrass, some of the eelgrass can be exposed
3 directly to sunlight at low tide. And so that's one of
4 the ways that it can get light that would be not
5 explained by a 22 percent-light-transmission-
6 through-the-water model.

7 Q. So the answer to the question is yes? I mean,
8 could you read it back? I mean, you explained to me why
9 the answer is -- why 22 percent wouldn't apply, but I
10 think a simple answer to the question first, and then if
11 you want to explain it later.

12 MR. HALL: I think if you read back,
13 wouldn't this 16-year...

14 (Record read as requested.)

15 A. So I think the answer is, I think, yes, with

16 the explanation I provided.

17 Q. With the explanation of why that's occurring?

18 A. Yes.

19 Q. Okay. That's fine. I mean, that, quite

20 frankly, that's the same explanation that Fred Short has

21 repeatedly given, right, why Great Bay isn't -- he

22 doesn't consider it to be a transparency-limited area,

23 because the eelgrass get enough light at low tide;

0362

1 right?

2 A. In the shallow areas. There are deeper areas

3 of Great Bay.

4 Q. Does your impairment status insist that you've

5 got, for 303d listing, say that something's considered

6 impaired, if you still meet the acreage requirements but

7 the eelgrass are not growing to some level in the deeper

8 areas?

9 A. No. Our protocol just looks at the overall

10 area.

11 Q. Okay. So the fact that some eelgrass may or

12 may not be growing in some of the deepest areas is not a

13 basis for to claim impaired; correct?

14 A. That's correct. That's not the way our

15 protocol works.

16 Q. Okay. Just checking.

17 Doesn't this same 16-year run of unimpaired

18 eelgrass status also confirm that whatever level of

19 nitrogen or inorganic nitrogen that was occurring in

20 this system is not at a level that's toxic to eelgrass?

21 A. I think you might want to clarify the question

22 in terms of toxic to eelgrass in Great Bay or in all

23 areas?

0363

1 Q. In Great Bay. I could only refer this

2 question to the specific area where the eelgrass were

3 fine. I mean, I --

4 A. Uhm-hmm.

5 Q. You couldn't draw an answer to an area where

6 the eelgrass aren't there; right?

7 A. Correct.

8 Q. So we're only talking about Great Bay. I

9 mean, and you understand what the question is; right?

10 There's this theory that nitrogen is toxic, inorganic

11 nitrogen forms are toxic to eelgrass. So doesn't --

12 whatever inorganic nitrogen levels occurring at that

13 time is not toxic to eelgrass because it's maintaining

14 its acreage requirements; right?

15 A. Uhm, I would say yes, with the explanation

16 that sometimes it takes a while for effects to be seen.

17 This is a fairly long run of data. And during the same

18 period there was a thinning of the beds. So there has

19 been some effects that aren't evident in this metric of

20 the eelgrass.

21 Q. Right. The thinning of the beds is not a

22 basis for declaring an impairment, correct, at this
23 point?

0364

1 A. That is correct.

2 Q. All right. So this is kind of like the
3 closeout question in this whole run of questions on
4 22 percent light and all of that. Is there any Great
5 Bay-specific information that you have or that's been
6 presented to you confirming that a 22 percent light
7 level is necessary to ensure the health and survival of
8 eelgrass anywhere in this system?

9 A. Anywhere in the Great Bay estuary system? So
10 you're asking has any evidence been or any information
11 been provided to me?

12 Q. Great Bay-specific information.

13 A. Great Bay-specific. No.

14 Q. Now, the source of the 22 percent, as we
15 discussed earlier, was a Chesapeake Bay analyses that
16 was done; correct?

17 A. Yes.

18 Q. Did you know that the Chesapeake Bay analysis
19 on 22 percent assumed that there was a significant level
20 of epiphyte growth occurring on the eelgrass?

21 A. Not that I'm aware of.

22 Q. Did you know that the Chesapeake Bay analysis
23 considered that a chlorophyll-a level in the range of 10

0365

1 to 13 micrograms was consistent with meeting the
2 transparency level that they had set in that system?

3 A. I'm sure I read that at some point, but it's a
4 totally different system in terms of its tidal range and
5 things.

6 Q. Right. So that means we probably shouldn't be
7 using Chesapeake Bay without accounting for all the
8 differences in this system; correct?

9 A. Well, when you look at any of these things you
10 have to account for changes between systems, and
11 22 percent was chosen as the minimal level for eelgrass
12 survival. It was not -- there was information or
13 reports that people gave us saying that the percentage
14 should be higher.

15 Q. I know what was chosen, Mr. Trowbridge. What
16 I'm asking is, we just covered the epiphyte point. If
17 Fred Short said epiphyte growth was not significant in
18 this system, then the 22 percent target that was
19 considered necessary and appropriate for Chesapeake Bay
20 would need to be adjusted for this system, wouldn't it,
21 if epiphyte growth was not significant?

22 A. Yeah. I think the way to phrase it is if you
23 had better site-specific information you could adjust

0366

1 that.

2 Q. I think that's a good response. And we do
3 have some information from the eelgrass expert as to

4 whether epiphytes are prevalent and causing a problem;
5 right?

6 A. Yes.

7 Q. Okay. And that would be relevant
8 site-specific information; right?

9 A. I guess what I meant by that is some sort of
10 information on the degree to which the number might be
11 changed.

12 Q. Ah. One could probably find that out by
13 looking at the basis of the Chesapeake Bay program
14 number, now, couldn't they?

15 A. I don't follow it.

16 Q. Chesapeake Bay program number was altered to
17 account for additional epiphytes. One can find out how
18 much it was altered to account for that; right?

19 A. Uhm, it's been a while since I looked at the
20 Chesapeake Bay program numbers. And as I recall, the
21 22 percent was the amount of light that the plant needed
22 to receive, and that amount was the light attenuation,
23 so it was a combination of the light attenuation through

0367

1 the water as well as the light attenuation through
2 epiphytes on the leaf.

3 Q. Uhm-hmm.

4 A. So the ultimate number, the 22 percent, was
5 what the plant needed to survive. It's not that the --
6 you know, I --

7 Q. Can I explore that with you a little bit
8 further? Because, I mean, Mr. Trowbridge, I hope you
9 understand that all the people that are involved in the
10 litigation are really interested in just trying to make
11 sure we get to an answer that's necessary, appropriate,
12 and reasonable for the bay. We're not trying to find
13 out a way to kill eelgrass and not protect eelgrass or
14 anything like that.

15 If the 22 percent number was the amount that
16 accounted for light loss with an epiphyte coating, and
17 you did not have that epiphyte coating, you could use a
18 lower light-penetration value, couldn't you, because you
19 don't have the coating of epiphytes on the leaves?

20 A. Right. I just -- my recollection of their
21 report is a little different, and I just think without
22 looking at it I'm hesitant to offer an --

23 Q. I'm not asking you to agree to my

0368

1 characterizations of the report, I'm just suggesting
2 that the -- that if there was a difference, and it was
3 due to epiphytes, on the amount of light penetration
4 people thought was needed, that would be something we
5 could check and look at the reports to figure out
6 whether a different number was appropriate. That also
7 might very well explain why these eelgrass in Great Bay
8 seem to be doing so well with less than 22 percent and
9 also might explain why the eelgrass in Portsmouth

10 Harbor, which also doesn't meet the light attenuation
11 numbers that you want achieved, why they were doing so
12 well all the way up through 2005 with a lesser level of
13 light coming in. Simply might be the explanation,
14 that's all. Okay?

15 MR. HALL: The witness nodded.

16 A. I mean, is there a question?

17 Q. No. I'm just explaining --

18 A. Yeah, right.

19 Q. -- as to why it's important and why we're
20 exploring some of these issues. It's not a case of
21 gotcha, it's a case of trying to get to the bottom of,
22 you know, how we get to reasonable answers on this case.

23 MR. HALL: Okay. You're looking like you

0369

1 wanted to --

2 MR. MULHOLLAND: I was going to say
3 that -- I was just going to say that there wasn't a
4 question pending so he shouldn't answer the nonquestion,
5 but you're beyond that.

6 MR. HALL: Okay.

7 Q. Now, let's go to after 2005 in the system.

8 Let me have that back so it's not in front of you.

9 (Handing.)

10 Q. After 2005 there was a major decrease in
11 eelgrass growth in the system; right? I think you could
12 look at, for example, the table from your 2013 PREP,
13 draft PREP report, and I will give us a document number,
14 bear with me, so we all know what we're looking at.
15 It's Exhibit 67.

16 There was a major decrease in eelgrass
17 populations in Great Bay; right?

18 A. You mean in 2006, 2007 and 2008?

19 Q. Yeah. Big drop-off?

20 A. Yes.

21 Q. I mean, actually, would you describe that as a
22 relatively dramatic drop-off?

23 A. It was a -- I just say it's a large change.

0370

1 It was a large decrease.

2 Q. A large decrease that happened quickly; right?

3 A. Uhm-hmm.

4 Q. Okay. That decline in eelgrass was basically
5 used as the basis for updating the impairment listings
6 for 2009 and thereafter to call Great Bay eelgrass --
7 impaired for eelgrass; correct?

8 A. Yes. And I'd say it's, you know, we just use
9 the same protocol that we used for the previous version,
10 but with updated data and that showed an impairment.

11 Q. Right. Certainly. And then in 2008, '9, '10,
12 I'll say -- no, I'll say 2009, '10 and '11, the eelgrass
13 rebounded back, and you and I covered that; right?

14 It --

15 A. Yes. It increased.

16 Q. Okay. What caused this major rapid decline
17 and then subsequent rebound in eelgrass acreage to
18 occur; do you know?

19 A. I don't know.

20 Q. Okay.

21 A. I will say that when you look at it plotted as
22 it is on figure HAB 2-1, it is a decline and then an
23 increase, but it's all part of a longer period of

0371

1 decline.

2 Q. Longer period of decline from when?

3 A. The regression on this graph was done from
4 1990. You know, really start to see it drop off after
5 the '90s.

6 Q. After 2005 it dropped off. It was back up
7 over 2,000 acres in 2005, wasn't it?

8 A. I'm just talking about the assessment protocol
9 that we use. We use this regression --

10 Q. But, I mean, if I took off those last five or
11 six years with the drop and the bounce back up, I mean,
12 that line would have come through those data virtually
13 flat? I mean, that's what your -- we don't need to go
14 there.

15 A. Yeah.

16 Q. Here's the question: That major decline, you
17 don't know what caused that in 2006, '7 and '8; right?

18 A. Uhm-hmm. Yes. We do not know.

19 Q. Okay. And then this, I'll go down to
20 Portsmouth Harbor because we've got a decline occurring,
21 I guess. I don't know, maybe it's starting in 2007.
22 It's dropping off a little bit and then coming down and
23 then bounce -- do we know what caused the decline in

0372

1 Portsmouth Harbor?

2 A. No.

3 Q. Okay. Do we have data showing that there's
4 major increases in algal growth in Great Bay or the
5 Portsmouth Harbor area occurring during this time? I
6 suppose the answer's no, or we might have tagged that as
7 a indicator of what was happening; right?

8 A. You're referring to phytoplankton?

9 Q. Phytoplankton, yeah.

10 A. For phytoplankton, no, there's no information.

11 Q. That really didn't change. Do we have data
12 showing that there was a major transparency decrease
13 from -- from before -- data from 2004, 2005 on
14 transparency? I know that the transparency plummeted in
15 2006, '7, '8, '9 in Great Bay. Do we have data that
16 shows that?

17 A. I haven't looked at the transparency data that
18 way, so I don't -- I'm not sure.

19 Q. Okay. What about the total nitrogen levels?
20 That was considered acceptable for 15 years prior to
21 2005. Did the total nitrogen levels increase

22 significantly after 2005 such that the nitrogen somehow
23 caused a toxic effect or some other effect on the
0373

1 eelgrass?

2 A. Uhm, we started measuring total nitrogen
3 either in 2003 or 2004. The concentrations, I'm not
4 sure exactly when, but concentrations were higher in
5 2006, 2007, 2008, compared to 2009, 2010, and 2011.

6 Q. Okay.

7 MR. HALL: I'm going to mark this as
8 Exhibit 83.

9

(Trowbridge Exhibit 83 marked for
10 identification.)

11

12 Q. This is your PREP 2003 nutrient document --
13 I'm sorry, 2013 --

14 A. This is the draft.

15 Q. Draft, correct. I'd like to draw your
16 attention to, this may clarify your recollection on
17 nutrient concentrations that you just testified on. The
18 dissolved -- looking at page 3, which lists dissolved
19 inorganic nitrogen, which had the higher dissolved
20 inorganic nitrogen level, the period when the
21 eelgrass -- the period before 2004 or the period after
22 2004?

23 A. In this analysis the higher DIN concentration
0374

1 was in the period before.

2 Q. Okay. So during the period when the, I'll
3 say, when the eelgrass were particularly healthy, 1993
4 to 2000, we have a DIN level of above .15. It might be
5 .16, who knows. You might be able to eyeball it better
6 than me because it's your graph. And then from 2004 to
7 2011, when the eelgrass populations were a fair amount
8 lower, the inorganic nitrogen concentrations were below
9 .15, and .14, so that the nitrogen concentrations don't
10 explain these changes in eelgrass, now, do they, the
11 ones -- the rapid decline that we saw after the
12 2004/2005 time frame, at least not based on this
13 analysis?

14 A. Yeah. This analysis is for dissolved
15 inorganic nitrogen. And what I was referring to is that
16 I was asked, as part of comments on this, to break the
17 data out by year.

18 Q. Uhm-hmm.

19 A. And I had been working on those calculations.
20 And when you break them out by year, the most recent
21 three-year period has lower nitrogen concentrations than
22 the previous one.

23 Q. Okay.

0375

1 A. And I'm talking about total nitrogen.

2 Q. Total nitrogen. Right.

3 In terms of threatened toxicity to eelgrass,
4 it's dissolved inorganic nitrogen that's supposed to
5 have the potential toxic effect; right?

6 A. That's my understanding.

7 Q. Yeah, okay. And -- all right. So here we are
8 with this big decline in eelgrass, we don't know, or
9 we're not sure what caused it, so what's the basis for
10 thinking that either nitrogen or transparency caused
11 that eelgrass decline in the system? I mean, other
12 than, other than the draft numeric criteria document
13 which, by the way, I know you're looking at the CALM
14 report. The explanation you have in the CALM report is
15 all the same data and information that's in the numeric
16 criteria document. That's not new stuff; right?

17 MR. MULHOLLAND: Objection. Do you want
18 him to answer the question?

19 Q. I'd like him to answer the question; what's
20 the basis?

21 A. What I'd like to point out is, in this
22 response to comments on the CALM, I don't know what
23 number it is, we added some information in there to talk
0376

1 about how -- our understanding of the way that nitrogen
2 affects eelgrass. And so it's on -- do you have this --

3 Q. I should. I certainly have it.

4 A. It's page 8 of that report, of the response to
5 comments on the CALM.

6 Q. I was going to walk you through those comments
7 in detail a little bit later. So which cause, that's
8 either -- this is marked as a double exhibit somehow.
9 It's either Exhibit 59 or Exhibit 60.

10 So it's not transparency changing, it's not
11 algae changing, we don't have an indication that the
12 nitrogen is toxic in this system, because the higher
13 nitrogen, inorganic nitrogen levels were present when
14 the eelgrass were the healthiest. How do -- how do we
15 conclude that transparency and nitrogen is the cause of
16 the eelgrass decline? Or flip it the other way, will
17 restore the eelgrass to the prior levels?

18 A. In response to that, I'd say part of our
19 response here is that in shallower areas overgrowth and
20 smothering by macroalgae and/or cellular disruption may
21 be the immediate cause of eelgrass loss. And so based
22 on the information that was provided us by Dr. Mathieson
23 and Jeremy Nettleton showing that there's been a
0377

1 dramatic increase in the macroalgae in this system
2 somewhere between the early measurements in the '70s and
3 '80s, and the repeat of those studies in 2009, 2010,
4 that that may be the more immediate cause in the shallow
5 areas of Great Bay.

6 Q. Do the eelgrass only decline in the shallow
7 areas of Great Bay?

8 A. Well, most of Great Bay is shallow.

9 Q. No, I'm asking the question. Does the
10 eelgrass -- okay. Let's back up a bit.

11 So we're back to pointing to the possible
12 answer is the Nettleton report and Art Mathieson's
13 e-mail to you, which we covered earlier, doesn't show,
14 for the Great Bay system, that macroalgae actually
15 caused the problem? I mean, it says it might have;
16 right?

17 A. It says it can; yes.

18 Q. But it doesn't say it did, and there's no
19 information that even shows that it was likely it did,
20 right; nothing in those reports?

21 A. I think we're, again, at this issue of can you
22 prove causation at a specific location. And we have --
23 there's conceptual models of how shallow estuaries

0378

1 respond to eutrophication. In a shallow estuary you
2 expect a proliferation of macroalgae which will affect
3 eelgrass. When you have a decline of eelgrass, and
4 evidence of a proliferation of macroalgae, you can put
5 those two together in terms of a scientific theory that
6 one is affecting the other.

7 Q. Scientific theory that's not proven for this
8 estuary with any specific data; correct?

9 A. Correct; not proven.

10 Q. Not even demonstrated; right? I mean, explain
11 the area of Great Bay where it's been -- any area of
12 Great Bay where it's been demonstrated that the
13 macroalgae are preventing eelgrass growth, regrowth,
14 colonization. Name one area in the bay where that was
15 demonstrated?

16 A. Would photographs of eelgrass with Gracilaria
17 and Ulva mixed in among them be demonstration?

18 Q. No. Why would that be a demonstration that it
19 caused it, that --

20 A. It's very difficult in this case. Without a
21 control for Great Bay, you can't prove it.

22 Q. But you could have gone out to Great Bay to
23 see whether or not we now had excessive macroalgae

0379

1 growth all throughout the system where the eelgrass
2 previously were, right, and nobody did that?

3 A. We did the study with the hyperspectral
4 mapping, which was mapping in the whole Great Bay. That
5 was a very good study.

6 Q. You had one data point then, as you and I
7 covered from the last -- I mean, we went through this
8 already in detail, Mr. Trowbridge -- that the eelgrass
9 rebounded after this decline, and that apparently
10 macroalgae and light transmission and nothing else
11 stopped the eelgrass from increasing about 50 percent
12 from their low point; right?

13 A. It did increase. It didn't come up to its
14 full level, but it did increase.

15 Q. So, again, so what information in Great Bay do
16 you have that shows macroalgae either caused the
17 eelgrass decline or prevented any eelgrass from
18 regrowing?

19 A. Again, in terms -- if the burden of proof is
20 to prove causation, since we do not have a control Great
21 Bay where we can run an experiment with or without
22 macroalgae or with our without nitrogen, we don't have
23 that information.

0380

1 Q. You could do several additional surveys
2 though, right, in the areas where the eelgrass were and
3 weren't? I mean, that's certainly doable?

4 A. Right. And the hyperspectral imagery study
5 was a very big study, very expensive, and then that was
6 followed on by the research done by Mathieson and
7 Nettleton.

8 Q. Okay. Well, the eelgrass also declined in the
9 harbor. Is somebody saying that the macroalgae are an
10 issue in the harbor?

11 A. It's less of an issue, just because of the
12 depth of beds there.

13 Q. Have you ever had anybody say that macroalgae
14 is a significant issue in the Piscataqua River, anywhere
15 in the Piscataqua? I didn't say less of an issue, I
16 said anyone ever given you any information showing you
17 that it is even remotely of concern in those areas?

18 A. With such a caveated question, I have to say I
19 don't know. I mean, whether someone has given me any
20 information about anything that it might be remotely of
21 concern.

22 Q. Okay. Has anybody given you any information
23 showing macroalgae are a concern in the Piscataqua

0381

1 River?

2 A. I don't think so.

3 Q. Okay. There was one significant change,
4 right, that happened after 2005 in this system. Didn't
5 the rainfall pattern increase significantly in the
6 system?

7 A. We had a few years of very wet weather. I
8 don't know. I haven't done an analysis of some kind of
9 change in the climate pattern.

10 Q. I didn't say change in the climate pattern, I
11 just said there's a number of years of much greater
12 rainfall and it coincided with the eelgrass decline;
13 right?

14 A. Uhm, certain years of greater rainfall; I
15 don't know if they exactly coincide.

16 Q. Did you ever check it?

17 A. It depends on the -- we're having trouble
18 figuring out what's the best weather station to use for
19 this area.

20 Q. Did you check the flow stations on the rivers

21 leading into Great Bay in the Upper Piscataqua to see if
22 the river flows increased during the period of eelgrass
23 decline?

0382

1 A. I did look at the river flows, but I don't
2 remember if they looked -- if they corresponded to those
3 three years. Is that what you're talking about, 2006,
4 2007, 2008?

5 Q. We actually submitted -- HydroQual developed
6 that analysis and submitted that information to you.

7 A. Yeah.

8 Q. Did you not look at it?

9 A. I probably did. I don't recall right now
10 whether it coincides.

11 Q. If increased -- would increased tributary
12 flows, could that be a direct and immediate cause, a
13 direct and immediate adverse effect on eelgrass growth?

14 A. It could.

15 Q. Can you tell me why?

16 A. There's a number of reasons: Increased
17 nitrogen loads, increased sediment loads, increased --

18 Q. Dissolved organic matter?

19 A. Yes.

20 Q. And that increase could have reduced the
21 transparency, possibly, very rapidly in the system;
22 right?

23 A. Are you talking about the color-dissolved

0383

1 organic matter or --

2 Q. No, turbidity. I mean, the turbidity and
3 color-dissolved organic matter would have an immediate
4 effect on the transparency in the system, wouldn't it?

5 A. Yes.

6 Q. And is that due to nitrogen loads, or is that
7 just due to the turbidity and the color-dissolved
8 organic matter coming in with the tributaries?

9 A. The -- I'm sorry, I don't quite understand the
10 question.

11 Q. The question is: Is that a nitrogen problem
12 or is that a turbidity color-dissolved organic matter
13 issue? In other words, you wouldn't control -- you
14 can't control the turbidity and color-dissolved organic
15 matter by regulating nitrogen in the system, can you?

16 A. Okay. So the last question is can you control
17 those things, and the answer's no, you can't control
18 color-dissolved organic matter or turbidity by
19 controlling nitrogen.

20 Q. And, Mr. Trowbridge, I guess that's part of
21 the point of why we're concerned where these analyses
22 have gone. And I realize one only takes them to a
23 certain point, but if the cause was due to a change in

0384

1 transparency due to turbidity and color-dissolved
2 organic matter, then all of the money we're talking

3 about spending on nitrogen control wouldn't change that
4 condition, would it, for the wastewater plants?

5 A. So speaking hypothetically?

6 Q. Uhm-hmm.

7 A. Yes.

8 Q. Yes, it wouldn't change it; right?

9 A. Yes, it wouldn't change it.

10 Q. Okay.

11 THE WITNESS: Can we take a break?

12 MR. HALL: Oh, certainly.

13 THE WITNESS: Are we at a breaking point?

14 MR. HALL: Phil, whenever you need a

15 break we're at a breaking point. Okay?

16 (Recess.)

17 MR. HALL: Back on the record.

18 BY MR. HALL:

19 Q. Phil, related to -- or Mr. Trowbridge, related
20 to the question of things that affect light transmission
21 and whether it's nitrogen and other factors, in our
22 earlier deposition we had talked about the Morrison
23 report, which you're familiar with; correct?

0385

1 A. Yes.

2 Q. Okay. I'd like to show you an e-mail that was
3 from you to a Henry Walker and a couple other people at
4 the EPA, regarding from March 14th, 2007. Do you recall
5 this e-mail?

6 MR. HALL: And I'd like to mark it as
7 Exhibit 84.

8

(Trowbridge Exhibit 84 marked for
9 identification.)

10

11 A. I recall it now that you show it to me.

12 Q. Okay. Was this e-mail discussing what was
13 going on with regard to the Morrison study, to your
14 knowledge?

15 A. The e-mail refers to receiving grant funds to
16 add this instrumentation to a buoy in 2008.

17 Q. Uhm-hmm.

18 A. And that was data collected for the Morrison,
19 et al, study.

20 Q. Okay. Now, the sentence I'd like to draw your
21 attention to is: We need this data stream to get enough
22 measurements to tease out the relationship between Kd
23 and water quality parameters.

0386

1 That was the purpose of the Morrison study,
2 right, to get enough information so you could develop a
3 relationship on the factors that are affecting
4 transparency in the system? Right?

5 A. Uhm, yes.

6 Q. Okay. And I'd like to show you another one.
7 We'll mark this as Exhibit 85. And this is an e-mail

8 that's December 9th, 2008, and it's discussing where
9 color-dissolved organic matter comes from. And this is
10 an e-mail from Bill McDowell back to yourself and, I
11 guess I'll call it a cast of thousands. Looks like it's
12 the folks on whatever PREP committee you have. Do you
13 recall this e-mail?

14

(Trowbridge Exhibit 85 marked for
15 identification.)

16

17 A. Yes.

18 Q. Okay. The e-mail says that -- I'll just read
19 you a couple quotes from it, see if there's any -- if
20 you have any further input on this: CDOM in the bay is
21 very tightly correlated with measured dissolved organic
22 carbon in the Lamprey River by Packers Falls.

23 Is that consistent with your understanding

0387

1 that the color-dissolved organic matter originates in
2 the watershed and then comes down the tidal rivers?

3 A. Yes.

4 Q. Okay. And, let's see. I'll read, with regard
5 to dissolved organic carbon, I'm just going to read you
6 the next sentence that kind of -- where they're
7 starting: DOC in the sub-basins of the Lamprey River is
8 tightly correlated with wetland coverage in the basin
9 and shows no effects at all from population density,
10 road work, soils, or anything else we have measured.

11 That's kind of consistent with the source of
12 the dissolved organic matter being leaf decay and
13 wetlands; correct?

14 A. Yes.

15 Q. Okay. And do you agree with the statement in
16 the next sentence that it seems very likely that the DOC
17 delivered to the bay, at least at present human
18 populations, is driven by wetlands and not people?

19 A. I'm not sure.

20 Q. Okay. Do you have any information -- now,
21 when I'm talking about DOC, I'm talking about the
22 component that's associated with color-dissolved organic
23 matter, that it's driven by wetlands and not people?

0388

1 A. I think the dissolved organic carbon pool is a
2 very complex situation, and just not comfortable making
3 a broadbrush statement about it.

4 Q. Do you have a -- any data that would say --
5 hmm.

6 Can you tell me why you might think
7 color-dissolved organic matter is originating from
8 people and not wetlands, or that's not what you're
9 trying to say? I mean, I'm not trying to put words in
10 your mouth. I'm trying to understand.

11 A. I'm not trying to say that. I'm just trying
12 to say that I don't want to -- I don't necessarily agree

13 with this statement that you pointed out.

14 Q. Okay. Did you ever tell him you don't agree
15 with it? When I say "tell him," I'm talking about
16 Dr. McDowell, who was a professor of water resources
17 management and presidential chair for the Department of
18 Natural Resources and Environment?

19 A. I don't think so.

20 Q. Could you flip to the back of the next page?
21 I just have a question on the composition of organic
22 matter in Great Bay.

23 Let's see. You've got a table there, it's --
0389

1 and I'm talking about your e-mail dated December 8th,
2 2008, and it's back to Ru Morrison and everyone else.
3 Why is the composition of organic matter in Great Bay
4 important? Why are you assessing it?

5 A. Uhm, I think in this instance we're trying to
6 figure out how nitrogen is partitioned between the
7 different species.

8 Q. Okay. And so that would be like looking at
9 the little table where it says particulate, and then you
10 have "in phytoplankton" and "in organic matter." Is
11 that -- so 1 percent of it is in phytoplankton,
12 22 percent is in the rest of the organic matter? Is
13 that the -- what is that -- what do those percentages
14 mean in that table, can you please explain that to me?

15 A. Sure. This table, I don't know if it was the
16 final one, it certainly looks like it was a draft, but
17 it was saying, you know, in a -- in Great Bay in, let's
18 say, a typical water sample, if you collected it and
19 tried to say how much of the nitrogen in that sample was
20 in the ammonia form, you'd say 13 percent, typically;
21 24 percent in the nitrate/nitrite form; 39 percent in
22 dissolved organic matter; 1 percent --

23 Q. Oh, so you were apportioning out where the
0390

1 nitrogen is in a sample?

2 A. Yeah.

3 Q. Okay. All right. And that was marked as
4 Exhibit 85.

5 There was a follow-up e-mail that came out of
6 this same series, and it's an e-mail from you to Jim
7 Latimer dated December 15th, 2008.

8 MR. HALL: Can we mark that as 86?
9

10 (Trowbridge Exhibit 86 marked for
11 identification.)

12 Q. And it looks like people are trying to -- do
13 you recall this e-mail where people are trying to pose
14 some type of question to a gentleman named Walter? They
15 need to tap his wisdom again?

16 A. Vaguely.

17 Q. Is that "Walter" Walter Bonyton; do you know?

18 A. I don't remember.

19 Q. Well, there's this question. It says:
20 Presumably, most of the particular organic nitrogen from
21 the -- is from the watershed or wetlands and, therefore,
22 the question is if turbidity is the main issue in Great
23 Bay --

0391

1 A. I'm sorry, where are you reading from?

2 Q. Right down in the -- the question: If
3 turbidity is the main issue in Great Bay estuary related
4 to seagrass health, what will the reduction of nitrogen
5 loading to the estuary, from point and nonpoint sources,
6 do to aid water clarity?

7 Did anybody ever give you an answer to that
8 question?

9 A. I don't remember this.

10 Q. Okay. Do you know the answer to that
11 question? If most of turbidity in the system is
12 originating from the watershed or wetlands, how will
13 reducing nitrogen loadings to the system control that
14 aspect, impacting water clarity?

15 A. Sorry. Can I just take a minute to read this?

16 Q. Oh, please. Take your time.

17 (Witness reviewed document.)

18 A. I don't really understand the way this
19 question is worded in Jim's e-mail.

20 Q. Really?

21 A. Well, it just seemed to mix a couple of
22 issues.

23 Q. Well, let's go back over this. What are the
0392

1 factors affecting transparency in the system; can you
2 name them?

3 A. You mean transparency and water clarity?

4 Q. Yeah.

5 A. Uhm, turbidity -- well, a -- yeah. Inorganic
6 particles, organic particles, CDOM, and water itself.

7 Q. And the organic particles are broken up into
8 two sets of organic particles: stuff that's washing down
9 the system from the watershed, and the algae that are
10 growing in the system; right?

11 A. Yeah. I don't know that it's exclusively
12 stuff washing in versus algae growing, but sort of
13 living versus dead algae, and also organic matter that's
14 been washed into the system or has broken off from other
15 types of plants in the system.

16 Q. Right. Kind of like the eelgrass losing their
17 leaves and that breaking up?

18 A. Yeah, or Ulva losing its leaves, or Spartinas,
19 or whatnot.

20 Q. But the point of that, if it were true that
21 95 percent, is that -- I think the number we're using, I
22 think it came from your earlier analysis. If 95 percent
23 of the particulate organic nitrogen is organic --

0393

1 95 percent of the particulate nitrogen is organic
2 nitrogen, and only a very small amount is in
3 phytoplankton -- or, in other words, it's -- I guess
4 they're replying it's not from an algal source. How
5 will regulating nitrogen in the system reduce that
6 source of particulate matter that's affecting
7 transparency? I mean, it wouldn't, right, if those
8 numbers were accurate?

9 A. Right. I just think the question was a little
10 different, and I can't -- I'm having a hard time
11 understand --

12 Q. That's all right. We'll just move on, on that
13 one. Thank you. I know sometimes looking at a document
14 from almost four years ago is -- can be a challenging
15 point. It was kind of an important point though.

16 Let's move on to the tidal rivers, if we can.
17 There were a series of e-mails. I showed them to Paul
18 Currier. You might recall them. I could pull them all
19 back out. Let's see if you -- wasn't there a point in
20 time where it was uncertain as to whether or not the
21 eelgrass restoration should be considered appropriate or
22 reasonable for tidal rivers? And when I mean tidal
23 rivers, I'll say like Squamscott and Lamprey, that it

0394

1 was uncertain whether or not the eelgrass could really
2 grow there anymore; right?

3 A. We've had, yeah, lots of discussion about that
4 issue.

5 Q. And that was an issue that was up in the air
6 for a while; right?

7 A. You mean like within DES or within a broader
8 discussion?

9 Q. Within DES.

10 A. Yes.

11 Q. Okay. And I guess I can show you an e-mail --
12 well, what the heck, it may as well get it in and mark
13 it. Let's call it Exhibit 87.

14

(Trowbridge Exhibit 87 marked for
15 identification.)

16

17 Q. This has to do with whether or not the
18 eelgrass-related transparency TM criteria should be
19 applied in the Squamscott and Lamprey Rivers. It's an
20 e-mail from Phil Trowbridge, June 3rd, 2011 to Ted
21 Diers. And re: Request for Clarification Regarding
22 Application of Eelgrass Transparency-based TN Criteria
23 in the Tidal Rivers.

0395

1 Do you recall this series of e-mails?

2 A. Some of these -- are they all the same? This
3 seems like there's some e-mails here that are different.
4 It's a combination of an e-mail from 2008.

5 Q. Oh, did we get bad copying? Yeah, it was
6 attached to a -- no, what it should have been was -- no,
7 it -- you should have the same one I got. Oh. Yeah,
8 this other 2008 one probably ought not be on there.
9 Don't worry about it. I'm not going to ask you about
10 the 2008 one.

11 I'm just talking about the 2011 e-mail, which
12 I guess was prepared in response to our request that you
13 clarify that it's inappropriate to apply the
14 transparency-based nitrogen numbers in the tidal rivers.
15 Do you recall this e-mail exchange?

16 A. Uhm, yes.

17 Q. Okay. And I draw your attention that -- to
18 the paragraph, the one that's highlighted, the first one
19 in yellow that's highlighted. It says: DES has made it
20 abundantly clear that we feel managing for DO in the
21 rivers is the appropriate next step. And our plan is to
22 eventually roll out the splits in the assessment units
23 when the time is right.

0396

1 Can you tell me what that's -- what that
2 statement is all about that you made to Ted Diers in
3 this e-mail exchange?

4 A. Uhm-hmm. What I'm referring to there is
5 splitting the assessment units for some of the tidal
6 rivers to distinguish areas where eelgrass has existed
7 historically and from those that where it has not.

8 Q. Okay. But at this point in time DES hadn't
9 made that decision, and you're still implying that we
10 should focus on the DO aspect, right, in the tidal
11 river?

12 A. I'm not sure exactly. I mean, clearly we have
13 not done the splits by that time.

14 Q. Okay. When you said where eelgrass had
15 historically existed, is that the basis that DES is
16 using for where the eelgrass transparency nitrogen
17 related criteria should apply, wherever eelgrass
18 historically existed?

19 A. Uhm, be sure we said that explicitly in this
20 report. Yeah. So you go to page 68 of this report --

21 Q. When you say "this report," oh, the numeric
22 nutrient. Okay.

23 A. So page 68, footnote number 4, the criteria to
0397

1 protect eelgrass supply in sections of the Great Bay
2 estuary where eelgrass has historically existed, which
3 is some or all of each of the tidal rivers, Great Bay,
4 Little Bay, Piscataqua River, Portsmouth Harbor, Little
5 Harbor, Back Channel, and Sagamore Creek.

6 Q. Okay. Just because something historically
7 existed in a location, does that mean it can presently
8 exist in that location naturally?

9 MR. MULHOLLAND: Objection as to form.
10 It's pretty vague.

11 MR. HALL: I'll see if he can answer.

12 A. In general, you mean?

13 Q. Yeah.

14 A. No.

15 Q. Okay. Now, I'm going to ask you to think
16 about narrative criteria application.

17 A. Uhm-hmm.

18 Q. The mere fact that historically eelgrass
19 existed in a location, but now presently does not, does
20 that mean you automatically declare that area as an
21 impairment for eelgrass under your narrative criteria?

22 A. Yes. So you're talking narrative. Do you
23 have the narrative criteria for the --

0398

1 Q. Ecology criteria; right? Is that the one
2 you're talking about?

3 A. Do you have that one? It's 1703.19? It's
4 probably in one of the 303d --

5 Q. I know it's somewhere, yeah. I'm thinking
6 it's in one of the 303d reports. I've got a 303d report
7 handy. So why don't we -- yeah, I think it's in the
8 303d report. That's a good memory. But then again you
9 wrote those reports, so you ought to know.

10 Regulatory authority, biological integrity, do
11 you want me to --

12 A. If I could just look at it.

13 Q. Why don't you take a look at it, read it into
14 the record so people know which one you're talking
15 about.

16 A. Sure. Okay. All right. So the Narrative
17 Criteria for Biological and Aquatic Community Integrity,
18 which is ENV-WQ 1703.19, states, "Surface waters shall
19 support and maintain a balanced, integrated and adaptive
20 community of organisms having a species composition,
21 diversity and functional organization comparable to that
22 of similar natural habitats of a region."

23 It goes on to say, "Differences from naturally

0399

1 occurring conditions shall be limited to nondetrimental
2 differences in community structure and function."

3 Q. Okay. So back to the question: Does the mere
4 fact that something existed in one location and does
5 not -- no longer exists there, mean that that narrative
6 criteria is violated?

7 MR. MULHOLLAND: Objection to the form;
8 it's vague.

9 A. The -- are we speaking generally, now, or
10 speaking about eelgrass?

11 Q. Generally first, and --

12 A. Generally, it's not necessarily.

13 Q. Okay. Well, let's talk specifically for
14 eelgrass. Eelgrass existed once upon a time --

15 A. Uhm-hmm.

16 Q. -- in the Squamscott and Lamprey River; right?

17 A. Yes.

18 Q. And as discussed in your various, I guess you
19 could pick up almost any of them, 303d impairment
20 listing documents, the reason for the eelgrass loss --
21 and now there's no eelgrass at all in those areas;
22 right? I mean there's, like, none?

23 A. I think in 2011 there was a little bit in the
0400

1 mouth of the Lamprey.

2 Q. Okay. But further up in the river there's
3 none; right? And there's none in the Squamscott; right?

4 A. Our maps --

5 Q. As far as we know?

6 A. Our maps show none.

7 Q. Okay. So in those areas where there's no
8 eelgrass present in the Squamscott and Lamprey, does
9 that narrative criteria say that you should presume that
10 they're violated because the eelgrass are no longer
11 present?

12 A. I'm sorry, could I have the August 2008
13 investigation of this report? I think you have it in
14 one of those folders.

15 Q. I probably do. Didn't bring your own?

16 MR. KINDER: I thought we had that out.

17 MR. HALL: I had the 2009 one out because
18 I thought that's the one we would end up with.

19 Q. Here you go.

20 (Handing.)

21 A. Thank you. Just give me a minute. We
22 addressed this question in here.

23 Okay. So on page 3 of this report --
0401

1 Q. Uhm-hmm. When you say "this report," we're
2 talking about the August --

3 A. -- 11, 2008 Methodology and Assessment Results
4 Related to Eelgrass.

5 Q. And that was one of the Fred Short deposition
6 exhibits. I don't know which one at this point.

7 A. So on page 3 of this report we addressed the
8 question by saying that, "Eelgrass is the base of the
9 estuarine food web of the Great Bay estuary. While
10 eelgrass is only one species in the estuarine community,
11 the presence of eelgrass is critical for the survival of
12 many species. Maintenance of eelgrass habitat should be
13 considered critical in order to 'maintain a balanced,
14 integrated and adaptive community of organisms.' Loss of
15 eelgrass habitat would change the species composition of
16 the estuary resulting in a detrimental difference in
17 community structure and function. In particular, if
18 eelgrass habitat is lost, the estuary will likely be
19 colonized by macroalgae species, which do not provide
20 the same habitat functions as eelgrass. Therefore, DES
21 believes that significant losses of eelgrass habitat
22 would not meet the narrative standard of ENVWS 1703.19

23 and create a water quality standard violation for
0402

1 biological integrity."

2 Q. Okay. No, I know you listed them, I'm just
3 trying to get to the question of is the mere fact that
4 eelgrass existed in a place at one point, and they're no
5 longer there, looking at the narrative criteria, does
6 that mean the narrative criteria have been violated?

7 A. I think we answered that by saying --

8 Q. So your answer would be yes?

9 A. Yes. The answer is yes.

10 Q. Okay.

11 A. Sorry. I didn't realize it was that --

12 Q. No. I'm just -- because the narrative
13 criteria, which you've got in front of you, did the
14 narrative criteria give any indication that whenever --
15 and I think you have it in front of you; right?

16 A. This one.

17 (Indicating.)

18 Q. Does that criteria give you an indication that
19 whenever an organism is lost you must declare something
20 to be in impairment regardless of why it was lost?

21 A. No. And that was why I pulled out that
22 document, because we were provided that explanation of
23 why we were considering the loss of eelgrass to be a

0403

1 violation of this standard. Because it's more than just
2 one species, that it's the cornerstone of the estuarine
3 ecology and lots of organisms depend on it.

4 Q. I think the problem is the answer I got back
5 was kind of a non sequitur to my question. I wasn't
6 disputing whether eelgrass are important. Eelgrass are
7 important. And but if their loss was due to natural
8 causes, would that be a violation of the narrative
9 criteria?

10 A. Oh, if it was -- if this was naturally
11 occurring?

12 Q. Yeah. If it occurred -- there was a huge
13 flood, there was a major eelgrass bed in the Squamscott,
14 the flood tore out the eelgrass bed and dumped huge
15 amounts of dirt and debris in that area.

16 A. Right.

17 Q. Would that be considered a narrative criteria
18 violation?

19 A. No, because it talks about differences from
20 naturally occurring conditions which is -- specific --
21 naturally occurring has a specific definition in the
22 water quality standards.

23 Q. Exactly. That's why I was trying to get at,

0404

1 does something automatically occur, but not if you
2 believe it may be naturally occurring; right?

3 A. Right.

4 Q. Okay. Let's talk more about the Squamscott

5 and Lamprey River. You're familiar with the restoration
6 compendium that was done to identify where eelgrass
7 could be restored in the system?

8 A. Yes.

9 Q. Okay. You're familiar that it -- you're
10 familiar with the result of it, that it did not identify
11 either the Squamscott or Lamprey Rivers as areas that
12 were susceptible to eelgrass restoration?

13 A. Yes. And that was because of the current
14 water quality.

15 Q. Oh, really?

16 A. Uhm-hmm.

17 Q. Caused by what?

18 A. This was part -- that was part of their model
19 was to look at the current water quality.

20 Q. Right. But I'm -- the current water quality,
21 but do we know if the current water quality was caused
22 by natural conditions or do we know if the current water
23 quality that's insufficient was caused by man-induced

0405
1 conditions?

2 A. We don't know.

3 Q. I wanted to -- there was a document that I
4 presented to Mr. Currier, and again in an effort to not
5 spend a lot of time shuffling paper, I think it's one
6 that you're readily familiar with. It talked about the
7 need to do more research before deciding whether or not
8 to apply the transparency-based eelgrass criteria in the
9 tidal rivers. It was from November of 2009.

10 Do you recall that discussion at that point in
11 time?

12 A. No. Do you have a document you want to show
13 me?

14 Q. Yeah. Okay. This is Currier Exhibit 39.
15 It's a series of e-mails from Paul Currier, and it's
16 part of the e-mail chain that transmitted what we keep
17 calling a wasteload allocation analysis. Okay?

18 And I'm going to draw your attention to, it's
19 a executive summary that you, yourself, wrote and you
20 transmitted to everybody. And I'm going to show you on
21 page, unmarked page 4 of this exhibit, it's right
22 yonder.

23 (Handing.)

0406
1 MR. MULHOLLAND: Feel free to orient
2 yourself.

3 Q. Yes, please.

4 A. There's been a lot of reports, haven't there?

5 Q. Yes, there have been.

6 Do you recognize that e-mail that you
7 apparently sent out to -- this is another cast of
8 thousands. And if you could just read the part with the
9 arrow.

10 A. Right here?

11 (Indicating.)

12 Q. Yeah, the --

13 A. This e-mail's undated, so I'm a little
14 confused.

15 Q. It's probably going from the top of -- I don't
16 know how it got stuck on that. It was attached to that.

17 A. Oh. So this is -- it's attached to this
18 e-mail from 2007? How can that be possible? Because
19 this report wasn't written until 2010.

20 Q. Well, they are somehow together in my
21 documents. That's how they came to me. But let's just
22 go --

23 A. So this one's sort of irrelevant.

0407

1 (Indicating.)

2 Q. Yeah, that's irrelevant.

3 A. Just this one, which we're not sure of the
4 date.

5 Q. Right.

6 A. Draft for review and comment. Okay. All
7 right.

8 Q. The executive summary, and that's, I believe,
9 the executive summary to the wasteload allocation
10 report.

11 A. Right. It looks like, based on the heading,
12 that it's draft for review and comments. So this is
13 something previous to the final version.

14 Q. Right.

15 A. We're seeking comments from this list of
16 people. Okay.

17 Q. Okay. Can you read that one highlighted
18 sentence then?

19 A. Sure. The sentence is, "This decision is
20 supported by the scientific consensus that eelgrass
21 should be present in Great Bay, Little Bay, and the
22 Upper Piscataqua River, but more research is needed to
23 determine whether eelgrass restoration is an appropriate

0408

1 or feasible goal for the tidal rivers."

2 Q. Okay. Do you remember writing that document?

3 A. It would help me if I had a date, but
4 obviously I did write it. I'm just not sure which
5 version of the document it is.

6 Q. The only thing I can tell you, sometime in
7 2009, but I guess the question really goes to do you
8 know if more research was done to confirm -- what's the
9 last part of the sentence, if I may read it -- to
10 confirm whether eelgrass restoration is an appropriate
11 or feasible goal for the tidal rivers?

12 A. If more research was done --

13 Q. If -- yeah. It says more research is needed?

14 A. Yeah.

15 Q. So do you know whether more research was ever
16 done to determine whether eelgrass restoration is an

17 appropriate or feasible goal for the tidal rivers?

18 A. Not knowing the date of that, it's hard for me
19 to answer. Uhm --

20 Q. From 2009 forward do you know if any more
21 research was done to show if it was an appropriate or
22 feasible goal for the tidal rivers?

23 A. I don't believe so.

0409

1 Q. Okay. Can you explain to me why, then, in
2 August of 2011, DES sent a letter to EPA saying it was
3 appropriate to apply the eelgrass criteria in the lower
4 sections of the Squamscott and Lamprey River if the
5 research wasn't done to show it was either appropriate
6 or feasible to have eelgrass in those areas?

7 A. I guess I may be getting tripped up on the
8 term "research." If research means a field study,
9 something was not done, but if research means to review
10 the data that we had and to discuss it more thoroughly
11 amongst ourselves, then we certainly did that.

12 Q. You -- you have data showing it's reasonable,
13 feasible, and/or appropriate to apply the nutrient
14 criteria for eelgrass restoration in those segments of
15 the rivers? If there's such an analysis, we did not
16 receive it under discovery so I'd like to know.

17 A. Well, what I'm referring to there is
18 discussions about what could have changed and the
19 parameters around, like, color-dissolved organic matter
20 that shouldn't have changed. There's been no change in,
21 or there should be no change in that. So it was deemed
22 that it was feasible to restore.

23 Q. Do you have an analysis demonstrating that

0410

1 nitrogen control will dramatically improve transparency
2 in either the Lamprey or the Squamscott River?

3 MR. MULHOLLAND: Objection to form.

4 A. We do not have such analysis.

5 Q. Then why would you put nitrogen criteria
6 applicable in those areas? I mean, I'm trying to
7 understand this because it's pretty clear that eelgrass
8 is gone. And it's pretty clear people understood that
9 there were water quality factors that were preventing
10 it, but you picked out nitrogen as the one to control.

11 A. Uhm-hmm.

12 Q. Why?

13 A. And you're asking about the impairment
14 determinations? Because I thought your first question
15 was about permits or --

16 Q. No. The water quality numbers. Why did you
17 pick nitrogen as the basis for controlling transparency
18 in the tidal rivers?

19 A. Because of our review of the scientific
20 literature on this topic that there -- based on that, we
21 have a conceptual model of what's affecting eelgrass in
22 the system, and nitrogen is the dominant factor.

23 Q. You're saying nitrogen is the dominant factor
0411

1 controlling light transmission in the Squamscott and
2 Lamprey Rivers?

3 A. In the tidal rivers, this is -- I'm looking at
4 the graph from our response to comments -- there is a
5 statistically significant relationship between light
6 attenuation and total nitrogen as well as in all samples
7 in other eelgrass areas.

8 Q. Okay. I'll say it again. You're telling me
9 controlling nitrogen, that means that you should control
10 nitrogen to control transparency? Are you saying that
11 that's a cause-and-effect relationship?

12 A. It's a correlation.

13 Q. Right. And as a matter of fact, it's a
14 correlation you know is incorrect; right? CDOM is the
15 major factor controlling -- let's back up for a second.

16 MR. MULHOLLAND: Objection. One question
17 at a time.

18 MR. HALL: You can strike that question.

19 MR. MULHOLLAND: Thanks.

20 Q. Let me show you another exhibit. I'm going to
21 mark this as Exhibit 88. Did we mark that, the -- Phil,
22 the exhibit you have in front of you, is that your CALM
23 thing?

0412

1 A. Yeah.

2 Q. Okay. Here's 88.

3

(Trowbridge Exhibit 88 marked for
4 identification.)

5

6 Q. Mr. Trowbridge, do you recall receiving this
7 e-mail dated -- it's an e-mail from you to Jim
8 Latimer -- or doing it, creating this e-mail dated
9 November 19th, 2008? And it says: Comments on New
10 Hampshire estuary nitrogen criteria document.

11 Are you familiar with this e-mail?

12 A. Vaguely.

13 Q. Only vaguely?

14 A. It's from 2008.

15 Q. All right. Because it's a pretty critical
16 question, isn't it? You're sending an e-mail to EPA
17 saying: The comment that seems the hardest to refute is
18 that nitrogen is correlated with light attenuation.
19 Nitrogen was not proven to be the causative agent for
20 light attenuation. Moreover, nitrogen is a component of
21 all the factors causing light attenuation
22 (phytoplankton, CDOM, particulate organic matter) so a
23 correlation would be expected."

0413

1 So you knew that nitrogen was related to
2 transparency, but not because nitrogen was controlling
3 transparency, simply because there was an inherent

4 correlation; correct?

5 A. There was, uhm, a challenging question.

6 Because, obviously, if you reduce the nitrogen, you're
7 also going to reduce all of the factors affecting the
8 light attenuation.

9 Q. Oh, really? You just covered with me that you
10 can't reduce CDOM by controlling nitrogen before, didn't
11 we?

12 A. Well --

13 Q. I would like an answer, yes, on that one.
14 Didn't you say to me before that controlling nitrogen
15 will not control CDOM?

16 A. Oh, okay. I'm sorry. I must have -- I was
17 thinking about point source controls in that question.
18 Because CDOM is a nonpoint source factor.

19 Q. Can you answer the question I just asked you?

20 A. Can you say it again, please?

21 MR. HALL: Can you read it back, please?
22 (Record read as requested.)

23 A. The question is didn't I say that before?

0414

1 Q. Uhm-hmm.

2 A. Yes, I said that.

3 Q. Okay. And with regard to particulate organic
4 matter that's coming down the system as a result of leaf
5 material or just the watershed, didn't you say before
6 that controlling nitrogen is not going to control that
7 factor also?

8 A. Uhm, I'm not sure. Can we -- did you ask that
9 question?

10 Q. Uhm-hmm.

11 A. That's -- that would be part of the nonpoint
12 source, so I guess that's how I was answering that
13 question. But -- I'm sorry.

14 Q. Nonpoint source.

15 A. I'm just confused. Is the question did I say
16 it before or are you asking a new question?

17 Q. The point is, Mr. Trowbridge, and let's not
18 beat around the bush. You already knew that
19 transparency was controlled by color-dissolved organic
20 matter, particulate matter, phytoplankton, and the
21 water. And the only thing that the nitrogen is going to
22 control in the tidal rivers is phytoplankton growth.
23 It's not going to control CDOM or particulate organic

0415

1 matter that's otherwise coming down into the system.

2 So you knew that nitrogen was not going to
3 control that, and yet you produced a graph that said,
4 Look, nitrogen's going to control transparency, when you
5 knew it wasn't going to control major factors affecting
6 transparency. Why did you do that?

7 A. Why did I produce a graph showing nitrogen
8 related to light attenuation?

9 Q. Why did you produce a relationship you knew

10 was false; that nitrogen did not, in fact, control
11 transparency?

12 MR. MULHOLLAND: Objection.

13 A. Yeah, I don't believe it's false.

14 Q. Explain why not. Explain how nitrogen control
15 is going to control CDOM coming from wetlands?

16 MR. MULHOLLAND: There's two questions
17 there, compound. Objection. One at a time.

18 A. The CDOM, is our understanding is that it
19 won't change very much. So changes in light attenuation
20 have more to do with other factors. So it's a
21 background. And that's actually one of the conclusions
22 in the Morrison report.

23 Q. And if CDOM is controlling the light
0416

1 transmission level in the tidal rivers, then you can't
2 materially improve the light transmission level in the
3 tidal river, now, can you, assuming it's the major
4 factor?

5 A. If it's a major factor and it is providing a
6 baseline, as your other factors go up and down you
7 adjust that baseline.

8 Q. Hold it. You didn't answer my question. I
9 didn't ask you about whether you were adjusting
10 baselines.

11 MR. HALL: Could you read my question
12 back?

13 Q. And will you please answer it?

14 (Record read as requested.)

15 A. Yes; assuming it's the major factor.

16 Q. Assuming it's the major factor you can't
17 improve it significantly; correct? Right?

18 A. Yes.

19 Q. Okay. Did you determine whether CDOM was the
20 major factor controlling light transmission in the tidal
21 rivers?

22 A. No.

23 Q. Okay. Let's mark that -- that's marked as
0417

1 Exhibit -- whatever we're up to. 88.

2 I'd like to show you some graphs from the
3 tidal rivers. Just to go back, and the purpose of the
4 Morrison study, right, was to figure out how much CDOM
5 and particulate organic matter and inorganic particles
6 and algae and water, how much each of those factors
7 influenced transparency; right? That was the purpose of
8 that study?

9 A. Yes.

10 Q. And it's the most detailed study done to date
11 on that issue?

12 A. Yes. And one of the things we have to
13 remember about that study is the conclusions are limited
14 to optically deep areas in Great Bay.

15 Q. Where's the -- where does the study say that?

16 A. Give me the report and I'll point it out.
17 Q. So you're telling me the equation in the
18 Morrison report only applies to optically deep areas?
19 A. It's in the conclusions section.
20 Q. This is one of the exhibits from Dr. Short's
21 deposition. Is this the document you're talking about,
22 using more to raise, and hyperspectral imagery?
23 A. Yep.

0418

1 Q. Okay.
2 A. Okay. So, on page 51, the determination of
3 water clarity was limited to optically deep water due to
4 the complexities associated with the inclusion of
5 remotely detectable bottom reflection.
6 Q. How does that mean that the equation he
7 developed was not applicable to anywhere else? That's
8 just telling you that the data was limited to a certain
9 area so they wouldn't get information on the data sets,
10 isn't it?
11 A. It's saying that this is what the -- where
12 they had data, so it's limited to the optically deep
13 water areas.

14 Q. Are you telling me that the factors affecting
15 transparency change, based on the depth of the water?
16 You want to tell me what treatise would give you --

17 A. What I'm saying is that the conclusions of
18 this study are limited.

19 Q. Where does that study say -- point to the page
20 in the study where it says you should not apply the
21 equation to any other area that's not otherwise deep?

22 A. Oh, I mean, I showed you right here. I mean,
23 I --

0419

1 Q. What page are you reading from?

2 A. Fifty-one.

3 Q. Can I have it, please?

4 A. There's other sections that talk about its
5 limitations at Great Bay or around the buoy.

6 Q. It just says recommendation for future work.
7 It's not in the conclusion section.

8 A. It's the same page.

9 Q. That wasn't a conclusion.

10 MR. MULHOLLAND: That's not a question.
11 Objection.

12 Q. All right. Just for the record, we're on
13 page 51, Mr. Trowbridge. Did you read from the
14 conclusion section or did you read from recommendations
15 for future work?

16 A. I read from the recommendations for future
17 work or management strategies.

18 Q. And does the conclusions section anywhere say
19 that you should not apply the equation that was
20 developed, which you asked EPA for a grant to develop so
21 you could make this analysis for the system, that that

22 equation should not be applied in other areas of the
23 system?

0420

1 A. Oh. Right. It says, "A novel technique for
2 estimating water turbidity and Kd power from the
3 available hyperspectral wavelengths in optically deep
4 waters was developed." It doesn't say you can't apply
5 it, it just talked about what it was developed for.

6 Q. Thank you.

7 A. There's one other section, I guess.

8 MR. MULHOLLAND: You don't need to --

9 THE WITNESS: All right.

10 Q. Didn't that report also include data taken
11 from the various rivers, various tidal rivers? You can
12 look at the table at the tail end. It took data from
13 every major tidal river?

14 A. Yes, it did. But the regression was based on
15 the data at the buoy.

16 Q. Did the report show that the regression
17 doesn't work for the tidal rivers?

18 A. I don't recall.

19 Q. Right. Because it doesn't, it's not in there.

20 All right. I'm going to show you some data
21 for Squamscott and Lamprey Rivers. This is data that
22 you should be quite familiar with because it was
23 presented in each of the hearings that applied your

0421

1 numeric criteria on the permits.

2 (Counsel conferred with the witness.)

3 Q. Mr. Trowbridge, are you aware that Dr. Short
4 testified that he never recommended applying the numeric
5 nutrient criteria in the tidal rivers?

6 A. No.

7 Q. This is Short Exhibit 20. That's a graph of
8 Kd transparency measurement versus chlorophyll-a. Okay.
9 Have you seen that grant before, Mr. Trowbridge?

10 A. I think so.

11 Q. Doesn't that graph demonstrate that regulating
12 nitrogen to control chlorophyll-a levels in the
13 Squamscott River will not and cannot assure attainment
14 of the transparency level contained in the June 2009
15 numeric criteria document?

16 A. I'm not sure. So the graph is light
17 attenuation measured at these two stations versus
18 chlorophyll?

19 Q. Uhm-hmm. Does, first off, does the graph show
20 that the light attenuation values claimed necessary in
21 the numeric criteria document are attained in the
22 Squamscott River, at either Chapman's Landing or the
23 further downstream station?

0422

1 A. No.

2 Q. It's not even close; right?

3 A. Right.

4 Q. These are large exceedences of that value?

5 A. Yes.

6 Q. Okay. Does the analysis show that controlling
7 chlorophyll-a will bring, even if you take the
8 chlorophyll-a down to near zero in Squamscott River,
9 that that will allow this system to attain the
10 nutrient -- the transparency targets set in the 2009
11 criteria document?

12 MR. MULHOLLAND: Object to form. I don't
13 understand it, but maybe Phil does.

14 Q. Look at the lower panel.

15 A. The lower panel.

16 Q. The one you just --

17 A. And this is a -- these box and whisker plots
18 on the lower panel, what are they?

19 Q. They're the data averaged from the plot above.

20 A. Oh.

21 Q. Same type of thing you've done.

22 A. Yeah, okay. This graph doesn't show a
23 relationship with chlorophyll and light attenuation.

0423

1 Q. Right. So controlling nitrogen to control
2 chlorophyll in this system will not allow this water
3 body to even come close to attaining the transparency
4 level that is contained in the 2009 criteria; right?

5 A. Based on this analysis, no.

6 Q. All right. This data had been submitted to
7 you and to EPA. Is there any basis that you know for
8 claiming that the analysis presented in this graph is
9 incorrect?

10 A. I'm not sure.

11 Q. You've not seen any analysis that shows it's
12 incorrect, have you?

13 A. No.

14 Q. Okay. Doesn't this analysis tell you it's
15 something else other than chlorophyll controlling the
16 transparency level in the Squamscott River?

17 A. Based on this data, yes; this graph, yes.

18 Q. Okay. Do you know if these other factors that
19 are controlling -- if it's not chlorophyll, there's only
20 two other factors that it can be, other than the water
21 itself. It's color-dissolved organic matter or it's
22 nonalgal-related turbidity; right?

23 A. Or it's organic matter that's not chlorophyll.

0424

1 Q. Right. Well, when I -- I said nonalgal
2 turbidity, so anything that could cause turbidity but
3 not related to algae?

4 A. Not related to living phytoplankton, you mean,
5 because that's what chlorophyll measures. There's other
6 types of organic matter that's in the water.

7 Q. Right. Correct.

8 A. You know, that's pieces of macroalgae, that's
9 dead phytoplankton, it's --

10 Q. In the Squamscott River, pieces of macroalgae?
11 I mean, let's stop talking theoretical, what this could
12 be. I'm talking about the Squamscott River,
13 Mr. Trowbridge. So let's not just go off on things that
14 we know don't even exist in the Squamscott River. These
15 data say it's one of those two other factors: something
16 turbidity-related or something color-dissolved organic
17 matter; right?

18 A. Right. And what I'm trying to distinguish is
19 turbidity can include organic matter as well as
20 inorganic matter.

21 Q. So reducing the Exeter discharge to zero
22 nitrogen, is that going to allow this water body to
23 attain the transparency level you're claiming is
0425

1 necessary to allow eelgrass to inhabit that system?

2 A. Uhm, I'm not sure.

3 Q. What do you mean you're not sure?

4 A. I'm not sure. There's a lot of factors.

5 Q. And you're telling me there's something else
6 in the Exeter discharge that's causing transparency
7 impacts?

8 A. Like I said, I am not sure. Eelgrass existed
9 in this system at some time in the past.

10 Q. What does that have to do with whether or not
11 the nitrogen is going to improve the transparency level?

12 A. Because the CDOM levels probably have not
13 changed. And if that's -- so one factor that has
14 changed is the nitrogen.

15 Q. Okay. Look, you're under oath,
16 Mr. Trowbridge. You've already testified I don't know
17 how many times that there's only four factors affecting
18 light transmission. Nitrogen is not one of those
19 factors; right? Nitrogen does not directly affect light
20 transmission; right?

21 A. Yeah. Nitrogen molecule does not directly
22 affect light transmission.

23 Q. Okay. So we've determined, from this graph,
0426

1 and there are two more just like it, that it's
2 chlorophyll -- chlorophyll-a control in this system will
3 not allow the transparency level to be improved to where
4 it can support eelgrass; right?

5 A. I've already said that.

6 Q. Okay. So how is it that regulating nitrogen
7 from the Exeter discharge, which is almost all dissolved
8 inorganic, is going to bring this system into compliance
9 with the transparency levels you claim are needed for
10 eelgrass growth?

11 A. Give me a minute to think about this. I think
12 I go back to the fact that the criteria we use for our
13 assessments or the thresholds we use for our assessments
14 are based on a variety of different mechanisms in which
15 nitrogen affects eelgrass. It's different in different

16 parts of the estuary, and it's different at different
17 times. Light attenuation is one of those factors but
18 it's not the only one. Shallowing, and shallower areas
19 overcomes --

20 Q. Can you stop. You're not answering my
21 question. I'm asking about transparency. I'm not
22 asking about overgrowth of the macroalgae, I'm not
23 asking about toxicity of nitrogen, which you throw into
0427

1 your CALM response. I'm asking about transparency. How
2 is controlling Exeter going to significantly improve the
3 transparency in the Squamscott River, based on this
4 graph?

5 A. Based on this graph, it would not.

6 Q. It's not. Thank you. Based on the Morrison
7 report you know CDOM is originating from the tidal
8 rivers; right?

9 A. Yes.

10 Q. Okay. Are the CDOM concentrations much higher
11 in the tidal rivers than they are in the bay?

12 A. Yes.

13 Q. They have to be, right, because that's where
14 they're coming from and they're not yet diluted into the
15 rest of the bay. Do you know if the tidal rivers tend
16 to be turbid because of the high exchange of saltwater
17 into the system?

18 A. Sometimes, yes.

19 Q. If the turbidity -- I'm sorry, if the poor
20 light levels in the Squamscott River are due to, one,
21 the CDOM coming down the system and, two, the turbidity
22 caused by the tidal exchange, isn't that a natural
23 condition, regardless of what the light transmission
0428

1 level is in that system?

2 A. Correct; that's a natural condition. The
3 question I have is why was eelgrass there earlier.

4 Q. Well, you know, Mr. Trowbridge, that, to me,
5 is an extraordinarily interesting question. I think the
6 data for the -- wasn't the data on eelgrass being
7 present in the Squamscott, that was based on some
8 anecdotal chat that Fred Short had with a Mr. Chapman;
9 right?

10 A. No. It was based on maps made by a UNH
11 masters student who did a survey of the tidal rivers and
12 portions of Great Bay and portions of the Piscataqua
13 River.

14 Q. I'm thinking of the earlier one, the 1948
15 extent, I believe, was claimed to be based on a
16 discussion with Mr. Chapman?

17 A. No. The 1948 was the masters thesis that was
18 published by UNH.

19 Q. Is it conceivable that some kind of physical
20 conditions in the tidal rivers have changed since 1948?

21 A. I don't know.

22 Q. Do you know if they filled in at all?

23 A. Uhm, hard -- it's hard to say. Sediment

0429

1 budgets is a complicated thing that we've been trying to
2 study.

3 Q. Okay. Do you know if any of the tidal rivers
4 have filled in? I thought a number of them had.

5 A. Well, the Oyster has had some sedimentation
6 issues because there's been discussions about dredging.

7 Q. Do you know if the level of the sea has
8 changed since 1948?

9 A. According to -- yes, it has changed, but I
10 don't know by how much.

11 Q. All right. So, but here's the point:
12 Regardless of why the eelgrass are not there at this
13 point in time, the transparency data shows it cannot
14 possibly support eelgrass at this time; right? That's
15 what this data indicates?

16 A. Uhm, at a -- yes. What that data indicates is
17 that at a two-meter restoration depth, that would be too
18 deep. So the question is, there maybe shallower areas
19 where it could survive. That's another way of looking
20 at it.

21 Q. Well, we don't have any eelgrass anywhere in
22 this system; right?

23 A. Correct.

0430

1 Q. So if you can't fix this via nitrogen control,
2 why would it be considered a nitrogen-impaired system?
3 If my statement is true, if you can't fix it via
4 nitrogen control, that there's other factors that you
5 cannot change because they're naturally occurring at
6 this point, would it still be considered a
7 nitrogen-impaired system?

8 A. So you're asking if we were to do a new 303d
9 assessment and it was conclusively proven that the
10 eelgrass loss in this system was not due to nitrogen
11 would it still be impaired for nitrogen?

12 Q. Why would one have to conclusively prove
13 something's not caused by nitrogen when you know the
14 transparency is insufficient to allow eelgrass growth
15 regardless of the nitrogen controls put on the system?

16 A. I think we're mixing issues. There's the
17 issue of an assessment versus the issue of permitting.

18 Q. I'm talking about a narrative criteria
19 violation. If that transparency level is natural, can't
20 be controlled --

21 A. Oh, so you're talking about as naturally
22 occurs?

23 Q. Yeah.

0431

1 A. In terms of the narrative standard of "as
2 naturally," if it was determined this was naturally
3 occurring, then it would not be an impairment.

4 Q. And there would be no point in regulating
5 nitrogen, right, because you wouldn't be able to change
6 it; right?

7 A. Yeah. That's not really our call, because we
8 don't write the permits, but the point would be -- the
9 question related to us is the "as naturally occurs"
10 clause of our standard.

11 Q. All right. I'm going to show you Exhibit 21
12 from Fred Short, Fred Short's deposition, Lamprey River.
13 Does this, in Lamprey River, with Kd versus transparency
14 level versus nitrogen -- I'm sorry, versus
15 chlorophyll-a, does this data show a similar pattern as
16 the Squamscott River, that transparency levels are poor
17 in this system even at very low levels of chlorophyll-a
18 content?

19 A. For the most part; yes.

20 Q. So will regulating nitrogen to control
21 chlorophyll-a in this system ensure that the
22 transparency level is achieved in the Lamprey River?
23 When I say "transparency level," that's the level

0432

1 necessary to support eelgrass?

2 A. Based on this data, no.

3 Q. Okay. Do you have -- oh, this is -- when we
4 say "this data," this is data that came out of your
5 system.

6 Do you know if there's any, any data that
7 shows, for the Lamprey River, that nitrogen control can
8 assure a sufficient transparency level is attained to
9 allow eelgrass to be restored?

10 A. And you're talking about data from the Lamprey
11 River?

12 Q. Oh, yeah.

13 A. Uhm, sorry. Can you say the question again,
14 please?

15 MR. HALL: Could you repeat that back,
16 please?

17 (Record read as requested.)

18 A. All right. So I think what you're asking is:
19 Are there any other data besides these?

20 Q. Data or analyses that show you control
21 nitrogen, you're going to fix that transparency problem,
22 transparency issue in the Lamprey River?

23 A. The answer is I don't believe so. It's the

0433

1 same issue as with the Squamscott.

2 Q. Okay. Could I have both of those back,
3 please? And I just want to say, shock of shocks, we've
4 got one more of these which is the Upper Piscataqua
5 River. This is Fred Short Exhibit 22.

6 A. Yes.

7 Q. I bring your attention to two things. First,
8 look at chlorophyll-a levels, annual median, in the
9 Piscataqua River, Upper Piscataqua. Does that level of

10 chlorophyll-a occurring in the Upper Piscataqua indicate
11 to you that there's cultural eutrophication occurring in
12 the Piscataqua?

13 A. We haven't defined cultural eutrophication in
14 terms of chlorophyll-a level.

15 Q. That's a pretty low chlorophyll-a level,
16 though; right? I mean, it's -- other than there's 2003
17 data that average above five, the rest of the time we're
18 in the one and a half to three range. That's not much
19 chlorophyll growth, is it?

20 A. As an annual median, yeah. I don't know what
21 the individual points look like here.

22 Q. But your transparency criteria is based on
23 annual median considerations; right?

0434

1 A. Yes.

2 Q. Okay. Look at the Kd chart right below there,
3 same thing. Kd measurements. Do those, from this
4 chart, do they indicate that they're significantly
5 affected by the chlorophyll-a level in the Upper
6 Piscataqua River?

7 A. They're not well-correlated.

8 Q. There's a minimal impact; right?

9 A. Uhm, based on this analysis; yes.

10 Q. Okay. That's the same conclusion that the
11 Morrison report came to, right; that chlorophyll had a
12 minimal impact on the water transparency, right?

13 A. Well, it had a -- it said it was a smaller
14 factor. It didn't say minimum, I don't think.

15 Q. I think somewhere around 12 percent is, I
16 think, what Morrison had; right?

17 A. Somewhere around there.

18 Q. Okay. Does this data indicate that if you
19 regulate nitrogen to control chlorophyll-a you will meet
20 the transparency target that is being applied to the
21 Upper Piscataqua River?

22 A. Not based on this analysis.

23 Q. By the way, look at 2006. Did the

0435

1 transparency get worse after 2006? Got particularly bad
2 that year.

3 A. In 2006 or in 2007?

4 Q. I think the high bar is associated with 2006.

5 A. It is, okay. It's kind of labeled in a funny
6 way.

7 Q. And that coincides with the -- that poorer
8 transparency, at least at this location, coincides with
9 the higher rainfall levels in 2006; right?

10 A. Uhm, I believe 2006 was one of the flood
11 years.

12 Q. Wasn't the Mother's Day flood, didn't that
13 happen in 2006?

14 A. I think so.

15 Q. Do you think that could have had a significant

16 impact on the eelgrass beds everywhere in the system,
17 given how large the flood was, how much debris and
18 material are brought down into the system?

19 A. It could have had an impact.

20 Q. Can I have that one back, please?

21 (Handing.)

22 MR. HALL: Thank you. Do you mind if we
23 take a two-minute break?

0436

1 (Recess.)

2 BY MR. HALL:

3 Q. Mr. Trowbridge, I've got a few more questions
4 about the 2009 criteria document, and then ask you some
5 weight-of-evidence questions, hopefully, and then we
6 will go on from there. That should be pretty much
7 closing.

8 2009 criteria document that you developed,
9 that's a -- you said you used a weight-of-evidence
10 analysis to come up with the criteria in that report;
11 right?

12 A. Yes.

13 Q. Did you include in that report the evidence
14 that indicated that transparency was not the cause of
15 eelgrass loss in the system that you had developed in
16 any of your earlier analyses?

17 A. What are you referring to for an earlier
18 analysis?

19 Q. That transparency, or analysis of transparency
20 had not changed over time; was that included anywhere in
21 that report?

22 A. No.

23 Q. What about all the statements that Great Bay

0437

1 is not a transparency-controlled system, from EPA and
2 Dr. Short, and those are the ones you and I walked
3 through in your first round of the deposition. Did you
4 include the statements that Great Bay was not
5 transparency-controlled?

6 A. I'm not sure; I don't believe so.

7 Q. Okay. What about the -- did you include the
8 statements that the cause of eelgrass losses and changes
9 in the system were unknown, statements that were
10 contained in the various 303d listing documents?

11 A. Uhm, I have to look through. I'm not sure.
12 I'm not seeing it here.

13 Q. Did you include any of Morrison's conclusions
14 that the major factors controlling transparency in the
15 system were, in fact, turbidity and color-dissolved
16 organic matter, and not chlorophyll?

17 A. I believe we included equations from the
18 Morrison study.

19 Q. Did you highlight the Morrison study concluded
20 that the transparency level of Great Bay was acceptable,
21 and that you needed to look at something else as the

22 cause of eelgrass demise?

23 A. I'm not sure if we have that statement in
0438

1 here.

2 Q. It's a pretty important statement, isn't it?

3 It made your report.

4 Did you -- well, did you include any
5 discussion about how the primary graphs that you were
6 using to develop the transparency and nitrogen
7 relationships were merely correlations and did not
8 demonstrate causation?

9 A. I don't believe so.

10 Q. Actually, let me ask you a quick question on
11 that. With regard to the low DO relationship to
12 chlorophyll-a, and your transparency relationship to
13 total nitrogen, both of those graphs are just
14 correlations, right; they do not show causation?

15 A. That is correct.

16 Q. Is there anywhere in that document that you
17 assessed the other factors, other confounding factors
18 that impact the DO regime, such as sediment, oxygen
19 demand, river flow, low DO coming in from swamp areas?
20 Did you assess that anywhere in this analysis?

21 A. No.

22 Q. What about the factors that are controllable
23 in tidal rivers; did you assess whether or not CDOM,
0439

1 turbidity or any of the other factors that are
2 significantly influencing the transparency level in the
3 tidal rivers, is there any assessment of that anywhere
4 in that document?

5 A. Uhm, can you clarify? Assessment of what?

6 Q. Of how those factors influence and control
7 transparency in the tidal rivers?

8 A. So in the tidal rivers specifically.

9 Q. In the tidal rivers specifically.

10 A. No.

11 Q. Is there any assessment about how the change
12 in rainfall patterns could have influenced the eelgrass
13 losses or the transparency occurring in the system
14 anywhere in that document?

15 A. Sorry. You said rainfall and what?

16 Q. Just how rainfall patterns influenced
17 transparency in eelgrass populations in the system?

18 A. I don't believe so.

19 Q. Okay. Does that report include any of the
20 case-specific analyses you did and evaluations that
21 confirmed TN did not cause any excessive algal growth in
22 the system or alter transparency in the system over
23 time?

0440

1 A. You say case-specific analyses. What are
2 those?

3 Q. Your March 2008 presentation to EPA that said

4 it's not a transparency issue. Does that -- was that
5 analysis reflected in this assessment?

6 A. So you're talking about, like, the -- either
7 the presentations or the interim reports?

8 Q. Correct.

9 A. Were they reflected in this report?

10 Q. Uhm-hmm.

11 A. I would say the interim analyses are not
12 included in the report; no. They were not included in
13 the final report. What was included was the final
14 analyses.

15 Q. The final analysis which left out all of these
16 prior analyses that indicated transparency wasn't
17 controlled by chlorophyll-a or nitrogen. Hmm. Okay.

18 Let's talk weight of evidence for a moment. I
19 don't have any further questions on that. Here's a --
20 darn it, what did I do with it? Ah, right here.

21 MR. HALL: Can we mark this as
22 Exhibit 89, please?

23

(Trowbridge Exhibit 89 marked for

0441

1 identification.)

2

3 Q. Mr. Trowbridge, are you familiar with this
4 document?

5 A. Yes.

6 Q. Okay. Oh, I need to ask you, before I get
7 into this document, I just need to ask you one question
8 about application of the 2009 criteria, how you apply
9 them from a regulatory perspective.

10 The 2009 criteria, they represent some type of
11 long-term annual average or median conditions that need
12 to be attained; correct? I'm talking about transparency
13 and nitrogen.

14 A. And you're referring, when you talk about
15 "apply," are you talking about use in the CALM or 303d
16 assessments?

17 Q. Yeah.

18 A. So the question is what is the metric we use?

19 Q. No. Those are long-term annual average levels
20 that you're trying to attain; right?

21 A. Yes. It's actually medians.

22 Q. Medians. Is it appropriate to mandate
23 compliance of those criteria under one-in-ten-year job

0442

1 flow conditions?

2 MR. MULHOLLAND: Objection.

3 A. I'm sorry, I'm not understanding.

4 Q. When you develop wasteload allocation, which
5 you did in 2009, was it -- was that analysis developed
6 to achieve compliance with those numeric criteria under
7 once-in-ten-year low flow conditions?

8 A. Like 7Q10?

9 Q. Yeah, like 7Q10.

10 A. So, was that -- I'm sorry. Are you asking did
11 we do the analysis for 7Q10 or was it appropriate to do
12 it when it's not 7Q10?

13 Q. Is it appropriate to apply that number at a
14 7Q10 condition?

15 A. We only apply this number in our CALM for
16 assessments, and we did that nitrogen loading analysis
17 to provide some general information about loading
18 thresholds. It was not, like, a wasteload allocation
19 for permitting.

20 Q. I'm asking you a technical question. For a
21 wasteload allocation for permitting, is it appropriate
22 to apply those criteria to mandate compliance under
23 7Q -- once-in-ten-year low flow conditions?

0443

1 A. I don't know because I'm not a permit writer.

2 Q. I'm asking a technical question. From a
3 scientific perspective, is that the appropriate
4 condition under which to apply the criteria?

5 A. I'm having trouble with it because we use the
6 criteria, we look backwards at the last five years of
7 data. And I don't --

8 Q. Look, Mr. Trowbridge. You spent a year and a
9 half doing a wasteload allocation report. You came up
10 with recommended nitrogen load reductions for point
11 sources and nonpoint sources, correct, in that document?

12 A. Yes; in that document.

13 Q. When you derived and developed that document,
14 did you set those wasteload allocations based on
15 one-in-ten-year low flow conditions; yes or no?

16 A. No, we did not.

17 Q. Next question: Do you think it's
18 scientifically proper to apply the long-term annual
19 average median criteria from that 2009 document under
20 7Q10 conditions?

21 MR. MULHOLLAND: Objection. Apply to
22 what? That's totally vague.

23 MR. HALL: No. He knows the answer to

0444

1 the question because it's a regulatory question that
2 gets applied in the state all the time.

3 A. Right. But we don't do -- I mean, I think
4 I'm -- we don't do the permits. So --

5 Q. I didn't ask if you did the permit, I asked
6 you whether or not you knew it was technically proper to
7 do that?

8 A. I don't know, because I haven't done that.

9 Q. Is it proper to apply these criteria inside a
10 mixing zone?

11 MR. MULHOLLAND: Objection. Apply to
12 what? It's a vague question. Objection to form.

13 A. Inside a mixing zone?

14 Q. To derive permit requirements?

15 A. This really is not my area of expertise. I'm
16 not a permit writer.

17 Q. All right. Simple question: Can the
18 nutrients in the discharge that's being regulated cause
19 a significant transparency impact in a mixing zone; yes
20 or no?

21 MR. MULHOLLAND: If you know.

22 THE WITNESS: Yeah. I don't know.

23 Q. You don't know the answer to that question?

0445

1 A. I'm not quite understanding the question. I
2 mean, are we talking about a big mixing zone, little
3 mixing zone? I don't -- what are you asking --

4 Q. The mixing zones that are being used for the
5 Exeter and Lamprey River, which are small.

6 A. Okay.

7 Q. Is it proper to -- it -- will the nitrogen
8 cause an impact within the mixing zone, impacting
9 transparency; yes or no?

10 A. I'm not sure, but I don't believe so.

11 Q. Okay. Let's talk about this multiple line of
12 evidence chart.

13 Do you recall developing this document?

14 A. Yes.

15 Q. Okay. Multiple lines of evidence, is this the
16 same approach that was used to develop the 2009
17 criteria?

18 A. Uhm, it's similar. It's a little bit expanded
19 from what we had in the 2009 document.

20 Q. Okay. I'd like you to draw your attention to
21 the third bullet that says, "Literature review for
22 macroalgae proliferation."

23 A. Oh, okay. This one.

0446

1 Q. You're saying that a -- this document is
2 saying that DES has determined that a .3, something in
3 the range of a .3 total nitrogen level is necessary to
4 control macroalgae?

5 A. That was the information we had in a draft
6 document. It's -- and it was included on this graph.

7 Q. Oh, so that's just the information from the
8 draft document?

9 A. Correct.

10 Q. Okay. So you've not rendered -- the DES
11 hasn't rendered any final decision that you have to have
12 a .3 total nitrogen to control macroalgae; right?

13 A. Right.

14 Q. Okay. Do any of the values plotted in the
15 data plotted on this graph provide a basis for
16 concluding that the nitrogen -- that the cause of
17 eelgrass loss in Great Bay was transparency?

18 A. No.

19 Q. Okay. I don't have any further questions on
20 that.

21 I'll just ask one last question, and it's
22 related to the CALM analysis. Do you have the CALM
23 analysis?

0447

1 A. Which one?

2 Q. Uhm, oh, I'm sorry. The CALM Response to
3 Comments?

4 A. Yes.

5 Q. And that would be Trowbridge Exhibit 59.

6 I'd like to draw your attention to page 12 of
7 16 where you've got those three charts on factors
8 affecting light attenuation. The chart in the middle,
9 you're indicating that color -- based on this chart,
10 you're indicating that color-dissolved organic matter is
11 less important than other factors affecting light
12 attenuation in the Great Bay system; right?

13 A. Yes.

14 Q. Does that chart use the same data that the
15 charts above it and below do?

16 A. They -- each of these charts was made with all
17 of the available data for each of the parameters. So
18 they're a little different, but there is a lot of
19 overlap.

20 Q. So the answer is no, it doesn't use the same
21 data?

22 A. Right. The answer is no.

23 Q. Okay.

0448

1 A. Just explaining why "no."

2 Q. Do you know that the data set used in that
3 middle chart is, primarily from 2010 during August and
4 September?

5 A. I just used all of the measurements that we
6 had that had both Kd and CDOM.

7 Q. So you didn't actually check when the data was
8 collected?

9 A. I know it was collected between 2003 and 2010.

10 Q. Okay. Did you know that the data that was
11 presented in that chart was from a period when CDOM
12 influences on the system were minimal, based on your
13 long-term recording in this system?

14 A. I'm not aware of that. I'd have to look at
15 the data.

16 Q. Okay. So you really didn't check the data
17 very carefully before you came up with this analysis to
18 conclude CDOM is not the major component you thought it
19 was?

20 MR. MULHOLLAND: Objection.

21 Q. Based on prior studies?

22 MR. MULHOLLAND: Objection. That
23 mischaracterizes what he said.

0449

1 A. In this analysis we used all of the data we
2 had.

3 Q. Again, you did not -- it's not the same data
4 sets on the two different -- on the three different
5 charts, and you didn't check the time periods from which
6 the data were being pulled; right?

7 A. It's not the same data sets because we're
8 trying to use all of the cases where you had the two
9 variables for the regressions. So we were trying to be
10 inclusive of all data, and we just pulled all of the
11 data that we had.

12 Q. Okay. You'll notice that your light
13 attenuation readings are much lower in your middle chart
14 of the figures, correct, than they are in the other
15 ones?

16 A. Yes.

17 Q. Wouldn't that mean that they are mainly from
18 the bay and not from the tidal rivers? Or did you not
19 check that?

20 A. We did not check that.

21 MR. HALL: Okay. I don't have any
22 further questions. Do you have anything else, guys?

23 MR. KINDER: No.

0450

1 MR. LUCIC: No.

2 MR. SERELL: No. I think we're good.

3 (Thereupon, the deposition was concluded at
4 3:50 p.m.)

5

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0451

1 C E R T I F I C A T E

2 I, Cheryl B. Palanchian, a Certified

3 Shorthand Reporter and Notary Public of the State of

4 New Hampshire, do hereby certify that the foregoing is

5 a true and accurate transcript of the testimony of

6 Philip Trowbridge, who was by me duly sworn, taken at

7 the place and on the date hereinbefore set forth and

8 under the conditions present.

9 I further certify that I am neither attorney
10 or counsel for, nor related to or employed by any of
11 the parties to the action in which this deposition was
12 taken, and further that I am not a relative or
13 employee of any attorney or counsel employed in this
14 case, nor am I financially interested in this action.
15

16 THE FOREGOING CERTIFICATION OF THIS TRANSCRIPT
17 DOES NOT APPLY TO ANY REPRODUCTION OF THE SAME BY ANY
18 MEANS UNLESS UNDER THE DIRECT CONTROL AND/OR DIRECTION
19 OF THE CERTIFYING COURT REPORTER.

19 _____
Cheryl B. Palanchian
20 Certified Shorthand Reporter
Registered Professional Reporter
21 Registered Merit Reporter
Certified Realtime Reporter
NH LCR No. 60

22
23
0452

1 E R R A T A S H E E T
2 IN RE: City of Dover, et al v. State of NH, et al
Court Reporter: Cheryl B. Palanchian
3 DEPOSITION OF: Philip Trowbridge
TAKEN: 7/11/12

4
5 DO NOT WRITE ON TRANSCRIPT - ENTER CHANGES HERE

6 PAGE #	LINE #	CHANGE	REASON
7	_____	_____	_____
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13	_____	_____	_____
14	_____	_____	_____

16 _____
Deponent
17 THE STATE OF _____
18 COUNTY OF _____, SS.

19 Subscribed and sworn to before me this
_____ day of _____, 20____.

20
21 _____
22 Justice of the Peace/Notary Public
23 My Commission expires:_____

STATE OF NEW HAMPSHIRE

MERRIMACK, SS.

SUPERIOR COURT

DOCKET NO. 217-2012-cv-212

* * * * *

CITY OF DOVER, TOWN OF EXETER, :
TOWN OF NEWMARKET, CITY OF :
PORTSMOUTH, and CITY OF ROCHESTER, :
: Petitioners, :
v. :
: STATE OF NEW HAMPSHIRE and NEW :
HAMPSHIRE DEPARTMENT OF :
ENVIRONMENTAL SERVICES, :
: Defendants. :
* * * * *

DEPOSITION OF FREDERICK T. SHORT

This deposition was taken at the offices
of Sheehan Phinney Bass + Green, PA, 1000
Elm Street, Manchester, NH 03101, on
Monday, May 14, 2012, by and before Deanna
Dean, RDR, CRR, New Hampshire License No.
87, commencing at 12:59 p.m.

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(Original exhibits returned with original of transcript.)

STIPULATIONS

It is agreed that the deposition shall be taken in the first instance in stenotype and when transcribed may be used for all purposes for which depositions are competent under New Hampshire practice.

Notice, filing, caption and all other formalities are waived. All objections except as to form are reserved and may be taken in court at time of trial.

It is further agreed that if the deposition is not signed within thirty (30) days after submission to counsel, the signature of the deponent is waived.

Short - May 14, 2012

1 P R O C E E D I N G S

2 FREDERICK T. SHORT,

3 having been first duly sworn according to law,

4 was deposed and testified as follows:

5 EXAMINATION

6 BY MR. HALL:

7 Q. Good afternoon, Dr. Short. How are you
8 doing?

9 A. Good.

10 Q. Good.

11 My name is John Hall and I am an
12 attorney for the petitioners, and I'm going to be
13 asking you some questions today regarding the Great
14 Bay issues, particularly related to eelgrass, a
15 topic that I would take you are intimately familiar
16 with?

17 A. (Nodding head)

18 Yes. Yes.

19 Q. Yes.

20 Let me just start with a few initial
21 points. If at any time I ask a question and you
22 don't understand what I'm asking or you think it's
23 confusing, please stop me and we'll, you know,

Short - May 14, 2012

1 rephrase the question, or I'll try to clarify how
2 things are.

3 A. Mm-hmm.

4 Q. If you get tired at any point and you
5 need some water or something else -- you need a
6 break -- you're the one answering the questions.
7 It's more difficult on your end than it is to ask the
8 questions. So please don't be bashful about asking
9 for a break. This isn't a forced march.

10 A. Okay. Great.

11 Q. And I guess the only --

12 MR. HALL: Marty, in terms of where we
13 are, I guess we -- I would say we're reserving
14 all objections except as to form, the
15 typical -- you know, we're not quite sure
16 exactly what all will be submitted or not with
17 the court.

18 MS. VAN OOT: Yeah. It's the usual
19 stipulations, which is reservation of all
20 objections until the time of trial, except as
21 to the form of the question. But that would
22 be modified by the court's protective order.
23 So I will object as necessary on the

Short - May 14, 2012

1 protective order. And it might be a good idea
2 to mark that before we start.

3 MR. HALL: Okay. And in terms of any
4 objections on the protective order, since I
5 was not the attorney that was there at the
6 hearing on the protective order but Tupper
7 Kinder was certainly among counsel that was
8 there, Tupper may be the one that provides the
9 reply on that for the record as issues come
10 up.

11 MR. KINDER: We have a clean copy of
12 the protective order.

13 BY MR. HALL:

14 Q. Dr. Short, just another question: Have
15 you ever been deposed before?

16 A. No.

17 Q. Okay. So this is the first time?

18 A. This is the first time.

19 Q. Well, we will try to make this as
20 pleasant an experience if possible, if it's possible.

21 A. That would be great.

22 Q. Can you please state your name for the
23 record.

Short - May 14, 2012

1 A. Frederick Tilton Short.

2 Q. And can you let us know what your
3 current place of employment is.

4 A. I'm employed at the University of New
5 Hampshire.

6 Q. And for how many years have you been
7 employed at the University of New Hampshire?

8 A. 29-plus years.

9 Q. 29-plus years.

10 Can you please tell me what your
11 educational background is. From college onward, of
12 course.

13 A. Okay. I went to college at Plymouth
14 State here in New Hampshire, majored in mathematics.
15 I did graduate work at -- in Rhode Island at the
16 Graduate School of Oceanography, University of Rhode
17 Island, and did my PhD at the University of Alaska.

18 Q. And before coming to the University of
19 New Hampshire, where were you working?

20 A. I was -- immediately before, I was at
21 Harbor Branch Institution in Fort Pierce, Florida.
22 That was a postdoc.

23 Q. Postdoc.

Short - May 14, 2012

1 And what would you consider your
2 specialty is in terms of your education?

3 A. Seagrass ecology, or almost everything
4 to do with seagrass.

5 Q. Okay. Can you tell me whether or not
6 you are a member of CLF, the Conservation Law
7 Foundation?

8 A. Like a dues-paying member? Or --

9 Q. Well, a member -- yes, a dues-paying
10 member.

11 A. No, I'm not.

12 Q. Do you work with them periodically to
13 provide them advice or insight on eelgrass issues?

14 A. Yes. Mm-hmm.

15 Q. Okay. And with regard to Great Bay,
16 have you provided advice to them on eelgrass and
17 nitrogen issues?

18 A. Yeah.

19 Q. I'm going to ask you the same question
20 with regard to a couple other organizations, too.

21 With regards to EPA, have you provided
22 them advice on the nitrogen criteria needed to
23 protect eelgrass and the need to regulate based on

Short - May 14, 2012

1 transparency?

2 A. I don't know. I basically --

3 MS. VAN OOT: Do you need the question
4 repeated?

5 A. Depends how specific those details are.
6 You know, they -- I have provided them information on
7 eelgrass, aspects of eelgrass ecology, and my
8 knowledge of Great Bay.

9 Q. Okay.

10 A. The Great Bay Estuary.

11 Q. With regard to DES, New Hampshire DES --

12 A. The same.

13 Q. -- the same question.

14 A. The same in all cases.

15 Q. Okay. Were you a member of the
16 Technical Advisory Committee that was formed to
17 address water quality criteria development and other
18 issues for Great Bay?

19 A. Yes.

20 Q. Do you recall what years you were a
21 member of that committee, or were you just a member
22 of it throughout its duration?

23 A. I think throughout its duration.

Short - May 14, 2012

1 Q. Okay. Yeah, I think those years, as I
2 recall -- though I'm not testifying -- I believe
3 were -- 2005 to 2008, I think, is the time frame when
4 that TAC was --

5 A. Well, yeah. It still exists.

6 Q. Oh, it still exists?

7 A. Yes.

8 Q. Okay.

9 A. It's actually combined with another
10 group from Estuarine Research Reserve.

11 Q. Regarding the State of the Estuary
12 reports, did you provide input on those reports?

13 A. Yes.

14 Q. Can you please describe the input that
15 you provided.

16 A. Maps of eelgrass distribution annually.

17 Q. Anything else other than maps?

18 A. Some data relating to the maps.

19 Q. Okay. And could you just tell me what
20 kind of data that might have been?

21 A. Eelgrass. You know, biomass. Cover
22 estimates.

23 Q. Okay. Did you receive any federal grant

Short - May 14, 2012

1 monies to do research on eelgrass issues for
2 Great Bay?

3 A. Over what time period?

4 Q. Let's go --

5 A. Are we going to go over the whole 30
6 years?

7 Q. Oh, no. That would be too complicated.
8 Let's -- actually, I wasn't asking for the individual
9 projects that you may have received.

10 A. Oh.

11 Q. Just, in the past 20 years, have you
12 received federal funding to do eelgrass research on
13 Great Bay?

14 A. Yes.

15 Q. Give me an idea of what kind of projects
16 that might have been related to.

17 A. I had a project for the Great Bay
18 National Estuarine Reserve program, looking at
19 developing a baseline assessment of eelgrass in
20 Great Bay, using two types of monitoring: one,
21 Seagrass Net monitoring, which is a program I run;
22 and another which is monitoring the -- that they
23 wanted to -- wanted to use or to think about using.

Short - May 14, 2012

1 Q. Okay. With regard to the eelgrass
2 mapping of Great Bay, I understand you've been
3 involved in that for quite some time?

4 A. Since I arrived in '84.

5 Q. Since 1984?

6 A. Yeah.

7 Q. Okay. So when I'm looking at an
8 eelgrass monitoring report and it talks about being
9 done by the Jackson Lab, that would have been your
10 work?

11 A. That would have been my work, yes.

12 Q. Okay. And I presume whatever research
13 associates or assistants that you required --

14 A. Mm-hmm. Yeah.

15 Q. -- for helping out on that?

16 A. Students and technicians.

17 Q. Gotcha.

18 When you conducted these eelgrass
19 mapping studies, were these studies designed to
20 address the causes for changing eelgrass populations
21 in the bay?

22 A. No. They were just to give an annual
23 assessment of how eelgrass was doing.

Short - May 14, 2012

1 Q. Were you involved in the development of
2 the 2009 numeric nutrient criteria for Great Bay?

3 A. As part of the Technical Advisory
4 Committee.

5 Q. So that would be yes --

6 A. Yes.

7 Q. -- as part of TAC?

8 A. Yes.

9 Q. Okay. I'm going to ask you a couple
10 questions as to where you would hold yourself out as
11 an expert to the regulatory agencies or to others
12 just generally.

13 Start out with the easy one: Do you
14 consider yourself an expert on eelgrass ecology?

15 A. Yes.

16 Q. Okay. Do you consider yourself an
17 expert on transparency analysis?

18 A. To some extent. Well, having -- I would
19 say only having to do with how it affects eelgrass.

20 Q. Okay. Do you consider yourself an
21 expert on macroalgae?

22 A. No.

23 MS. VAN OOT: What was the word?

Short - May 14, 2012

1 MR. HALL: "Macroalgae."

2 M-a-c-r-o-a-l-g-a-e.

3 Q. Did I spell that right?

4 A. Also "seaweed."

5 MS. VAN OOT: Thank you.

6 Q. Do you consider yourself an expert on
7 algal dynamics?

8 A. No.

9 Q. Do you consider yourself an expert on
10 nutrient transport and dynamics in estuarine systems?

11 A. Yes.

12 Q. Okay. Can you explain how you consider
13 yourself an expert on nutrient dynamics?

14 A. I have a number of papers on it. I did
15 my PhD dissertation on nitrogen cycling and eelgrass
16 beds.

17 Q. Oh. Related to eelgrass?

18 A. Related to eelgrass.

19 Q. Okay. Yeah, I was asking -- the
20 question related to transport and -- so do you
21 consider yourself as an expert on nitrogen transport
22 through estuaries?

23 A. Can you be more specific?

Short - May 14, 2012

1 Q. Well, nitrogen loads come into tidal
2 rivers; hydraulically mixed within various sections
3 of a bay; converted to different forms; the rates at
4 which those forms convert. The freight and transport
5 of the nitrogen itself in the system.

6 A. Well, I did -- a lot of my PhD work was
7 nitrogen biogeochemistry. I've done a lot of
8 hydrodynamic modeling, having to do with current
9 movements and current flows and transport of
10 materials. I wouldn't necessarily say I'm an expert
11 on all of it, but I have a -- I have two degrees in
12 oceanography, which is pretty much dealing with those
13 issues.

14 Q. Okay. Did you conduct any nutrient
15 transport modeling or hydrodynamic modeling for Great
16 Bay?

17 A. Yes.

18 Q. During what time period?

19 A. Probably the mid-'90s.

20 Q. Who was that work conducted for?

21 A. I was working with a graduate student.

22 Q. But it wasn't --

23 A. It wasn't funded.

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1 Q. Oh, it wasn't funded?

2 A. No.

3 Q. Okay. So were the results of that
4 research provided to any of the federal or state
5 agencies?

6 A. There is a second program which was
7 funded by NOAA, which looked at ecosystem modeling,
8 not hydrodynamics.

9 Q. Not hydrodynamics. All right.

10 Okay. With regard to studies of Great
11 Bay to date, I'm going to just ask you some general
12 questions and then we'll get down to more some
13 specifics of the types of studies that you've
14 completed.

15 A. Mm-hmm.

16 Q. Did you ever do transparency monitoring
17 and modeling for Great Bay or the tidal rivers?

18 A. No.

19 Q. What about algal modeling or monitoring
20 for Great Bay or the tidal rivers?

21 A. No.

22 Q. Okay. Same question for turbidity in --
23 did you do turbidity monitoring and modeling for

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1 Great Bay and the tidal rivers?

2 A. Both.

3 Q. Well, maybe if you can --

4 A. No to both.

5 Q. Well, no to both?

6 A. No. Not --

7 Q. Oh.

8 A. No to the two together.

9 Q. Could you -- and I should stop asking
10 you compound questions.

11 A. That's right.

12 MS. VAN OOT: Yes.

13 Q. Well, I'm trying to save us time. I'm
14 moving through things maybe a tad bit more quickly
15 than should be done.

16 Can you please explain -- let's break
17 it down into two pieces.

18 Did you do turbidity modeling for Great
19 Bay or the tidal rivers?

20 A. No.

21 Q. No on the modeling.

22 And so then you did turbidity
23 monitoring?

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1 A. Monitoring, yes.

2 Q. Okay. For Great Bay.

3 Can you please tell me where you did
4 turbidity monitoring either within Great Bay or any
5 of the tidal rivers?

6 A. As part of the long-term monitoring
7 program that I ran for the State of New Hampshire, I
8 put out sediment elevation tables, sediment -- which
9 are permanent sites in the bay that measure how much
10 sediment is eroding or being deposited, and I
11 operated those for about 12 years. And at various
12 times I've had students that have done measurements
13 of sediment accumulation independent of that, in
14 marshes, mostly.

15 Q. Let's switch to the water column, then.

16 A. Okay.

17 Q. In terms of the turbidity level in the
18 water column, did you do any -- you did no modeling
19 of that?

20 A. I did neither one, no.

21 Q. On neither?

22 A. Yeah.

23 Q. So neither monitoring nor modeling on

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1 the water column turbidity?

2 A. Right.

3 Q. Okay. Same question: monitoring or
4 modeling of Great Bay and the tidal rivers with
5 regard to color?

6 A. No.

7 Q. No. Okay.

8 Did you ever do any water quality
9 modeling on how point or nonpoint source or nutrient
10 loads impact Great Bay and the tidal river -- and
11 the tidal rivers?

12 A. Repeat it, please.

13 Q. Yeah, I'm sorry. Let me do it again.

14 Did you ever do any water quality
15 modeling of how point and nonpoint source nutrient
16 loads impact Great Bay or the tidal rivers?

17 A. Yes.

18 Q. Can you please explain what the scope of
19 that was?

20 A. As part of a project funded by USDA, we
21 looked at the potential for eelgrass restoration in
22 the Bellamy River, and in that process, the
23 monitoring that went with that process, we looked at

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1 sediment dynamics.

2 Q. You looked at sediment dynamics?

3 A. Yes.

4 Q. Okay.

5 A. And measured light levels.

6 Q. Okay. And -- okay. Let me refine the
7 question a little bit.

8 Did you ever do any water quality
9 modeling on how point and nonpoint source nutrient
10 loads impact transparency in Great Bay and tidal
11 rivers?

12 A. No.

13 Q. No.

14 How about how it would have impacted
15 algal growth in the Great Bay or tidal rivers?

16 A. How turbidity?

17 Q. Oh, no. No, no. I'm sorry. I'll --

18 A. Can you start it again.

19 Q. I'll start it over again.

20 Did you ever do any water quality
21 modeling of how point and nonpoint source nutrient
22 loads affect algal growth in the water column in
23 Great Bay or the tidal rivers?

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1 A. By -- you're restricting that to
2 phytoplankton?

3 Q. Yes, phytoplankton.

4 A. No.

5 Q. Okay. So do you -- one of the issues
6 that's come up on, as you know, with Great Bay, is
7 this whole issue of what nitrogen limit do they --
8 should the wastewater plants be initially directed
9 to, and there is a variety of opinions, as you know,
10 on this.

11 *So with regard to the research you
12 have done to date, do you know whether or not an
13 8-milligram-per-liter limit versus a
14 5-milligram-per-liter limit versus a
15 3-milligram-per-liter limit is required to protect
16 eelgrass resources in Great Bay?

17 MS. VAN OOT: I'm going to object on
18 the grounds of the protective order. I think
19 you're asking him for an opinion other than
20 the opinions expressed in the February 2012
21 e-mail.

22 MR. KINDER: Well, let's see if he has
23 any.

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1 MR. HALL: Well, actually, I thought
2 you might say that, because part of the letter
3 in December 22, 2011, that Dr. Short authored,
4 talks about all wastewater plants in the
5 watershed should advance to a discharge of 8
6 milligrams per liter in the next two to three
7 years.

8 MS. VAN OOT: Okay. Well, I've got two
9 objections going here. I've got Tupper's
10 objection and I've got your objection. So
11 which one are we addressing?

12 MR. HALL: Which one would you like to
13 do first?

14 MR. KINDER: Let's find out if he has a
15 opinion.

16 MS. VAN OOT: You can answer the
17 question yes or no.

18 A. I'm not sure what the question was.

19 Q. I knew you were going to say that.

20 MS. VAN OOT: That's what lawyers do.

21 MR. HALL: Could you read it back.

22 *(Last question read back by the
23 reporter.)

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1 MS. VAN OOT: Opinion based on your
2 research to date.

3 A. And "research" is -- are we defining
4 "research" as just observational or are we defining
5 research that projects that lead to answering some
6 question?

7 Q. Projects that lead to answering some
8 type of question.

9 A. No.

10 Q. Okay. Did you ever study whether or how
11 organic nitrogen converts to inorganic nitrogen forms
12 in Great Bay Estuary?

13 A. No.

14 Q. A little bit earlier, when you were
15 giving me an answer, you had mentioned something
16 about some long-term trend work that you had been
17 doing, so I've got a couple long-term-trend
18 questions, because it's been also an issue of
19 interest with regard to the nutrient requirements of
20 Great Bay.

21 Did you ever do any long-term-trend
22 analysis of nutrient levels for Great Bay or the
23 tidal rivers?

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1 A. Yes.

2 Q. Could you please explain what you have
3 done?

4 A. I think back in the early '90s -- yeah,
5 I'm sure it was the early '90s -- I looked back at
6 the historical data on nutrient dynamics, nitrogen
7 and phosphorus, in the tidal rivers and Great Bay, to
8 try and assess whether change was -- could be
9 detected.

10 Q. Okay. Well, let's try post 19 -- I'll
11 pick a date -- post-1993. I apologize.

12 A. Yeah.

13 Q. Say post-1990. Have you been working on
14 any long-term-trend analysis of nutrient levels of
15 Great Bay or the tidal rivers?

16 A. In that time period, yes. I just
17 answered that, I think.

18 Q. Oh. I thought that one, it sounded like
19 you were looking at data from before 1990.

20 A. I was looking at data from before, but
21 that was done in that time period.

22 Q. All right. Over what time frame does
23 this long-term-trend analysis of nutrient levels

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1 cover?

2 MS. VAN OOT: I'm sorry, I've lost you.

3 Which long-term-trend analysis?

4 MR. HALL: The one that Dr. Short said
5 he has done.

6 A. I think it was the data from the '70s,
7 '80s, then there was a break, and some data in the
8 late '80s.

9 Q. Okay.

10 A. So it was 10 -- 20 -- 10 years, or 20
11 years. 10 to 20 years.

12 Q. Okay. Focusing primarily on the '70s
13 and '80s?

14 A. Yeah.

15 Q. Okay. So I gather you don't have the
16 same analysis done for the '90s and '00s?

17 A. No. Phil Trowbridge did that.

18 Q. Phil Trowbridge did that.

19 Did you ever do any long-term-trend
20 analysis of transparency levels for Great Bay or the
21 tidal rivers?

22 A. Not specific measurements of
23 transparency.

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1 Q. Okay. Is there something else that you
2 would have -- you would be thinking is a --

3 A. I measure light levels at depth, which
4 is related to the transparency of the water.

5 Q. Okay. So with regard to the -- maybe
6 you can tell me whether or not you've done any
7 long-term-trend analysis of the light levels within
8 Great Bay and the tidal rivers, I'll say since 1990.

9 A. No, not -- not comprehensively.

10 Q. Okay. Same question: long-term-trend
11 analysis of turbidity, turbidity levels -- and this
12 is in the water column -- for Great Bay or the tidal
13 rivers?

14 A. And when you say "turbidity," you're
15 talking only about suspended sediments?

16 Q. Yes, sir.

17 A. Well, aside from the one I mentioned
18 from the Bellamy, no.

19 Q. Okay. Did you ever do anything from the
20 Lamprey River?

21 A. No.

22 Q. The Squamscott?

23 A. Well, in '92 I put out the Great Bay

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1 Profile, an assessment of everything we know about
2 Great Bay at the time, and I believe we compiled
3 turbidity data as part of that.

4 Q. At that point in time?

5 A. Yeah.

6 Q. Okay.

7 A. And that covers all these things.

8 Q. And -- well, let's switch to another
9 one, just so I can make sure I've got my bearings
10 straight and I'm not asking you to overstate what you
11 did or you didn't.

12 Upper Piscataqua River, did you do
13 any -- have you ever done any long-term-trend
14 analysis of the turbidity levels in that area?

15 A. No.

16 Q. Okay. What about by the mouth of the
17 harbor? Long-term analysis down there?

18 A. That was included in that study because
19 we had some data from the coastal lab.

20 Q. Oh, so the 1992 study?

21 A. Yeah.

22 Q. All right. So after 1992, had you
23 done --

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1 A. No.

2 Q. -- any -- no. Okay.

3 Now, earlier, you had mentioned that
4 you didn't consider yourself to be a macroalgae
5 expert, so I'll ask the question, but I think I know
6 the answer.

7 Did you ever do any long-term-trend
8 analysis of macroalgae levels in Great Bay or the
9 tidal rivers?

10 A. Not specifically long-term-trend, or
11 not -- not an analysis that was written down or
12 published.

13 Q. Did you measure macroalgae levels in
14 various areas of the bay or tidal rivers?

15 A. No.

16 Q. No.

17 And then the last question in the loop
18 is algae. Did you ever do any long-term-trend
19 analysis for changing algal levels -- and by
20 "algae," I mean phytoplankton -- for Great Bay or
21 the tidal rivers?

22 A. Since '92?

23 Q. Since '92. Thank you.

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1 A. No.

2 Q. No.

3 Thank you for the correction. I
4 appreciate that.

5 I'm going to show you a copy of the --
6 and we'll mark this as Exhibit --

7 MR. KINDER: Let me do 2. This will be
8 1, which is the court's order.

9 MR. HALL: Court's order. We'll mark
10 this one as Exhibit 2.

11 *(Short Exhibit 1 and 2 are marked for*
12 *identification.)*

13 Q. This was an e-mail dated December 22,
14 2011, sent to Steven Perkins, several other people at
15 the EPA. Other people were cc'ed, including Dean
16 Peschel, Rachel Rouillard, Phil Colarusso, and
17 others. Phil Trowbridge, State of New Hampshire.
18 And it's entitled "Response to the Great Bay
19 Municipal Coalition Adapted Management Plan."

20 I'd like to ask you a couple questions
21 about this e-mail.

22 MS. VAN OOT: Okay. Before you do, I
23 need to tell you that Professor Short is

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1 dyslexic. So if you are going to be asking
2 him about specific paragraphs or sentences in
3 here, I would ask that you read the paragraph
4 ahead and the paragraph after and the
5 paragraph that you want to ask him questions
6 about.

7 MR. HALL: Okay.

8 MR. KINDER: Well, I'm --

9 MR. HALL: Go ahead, Tupper.

10 MR. KINDER: I'm responding because I
11 was at the hearing.

12 MS. VAN OOT: Right.

13 MR. KINDER: This document, Exhibit
14 2 -- John's got a very short statement that I
15 presume he's going to ask about. The
16 paragraph above and below are long. I
17 don't --

18 MS. VAN OOT: Actually, they're not.

19 MR. KINDER: Well, even so, it seems to
20 me, since this is a time-sensitive deposition,
21 that asking for those things, if it's -- if
22 it's necessary, if Mr. Short doesn't
23 understand the question, then maybe that's --

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1 maybe that's appropriate.

2 Could we proceed in that fashion?

3 MR. HALL: And Fred, I feel your pain.
4 I'm dyslexic also. So I -- I'm good with
5 numbers.

6 THE WITNESS: Find somebody else to
7 read it.

8 MR. HALL: I know, which is, you
9 know -- well, actually, no. I reverse
10 numbers, which is -- it's a good thing I was a
11 math major like you, because you know, you
12 don't use numbers in questions. You just go
13 with letters. So it's a --

14 MS. VAN OOT: Okay. How about with
15 start with just reading the statement that you
16 want him to look at and then --

17 MR. HALL: We don't even have to go
18 there yet. I just have a few preliminary
19 questions first, and then . . .

20 BY MR. HALL:

21 Q. This e-mail that provides an opinion on
22 the coalition's adaptive management plan, did anyone
23 ask you to provide comments on the plan? I mean --

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1 meaning did EPA or CLF or DES ask for you to please
2 send your observations and comments on the adaptive
3 management plan, or did you do this all just because
4 you wanted to?

5 MS. VAN OOT: Okay. I'm going to
6 object to the form of the question.

7 You can answer if you understand it.

8 A. I did it because I wanted to.

9 Q. Okay. Did you discuss the contents of
10 this response with either EPA, DES, or CLF before it
11 was submitted to EPA?

12 A. I really am not sure.

13 Q. Okay. So you may have, but you don't
14 remember?

15 A. Right.

16 Q. Right. Okay.

17 A. I know I did talk to a number of people
18 about it, including, I think to Dean, I think to
19 other -- well, I brought it up at a couple meetings,
20 because I felt that there were some -- I was
21 initially under the impression that the coalition's
22 thing was put out as a draft when it was originally
23 put out, and that's why I looked at it, and found

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1 things that I thought could be corrected by the next
2 creation of the document. And then I heard it had
3 already been submitted to EPA. So . . .

4 Q. Okay. Fine. I appreciate that
5 clarification.

6 There are a number of statements in
7 here that I -- that the coalition ended up taking an
8 issue over, and they have to do with what I'll call
9 various statements over research claims or research
10 that was available. And I'm going to just read a
11 couple of them. I don't know that I have to read
12 all six right now, seven that we've got marked. And
13 then I'm going to ask you -- well, actually, I
14 probably need to go one at a time. Let's just do it
15 this way.

16 Under No. 1: "My long-term research
17 and annual monitoring of eelgrass in the estuary has
18 clearly demonstrated that eelgrass is disappearing
19 from the estuary" -- and here's the point -- "due to
20 excess algal growth caused by increasing nitrogen
21 levels in the water. There simply is no doubt about
22 this fact."

23 A. Okay.

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1 Q. Okay. Can you tell me who that research
2 was presented to? And when I'm asking who, like from
3 the State or the federal government or PREP or TAC.
4 You know, long-term research and annual monitoring
5 showing that eelgrass was disappearing because of
6 excess algae growth caused by increased nitrogen
7 levels.

8 A. Well, there are a number of different
9 sources of data. A lot of it is observational
10 information where I've -- I mean, I -- observations
11 that I had made. And, for example, I mentioned
12 earlier the Port Authority mitigation monitoring,
13 which was a 15-year monitoring program. And that
14 was -- that was one of -- and that's published in a
15 paper that I sent to the coalition.

16 Q. And I'm going to -- I guess we'll end up
17 going through the individual papers one at a time.

18 But if I was going to look for a
19 research piece that you have published -- let's say
20 formally or informally -- that you've published,
21 presented to the State or to EPA or as part of your
22 database, that showed nitrogen caused increasing
23 algal growth and it was that change in increasing

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1 algal growth that caused the eelgrass to climb,
2 where would I find that document?

3 A. It's a publication which I've sent to
4 you. It should be in your e-mails, Short, et al.,
5 1995, published in Limnology and Oceanography.

6 Q. Okay.

7 A. Also Burdick, and -- who is the other
8 author? A student. Kaldy. Short, Burdick, and
9 Kaldy.

10 Q. I'm going to show you a copy of that
11 paper, the 1995 paper, and I'm going to ask you -- is
12 this the paper you're referring to in your response?

13 (Handing)

14 A. Short, Burdick, and Kaldy.

15 MR. HALL: Let's mark that as Exhibit

16 3.

17 (*Short Exhibit 3 is marked for*
18 *identification.*)

19 Q. Can you please show me where in this
20 paper it confirms nitrogen is causing excessive algal
21 growth which is the cause of eelgrass losses in
22 Great Bay?

23 MS. VAN OOT: Okay. I'm going to

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1 object to the question. You have just handed
2 the witness a nine-page publication that he
3 did back in 1995, and you're apparently asking
4 him to read through it to locate a particular
5 statement, after I made clear to you that
6 Professor Short has dyslexia and that will
7 take him some time.

8 MR. HALL: Well, I guess I'm asking
9 Dr. Short if he can point out the table or the
10 page or anywhere in this report where this
11 analysis would show me that for Great Bay.

12 Q. And this is a paper that was done in --
13 it was published in 1995, and it was based on
14 research conducted in 1988 and 1990, as I read the
15 front --

16 A. Mm-hmm.

17 Q. -- that how this paper could confirm
18 that eelgrass losses that I understand happened in
19 Great Bay two decades later were caused by algal
20 growth.

21 MS. VAN OOT: Object to the form of the
22 question.

23 MR. KINDER: You can answer.

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1 A. Okay. Well, the -- the graph on Figure
2 3 --

3 MS. VAN OOT: Which page?

4 A. It's on 744. C, the biomass versus
5 nutrient level. The first three bars are plants
6 growing in ambient conditions. That means under
7 normal conditions that you see in the bay. And the
8 next three bars are eelgrass biomass growing at
9 enriched conditions, where we increased the amount of
10 nitrogen in the water and looked to see what happened
11 with -- in response to that over time.

12 Q. Okay.

13 A. And this was done at the Jackson
14 Esturine Lab with water directly out of the bay.

15 Q. All right. Two questions, or a couple
16 questions on that. How does this tell me that there
17 was a substantial increase in algal growth?

18 A. You'd have to read -- you would have to
19 read the text. That's not spelled out, that that's
20 the . . .

21 Q. And in terms of these enriched
22 conditions, can you tell me whether or not this paper
23 compared the conditions you used in your enriched

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1 tests to the conditions actually occurring in
2 Great Bay?

3 A. Well, the conditions occurring in Great
4 Bay were the ambient at that time, that was
5 background level, on the -- on -- that depended.
6 Added to, no extra nitrogen added. And the enriched
7 were elevating them above that. And I know somewhere
8 it says how much above that, but I can't remember.
9 Whether it's the same as what they were -- the bay is
10 at now, I don't -- I couldn't forecast it at that
11 point, of course.

12 Q. Okay. That's fine.

13 Now, in terms of -- let's go back to
14 Exhibit 2 again. That's the one with the little
15 yellow markings on that.

16 There's another statement on the next
17 page, on page 2, Portsmouth Harbor -- "In Portsmouth
18 Harbor, eelgrass has been declining for the past
19 five years as a result of reduced water clarity
20 cause by nitro" -- "rising" -- let me -- I'll start
21 from scratch again.

22 "In Portsmouth Harbor, eelgrass has
23 been declining for the past five years as a result

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1 of reduced water clarity caused by rising nitrogen
2 inputs that foster increased phytoplankton growth in
3 the water (microscopic algae)."

4 Where would I find any publication
5 you've done that has the data showing that sequence
6 of events has occurred and was the cause of any
7 eelgrass reductions in the Portsmouth Harbor area?

8 A. The -- it's combined from two different
9 sources, actually. One source is a student's
10 master's PhD thesis, who monitored light levels at
11 the deep edge and the shallow edge of eelgrass beds
12 over time, and a bunch of other things as well. And
13 so that basically was -- documented the change in
14 water clarity.

15 And the connection to phytoplankton
16 production is from my observational observation,
17 having been in that Portsmouth Harbor every year for
18 the last 20 years and seeing the water color change
19 from blue to green, which is pretty diagnostic and
20 very evident when you're under the water.

21 Q. Can you tell me what the actual change
22 in algal level has been in Portsmouth Harbor in the
23 past 10 years? It went from X to Y? Do you know

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1 what it is, or is this just visual?

2 A. Just visual.

3 Q. Just visual. Okay.

4 I'm just curious. In the eelgrass beds
5 in Portsmouth Harbor, are they reducing only in the
6 areas that are the deepest or are they reducing in
7 areas that are also shallow?

8 A. They started at the areas that were
9 deepest, and now it's pretty much decreasing
10 everywhere.

11 Q. Decreasing everywhere?

12 A. Yeah. Well, not in every area, but a
13 lot of areas, anyway.

14 Q. The PhD thesis that you're saying you're
15 relying on to reach --

16 MS. VAN OOT: Objection to the form of
17 the question.

18 Q. Oh.

19 In your last answer, you mentioned that
20 your response to Point No. 2 that you were relying
21 in part to some PhD thesis that was done. Can we
22 get our -- has that PhD thesis been submitted to the
23 State as information to show what's causing eelgrass

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1 losses in this area of the estuary?

2 A. No.

3 Q. Has it been submitted to anyone?

4 A. No.

5 Q. Can we get a copy of it?

6 A. No, I don't believe I can give that out.

7 Q. Okay.

8 A. Part of -- a related part of her
9 dissertation was -- has been published in 2010, but
10 not this specific part as yet.

11 Q. Okay. With regard to Great Bay, you
12 mentioned that there's areas that are declining in
13 biomass and becoming overgrown with nuisance
14 macroalgae. That's under Bullet Point 4.

15 A. Mm-hmm.

16 Q. Can you tell us where --

17 MS. VAN OOT: Actually, there aren't
18 any bullet points.

19 Q. Oh, I didn't number yours?

20 A. No.

21 Q. Oh, I'm sorry.

22 A. So it's been a little vague here.

23 Q. Oh, yeah. I'm saying numbers and you're

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1 probably looking and saying, you know, "Where's
2 that?"

3 Can you tell me where in Great Bay
4 those conditions are occurring?

5 MS. VAN OOT: Do you want to read it?

6 Q. If you know.

7 A. You want to know where the -- where
8 macroalgal seaweed biomass is increasing?

9 Q. Yeah. Just -- "With increased nitrogen
10 into the bay, these beds are declining, losing
11 biomass, and becoming overgrown with nuisance
12 macroalgae."

13 Where precisely in the bay is that
14 occurring?

15 A. I can -- I could -- I have that
16 information. I could tell you that.

17 Q. Oh. You have it, but you -- I'm sorry.
18 Could you repeat your answer, Doctor.

19 A. You asked me if I could --

20 Q. Tell me.

21 A. -- tell you, and I'm saying yes, I
22 could. I have that information.

23 Q. Okay. Where is it occurring?

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1 A. I could -- I don't think you'll
2 understand what I'm saying when -- I'm saying it's
3 occurring throughout much of the bay to differing
4 degrees. It's -- you know, the part that's affecting
5 eelgrass is where the eelgrass beds are, and you've
6 seen my maps of those. There are areas where the
7 seaweeds collect in greater abundance, and you
8 obviously find more seaweed in those areas.

9 Q. And if I were looking for a report that
10 would tell me where this is occurring and how much
11 it's occurring, what report would you direct me to?

12 A. I don't think -- I don't think there's
13 any published report --

14 Q. Okay.

15 A. -- at this point.

16 There is a -- there is a report that --
17 where an attempt was done to look at that, using
18 fancy aerial imagery, and that was reported to PREP.
19 It was a PREP study.

20 Q. Do you know when that was admitted?

21 A. 2008 or 9.

22 Q. Okay. All right. A little further
23 down --

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1 A. I wasn't the first author on it.

2 Q. A little further down the page, the
3 next-to-last yellow point -- that's the one -- where
4 it says, "In the Piscataqua River and Little Bay, the
5 eelgrass losses were primarily" -- oh, I'm sorry --
6 "were predominantly a result of reduced transparency,
7 and, to a lesser extent, excessive epiphyte growth."

8 Where would I find research showing
9 that those -- that statement is correct?

10 A. The first part of it, the transparency
11 part, is in another student's thesis. And the
12 epiphyte is just anecdotal observation.

13 Q. Okay. Now, I'm going to ask a question
14 on this later on, but I'll divert for a second,
15 because we're talking about Little Bay.

16 My understanding was that the eelgrass
17 populations in Little Bay declined rather
18 precipitously and dramatically after the -- was it
19 1988 or 1989 wasting disease?

20 A. In Little Bay? I don't -- I think it
21 was more -- what, '88-'89?

22 Q. Mm-hmm.

23 A. That was Great Bay, primarily. And

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1 Little Bay had, I think, disappeared quite a while
2 before that.

3 Q. Before -- so Little Bay had disappeared
4 before that?

5 A. Not completely, but the major decline
6 had occurred sometime before '83.

7 Q. Oh, really?

8 A. Yeah.

9 Q. Okay. Well, that might explain why, in
10 several of the State reports that I've read, they
11 said that people don't know the reason that the
12 eelgrass declined in Little Bay because it happened
13 so long ago.

14 MS. VAN OOT: Objection to the form of
15 the question, if it was a question.

16 Q. Are you aware that the State has
17 published numerous reports that say the -- no one
18 understands why the eelgrass were lost in Little Bay?

19 A. Who from the State has done that?

20 Q. DES. State of the Estuary reports. The
21 impairment reports for 2008, '10, and '12.

22 A. I may be confused, but I'm not sure that
23 that's what they say.

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1 Q. Okay. Well, we'll loop back to that
2 later. I can show you one of them.

3 So I guess my question is, if you've
4 got somebody working on a thesis on this today,
5 or -- well, actually, let me ask you a question
6 about this.

7 Over what time frame does this person's
8 thesis cover for Little Bay?

9 A. Oh. They all run together now.
10 I think probably 2007 to 2009.

11 Q. Okay.

12 A. Give or take a year.

13 Q. All right. And so it's only within
14 that -- I'll ask the question.

15 Is it only within that time frame that
16 this assertion that transparency, reduced
17 transparency caused by nitrogen caused by excessive
18 algal growth has caused additional declines in the
19 system?

20 MS. VAN OOT: Object to the form of the
21 question.

22 You can answer it.

23 A. No. It's in my own observations

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1 unrelated to these studies.

2 Q. Okay. And what information or
3 publication could I look at that I could objectively
4 assess whether or not this sequence of events is
5 actually demonstrated by data?

6 A. I just said it was my observation, so I
7 think that precludes there being actual data.

8 Q. Okay. Let's -- could we go to the next
9 page, at the top. This is the last question I have
10 on this. It makes a statement about dissolved
11 organic nitrogen. It says, "Excessive macroalgae
12 growth is stimulated by DIN" -- which is dissolved
13 inorganic nitrogen -- "but dissolved organic nitrogen
14 (DON) and other forms of nitrogen are rapidly
15 converted to DIN once they enter the estuary."

16 Can you tell me what research or
17 publication that statement is based on?

18 A. It's pretty basic knowledge in coastal
19 oceanographic literature. You know, it's the whole
20 biogeochemical cycles: breaking down organic carbon
21 and turning it into inorganic -- organic nitrogen and
22 turning it into inorganic nitrogen.

23 Q. Okay. I'll be much more specific with

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1 the question here.

2 With regard to the Great Bay Estuary,
3 did you perform any research or analyses of
4 dissolved organic nitrogen levels converting to
5 dissolved inorganic nitrogen levels within the
6 system?

7 A. Well, I mean, Great Bay isn't that
8 unique. The processes that happen everywhere else
9 would also happen here.

10 Q. I'm asking you whether or not this --

11 A. No, I have not done any studies.

12 Q. Okay. Thank you.

13 With regard -- I'm going to show you
14 Exhibit 21, and it's a letter with an attachment
15 that you received -- I'm sorry. I shouldn't have
16 said "Exhibit 21." It's Exhibit 4.

17 Actually, I want to mark also -- we'll
18 mark it as Exhibit 5 -- "The Mesocosm Experiment
19 Quantifying the Effects of Eutrophication on
20 Eelgrass."

21 MR. KINDER: That's marked already.

22 That's 3.

23 MR. HALL: Oh, okay.

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1 THE WITNESS: I gave her mine.

2 MR. HALL: Thank you.

3 THE WITNESS: Can I get some water?

4 MR. HALL: Sure.

5 *(Pause in the proceedings.)*

6 *(Short Exhibit 4 is marked for*
7 *identification.)*

8 BY MR. HALL:

9 Q. Okay. I'm showing you a letter dated
10 January 23, 2012. It was directed to you and
11 Great Bay Municipal Coalition. It attaches a number
12 of reports and analyses done by HydroQual, and
13 there's a fair amount of information regarding the
14 long term trends and various parameters at a number
15 of stations in Great Bay.

16 Dr. Short, are you familiar with this
17 letter?

18 A. Mm-hmm.

19 Q. Okay.

20 A. Yes.

21 Q. Did you look at the HydroQual report and
22 the attachments to look at the trend in data analyses
23 that was in this correspondence?

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1 A. No.

2 Q. No.

3 Can you tell me why you didn't look at
4 it?

5 A. I was rather put off by the letter, and
6 the appendices seemed long and excessive and I just
7 didn't bother.

8 Q. You did read the cover letter, though;
9 right?

10 A. Yes.

11 Q. I'd like to ask you about a couple of
12 the statements in the cover letter that's on the
13 front page, the A, B, C, and D, and I'd like to go
14 through these four bullets and ask you to tell me
15 what in fact is incorrect with the statements that
16 are in those bullets, if anything is in fact
17 incorrect with them. And they're based on the
18 analysis that HydroQual did and the coalition's
19 review of the long-term-trend data.

20 Bullet A: "HydroQual is saying that
21 it's confirmed that there were no analyses or data
22 in the record." And when we're talking about in the
23 record, we're talking about the 2009 criteria

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1 document and papers that were submitted to TAC and
2 things that were, you know, made available to the
3 public. That's what we're talking about.

4 A. Where does it say that?

5 Q. No. That I'm explaining.

6 A. Okay. But you didn't say that in the
7 letter?

8 Q. No. I mean, what HydroQual did was,
9 they contacted Phil Trowbridge and asked him for all
10 the background information they could find on various
11 parameters that were mentioned in your earlier
12 e-mail.

13 MS. VAN OOT: I think you need to set a
14 foundation for the question.

15 MR. HALL: Well, on this -- the
16 foundation for these questions go back to
17 Dr. Short's statements in the December 22
18 e-mail that talks about long-term research and
19 monitoring confirming that eelgrass had
20 disappeared due to excessive algal growth
21 caused by increasing nitrogen levels.

22 MS. VAN OOT: No. Your question was
23 directed towards A, B, C, and D --

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1 MR. HALL: Yes.

2 MS. VAN OOT: -- and you prefaced it
3 with a reference to specifically HydroQual has
4 confirmed there are no analyses or data in the
5 record showing the following, and then you
6 went on to explain what your understanding of
7 the record is.

8 MR. HALL: Okay.

9 MS. VAN OOT: And I just don't know
10 that the Professor Short has the same
11 understanding of the record. So your question
12 is unfair.

13 *BY MR. HALL:*

14 Q. I'll just ask you whether you agree with
15 the statements, that there's no information showing
16 transparency has materially decreased during the
17 period of significant eelgrass decline --

18 MS. VAN OOT: Same objection.

19 Q. -- in Great Bay.

20 MS. VAN OOT: Same objection.

21 MR. KINDER: Just ask the first
22 question.

23 MS. VAN OOT: Right.

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1 MR. HALL: Well, he just did.

2 MS. VAN OOT: No, he didn't. He said
3 no information in the record.

4 MR. HALL: Okay.

5 MS. VAN OOT: Without establishing what
6 Professor Short's understanding of is the
7 record. If you want to ask him whether he --

8 BY MR. HALL:

9 *Q. Dr. Short, do you disagree with the
10 statement that transparency has not materially
11 decreased during the period of significant eelgrass
12 decline in Great Bay?

13 MS. VAN OOT: That is not what it said.

14 MR. HALL: Well, I'm now asking the
15 question the way I want to.

16 MS. VAN OOT: Well, you can't say that
17 you're asking a question based on A, B, C, D,
18 and then read A incorrectly.

19 MR. KINDER: He's restated the
20 question, so he can proceed.

21 MS. VAN OOT: No, he can't. Well, he
22 can proceed over my objection.

23 MR. KINDER: Okay.

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1 MR. HALL: Correct.

2 MS. VAN OOT: Do you understand the
3 question?

4 THE WITNESS: Not completely.

5 MS. VAN OOT: Why don't you -- could we
6 read back the question, the last question.

7 **(Last question read back by the
8 reporter.)*

9 MS. VAN OOT: Could you do it again,
10 because that's not what A says.

11 **(Last question read back by the
12 reporter.)*

13 MS. VAN OOT: A says -- does not have
14 not "materially decreased," and it doesn't
15 have "Great Bay" in it.

16 So are you asking him -- if you want to
17 ask him that question, that's fine. But you
18 said you were asking him about A, B, C, and D.

19 Q. Could you please answer the question I
20 posed, Dr. Short?

21 MS. VAN OOT: Read it back one more
22 time and listen carefully.

23 A. It's not what's said here, so I'm not

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1 sure -- do you want me to answer the one that --

2 Q. Yes.

3 MS. VAN OOT: Could you read back the
4 question, please.

5 **(Last question read back by the
6 reporter.)*

7 A. It's such a double negative that it's
8 very hard to get your head around it.

9 I guess I'd like to know what you mean
10 by "materially decreased." I mean, is this a
11 statistical statement or some other --

12 Q. Enough to significantly affect eelgrass
13 growth.

14 A. And you said, in your question,
15 "Great Bay." But in here, we're talking about the
16 Great Bay Estuary. So are you talking just about
17 Great Bay or the whole system?

18 Q. Let's do Great Bay, and then we'll do
19 them one at a time.

20 A. Okay. The transparency has decreased
21 significantly in the Great Bay Estuary.

22 Q. Okay. And what data do you base that
23 on?

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1 A. Observation, personally, and the
2 master's student that I spoke of earlier, the thesis.

3 Q. And this master's thesis covers what
4 period of time?

5 A. I believe it was 2007 to 2009, but I'm
6 not positive.

7 Q. 2007 to 2009.

8 Is that based on data from that period?

9 A. Probably -- basically, but maybe going
10 back to 2006.

11 Q. To your knowledge, is there any data
12 from 2005 backward, showing that transparency had
13 significantly decreased in Great Bay?

14 A. There is data in the PREP reports, but I
15 don't remember the specific time periods that they
16 would have used.

17 Q. And do you recall which PREP report you
18 believe this data was in?

19 A. I think it's in the State of the
20 Estuaries report.

21 Q. Do you recall which one?

22 A. 2006.

23 Q. 2006?

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1 A. No. 2009.

2 Q. 2009?

3 A. Or both, maybe.

4 Q. Okay. Same question: Is there data
5 that shows -- that is confirmed that transparency has
6 materially decreased in the Piscataqua River over the
7 period of eelgrass decline in that water body?

8 A. Yes.

9 Q. And where is that data?

10 A. That's the same master's thesis.

11 Q. The same master's thesis.

12 Has that data been presented to DES and
13 EPA?

14 A. No.

15 Q. No.

16 A. It was offered to them.

17 Q. Portsmouth Harbor is the --

18 A. Yes. Same.

19 Q. Same time frame?

20 A. Mm-hmm.

21 Q. Same period?

22 A. Mm-hmm.

23 Q. Any other datasets?

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1 MS. VAN OOT: Form of the question.

2 A. No, I don't believe so.

3 Q. Now, HydroQual wouldn't have had access
4 to this master's thesis?

5 A. I don't know what HydroQual did.

6 Q. I mean, it's not generally available;
7 right?

8 A. That's right.

9 Q. Is there data showing that the existing
10 transparency in Great Bay, Little Bay, or Portsmouth
11 Harbor is insufficient, given the tidal variation in
12 the system?

13 A. Insufficient for what?

14 Q. To support eelgrass growth.

15 A. Yes.

16 Q. And --

17 A. The same master's thesis.

18 Q. Same master's thesis.

19 Do you know if that data is in any
20 PREP -- do you know if there were any other data in
21 a PREP report or any DES report that would be
22 publicly available?

23 A. Not that related to the tidal variation.

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1 Q. Okay. Can you -- is there any data or
2 analysis showing that nitrogen triggered excessive
3 phytoplankton growth, significantly lowering
4 transparency levels anywhere in the estuary?

5 A. I believe that's in the 2009 PREP
6 report, State of the Estuaries report.

7 Q. So you think the PREP report showed the
8 nitrogen triggered phytoplankton growth, which then
9 triggered a lowering of transparency, and that's in
10 the PREP report?

11 A. No, I wasn't targeting that aspect of
12 the question. They show trends in nitrogen over that
13 time period.

14 Q. They show trends in nitrogen?

15 A. Right.

16 Q. I agree that the PREP report certainly
17 showed trends in nitrogen, Dr. Short. There's no
18 question about that.

19 Do you know if the PREP reports also
20 showed that the trends in nitrogen caused a trend in
21 phytoplankton growth?

22 A. I don't know if they showed that or not.

23 Q. Don't know. Okay.

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1 And do you know if the PREP reports
2 actually contained the transparency levels changing
3 over time?

4 A. Not expressed as transparency, no.

5 Q. What would it have been expressed as?

6 A. Suspended sediments or suspended
7 sediments and phytoplankton.

8 Q. Okay. So -- with your thesis that if
9 the suspended sediments go up, the transparency is
10 increased?

11 A. Right. I mean, that's basic
12 oceanography, you know.

13 Q. I wasn't saying I was disagreeing. I
14 was just trying to understand the basis of the
15 statement. Thank you.

16 Do you know of any data or analyses
17 showing suspended algal growth is a substantial
18 component affecting water column transparency
19 anywhere in the estuary?

20 A. So you're talking phytoplankton?

21 Q. Yes, sir.

22 A. Not in a single document, no.

23 Q. When you say "not in a single

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1 document" --

2 A. Well, PREP shows that -- PREP shows the
3 increases in phytoplankton, I believe, and it shows
4 decreases in -- or increases in nitrogen and
5 increases in phytoplankton, as part of the whole
6 nitrogen dynamics.

7 Q. Okay. Do any of those analyses show
8 that the phytoplankton component is a very
9 significant component of what's affect -- what would
10 affect light transmission in the bay?

11 A. I don't think they look at that
12 specifically.

13 Q. Okay. So in terms of some of the other
14 earlier things that we covered, and I certainly don't
15 want to put words in your mouth, I want to --
16 withdraw that question.

17 With regard to the Piscataqua River,
18 can you tell me what the state of the eelgrass
19 condition is there?

20 A. It's completely gone from the upper
21 Piscataqua.

22 Q. It's completely gone?

23 A. Yes.

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1 Q. Is it gone in both the areas that are
2 shallow and deep?

3 A. Yes. They're not -- they're not shallow
4 like the areas in Great Bay are shallow.

5 Q. But are there areas in the upper
6 Piscataqua where eelgrass are -- would have been in
7 some shallower zones, or had been?

8 A. Historically --

9 MS. VAN OOT: Wait, wait. I object to
10 the form of the question. You can answer.

11 A. Historically, they may have been.
12 But -- well, there's some historical data that
13 suggests that they -- that it was there. But not
14 since I've been observing it.

15 Q. Do you know if in the shallow areas
16 of -- the upper Piscataqua and the lower
17 Piscataqua -- because I know you've done quite a more
18 bit more research, I believe, on the lower
19 Piscataqua.

20 A. Mm-hmm.

21 Q. So the shallower areas of the upper
22 Piscataqua and the lower Piscataqua, do you know if
23 the transparency levels are insufficient in those

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1 areas to maintain eelgrass growth?

2 A. Can you tell me where your demarcation
3 of upper and lower is? Are we talking the whole
4 Piscataqua from the Mildred Long Bridge north?

5 Q. Yeah. Why don't we try that.

6 A. No, I can't tell you.

7 Q. You can't tell me. Okay.

8 In response to the letter, Exhibit 4,
9 to Dr. Short, you sent -- you sent some e-mails back
10 to Dean Peschel; correct?

11 A. Yes.

12 MR. HALL: Okay. I'd like this marked
13 as Exhibit 5.

14 *(Short Exhibit 5 is marked for*
15 *identification.)*

16 Q. This is an e-mail to Dean Peschel. One
17 is dated -- there are actually two e-mails. One is
18 dated February 6, 2012, and the other one is also
19 dated February 6, 2012. Looks like one e-mail was
20 sent about a half an hour after the prior one.

21 MS. VAN OOT: No, no.

22 MR. HALL: It looks like one came out
23 at 10:07 and the other one came out at 10:31

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1 is what I have for the two e-mails.

2 MS. VAN OOT: I'm not following you.

3 MR. HALL: Marty, if you look at the
4 top of the page, it tells you what the time it
5 was sent. It says Monday, February 6, 2012,
6 10:07 a.m.

7 MS. VAN OOT: That is the full reading
8 of the e-mail from Mr. Peschel to his counsel
9 and everybody else in this room, not the
10 e-mail from --

11 MR. HALL: Oh. Right you are. I'm
12 sorry. That was my confusion.

13 MS. VAN OOT: That's what I thought.

14 MR. HALL: Here -- this -- thank you
15 for that clarification.

16 This e-mail from Fred Short to Dean
17 Peschel was on February 4 --

18 MS. VAN OOT: The first one.

19 MR. HALL: -- the first one, at 2012,
20 at the impressive time of 6:52 a.m. in the
21 morning.

22 MS. VAN OOT: 6:54.

23 MR. HALL: I've got 6:52 on the first

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1 one. And then the second one was sent at 6:54
2 a.m. in the morning.

3 MS. VAN OOT: Okay. Gotcha.

4 MR. HALL: And it's -- one is labeled
5 "papers 1 of 2" and the other one says "papers
6 2 of 2."

7 BY MR. HALL:

8 Q. Okay. Dr. Short, can you tell me what
9 this -- what this e-mail is all about, from you to
10 Dean Peschel?

11 A. I believe in an earlier e-mail I said I
12 would send some publications, and they weren't
13 included with that e-mail.

14 Q. Okay.

15 A. And this was a follow-up, sending them
16 in two separate e-mails.

17 Q. Okay. And why were you sending those
18 publications off to Dean Peschel?

19 A. I believe he requested background
20 information that supported my statements.

21 Q. And the statements that you're talking
22 about are the statements that were in the December 22
23 e-mail?

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1 A. Yes. Exhibit 2.

2 Q. Exhibit 2? Would that be correct?

3 A. Yes.

4 Q. Okay. So I've got -- oh, 12 or so
5 papers that you sent along, and we could go through
6 each one. Maybe we can just -- you can just tell me
7 with regard to each paper, tell me whether or not the
8 paper had Great Bay-specific data and analysis to it
9 or if it was just a more generalized research paper.
10 If you know.

11 A. My assumption in sending these papers
12 was that the oceanography and the hydrodynamics and
13 the ecology of Great Bay is not that different than
14 ecological and -- ecological seagrass and eelgrass
15 populations in other locations.

16 So many of those were related to other
17 studies. For example, identification of loss of
18 eelgrass in Waquoit Bay, Massachusetts, back in the
19 '90s, that basically followed the exact same
20 scenario we see happening here, 20 years ago.

21 Q. Okay. So why don't we -- why don't we
22 just try to quickly go through these, and then you
23 can tell me which one is a Great Bay and which one

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1 wasn't.

2 A. Okay.

3 Q. And we can go from there.

4 MR. HALL: I think we'll probably just
5 mark these in sequence. Marty, I can give you
6 a copy on each one, but I'm just going to ask
7 him if it's a Great Bay or not a Great Bay
8 study.

9 MS. VAN OOT: I'd like a copy.

10 MR. HALL: Sure.

11 Q. Dr. Short, the paper entitled "Nitrogen
12 Uptake by Leaves and Roots of Seagrass," and I will
13 not try to pronounce the name, was that a study done
14 specifically for Great Bay or not?

15 A. No.

16 MR. HALL: Let's mark that as Exhibit
17 6.

18 *(Short Exhibit 6 is marked for*
19 *identification.)*

20 Q. The next paper is titled "Effects of
21 Sediment Nutrients on Seagrass: Literature Review
22 and Mesocosm Experiment."

23 Was this specific to Great Bay?

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1 A. It was done while I was at the
2 University of New Hampshire, and I consulted with
3 Dr. Art Mathieson, who is our seaweed ecologist at
4 the lab, and I did talk about experimental mesocosms
5 with eelgrass. So it was a study done in Great Bay,
6 or the Great Bay watershed, but in tanks, rather than
7 in the bay itself.

8 Q. Okay. And --

9 A. My thinking was influenced by what I was
10 observing at the bay.

11 Q. That's quite all right.

12 Did that study have anything to do with
13 transparency, to your knowledge?

14 A. No. This was -- this was part of a
15 volume from Aquatic Botany that I was the editor for,
16 and there were other papers in that volume that
17 covered transparency, photosynthesis transport, those
18 sorts of things.

19 MR. HALL: Okay. Let's mark it as No.

20 7.

21 *(Short Exhibit 7 is marked for*
22 *identification.)*

23 Q. Here's another paper entitled

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1 "Sustaining Eelgrass to Manage a Healthy Estuary."

2 And this was -- looks like a 1989 publication.

3 Was this specific to Great Bay, and did
4 it have anything -- if so, did it have anything
5 specifically to do with transparency light levels
6 necessary for --

7 A. Yes.

8 MS. VAN OOT: Well, wait.

9 Objection to the form of the compound
10 question.

11 Q. So is it specific to Great Bay?

12 A. It was specific to Great Bay and the
13 mesocosm experiments were run in Great Bay water,
14 Figure 4 and -- well, all of them, all of the
15 mesocosm studies. But Figure 4 shows how eelgrass
16 growth was affected by reduced light, and those were
17 experiments done at the lab.

18 Q. Was the reduced light related directly
19 to conditions in Great Bay?

20 A. No.

21 Q. No?

22 A. They were -- they were not.

23 MR. HALL: Okay. Let's mark that as

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1 Exhibit 8.

2 A. This is also a paper that summarizes the
3 effects of various impacts of -- talks about being
4 smothered by sediments, turbidity effects, those
5 things that are all happening in Great Bay presently.

6 *(Short Exhibit 8 is marked for*
7 *identification.)*

8 Q. You mentioned about plants being
9 smothered in Great Bay.

10 A. I said smothered and other factors that
11 influence eelgrass as in Great Bay.

12 Q. Oh, I'm sorry.

13 A. It's okay. You didn't paraphrase me
14 correctly.

15 Q. Sorry. So are eelgrass being smothered
16 in Great Bay?

17 A. No.

18 Q. Okay. I was just confused. I didn't
19 think they were, and I was just wondering if I had
20 heard incorrectly. I apparently had.

21 This next paper, "Natural and Human-
22 Induced Disturbances of Eelgrasses," is this a
23 Great Bay-specific paper?

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1 MS. VAN OOT: Wait. Are you marking
2 that?

3 MR. HALL: I will.

4 THE REPORTER: It will be 9 when we get
5 there.

6 A. Yes, it does talk about Great Bay.

7 Q. It talks about Great Bay or --

8 A. It includes data from Great Bay.

9 Q. Includes data from Great Bay?

10 A. Yes. It's a seagrass study that is
11 global in scope.

12 Q. That is what in scope?

13 A. "Global."

14 Q. Global in scope.

15 A. The same issues that are happening in
16 Great Bay are happening all over the world.

17 Q. Could this study tell me what the
18 necessary transparency level needs to be in
19 Great Bay?

20 A. I don't think so, no. Only that
21 transparency is something that causes eelgrass
22 decline almost everywhere.

23 Q. Something that may cause eelgrass

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1 decline; correct?

2 A. Yes.

3 MR. HALL: Okay. Thank you. That's 9.

4 *(Short Exhibit 9 is marked for*
5 *identification.)*

6 MR. HALL: Off the record.

7 *(Discussion held off the record.)*

8 BY MR. HALL:

9 Q. Back on the record, please.

10 Dr. Short, this report entitled
11 "Quantifying Eelgrass Habitat Loss in Relation to
12 Housing Development and Nitrogen Loading in Waquoit
13 Bay, Massachusetts," is this a Great Bay-specific --

14 A. Yes. This was done again while I was
15 Jackson Lab, in conjunction with Dave Burdick, who is
16 a scientist at the Jackson Esturine Lab, and it
17 documents the loss of eelgrass as a result of --
18 well, the loss over time, and relates the losses to
19 increasing housing in the watershed and increasing
20 nitrogen loading into the watershed.

21 Q. And this is a watershed in
22 Massachusetts?

23 A. It's a watershed in Massachusetts.

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1 Q. Okay.

2 THE REPORTER: That will be 10.

3 *(Short Exhibit 10 is marked for*
4 *identification.)*

5 Q. I'd like to show you another paper
6 entitled "The Seagrasses of the Western North
7 Atlantic." It would appear to be some type of survey
8 paper, but if you could please tell me about it.

9 A. A chapter which I published with my wife
10 in World Atlas of Seagrasses, which I was the editor
11 for -- an editor -- and it talks about the North
12 Atlantic, and I suspect talks about Great Bay as
13 well. Yes, it does.

14 Q. Okay. Is there information in this
15 document that would tell me what the transparency
16 level needs to be to protect eelgrass in Great Bay?

17 A. That's -- it might. The case study 20.1
18 on the second page is about Great Bay. I haven't
19 reread it, but it talks about the problems facing
20 Great Bay and about the transplant studies that we
21 did in the Piscataqua River, which thrived for a
22 while until the conditions in the Piscataqua River
23 got to be too bad to support them anymore.

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1 Q. Okay. Is there specific information in
2 there that I could look at -- that one could look at
3 to tell me, "This level of nitrogen is going to cause
4 this level of transparency impairment" or anything
5 like that?

6 A. All that in one paper, you've got to
7 fund somebody to do that, and not just -- otherwise,
8 it's all put together from little studies that are
9 unfunded or something like that.

10 Q. Would I take it from your pithy response
11 to me that the short answer would be that information
12 is not --

13 A. That would be a no.

14 Q. That would be a no. Okay. Thank you.

15 *(Short Exhibit 11 is marked for*
16 *identification.)*

17 Q. This next document is a page titled
18 "Global Overview: The Distribution and Status of
19 Seagrasses."

20 A. This is also from the World Atlas of
21 Seagrasses. Introductory chapter.

22 Q. Introductory chapter? Okay.

23 MR. HALL: Let's just mark that as

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1 Exhibit 12.

2 (Short Exhibit 12 is marked for
3 identification.)

4 Q. I'd like to give you a copy of a paper
5 that's called "Development of a Nutrient Pollution
6 Indicator Using Seagrasses Among Nature Gradients in
7 Three New England Estuaries."

8 Can you tell me whether or not this
9 paper provided information on the transparency
10 levels necessary to protect eelgrass in Great Bay?

11 A. This is specifically about Great Bay and
12 two other New England estuaries, one being Waquoit
13 Bay, the one we talked about before, that had the
14 eelgrass decline, and the other one being
15 Narragansett Bay, which is a deep-water,
16 phytoplankton-dominated system, which is also -- most
17 of it's eelgrass.

18 Q. Okay. Are there transparency analyses
19 in that paper.

20 A. There might be. It really don't know.
21 I can't remember. But it's -- the nice part about
22 this paper is it shows the deep-water system, which
23 is similar to the Piscataqua, and the shallow-water

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1 system like Waquoit Bay, which is similar to what's
2 going on in Great Bay, and how different types of
3 nutrient loading into the system affect how --
4 because it's a response.

5 For example, in Waquoit Bay, where it's
6 a shallow, flat system, it's affected by macroalgae
7 as in Little Bay, and the phytoplankton-dominated
8 system which we have in Narragansett Bay, it's light
9 limitation, and that has decreased and caused the
10 losses.

11 Q. Do you know if the phytoplankton levels
12 in Narragansett Bay are significantly higher than
13 those in Great Bay?

14 A. Narragansett Bay is a very big bay, and
15 there's almost any phytoplankton level you want,
16 depending on where you go. It's not -- you can't
17 really take an average from there and compare it.
18 There are, I think -- I would guess there are many
19 places in Narragansett Bay where it is higher than it
20 is in Great Bay proper. That would be accurate.

21 MR. HALL: Okay. Let's mark that as

22 Exhibit 13.

23 *(Short Exhibit 13 is marked for*

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1 *identification.*)

2 Q. The title of this paper is "Subtidal
3 Eelgrass Declines in the Great Bay Estuary, New
4 Hampshire and Maine, USA."

5 And, Dr. Short, can you tell us a
6 little bit about this paper.

7 A. Mm-hmm. The first author on this paper
8 was one of my students, and the data presented is
9 from the Great -- from the New Hampshire Port
10 Authority Mitigation and Monitoring Program. And it
11 looks at the -- essentially the biomass and the
12 structure of eelgrass beds from 2001 to 2007 -- 8, I
13 guess.

14 Q. Does this paper show that the eelgrass
15 beds are declining?

16 A. Yes.

17 Q. And can you tell me where it shows that?

18 A. Well, Figure 2 are four sites in the
19 Piscataqua River and one in Dover Point, that are all
20 showing eelgrass decline.

21 Q. Okay. Does this paper anywhere measure
22 the nutrient level or the transparency level
23 occurring over time at these sites?

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1 A. No. This is specifically looking at the
2 eelgrass data itself.

3 Q. Okay. So this paper doesn't tell me
4 what caused the eelgrass decline; it just says the
5 eelgrass declined occurred?

6 A. Correct.

7 Q. Okay. I have been curious about this
8 for quite some time, so I feel compelled to ask you a
9 couple questions about this data. And I was hopeful,
10 because you had identified it as an important paper,
11 you could give us an idea of what's going on.

12 What is the OCC site?

13 A. That's Outer Cutts Cove.

14 Q. Okay. Where is that located?

15 A. Just above the Mildred Long Bridge, the
16 lower Piscataqua.

17 Q. So that's near the mouth, towards the
18 mouth of the estuary?

19 A. No. It's right by North Mill Pond, by
20 where the Port Authority dock is.

21 Q. Okay. And can you explain something to
22 me, from Figure 2, if you have an opinion as to
23 cause.

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1 The OCC site is declining since 2001,
2 it appears, based on the line you've got drawn
3 through the data.

4 A. Mm-hmm.

5 Q. The T1 site, which is a bit north of
6 that, is also declining since 2001. But the T3 site,
7 a little further upstream, is actually increasing for
8 several years, and then it doesn't decline until --
9 it starts to decline in, say, 2004 or later. We see
10 the same thing happen at the R2 site a little further
11 upstream: that it is first increasing during the
12 period when T1 and OCC -- or decreasing, and then
13 doesn't start declining until 2004, say, in that time
14 frame. And then last but not least, Dover Point,
15 which is -- is that part of Little Bay?

16 A. It's in Little Bay, yes.

17 Q. Okay. Dover Point is increasing from
18 2003 to 2005 and doesn't start -- looks like start
19 declining, until '6 or '7. It looks to me like the
20 decline in eelgrass is working its way up the system.

21 A. Mm-hmm.

22 Q. Can you explain what's happening here?

23 A. No. It looks like it's working its way

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1 up the system. But I don't have the nutrient data.
2 We don't have -- we have almost no data in this part
3 of the Piscataqua River. PREP has no -- or DES has
4 very little data in this part of the river.

5 So it -- I mean, it's -- these -- all
6 these stations are between the Dover discharge and
7 the Portsmouth Harbor discharge. And as to why
8 they're -- we also have comparable data for this
9 time period from that -- from what's happening to
10 the deep edge of the eelgrass bed, and it basically
11 follows the same pattern.

12 Q. Do you know -- well, let me ask you,
13 just because you've said you've looked at data in the
14 system over time, which area has the best
15 transparency and the best water quality -- the
16 best -- the lowest nitrogen number and the best
17 transparency? Is it the OCC site? Or which of these
18 sites is the best water quality?

19 MS. VAN OOT: Object to the form of the
20 question.

21 Q. Do you know?

22 MS. VAN OOT: You can answer.

23 A. I guess I probably have an opinion on

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1 it, but I don't specifically know.

2 Q. Well -- and what would your opinion
3 might be?

4 MS. VAN OOT: I think that's beyond the
5 scope of the protective order.

6 MR. KINDER: What part of it?

7 MR. HALL: He cited this as one of the
8 bases for the response on the letter that was
9 sent to the coalition that was --

10 MS. VAN OOT: No, he didn't. He cited
11 it as an article that he sent at the request
12 of the City of Dover's consultant.

13 MR. HALL: No, that's not quite right.
14 The City of Dover's consultant sent a letter
15 and said, "Where's your backup information for
16 A, B, and C?"

17 MS. VAN OOT: Okay. But you're not
18 going to do an end run and ask him for
19 opinions beyond the statements that he made in
20 the e-mail. That was the court's order.

21 MR. KINDER: No, I think that -- I
22 think that --

23 MR. HALL: Well, I could go to the

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1 e-mail and show you the statement, and I could
2 ask --

3 MS. VAN OOT: You could do anything you
4 want. But I'm --

5 MR. HALL: We could argue about the
6 documents that line up with that statement.

7 MS. VAN OOT: Do you have a copy of the
8 court order?

9 MR. KINDER: Well, let's find out if he
10 has -- does he have an opinion?

11 MS. VAN OOT: He said he had an
12 opinion.

13 MR. KINDER: Oh, okay.

14 MS. VAN OOT: But my understanding of
15 the court's order was that Professor Short was
16 not going to be compelled to testify as to
17 opinions he has as an expert witness beyond
18 his observations that were the basis of his
19 e-mail --

20 MR. KINDER: Well, I think that's
21 what --

22 MS. VAN OOT: -- and his involvement
23 with respect to the -- to the 2009 criteria.

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1 MR. HALL: Let me rephrase the
2 question, and we may be able to simply avoid
3 any thought of problems.

4 BY MR. HALL:

5 Q. Dr. Short, I believe you said you're not
6 certain why this pattern of decline occurred. So
7 here's my question.

8 Comparing the DP site, which is Dover
9 Point, which is in Little Bay, compared to the OCC
10 site, which of those two sites has the lower
11 nitrogen and the better transparency level?

12 MS. VAN OOT: That's a fact question.
13 You can answer it if you -- if it --

14 THE WITNESS: A what question?

15 MS. VAN OOT: A fact question.

16 THE WITNESS: Oh.

17 MS. VAN OOT: Based on the data that's
18 shown in that exhibit.

19 THE WITNESS: Well, he's asking for the
20 cause.

21 MS. VAN OOT: All right. Well, that's
22 an opinion.

23 Q. Well, I'm just curious as to -- you

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1 know, we're seeing declines, but how were they
2 related to the water quality? Which is the essence
3 of what we're all concerned about today.

4 MS. VAN OOT: You want his opinion as
5 to how they relate to the water quality?

6 MR. HALL: No. I want to ask him which
7 one has the lower water quality -- which one
8 has the poorer water quality first.

9 MS. VAN OOT: Do you have an opinion as
10 to which one has a lower quality?

11 THE WITNESS: No. I don't think I want
12 to be quoted on that.

13 BY MR. HALL:

14 Q. Okay. You mentioned you didn't look at
15 the HydroQual response.

16 A. Mm-hmm.

17 Q. Okay. Were you present at -- strike the
18 question.

19 Do you know if the transparency levels
20 present at the time these eelgrass were declining at
21 these various sites in the Piscataqua River and down
22 to where the OCC is, do you know if the transparency
23 level was insufficient to allow for eelgrass growth?

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1 A. Yes. Not at all sites. I don't know
2 for all sites, but I do know for the Granger sites.

3 Q. Okay. Which sites was it insufficient
4 to allow for eelgrass growth?

5 A. I would have to go back and look at
6 that.

7 Q. Okay. But that's not contained in this
8 report?

9 A. No.

10 Q. Okay.

11 A. Not from -- yes, where eelgrass
12 disappears, is what it should say.

13 Q. When HydroQual looked at your report,
14 they went back -- and I'm going back to Exhibit 4 --
15 they went back, and, for each of the sites, looked at
16 the transparency level and the chlorophyll-a level
17 and the nitrogen level in each of those locations.

18 MS. VAN OOT: Is there a foundation for
19 this? He said he didn't look at the HydroQual
20 report.

21 Q. Assuming that the data is correct --

22 MS. VAN OOT: Why should he assume
23 that?

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1 A. My data or their data?

2 MR. HALL: No. Because I'm using it --
3 I'm asking him to assume that for the purpose
4 of the question.

5 MS. VAN OOT: Which is a great question
6 for an expert witness.

7 MR. LUCIC: Let him finish the question
8 first, and then --

9 MR. HALL: Yeah.

10 MS. VAN OOT: Okay.

11 BY MR. HALL:

12 Q. Assuming these data are correct, does
13 these data show that the transparency level in the
14 Piscataqua River or the OCC site is insufficient to
15 maintain acceptable eelgrass growth?

16 MS. VAN OOT: If you can answer --

17 Q. If you know the answer to that question.

18 MS. VAN OOT: -- based upon the
19 assumption you are being asked to make.

20 A. I -- I don't -- I would have to look at
21 it. I don't know enough about what this data came
22 from. I don't know.

23 Q. Okay. Assume the data are correct.

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1 Well, just by way of foundation --

2 A. Yeah, but I don't think they are, so
3 it's hard for me to make that statement.

4 Q. Well, I'll ask you to assume that they
5 are.

6 If the data are correct, is this
7 transparency level at these -- at the T3, T1, and
8 OCC site and R2 site, is that sufficiently --
9 sufficient to maintain an acceptable level of
10 eelgrass growth?

11 MS. VAN OOT: I'm going to object.

12 You're asking him for an opinion based on the
13 type of data that's generally relied on by
14 experts, and this is data that he hasn't even
15 seen and doesn't know is accurate. So I think
16 that's beyond the scope of the protective
17 order.

18 MR. KINDER: We're asking about
19 essentially an opinion that he expressed in
20 this December 22nd e-mail, which is
21 precisely --

22 MS. VAN OOT: And you can ask him about
23 that. But you can't ask him to give opinions

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1 on data that he hasn't seen or reviewed, and
2 ask him to give an expert opinion. That was
3 clearly what the court said. He said -- the
4 court said that he could be asked about the
5 statements, the factual basis for the
6 statements that he made in the e-mail. That's
7 it.

8 MR. HALL: I will rephrase it.

9 MS. VAN OOT: And I'm sure you want to
10 comply with the court's order.

11 BY MR. HALL:

12 Q. Dr. Short, did you, in indicating that
13 transparency is insufficient in Portsmouth Harbor and
14 in the -- I guess this is called the lower Piscataqua
15 River -- that transparency was insufficient in those
16 sites, did you look at DES's database of transparency
17 to see what the transparency was in those locations?

18 A. No.

19 Q. I have no further question on that.

20 MR. KINDER: Well, okay. Do you want
21 to take a break?

22 Q. Dr. Short, would you like to take a
23 five-minute break?

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1 A. Yeah.

2 Q. Okay. Thank you very much for the
3 clarification on the question.

4 *(Recess taken from 2:44 to 2:55 p.m.)*

5 *(Short Exhibit 14 is marked for*
6 *identification.)*

7 BY MR. HALL:

8 Q. Okay. Dr. Short, if we could go back on
9 the record.

10 You mentioned earlier that a number of
11 your opinions are based on some student work, in
12 particular, a particular master's thesis that has
13 relevant data in it.

14 Could you tell me the name of that
15 master's thesis?

16 MS. VAN OOT: I'm going to have to have
17 to interpose an objection here, only because
18 work done by a college student at the
19 University of New Hampshire is subject to the
20 Buckley Act amendments, and Dr. Short cannot
21 discuss anything to do with his students or
22 their papers unless they're public. I have
23 it -- I believe that's correct.

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1 A. Yeah.

2 Q. You can't tell me the name of the paper?

3 A. I probably couldn't anyway. I could
4 probably tell you the name of the student.

5 Q. Well, I don't want to know the name of
6 the student. I don't want that type of private -- so
7 you don't -- you're uncertain as to the name of the
8 paper.

9 Do you know if the paper has been
10 accepted for publication?

11 A. I know that it has not.

12 Q. Okay. Is there some on the type of
13 peer-review process, other than whoever is the
14 master's adviser on the paper, to ensure that --
15 quality-assure the data or things like that?

16 A. Yes. For a master's thesis, it's a
17 three-faculty committee that reviews it.

18 Q. Okay.

19 A. And for PhDs, it's usually five.

20 Q. It's usually five. Okay.

21 So just to recap, we don't know the
22 name of the paper. It's probably --

23 A. We're talking about multiple papers;

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1 right? Or are we talking about just one paper?

2 Q. We're talking about the one paper you
3 were referring to, the 2007-2009 paper.

4 A. Okay.

5 Q. And it's not likely to be published?

6 A. I'm hoping it will be published, yes.

7 Q. But you don't know if it will?

8 A. I don't know if it will or not.

9 Q. Okay. Is there any planned follow-up
10 research on this paper by the university at this
11 point in time?

12 MS. VAN OOT: By the university or the
13 student?

14 Q. It could be -- I'll make it general. By
15 the university.

16 A. Well, that would probably be me. But
17 since I'm leaving town, probably not.

18 Q. Probably not.

19 On the topic of leaving town --

20 A. You did it.

21 Q. No, I didn't. Hopefully not.

22 -- can you please tell us how long you
23 are going to be gone for and when do you believe you

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1 may be back? If you know.

2 A. Well, I've been here almost 30 years,
3 and I will be holding the position of seagrass
4 ecologist for the State of Washington, based in
5 Olympia, which is the capital. And I'm on a two-year
6 leave of absence from UNH. Therefore, I should be
7 back in two years.

8 Q. Okay. Well, I wish you all the best in
9 your new position and that you enjoy it out there.

10 A. Well, it's a neat opportunity, because I
11 get to work on the management side, try to solve
12 situations so they don't get to this point.

13 *(Short Exhibit 15 is marked for*
14 *identification.)*

15 Q. Okay. I am going to show you a -- it's
16 a series of e-mails. This would be Exhibit 15. And
17 these e-mails start with -- I believe you're in
18 Korea. This e-mails going from July 4, 2008, to the
19 final one on the front is November 13, 2008. These
20 e-mails all concern biomass, the reliability of the
21 biomass that are done for the eel grass maps.

22 Do you recall this series of e-mails?

23 A. I -- no. I mean, I recognize them now,

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1 but I wouldn't have remembered them if you hadn't
2 shown them to me.

3 Q. Do you recall Phil Trowbridge from New
4 Hampshire DES requesting backup information to show
5 the reliability of the biomass estimates?

6 A. Yes.

7 Q. And do you recall what your -- do you
8 recall what your response was?

9 A. No.

10 Q. Okay. Well, I'm going to read your
11 response and see if this --

12 A. Which one are you reading from?

13 Q. I'm sorry. I'm reading right on the
14 first page. It says, "As the attached e-mail
15 shows" -- and I'm right in the middle of that first
16 full paragraph that says "Al, Phil, and Steve."

17 So Philip Trowbridge back to Al Basile,
18 Phil Colarusso, and Steve Silva at EPA Region 1.

19 MS. VAN OOT: I'm sorry.

20 Q. Right here, Fred.

21 A. Okay.

22 MS. VAN OOT: It's down here.

23 A. Okay.

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1 Q. I'll just read it. "As the attached
2 e-mail --"

3 MS. VAN OOT: Can you wait a second?

4 A. Okay. I got it.

5 Q. Sure.

6 "As the attached e-mail shows,
7 Dr. Short was not able to provide the needed data.
8 Without the missing data, the planned error analysis
9 cannot be completed and DES cannot consider eelgrass
10 biomass as an indicator for the 305(b)/303(d)
11 assessments since quality assurance cannot be
12 confirmed."

13 Do you recall whether or not that's an
14 accurate statement?

15 A. I believe it is, yes.

16 Q. Okay. Do you recall whether or not you
17 were able to subsequently provide backup information
18 of quality assurance on biomass measurements to
19 Mr. Trowbridge?

20 A. I believe I did. I know we went around
21 on it a couple times.

22 Q. You believe you did. Okay.

23 And if you had a copy of what you sent

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1 to Mr. Trowbridge, that would -- we'd be able to
2 receive a copy of that?

3 A. I --

4 Q. Assuming you can find it.

5 MS. VAN OOT: Well, wait a second.

6 Again, the court order said that DES is
7 required to produce those documents in the
8 first instance.

9 Q. Do you know whether or not DES is
10 presently accepting biomass as a reliable indicator
11 of eelgrass health in the estuary?

12 A. Yes, they are.

13 Q. What's your basis for that statement?

14 A. From discussions that I had with Phil
15 Trowbridge, I believe.

16 Q. Okay.

17 A. I guess I -- I assume -- I don't know.
18 I don't know -- that's my impression.

19 Q. So that's your impression, but you're
20 not certain that it's --

21 A. I haven't talked to Phil in weeks. So I
22 don't know if -- things may have transpired since
23 then.

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1 Q. Okay. I'm going to point your attention
2 to the page 2 of that document and in the middle of
3 the first full paragraph, the sentence that starts,
4 "Since NHEP never funded the study to actually go out
5 and collect the data for this purpose, what I have
6 given you before is the result of cobbling together
7 what data I could from my historic eelgrass
8 collections."

9 Can you describe --

10 MS. VAN OOT: Want to finish the
11 sentence, just so it's accurate?

12 Q. Oh. "Not having any resources to pull
13 together a complete dataset."

14 Can you tell me what you mean by that
15 you've been cobbling together data for these
16 assessments?

17 A. Well, I've been collecting data on
18 eelgrass in Great Bay for 30 years, and biomass data
19 is a big part of what all seagrass ecologists measure
20 and -- because it's one of the more robust indicators
21 of the health of the plants. And I went through my
22 various data records and pulled out information where
23 I had both cover and biomass to come up with the

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1 best measure of -- the best method for converting
2 cover to biomass.

3 Q. Okay. Dr. Short, has anybody
4 independently checked your biomass and eelgrass
5 estimates that are done each time you go out and do a
6 mapping survey?

7 MS. VAN OOT: If you know.

8 Q. If you know.

9 A. And if I don't like the question, can
10 you restate?

11 Q. If the question is confusing.

12 A. It's confusing.

13 Q. Oh.

14 After you complete the mapping study
15 and you've estimated acreage and biomass, is there
16 anyone else that independently checks to make sure
17 that the estimates are done correctly?

18 A. Phil Trowbridge does, or his technician.

19 Q. Do you know whether or not any of your
20 recent estimates have been modified by
21 Mr. Trowbridge?

22 A. The -- what we're talking about was
23 this, relative to this e-mail, about calculating

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1 biomass from cover. And that is a constant. That
2 has not changed over time. Okay? Based on this
3 cobbled-together data, never having any funding to go
4 out and actually do it, that's what we're stuck with.

5 But -- so now your -- I can't tell if
6 you're asking about that same thing or you're asking
7 about --

8 Q. No, I'm asking about something
9 different.

10 A. That's what I thought.

11 Q. When you completed -- have there been
12 any recent reports that your eelgrass acreage
13 estimates or biomass estimates were subsequently
14 amended by --

15 A. Yes.

16 Q. Can you tell me which ones?

17 A. Probably not all of them. I know, I
18 think 2009 -- no, 2010 was. And there was another
19 year, but I don't remember which it was.

20 Q. And I suppose we'd have to get that
21 information from Mr. Trowbridge?

22 A. He could tell you that.

23 Q. Okay. These changes in biomass and

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1 acreage estimates, does this happen because of
2 something that occurred in the field or is it
3 something that occurred in a -- kind of a review of
4 the data?

5 A. It's -- it's -- no. It's something that
6 occurred in the analysis of the data, processing of
7 data. The data -- the estimates of area are
8 determined from polygons, which is done in GIS.

9 Q. Mm-hmm.

10 A. And there were -- inadvertently, there
11 were some polygon overlaps that were not removed.
12 And if two polygons overlap and both -- one polygon
13 and the other polygon counts the same value twice,
14 then you have an error. So you have an overestimate.

15 Q. Okay. So I noted that some estimates
16 had changed from the 1981 estimate of the eelgrass
17 level in Great Bay. The estimates changed from the
18 2008 impairment report to the 2009 updated eelgrass
19 impairment report. The 2008 report had the 1981
20 eelgrass acreage of Great Bay at 1,271 acres. The
21 2009 report had it as 2,130 acres.

22 Do you recall any discussions or
23 information regarding the historical eelgrass levels

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1 in 1981 and changing the number in that magnitude?

2 A. Tell me what the numbers were again.

3 Q. The original number in the 2008 report
4 was 1,271 acres --

5 MS. VAN OOT: You just said 1,281. And
6 was that from 1981?

7 MR. HALL: I'm sorry. 1271.

8 MS. VAN OOT: Okay.

9 MR. HALL: From 1981. These are both
10 in 1981.

11 Q. -- and it got changed to 2,130 acres in
12 the 2009 impairment report.

13 Do you have any recollection of the
14 number changing?

15 A. Well, from what you read there, it
16 sounds like the 2008 was Great Bay and the 2009 was
17 the Great Bay Estuary.

18 Q. No, no. It's --

19 A. That's what you said.

20 Q. No. They were both Great Bay.

21 A. I don't know that. You'd have to ask
22 Phil.

23 Q. Okay.

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1 A. That's not -- that's --

2 Q. You don't recall that --

3 A. No.

4 Q. -- that change? Okay.

5 All right. I'd like to quickly walk
6 you through a couple of the State of the Estuaries
7 reports, but I want to get an idea of when the bay
8 was determined to be eelgrass-impaired. All right?

9 MR. HALL: Here's a -- let's mark this
10 as Exhibit 16.

11 *(Short Exhibit 16 is marked for*
12 *identification.)*

13 Q. This is the 2000 State of the Estuaries
14 report, and I'd like to bring your attention to page
15 28.

16 A. Are the pages numbered?

17 Q. Page 28. They're all the way at the
18 bottom. They're a little difficult to see.

19 MS. VAN OOT: Mine's not.

20 A. I don't see any numbers.

21 Q. If you can hand it to me, I can show you
22 page 28.

23 MS. VAN OOT: Wait. Did you get mine?

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1 MR. HALL: Oh, it is very light.

2 MS. VAN OOT: Yeah. Like nonexistent.

3 MR. HALL: Makes me feel like I should
4 have stronger glasses on.

5 MS. VAN OOT: Is there a topic that we
6 could look for?

7 MR. HALL: Oh. Here it is.

8 Q. In this --

9 MS. VAN OOT: Can I wait until I find
10 the unnumbered page 28?

11 THE WITNESS: (Pointing)

12 MS. VAN OOT: Thanks.

13 BY MR. HALL:

14 Q. Do you know if in the State of the
15 Estuaries report, Great Bay was considered impaired
16 for eelgrass?

17 MS. VAN OOT: Objection to the form of
18 the question. How do you -- is there a
19 definition?

20 A. What's -- what do you mean by
21 "impaired"?

22 Q. How did you determine that eelgrass -- I
23 mean, you've been doing assessments of eelgrass

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1 impairments your whole life, haven't you, Dr. Short?

2 A. (Nodding head)

3 Q. So I'm just -- your definition of
4 "impaired" will do.

5 Does this report state that the
6 eelgrass levels in Great Bay are suffering
7 impairment?

8 A. I haven't read this, so I don't know.
9 But I don't believe it does. This is before the --
10 the impairment language is something which comes from
11 EPA, and they, I think, define it as part of
12 their . . .

13 Q. I'll read you the -- I'll just read you
14 a quote from here. The one that starts, "In the late
15 1980s, eelgrass wasting disease caused a dramatic
16 eelgrass decline in Great Bay Estuary, rousing great
17 concern into the early '90s. However, historic
18 eelgrass beds have made an impressive recovery of
19 acreage and densities."

20 Do you agree with that statement?

21 MS. VAN OOT: Well, you haven't
22 finished the statement or the paragraph.

23 Q. "And the new beds have been observed in

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1 areas previously devoid of eelgrass."

2 Do you agree with that statement?

3 MS. VAN OOT: And then there's a
4 paragraph --

5 MR. HALL: Can I just ask him my own
6 question?

7 MS. VAN OOT: Sure.

8 MR. HALL: Thank you, counselor.

9 A. Yes.

10 Q. Now, there's some statements below with
11 regard to Little Bay, right below that paragraph:
12 "While overall resource is improving, lost eelgrass
13 in Little Bay have been significantly slower to
14 recover."

15 Can you explain why -- or do you
16 know -- have you ever offered an opinion or an
17 explanation to DES or EPA why Great Bay had such a
18 significant recovery of eelgrass beds after the
19 wasting disease event but Little Bay did not?

20 MS. VAN OOT: Did you ever offer that
21 opinion? Yes or no.

22 A. I have offered it to someone. I don't
23 remember if DES was part of that. But, yeah, I have

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1 given that opinion in the past.

2 Q. Can you tell me what it is?

3 MS. VAN OOT: Well, it's beyond the
4 scope of his e-mail and the court's order.
5 But --

6 MR. HALL: He may have done it to DES.
7 He just can't remember. I'll find out from
8 Mr. Trowbridge if I can find out what the --

9 MS. VAN OOT: That's fine, but you're
10 limited --

11 THE WITNESS: It probably predates
12 Phil.

13 MS. VAN OOT: -- you're limited to the
14 statements that were set forth in his e-mail
15 in terms of his opinions.

16 A. Yeah. It came back very quickly in
17 Great Bay because it's intertidal; shallow; gets a
18 lot of light at low tide, as I've explained to you
19 before. And because with the slow onset of the
20 disease, eelgrass became more flowering, produces --
21 it's a flowering plant, produces flowers and seeds,
22 and gave it the ability with the high seed production
23 to make a very rapid comeback. At that point it was

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1 not -- the water quality was not impaired.

2 Q. So at that point the water quality,
3 shall we say the water quality -- and that's, I
4 guess, a related question I was going to have on all
5 of this.

6 The water quality at the time that this
7 regrowth occurred in Great Bay, the water quality
8 was acceptable for eelgrass growth, I take it?

9 A. Yes, I believe it was.

10 MR. HALL: Okay. All right. Let's
11 just mark -- that's already marked; right?

12 MS. VAN OOT: Which year was this
13 report?

14 MR. HALL: That was 2000.

15 MS. VAN OOT: 2000? Okay. It doesn't
16 say on it.

17 MR. HALL: I know. You have to go
18 hunting into the middle of the report to find
19 it.

20 *(Short Exhibit 17 is marked for*
21 *identification.)*

22 Q. Dr. Short, I'll show you yet another
23 report. This is the 2003 State of the Estuaries

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1 report. And I will direct your attention to page 16,
2 which the little print is down in the left-hand
3 corner which you should be able to follow.

4 It looks like this, Doctor.

5 A. 16.

6 Q. There you go.

7 What information is contained on that
8 page of the 2003 --

9 A. I haven't read it.

10 Q. Oh, I'm sorry. Please. If you could
11 take a quick look at it.

12 MS. VAN OOT: You're asking him to
13 read --

14 MR. HALL: Just to review the
15 information that's presented on that page.

16 MS. VAN OOT: Generally, I assume?

17 MR. HALL: Yeah.

18 A. Well, the graph shows eelgrass cover
19 over time, which I've collected.

20 Q. I take it this is more of the data from
21 your organization; correct?

22 A. Yes.

23 Q. Okay. And does this report indicate

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1 that the eelgrass in Great Bay are suffering
2 impairment or decline?

3 MS. VAN OOT: Objection to the form of
4 the question.

5 A. Eelgrass shows a decline through 1989,
6 and then a very rapid recovery and fairly stable
7 values through 2002, or '1.

8 Q. Yeah, it's probably 2001, I would say.

9 A. Yeah.

10 Q. So this data covers through 2001?

11 A. Mm-hmm.

12 Q. Okay. So -- okay.

13 So at this point, do you consider the
14 eelgrass beds in Great Bay impaired?

15 A. No.

16 Q. Or --

17 MS. VAN OOT: Objection.

18 Q. No?

19 Could you --

20 A. I don't.

21 Q. You don't. Thank you.

22 MS. VAN OOT: "At this point" being
23 2000 and --

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1 MR. HALL: 2001.

2 MS. VAN OOT: -- 1. Okay.

3 Q. Dr. Short, do you know what the nitrogen
4 levels were in Great Bay in 2001?

5 A. It's probably in this report, I would
6 imagine. I don't have it in memory.

7 Q. Okay. Well, let me direct your
8 attention to page 8: It's indicated at No. 3. The
9 question states, "Have nitrogen concentrations in
10 Great Bay changed significantly over time?"

11 A. Mm-hmm.

12 Q. Okay. I'm going to read you a quote
13 that's right next to the little picture of the
14 nitrogen concentrations increasing slowly over time.

15 A. Okay.

16 Q. "Despite increasing concentration of
17 nitrate/nitrite in the estuary, there have not been
18 any significant trends for the typical indicators of
19 eutrophication: Dissolved oxygen and chlorophyll-a
20 concentrations. Therefore, the load of nitrate/
21 nitrite to the bay appears to not have" -- "to have
22 not yet reached the level at which the undesirable
23 effects of eutrophication occur."

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1 Do you have any reason to disagree with
2 that statement that's contained in this State of the
3 Estuaries report? Realizing this is made for 2001.

4 MS. VAN OOT: And that you read it
5 correctly.

6 A. Yeah.

7 I think that's the interpretation that
8 was derived from this specific graph. As you well
9 know, nitrate and nitrite are not the only
10 indicators, or the only nitrogen forms present. And
11 if this were total nitrogen, it may be quite a
12 different story.

13 Q. I guess what I'm asking is, where it
14 says that there have not been any significant trends
15 for the typical indicators of eutrophication, meaning
16 poor dissolved nitrogen and increased chlorophyll-a.

17 A. Well, those are not the best indicators
18 of eutrophication, despite what they thought at that
19 time. They have become more educated since then.

20 Q. So are you telling me you disagree with
21 the statement that chlorophyll-a concentrations have
22 not been significant trends?

23 A. I don't see the chlorophyll-a

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1 concentrations given here, so I can't really say.

2 Q. Let's move on to the next one.

3 MR. HALL: This is the 2006 State of
4 the Estuaries report.

5 *(Short Exhibit 18 is marked for*
6 *identification.)*

7 Q. All right. I'd like to draw your
8 attention to page 20 and 21.

9 Okay. On page 20 there's some text,
10 and on page 21 I take it is another one of your
11 eelgrass acreage and biomass graphs?

12 A. It's not my graph, but it is my --
13 derived from my data.

14 Q. Oh. Do you know who puts together these
15 graphs?

16 A. Whoever was the technician before Phil,
17 I think. I don't know who did that.

18 Q. This report discusses some -- on page
19 20, some decline in eelgrass coverage.

20 MS. VAN OOT: Is that a question?

21 MR. HALL: No, I'm just making an
22 observation.

23 Q. But it says something about it in the

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1 second column, and I was going to ask you whether or
2 not you -- at this point in time, you -- well,
3 actually, let me back up.

4 Did you have input on the text of this
5 report?

6 A. I don't know. I haven't read it lately.
7 I had input -- I had some input to the report, and I
8 don't know if I specifically got to review this or
9 not.

10 Q. Okay.

11 MS. VAN OOT: The 2006 report?

12 THE WITNESS: 2006.

13 Q. You know, I'm going to pass on questions
14 on this report for now.

15 With regard to the eelgrass health in
16 Great Bay in the mid-'90s, can you -- did you
17 observe at that time whether macroalgae growth was
18 excessive in the mid-'90s and did it interfere with
19 eelgrass growth in Great Bay?

20 A. The mid-'90s? I don't remember
21 specifically the mid-'90s.

22 Q. I'm sorry?

23 A. I don't remember what the macroalgal

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1 populations looked like in the mid-'90s.

2 Q. Who was primarily -- were you
3 responsible for looking at macroalgae --

4 A. No.

5 Q. -- or was that another researcher?

6 A. No one was.

7 Q. No one was. Okay.

8 But the eelgrass rebounded in the
9 mid-'90s; right? To a --

10 A. In the early '90s it rebounded.

11 Q. In the early '90s?

12 A. Yeah.

13 Q. And would the macroalgae -- I guess the
14 macroalgae didn't prevent the eelgrass from
15 declining?

16 A. Well, the decline, if you remember, was
17 from wasting disease.

18 Q. Ah. Yes.

19 A. And it rebounded from wasting disease.
20 And my guess is that's the time period when
21 macroalgae was beginning to show up in the estuary.

22 MS. VAN OOT: You're not obliged to
23 guess here.

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1 THE WITNESS: Oh, I thought I could
2 guess. All right. I tend to guess.

3 MR. HALL: Is counsel directing --
4 telling him not to guess?

5 MS. VAN OOT: No. Do not guess.

6 MR. HALL: The record will reflect that
7 Dr. Short guessed and he's not supposed to.

8 Why don't --

9 MS. VAN OOT: That should have been
10 part of the instructions; right? He's not
11 obliged to speculate or guess. To the best of
12 his knowledge.

13 Q. I'd like to look at this 2008 report on
14 eelgrass quality. It covers eelgrass impairments.

15 MR. HALL: This is Exhibit 19.

16 *(Short Exhibit 19 is marked for*
17 *identification.)*

18 Q. Dr. Short, can you tell me whether or
19 not you recall if you were involved in the
20 discussions and development of this report assessing
21 eelgrass health throughout the entire estuary?

22 A. Can you read the title.

23 Q. The title is "Methodology and Assessment

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1 of Results Related to Eelgrass and Nitrogen in Great
2 Bay Estuary for Compliance with Water Quality
3 Standards for the New Hampshire 2008 Section 303(d)
4 List."

5 A. I think I did edit -- have input as
6 well.

7 Q. Okay. Could I direct your attention to
8 page 9, and it's -- page 9 through page -- oh, let's
9 keep going -- to page 14, to page 15 is basically a
10 historical rendition of what happened in various
11 sections of Great Bay and when the various occasions
12 of wasting disease occurred and how the estuary
13 responded.

14 Do you know who prepared this history?

15 A. Not without reading it, no.

16 Q. Do you recall whether or not you
17 provided assistance on providing the history?

18 A. Well, I'm not an author on it.

19 Q. Okay.

20 A. And I don't know if they actually used
21 my data or not. If they did use some of my data.

22 Q. I'm going to direct your attention to
23 page -- on Great Bay. It's on page 12. And I'm

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1 going to read you a sentence from it, and then I'm
2 going to show you a table that was developed. It
3 says, "Linear regression of eelgrass cover from
4 1990-2005 did not detect a significant trend at the
5 0.05 significant level. The trend was evaluated for
6 the 1990-2005 period because the eelgrass populations
7 in the estuary --"

8 MS. VAN OOT: "Whole estuary."

9 Q. "-- in the whole estuary were devastated
10 in 1988-1989 due to an infestation of slime mold."

11 MS. VAN OOT: Go ahead and pronounce
12 it.

13 Q. Then I'm going to skip a sentence or two
14 and just go to the punchline: "Great Bay should not
15 be considered impaired for significant eelgrass
16 loss."

17 Do you recall having -- and this is
18 2008 when they're making this statement. I'll show
19 you the date it was based on.

20 Do you recall having any input into
21 this conclusion as to whether Great Bay was impaired
22 for eelgrass?

23 A. No, I do not remember being asked for

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1 input to that.

2 Q. Okay. Do you --

3 A. It should be listed as threatened, it
4 says.

5 Q. Yeah, should be listed as threatened.
6 It's not impaired. It's threatened.

7 A. Yeah, I -- again, that's -- well, I
8 mean, We should probably correct some definitions
9 here.

10 Q. Please.

11 A. "Impaired" is the impairment of the
12 estuary, which is how EPA uses it. I mean, as far as
13 I know, the only one who has talked about impairment
14 of eelgrass is you.

15 Q. No, actually, I could direct you to
16 page -- Table 2 in the back of the document at page
17 26 where they do impairment, river by river by river
18 and section by section of the estuary, and they make
19 individual findings of whether or not something is
20 impaired or not.

21 A. What page?

22 Q. Well, if you -- let me -- I'll get it
23 for you quickly. It's page 26. It's Table 2.

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1 A. I don't think I have that.

2 MS. VAN OOT: His point was "impairment
3 of estuary" as opposed to "impairment of
4 eelgrass."

5 Q. Here's the table. What they do is go
6 section -- the Winnicut River.

7 A. Right.

8 Q. And they say, "Significant decrease:
9 Yes." "Listing: Impaired."

10 "Squamscott River, Percent Change: 100
11 percent loss."

12 A. "Impairment" is impairment of the
13 estuary --

14 MS. VAN OOT: Not the eelgrass.

15 A. -- not the eelgrass.

16 Q. No, it's -- well, I --

17 A. I mean, that's pretty standard how EPA
18 uses that terminology.

19 Q. What does "impairment of estuary" mean?

20 A. There's no eelgrass in the Squamscott.
21 So impaired -- you wouldn't say the eelgrass is
22 impaired, because it's not there.

23 Q. No.

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1 A. "Impaired" means that the estuary is
2 impaired and it will no longer support eelgrass.

3 MR. HALL: Okay. Well, let the record
4 reflect that Dr. Short has a definition of
5 what he believes impaired is. I'm asking him
6 about questions as to whether or not various
7 segments of the estuary were considered
8 impaired due to eelgrass loss.

9 Q. Looking at Table 2, Dr. Short, is the
10 Great Bay Estuary listed as impaired for eelgrass?

11 A. Well, the Great Bay Estuary isn't
12 listed.

13 Q. Hmm?

14 A. This is -- this is all the different
15 components of the estuary, and some are impaired and
16 some are not impaired.

17 Q. Right. And when you go under the column
18 for Great Bay --

19 A. Great Bay --

20 Q. -- does it say it's impaired?

21 A. That's not just Great Bay Estuary. It's
22 not the whole thing.

23 Q. Oh, right. Just Great Bay.

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1 A. Okay. Well, you said "estuary."

2 Q. Oh, did I?

3 A. Yeah.

4 Q. Oh, I apologize if I used the word
5 "estuary."

6 A. Okay. It is confusing.

7 Q. I should have said it is in Great Bay.

8 A. Yeah.

9 Q. And does that -- consistent with the
10 language you read before, does that indicate
11 Great Bay is impaired?

12 A. Well, impaired is a -- is something
13 which really has degrees of impairment, and it's not
14 just nonimpaired and impaired. They obviously have
15 some criteria they're using to say that if it's at
16 some level, then it's impaired. I think 68 percent
17 change would be impaired.

18 Q. That was a 68 percent increase,
19 Dr. Short, not a decrease.

20 A. Are you sure?

21 Q. Yes.

22 A. Oh, yeah. Okay. Oh, that's the 2003 to
23 '5.

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1 No, it's not impaired, then.

2 Q. Okay. And it says it's not impaired up
3 through -- what's the last year they took data there?

4 A. 2005.

5 Q. 2005. Do you know --

6 A. Because that -- okay. That's going
7 back -- but that's -- yeah. Okay.

8 Sorry. Go ahead.

9 Q. So we're both understanding this as not
10 impaired, looking at data through 2005?

11 A. Well, only looking at three years:
12 2003, 2004, 2005.

13 Q. Right.

14 A. And it's just looking at too short a
15 dataset to make any real decision, in my viewpoint.
16 I mean, you could pick three points that all show an
17 increase, or you could go back further to include '96
18 and it would show a decrease. So . . .

19 Q. To your knowledge, is 1996 the mark by
20 which any impairments of eelgrass must be determined?

21 A. I think '96 is the most extensive
22 eelgrass I ever found in the Great Bay. So that's --

23 Q. Right. Well, using that as --

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1 A. And it is also the closest to what we've
2 put together as a historical distribution.

3 Q. Well, the historical distribution is
4 listed up at the top for 1980-'81. That's the
5 1,217 acres.

6 A. That's not the actual historical.

7 Q. That's not?

8 A. That's 1981. No. This is recorded back
9 to '48.

10 Q. And there was more eelgrass in 1948 than
11 there was in 2005?

12 A. I don't know. Doesn't look like it,
13 according to this. But that wasn't -- this is --
14 this was done, when? 2008.

15 Q. 2008.

16 On these various tidal rivers, they
17 have a little write-up. And I'll direct your
18 attention back to page 11, please, if you could.

19 MS. VAN OOT: Exhibit 19?

20 MR. HALL: We're still on the same
21 exhibit.

22 Q. For each of these tidal river -- before
23 I ask that question -- I'm sorry. Strike that.

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1 Do you know what the nitrogen and
2 transparency level was in the 2004-2005 time frame
3 in Great Bay?

4 A. I mean, can I give you a number right
5 now?

6 Q. Was it recorded?

7 A. I didn't record it.

8 Q. Okay. So -- okay.

9 When you look at the tidal rivers on
10 each of these sections, they each talk about the
11 historic maps do not show eelgrass -- for example,
12 Winnicut. "Historic maps do not show eelgrass
13 cover." And then they talk about wasting disease.

14 In each one of these tidal rivers --
15 and I could walk you through each one, but I'll ask
16 you first for your recollection and maybe we can
17 avoid that. In each one, they say, the present
18 acres is basically zero. Squamscott. Lamprey.
19 Oyster. I guess the Bellamy was doing a little bit
20 better. And they each say the eelgrass coverage is
21 the loss -- the cause of eelgrass loss is unknown.

22 Is that an accurate statement, that --

23 A. Presumably they didn't know or they

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1 would have said so.

2 Q. Okay.

3 A. It doesn't mean it's not unknown by
4 anyone.

5 Q. Ah. Well, let me ask the question,
6 since you are the eelgrass expert.

7 A. Well, they didn't ask me, obviously.

8 Q. And would you have told them that the
9 cause of eelgrass loss in the Squamscott River is
10 known?

11 A. For the Squamscott specifically?

12 Q. Yeah. How it lost all its eelgrass.

13 A. Yes, I would.

14 MS. VAN OOT: Okay.

15 Q. And what would you have said that the
16 Squamscott -- was the cause of the eelgrass loss in
17 the Squamscott?

18 A. The eutrophication of the Squamscott
19 river.

20 Q. And what would you base that on?

21 A. Discussions with Mr. Chapman, who used
22 to run the boat launch ramp at Chapman's Landing in
23 the early '80s, mid-'80s. I talked to him, and he

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1 said it used to be all over the place here, back when
2 you can see the bottom.

3 Q. So that you couldn't see the bottom
4 anymore. Is that what you're saying the problem is?

5 A. I don't know. That's what he said.

6 Q. That's what he said.

7 Do you know if there was any -- well,
8 is there any data that one could check to see
9 whether or not that was -- increased algal growth
10 was the cause of eelgrass loss in the Squamscott?

11 A. For that point in time, I don't know.

12 Q. Okay. Every one of these tidal rivers
13 has had major losses in eelgrass. The Squamscott;
14 right?

15 A. Mm-hmm.

16 Q. The Lamprey?

17 A. Mm-hmm.

18 Q. The Oyster? Is there anything left in
19 the Oyster?

20 A. There was in '96.

21 Q. How much? Do you know?

22 MS. VAN OOT: Are you asking him to --

23 MR. HALL: Oh, I'm sorry. Well, let me

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1 finish.

2 MS. VAN OOT: -- to read from the
3 report that he said he didn't contribute to or
4 doesn't think he contributed to?

5 MR. HALL: No. I'm asking him why
6 there's a loss of eelgrass in every one of
7 these rivers, and every one of these says the
8 loss is unknown, including the Bellamy. "The
9 cause of the eelgrass loss is unknown." I'm
10 reading on page 12. Oyster River. "The cause
11 of the eelgrass loss is unknown."

12 Q. Dr. Short, do you know the cause of the
13 eelgrass loss in each of these rivers?

14 MS. VAN OOT: Are you asking for an
15 opinion? That's beyond the scope of his
16 December 22nd e-mail. I'm going to --

17 MR. HALL: No, he said he participated
18 in -- with DES in these impairment reports. I
19 don't know to what degree.

20 MS. VAN OOT: But you're asking him
21 about a specific section of the 2008 report,
22 which he said he doesn't know who did the
23 historical summary that appears at pages 9

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1 through 15.

2 So if you're asking him to read from
3 the report, fine; he can do that. But you're
4 not going to ask him his opinions as to
5 statements that are made in that report. I've
6 let you go for a while on it, but I think it's
7 well beyond the scope of the protective order.

8 MR. HALL: All right. Well, let's
9 clarify --

10 MS. VAN OOT: And you're better off
11 asking the people that prepared the report.

12 MR. HALL: Well, let's clarify this for
13 the record, just so I -- there's no mistake on
14 this.

15 BY MR. HALL:

16 Q. Dr. Short, did you participate in any of
17 the writeups for the descriptions of when and why
18 eelgrass were lost for the Winnicut? the Squamscott?
19 the Lamprey? the Oyster? the Bellamy?

20 A. I don't know if I contributed to
21 these -- to this specific report. I did give them
22 some input on eelgrass in the Great Bay Estuary, but
23 this -- I would not have written these, so I

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1 obviously didn't get to edit them.

2 Q. Okay. So, I mean, I'll just say this as
3 a -- consequently, you don't know if changing
4 nitrogen levels then caused significant changes in
5 eelgrass losses in these areas?

6 MS. VAN OOT: Based on the information
7 or data that's set forth at pages 9 through
8 15?

9 MR. HALL: No. I'm just asking since
10 he says he's been looking at this for 30
11 years.

12 MS. VAN OOT: And if you're asking him
13 on what he's been looking at for 30 years,
14 you're asking him for his expert opinion as to
15 the cause.

16 MR. KINDER: That's what -- I'd just
17 like to point out that that's what his
18 December 22nd letter read of he said, and
19 that's directly what Judge McNamara said we
20 can ask him about.

21 MS. VAN OOT: You can ask him about it
22 with respect to the statements in his report
23 based upon his observations. That's what

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1 Judge McNamara said. Judge McNamara did not
2 say you could examine him on reports prepared
3 by other experts, which is the type of
4 information that's relied upon by an expert
5 who has been retained to prepare a report in
6 the case.

7 MR. KINDER: Well, we don't accept
8 that. But can I suggest --

9 MS. VAN OOT: I understood you don't
10 accept it, Tupper, but that's what the court's
11 order is. I've got it here.

12 MR. KINDER: The court's order says we
13 can ask him about the extent to which he --
14 what the background is for his opinion that
15 these areas of the Great Bay Estuary are
16 impaired because of nutrients causing --

17 MS. VAN OOT: Hang on.

18 MR. KINDER: -- causing transparency
19 problems.

20 MR. HALL: I could just ask him the
21 question related to the exact statement that's
22 contained in the December 22nd letter.

23 MS. VAN OOT: Which is fine, and I said

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1 you could do that all along.

2 MR. HALL: Well, let's do that.

3 MS. VAN OOT: So ask him what the basis
4 for the statements are. You've already asked
5 him, but you could ask him again.

6 MR. HALL: Okay.

7 *BY MR. HALL:*

8 Q. Dr. Short, back to Exhibit 1, and I'll
9 just read it: "My long-term research and annual
10 monitoring of eelgrass in the estuary have clearly
11 demonstrated that eelgrass is disappearing from the
12 estuary due to excessive algal growth caused by
13 increasing nitrogen levels in the water."

14 And I'm going to ask you whether or not
15 you've got research showing that for the Squamscott
16 River.

17 MS. VAN OOT: That's a yes-or-no
18 question. Do you have research?

19 Q. Do you have research showing that that
20 statement is true for the Squamscott River?

21 MS. VAN OOT: Which is not specifically
22 mentioned in this December 22nd, but that's
23 all right.

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1 A. What was the time frame on that?

2 Q. It doesn't say what the time frame is.
3 It just says, "My long-term research and annual
4 monitoring," and it doesn't say -- it says "from the
5 estuary."

6 So I'm trying to narrow down, which
7 parts of the estuary do you actually have research
8 and long-term monitoring associated with to support
9 this statement? Do you have that support for that
10 statement from your research for the Squamscott
11 River?

12 A. I have -- I have knowledge of conditions
13 in the Squamscott River from some of the previous
14 information that I told you about, my earlier studies
15 in the Squamscott River in -- I think it was in the
16 '80s. And I didn't rely on them to make that
17 statement, but they may be contributing to my
18 background knowledge of that.

19 Q. Well, let's get a clarification, then.
20 Have you done long-term research and
21 annual monitoring in the Squamscott River? Yes or
22 no.

23 A. Well, that's two questions. Ask one or

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1 the other. Long-term monitoring and --

2 Q. It says, "My long-term research and
3 annual monitoring."

4 A. Long-term research is different than
5 annual monitoring. So they're talking about two
6 different things here. Which one do you want to know
7 about?

8 Q. Well, it says "my long-term research."
9 I'm not talking about anybody else's --

10 A. Okay. That's fine. And --

11 Q. -- research for the Squamscott River.

12 A. Mm-hmm.

13 Q. Do you have -- have you done long-term
14 research and annual monitoring for the Squamscott
15 River?

16 MS. VAN OOT: Both or either?

17 MR. HALL: Either.

18 A. Yes.

19 Q. When?

20 MS. VAN OOT: Which?

21 A. Which is first. I've not done long --
22 I've not done long-term monitoring in the Squamscott
23 River. I have done some research and observational

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1 information on the Squamscott River, and it dates
2 back to my work in the '80s.

3 Q. The Lamprey River. Have you done
4 long-term research on the Lamprey River?

5 A. No.

6 Q. What about annual monitoring?

7 A. No.

8 Q. The Oyster River?

9 A. But there is long-term monitoring done
10 on the Lamprey River. Not mine, but --

11 Q. For eelgrass and nitrogen and algal
12 growth?

13 A. No, you didn't ask about eelgrass and
14 nitrogen and algal growth.

15 Q. Well, this is what it's all about.

16 A. Well, I mean, here we are.

17 Q. I'm not asking you whether you did the
18 research on -- you know, on gumdrops. I mean, it's
19 all related to the point.

20 MS. VAN OOT: If you finish the
21 question, it might put it in context.

22 A. So tell me what the question is that
23 you're asking about. That's not this.

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1 Q. No.

2 A. You had me in here, and now you've gone
3 back to something else again.

4 Q. That's because your counsel objected to
5 asking any general questions about a document that
6 you --

7 MS. VAN OOT: Your counsel objected on
8 the basis of a court order. Okay?

9 Q. The document that I'm taking this
10 statement from is Exhibit 1. And now I'm going
11 through -- this is the e-mail that you sent to Steve
12 Perkins. So I'm trying to understand --

13 MS. VAN OOT: Let me get a copy of that
14 in front of you.

15 THE WITNESS: I don't have it.

16 Q. -- where in the estuary --

17 THE WITNESS: It's 2. I have 2.

18 MS. VAN OOT: All right.

19 A. And you're on the first page, the first
20 paragraph?

21 Q. Yeah. Where it says, "My long-term
22 research and annual monitoring of eelgrass in the
23 estuary has clearly demonstrated that eelgrass is

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1 disappearing from the estuary" -- as a whole -- "due
2 to excess algal growth caused by increased nitrogen
3 levels in the water."

4 A. Mm-hmm.

5 Q. So I am trying to find out whether or
6 not you did long-term research and annual monitoring
7 in these various subsections of the estuary.

8 A. Ah.

9 Q. Okay. Does that help clarify the
10 question?

11 A. It does.

12 Q. Okay. Thank you.

13 With regard to that statement, the
14 Squamscott River, does that statement regarding your
15 long-term research and monitoring apply to the
16 Squamscott?

17 A. Yes.

18 Q. Okay. And when have you been doing
19 research on the Squamscott?

20 A. Oh, off and on since I've been here.

21 Q. Okay. And this research was presented
22 to --

23 A. It's never been presented to anyone.

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1 Q. Never been presented to anyone?

2 A. Well, it was presented to -- some of it
3 was presented to -- who headed that up? The Nature
4 Conservancy, when they did the Great Bay compendium.

5 Q. Presented to DES?

6 A. I don't think so.

7 Q. Okay.

8 Lamprey River?

9 MS. VAN OOT: Question?

10 Q. Long-term research and monitoring on the
11 Lamprey River?

12 A. No.

13 Q. No.

14 Oyster River, long-term research and
15 monitoring there?

16 A. Yes.

17 Q. And what's the nature of that long-term
18 research and monitoring?

19 A. Eelgrass observations.

20 Q. Eelgrass observations, but --

21 A. Since --

22 Q. -- did you have -- have you been
23 monitoring algal growth and increased nitrogen levels

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1 with that eelgrass monitoring?

2 A. No.

3 Q. Okay.

4 A. I mean, this statement doesn't say I did
5 all these things in all these places, at every time.

6 And it doesn't even say --

7 Q. Oh. So you --

8 A. -- whether "long-term" is two points in
9 time or "long-term" is 10 years. I mean, you're
10 trying to sort of nitpick this down and weasel it
11 down to some little, you know, specifics.

12 But it's a general statement that I've
13 been in the estuary for 30 years. I've seen the
14 color of the water change. I've seen the turbidity
15 levels change. I've seen the occurrence of plankton
16 populations increase. You know? And this was a
17 general statement reflecting that.

18 Q. Have you been presented with data
19 showing that algal levels have very little to do with
20 water column transparency occurring in the tidal
21 rivers?

22 A. By who?

23 Q. HydroQual.

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1 A. I don't know that I've seen that.
2 Unless -- actually, I -- I may have. It may have
3 been at one of the meetings that you presented at,
4 or --

5 Q. I see.

6 I would just show you a couple of these
7 exhibits, Dr. Short, to go over this question of
8 whether or not that I -- I realize you are now
9 explaining to me that this is a very general
10 statement on page 1.

11 A. I think that, yes. It is.

12 Q. We're all trying to figure out what
13 you're saying and what you're not.

14 A. Okay.

15 MR. HALL: Let's mark this as Exhibit
16 20. This is data on the Squamscott River with
17 transparency level versus chlorophyll-a.

18 MS. VAN OOT: And the source of this
19 document?

20 MR. HALL: This document was submitted
21 as part of the comments at the Great Bay
22 Coalition on the Exeter permit. The data is
23 generated from DES's database provided by Phil

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1 Trowbridge.

2 MS. VAN OOT: And provided by whom?

3 MR. HALL: Provided by Phil Trowbridge
4 to HydroQual.

5 MS. VAN OOT: All right. So this is
6 part of the HydroQual analysis?

7 MR. HALL: Part of the HydroQual
8 analysis.

9 MS. VAN OOT: Okay. Do you want to
10 determine whether or not the witness has seen
11 this particular data?

12 BY MR. HALL:

13 Q. Have you seen that particular document
14 before, or that particular analysis before,
15 Dr. Short?

16 A. I'm not sure. There's been a lot of
17 them, so I have to look at them. This is --

18 Q. This is actually Kd. This is the actual
19 transparency measurement that you would use to
20 implement the transparency.

21 A. Kd is the extinction coefficient.

22 Q. Yeah, extinction coefficient.

23 MS. VAN OOT: So you're just being

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1 asked if you've seen it.

2 A. I don't recall having seen it.

3 Q. Okay. Let's -- you don't recall having
4 seen it? Okay. Fine.

5 MR. HALL: Let's mark that as Exhibit
6 20.

7 *(Short Exhibit 20 is marked for*
8 *identification.)*

9 MR. HALL: Then we're going to go for
10 Exhibit 21. It's the same type of analysis on
11 the Lamprey River. This was presented at the
12 Newmarket public hearing. The same source of
13 the data, DES.

14 *(Short Exhibit 21 is marked for*
15 *identification.)*

16 Q. Dr. Short, did you attend the Newmarket
17 public hearing?

18 A. I did, yes.

19 Q. Okay. Do you recall seeing this data
20 presented at the hearing?

21 A. I don't remember it, but I believe it
22 was presented.

23 Q. Okay.

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1 A. If you say it was.

2 MS. VAN OOT: Well, you don't have to
3 remember it because he said it.

4 THE WITNESS: Oh, yeah. That's true.

5 A. I don't remember.

6 What's the source of the data?

7 Q. DES.

8 A. What time periods?

9 Q. Over 2000 to 2008. The entire record
10 that they have.

11 MS. VAN OOT: There's nothing that
12 shows that.

13 A. So what was the Kd calculated from, the
14 extinction coefficient?

15 Q. No. From actual measurements with
16 the -- field measurements with a probe.

17 A. No, I'm not aware of this data.

18 Q. Okay. And I'll show you one last one,
19 Dr. Short. It's the Piscataqua River. This was
20 presented at the Dover hearing.

21 Were you present at the Dover hearing?

22 A. Yes.

23 Q. Okay. Do you recall HydroQual doing a

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1 presentation and myself doing a presentation
2 regarding the datasets there?

3 A. I missed yours, but I think I saw --

4 Q. Saw the HydroQual one?

5 A. Yes.

6 *(Short Exhibit 22 is marked for*
7 *identification.)*

8 Q. Do you recall seeing this analysis,
9 Dr. Short?

10 A. Well, Tom presented an awful lot of data
11 that night at the meeting, and I don't specifically
12 remember this one.

13 Q. Regarding these graphs, which show
14 eelgrass -- I'm sorry -- which show an extinction
15 coefficient and then the effect of chlorophyll on
16 that extinction coefficient, had you ever done
17 analyses like these yourself?

18 A. Yes.

19 Q. And what did it show?

20 A. It shows that, under some circumstances,
21 extinction is related to chlorophyll and sometimes it
22 isn't.

23 Q. Did it show the same type of analysis as

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1 these, that the vast majority of time, extinction has
2 got very little relationship to chlorophyll level?

3 A. No.

4 Q. Okay. And --

5 A. The problem with all this DES data is
6 it's just single points in time, you know. It's
7 not -- there's no integrated monitoring of the --
8 those conditions. So it's -- it's -- it may be a
9 fine analysis, but it's on very flawed data.

10 Q. And do you have better data, less flawed
11 data than DES?

12 A. I have better observations than DES.

13 Q. Did you provide them to DES?

14 A. They're not in a numeric format.

15 They're qualitative observations.

16 Q. Can you explain "qualitative
17 observations"?

18 A. Yeah. When you swim in the bay and it
19 looks green instead of blue, it means that there's
20 phytoplankton in the water.

21 Q. Right. And if --

22 A. And there's been a progressive change in
23 the Piscataqua. Well, in the Piscataqua at the Dover

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1 Bridge.

2 Q. All right. And how frequently do you
3 swim in the bay?

4 A. Usually two or three times a year.

5 Q. Did you ever try to calibrate your view
6 or understanding of green and blue to the
7 chlorophyll-a data contemporaneously taken by the
8 State, if such data were available?

9 A. No, I don't think so.

10 Q. You said you swim in the bay two or
11 three times --

12 A. Well, that's more than swim. I'm
13 actually scuba diving.

14 Q. Oh. I'm sorry. You scuba-dive two or
15 three times a year.

16 Do you know how many data points those
17 are? Are those more than two to three data points
18 per year?

19 A. Per year, I don't know, but I don't
20 suspect so. I think it's only a few points a year.

21 No, actually, it may be -- it may be,
22 like, one data point a month.

23 Q. So if this were based on data that were

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1 on the order of 12 to 15 data points a year, compared
2 to two to three observations a year, which analysis
3 do you think is more reliable?

4 MS. VAN OOT: Objection. That's
5 opinion.

6 THE WITNESS: I don't -- I shouldn't
7 answer that?

8 MR. KINDER: This goes right to his
9 December 22nd thing. He says, "My
10 observations led me to the opinion that, you
11 know, there's all this causal relationship."

12 MS. VAN OOT: Show me in -- show me --

13 A. Except that the difference is that these
14 data are out there, pulling out, taking a sample, and
15 going away. And I'm there for four hours, five
16 hours, in the water, out of the water, different
17 spots in the river. So I see what happens when the
18 tide changes. I see what happens when the system --
19 so it is different. It's more -- it's far closer to
20 a continuous monitoring than it is -- I mean, it's
21 short-term, but you see that -- you see the changes
22 in the system.

23 You can laugh. It's all right.

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1 Q. I'm not -- I'm just suggesting --

2 A. How many times have you been in the
3 Piscataqua?

4 Q. Actually, sir, other than being in a
5 boat, which was extraordinarily enjoyable, I haven't.
6 But I do know something about monitoring and modeling
7 programs, and usually the more data you have, the
8 more likely your answer is going to be correct.

9 MS. VAN OOT: Good. Then you can
10 testify to that.

11 Q. I'd like to ask you a question
12 Dr. Short, about restoration of eelgrass. And have
13 you done --

14 MS. VAN OOT: Which specific statement
15 does that refer to now in the December 22nd
16 e-mail?

17 MR. KINDER: Why don't you find out
18 what the question is first.

19 MS. VAN OOT: Well --

20 Q. Have you provided advice to DES
21 regarding restoration of eelgrass?

22 A. Are we talking about this?

23 Q. No. Jim will.

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1 A. Advice I've given, yes.

2 Q. Yes. Okay.

3 Did you prepare these graphs, or have a
4 role in preparing these graphs, which is Exhibit 23,
5 which identify the areas of Great Bay where eelgrass
6 restoration is more suitable as to habitat?

7 A. Yes.

8 *(Short Exhibit 23 is marked for*
9 *identification.)*

10 Q. And I'd like you to look at the tidal
11 rivers for Lamprey and Squamscott.

12 A. Mm-hmm.

13 Q. Does that indicate that eelgrass
14 restoration is suitable in those areas?

15 A. No. Unsuitable.

16 Q. Can you explain to me why?

17 A. The water quality isn't good enough.

18 Q. Okay. What factors of the water quality
19 are preventing it?

20 A. I haven't specifically analyzed that,
21 but I suspect it's all those related with nutrient
22 inputs and runoff.

23 Q. Do you know whether or not the turbidity

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1 level and the color level in the Squamscott and
2 Lamprey River, all by themselves, even if there was
3 no algal growth in those waters whatsoever, do you
4 know if that's sufficient to prevent the eelgrass
5 growth in those water bodies?

6 MS. VAN OOT: Are you continuing to ask
7 him about advice he provided to DES?

8 MR. HALL: Yes.

9 MS. VAN OOT: Did you provide that
10 advice to DES?

11 THE WITNESS: No.

12 Q. Which advice did you not provide to DES?

13 A. Anything about the nature of the
14 decreased water clarity in the two rivers.

15 Q. In those two rivers?

16 A. Yes.

17 Q. Did you advise DES that it was necessary
18 to attain the 0.3 nitrogen standard in the Squamscott
19 or Lamprey River to ensure eelgrass restoration?

20 MS. VAN OOT: It's a yes-or-no
21 question.

22 A. No.

23 Q. Okay.

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1 MR. HALL: Would you mind taking a
2 break for five minutes?

3 MS. VAN OOT: Sure. We're running into
4 some time limits, but --

5 MR. HALL: That's what we're trying to
6 make sure we don't.

7 MS. VAN OOT: Okay. So 4:30?

8 MR. HALL: We'll probably end up going
9 to 4:45, I think, based on the little
10 wrangling and back-and-forth, but it shouldn't
11 be any later than that.

12 MS. VAN OOT: Well, I object to the
13 characterization of my objections as
14 "wrangling." You didn't engage.

15 MR. HALL: It's offered in the most
16 collegial of ways.

17 *(Recess taken from 4:05 to 4:11 p.m.)*

18 MR. HALL: That's going to be 24.

19 *(Short Exhibit 24 is marked for*
20 *identification.)*

21 BY MR. HALL:

22 Q. Back on the record.

23 Dr. Short, you mentioned at the very

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1 beginning of your deposition that you were involved
2 in the Technical Advisory Committee that the New
3 Hampshire Estuaries Project conducted.

4 Can you please tell us what your role
5 was in that committee?

6 A. I was an adviser like everyone else.

7 Q. And what did that entail?

8 A. Attending meetings, talking over all the
9 issues that went into the estuary program, and
10 commenting on issues as they came up, and reviewing
11 documents.

12 Q. Reviewing technical presentations that
13 were done?

14 A. Not reviewing them, but seeing them.

15 Q. Seeing them?

16 A. Yeah.

17 Q. Very good. Okay.

18 I'd like to ask you some questions
19 regarding these meeting minutes. Were you -- or I
20 guess the first of these meeting minutes is
21 September 20, 2005, that we've got here.

22 MS. VAN OOT: Are these in
23 chronological order?

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1 MR. HALL: They are in chronological
2 order.

3 MS. VAN OOT: So they go from
4 September 30, 2005, to November 17, 2008?

5 MR. HALL: To November 17, 2008. That
6 is correct.

7 Q. It says here that EPA presented -- and
8 I'm looking under Bullet Point No. 2 on the first
9 page -- presented the federal mandate for developing
10 nutrient criteria for estuaries.

11 Was it your understanding as part of
12 this advisory committee that the State was mandated
13 to adopt numeric nutrient criteria?

14 A. At that point in 2005, I don't remember.

15 Q. Do you recall Matt Liebman's
16 presentation at all?

17 A. Where is that? I don't see a reference.

18 MS. VAN OOT: Paragraph two. The
19 question is simply do you remember it.

20 A. No, I don't remember.

21 Q. Was one of the purposes of the Technical
22 Advisory Committee to give advice on the development
23 of numeric nutrient criteria?

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1 A. No, I don't believe so.

2 Q. I'd like you to look at the June 15,
3 2006, minutes. You were present at that meeting
4 also, when you go to the middle of the page, the one
5 with the highlights on it.

6 Do you recall that there was a
7 discussion on the need to develop empirical
8 relationships between light attenuation, turbidity,
9 TSS, and chlorophyll, as it relates to eelgrass in
10 the estuary?

11 A. Is that the first yellow mark?

12 Q. Yeah, that's the first one. Under
13 "Water Clarity Indicators."

14 MS. VAN OOT: What?

15 A. Under linkage? Linkage between them?

16 Q. No. It's on the prior page. Or maybe
17 the pages are reversed.

18 MS. VAN OOT: No.

19 MR. HALL: One, two, three -- no, a
20 little bit after that. There.

21 MS. VAN OOT: Okay. That's not on page
22 4.

23 MR. HALL: Yeah, that would be page --

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1 I guess mine is out of order.

2 Q. Do you recall the discussion regarding
3 the need to develop an empirical relationship between
4 light attenuation, turbidity, TSS, chlorophyll-a, and
5 eelgrass?

6 A. I remember discussing the issue.

7 Q. Okay.

8 A. Not that we needed to develop a
9 relationship or not, but what was out there.

10 Q. Okay. Let's go back on the linkage
11 statement on that prior page, on page 3. They talk
12 about the group had this discussion. They say, "Data
13 presented show increasing nitrogen concentration and
14 eelgrass, but do not show a strong linkage between
15 increasing nitrogen and decreasing water clarity."

16 A. Mm-hmm.

17 Q. Do you recall what presentation was done
18 to make that in support of this statement?

19 A. No.

20 Q. Did you do the presentation?

21 A. No.

22 Q. Okay.

23 A. Phil did it.

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1 Q. I'm sorry?

2 A. Phil Trowbridge.

3 Q. Phil Trowbridge did it.

4 Under "Next Steps," it says, "Phil
5 Trowbridge will work with Fred Short on an eelgrass
6 water clarity model." Do you recall being tasked
7 with being -- developing an eelgrass water clarity
8 model?

9 A. I remember talking about it at the
10 meeting.

11 Q. Do you recall working on an eelgrass
12 water clarity model?

13 A. No. They never came up with any money
14 to support that.

15 Q. Okay. So you didn't do anything,
16 because it -- so you're saying you didn't do anything
17 on --

18 A. I wasn't involved in it, no.

19 Q. Okay. So the next statement says, "Phil
20 Trowbridge, Jim Latimer, and Fred Short will complete
21 the analysis related to water clarity and eelgrass.
22 The biggest issue is clarifying whether nitrogen is
23 responsible for water clarity changes in Great Bay."

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1 Again, you're saying that following
2 this meeting, you didn't participate in that effort?

3 A. No. I gave them some information that I
4 had.

5 Q. You gave them some information.
6 Do you recall what kind of information
7 you gave them?

8 A. Literature.

9 Q. When you say "literature" --

10 A. That's the --

11 Q. I'm sorry.

12 A. Not -- stuff published by other people.

13 Q. Okay. Not Great Bay-specific?

14 A. Published literature.

15 No.

16 Q. No. Okay.

17 A. It's a general issue.

18 Q. Gotcha.

19 Let's go on the next meeting. It's
20 February 20, 2007. And I'm on page 2, where Phil
21 Trowbridge is apparently giving a presentation on
22 light availability.

23 A. Tell me again where you are. The

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1 next --

2 Q. Yeah, the next one, page 2 of it.
3 February 20. Do you see right here, top right --

4 A. Could you read that?

5 Q. Yeah, I'll read it. It says, "Phil
6 Trowbridge gave a presentation on light availability
7 for eelgrass in Great Bay. In summary, the data
8 analysis show that measured light attenuation factors
9 accurately predicted where eelgrass was present and
10 absent. However, there were no valid relationships
11 between light attenuation factors and water quality
12 parameters, such as chlorophyll-a and suspended
13 solids. Approximately half the variability in the
14 light attenuation factor was explained by changes in
15 salinity, which is inversely proportional to colored
16 dissolved organic matter."

17 Do you recall Phil Trowbridge doing a
18 presentation, saying, "I can't develop a
19 relationship showing" --

20 A. Yes, I think I do.

21 Q. Okay. And did you agree with the
22 results?

23 A. No.

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1 Q. Can you tell us why not?

2 A. Because it's more complicated than what
3 he was trying to do.

4 Q. How so?

5 A. Well, because in Great Bay, a lot of the
6 issue is macroalgal problems and not chlorophyll. So
7 in not all instances, not all parts of Great Bay
8 do -- does chlorophyll relate to light attenuation.
9 So it's -- and it took -- this is back
10 in, whatever it was, 2007.

11 Q. '7.

12 A. Yeah. It took several years to educate
13 the community as to how the system actually
14 functioned. And as you recall, I've talked to you
15 and written to you about it in the past.

16 Q. And in terms of how the system -- this
17 system actually --

18 A. The Great Bay doesn't function the same
19 as Little Bay and the Piscataqua River. They're
20 quite different systems, that the light reaching the
21 eelgrass is -- is -- and the nitrogen problem in
22 Great Bay is primarily seaweed/macroalgal-related.

23 Q. Primarily, not --

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1 A. Not exclusively.

2 Q. I'm sorry. Could you slowly restate
3 that? That --

4 A. That the nitrogen problem in Great Bay
5 is not primarily -- is primarily connected to
6 macroalgal or seaweed growth.

7 Q. Okay. And that's --

8 A. Not exclusively, but --

9 Q. That's consistent with statements that
10 you've made in other forms here; correct?

11 A. Yes.

12 Q. Okay.

13 A. But the group here didn't have the sense
14 of that at this point.

15 Q. And the next statement, where they talk
16 about -- I'm going down a couple bullets down --
17 "Compile the coefficients of light attenuation
18 factors for TSS, chlorophyll-a, colored dissolved
19 organic matter from other systems. Use these
20 relationships to predict light attenuation for
21 Great Bay based on measured water quality."

22 That was a recommendation. Do you know
23 if that was carried out?

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1 research Dr. Morrison did?

2 A. Yes.

3 Q. Okay. What research did he do?

4 A. He deployed a monitoring buoy in the bay
5 that measured all these parameters, and then analyzed
6 them.

7 Q. Okay. Do you recall what the purpose of
8 that was?

9 A. To try and understand what's going on
10 with water clarity in the bay and -- well, water
11 quality in general, I assume.

12 Q. Was it like how much the water clarity
13 was affected by different components? Was that part
14 of the analysis?

15 A. No. It was really what -- well, I don't
16 know what the analysis was. The buoy was measuring
17 all these things, and he was looking at
18 interrelationships between them.

19 Q. Okay. Well, I'll read the next
20 sentence. It says, "In summary, the data analysis
21 showed light attenuation is largely controlled by
22 turbidity and colored dissolved organic matter.
23 Chlorophyll-a only accounts for 8 percent of the

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1 overall light attenuation. Turbidity in the estuary
2 can be predicted from stream flow and wind speed."

3 Did you have any basis for disagreeing
4 with these conclusions from Dr. Morrison's research?

5 A. Yes.

6 Q. And what's your basis for disagreeing?

7 A. I don't think I need to go into it,
8 actually. Without going back and reviewing the data
9 again, I'm not prepared to present that.

10 Q. Did Dr. Morrison -- was his analysis not
11 competently done?

12 A. I -- I don't remember what my objections
13 were to it, but I know I have some concerns about it.

14 Q. Let me show you what we'll mark as
15 Exhibit 25, and this is Dr. Morrison's report.

16 *(Short Exhibit 25 is marked for*
17 *identification.)*

18 Q. And let me see if that refreshes your
19 recollection as to --

20 MS. VAN OOT: Wait. This is a report
21 that was issued a year after --

22 MR. HALL: Yes. This was the report of
23 Dr. --

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1 MS. VAN OOT: -- a year after the
2 meeting at which the presentation was given?

3 MR. HALL: Yes.

4 MS. VAN OOT: Just for the record.

5 MR. HALL: It was presenting the
6 results of the research, and this is the
7 report that comes out.

8 MS. VAN OOT: Okay.

9 BY MR. HALL:

10 Q. With regard to that report, Dr. Short,
11 do you recall submitting comments to Dr. Morrison
12 explaining that there were errors or anomalies in his
13 analysis that needed to be corrected?

14 A. I don't remember.

15 Q. Do you recall having any discussions
16 with Phil Trowbridge or anyone else from the State of
17 New Hampshire, telling them there were areas or
18 anomalies or discrepancies in that report that needed
19 to be corrected?

20 A. I do believe I had some discussions
21 saying I didn't think it characterized the situation
22 correctly.

23 Q. Did you have actually any -- any actual

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1 data that you collected, like, that showed that
2 Dr. Morrison's findings or analyses were incorrect,
3 that you presented to the State?

4 A. No, I don't believe so.

5 Q. Dr. Morrison calculated that the
6 chlorophyll-a level -- this is in Great Bay -- is
7 only 8 percent of what affects light transmission in
8 the bay.

9 MS. VAN OOT: Are you representing
10 that's what's in the report or that's what's
11 in the --

12 MR. HALL: It's right on page 1 of this
13 analysis. It's also what's in the report.
14 It's -- what's in the report is specified
15 that --

16 MS. VAN OOT: Okay. That was my
17 question. Does the 8 percent come from his
18 presentation in December of 2007?

19 MR. HALL: And is reflected in the
20 report.

21 MS. VAN OOT: Okay. Can you just tell
22 me where, so I can --

23 A. Where is it in the report?

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1 Q. It's in the graphs. About the
2 chlorophyll-a percentage.

3 A. Well, this one says 12 percent
4 chlorophyll.

5 MS. VAN OOT: Yeah.

6 So is it -- are you asking him --

7 MR. HALL: All right. Let's go with
8 12 percent, then, for the time being.

9 Q. Dr. Short, do you disagree that the
10 chlorophyll-a component was properly calculated to be
11 only 12 percent of what affects light transmission in
12 Great Bay?

13 MS. VAN OOT: Is that what the report
14 says? Yes or no.

15 Q. Assuming that's what the report says.

16 MS. VAN OOT: Assuming. You don't have
17 to assume what the report says.

18 A. Yeah, I'd have to read through it to
19 find that.

20 Q. On page 3 of this analysis -- I'm sorry.
21 Page 3 of the meeting minutes, right in
22 the middle --

23 MS. VAN OOT: On December 7th?

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1 MR. HALL: On December 7th.

2 Q. -- there's a statement.

3 And this is, I guess, after a
4 presentation was done by Paul Currier and some
5 others on various options to generate criteria for
6 Great Bay. It says, "Do not spend time researching
7 other estuaries for Option 5." It means reference
8 approach for other estuaries within the region.
9 "Reference estuaries are too different from
10 Great Bay to be useful."

11 Do you know who made that statement and
12 what it's based on?

13 MS. VAN OOT: Two questions, but go
14 ahead and answer if you know.

15 A. I -- I do not know who made that. Was
16 this the presentation by Paul that we're under?

17 Q. No. This is a group discussion after
18 looking at various options to try to come up with a
19 way to calculate a nitrogen criteria for Great Bay.
20 I mean --

21 MS. VAN OOT: It refers back to option
22 5 on page 2.

23 A. Yeah, I don't know who made that.

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1 Q. I'm going to show you the -- let's go to
2 the next page, on June 10.

3 Now we've marked that as Exhibit 25.

4 Looking at No. 4 under -- on page 2,
5 where it says, "Phil Trowbridge now made a
6 presentation on the relationship between light
7 attenuation and water quality parameters using
8 aggregate statistics from different segments of the
9 estuary," and they attach the presentation. I'll
10 show you the graph in a moment.

11 MS. VAN OOT: The presentation is not
12 attached in the exhibit.

13 MR. HALL: No. I said I'll show him
14 the graph that's referenced in a moment.

15 MS. VAN OOT: Okay.

16 Q. It says, "General comments on the
17 presentation was that causation needs to be proved
18 better and that lumping data from all seasons and
19 tides may mask cause and effect."

20 Do you know what new presentation Phil
21 Trowbridge was doing at that time?

22 MS. VAN OOT: What what?

23 MR. HALL: What type of presentation

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1 Phil Trowbridge was doing at that time.

2 A. No. You should ask him.

3 Q. Do you recall Mr. Trowbridge presenting
4 this graph?

5 MR. HALL: Let's mark this as Exhibit
6 26.

7 *(Short Exhibit 26 is marked for*
8 *identification.)*

9 MS. VAN OOT: Do you remember this one?

10 A. Yeah, I remember a graph like this.

11 Q. Did you ever inform DES that that graph
12 demonstrates a cause-and-effect relationship between
13 nitrogen and light extinction?

14 A. Well, that it's the definition of a
15 regression.

16 Q. The definition of regression is that it
17 demonstrates cause and effect?

18 A. No. That it -- it says that attenuation
19 coefficient is a function of nitrogen.

20 Q. What I asked was, do you recall ever
21 advising New Hampshire DES that that graph in fact
22 does demonstrate a cause-and-effect analysis of light
23 attenuation due to nitrogen?

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1 A. I don't remember ever using those
2 specific words. Well, I don't even remember talking
3 to the DES about it, because I don't know who you're
4 referring to at DES.

5 Q. Phil Trowbridge.

6 So you don't recall having any kind of
7 discussion like that with Phil Trowbridge?

8 A. I don't recall, no.

9 But the mathematical interpretation of
10 this is that attenuation coefficient is a function
11 of total nitrogen.

12 Q. But didn't Dr. Morrison just show
13 that --

14 A. That was different data, I believe.

15 Q. No, no.

16 A. Well, I think it was.

17 Q. Do you know if it was different data?

18 A. No. Do you?

19 Q. Yes, actually. But I'm not testifying.

20 A. That's true.

21 No, I don't know what the source of the
22 data is. It says many different -- many fewer data
23 points than within the other one. So it's -- it

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1 doesn't look to me as if it's the same data.

2 Q. Did you ever inform Mr. Trowbridge that
3 it's appropriate to plot data from --

4 A. In fact, I know that it's different
5 data, because his data was all from one point in the
6 estuary, and this is data from the entire estuary.
7 So it is in fact different data.

8 Q. There's some different data.

9 Did you ever tell Mr. Trowbridge that
10 it was appropriate to plot light extinction from
11 different parts of the estuary versus nitrogen as
12 the complete explanation for what's affecting light
13 extinction in those various sections of the estuary?

14 MS. VAN OOT: The question is did you
15 ever tell him that.

16 A. No.

17 Q. There's a statement in the November 17,
18 2008, meeting minutes regarding that correlation --

19 MS. VAN OOT: Page?

20 MR. HALL: It's on page 3.

21 Q. -- and it's a related statement that has
22 to do with nitrogen and turbidity. It says, "The
23 relationship between nitrogen and turbidity is a

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1 correlation."

2 A. Which one is this?

3 MS. VAN OOT: Wait. What page are you
4 on?

5 MR. HALL: I'm on page 3. Page 3 of
6 the -- oh, the very last one.

7 We're switching to November 17. Sorry.

8 MS. VAN OOT: Okay.

9 MR. HALL: Last one.

10 MS. VAN OOT: Give us a minute. We're
11 slow.

12 Page 3?

13 MR. HALL: Yeah. It says, "The
14 relationship" -- the demonstrated relationship
15 between nitrogen and turbidity.

16 MS. VAN OOT: What's the context of
17 this?

18 MR. HALL: It says that -- there's a
19 relationship just like that. There's a stack
20 of them. You may have seen them before.

21 Q. It says, "The relationship between
22 nitrogen and turbidity is a correlation. Causation
23 has not been proven."

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1 Do you --

2 A. That's consistent.

3 Q. Hmm?

4 A. I'm -- what's your question?

5 Q. I'm sorry.

6 Were you there when that statement was
7 made, that this has not proven causation?

8 A. I don't know. It says I was at the
9 meeting. If it was made in the general discussion at
10 the meeting, I probably was there.

11 Q. Okay. Do you know if correlations prove
12 causation?

13 MS. VAN OOT: As a general principle?

14 MR. HALL: Yeah.

15 A. No, they don't.

16 Q. No, they do not?

17 A. No, they do not.

18 Q. I have no further questions on those
19 charts. And now let's just move to the 2009 criteria
20 report.

21 MR. HALL: This is Exhibit 27.

22 *(Short Exhibit 27 is marked for*
23 *identification.)*

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1 Q. Dr. Short, were you involved in the
2 development of the 2009 numeric nutrient criteria?

3 A. No.

4 Q. Did you attend any meetings of the
5 Jackson Laboratory with CLF and DES to discuss the
6 establishment of these numeric criteria?

7 A. With who, specifically?

8 Q. With CLF and DES.

9 A. They're not people.

10 Q. No. People -- members of CLF.

11 MS. VAN OOT: As Mitt Romney would say.

12 Q. Members of CLF.

13 A. Unless you tell me the specific people
14 who were there, I don't -- you know, I attend
15 meetings with a lot of people at a lot of times, and
16 the two of them may have been there, or there may
17 have been a meeting. I don't know.

18 Q. Are you familiar with this 2009 numeric
19 nutrient criteria document?

20 A. Yes.

21 Q. You're familiar with -- you didn't
22 provide any input on it?

23 A. I didn't say that.

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1 Q. Oh, okay. I thought you asked you if
2 you were involved in the development of it.

3 A. Of the criteria.

4 Q. Yeah.

5 A. This is not the criteria. This is an
6 explanation of the criteria.

7 Q. Of the criteria.

8 A. I was involved in the development -- in
9 this -- I reviewed this document.

10 Q. Ah. Okay. That's --

11 A. That's -- it's quite different than
12 developing the criteria.

13 Q. Well, what was the purpose of that
14 document?

15 A. To describe the method by which they
16 developed the nutrient criteria.

17 Q. This document assisted in the
18 development of a number of new water quality metrics;
19 is that correct?

20 A. I really don't remember.

21 Q. Did this document develop a specific
22 transparency level that should be achieved to protect
23 eelgrass?

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1 MS. VAN OOT: Do you want him to
2 review -- I mean --

3 A. I would have to reread it to find that
4 out, to figure that out. I review a lot of things.
5 This is -- you know, this is all volunteer work.
6 It's, you know, not something I keep in memory.

7 MS. VAN OOT: Do you want to direct his
8 attention to a page number?

9 MR. HALL: Yeah. I thought he was more
10 familiar with the document than maybe what he
11 is.

12 Q. If you can go to page 68.

13 MS. VAN OOT: That wasn't a question,
14 was it? It was just your comment?

15 MR. HALL: Hmm?

16 MS. VAN OOT: That wasn't a question?

17 MR. HALL: No, no, that wasn't a
18 question. That was simply an observation.

19 MS. VAN OOT: It was a simple comment.

20 Q. If you would go to page 68, Dr. Short,
21 the page entitled "Summary Proposed Nutrient
22 Criteria."

23 A. Yes.

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1 Q. Okay. Do you remember the -- do you
2 recall that the purpose of this document was to
3 develop numeric nutrient criteria?

4 A. It was to explain how different criteria
5 were developed. This document did not develop them.
6 That's different.

7 Q. Do you want to explain the difference,
8 or could you?

9 A. I could.

10 Q. Please.

11 A. But I don't think I really need to, do
12 I? You're talking about that this document itself
13 created the criteria --

14 Q. Oh.

15 A. -- and it did not.

16 Q. Was this the technical support document
17 for the development of the --

18 A. Yes.

19 Q. -- nutrient criteria?

20 A. That's more correct. That would be
21 correct.

22 Q. Okay. And did this document recommend a
23 specific transparency level that was necessary for

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1 eelgrass protection in Great Bay and other tidal
2 rivers?

3 A. I suspect it did.

4 Q. Okay. Do you know where -- what the
5 basis or the derivation of the transparency target
6 was?

7 A. Yes.

8 Q. And what was it?

9 A. It was a calculation that Phil
10 Trowbridge did.

11 Q. Okay. Was the transparency level based
12 on the degree of light considered necessary to
13 protect eelgrass in Chesapeake Bay?

14 MS. VAN OOT: If you know.

15 A. You have to ask Phil.

16 Q. You don't recall?

17 A. No.

18 Q. Okay. Do you know if anybody looked at
19 the transparency levels in Great Bay that occurred
20 when healthy eelgrass populations were present in the
21 bay?

22 A. Do you mean is there any historic data?
23 Is that what you're asking?

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1 Q. Well, in developing this document.

2 A. Oh, I don't know.

3 Q. Okay.

4 A. How can I know what everybody did?

5 Q. Now, this document -- this document also
6 developed, say, a nitrogen level associated with the
7 transparency level; is that correct?

8 A. I think one is derived from the other.

9 Q. Okay. And is there an assumption built
10 into that that the nitrogen is growing chlorophyll-a
11 and that's what's causing the transparency level to
12 change?

13 MS. VAN OOT: If you know.

14 Q. Would you know?

15 A. I don't know.

16 Q. Do you know if anybody checked the
17 nitrogen levels in Great Bay that were present when
18 healthy eelgrass populations existed in Great Bay
19 before recommending these specific nitrogen targets?

20 A. I don't know. That's asking me what
21 other people did.

22 Q. Oh, no. I'm just asking whether you
23 know. You may or may not.

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1 Do you know if the development of this
2 nitrogen development criteria document utilized
3 methods that TAC members said do not show cause and
4 effect?

5 A. Say it again, please.

6 Q. Do you know if the development of -- the
7 derivation of the nitrogen criteria from this
8 document relied on methodologies that the TAC
9 committee indicated do not show cause and effect?

10 MS. VAN OOT: Objection to the form of
11 the question.

12 Q. If you can answer that.

13 A. I don't know.

14 Q. Do you know whether or not DES, in
15 developing the 0.3 total nitrogen standard, accounted
16 for other factors that influenced light extinction in
17 different locations in the estuary?

18 MS. VAN OOT: Objection to what DES
19 understood.

20 A. I don't know.

21 Q. Dr. Short, do you know whether or not --
22 and I'm showing you again Exhibit 26 -- do you know
23 if Exhibit 26 was the basis upon which the 0.3

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1 nitrogen standard was developed?

2 MS. VAN OOT: Objection to the form.

3 You can answer.

4 A. I don't know. I mean, it's -- the
5 indications on there are that that's what that
6 implies. But . . .

7 Q. I think I covered this with you earlier,
8 but I'll just ask it again.

9 With regard to that 0.3 total nitrogen
10 number that's in the table on page 68 of this
11 report -- can you find that table on page 68?

12 A. (Complies)

13 Q. Okay.

14 -- did you advise DES that it was
15 appropriate to apply that number in the tidal
16 rivers? And when I mean tidal rivers, I mean the
17 Lamprey, the Squamscott, the Oyster River.

18 A. What was the number again?

19 Q. 0.3 milligrams per liter total nitrogen.

20 A. No, I did not advise them.

21 Q. Dr. Short, were you involved at all in
22 the updated impairment listing document that got
23 issued by DES in August of 2009?

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1 Let me just --

2 MS. VAN OOT: Is there a page number?

3 MR. HALL: It's not in that one. I

4 just want to ask --

5 Q. Let me just show you this document and
6 ask you whether or not you were involved in that --
7 in the development of that document.

8 A. Was this reviewed by the TAC?

9 Q. I am not certain.

10 A. I don't -- I don't know. I don't
11 recognize it.

12 Q. You don't recall seeing that one?

13 A. There are a lot of versions of a lot of
14 reports.

15 Q. Okay. Do you have any knowledge as to
16 whether or not DES utilized the numeric values
17 contained in the table on page 68 -- I'm going to
18 just go back to that one -- whether or not they
19 utilized those numeric values to go back and assess
20 different areas of the bay as impaired for
21 transparency or impaired for nitrogen or impaired for
22 dissolved oxygen?

23 MS. VAN OOT: Do you know what DES did?

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1 A. Don't know what DES did.

2 Q. You don't know what DES did?

3 MR. HALL: Okay. I don't have any
4 further questions. Thank you, sir.

5 MR. LUCIC: I have no questions at this
6 time.

7 MR. SERELL: No questions.

8 MS. VAN OOT: Please send the
9 transcript to me in electronic form, and I'll
10 make sure it gets to Professor Short and have
11 him execute it with the usual instructions,
12 which you'll find fascinating, and get it back
13 to everybody.

14 MR. HALL: Great.

15 MS. VAN OOT: Thank you.

16 *(Witness excused and deposition*
17 *concluded at 4:49 p.m.)*

18

19

20

21

22

23

WITNESS CERTIFICATION and ERRATA SHEET

In accordance with the rules of procedure governing depositions, you are entitled to read and correct your deposition transcript. Please read your deposition and on this errata sheet make any necessary corrections or changes, either in form or substance. Identify those corrections/changes by page and line number, stating the change and the reason. Please do not mark the actual transcript. **(Make extra copies of this sheet if you need to indicate more changes or corrections than will fit on this one page.)** When completed, date and sign the errata sheet and have your signature notarized.

<u>Page/Line</u>	<u>Correction</u>	<u>Reason</u>
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Date: _____

FREDERICK T. SHORT

Subscribed and sworn to before me this _____ day of _____, 20__.

Notary Public/Justice of the Peace

C E R T I F I C A T E

I, Deanna J. Dean, a New Hampshire Licensed Court Reporter, Registered Diplomate Reporter, and Certified Realtime Reporter, do hereby certify that the foregoing, to the best of my knowledge, skill and ability, is a true and accurate transcript of my computer-aided electronic stenographic notes of the deposition of FREDERICK T. SHORT, who was duly sworn, taken at the place and under the circumstances present on the date hereinbefore set forth.

I further certify that I am neither attorney or counsel for, nor related to or employed by any of the parties to the action in which this deposition was taken, and further that I am not a relative or employee of any attorney or counsel employed in this case, nor am I financially interested in this action.

Deanna J. Dean, RDR, CRR

NH LCR No. 87 (RSA 310-A)

Signed this ____ day of _____, 2012