EXHIBIT 27 (AR J.19)

R-WD-09-14

Amendment to the New Hampshire 2008 Section 303(d) List Related to Nitrogen and Eelgrass in the Great Bay Estuary

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August 13, 2009

Executive Summary

The New Hampshire Department of Environmental Services (DES) has updated New Hampshire's 2008 305b/303d surface water quality assessments based on new information and public comment. Three analyses were performed for this update. First, the indicator for significant eelgrass loss was updated using new data on eelgrass cover in the Great Bay Estuary from 2006, 2007, and 2008. Second, the numeric nutrient criteria published by DES (DES, 2009) were used to make assessments for dissolved oxygen, chlorophyll-a, water clarity, and total nitrogen relative to the Aquatic Life designated use. Third, in response to public comments, the assessment unit for the Lower Piscataqua River was split in half. All of the assessments for all designated uses were redone for the two new assessment units.

The analyses determined that there has been significant eelgrass loss in most of the assessment zones of the Great Bay Estuary. Due to the importance of eelgrass for the ecosystem of the estuary, the loss of this habitat constitutes a violation of the Biological Aquatic Community Integrity water quality criteria (Env-Wq 1703.19). Based on the numeric nutrient criteria, many of the assessment units were found to be impaired for nitrogen. In the Cocheco River and the Salmon Falls River, the nitrogen impairment is related to violations of the dissolved oxygen criteria. In all the other impaired assessment zones, the nitrogen impairment is related to significant eelgrass loss.

These impairments for nitrogen and other parameters will be added to the State of New Hampshire 2008 Section 303(d) List.

Introduction

The New Hampshire Department of Environmental Services released the 2008 305b/303d assessments for New Hampshire on February 22, 2008. DES received comments from the public on the assessments regarding the need to add quantitative assessments for nitrogen and eelgrass loss in the Great Bay Estuary. At the time, DES was in the last year of a four year effort to establish numeric nutrient criteria for the Great Bay Estuary. DES could not comply with all of the requested changes until this process was complete. On June 10, 2009, DES published numeric nutrient criteria for the Great Bay Estuary (DES, 2009). The purpose of this report is to update New Hampshire's 2008 305b/303d assessments based on the numeric criteria and other relevant data and assessments that have been performed since the 305b/303d assessments were first released.

The 2008 305b/303d assessments will be updated based on three assessments:

1. On August 11, 2008, DES published an update to the 2008 305b/303d assessments based on a quantitative assessment of eelgrass habitat losses in the Great Bay Estuary (DES, 2008b). However, the data on eelgrass habitat used in the assessments were only current through 2005. Since the publication of that report, DES obtained eelgrass maps current through 2008. The availability of the newer data has made it possible for DES to perform an updated eelgrass assessment.

2. On June 10, 2009, DES published numeric nutrient criteria for water quality in the Great Bay Estuary for both the protection of eelgrass habitat and for the prevention of low dissolved oxygen (DES, 2009). The numeric criteria can be used as interpretations of the water quality standards narrative criteria for nutrients (Env-Wq 1703.14). The availability of numeric nutrient criteria has made it possible for DES to perform quantitative assessments of nutrient-related impairments to the Aquatic Life designated use in the Great Bay Estuary.

3. During the public comment period for the numeric nutrient criteria, DES received comments that the assessment unit for the Lower Piscataqua River should be split into two smaller units. The original assessment unit was very large and was not likely to have homogeneous water quality. DES agreed with this comment and divided the assessment unit just north of the Schiller Station power plant. The major consequence of this action was that all of the designated use assessments in the two new assessment units in Lower Piscataqua River had to be redone.

The purpose of this report is to document the methodologies and resulting 305b/303d assessments associated with these three updates.

Regulatory Authority

The water quality standards for New Hampshire contain a narrative criteria for nutrients in estuarine waters (Env-Wq 1703.14), which states:

> (b) Class B waters shall contain no phosphorus or nitrogen in such concentrations that would impair any existing or designated uses, unless naturally occurring.

The numeric nutrient criteria developed by DES (DES, 2009) are considered numeric translators for the narrative criteria.

Regulatory authority to consider eelgrass habitat loss to be a water quality violation comes from the narrative criteria for Biological and Aquatic Community Integrity, Env-Wq 1703.19. This regulation states:

> (a) The surface waters shall support and maintain a balanced, integrated, and adaptive community of organisms having a species composition, diversity, and functional organization comparable to that of similar natural habitats of a region.
>
> (b) Differences from naturally occurring conditions shall be limited to non-detrimental differences in community structure and function.

New Hampshire Assessment Methodology

Three separate assessments were performed for this update: (1) Updated eelgrass assessments; (2) Evaluation of nitrogen and eutrophic response data for support of the Aquatic Life designated use; and (3) Revised assessments for designated uses in the Lower Piscataqua River.

The methodologies for these assessments are described below.

Eelgrass Assessments

The methodology for assessments of eelgrass data is described in the report for the previous assessment (DES, 2008b). The only deviation from this protocol is that eelgrass cover in Little Harbor/Back Channel was evaluated separately from Portsmouth Harbor. In the previous assessment, these two areas were merged together to conform with an older protocol. However, Portsmouth Harbor and Little Harbor/Back Channel are distinct areas with different tributaries and should be evaluated separately. Similarly, the assessment zone for the Lower Piscataqua River was split in half just north of Schiller Station. The eelgrass cover in the northern and southern halves was evaluated separately as discussed later in this document.

Evaluation of Nitrogen and Eutrophic Response Data

DES has published numeric nutrient criteria for chlorophyll-a, water clarity, and total nitrogen in the Great Bay Estuary for both the protection of eelgrass habitat and for the prevention of low dissolved oxygen (DES, 2009). The numeric criteria can be used as interpretations of the water

quality standards narrative criteria for nutrients (Env-Wq 1703.14). The Consolidated Assessment and Listing Methodology (CALM) for the 2008 305b/303d assessments (DES, 2008) does not contain indicators or use support criteria for chlorophyll-a, water clarity, or total nitrogen associated with the Aquatic Life designated use. Therefore, DES developed the following methodologies which are comparable to the indicators already in the CALM.

ASSESSMENT UNITS AND ASSESSMENT ZONES

For 305b/303d assessments, DES uses 40 assessment units to cover the Great Bay Estuary that are coincident with the National Shellfish Sanitation Program growing areas. Great Bay itself consists of seven different assessment units. In terms of nitrogen and eutrophication parameters it makes sense to evaluate data from larger aggregates of assessment units covering contiguous areas. Eutrophication effects are less localized than the bacteria pollution sources that affect shellfish harvesting . Therefore, DES aggregated the assessment units in the Great Bay Estuary into eighteen assessment zones. These assessment zones were also used for the nutrient criteria development report (DES, 2009). The boundaries of each of the aggregated assessment zones are shown in Figure 1. For 305b/303d reporting, the categories assigned to these larger assessment zones will be assigned to each of the assessment units within the zone (Table 1). For the assessment zones along the Piscataqua River, data from both the New Hampshire and Maine sides of the river were used for the assessments of New Hampshire waters to provide a more comprehensive dataset.

DATA PROCESSING METHODS

For each of these zones, data for dissolved oxygen, total nitrogen, chlorophyll-a, and water clarity were combined to calculate summary statistics or violation frequencies for the zone. Results from between January 1, 2002 and January 23, 2008 were used for this analysis to match the date range used for all of the other 2008 305b/303d assessments.

Dissolved oxygen data were processed according to the methods listed in the CALM. For assessment zones in which a datasonde had been deployed, the dissolved oxygen assessments were exclusively based on datasonde measurements. Datasondes, which are deployed continuously near the bottom of the water column, are far more likely to detect violation of water quality standards than grab samples.

For total nitrogen, chlorophyll-a, and water clarity, the data were processed using the same methods as were used for the nutrient criteria report (DES, 2009). In summary, results reported as less than the method detection level were included with a value equal to the reporting detection limit. This approach is justified because less than 10% of the results for any parameter were reported as being less than the method detection level; therefore, percentiles equal to or greater than 10% would not be affected by the censored results. To generate the complete list of independent results in each assessment unit and for each trend station, pairs of field duplicate samples were first averaged (which is equivalent to a median). Then, if there were multiple samples taken at the station on the same date (e.g., from different depths or at different times), the maximum value for the day was calculated. (Note that water clarity is measured with the light attenuation coefficient which increases with decreasing clarity; therefore, taking the

maximum value for a station visit is more likely to detect exceedences of the criteria.) The summary statistics for each assessment unit were then calculated using this list of independent samples. If total nitrogen concentrations were not measured directly, total nitrogen was calculated from the sum of total dissolved nitrogen and particulate nitrogen. Dissolved inorganic nitrogen was calculated from the sum of nitrate+nitrite and ammonia or nitrate, nitrite, and ammonia.

EELGRASS RESTORATION DEPTHS

The numeric criteria for nitrogen and water clarity are based on a restoration depth for eelgrass. Therefore, an eelgrass restoration depth must be assigned for each of the assessment zones in order to apply the criteria.

The minimum restoration depth for any eelgrass to survive is 2 meters below the mean water level (MWL). This 2 meter restoration depth will be used for the tidal river assessment zones where eelgrass has virtually disappeared: the Winnicut River, Squamscott River, Lamprey River, Oyster River, Bellamy River, Upper Piscataqua River, Lower Piscataqua River North, Lower Piscataqua River South, and Sagamore Creek. The 2 meter restoration depth will also be applied to shallow embayments and creeks where eelgrass data are absent such as Berrys Brook, North Mill Pond, and South Mill Pond. The average depth in these zones is less than 2 meters, except for the Piscataqua River.

The depths of eelgrass beds in Great Bay and Little Bay in 1981 were analyzed to determine the restoration depths for these zones. The 1981 eelgrass maps from Short (2009) are the oldest eelgrass maps based on aerial photography. These maps were overlain on the NOAA Charts using GIS to estimate the deep edge depth for the eelgrass beds. The edges of the beds in Great Bay and Little Bay were consistently shallower than the 6 foot mean low water (MLW) contour on the charts (which would be equivalent to a 3 meter MWL restoration depth). Therefore, the restoration depth should be either 2 or 2.5 meters. The bathymetric data on the charts were sparse, which made it difficult to delineate the 2 meter contour from the 2.5 meter contour. However, based on the available data, the 2 meter restoration depth appeared to be correct for Great Bay and Little Bay. Therefore, for the purposes of this assessment, the 2 meter restoration depth was assigned to Great Bay and Little Bay. This restoration depth should be revisited when better bathymetric data are available.

In Little Harbor/Back Channel, the 1981 eelgrass maps showed eelgrass growing down to the 6 foot MLW contour (equivalent to the 3 meter MWL restoration depth). Therefore, the restoration depth for this assessment zone was set at 3 meters.

In Portsmouth Harbor, the 1981 and 2008 eelgrass maps showed eelgrass growing down to the 12 foot MLW contour (equivalent to a 5 meter MWL restoration depth). These deep eelgrass beds are located south of Fort Point along the New Castle shore and between Wood and White Island off Gerrish Island. The beds off Gerrish Island actually reach the 18 foot MLW bathymetric contour (equivalent to a 7 meter MWL restoration depth). The eelgrass beds in the inner portion of the harbor are smaller and shallower than the deep beds in the outer harbor. The nutrient criteria were only defined for restoration depths between 2 and 3 meters MWL.

Therefore, for the purposes of this assessment, the restoration depth for this assessment zone was set at the maximum possible value, 3 meters. This restoration depth should be revisited when better bathymetric data are available.

ASSESSEMENT CATEGORIES

The basic categories for the 305b/303d assessment include Category 2 (Fully Supporting), Category 5 (Not Supporting), and Category 3 (Insufficient Information). The 303d List is comprised of all the waters in Category 5. DES has added sub-categories to provide more information on how good or bad the water quality is in Category 2 and Category 5 water bodies, respectively. Category 3 has also been divided to distinguish between waterbodies without any information and waterbodies with incomplete information. The DES categories will be used for the rest of this report. A crosswalk between the DES categories and the basic 305b/303d assessment categories is provided below.

305b/303d Category	DES Category	Description
Category 2 (Fully Supporting)	2-G	Full Support, good water quality
	2-M	Full Support, marginally above criteria
Category 3 (Insufficient Information)	3-PAS	Insufficient information, potentially attaining standards
	3-PNS	Insufficient information, potentially not supporting
	3-ND	Insufficient information, no data
Category 5 (Not Supporting, 303d)	5-M	Impaired, marginally below criteria (303d)
	5-P	Impaired, poor water quality (303d)

INDICATORS FOR DISSOLVED OXYGEN IMPAIRMENTS

Four quantitative indicators are related to violations of the water quality standards for dissolved oxygen. DES already uses direct measurements of dissolved oxygen and dissolved oxygen saturation and compares those to the numeric water quality criteria in Env-Wq 1703.07. The new numeric criteria for total nitrogen and chlorophyll-a concentrations can also be used as indicators of violations of the dissolved oxygen criteria (DES, 2009). The methodology for assessing dissolved oxygen and dissolved oxygen saturation measurements are provided in the CALM (DES, 2008). The methodologies for assessing the nitrogen and chlorophyll-a indicators are described below.

Indicator: Dissolved Oxygen Impairments Predicted from Total Nitrogen Concentrations (TN)

Fully Supporting: Median TN concentrations are <= 0.45 mg N/L
Not Supporting: Median TN concentrations are > 0.45 mg N/L

Notes:

1. Data Requirements
    a Assessments shall be based on TN data that is 5 years or less in age and the median TN concentration shall be used to make the criteria comparison.
    b The median TN concentration shall be calculated from representative data that cover all four seasons of the year.
    c The minimum sample size of independent results for TN shall be 15 for a given waterbody.
    d If older data indicated Non Support, the more recent data used to make a Full Support decision must have been collected under similar conditions (i.e., wet weather, dry weather, season, etc) as when the older exceedances occurred.
2. DES subcategories shall be assigned according to the following:
    a For Category 2, the DES category shall be 2-G if the TN indicator is less than 75% of the criterion. Otherwise, the DES category shall be 2-M.
    b For Category 3, the DES category shall be 3-PAS if there are fewer samples than required for the sample size but the available data have a median value less than the criterion. The DES category shall be 3-PNS if there are fewer samples than required for the sample size but the available data have a median value greater than the criterion; however, DES may assign Category 5 if the median value of the available TN data is several times greater than the criterion. The DES category shall be 3-ND if there are no data for this indicator.
    c For Category 5, the DES category shall be 5-P if the TN indicator is more than 50% greater than the criterion. Otherwise, the DES category shall be 5-M.

Indicator: Dissolved Oxygen Impairments Predicted from Chlorophyll-a Concentrations (Chl-a)

Fully Supporting: 90th Percentile Chl-a concentrations are <= 10 ug/L
Not Supporting: 90th Percentile Chl-a concentrations are > 10 ug/L

Notes**:**

1. Data Requirements
   - a Assessments shall be based on Chl-a data that is 5 years or less in age and the 90th percentile Chl-a concentration shall be used to make the criteria comparison.
   - b The 90th percentile Chl-a concentration shall be calculated from representative data that cover all four seasons of the year.
   - c The minimum sample size of independent results for Chl-a shall be 15 for a given waterbody.
   - d If older data indicated Non Support, the more recent data used to make a Full Support decision must have been collected under similar conditions (i.e., wet weather, dry weather, season, etc) as when the older exceedances occurred.
2. DES subcategories shall be assigned according to the following:
   a. For Category 2, the DES category shall be 2-G if the Chl-a indicator is less than 75% of the criterion. Otherwise, the DES category shall be 2-M.
   b. For Category 3, the DES category shall be 3-PAS if there are fewer samples than required for the sample size but the available data have a 90th percentile value less than the criterion. The DES category shall be 3-PNS if there are fewer samples than required for the sample size but the available data have a 90th percentile value greater than the criterion. The DES category shall be 3-ND if there are no data for this indicator.
   c. For Category 5, the DES category shall be 5-P if the Chl-a indicator is more than 50% greater than the criterion. Otherwise, the DES category shall be 5-M.

INDICATORS FOR EELGRASS IMPAIRMENTS

Three quantitative indicators are related to violations of the water quality criteria for Biological and Aquatic Community Integrity (Env-Wq 1703.19), one manifestation of which is significant eelgrass loss. DES already uses trends in eelgrass cover as an indicator. The new numeric criteria for water clarity and total nitrogen concentrations can also be used as indicators of violations of the Biological and Aquatic Community Integrity criteria (DES, 2009). The methodology for assessing eelgrass cover measurements are provided in a previous report (DES, 2008b). The methodologies for assessing the nitrogen and water clarity indicators are described below.

Indicator: Biological and Aquatic Community Integrity Impairments Predicted from Water Clarity (light attenuation coefficient, Kd)

Fully Supporting: Median Kd values are <= criteria in table below note 2
Not Supporting: Median Kd values are > criteria in table below note 2

Notes:

1. Data Requirements
   a Assessments shall be based on Kd data that is 5 years or less in age and the median Kd value shall be used to make the criteria comparison.
   b The median Kd value shall be calculated from representative data that cover all four seasons of the year.
   c The minimum sample size of independent results for Kd shall be 15 for a given waterbody.
   d If older data indicated Non Support, the more recent data used to make a Full Support decision must have been collected under similar conditions (i.e., wet weather, dry weather, season, etc) as when the older exceedances occurred.
   e The waterbody being assessed must have been assigned an eelgrass restoration depth. The default restoration depth is 2 m below mean water level (MWL). Restoration depths of 2.5 and 3.0 m below MWL should be considered for deeper waterbodies.
2. The Kd criteria vary by eelgrass restoration depth. The criteria for different depths are depicted in the table below.

Restoration Depth (m below MWL)	Median Kd (m^{-1})
2.0	0.75
2.5	0.60
3.0	0.50

3. DES subcategories shall be assigned according to the following:
   a For Category 2, the DES category shall be 2-G if the Kd indicator is less than 75% of the criterion. Otherwise, the DES category shall be 2-M.
   b For Category 3, the DES category shall be 3-PAS if there are fewer samples than required for the sample size but the available data have a median value less than the criterion. The DES category shall be 3-PNS if there are fewer samples than required for the sample size but the available data have a median value greater than the criterion. The DES category shall be 3-ND if there are no data for this indicator.
   c For Category 5, the DES category shall be 5-P if the Kd indicator is more than 50% greater than the criterion. Otherwise, the DES category shall be 5-M.

Indicator: Biological and Aquatic Community Integrity Impairments Predicted from Total Nitrogen Concentrations (TN)

Fully Supporting: Median TN concentrations are <= criteria in table below note 2

Not Supporting: Median TN concentrations are > criteria in table below note 2

Notes:

1. Data Requirements
   a Assessments shall be based on TN data that is 5 years or less in age and the median TN concentration shall be used to make the criteria comparison.
   b The median TN concentration shall be calculated from representative data that cover all four seasons of the year.
   c The minimum sample size of independent results for TN shall be 15 for a given waterbody.
   d If older data indicated Non Support, the more recent data used to make a Full Support decision must have been collected under similar conditions (i.e., wet weather, dry weather, season, etc) as when the older exceedances occurred.
   e The waterbody being assessed must have been assigned an eelgrass restoration depth. The default restoration depth is 2 m below mean water level (MWL). Restoration depths of 2.5 and 3.0 m below MWL should be considered for deeper waterbodies.
2. The TN criteria vary by eelgrass restoration depth. The criteria for different depths are depicted in the table below.

Restoration Depth (m below MWL)	Median TN (mg N/L)
2.0	0.30
2.5	0.27
3.0	0.25

3. DES subcategories shall be assigned according to the following:
   a For Category 2, the DES category shall be 2-G if the TN indicator is less than 75% of the criterion. Otherwise, the DES category shall be 2-M.
   b For Category 3, the DES category shall be 3-PAS if there are fewer samples than required for the sample size but the available data have a median value less than the criterion. The DES category shall be 3-PNS if there are fewer samples than required for the sample size but the available data have a median value greater than the criterion; however, DES may assign Category 5 if the median value of the available TN data is several times greater than the criterion. The DES category shall be 3-ND if there are no data for this indicator.
   c For Category 5, the DES category shall be 5-P if the TN indicator is more than 50% greater than the criterion. Otherwise, the DES category shall be 5-M.

METHODOLOGY TO COMBINE RESULTS FROM INDICATORS

As discussed in the previous section, there are multiple indicators related to violations of the water quality standards for dissolved oxygen (Env-Wq 1703.07) and Biological and Aquatic Community Integrity (Env-Wq 1703.19) one manifestation of which is significant eelgrass loss. The indicators are grouped into response and nutrient indicators. Response indicators consist of dissolved oxygen, dissolved oxygen saturation, chlorophyll-a, eelgrass assessments, and water clarity. The nutrient indicator for estuarine waters is the median total nitrogen concentration because nitrogen is the limiting nutrient in the Great Bay Estuary (DES, 2009). Each of these indicators will be evaluated separately relative to numeric criteria using the methods in the CALM or those outlined above. Then, DES will review the suite of indicators using the matrix in Table 2 below to determine the appropriate assessment category for nitrogen in the 305b Report /303d List. A weight-of-evidence approach, considering the quality of the underlying data for each indicator, will be used to make this determination. If there are conflicting results between indicators, DES will provide a narrative justification for the assessment.

Nitrogen is the only parameter for which DES *may* assign a different category than indicated by the data for the nitrogen indicator. In most cases it is expected that the nitrogen indicators will be consistent with response indicators and no change will be necessary. However, there may be situations in which the nitrogen and response indicators are conflicting and the weight-of-evidence analysis finds that the response indicators are more credible or that more research is needed before making either a Full Support or Non Support determination for nitrogen for that assessment zone. The categories assigned to the response indicators will not change based on this weight-of-evidence assessment.

Revised Assessments for Designated Uses in the Lower Piscataqua River

The Lower Piscataqua River assessment unit was split into two halves. Therefore, all parameters for all designated uses for this assessment unit had to be redone. Valid data in the DES Environmental Monitoring Database between 1/1/2002 and 1/23/2008 dates were queried and assessed for Primary Contact Recreation, Secondary Contact Recreation, and Aquatic Life Use Support. The assessments of all parameters for all designated uses in the Lower Piscataqua River assessments units were performed following the methodologies in the CALM or those described in this report. The assessments for Drinking Water, Shellfishing, Shellfish Consumption, and Wildlife were based on assessment unit or estuary wide data and, therefore, did not change.

Results and Discussion

Eelgrass Assessments

DES applied the assessment methodology to the eelgrass cover data for all sections of the Great Bay Estuary using two new data sources that were not available for the previous assessment by DES (DES, 2008b).

- The eelgrass cover in 1981 mapped from archived aerial imagery was added to the suite of historical eelgrass cover maps (Short, 2009). This dataset was considered more accurate than other historical datasets because it was mapped from aerial imagery. Eelgrass losses from historical conditions in the Great Bay, Little Bay, Lower Piscataqua River North, Portsmouth Harbor, Little Harbor, and Sagamore Creek were calculated using the 1981 dataset. Eelgrass had been mostly lost from the tidal rivers by 1981, so the 1948 and 1962 datasets had to be used to estimate habitat losses in these areas. Eelgrass in portions of the Lower Piscataqua River South, Portsmouth Harbor, and Little Harbor/Back Channel was not mapped from the 1981 imagery due to glare. However, for Portsmouth Harbor and Little Harbor/Back Channel, no other source of historical eelgrass coverage was available, so the 1981 imagery was still used with qualifications. For the Lower Piscataqua River South zone, the glare affected a large portion of the zone where eelgrass currently exists. Therefore, the historical distributions from 1962 and 1980-1981 were substituted as the baseline for this assessment zone.
- The eelgrass habitat maps from 2006, 2007, and 2008 were included in this assessment, but were not available for the last assessment.

The results of the assessments are summarized in Table 3. Impairments due to significant eelgrass loss were found in all of the assessment zones with eelgrass data. Many of the assessments did not change from the previous assessment. In the following sections, the eelgrass data for each assessment zone has been summarized.

BELLAMY RIVER

The historic maps of eelgrass in the Bellamy River show 66.9 acres of habitat in 1948. Median eelgrass cover for the 2006-2008 period was 0 acres. Therefore, 100% of the eelgrass cover in this area has been lost. The cause of the eelgrass loss is unknown. Dredging is not a possible cause as the last channel dredge occurred in 1896 (USACE, 2005). There are only a few small mooring fields in this assessment zone. Per the assessment methodology, the Bellamy River should be considered impaired for significant eelgrass loss. The previous assessment by DES (DES, 2008b) came to the same conclusion.

BERRYS BROOK

Eelgrass has not been mapped in Berrys Brook in either the historical data sources or the recent mapping programs. It is not clear whether eelgrass historically existed in this waterbody. Therefore, there is insufficient information to assess this waterbody for eelgrass loss. The previous assessment by DES (DES, 2008b) did not include Berrys Brook because there were no eelgrass data to review.

COCHECO RIVER

Eelgrass is not known to have been present in the Cocheco River. The historic sources did not map, and current eelgrass maps do not show, eelgrass in this zone. Therefore, the eelgrass loss indicator is not relevant to this waterbody. The previous assessment by DES (DES, 2008b) came to the same conclusion.

GREAT BAY

The historic maps of eelgrass in the Great Bay show 2,131 acres of habitat in 1981. Median eelgrass cover for the 2006-2008 period was 1,321 acres. Therefore, 38% of the eelgrass cover in this area has been lost. Linear regression of eelgrass cover from 1990 to 2008 detected a significant decreasing trend at the 0.05 significance level (Figure 2). The trend indicates that at least 12% of the eelgrass cover in this assessment unit was lost as of 2008. The trend was evaluated for the 1990-2008 period because the eelgrass populations in the whole estuary were devastated in 1988-1989 due to an infestation of the slime mold, *Labryinthula zostera*, commonly called "wasting disease" (Muehlstein et al., 1991). The cause of the eelgrass loss is unknown. Dredging has occurred between Thomas Point and Woodman Point in 1962 (USACE, 2005). There are few moorings in this assessment zone relative to its size. Therefore, per the assessment methodology, Great Bay should be considered impaired for significant eelgrass loss. The previous assessment by DES (DES, 2008b) determined that the Great Bay should be listed as "threatened" on the 2008 303d List.

LAMPREY RIVER

The historic maps of eelgrass in the Lamprey River show 53.4 acres of habitat in 1948. Median eelgrass cover for the 2006-2008 period was 0 acres. Therefore, 100% of the eelgrass cover in this area has been lost. The cause of the eelgrass loss is unknown. Dredging is not a possible cause as the last channel dredge occurred in 1903 (USACE, 2005). There are no major mooring fields in this assessment zone. Per the assessment methodology, the Lamprey River should be considered impaired for significant eelgrass loss. The previous assessment by DES (DES, 2008b) came to the same conclusion.

LITTLE BAY

The historic maps of eelgrass in the Little Bay show 252 acres in 1981. Median eelgrass cover for the 2006-2008 period was 0.1 acres. Therefore, nearly 100% of the eelgrass cover from this area has been lost. Linear regression of eelgrass cover from 1990 to 2008 detected a significant decreasing trend at the 0.05 significance level (Figure 2). The trend indicates that at least 30% of the eelgrass cover in this assessment unit was lost as of 2008. The trend was evaluated for the 1990-2008 period because the eelgrass populations in the whole estuary were devastated in 1988-1989 due to an infestation of the slime mold, *Labryinthula zostera*, commonly called "wasting disease" (Muehlstein et al., 1991). The cause of the eelgrass loss is unknown. Dredging is not a possible cause as major dredging has not occurred in this assessment zone (USACE, 2005). There are several large mooring fields in this assessment zone. The mooring fields near

Dover Point and the Bellamy River seem to overlap with potential and current eelgrass habitat. Per the assessment methodology, Little Bay should be considered impaired for significant eelgrass loss. The previous assessment by DES (DES, 2008b) came to the same conclusion.

LITTLE HARBOR/BACK CHANNEL

The historic maps of eelgrass in Little Harbor/Back Channel show 68.8 acres of habitat in 1981. This estimate is likely to be low because eelgrass could not be mapped in a portion of this area in 1981 due to glare in the imagery. Median eelgrass cover for the 2006-2008 period was 42.7 acres. Therefore, at least 38% of the eelgrass cover in this area has been lost. Linear regression of eelgrass cover from 1990 to 2008 detected a significant decreasing trend at the 0.05 significance level (Figure 2). The trend indicates that at least 9% of the eelgrass cover in this assessment unit was lost as of 2008. The trend was evaluated for the 1990-2008 period because the eelgrass populations in the whole estuary were devastated in 1988-1989 due to an infestation of the slime mold, *Labryinthula zostera*, commonly called "wasting disease" (Muehlstein et al., 1991). The cause of the eelgrass loss is unknown. Dredging occurs regularly in this harbor, with the most recent activity in 2001 (USACE, 2005). There is a large mooring field in this assessment zone. The mooring field in Little Harbor seems to overlap with potential and current eelgrass habitat. Therefore, per the assessment methodology, Little Harbor/Back Channel should be considered impaired for significant eelgrass loss. The previous assessment by DES (DES, 2008b) came to a different conclusion. The previous assessment evaluated the eelgrass cover in a larger assessment zone that included Little Harbor/Back Channel and Portsmouth Harbor. In this larger assessment zone, the data did not meet the criteria for significant eelgrass loss.

LOWER PISCATAQUA RIVER NORTH

The historic maps of eelgrass in the Lower Piscataqua River North show 60.1 acres of habitat in 1981, combining the acreages from the Maine and New Hampshire sides of the river. Median eelgrass cover for the 2006-2008 period was 0.4 acres. Therefore, 99% of the eelgrass cover in this area has been lost. The cause of the eelgrass loss is unknown. Significant dredging operations have occurred in this assessment zone between 1956 and 2000 (USACE, 2005). This assessment zone is used frequently by large ships. There are several large mooring fields in this assessment zone that seem to overlap with potential and current eelgrass habitat. Per the assessment methodology, the Lower Piscataqua River North should be considered impaired for significant eelgrass loss. The previous assessment by DES (DES, 2008b) came to the same conclusion for the combined area covered by the Lower Piscataqua River North and Lower Piscataqua River South assessment zones.

LOWER PISCATAQUA RIVER SOUTH

The historic maps of eelgrass in the Lower Piscataqua River South show 21.8 acres of habitat on the Maine side of the river in 1962 and 10.7 acres of habitat on the New Hampshire side in 1980-1981. Combining the acreages from the Maine and New Hampshire sides of the river in 1962 and 1980-1981, respectively, the historic coverage of eelgrass in this zone was 32.5 acres. The eelgrass cover mapped from the 1981 imagery is not valid for this assessment because eelgrass could not be mapped in a large portion of this assessment zone around Seavey Island due to

glare. Median eelgrass cover for the 2006-2008 period was 5.6 acres. Therefore, 83% of the eelgrass cover in this area has been lost. Significant dredging operations have occurred in this assessment zone between 1956 and 2000 (USACE, 2005). This assessment zone is used frequently by large ships. There are several large mooring fields in this assessment zone that seem to overlap with potential and current eelgrass habitat. Per the assessment methodology, the Lower Piscataqua River South should be considered impaired for significant eelgrass loss. The previous assessment by DES (DES, 2008b) came to the same conclusion for the combined area covered by the Lower Piscataqua River North and Lower Piscataqua River South assessment zones.

NORTH MILL POND

Eelgrass has not been mapped in North Mill Pond in either the historical data sources or the recent mapping programs. It is not clear whether eelgrass historically existed in this waterbody. Therefore, there is insufficient information to assess this waterbody for eelgrass loss. The previous assessment by DES (DES, 2008b) did not include North Mill Pond because there were no eelgrass data to review.

OYSTER RIVER

The historic maps of eelgrass in the Oyster River show 182.5 acres of habitat in 1948. Median eelgrass cover for the 2006-2008 period was 0 acres. Therefore, 100% of the eelgrass cover in this area has been lost. The cause of the eelgrass loss is unknown. Dredging is not a possible cause as the channel has not been dredged (PDA, 2006). There are only a few small mooring fields in this assessment zone. Per the assessment methodology, this assessment unit should be considered impaired for significant eelgrass loss.

PORTSMOUTH HARBOR

The historic maps of eelgrass in the Lower Piscataqua River North show 227.7 acres of habitat in 1981, combining the acreages from the Maine and New Hampshire sides of the river. This estimate is likely to be low because eelgrass could not be mapped in a portion of this area due to glare in the 1981 imagery. Median eelgrass cover for the 2006-2008 period was 201.3 acres. Therefore, 12% of the eelgrass cover in this area has been lost. Linear regression of eelgrass cover from 1990 to 2008 detected a significant decreasing trend at the 0.05 significance level (Figure 2). The trend indicates that at least 5% of the eelgrass cover in this assessment unit was lost as of 2008. The trend was evaluated for the 1990-2008 period because the eelgrass populations in the whole estuary were devastated in 1988-1989 due to an infestation of the slime mold, *Labryinthula zostera*, commonly called “wasting disease” (Muehlstein et al., 1991). The cause of the eelgrass loss is unknown. Dredging operations have occurred in this assessment zone near Fort Point (USACE, 2005). This assessment zone is used frequently by large ships. There are several large mooring fields in this assessment zone that seem to overlap with potential and current eelgrass habitat. Per the assessment methodology, Portsmouth Harbor should not be considered impaired for significant eelgrass loss. However, the declining trends in both indicators suggests that an impairment is likely for the next listing cycle. The Clean Water Act allows for water bodies to be listed as "threatened," which generally means that the listing

agency has cause to believe that the water body may well be impaired by the next listing cycle. Therefore, DES has determined that Portsmouth Harbor should be listed as "threatened" for significant eelgrass loss on the 2008 303d List. The previous assessment by DES (DES, 2008b) came to a different conclusion. The previous assessment evaluated the eelgrass cover in a larger assessment zone that included Little Harbor/Back Channel and Portsmouth Harbor. In this larger assessment zone, the data did not meet the criteria for significant eelgrass loss.

SAGAMORE CREEK

The historic maps of eelgrass in Sagamore Creek show 4.1 acres of habitat in 1981. Median eelgrass cover for the 2006-2008 period was 0.9 acres. Therefore, 78% of the eelgrass cover in this area has been lost. The cause of the eelgrass loss is unknown. Dredging operations occurred in this assessment zone in 1971 (USACE, 2005). There are moorings along the working waterfront in the middle of the creek but most of the eelgrass is near the confluence with Back Channel. Per the assessment methodology, Sagamore Creek should be considered impaired for significant eelgrass loss. The previous assessment by DES (DES, 2008b) did not find evidence for eelgrass loss because the historical maps available at that time did not cover Sagamore Creek.

SALMON FALLS RIVER

Eelgrass is not known to have been present in the Salmon Falls River. The historic sources did not map, and current eelgrass maps do not show, eelgrass in this zone. Therefore, the eelgrass loss indicator is not relevant to this waterbody. The previous assessment by DES (DES, 2008b) came to the same conclusion.

SOUTH MILL POND

Eelgrass has not been mapped in South Mill Pond in either the historical data sources or the recent mapping programs. It is not clear whether eelgrass historically existed in this waterbody. Therefore, there is insufficient information to assess this waterbody for eelgrass loss. The previous assessment by DES (DES, 2008b) did not include South Mill Pond because there were no eelgrass data to review.

SQUAMSCOTT RIVER

The historic maps of eelgrass in the Squamscott River show 42.1 acres of habitat in 1948. Median eelgrass cover for the 2006-2008 period was 0 acres. Therefore, 100% of the eelgrass cover in this area has been lost. The cause of the eelgrass loss is unknown. Dredging is not a possible cause as the last channel dredge occurred in 1911 (USACE, 2005). There are no major mooring fields in this assessment zone. Per the assessment methodology, the Squamscott River should be considered impaired for significant eelgrass loss. The previous assessment by DES (DES, 2008b) came to the same conclusion.

UPPER PISCATAQUA RIVER

The historic maps of eelgrass in the Upper Piscataqua River show 62.0 acres of habitat on the New Hampshire side of the river in 1948, 17.7 acres on the Maine side of the river in 1962, and 42.2 acres on the New Hampshire side in 1980-1981. Combining the acreages from the New Hampshire and Maine sides of the river in 1948 and 1962, respectively, the historic coverage of eelgrass in this zone was 79.7 acres. Median eelgrass cover for the 2006-2008 period was 0 acres. Therefore, 100% of the eelgrass cover in this area has been lost. The cause of the eelgrass loss is unknown. Dredging is not a possible cause as major dredging has not occurred in this assessment zone (USACE, 2005). There are several large mooring fields in this assessment zone that seem to overlap with potential eelgrass habitat. Per the assessment methodology, the Upper Piscataqua River should be considered impaired for significant eelgrass loss. The previous assessment by DES (DES, 2008b) came to the same conclusion.

WINNICUT RIVER

The historic maps of eelgrass do not show eelgrass cover in the Winnicut River. Linear regression of eelgrass cover from 1990 to 2008 detected a significant decreasing trend at the 0.05 significance level (Figure 2). The trend indicates that at least 64% of the eelgrass cover in this assessment unit was lost as of 2008. The trend was evaluated for the 1990-2008 period because the eelgrass populations in the whole estuary were devastated in 1988-1989 due to an infestation of the slime mold, *Labryinthula zostera*, commonly called “wasting disease” (Muehlstein et al., 1991). Per the assessment methodology, the Winnicut River should be considered impaired for significant eelgrass loss. The cause of the eelgrass loss is unknown. Dredging is not a possible cause as there are no records of major dredging operations in Winnicut River (USACE, 2005). There are no major mooring fields in this assessment zone. The previous assessment by DES (DES, 2008b) came to the same conclusion.

Evaluation of Nitrogen and Eutrophic Response Data

DES applied the assessment methodology to the nitrogen and eutrophic response data for all sections of the Great Bay Estuary. The raw data and the results of the assessments for each assessment zone are summarized in Table 4. Impairments due to nitrogen were found in 11 of the 18 assessment zones. In the following sections, the nitrogen indicator and response variables as well as the eelgrass data for each assessment zone has been summarized.

BELLAMY RIVER (Table 4A)

Relative to the dissolved oxygen criteria (Env-Wq 1703.07), sufficient data were available for dissolved oxygen, total nitrogen, and chlorophyll-a. All of these indicators met their individual criteria for Full Support. There were no conflicting results between the indicators. Therefore, following the decision matrix in Table 2, nitrogen concentrations in the Bellamy River were categorized as Fully Supporting (Category 2-M) relative to preventing violations of the dissolved oxygen standard.

Relative to the Biological and Aquatic Community Integrity criteria as manifested by significant eelgrass loss (Env-Wq 1703.19), sufficient data were available for eelgrass assessments and total nitrogen. Both of these indicators were categorized as impaired (Non Support) based on their individual criteria. There were no conflicting results between the indicators. Therefore, following the decision matrix in Table 2, nitrogen concentrations in the Bellamy River were categorized as Not Supporting (Category 5-M) relative to preventing significant eelgrass loss.

There can be only one category assigned to nitrogen for the Aquatic Life designated use. The lower (i.e., worse) category of the two was used in the Assessment Database. For this assessment zone, the lower category for nitrogen was the one for the protection of Biological and Aquatic Community Integrity.

BERRYS BROOK (Table 4B)

Data were incomplete or absent for all of the indicators. Therefore, the category for nitrogen in Berrys Brook is Insufficient Information (Category 3-ND).

COCHECO RIVER (Table 4C)

Relative to the dissolved oxygen criteria (Env-Wq 1703.07), sufficient data were available for assessments for dissolved oxygen, dissolved oxygen saturation, total nitrogen, and chlorophyll-a. The dissolved oxygen and dissolved oxygen saturation measurements met their individual criteria for Full Support. However, the total nitrogen and chlorophyll-a indicators were categorized as impaired (Non Support) based on their individual criteria. The dissolved oxygen measurements are all from grab samples, mostly collected by volunteers. There were no high frequency datasonde measurements of dissolved oxygen to more accurately characterize dissolved oxygen in the waterbody. The median total nitrogen concentrations were 70% higher than the threshold for Non Support. Even though there were more measurements of dissolved oxygen, DES feels that the quality and representativeness of the total nitrogen data are better

than the dissolved oxygen data. Therefore, DES has determined that the Cocheco River should be classified as Not Supporting (Category 5-P) for nitrogen relative to preventing violations of the dissolved oxygen standard. The assignment of this category deviates from the decision matrix shown in Table 2 but is justified based on the extremely high nitrogen concentrations and the absence of datasonde measurements of dissolved oxygen. Obtaining high frequency, in-situ observation of dissolved oxygen in the Cocheco River should be a priority.

Relative to the Biological and Aquatic Community Integrity criteria as manifested by significant eelgrass loss (Env-Wq 1703.19), eelgrass is not known to have been present in the Cocheco River. Therefore, this assessment zone was not evaluated for significant eelgrass loss.

GREAT BAY (Table 4D)

Relative to the dissolved oxygen criteria (Env-Wq 1703.07), sufficient data were available for dissolved oxygen, dissolved oxygen saturation, total nitrogen, and chlorophyll-a. The assessments of the individual indicators of dissolved oxygen, chlorophyll-a, and nitrogen produced conflicting results.

The Great Bay was categorized as Not Supporting for dissolved oxygen based on datasonde measurements at station GRBGB. The daily minimum dissolved oxygen standard was only violated on 1.2% of the days with data. However, the daily minimum fell below the Magnitude of Exceedence (MAGEXC) criterion of 4.5 mg/L on three days in May 2004. These MAGEXC violations were sufficient to trigger a Non Support determination per the CALM. The absence of any other low dissolved oxygen events since 2004 makes this impairment questionable. With newer data, the 2010 305b/303d assessments may show that this impairment should be delisted.

The chlorophyll-a and nitrogen indicators met their respective criteria to be considered Fully Supporting, but just barely. The median nitrogen concentration in the Great Bay was 0.42 mg/L, compared to the criterion of 0.45 mg/L. The 90^{th} percentile chlorophyll-a concentration was 8.35 ug/L, compared to the criterion of 10 ug/L.

When the nutrient and response indicators are conflicting, the decision matrix from Table 2 shows that the assessment zone should be classified as Insufficient Information. Therefore, following the decision matrix in Table 2, nitrogen concentrations in the Great Bay were categorized as Insufficient Information (Category 3-PNS) relative to preventing violations of the dissolved oxygen standard.

Relative to the Biological and Aquatic Community Integrity criteria as manifested by significant eelgrass loss (Env-Wq 1703.19), sufficient data were available for eelgrass assessments, total nitrogen, and water clarity. All of these indicators were categorized as impaired (Non Support) based on their individual criteria. There were no conflicting results between the indicators. Therefore, following the decision matrix in Table 2, nitrogen concentrations in the Great Bay were categorized as Not Supporting (Category 5-M) relative to preventing significant eelgrass loss.

There can be only one category assigned to nitrogen for the Aquatic Life designated use. The lower (i.e., worse) category of the two was used in the Assessment Database. For this assessment zone, the lower category for nitrogen was the one for the protection of Biological and Aquatic Community Integrity.

LAMPREY RIVER (Table 4E)

Relative to the dissolved oxygen criteria (Env-Wq 1703.07), sufficient data were available for dissolved oxygen, dissolved oxygen saturation, total nitrogen, and chlorophyll-a. All of these indicators were categorized as impaired (Non Support) based on their individual criteria. There were no conflicting results between the indicators. Therefore, following the decision matrix in Table 2, nitrogen concentrations in the Lamprey River were categorized as Non Supporting (Category 5-M) relative to preventing violations of the dissolved oxygen standard.

Relative to the Biological and Aquatic Community Integrity criteria as manifested by significant eelgrass loss (Env-Wq 1703.19), sufficient data were available for assessments for eelgrass assessments, total nitrogen, and water clarity. All of these indicators were categorized as impaired (Non Support) based on their individual criteria. There were no conflicting results between the indicators. Therefore, following the decision matrix in Table 2, nitrogen concentrations in the Lamprey River were categorized as Not Supporting (Category 5-P) relative to preventing significant eelgrass loss.

There can be only one category assigned to nitrogen for the Aquatic Life designated use. The lower (i.e., worse) category of the two was used in the Assessment Database. For this assessment zone, the lower category for nitrogen was the one for the protection of Biological and Aquatic Community Integrity.

LITTLE BAY (Table 4F)

Relative to the dissolved oxygen criteria (Env-Wq 1703.07), sufficient data were available for assessments for dissolved oxygen, dissolved oxygen saturation, total nitrogen, and chlorophyll-a. All of these indicators met their individual criteria for Full Support. There were no conflicting results between the indicators. Therefore, following the decision matrix in Table 2, nitrogen concentrations in Little Bay were categorized as Fully Supporting (Category 2-M) relative to preventing violations of the dissolved oxygen standard.

Relative to the Biological and Aquatic Community Integrity criteria as manifested by significant eelgrass loss (Env-Wq 1703.19), sufficient data were available for assessments for eelgrass assessments, total nitrogen, and water clarity. All of these indicators were categorized as impaired (Non Support) based on their individual criteria. There were no conflicting results between the indicators. Therefore, following the decision matrix in Table 2, nitrogen concentrations in Little Bay were categorized as Not Supporting (Category 5-M) relative to preventing significant eelgrass loss.

There can be only one category assigned to nitrogen for the Aquatic Life designated use. The lower (i.e., worse) category of the two was used in the Assessment Database. For this

assessment zone, the lower category for nitrogen was the one for the protection of Biological and Aquatic Community Integrity.

LITTLE HARBOR/BACK CHANNEL (Table 4G)

Relative to the dissolved oxygen criteria (Env-Wq 1703.07), sufficient data were available for assessments for dissolved oxygen, total nitrogen, and chlorophyll-a. All of these indicators met their individual criteria for Full Support. There were no conflicting results between the indicators. Therefore, following the decision matrix in Table 2, nitrogen concentrations in Little Harbor/Back Channel were categorized as Fully Supporting (Category 2-G) relative to preventing violations of the dissolved oxygen standard.

Relative to the Biological and Aquatic Community Integrity criteria as manifested by significant eelgrass loss (Env-Wq 1703.19), sufficient data were available for assessments for eelgrass assessments, total nitrogen, and water clarity. All of these indicators were categorized as impaired (Non Support) based on their individual criteria. There were no conflicting results between the indicators. Therefore, following the decision matrix in Table 2, nitrogen concentrations in Little Bay were categorized as Not Supporting (Category 5-M) relative to preventing significant eelgrass loss.

There can be only one category assigned to nitrogen for the Aquatic Life designated use. The lower (i.e., worse) category of the two was used in the Assessment Database. For this assessment zone, the lower category for nitrogen was the one for the protection of Biological and Aquatic Community Integrity.

LOWER PISCATAQUA RIVER NORTH (Table 4H)

Relative to the dissolved oxygen criteria (Env-Wq 1703.07), sufficient data were available for dissolved oxygen and dissolved oxygen saturation. Both of these indicators met their individual criteria for Full Support. There were insufficient data for assessments of the chlorophyll-a and total nitrogen indicators. Therefore, following the decision matrix in Table 2, nitrogen concentrations in the Lower Piscataqua River North were categorized as Insufficient Information (Category 3-PAS) relative to preventing violations of the dissolved oxygen standard.

Relative to the Biological and Aquatic Community Integrity criteria as manifested by significant eelgrass loss (Env-Wq 1703.19), sufficient data were available for eelgrass assessments. This indicator showed that significant eelgrass loss has occurred. However, there were insufficient data for total nitrogen and water clarity. Therefore, following the decision matrix in Table 2, nitrogen concentrations in the Lower Piscataqua River North were categorized as Insufficient Information (Category 3-PNS) relative to preventing significant eelgrass loss.

There can be only one category assigned to nitrogen for the Aquatic Life designated use. The lower (i.e., worse) category of the two was used in the Assessment Database. For this assessment zone, the lower category for nitrogen was the one for the protection of Biological and Aquatic Community Integrity.

LOWER PISCATAQUA RIVER SOUTH (Table 4I)

Relative to the dissolved oxygen criteria (Env-Wq 1703.07), sufficient data were available for assessments for dissolved oxygen, total nitrogen, and chlorophyll-a. All of these indicators met their individual criteria for Full Support. There were no conflicting results between the indicators. Therefore, following the decision matrix in Table 2, nitrogen concentrations in the Lower Piscataqua River South were categorized as Fully Supporting (Category 2-G) relative to preventing violations of the dissolved oxygen standard.

Relative to the Biological and Aquatic Community Integrity criteria as manifested by significant eelgrass loss (Env-Wq 1703.19), sufficient data were available for assessments for eelgrass assessments and total nitrogen. There were conflicting results between the indicators. The estuarine bioassessments indicator showed significant eelgrass loss in this assessment zone. In contrast, the total nitrogen concentration met the criteria for Full Support for a 2 meter restoration depth. Given the conflict between the two indicators and following the decision matrix in Table 2, nitrogen concentrations in the Lower Piscataqua River South were categorized as Insufficient Information (Category 3-PNS) relative to preventing significant eelgrass loss.

There can be only one category assigned to nitrogen for the Aquatic Life designated use. The lower (i.e., worse) category of the two was used in the Assessment Database. For this assessment zone, the lower category for nitrogen was the one for the protection of Biological and Aquatic Community Integrity.

NORTH MILL POND (Table 4J)

Relative to the dissolved oxygen criteria (Env-Wq 1703.07), sufficient data were available for assessments for dissolved oxygen and dissolved oxygen saturation. These meet their individual criteria for Full Support. However, there were insufficient data for the total nitrogen and chlorophyll-a indicators. Therefore, following the decision matrix in Table 2, nitrogen concentrations in North Mill Pond were categorized as Insufficient Information (Category 3-PAS) relative to preventing violations of the dissolved oxygen standard.

Relative to the Biological and Aquatic Community Integrity criteria as manifested by significant eelgrass loss (Env-Wq 1703.19), data were incomplete or absent for all of the indicators. Therefore, following the decision matrix in Table 2, nitrogen concentrations in North Mill Pond were categorized as Insufficient Information (Category 3-PNS) relative to preventing significant eelgrass loss.

There can be only one category assigned to nitrogen for the Aquatic Life designated use. The lower (i.e., worse) category of the two was used in the Assessment Database. For this assessment zone, the lower category for nitrogen was the one for the protection of Biological and Aquatic Community Integrity.

OYSTER RIVER (Table 4K)

Relative to the dissolved oxygen criteria (Env-Wq 1703.07), sufficient data were available for assessments for dissolved oxygen, dissolved oxygen saturation, total nitrogen, and chlorophyll-a. All of these indicators were categorized as impaired (Non Support) based on their individual criteria. There were no conflicting results between the indicators. Therefore, following the decision matrix in Table 2, nitrogen concentrations in the Oyster River were categorized as Non Supporting (Category 5-M) relative to preventing violations of the dissolved oxygen standard.

Relative to the Biological and Aquatic Community Integrity criteria as manifested by significant eelgrass loss (Env-Wq 1703.19), sufficient data were available for assessments for eelgrass assessments, total nitrogen, and water clarity. All of these indicators were categorized as impaired (Non Support) based on their individual criteria. There were no conflicting results between the indicators. Therefore, following the decision matrix in Table 2, nitrogen concentrations in the Lamprey River were categorized as Not Supporting (Category 5-P) relative to preventing significant eelgrass loss.

There can be only one category assigned to nitrogen for the Aquatic Life designated use. The lower (i.e., worse) category of the two was used in the Assessment Database. For this assessment zone, the lower category for nitrogen was the one for the protection of Biological and Aquatic Community Integrity.

PORTSMOUTH HARBOR (Table 4L)

Relative to the dissolved oxygen criteria (Env-Wq 1703.07), sufficient data were available for assessments for dissolved oxygen, dissolved oxygen saturation, total nitrogen, and chlorophyll-a. All of these indicators meet their individual criteria for Full Support. There were no conflicting results between the indicators. Therefore, following the decision matrix in Table 2, nitrogen concentrations in Portsmouth Harbor were categorized as Fully Supporting (Category 2-G) relative to preventing violations of the dissolved oxygen standard.

Relative to the Biological and Aquatic Community Integrity criteria as manifested by significant eelgrass loss (Env-Wq 1703.19), sufficient data were available for assessments for eelgrass assessments, total nitrogen, and water clarity. The total nitrogen and water clarity indicators were categorized as impaired (Non Support) based on their individual criteria. The eelgrass bioassessment indicator was classified as Threatened. The combination of these indicators supports a classification of Not Supporting relative to preventing significant eelgrass loss. Therefore, following the decision matrix in Table 2, nitrogen concentrations in Portsmouth Harbor were categorized as Not Supporting (Category 5-M) relative to preventing significant eelgrass loss.

There can be only one category assigned to nitrogen for the Aquatic Life designated use. The lower (i.e., worse) category of the two was used in the Assessment Database. For this assessment zone, the lower category for nitrogen was the one for the protection of Biological and Aquatic Community Integrity.

SAGAMORE CREEK (Table 4M)

Relative to the dissolved oxygen criteria (Env-Wq 1703.07), sufficient data were available for assessments for dissolved oxygen only, which met the criteria for Full Support. However, there were insufficient data for the total nitrogen and chlorophyll-a indicators. Therefore, following the decision matrix in Table 2, nitrogen concentrations in Sagamore Creek were categorized as Insufficient Information (Category 3-PAS) relative to preventing violations of the dissolved oxygen standard.

Relative to the Biological and Aquatic Community Integrity criteria as manifested by significant eelgrass loss (Env-Wq 1703.19), sufficient data were available for assessments for eelgrass assessments. This indicator showed that significant eelgrass loss has occurred and was categorized as impaired (Non Support). However, there were insufficient data for total nitrogen and water clarity. Therefore, following the decision matrix in Table 2, nitrogen concentrations in Sagamore Creek were categorized as Insufficient Information (Category 3-PNS) relative to preventing significant eelgrass loss.

There can be only one category assigned to nitrogen for the Aquatic Life designated use. The lower (i.e., worse) category of the two was used in the Assessment Database. For this assessment zone, the lower category for nitrogen was the one for the protection of Biological and Aquatic Community Integrity.

SALMON FALLS RIVER (Table 4N)

Relative to the dissolved oxygen criteria (Env-Wq 1703.07), sufficient data were available for assessments for dissolved oxygen, dissolved oxygen saturation, total nitrogen, and chlorophyll-a. All of these indicators were categorized as impaired (Non Support) based on their individual criteria. There were no conflicting results between the indicators. Therefore, following the decision matrix in Table 2, nitrogen concentrations in the Salmon Falls River were categorized as Not Supporting (Category 5-M) relative to preventing violations of the dissolved oxygen standard.

Relative to the Biological and Aquatic Community Integrity criteria as manifested by significant eelgrass loss (Env-Wq 1703.19), eelgrass is not known to have been present in the Salmon Falls River. Therefore, this assessment zone was not evaluated for significant eelgrass loss.

SOUTH MILL POND (Table 4O)

Relative to the dissolved oxygen criteria (Env-Wq 1703.07), sufficient data were available for assessments for dissolved oxygen and dissolved oxygen saturation. These indicators provided conflicting results. The daily average dissolved oxygen saturation indicator met the criteria for Full Support while the daily minimum dissolved oxygen indicator was categorized as impaired (Non Support). .There were insufficient data for the total nitrogen and chlorophyll-a indicators. The conflicting results in the dissolved oxygen indicators and the absence of total nitrogen and chlorophyll-a indicators supports a classification of Insufficient Information for nitrogen relative to preventing violations of dissolved oxygen. Therefore, following the decision matrix in Table

2, nitrogen concentrations in South Mill Pond were categorized as Insufficient Information (Category 3-PNS) relative to preventing violations of the dissolved oxygen standard.

Relative to the Biological and Aquatic Community Integrity criteria as manifested by significant eelgrass loss (Env-Wq 1703.19), data were incomplete or absent for all of the indicators. Therefore, following the decision matrix in Table 2, nitrogen concentrations in South Mill Pond were categorized as Insufficient Information (Category 3-ND) relative to preventing significant eelgrass loss.

There can be only one category assigned to nitrogen for the Aquatic Life designated use. The lower (i.e., worse) category of the two was used in the Assessment Database. For this assessment zone, the lower category for nitrogen was the one for the protection of dissolved oxygen.

SQUAMSCOTT RIVER (Table 4P)

Relative to the dissolved oxygen criteria (Env-Wq 1703.07), sufficient data were available for assessments for dissolved oxygen, dissolved oxygen saturation, total nitrogen, and chlorophyll-a. All of these indicators except for the dissolved oxygen saturation indicator were categorized as impaired (Non Support) based on their individual criteria. The dissolved oxygen saturation indicator met the criteria for Fully Supporting. This discrepancy is explained by the large diurnal swings in dissolved oxygen that occur in the Squamscott River. These daily fluctuations cause violations of the daily minimum standard but not necessarily the daily average saturation. Such large diurnal swings are another indicator of eutrophication which is consistent with a Non Supporting classification for nitrogen for the Squamscott River. Therefore, following the decision matrix in Table 2, nitrogen concentrations in the Squamscott River were categorized as Non Supporting (Category 5-P) relative to preventing violations of the dissolved oxygen standard.

Relative to the Biological and Aquatic Community Integrity criteria as manifested by significant eelgrass loss (Env-Wq 1703.19), sufficient data were available for assessments for eelgrass assessments, total nitrogen, and water clarity. All of these indicators were categorized as impaired (Non Support) based on their individual criteria. There were no conflicting results between the indicators. Therefore, following the decision matrix in Table 2, nitrogen concentrations in the Squamscott River were categorized as Not Supporting (Category 5-P) relative to preventing significant eelgrass loss.

There can be only one category assigned to nitrogen for the Aquatic Life designated use. The lower (i.e., worse) category of the two was used in the Assessment Database. For this assessment zone, the lower category for nitrogen was the one for the protection of Biological and Aquatic Community Integrity.

UPPER PISCATAQUA RIVER (Table 4Q)

Relative to the dissolved oxygen criteria (Env-Wq 1703.07), sufficient data were available for assessments for dissolved oxygen, dissolved oxygen saturation, total nitrogen, and chlorophyll-a.

The dissolved oxygen, dissolved oxygen saturation, and chlorophyll-a indicators met their individual criteria for Full Support. However, the total nitrogen indicator was categorized as impaired (Non Support). The dissolved oxygen data for this assessment were collected from grab samples, not datasondes, with which it is difficult to detect violations. The chlorophyll-a and total nitrogen concentrations were based on large and representative datasets. These conflicting results and the absence of datasonde data for dissolved oxygen are consistent with Insufficient Information as the correct classification for nitrogen for this assessment zone. Therefore, following the decision matrix in Table 2, nitrogen concentrations in the Upper Piscataqua River were categorized as Insufficient Information (Category 3-PNS) relative to preventing violations of the dissolved oxygen standard.

Relative to the Biological and Aquatic Community Integrity criteria as manifested by significant eelgrass loss (Env-Wq 1703.19), sufficient data were available for assessments for eelgrass assessments, total nitrogen, and water clarity. All of these indicators were categorized as impaired (Non Support) based on their individual criteria. There were no conflicting results between the indicators. Therefore, following the decision matrix in Table 2, nitrogen concentrations in the Upper Piscataqua River were categorized as Not Supporting (Category 5-P) relative to preventing significant eelgrass loss.

There can be only one category assigned to nitrogen for the Aquatic Life designated use. The lower (i.e., worse) category of the two was used in the Assessment Database. For this assessment zone, the lower category for nitrogen was the one for the protection of Biological and Aquatic Community Integrity.

WINNICUT RIVER (Table 4R)

Relative to the dissolved oxygen criteria (Env-Wq 1703.07), sufficient data were available for assessments for dissolved oxygen and dissolved oxygen saturation and these indicators met their individual criteria for Full Support. However, there were insufficient data for the total nitrogen and chlorophyll-a indicators. Therefore, following the decision matrix in Table 2, nitrogen concentrations in the Winnicut River were categorized as Insufficient Information (Category 3-ND) relative to preventing violations of the dissolved oxygen standard.

Relative to the Biological and Aquatic Community Integrity criteria as manifested by significant eelgrass loss (Env-Wq 1703.19), sufficient data were available for assessments for eelgrass assessments. This indicator was categorized as impaired (Non Support) based on significant eelgrass loss. However, there were insufficient data for total nitrogen and water clarity. Therefore, following the decision matrix in Table 2, nitrogen concentrations in the Winnicut River were categorized as Insufficient Information (Category 3-PNS) relative to preventing significant eelgrass loss.

There can be only one category assigned to nitrogen for the Aquatic Life designated use. The lower (i.e., worse) category of the two was used in the Assessment Database. For this assessment zone, the lower category for nitrogen was the one for the protection of Biological and Aquatic Community Integrity.

Revised Assessments for Designated Uses in the Lower Piscataqua River

As part of the nutrient criteria development process, DES split the assessment unit for the Lower Piscataqua River in half. This assessment unit stretched from Dover Point to Pierce Island and could not reasonably be considered homogeneous. In order to be consistent with the new assessment units, the 305b/303d assessments for the old assessment unit were redone. The data were split based on whether the sampling station fell in the northern or southern half of the old assessment unit. All parameters for all designated uses were then assessed for the two new assessment units using the protocols in the CALM. The updated eelgrass assessments and assessments of nitrogen and eutrophication indicators were evaluated in the previous sections already. NHEST600031001-02-01 is Lower Piscataqua River North and NHEST600031001-02-02 is Lower Piscataqua River South.

PRIMARY CONTACT RECREATION

In NHEST600031001-02-01:

- The category for chlorophyll-a changed from 2-G to 3-PAS. Most of the data for chlorophyll-a were from the other assessment unit.
- The category for enterococcus changed from 5-P to 2-G. A total of 10 enterococcus samples were collected (9 in the critical period). The concentrations in all of the samples were less than 75% of the single sample criterion. The 5-P category for this assessment unit was due to two MAGEXC violations at a station in the other assessment unit and discharges of untreated sewage from combined sewer overflows, also in the other assessment unit. This impairment was retained for NHEST600031001-02-02.

In NHEST600031001-02-02:

- The category for chlorophyll-a and enterococcus did not change.

SECONDARY CONTACT RECREATION

In NHEST600031001-02-01:

- The category for enterococcus changed from 5-P to 2-G. A total of 10 enterococcus samples were collected (9 in the critical period). The concentrations in all of the samples were less than 75% of the single sample criterion. The 5-P category for this assessment unit was due to discharges of untreated sewage from combined sewer overflows in the other assessment unit. This impairment was retained for NHEST600031001-02-02.

In NHEST600031001-02-02:

- The categories for enterococcus did not change.

AQUATIC LIFE

In NHEST600031001-02-01:

- The category for ammonia changed from 2-G to 3-PAS. Most of the data for ammonia were from the other assessment unit.

- The categories for dissolved oxygen, dissolved oxygen saturation, and pH did not change.
- All of the toxic contaminant parameters based on sediment samples did not change categories. All of the sediment samples for the old assessment unit were taken from NHEST600031001-02-01.
- The category for Estuarine Bioassessments (eelgrass loss) did not change.
- The following parameters and categories were added as a result of the numeric nutrient criteria assessments: chlorophyll-a (Category 3-PAS), water clarity (Category 3-PAS), and nitrogen (Category 3-PNS).

In NHEST600031001-02-02:

- The category for pH changed from 2-M to 2-G. The results that exceeded the criteria for pH were all in the other assessment unit.
- The categories for dissolved oxygen, dissolved oxygen saturation, and ammonia did not change.
- All of the toxic contaminant parameters based on sediment samples were removed from this assessment unit. All of the sediment samples for the old assessment unit were taken from NHEST600031001-02-01.
- The category for Estuarine Bioassessments (eelgrass loss) did not change.
- The following parameters and categories were added as a result of the numeric nutrient criteria assessments: chlorophyll-a (Category 2-G), water clarity (Category 3-PAS), and nitrogen (Category 5-M).

FISH CONSUMPTION

There were no changes to any of the parameters. All of the assessments were based on state-wide advisories which are equally applicable to both of the new assessment units.

WILDLIFE

There were no changes to any of the parameters because this designated use was not assessed.

DRINKING WATER

There were no changes to any of the parameters.

SHELLFISHING

There were no changes to any of the parameters. All of the assessments were based on state-wide advisories or NSSP classifications which are equally applicable to both of the new assessment units.

Conclusions and Recommendations

1. There has been significant eelgrass loss in most of the assessment zones of the Great Bay Estuary. Due to the importance of eelgrass for the ecosystem of the estuary, the loss of this habitat constitutes a violation of the Biological Aquatic Community Integrity water quality criteria (Env-Wq1703.19). The specific zones and assessment units that will be considered impaired for "Estuarine Bioassessments" for the Aquatic Life designated use on the 2008 303d List are summarized in Table 6 and shown on Figure 3.

2. The assessments for dissolved oxygen and dissolved oxygen saturation changed for a small number of assessment units. The reason for the changes was that dissolved oxygen data were aggregated into larger assessment zones, instead of the smaller assessment units. Therefore, the changes were mostly conversions from Insufficient Information to either Fully Supporting or Not Supporting. The specific zones and assessment units that will be considered impaired for dissolved oxygen and dissolved oxygen saturation for the Aquatic Life designated use on the 2008 303d List are summarized in Tables 7 and 8.

3. New assessments for chlorophyll-a, water clarity, and total nitrogen relative to the Aquatic Life designated use were added to all of the assessment units in the Great Bay Estuary. More than half of the assessment zones were found to be impaired for nitrogen. In the Cocheco River and the Salmon Falls River, the nitrogen impairment is relative to preventing violations of the dissolved oxygen criteria. In all the other assessment zones, the nitrogen impairment is relative to preventing significant eelgrass loss. The specific zones and assessment units that will be considered impaired for chlorophyll-a, water clarity, and nitrogen for the Aquatic Life designated use on the 2008 303d List are summarized in Tables 9, 10, and 11. Figure 4 shows the nitrogen impairments in the estuary. The new impairments for chlorophyll-a relative to the Aquatic Life designated use do not replace the existing impairments for chlorophyll-a relative to the Primary Contact Recreation designated use.

4. The assessment unit for the Lower Piscataqua River was split into two smaller units. When the data within each of the new assessment units were assessed, the impairments for enterococcus relative to the Primary and Secondary Contact Recreation designated uses were only retained by the Lower Piscataqua River South unit. The enterococcus concentrations in the Lower Piscataqua River North assessment unit were Fully Supporting of these designated uses. All of the data for toxic contaminants in sediment were from the northern unit. Therefore, these parameters were removed from the southern unit. The old and new assessments for each parameter in the two new assessment units are shown on Tables 12 and 13.

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Table 1: Assessment units in each assessment zone of the Great Bay Estuary

AUID	DESCRIPTION	ASSESSMENT ZONE
NHEST600030903-01-01	BELLAMY RIVER NORTH	BELLAMY RIVER
NHEST600030903-01-02	BELLAMY RIVER SOUTH	BELLAMY RIVER
NHEST600031002-01-01	WITCH CREEK	BERRYS BROOK
NHEST600031002-01-02	BERRYS BROOK	BERRYS BROOK
NHEST600030608-01	COCHECO RIVER	COCHECO RIVER
NHEST600030904-02	GREAT BAY PROHIB SZ1	GREAT BAY
NHEST600030904-03	GREAT BAY PROHIB SZ2	GREAT BAY
NHEST600030904-04-02	CROMMENT CREEK	GREAT BAY
NHEST600030904-04-03	PICKERING BROOK	GREAT BAY
NHEST600030904-04-04	FABYAN POINT	GREAT BAY
NHEST600030904-04-05	GREAT BAY CONDITIONALLY APPROVED	GREAT BAY
NHEST600030904-04-06	ADAMS POINT SOUTH CONDITIONALLY APPR	GREAT BAY
NHEST600030709-01	LAMPREY RIVER	LAMPREY RIVER
NHEST600030904-06-10	ADAMS POINT MOORING FIELD SZ	LITTLE BAY
NHEST600030904-06-11	ADAMS POINT TRIB	LITTLE BAY
NHEST600030904-06-12	U LITTLE BAY (SOUTH)	LITTLE BAY
NHEST600030904-06-13	LOWER LITTLE BAY	LITTLE BAY
NHEST600030904-06-14	LOWER LITTLE BAY MARINA SZ	LITTLE BAY
NHEST600030904-06-15	LOWER LITTLE BAY GENERAL SULLIVAN BRIDGE	LITTLE BAY
NHEST600030904-06-16	ULITTLE BAY (NORTH)	LITTLE BAY
NHEST600031001-05	BACK CHANNEL	LITTLE HARBOR/BACK CHANNEL
NHEST600031001-08	WENTWORTH-BY-THE-SEA	LITTLE HARBOR/BACK CHANNEL
NHEST600031002-02	LITTLE HARBOR	LITTLE HARBOR/BACK CHANNEL
NHEST600031001-02-01	LOWER PISCATAQUA RIVER NORTH	LOWER PISCATAQUA RIVER NORTH
NHEST600031001-02-02	LOWER PISCATAQUA RIVER SOUTH	LOWER PISCATAQUA RIVER SOUTH
NHEST600031001-10	NORTH MILL POND	NORTH MILL POND
NHEST600030902-01-01	OYSTER RIVER (JOHNSON CR)	OYSTER RIVER
NHEST600030902-01-02	OYSTER RIVER (BUNKER CR)	OYSTER RIVER
NHEST600030902-01-03	OYSTER RIVER	OYSTER RIVER
NHEST600030904-06-17	OYSTER RIVER MOUTH	OYSTER RIVER
NHEST600031001-11	UPPER PORTSMOUTH HARBOR-NH	PORTSMOUTH HARBOR
NHEST600031001-03	UPPER SAGAMORE CREEK	SAGAMORE CREEK
NHEST600031001-04	LOWER SAGAMORE CREEK	SAGAMORE CREEK
NHEST600030406-01	SALMON FALLS RIVER	SALMON FALLS RIVER
NHEST600031001-09	SOUTH MILL POND	SOUTH MILL POND
NHEST600030806-01	SQUAMSCOTT RIVER	SQUAMSCOTT RIVER
NHEST600031001-01-01	UPPER PISCATAQUA RIVER-NORTH, P/UC, 71.158, AC	UPPER PISCATAQUA RIVER
NHEST600031001-01-02	DOVER WWTF SZ, CLOSED, P/SZ, 208.27, AC	UPPER PISCATAQUA RIVER
NHEST600031001-01-03	UPPER PISCATAQUA RIVER-SOUTH CLOSED, P/UNC, 208.27, AC	UPPER PISCATAQUA RIVER
NHEST600030904-01	WINNICUT RIVER	WINNICUT RIVER

Table 2: Decision matrix to assign a category for nitrogen for estuarine assessment units using the results from both response and nitrogen indicators

<table>
<tr><td></td><td></td><td colspan="5">Nutrient Indicator</td></tr>
<tr><td></td><td></td><td>Category 5
(Not Supporting)</td><td>Category 2
(Fully Supporting)</td><td colspan="3">Category 3
(Insufficient Information)</td></tr>
<tr><td rowspan="4">Response Indicator</td><td>Category 5
(Not Supporting)</td><td>Category 5</td><td>Category 3-PNS</td><td colspan="3">Category 3-PNS</td></tr>
<tr><td>Category 2
(Fully Supporting)</td><td>Category 3-PNS</td><td>Category 2</td><td colspan="3">Category 3 (See Note 2)</td></tr>
<tr><td rowspan="4">Category 3
(Insufficient Information)</td><td rowspan="4">If Response Indicator is 3-PNS, then Category 5.

If Response Indicator is 3-PAS or 3-ND, then Category 3-PNS.

See Note 3</td><td rowspan="4">If Response Indicator is 3-PAS, then Category 2.

If Response Indicator is 3-PNS or 3-ND, then Category 3-PAS.

See Note 3</td><td></td><td>3-ND</td><td>3-PAS</td><td>3-PNS</td></tr>
<tr><td>3-ND</td><td>3-ND</td><td>3-PAS</td><td>3-PNS</td></tr>
<tr><td>3-PAS</td><td>3-ND</td><td>3-PAS</td><td>Note 4</td></tr>
<tr><td>3-PNS</td><td>3-ND</td><td>Note 4</td><td>3-PNS</td></tr>
</table>

Note 1: If the conditions warrant, DES reserves the right to deviate from this matrix.

Note 2: The category for the nutrient will be 3-PAS, 3-PNS, or 3-ND based on the assessment of the nutrient indicator.

Note 3: If there are incomplete data for the response indicator which are consistent with the category for the nutrient indicator, then the category for the nutrient indicator will be used. If the incomplete data for the response indicator are inconsistent with the nutrient indicator or if there are no data for the response indicator, the category for the nutrient will be 3-PNS or 3-PAS as shown in the matrix.

Note 4: In the case where there are incomplete or missing data for both the nutrient and the response indicators, the sub-table in the lower right corner will be used. The category for the nutrient indicator will be used for the nutrient category except for the two cases marked by Note 4. For these cases, where the available data for the response indicator and nutrient indicator conflict, the category for the higher quality dataset will be used. If data quality is the same for the two indicators, then the category for the nutrient indicator will be used.

Table 3: Eelgrass cover in different zones of the Great Bay Estuary (acres)

Year	Winnicut River	Squamscott River	Lamprey River	Oyster River	Bellamy River	Great Bay	Little Bay	Upper Piscataqua River*	Lower Piscataqua River (N)*	Lower Piscataqua River (S)*	Portsmouth Harbor*	Little Harbor	Sagamore Creek
1948	0.0	42.1	53.4	182.5	66.9	263.9	76.5	62.0	a	a	a	a	a
1962	a	a	a	a	a	a	a	17.7	20.0	21.8	a	a	a
1980-1981	a	a	a	a	36.0	1217.4	408.7	42.2	75.9	10.7	a	a	a
1981	0.0	0.0	0.0	a	3.4	2131.4	252.0	0.5	60.1	5.1	227.7	68.8	4.1
1986	2.2	0.0	0.0	a	a	2015.2	a	a	a	a	a	a	a
1987	2.2	0.0	0.0	a	a	1685.7	a	a	a	a	a	a	a
1988	0.0	0.0	0.0	a	a	1187.5	a	a	a	a	a	a	a
1989	0.0	0.0	0.0	a	a	312.6	a	a	a	a	a	a	a
1990	15.9	0.0	0.0	a	a	2024.2	a	a	a	a	a	a	a
1991	23.4	0.0	0.0	a	a	2255.8	a	a	a	a	a	a	a
1992	7.3	0.0	0.0	a	a	2334.4	a	a	a	a	a	a	a
1993	6.9	0.0	0.0	a	a	2444.9	a	a	a	a	a	a	a
1994	13.8	0.0	0.0	a	a	2434.3	a	a	a	a	a	a	a
1995	7.8	0.0	0.0	a	a	2224.9	a	a	a	a	a	a	a
1996	7.6	0.0	0.0	14.0	0.0	2495.4	32.7	1.6	20.9	10.2	245.6	70.1	1.8
1997	7.5	0.0	0.0	a	a	2297.8	a	a	a	a	a	a	a
1998	10.0	0.0	0.0	a	a	2387.8	a	a	a	a	a	a	a
1999	10.2	0.0	0.0	0.0	0.0	2119.5	26.2	0.5	7.4	4.0	244.0	50.1	3.0
2000	0.0	0.0	0.0	0.0	0.0	1944.5	7.5	1.6	3.8	7.6	260.5	60.9	0.9
2001	4.1	0.0	0.0	0.0	0.0	2388.2	10.9	2.0	9.7	10.7	274.2	45.3	2.2
2002	3.5	0.0	0.0	0.0	0.0	1791.8	4.3	0.5	8.0	9.3	268.9	63.1	2.3
2003	3.5	0.0	2.2	0.0	0.0	1620.9	14.2	2.9	22.9	9.2	270.1	54.7	2.2
2004	4.2	0.0	0.0	0.0	0.8	2043.3	12.8	0.7	13.6	6.5	225.2	65.9	2.5
2005	9.2	0.0	0.0	0.0	0.0	2201.2	25.8	0.4	14.6	9.6	232.5	50.8	6.1
2006	0.8	0.0	0.0	0.0	0.0	1320.7	12.2	0.8	10.8	11.6	217.6	52.1	0.9
2007	0.0	0.0	0.0	0.0	0.0	1246.1	0.1	0.0	0.4	5.6	201.3	42.7	0.6
2008	0.0	0.0	0.0	0.0	0.0	1395.1	0.0	0.0	0.0	3.9	183.8	41.4	2.3
2006-2008 median	0.0	0.0	0.0	0.0	0.0	1320.7	0.1	0.0	0.4	5.6	201.3	42.7	0.9
Percent Change: Historic to '06-'08	NA	-100%	-100%	-100%	-100%	-38%	-100%	-100%	-99%	-83%	-12%	-38%	-78%
Significant Decrease Since 1990	Yes (-64%)	NA	NA	NA	NA	Yes (-12%)	Yes (-30%)	No	No	No	Yes (-5%)	Yes (-9%)	No
Listing	Impaired	Impaired	Impaired	Impaired	Impaired	Impaired	Impaired	Impaired	Impaired	Impaired	Threatened	Impaired	Impaired

a = not mapped NA = not analyzed * The 1948 and 1980-1981 surveys only covered the NH side of the river. The 1962 survey only covered the ME side.

* The acreages for 1996-2008 include beds from both the NH and ME sides of the river but not the tidal creeks along the Maine shore.

Eelgrass has not been mapped in North Mill Pond, South Mill Pond, Berrys Brook, Salmon Falls River, and Cocheco River. These assessment zones were left off this table.

Table 4: Summary of data for nitrogen and eutrophication parameters in each assessment zone relative to the Aquatic Life designated use

Table 4A

Assessment Zone	Relevant Water Quality Standard	Indicator	Results	Category
BELLAMY RIVER	Dissolved Oxygen (Env-Wq 1703.07)	Chlorophyll-a	90th %ile=6.68 ug/L (n=53). Per CALM list as 2-G.	2-G
BELLAMY RIVER	Dissolved Oxygen (Env-Wq 1703.07)	Dissolved Oxygen	A total of 66 measurements collected (37 in CP). 0 violations of SSMC. Per CALM list as 2-G.	2-G
BELLAMY RIVER	Dissolved Oxygen (Env-Wq 1703.07)	Dissolved Oxygen Saturation	No data. Per CALM list as 3-ND.	3-ND
BELLAMY RIVER	Dissolved Oxygen (Env-Wq 1703.07)	Nitrogen	Median=0.434 mg/L (n=38). Per CALM list as 2-M.	2-M
BELLAMY RIVER	Biological and Aquatic Community Integrity (Env-Wq 1703.19)	Estuarine Bioassessments (eelgrass)	The long term trend in eelgrass loss relative to historic eelgrass cover is Significant Decline (-100%). The trend in recent years (since 1990) is Not Available.	5-P
BELLAMY RIVER	Biological and Aquatic Community Integrity (Env-Wq 1703.19)	Light Attenuation Coefficient (Water Clarity)	No data. For an eelgrass restoration depth of 2 m, the light attenuation coefficient criterion is 0.75 m^-1. Per CALM list as 3-ND.	3-ND
BELLAMY RIVER	Biological and Aquatic Community Integrity (Env-Wq 1703.19)	Nitrogen	Median=0.434 mg/L (n=38). For an eelgrass restoration depth of 2 m, the nitrogen criterion is 0.3 mg/L. Per CALM list as 5-M.	5-M

* The lower (worse) of the two categories for nitrogen will be included in the assessment database.

Table 4B

Assessment Zone	Relevant Water Quality Standard	Indicator	Results	Category
BERRYS BROOK	Dissolved Oxygen (Env-Wq 1703.07)	Chlorophyll-a	90th %ile=0 ug/L (n=0). Per CALM list as 3-ND.	3-ND
BERRYS BROOK	Dissolved Oxygen (Env-Wq 1703.07)	Dissolved Oxygen	No data. Per CALM list as 3-ND.	3-ND
BERRYS BROOK	Dissolved Oxygen (Env-Wq 1703.07)	Dissolved Oxygen Saturation	No data. Per CALM list as 3-ND.	3-ND
BERRYS BROOK	Dissolved Oxygen (Env-Wq 1703.07)	Nitrogen	No data. Per CALM list as 3-ND.	3-ND
BERRYS BROOK	Biological and Aquatic Community Integrity (Env-Wq 1703.19)	Estuarine Bioassessments (eelgrass)	The long term trend in eelgrass loss relative to historic eelgrass cover is Not Available. The trend in recent years (since 1990) is Not Available.	3-ND
BERRYS BROOK	Biological and Aquatic Community Integrity (Env-Wq 1703.19)	Light Attenuation Coefficient (Water Clarity)	No data. For an eelgrass restoration depth of 2 m, the light attenuation coefficient criterion is 0.75 m^-1. Per CALM list as 3-ND.	3-ND
BERRYS BROOK	Biological and Aquatic Community Integrity (Env-Wq 1703.19)	Nitrogen	No data. For an eelgrass restoration depth of 2 m, the nitrogen criterion is 0.3 mg/L. Per CALM list as 3-ND.	3-ND

* The lower (worse) of the two categories for nitrogen will be included in the assessment database.

Table 4C

Assessment Zone	Relevant Water Quality Standard	Indicator	Results	Category
COCHECO RIVER	Dissolved Oxygen (Env-Wq 1703.07)	Chlorophyll-a	90th %ile=11.914 ug/L (n=32). Per CALM list as 5-M.	5-M
COCHECO RIVER	Dissolved Oxygen (Env-Wq 1703.07)	Dissolved Oxygen	203 grab samples were collected (107 in the critical period). One of the 203 samples violated the SSMC and MAGEXC. Per CALM list as 2-M.	2-M
COCHECO RIVER	Dissolved Oxygen (Env-Wq 1703.07)	Dissolved Oxygen Saturation	A total of 79 daily average concentrations were calculated from grab samples collected on high and low tides. None of the averages violated the criterion. Per CALM list as 2-G.	2-G
COCHECO RIVER	Dissolved Oxygen (Env-Wq 1703.07)	Nitrogen	Median=0.763 mg/L (n=21). Per CALM list as 5-P.	5-P**
COCHECO RIVER	Biological and Aquatic Community Integrity (Env-Wq 1703.19)	Estuarine Bioassessments (eelgrass)	Eelgrass is not known to have existed in this assessment zone. Therefore, this indicator does not apply.	NA
COCHECO RIVER	Biological and Aquatic Community Integrity (Env-Wq 1703.19)	Light Attenuation Coefficient (Water Clarity)	Eelgrass is not known to have existed in this assessment zone. Therefore, this indicator does not apply.	NA
COCHECO RIVER	Biological and Aquatic Community Integrity (Env-Wq 1703.19)	Nitrogen	Eelgrass is not known to have existed in this assessment zone. Therefore, this indicator does not apply.	NA

* The lower (worse) of the two categories for nitrogen will be included in the assessment database.
** Category assignment does not follow decision matrix in Table 2. See explanation in text.

Table 4D

Assessment Zone	Relevant Water Quality Standard	Indicator	Results	Category
GREAT BAY	Dissolved Oxygen (Env-Wq 1703.07)	Chlorophyll-a	90th %ile=8.349 ug/L (n=114). Per CALM list as 2-M.	2-M
GREAT BAY	Dissolved Oxygen (Env-Wq 1703.07)	Dissolved Oxygen	Daily minimum DO was measured by datasondes on 518 days. The SSMC was violated on 6 days (1.2%). The MAGEXC was violated on 3 days. Per CALM, list as 5-P. Impairment is based on 3 dates in May 2004 when the daily minimum DO fell below 4.5 mg/L (stn GRBGB and installation GB04-02).	5-P
GREAT BAY	Dissolved Oxygen (Env-Wq 1703.07)	Dissolved Oxygen Saturation	Daily average DO measurements made by datasondes on 453 days. The daily average standard was violated on 3 days (0.7%). No MAGEXC violations. Per CALM, list as 2-M.	2-M
GREAT BAY	Dissolved Oxygen (Env-Wq 1703.07)	Nitrogen	Median=0.421 mg/L (n=82). Per CALM list as 2-M. However, given the measurements of low dissolved oxygen and the decision matrix in Table 2, list as 3-PNS.	3-PNS
GREAT BAY	Biological and Aquatic Community Integrity (Env-Wq 1703.19)	Estuarine Bioassessments (eelgrass)	The long term trend in eelgrass loss relative to historic eelgrass cover is Significant Decline (-38%). The trend in recent years (since 1990) is Decline (-12%).	5-P
GREAT BAY	Biological and Aquatic Community Integrity (Env-Wq 1703.19)	Light Attenuation Coefficient (Water Clarity)	Median=1.14 m^-1 (n=45). For an eelgrass restoration depth of 2 m, the light attenuation coefficient criterion is 0.75 m^-1. Per CALM list as 5-P.	5-P
GREAT BAY	Biological and Aquatic Community Integrity (Env-Wq 1703.19)	Nitrogen	Median=0.421 mg/L (n=82). For an eelgrass restoration depth of 2 m, the nitrogen criterion is 0.3 mg/L. Per CALM list as 5-M.	5-M

* The lower (worse) of the two categories for nitrogen will be included in the assessment database.

Table 4E

Assessment Zone	Relevant Water Quality Standard	Indicator	Results	Category
LAMPREY RIVER	Dissolved Oxygen (Env-Wq 1703.07)	Chlorophyll-a	90th %ile=14.297 ug/L (n=110). Per CALM list as 5-M.	5-M
LAMPREY RIVER	Dissolved Oxygen (Env-Wq 1703.07)	Dissolved Oxygen	Evaluation is based on sonde data, not grab samples Sonde data is the preferred data source. When sonde data is available, the sonde data should be the basis for the assessment. A total of 55 of 413 days (13.3%) had minimum DO data less than the SSMC. Therefore, this AU should be classified as 5-P.	5-P
LAMPREY RIVER	Dissolved Oxygen (Env-Wq 1703.07)	Dissolved Oxygen Saturation	50 out of 352 days (14.2%) had daily average DOSAT below the standard. 47 of 188 days (25%) during the critical period also failed the standard. This violation rate is greater than 10%. The AU should be classified as 5-P.	5-P
LAMPREY RIVER	Dissolved Oxygen (Env-Wq 1703.07)	Nitrogen	Median=0.451 mg/L (n=39). Per CALM list as 5-M.	5-M
LAMPREY RIVER	Biological and Aquatic Community Integrity (Env-Wq 1703.19)	Estuarine Bioassessments (eelgrass)	The long term trend in eelgrass loss relative to historic eelgrass cover is Significant Decline (-100%). The trend in recent years (since 1990) is Not Available.	5-P
LAMPREY RIVER	Biological and Aquatic Community Integrity (Env-Wq 1703.19)	Light Attenuation Coefficient (Water Clarity)	Median=2.02 m^-1 (n=37). For an eelgrass restoration depth of 2 m, the light attenuation coefficient criterion is 0.75 m^-1. Per CALM list as 5-P.	5-P
LAMPREY RIVER	Biological and Aquatic Community Integrity (Env-Wq 1703.19)	Nitrogen	Median=0.451 mg/L (n=39). For an eelgrass restoration depth of 2 m, the nitrogen criterion is 0.3 mg/L. Per CALM list as 5-P.	5-P

* The lower (worse) of the two categories for nitrogen will be included in the assessment database.

Table 4F

Assessment Zone	Relevant Water Quality Standard	Indicator	Results	Category
LITTLE BAY	Dissolved Oxygen (Env-Wq 1703.07)	Chlorophyll-a	90th %ile=8.2 ug/L (n=106). Per CALM list as 2-M.	2-M
LITTLE BAY	Dissolved Oxygen (Env-Wq 1703.07)	Dissolved Oxygen	A total of 391 measurements collected (197 in CP). 1 violation of SSMC in NCP. Per CALM list as 2-M.	2-M
LITTLE BAY	Dissolved Oxygen (Env-Wq 1703.07)	Dissolved Oxygen Saturation	A total of 152 daily averages calculated (72 in CP). 1 violation of SSMC in NCP. Per CALM list as 2-M.	2-M
LITTLE BAY	Dissolved Oxygen (Env-Wq 1703.07)	Nitrogen	Median=0.403 mg/L (n=88). Per CALM list as 2-M.	2-M
LITTLE BAY	Biological and Aquatic Community Integrity (Env-Wq 1703.19)	Estuarine Bioassessments (eelgrass)	The long term trend in eelgrass loss relative to historic eelgrass cover is Significant Decline (-100%). The trend in recent years (since 1990) is Significant Decline (-30%).	5-P
LITTLE BAY	Biological and Aquatic Community Integrity (Env-Wq 1703.19)	Light Attenuation Coefficient (Water Clarity)	Median=1.099 m^-1 (n=50). For an eelgrass restoration depth of 2 m, the light attenuation coefficient criterion is 0.75 m^-1. Per CALM list as 5-M.	5-M
LITTLE BAY	Biological and Aquatic Community Integrity (Env-Wq 1703.19)	Nitrogen	Median=0.403 mg/L (n=88). For an eelgrass restoration depth of 2 m, the nitrogen criterion is 0.3 mg/L. Per CALM list as 5-M.	5-M

* The lower (worse) of the two categories for nitrogen will be included in the assessment database.

Table 4G

Assessment Zone	Relevant Water Quality Standard	Indicator	Results	Category
LITTLE HARBOR/BACK CHANNEL	Dissolved Oxygen (Env-Wq 1703.07)	Chlorophyll-a	90th %ile=1.804 ug/L (n=69). Per CALM list as 2-G.	2-G
LITTLE HARBOR/BACK CHANNEL	Dissolved Oxygen (Env-Wq 1703.07)	Dissolved Oxygen	A total of 190 measurements collected (100 in CP). 0 violations of SSMC. Per CALM list as 2-G.	2-G
LITTLE HARBOR/BACK CHANNEL	Dissolved Oxygen (Env-Wq 1703.07)	Dissolved Oxygen Saturation	No data	3-ND
LITTLE HARBOR/BACK CHANNEL	Dissolved Oxygen (Env-Wq 1703.07)	Nitrogen	Median=0.252 mg/L (n=42). Per CALM list as 2-G.	2-G
LITTLE HARBOR/BACK CHANNEL	Biological and Aquatic Community Integrity (Env-Wq 1703.19)	Estuarine Bioassessments (eelgrass)	The long term trend in eelgrass loss relative to historic eelgrass cover is Significant Decline (-38%). The trend in recent years (since 1990) is Significant Decline (-9%).	5-P
LITTLE HARBOR/BACK CHANNEL	Biological and Aquatic Community Integrity (Env-Wq 1703.19)	Light Attenuation Coefficient (Water Clarity)	Median=0.571 m^-1 (n=23). For an eelgrass restoration depth of 3 m, the light attenuation coefficient criterion is 0.5 m^-1. Per CALM list as 5-M.	5-M
LITTLE HARBOR/BACK CHANNEL	Biological and Aquatic Community Integrity (Env-Wq 1703.19)	Nitrogen	Median=0.252 mg/L (n=42). For an eelgrass restoration depth of 3 m, the nitrogen criterion is 0.25 mg/L. Per CALM list as 5-M.	5-M

* The lower (worse) of the two categories for nitrogen will be included in the assessment database.

Table 4H

Assessment Zone	Relevant Water Quality Standard	Indicator	Results	Category
LOWER PISCATAQUA RIVER NORTH	Dissolved Oxygen (Env-Wq 1703.07)	Chlorophyll-a	90th %ile=3.03 ug/L (n=9). Per CALM list as 3-PAS.	3-PAS
LOWER PISCATAQUA RIVER NORTH	Dissolved Oxygen (Env-Wq 1703.07)	Dissolved Oxygen	124 samples collected (77 in CP). No violations of SSMC. Per CALM, list as 2-G. Old assessment of combined LPR unit was 2-G.	2-G
LOWER PISCATAQUA RIVER NORTH	Dissolved Oxygen (Env-Wq 1703.07)	Dissolved Oxygen Saturation	Daily average DOSAT calculated from paired tide samples on 44 days (24 in CP). No violations of SSMC. Per CALM, list as 2-G.	2-G
LOWER PISCATAQUA RIVER NORTH	Dissolved Oxygen (Env-Wq 1703.07)	Nitrogen	Median=0.232 mg/L (n=7). Per CALM list as 3-PAS.	3-PAS
LOWER PISCATAQUA RIVER NORTH	Biological and Aquatic Community Integrity (Env-Wq 1703.19)	Estuarine Bioassessments (eelgrass)	The long term trend in eelgrass loss relative to historic eelgrass cover is Significant Decline (-99%). The trend in recent years (since 1990) is Not Significant.	5-P
LOWER PISCATAQUA RIVER NORTH	Biological and Aquatic Community Integrity (Env-Wq 1703.19)	Light Attenuation Coefficient (Water Clarity)	Median=0.463 m^-1 (n=7). For an eelgrass restoration depth of 2 m, the light attenuation coefficient criterion is 0.75 m^-1. Per CALM list as 3-PAS.	3-PAS
LOWER PISCATAQUA RIVER NORTH	Biological and Aquatic Community Integrity (Env-Wq 1703.19)	Nitrogen	Median=0.232 mg/L (n=7). For an eelgrass restoration depth of 2 m, the nitrogen criterion is 0.3 mg/L. Per CALM list as 3-PAS. However, given the significant eelgrass loss and the decision matrix in Table 2, list as 3-PNS.	3-PNS

* The lower (worse) of the two categories for nitrogen will be included in the assessment database.

Table 4I

Assessment Zone	Relevant Water Quality Standard	Indicator	Results	Category
LOWER PISCATAQUA RIVER SOUTH	Dissolved Oxygen (Env-Wq 1703.07)	Chlorophyll-a	90th %ile=2.2 ug/L (n=37). Per CALM list as 2-G.	2-G
LOWER PISCATAQUA RIVER SOUTH	Dissolved Oxygen (Env-Wq 1703.07)	Dissolved Oxygen	56 samples collected (35 in CP). No violations of SSMC. Per CALM, list as 2-G.	2-G
LOWER PISCATAQUA RIVER SOUTH	Dissolved Oxygen (Env-Wq 1703.07)	Dissolved Oxygen Saturation	No data	3-ND
LOWER PISCATAQUA RIVER SOUTH	Dissolved Oxygen (Env-Wq 1703.07)	Nitrogen	Median=0.3 mg/L (n=23). Per CALM list as 2-G.	2-G
LOWER PISCATAQUA RIVER SOUTH	Biological and Aquatic Community Integrity (Env-Wq 1703.19)	Estuarine Bioassessments (eelgrass)	The long term trend in eelgrass loss relative to historic eelgrass cover is Significant Decline (-83%). The trend in recent years (since 1990) is Not Significant.	5-P
LOWER PISCATAQUA RIVER SOUTH	Biological and Aquatic Community Integrity (Env-Wq 1703.19)	Light Attenuation Coefficient (Water Clarity)	Median=0.502 m^-1 (n=5). For an eelgrass restoration depth of 2 m, the light attenuation coefficient criterion is 0.75 m^-1. Per CALM list as 3-PAS.	3-PAS
LOWER PISCATAQUA RIVER SOUTH	Biological and Aquatic Community Integrity (Env-Wq 1703.19)	Nitrogen	Median=0.3 mg/L (n=23). For an eelgrass restoration depth of 2 m, the nitrogen criterion is 0.3 mg/L. Per CALM list as 2-M. However, given the significant eelgrass loss and the decision matrix in Table 2, list as 3-PNS.	3-PNS

* The lower (worse) of the two categories for nitrogen will be included in the assessment database.

Table 4J

Assessment Zone	Relevant Water Quality Standard	Indicator	Results	Category
NORTH MILL POND	Dissolved Oxygen (Env-Wq 1703.07)	Chlorophyll-a	90th %ile=1.584 ug/L (n=5). Per CALM list as 3-PAS.	3-PAS
NORTH MILL POND	Dissolved Oxygen (Env-Wq 1703.07)	Dissolved Oxygen	88 grab samples collected (47 in CP). No violations of SSMC. Per CALM, list as 2-G.	2-G
NORTH MILL POND	Dissolved Oxygen (Env-Wq 1703.07)	Dissolved Oxygen Saturation	Daily average DOSAT measured on 40 days from paired tide samples (20 in CP). No violations of SSMC. Per CALM, list as 2-G.	2-G
NORTH MILL POND	Dissolved Oxygen (Env-Wq 1703.07)	Nitrogen	Median=0.333 mg/L (n=4). Per CALM list as 3-PAS.	3-PAS
NORTH MILL POND	Biological and Aquatic Community Integrity (Env-Wq 1703.19)	Estuarine Bioassessments (eelgrass)	The long term trend in eelgrass loss relative to historic eelgrass cover is Not Available. The trend in recent years (since 1990) is Not Available.	3-ND
NORTH MILL POND	Biological and Aquatic Community Integrity (Env-Wq 1703.19)	Light Attenuation Coefficient (Water Clarity)	Median=0.05 m^-1 (n=1). For an eelgrass restoration depth of 2 m, the light attenuation coefficient criterion is 0.75 m^-1. Per CALM list as 3-PAS.	3-PAS
NORTH MILL POND	Biological and Aquatic Community Integrity (Env-Wq 1703.19)	Nitrogen	Median=0.333 mg/L (n=4). For an eelgrass restoration depth of 2 m, the nitrogen criterion is 0.3 mg/L. Per CALM list as 3-PNS.	3-PNS

* The lower (worse) of the two categories for nitrogen will be included in the assessment database.

Table 4K

Assessment Zone	Relevant Water Quality Standard	Indicator	Results	Category
OYSTER RIVER	Dissolved Oxygen (Env-Wq 1703.07)	Chlorophyll-a	90th %ile=17.036 ug/L (n=112). Per CALM list as 5-P.	5-P
OYSTER RIVER	Dissolved Oxygen (Env-Wq 1703.07)	Dissolved Oxygen	DO measured by datasondes on 335 days. The DO fell below the SSMC on 31 days (9.3%). The MAGEXC was violated on 14 days. Per CALM, list as 5-P.	5-P
OYSTER RIVER	Dissolved Oxygen (Env-Wq 1703.07)	Dissolved Oxygen Saturation	Daily average DO measured by datasondes on 290 days. The standard was violated on 30 days (10.3%). Per CALM, list as 5-M.	5-M
OYSTER RIVER	Dissolved Oxygen (Env-Wq 1703.07)	Nitrogen	Median=0.519 mg/L (n=41). Per CALM list as 5-M.	5-M
OYSTER RIVER	Biological and Aquatic Community Integrity (Env-Wq 1703.19)	Estuarine Bioassessments (eelgrass)	The long term trend in eelgrass loss relative to historic eelgrass cover is Significant Decline (-100%). The trend in recent years (since 1990) is Not Available.	5-P
OYSTER RIVER	Biological and Aquatic Community Integrity (Env-Wq 1703.19)	Light Attenuation Coefficient (Water Clarity)	Median=1.935 m^-1 (n=32). For an eelgrass restoration depth of 2 m, the light attenuation coefficient criterion is 0.75 m^-1. Per CALM list as 5-P.	5-P
OYSTER RIVER	Biological and Aquatic Community Integrity (Env-Wq 1703.19)	Nitrogen	Median=0.519 mg/L (n=41). For an eelgrass restoration depth of 2 m, the nitrogen criterion is 0.3 mg/L. Per CALM list as 5-P.	5-P

* The lower (worse) of the two categories for nitrogen will be included in the assessment database.

Table 4L

Assessment Zone	Relevant Water Quality Standard	Indicator	Results	Category
PORTSMOUTH HARBOR	Dissolved Oxygen (Env-Wq 1703.07)	Chlorophyll-a	90th %ile=3.215 ug/L (n=58). Per CALM list as 2-G.	2-G
PORTSMOUTH HARBOR	Dissolved Oxygen (Env-Wq 1703.07)	Dissolved Oxygen	Daily minimum DO measured on 372 days (189 in CP). 0 violations of SSMC. Per CALM, list as 2-G.	2-G
PORTSMOUTH HARBOR	Dissolved Oxygen (Env-Wq 1703.07)	Dissolved Oxygen Saturation	Daily average DOSAT measured on 317 days (163 in CP). 0 violations of SSMC. Per CALM, list as 2-G.	2-G
PORTSMOUTH HARBOR	Dissolved Oxygen (Env-Wq 1703.07)	Nitrogen	Median=0.279 mg/L (n=48). Per CALM list as 2-G.	2-G
PORTSMOUTH HARBOR	Biological and Aquatic Community Integrity (Env-Wq 1703.19)	Estuarine Bioassessments (eelgrass)	The long term trend in eelgrass loss relative to historic eelgrass cover is Decline (-12%). The trend in recent years (since 1990) is Decline (-5%).	5-T
PORTSMOUTH HARBOR	Biological and Aquatic Community Integrity (Env-Wq 1703.19)	Light Attenuation Coefficient (Water Clarity)	Median=0.63 m^-1 (n=38). For an eelgrass restoration depth of 3 m, the light attenuation coefficient criterion is 0.5 m^-1. Per CALM list as 5-M.	5-M
PORTSMOUTH HARBOR	Biological and Aquatic Community Integrity (Env-Wq 1703.19)	Nitrogen	Median=0.279 mg/L (n=48). For an eelgrass restoration depth of 3 m, the nitrogen criterion is 0.25 mg/L. Per CALM list as 5-M.	5-M

* The lower (worse) of the two categories for nitrogen will be included in the assessment database.

Table 4M

Assessment Zone	Relevant Water Quality Standard	Indicator	Results	Category
SAGAMORE CREEK	Dissolved Oxygen (Env-Wq 1703.07)	Chlorophyll-a	90th %ile=0.8 ug/L (n=4). Per CALM list as 3-PAS.	3-PAS
SAGAMORE CREEK	Dissolved Oxygen (Env-Wq 1703.07)	Dissolved Oxygen	A total of 12 measurements collected (10 in CP). 0 violations of SSMC. Per CALM list as 2-G.	2-G
SAGAMORE CREEK	Dissolved Oxygen (Env-Wq 1703.07)	Dissolved Oxygen Saturation	No data	3-ND
SAGAMORE CREEK	Dissolved Oxygen (Env-Wq 1703.07)	Nitrogen	Median=0.174 mg/L (n=3). Per CALM list as 3-PAS.	3-PAS
SAGAMORE CREEK	Biological and Aquatic Community Integrity (Env-Wq 1703.19)	Estuarine Bioassessments (eelgrass)	The long term trend in eelgrass loss relative to historic eelgrass cover is Significant Decline (-78%). The trend in recent years (since 1990) is Not Significant.	5-P
SAGAMORE CREEK	Biological and Aquatic Community Integrity (Env-Wq 1703.19)	Light Attenuation Coefficient (Water Clarity)	Median=0.818 m^-1 (n=1). For an eelgrass restoration depth of 2 m, the light attenuation coefficient criterion is 0.75 m^-1. Per CALM list as 3-PNS.	3-PNS
SAGAMORE CREEK	Biological and Aquatic Community Integrity (Env-Wq 1703.19)	Nitrogen	Median=0.174 mg/L (n=3). For an eelgrass restoration depth of 2 m, the nitrogen criterion is 0.3 mg/L. Per CALM list as 3-PAS. However, given the significant eelgrass loss and the decision matrix in Table 2, list as 3-PNS.	3-PNS

* The lower (worse) of the two categories for nitrogen will be included in the assessment database.

Table 4N

Assessment Zone	Relevant Water Quality Standard	Indicator	Results	Category
SALMON FALLS RIVER	Dissolved Oxygen (Env-Wq 1703.07)	Chlorophyll-a	90th %ile=13.154 ug/L (n=39). Per CALM list as 5-M.	5-M
SALMON FALLS RIVER	Dissolved Oxygen (Env-Wq 1703.07)	Dissolved Oxygen	UNH collected valid dissolved oxygen data on 135 days using an in-situ datasonde (116 days in the critical period). The daily minimum DO concentration was less than the WQS (5 mg/L) on 19 days (14.1% of the days) and less than the MAGEXC criterion (4.5 mg/L) on 12 days (8.9% of the days). Therefore, the DO concentrations do not support aquatic life per the CALM.	5-P
SALMON FALLS RIVER	Dissolved Oxygen (Env-Wq 1703.07)	Dissolved Oxygen Saturation	UNH collected 111 full days of valid dissolved oxygen saturation measurements with an in-situ datasonde (95 days in the critical period). Out of the 111 days, the daily average dissolved oxygen saturation was less than 75% on 12 days (10.8%). Therefore, dissolved oxygen saturation is not supporting aquatic life per the CALM.	5-M
SALMON FALLS RIVER	Dissolved Oxygen (Env-Wq 1703.07)	Nitrogen	Median=0.552 mg/L (n=25). Per CALM list as 5-M.	5-M
SALMON FALLS RIVER	Biological and Aquatic Community Integrity (Env-Wq 1703.19)	Estuarine Bioassessments (eelgrass)	Eelgrass is not known to have existed in this assessment zone. Therefore, this indicator does not apply.	NA
SALMON FALLS RIVER	Biological and Aquatic Community Integrity (Env-Wq 1703.19)	Light Attenuation Coefficient (Water Clarity)	Eelgrass is not known to have existed in this assessment zone. Therefore, this indicator does not apply.	NA
SALMON FALLS RIVER	Biological and Aquatic Community Integrity (Env-Wq 1703.19)	Nitrogen	Eelgrass is not known to have existed in this assessment zone. Therefore, this indicator does not apply.	NA

* The lower (worse) of the two categories for nitrogen will be included in the assessment database.

Table 4O

Assessment Zone	Relevant Water Quality Standard	Indicator	Results	Category
SOUTH MILL POND	Dissolved Oxygen (Env-Wq 1703.07)	Chlorophyll-a	90th %ile=0 ug/L (n=0). Per CALM list as 3-ND.	3-ND
SOUTH MILL POND	Dissolved Oxygen (Env-Wq 1703.07)	Dissolved Oxygen	158 grab samples collected (80 in CP). 2 violations of SSMC in CP. One violation of MAGEXC. Per CALM, this should be listed as 2-M. 2006 listing was 5-P due to multiple MAGEXC violations but these data have timed out. Listing retained at 5-P until it can be verified that recent data was collected under the same conditions as the older MAGEXC samples.	5-P
SOUTH MILL POND	Dissolved Oxygen (Env-Wq 1703.07)	Dissolved Oxygen Saturation	Daily average DOSAT calculated from paired tide samples on 79 days. No violations of SSMC. Per CALM, list as 2-G.	2-G
SOUTH MILL POND	Dissolved Oxygen (Env-Wq 1703.07)	Nitrogen	No data. Per CALM list as 3-ND. However, given the impairment for dissolved oxygen and the decision matrix in Table 2, list as 3-PNS.	3-PNS
SOUTH MILL POND	Biological and Aquatic Community Integrity (Env-Wq 1703.19)	Estuarine Bioassessments (eelgrass)	The long term trend in eelgrass loss relative to historic eelgrass cover is Not Available. The trend in recent years (since 1990) is Not Available.	3-ND
SOUTH MILL POND	Biological and Aquatic Community Integrity (Env-Wq 1703.19)	Light Attenuation Coefficient (Water Clarity)	No data. For an eelgrass restoration depth of 2 m, the light attenuation coefficient criterion is 0.75 m^-1. Per CALM list as 3-ND.	3-ND
SOUTH MILL POND	Biological and Aquatic Community Integrity (Env-Wq 1703.19)	Nitrogen	No data. For an eelgrass restoration depth of 2 m, the nitrogen criterion is 0.3 mg/L. Per CALM list as 3-ND.	3-ND

* The lower (worse) of the two categories for nitrogen will be included in the assessment database.

Table 4P

Assessment Zone	Relevant Water Quality Standard	Indicator	Results	Category
SQUAMSCOTT RIVER	Dissolved Oxygen (Env-Wq 1703.07)	Chlorophyll-a	90th %ile=24.158 ug/L (n=105). Per CALM list as 5-P.	5-P
SQUAMSCOTT RIVER	Dissolved Oxygen (Env-Wq 1703.07)	Dissolved Oxygen	Datasonde measurements of DO were available for 530 days. The SSMC was violated on 52 days (9.8%). MAGEXC violations were recorded on 21 days. Per the CALM, this AU should be listed as 5-P.	5-P
SQUAMSCOTT RIVER	Dissolved Oxygen (Env-Wq 1703.07)	Dissolved Oxygen Saturation	2008. Daily datasonde measurements of DO were collected on 469 days (259 in critical period). The SSMC was violated on 29 days (6.2%). No MAGEXC violations occurred. Per the CALM, this AU should be listed as 2-M. Daily average DO data from high tide/low tide samples does not indicate an impairment either.	2-M
SQUAMSCOTT RIVER	Dissolved Oxygen (Env-Wq 1703.07)	Nitrogen	Median=0.748 mg/L (n=68). Per CALM list as 5-P.	5-P
SQUAMSCOTT RIVER	Biological and Aquatic Community Integrity (Env-Wq 1703.19)	Estuarine Bioassessments (eelgrass)	The long term trend in eelgrass loss relative to historic eelgrass cover is Significant Decline (-100%). The trend in recent years (since 1990) is Not Available.	5-P
SQUAMSCOTT RIVER	Biological and Aquatic Community Integrity (Env-Wq 1703.19)	Light Attenuation Coefficient (Water Clarity)	Median=3.005 m^-1 (n=66). For an eelgrass restoration depth of 2 m, the light attenuation coefficient criterion is 0.75 m^-1. Per CALM list as 5-P.	5-P
SQUAMSCOTT RIVER	Biological and Aquatic Community Integrity (Env-Wq 1703.19)	Nitrogen	Median=0.748 mg/L (n=68). For an eelgrass restoration depth of 2 m, the nitrogen criterion is 0.3 mg/L. Per CALM list as 5-P.	5-P

* The lower (worse) of the two categories for nitrogen will be included in the assessment database.

Table 4Q

Assessment Zone	Relevant Water Quality Standard	Indicator	Results	Category
UPPER PISCATAQUA RIVER	Dissolved Oxygen (Env-Wq 1703.07)	Chlorophyll-a	90th %ile=7.908 ug/L (n=65). Per CALM list as 2-M.	2-M
UPPER PISCATAQUA RIVER	Dissolved Oxygen (Env-Wq 1703.07)	Dissolved Oxygen	A total of 164 measurements collected (97 in CP). 0 violations of SSMC. Per CALM list as 2-G.	2-G
UPPER PISCATAQUA RIVER	Dissolved Oxygen (Env-Wq 1703.07)	Dissolved Oxygen Saturation	A total of 37 daily averages calculated (19 in CP). 0 violations of SSMC. Per CALM list as 2-G.	2-G
UPPER PISCATAQUA RIVER	Dissolved Oxygen (Env-Wq 1703.07)	Nitrogen	Median=0.519 mg/L (n=36). Per CALM list as 5-M. However, given the lack of impairments for chlorophyll-a and dissolved oxygen and the decision matrix from Table 2, list as 3-PNS.	3-PNS
UPPER PISCATAQUA RIVER	Biological and Aquatic Community Integrity (Env-Wq 1703.19)	Estuarine Bioassessments (eelgrass)	The long term trend in eelgrass loss relative to historic eelgrass cover is Significant Decline (-100%). The trend in recent years (since 1990) is Not Significant.	5-P
UPPER PISCATAQUA RIVER	Biological and Aquatic Community Integrity (Env-Wq 1703.19)	Light Attenuation Coefficient (Water Clarity)	Median=1.3 m^-1 (n=15). For an eelgrass restoration depth of 2 m, the light attenuation coefficient criterion is 0.75 m^-1. Per CALM list as 5-P.	5-P
UPPER PISCATAQUA RIVER	Biological and Aquatic Community Integrity (Env-Wq 1703.19)	Nitrogen	Median=0.519 mg/L (n=36). For an eelgrass restoration depth of 2 m, the nitrogen criterion is 0.3 mg/L. Per CALM list as 5-P.	5-P

* The lower (worse) of the two categories for nitrogen will be included in the assessment database.

Table 4R

Assessment Zone	Relevant Water Quality Standard	Indicator	Results	Category
WINNICUT RIVER	Dissolved Oxygen (Env-Wq 1703.07)	Chlorophyll-a	90th %ile=0 ug/L (n=0). Per CALM list as 3-ND.	3-ND
WINNICUT RIVER	Dissolved Oxygen (Env-Wq 1703.07)	Dissolved Oxygen	Data sonde record is only for NCP. Datasonde record lasts for 43 days. 80 additional grab samples taken. No violations detected in the datasonde record. Three SSMC and one MAGEXC violation detected in the grab samples. Per CALM, list as 2-M.	2-M
WINNICUT RIVER	Dissolved Oxygen (Env-Wq 1703.07)	Dissolved Oxygen Saturation	Data sonde record is only for NCP. Datasonde record covers 41 days. DO percent saturation calculated from two-tide samples on 40 other dates. No violations of SSMC observed. Per CALM, list as 2-G.	2-G
WINNICUT RIVER	Dissolved Oxygen (Env-Wq 1703.07)	Nitrogen	No data. Per CALM list as 3-ND.	3-ND
WINNICUT RIVER	Biological and Aquatic Community Integrity (Env-Wq 1703.19)	Estuarine Bioassessments (eelgrass)	The long term trend in eelgrass loss relative to historic eelgrass cover is Not Available. The trend in recent years (since 1990) is Significant Decline (-64%).	5-P
WINNICUT RIVER	Biological and Aquatic Community Integrity (Env-Wq 1703.19)	Light Attenuation Coefficient (Water Clarity)	No data. For an eelgrass restoration depth of 2 m, the light attenuation coefficient criterion is 0.75 m^-1. Per CALM list as 3-ND.	3-ND
WINNICUT RIVER	Biological and Aquatic Community Integrity (Env-Wq 1703.19)	Nitrogen	No data. For an eelgrass restoration depth of 2 m, the nitrogen criterion is 0.3 mg/L. Per CALM list as 3-ND. However, given the significant eelgrass loss and the decision matrix in Table 2, list as 3-PNS.	3-PNS

* The lower (worse) of the two categories for nitrogen will be included in the assessment database.

Table 5: Summary of category changes for the estuarine assessments (eelgrass) parameter associated with the Aquatic Life designated use

AUID	ASSESSMENT ZONE	OLD CATEGORY	NEW CATEGORY	COMMENTS
NHEST600030903-01-01	BELLAMY RIVER	5-P	5-P	No Change
NHEST600030903-01-02	BELLAMY RIVER	5-P	5-P	No Change
NHEST600031002-01-01	BERRYS BROOK		3-ND	
NHEST600031002-01-02	BERRYS BROOK		3-ND	
NHEST600030608-01	COCHECO RIVER		NA	
NHEST600030904-02	GREAT BAY	5-T	5-P	
NHEST600030904-03	GREAT BAY	5-T	5-P	
NHEST600030904-04-02	GREAT BAY	5-T	5-P	
NHEST600030904-04-03	GREAT BAY	5-T	5-P	
NHEST600030904-04-04	GREAT BAY	5-T	5-P	
NHEST600030904-04-05	GREAT BAY	5-T	5-P	
NHEST600030904-04-06	GREAT BAY	5-T	5-P	
NHEST600030709-01	LAMPREY RIVER	5-P	5-P	No Change
NHEST600030904-06-10	LITTLE BAY	5-P	5-P	No Change
NHEST600030904-06-11	LITTLE BAY	5-P	5-P	No Change
NHEST600030904-06-12	LITTLE BAY	5-P	5-P	No Change
NHEST600030904-06-13	LITTLE BAY	5-P	5-P	No Change
NHEST600030904-06-14	LITTLE BAY	5-P	5-P	No Change
NHEST600030904-06-15	LITTLE BAY	5-P	5-P	No Change
NHEST600030904-06-16	LITTLE BAY	5-P	5-P	No Change
NHEST600031001-05	LITTLE HARBOR/BACK CHANNEL		5-P	
NHEST600031001-08	LITTLE HARBOR/BACK CHANNEL		5-P	
NHEST600031002-02	LITTLE HARBOR/BACK CHANNEL		5-P	
NHEST600031001-02-01	LOWER PISCATAQUA RIVER NORTH	5-P	5-P	No Change
NHEST600031001-02-02	LOWER PISCATAQUA RIVER SOUTH	5-P	5-P	No Change
NHEST600031001-10	NORTH MILL POND		3-ND	
NHEST600030902-01-01	OYSTER RIVER	5-P	5-P	No Change
NHEST600030902-01-02	OYSTER RIVER	5-P	5-P	No Change
NHEST600030902-01-03	OYSTER RIVER	5-P	5-P	No Change
NHEST600030904-06-17	OYSTER RIVER	5-P	5-P	No Change
NHEST600031001-11	PORTSMOUTH HARBOR		5-T	
NHEST600031001-03	SAGAMORE CREEK		5-P	
NHEST600031001-04	SAGAMORE CREEK		5-P	
NHEST600030406-01	SALMON FALLS RIVER		NA	
NHEST600031001-09	SOUTH MILL POND		3-ND	
NHEST600030806-01	SQUAMSCOTT RIVER	5-P	5-P	No Change
NHEST600031001-01-01	UPPER PISCATAQUA RIVER	5-P	5-P	No Change
NHEST600031001-01-02	UPPER PISCATAQUA RIVER	5-P	5-P	No Change
NHEST600031001-01-03	UPPER PISCATAQUA RIVER	5-P	5-P	No Change
NHEST600030904-01	WINNICUT RIVER	5-M	5-P	

Table 6: Summary of category changes for the dissolved oxygen concentration parameter associated with the Aquatic Life designated use

AUID	ASSESSMENT ZONE	OLD CATEGORY	NEW CATEGORY	COMMENTS
NHEST600030903-01-01	BELLAMY RIVER	2-G	2-G	No Change
NHEST600030903-01-02	BELLAMY RIVER	2-G	2-G	No Change
NHEST600031002-01-01	BERRYS BROOK	3-ND	3-ND	No Change
NHEST600031002-01-02	BERRYS BROOK	3-ND	3-ND	No Change
NHEST600030608-01	COCHECO RIVER	2-M	2-M	No Change
NHEST600030904-02	GREAT BAY	5-P	5-P	No Change
NHEST600030904-03	GREAT BAY	5-P	5-P	No Change
NHEST600030904-04-02	GREAT BAY	3-PAS	5-P	
NHEST600030904-04-03	GREAT BAY	3-PAS	5-P	
NHEST600030904-04-04	GREAT BAY	3-ND	5-P	
NHEST600030904-04-05	GREAT BAY	5-P	5-P	No Change
NHEST600030904-04-06	GREAT BAY	2-M	5-P	
NHEST600030709-01	LAMPREY RIVER	5-P	5-P	No Change
NHEST600030904-06-10	LITTLE BAY	2-M	2-M	No Change
NHEST600030904-06-11	LITTLE BAY	3-ND	2-M	
NHEST600030904-06-12	LITTLE BAY	2-M	2-M	No Change
NHEST600030904-06-13	LITTLE BAY	2-G	2-M	
NHEST600030904-06-14	LITTLE BAY	2-G	2-M	
NHEST600030904-06-15	LITTLE BAY	3-ND	2-M	
NHEST600030904-06-16	LITTLE BAY	2-M	2-M	No Change
NHEST600031001-05	LITTLE HARBOR/BACK CHANNEL	2-G	2-G	No Change
NHEST600031001-08	LITTLE HARBOR/BACK CHANNEL	3-ND	2-G	
NHEST600031002-02	LITTLE HARBOR/BACK CHANNEL	2-G	2-G	No Change
NHEST600031001-02-01	LOWER PISCATAQUA RIVER NORTH	2-G	2-G	No Change
NHEST600031001-02-02	LOWER PISCATAQUA RIVER SOUTH	2-G	2-G	No Change
NHEST600031001-10	NORTH MILL POND	2-G	2-G	No Change
NHEST600030902-01-01	OYSTER RIVER	3-ND	5-P	
NHEST600030902-01-02	OYSTER RIVER	3-ND	5-P	
NHEST600030902-01-03	OYSTER RIVER	5-P	5-P	No Change
NHEST600030904-06-17	OYSTER RIVER	3-ND	5-P	
NHEST600031001-11	PORTSMOUTH HARBOR	2-G	2-G	No Change
NHEST600031001-03	SAGAMORE CREEK	2-G	2-G	No Change
NHEST600031001-04	SAGAMORE CREEK	3-ND	2-G	
NHEST600030406-01	SALMON FALLS RIVER	5-P	5-P	No Change
NHEST600031001-09	SOUTH MILL POND	5-P	5-P	No Change
NHEST600030806-01	SQUAMSCOTT RIVER	5-P	5-P	No Change
NHEST600031001-01-01	UPPER PISCATAQUA RIVER	3-PAS	2-G	
NHEST600031001-01-02	UPPER PISCATAQUA RIVER	2-G	2-G	No Change
NHEST600031001-01-03	UPPER PISCATAQUA RIVER	3-PAS	2-G	
NHEST600030904-01	WINNICUT RIVER	2-M	2-M	No Change

Table 7: Summary of category changes for the dissolved oxygen saturation parameter associated with the Aquatic Life designated use

AUID	ASSESSMENT ZONE	OLD CATEGORY	NEW CATEGORY	COMMENTS
NHEST600030903-01-01	BELLAMY RIVER	3-ND	3-ND	No Change
NHEST600030903-01-02	BELLAMY RIVER	3-ND	3-ND	No Change
NHEST600031002-01-01	BERRYS BROOK	3-ND	3-ND	No Change
NHEST600031002-01-02	BERRYS BROOK	3-ND	3-ND	No Change
NHEST600030608-01	COCHECO RIVER	2-G	2-G	No Change
NHEST600030904-02	GREAT BAY	2-M	2-M	No Change
NHEST600030904-03	GREAT BAY	2-M	2-M	No Change
NHEST600030904-04-02	GREAT BAY	3-ND	2-M	
NHEST600030904-04-03	GREAT BAY	3-ND	2-M	
NHEST600030904-04-04	GREAT BAY	3-ND	2-M	
NHEST600030904-04-05	GREAT BAY	2-M	2-M	No Change
NHEST600030904-04-06	GREAT BAY	3-ND	2-M	
NHEST600030709-01	LAMPREY RIVER	5-P	5-P	No Change
NHEST600030904-06-10	LITTLE BAY	3-ND	2-M	
NHEST600030904-06-11	LITTLE BAY	3-ND	2-M	
NHEST600030904-06-12	LITTLE BAY	2-M	2-M	No Change
NHEST600030904-06-13	LITTLE BAY	2-G	2-M	
NHEST600030904-06-14	LITTLE BAY	3-ND	2-M	
NHEST600030904-06-15	LITTLE BAY	3-ND	2-M	
NHEST600030904-06-16	LITTLE BAY	3-ND	2-M	
NHEST600031001-05	LITTLE HARBOR/BACK CHANNEL	3-ND	3-ND	No Change
NHEST600031001-08	LITTLE HARBOR/BACK CHANNEL	3-ND	3-ND	No Change
NHEST600031002-02	LITTLE HARBOR/BACK CHANNEL	3-ND	3-ND	No Change
NHEST600031001-02-01	LOWER PISCATAQUA RIVER NORTH	2-G	2-G	No Change
NHEST600031001-02-02	LOWER PISCATAQUA RIVER SOUTH	3-ND	3-ND	No Change
NHEST600031001-10	NORTH MILL POND	2-G	2-G	No Change
NHEST600030902-01-01	OYSTER RIVER	3-ND	5-M	
NHEST600030902-01-02	OYSTER RIVER	3-ND	5-M	
NHEST600030902-01-03	OYSTER RIVER	5-M	5-M	No Change
NHEST600030904-06-17	OYSTER RIVER	3-ND	5-M	
NHEST600031001-11	PORTSMOUTH HARBOR	2-G	2-G	No Change
NHEST600031001-03	SAGAMORE CREEK	3-ND	3-ND	No Change
NHEST600031001-04	SAGAMORE CREEK	3-ND	3-ND	No Change
NHEST600030406-01	SALMON FALLS RIVER	5-M	5-M	No Change
NHEST600031001-09	SOUTH MILL POND	2-G	2-G	No Change
NHEST600030806-01	SQUAMSCOTT RIVER	2-M	2-M	No Change
NHEST600031001-01-01	UPPER PISCATAQUA RIVER	3-ND	2-G	
NHEST600031001-01-02	UPPER PISCATAQUA RIVER	2-G	2-G	No Change
NHEST600031001-01-03	UPPER PISCATAQUA RIVER	3-ND	2-G	
NHEST600030904-01	WINNICUT RIVER	2-G	2-G	No Change

Table 8: Summary of category changes for the chlorophyll-a parameter associated with the Aquatic Life designated use

AUID	ASSESSMENT ZONE	OLD CATEGORY	NEW CATEGORY	COMMENTS
NHEST600030903-01-01	BELLAMY RIVER		2-G	
NHEST600030903-01-02	BELLAMY RIVER		2-G	
NHEST600031002-01-01	BERRYS BROOK		3-ND	
NHEST600031002-01-02	BERRYS BROOK		3-ND	
NHEST600030608-01	COCHECO RIVER		5-M	
NHEST600030904-02	GREAT BAY		2-M	
NHEST600030904-03	GREAT BAY		2-M	
NHEST600030904-04-02	GREAT BAY		2-M	
NHEST600030904-04-03	GREAT BAY		2-M	
NHEST600030904-04-04	GREAT BAY		2-M	
NHEST600030904-04-05	GREAT BAY		2-M	
NHEST600030904-04-06	GREAT BAY		2-M	
NHEST600030709-01	LAMPREY RIVER		5-M	
NHEST600030904-06-10	LITTLE BAY		2-M	
NHEST600030904-06-11	LITTLE BAY		2-M	
NHEST600030904-06-12	LITTLE BAY		2-M	
NHEST600030904-06-13	LITTLE BAY		2-M	
NHEST600030904-06-14	LITTLE BAY		2-M	
NHEST600030904-06-15	LITTLE BAY		2-M	
NHEST600030904-06-16	LITTLE BAY		2-M	
NHEST600031001-05	LITTLE HARBOR/BACK CHANNEL		2-G	
NHEST600031001-08	LITTLE HARBOR/BACK CHANNEL		2-G	
NHEST600031002-02	LITTLE HARBOR/BACK CHANNEL		2-G	
NHEST600031001-02-01	LOWER PISCATAQUA RIVER NORTH		3-PAS	
NHEST600031001-02-02	LOWER PISCATAQUA RIVER SOUTH		2-G	
NHEST600031001-10	NORTH MILL POND		3-PAS	
NHEST600030902-01-01	OYSTER RIVER		5-P	
NHEST600030902-01-02	OYSTER RIVER		5-P	
NHEST600030902-01-03	OYSTER RIVER		5-P	
NHEST600030904-06-17	OYSTER RIVER		5-P	
NHEST600031001-11	PORTSMOUTH HARBOR		2-G	
NHEST600031001-03	SAGAMORE CREEK		3-PAS	
NHEST600031001-04	SAGAMORE CREEK		3-PAS	
NHEST600030406-01	SALMON FALLS RIVER		5-M	
NHEST600031001-09	SOUTH MILL POND		3-ND	
NHEST600030806-01	SQUAMSCOTT RIVER		5-P	
NHEST600031001-01-01	UPPER PISCATAQUA RIVER		2-M	
NHEST600031001-01-02	UPPER PISCATAQUA RIVER		2-M	
NHEST600031001-01-03	UPPER PISCATAQUA RIVER		2-M	
NHEST600030904-01	WINNICUT RIVER		3-ND	

Table 9: Summary of category changes for the water clarity parameter associated with the Aquatic Life designated use

AUID	ASSESSMENT ZONE	OLD CATEGORY	NEW CATEGORY	COMMENTS
NHEST600030903-01-01	BELLAMY RIVER		3-ND	
NHEST600030903-01-02	BELLAMY RIVER		3-ND	
NHEST600031002-01-01	BERRYS BROOK		3-ND	
NHEST600031002-01-02	BERRYS BROOK		3-ND	
NHEST600030608-01	COCHECO RIVER		3-PNS	
NHEST600030904-02	GREAT BAY		5-P	
NHEST600030904-03	GREAT BAY		5-P	
NHEST600030904-04-02	GREAT BAY		5-P	
NHEST600030904-04-03	GREAT BAY		5-P	
NHEST600030904-04-04	GREAT BAY		5-P	
NHEST600030904-04-05	GREAT BAY		5-P	
NHEST600030904-04-06	GREAT BAY		5-P	
NHEST600030709-01	LAMPREY RIVER		5-P	
NHEST600030904-06-10	LITTLE BAY		5-M	
NHEST600030904-06-11	LITTLE BAY		5-M	
NHEST600030904-06-12	LITTLE BAY		5-M	
NHEST600030904-06-13	LITTLE BAY		5-M	
NHEST600030904-06-14	LITTLE BAY		5-M	
NHEST600030904-06-15	LITTLE BAY		5-M	
NHEST600030904-06-16	LITTLE BAY		5-M	
NHEST600031001-05	LITTLE HARBOR/BACK CHANNEL		5-M	
NHEST600031001-08	LITTLE HARBOR/BACK CHANNEL		5-M	
NHEST600031002-02	LITTLE HARBOR/BACK CHANNEL		5-M	
NHEST600031001-02-01	LOWER PISCATAQUA RIVER NORTH		3-PAS	
NHEST600031001-02-02	LOWER PISCATAQUA RIVER SOUTH		3-PAS	
NHEST600031001-10	NORTH MILL POND		3-PAS	
NHEST600030902-01-01	OYSTER RIVER		5-P	
NHEST600030902-01-02	OYSTER RIVER		5-P	
NHEST600030902-01-03	OYSTER RIVER		5-P	
NHEST600030904-06-17	OYSTER RIVER		5-P	
NHEST600031001-11	PORTSMOUTH HARBOR		5-M	
NHEST600031001-03	SAGAMORE CREEK		3-PNS	
NHEST600031001-04	SAGAMORE CREEK		3-PNS	
NHEST600030406-01	SALMON FALLS RIVER		3-PNS	
NHEST600031001-09	SOUTH MILL POND		3-ND	
NHEST600030806-01	SQUAMSCOTT RIVER		5-P	
NHEST600031001-01-01	UPPER PISCATAQUA RIVER		5-P	
NHEST600031001-01-02	UPPER PISCATAQUA RIVER		5-P	
NHEST600031001-01-03	UPPER PISCATAQUA RIVER		5-P	
NHEST600030904-01	WINNICUT RIVER		3-ND	

Table 10: Summary of category changes for the nitrogen parameter associated with the Aquatic Life designated use

AUID	ASSESSMENT ZONE	OLD CATEGORY	NEW CATEGORY	COMMENTS
NHEST600030903-01-01	BELLAMY RIVER		5-M	Eelgrass
NHEST600030903-01-02	BELLAMY RIVER		5-M	Eelgrass
NHEST600031002-01-01	BERRYS BROOK		3-ND	
NHEST600031002-01-02	BERRYS BROOK		3-ND	
NHEST600030608-01	COCHECO RIVER		5-P	Dissolved oxygen
NHEST600030904-02	GREAT BAY		5-M	Eelgrass
NHEST600030904-03	GREAT BAY		5-M	Eelgrass
NHEST600030904-04-02	GREAT BAY		5-M	Eelgrass
NHEST600030904-04-03	GREAT BAY		5-M	Eelgrass
NHEST600030904-04-04	GREAT BAY		5-M	Eelgrass
NHEST600030904-04-05	GREAT BAY		5-M	Eelgrass
NHEST600030904-04-06	GREAT BAY		5-M	Eelgrass
NHEST600030709-01	LAMPREY RIVER		5-P	Eelgrass
NHEST600030904-06-10	LITTLE BAY		5-M	Eelgrass
NHEST600030904-06-11	LITTLE BAY		5-M	Eelgrass
NHEST600030904-06-12	LITTLE BAY		5-M	Eelgrass
NHEST600030904-06-13	LITTLE BAY		5-M	Eelgrass
NHEST600030904-06-14	LITTLE BAY		5-M	Eelgrass
NHEST600030904-06-15	LITTLE BAY		5-M	Eelgrass
NHEST600030904-06-16	LITTLE BAY		5-M	Eelgrass
NHEST600031001-05	LITTLE HARBOR/BACK CHANNEL		5-M	Eelgrass
NHEST600031001-08	LITTLE HARBOR/BACK CHANNEL		5-M	Eelgrass
NHEST600031002-02	LITTLE HARBOR/BACK CHANNEL		5-M	Eelgrass
NHEST600031001-02-01	LOWER PISCATAQUA RIVER NORTH		3-PNS	Eelgrass
NHEST600031001-02-02	LOWER PISCATAQUA RIVER SOUTH		3-PNS	Eelgrass
NHEST600031001-10	NORTH MILL POND		3-PNS	Eelgrass
NHEST600030902-01-01	OYSTER RIVER		5-P	Eelgrass
NHEST600030902-01-02	OYSTER RIVER		5-P	Eelgrass
NHEST600030902-01-03	OYSTER RIVER		5-P	Eelgrass
NHEST600030904-06-17	OYSTER RIVER		5-P	Eelgrass
NHEST600031001-11	PORTSMOUTH HARBOR		5-M	Eelgrass
NHEST600031001-03	SAGAMORE CREEK		3-PNS	Eelgrass
NHEST600031001-04	SAGAMORE CREEK		3-PNS	Eelgrass
NHEST600030406-01	SALMON FALLS RIVER		5-M	Dissolved oxygen
NHEST600031001-09	SOUTH MILL POND		3-PNS	Dissolved oxygen
NHEST600030806-01	SQUAMSCOTT RIVER		5-P	Eelgrass
NHEST600031001-01-01	UPPER PISCATAQUA RIVER		5-P	Eelgrass
NHEST600031001-01-02	UPPER PISCATAQUA RIVER		5-P	Eelgrass
NHEST600031001-01-03	UPPER PISCATAQUA RIVER		5-P	Eelgrass
NHEST600030904-01	WINNICUT RIVER		3-PNS	Eelgrass

Note: The nitrogen category selected was the lower (closer to impaired) of the categories assigned for the dissolved oxygen and eelgrass end points. The end point is specified in the comments field.

Table 11: Summary of category changes for the all parameters and all designated uses for assessment unit NHEST600031001-02-01 (Lower Piscataqua River North)

DESIGNATED USE	PARAMETER	OLD CATEGORY	NEW CATEGORY	COMMENTS
Primary Contact Recreation	CHLOROPHYLL-A	2-G	3-PAS	
	ENTEROCOCCUS	5-P	2-G	
Secondary Contact Recreation	ENTEROCOCCUS	5-P	2-G	
Aquatic Life	.ALPHA.-ENDOSULFAN(ENDOSULFAN 1)	2-G	2-G	No Change
	.BETA.-ENDOSULFAN (ENDOSULFAN 2)	2-G	2-G	No Change
	2-METHYLNAPHTHALENE	2-M	2-M	No Change
	ACENAPHTHENE	2-M	2-M	No Change
	ACENAPHTHYLENE	2-M	2-M	No Change
	ALUMINUM	2-G	2-G	No Change
	AMMONIA (UN-IONIZED)	2-G	3-PAS	
	ANTHRACENE	2-M	2-M	No Change
	ANTIMONY	2-G	2-G	No Change
	ARSENIC	2-G	2-G	No Change
	BENZO(A)PYRENE (PAHS)	2-M	2-M	No Change
	BENZO[A]ANTHRACENE	2-M	2-M	No Change
	BENZO[B]FLUORANTHENE	2-G	2-G	No Change
	BENZO[G,H,I]PERYLENE	2-G	2-G	No Change
	BENZO[K]FLUORANTHENE	2-G	2-G	No Change
	BIPHENYL	2-G	2-G	No Change
	CADMIUM	2-G	2-G	No Change
	CHRYSENE (C1-C4)	2-M	2-M	No Change
	COPPER	2-G	2-G	No Change
	DDD	2-M	2-M	No Change
	DDE	2-M	2-M	No Change
	DDT	2-M	2-M	No Change
	DIBENZ[A,H]ANTHRACENE	2-M	2-M	No Change
	DIELDRIN	2-G	2-G	No Change
	DISSOLVED OXYGEN SATURATION	2-G	2-G	No Change
	ENDOSULFAN SULFATE	2-G	2-G	No Change
	ENDRIN	2-G	2-G	No Change
	Estuarine Bioassessments	5-P	5-P	No Change
	FLUORANTHENE	2-M	2-M	No Change
	FLUORENE	2-M	2-M	No Change
	HEXACHLOROBENZENE	2-G	2-G	No Change
	INDENO[1,2,3-CD]PYRENE	2-G	2-G	No Change
	IRON	2-G	2-G	No Change
	LEAD	2-G	2-G	No Change
	LINDANE	2-G	2-G	No Change
	Mercury	2-G	2-G	No Change
	NAPHTHALENE	2-M	2-M	No Change
	NICKEL	2-G	2-G	No Change
	OXYGEN, DISSOLVED	2-G	2-G	No Change

DESIGNATED USE	PARAMETER	OLD CATEGORY	NEW CATEGORY	COMMENTS
	PHENANTHRENE	2-G	2-G	No Change
	PYRENE	2-M	2-M	No Change
	SILVER	2-G	2-G	No Change
	TOXAPHENE	2-G	2-G	No Change
	ZINC	2-G	2-G	No Change
	PH	2-M	2-M	No Change
Fish Consumption	Mercury	5-M	5-M	No Change
	Polychlorinated biphenyls	5-M	5-M	No Change
Shellfishing	Dioxin (including 2,3,7,8-TCDD)	5-M	5-M	No Change
	Mercury	5-M	5-M	No Change
	Polychlorinated biphenyls	5-M	5-M	No Change

Table 12: Summary of category changes for the all parameters and all designated uses for assessment unit NHEST600031001-02-02 (Lower Piscataqua River South)

DESIGNATED USE	PARAMETER	OLD CATEGORY	NEW CATEGORY	COMMENTS
Primary Contact Recreation	CHLOROPHYLL-A	2-G	2-G	No Change
	ENTEROCOCCUS	5-P	5-P	No Change
Secondary Contact Recreation	ENTEROCOCCUS	5-P	5-P	No Change
Aquatic Life	AMMONIA (UN-IONIZED)	2-G	2-G	No Change
	Estuarine bioassessments	5-P	5-P	No Change
	OXYGEN, DISSOLVED	2-G	2-G	No Change
	PH	2-M	2-G	
	.ALPHA.-ENDOSULFAN(ENDOSULFAN 1)	2-G		
	.BETA.-ENDOSULFAN (ENDOSULFAN 2)	2-G		
	2-METHYLNAPHTHALENE	2-M		
	ACENAPHTHENE	2-M		
	ACENAPHTHYLENE	2-M		
	ALUMINUM	2-G		
	ANTHRACENE	2-M		
	ANTIMONY	2-G		
	ARSENIC	2-G		
	BENZO(A)PYRENE (PAHS)	2-M		
	BENZO[A]ANTHRACENE	2-M		
	BENZO[B]FLUORANTHENE	2-G		
	BENZO[G,H,I]PERYLENE	2-G		
	BENZO[K]FLUORANTHENE	2-G		
	BIPHENYL	2-G		
	CADMIUM	2-G		
	CHRYSENE (C1-C4)	2-M		
	COPPER	2-G		
	DDD	2-M		
	DDE	2-M		
	DDT	2-M		
	DIBENZ[A,H]ANTHRACENE	2-M		
	DIELDRIN	2-G		
	ENDOSULFAN SULFATE	2-G		
	ENDRIN	2-G		
	FLUORANTHENE	2-M		
	FLUORENE	2-M		
	HEXACHLOROBENZENE	2-G		
	INDENO[1,2,3-CD]PYRENE	2-G		
	IRON	2-G		
	LEAD	2-G		
	LINDANE	2-G		
	Mercury	2-G		
	NAPHTHALENE	2-M		
	NICKEL	2-G		

DESIGNATED USE	PARAMETER	OLD CATEGORY	NEW CATEGORY	COMMENTS
	PHENANTHRENE	2-G		
	PYRENE	2-M		
	SILVER	2-G		
	TOXAPHENE	2-G		
	ZINC	2-G		
Fish Consumption	Mercury	5-M	5-M	No Change
	Polychlorinated biphenyls	5-M	5-M	No Change
Shellfishing	Dioxin (including 2,3,7,8-TCDD)	5-M	5-M	No Change
	Mercury	5-M	5-M	No Change
	Polychlorinated biphenyls	5-M	5-M	No Change

Figure 1: Assessment zones in the Great Bay Estuary

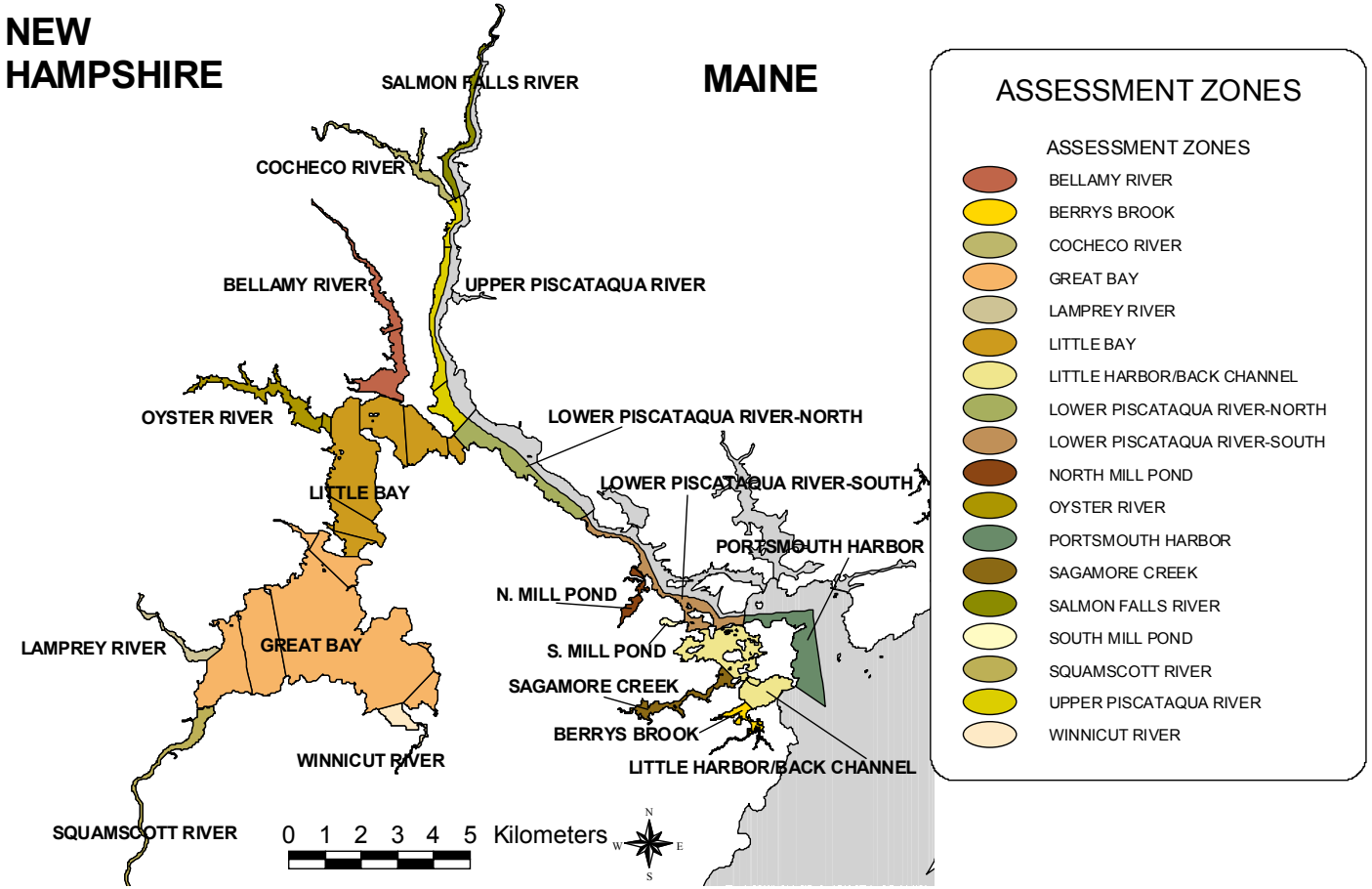
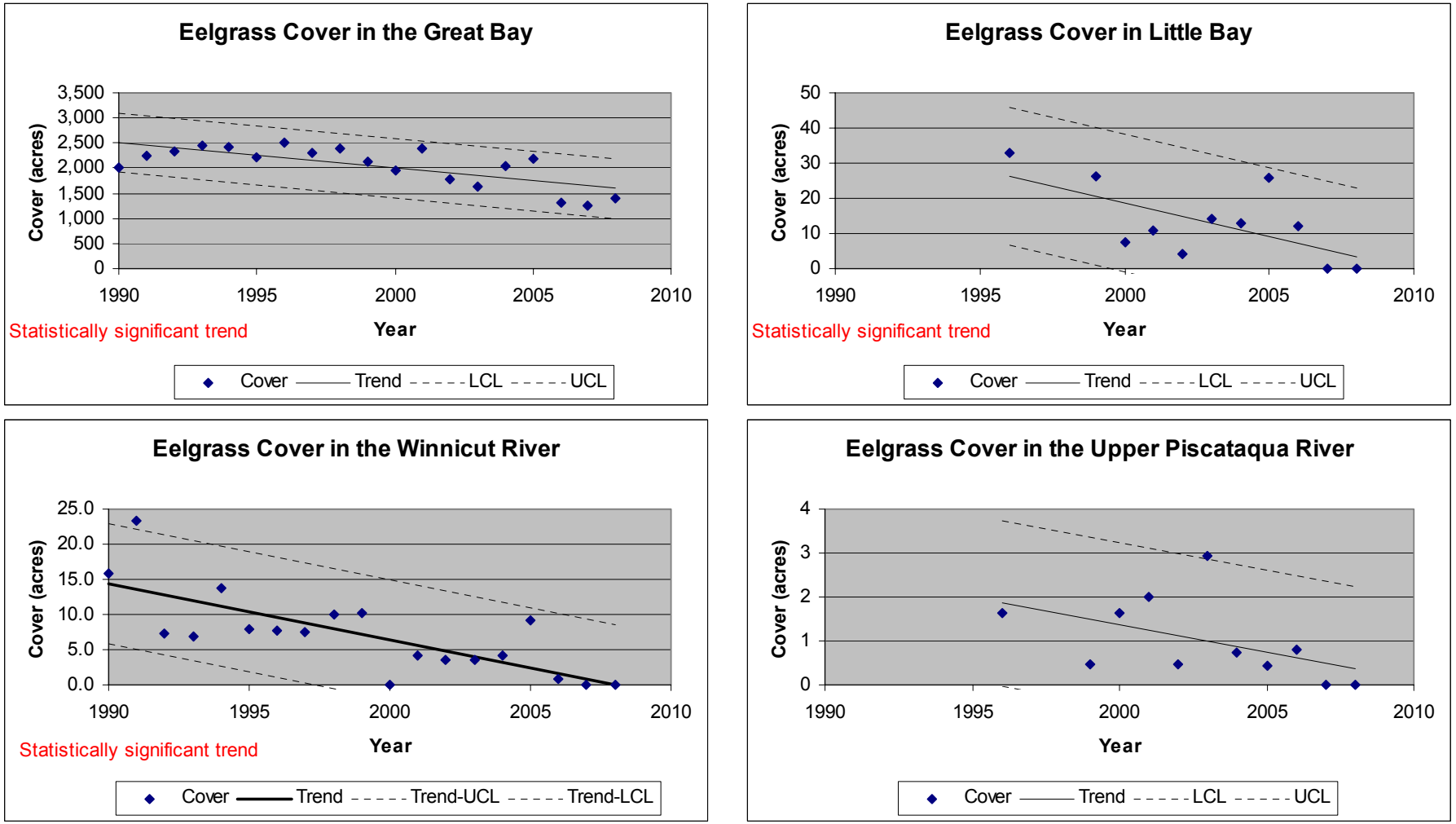
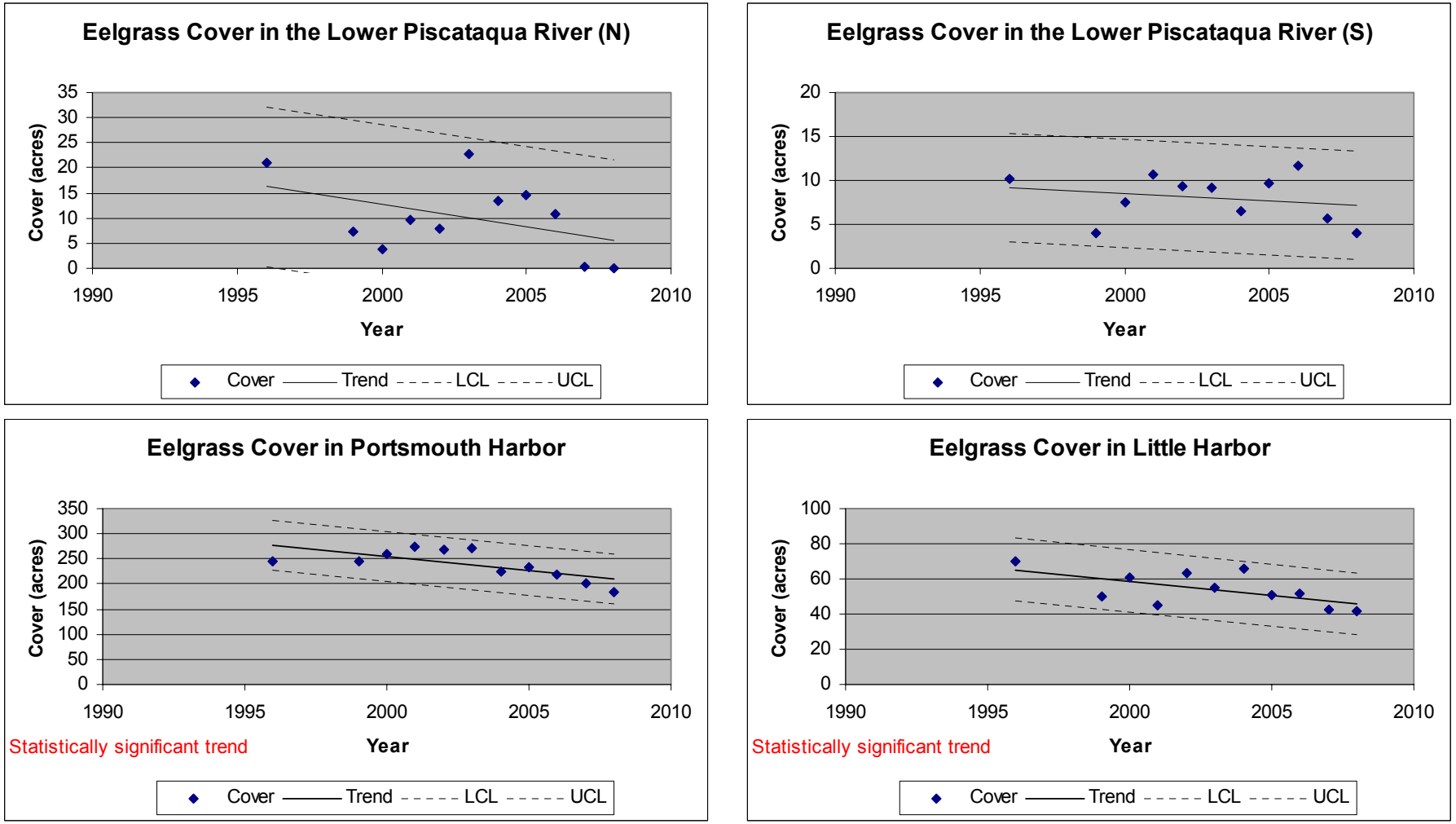


Figure 2: Eelgrass coverage in assessment zones of the Great Bay Estuary



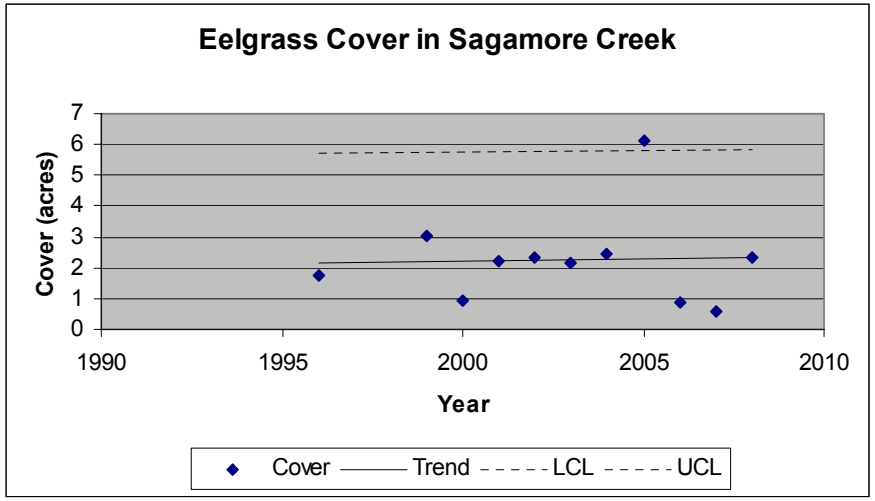
* Trend UCL and Trend LCL refer to the upper and lower confidence limits (95th percentile) of the trend line

Figure 2: Eelgrass coverage in assessment zones of the Great Bay Estuary (cont.)



* Trend UCL and Trend LCL refer to the upper and lower confidence limits (95th percentile) of the trend line

Figure 2: Eelgrass coverage in assessment zones of the Great Bay Estuary (cont.)



* Trend UCL and Trend LCL refer to the upper and lower confidence limits (95th percentile) of the trend line

Figure 3: Categories for estuarine assessments for significant eelgrass loss

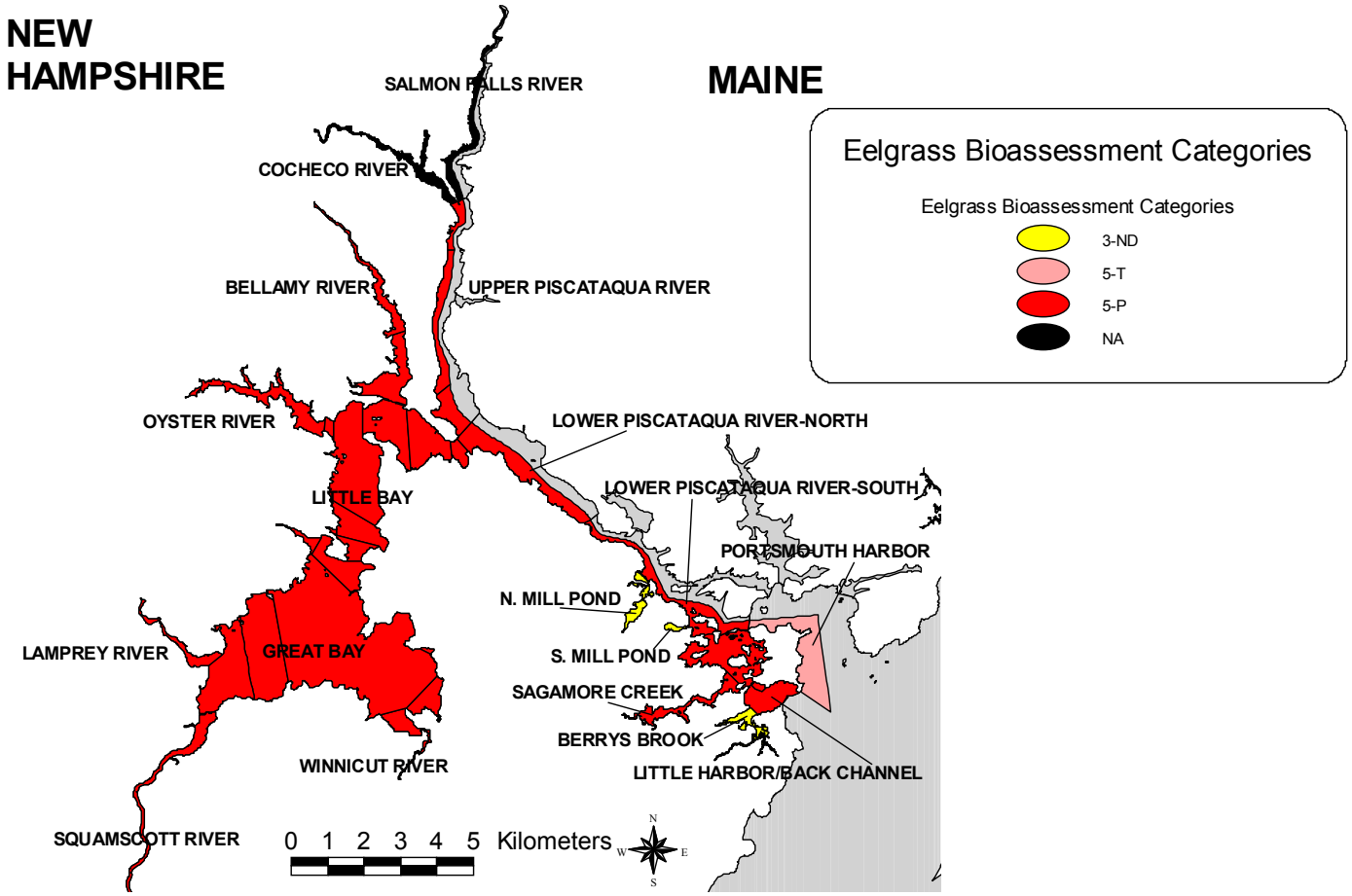


Figure 4: Categories for nitrogen associated with the Aquatic Life designated use