ATTACHMENT 5

Town of Marion's Comments on the November 2014 Draft NPDES Permit for the Marion Water Pollution Control Facility (Permit No. MA0100030)

Overview

The United States Environmental Protection Agency (EPA) issued a draft National Pollution Discharge Elimination System (NPDES) permit to the Town of Marion (Town) for its water pollution control facility on November 28, 2014. The changes imposed within the Draft Permit are vast and, if left unchanged, will require a substantial, unprecedented and unwarranted revision to the Town's water pollution control facility (WPCF) liquid and solids processes. The Draft Permit would require significant upgrades to the existing facilities, which are less than 10 years old, and construction of new facilities to respond to the following conditions in the Draft Permit:

- Further reduction of already very low levels of total nitrogen in the effluent, which would only decrease the current WPCF's discharge of total nitrogen (TN) from an average of 3.46 mg/l to 3 mg/l.
- Reduction of total phosphorus (TP) in the effluent, which if done with chemical addition would create the need to handle and dispose of the chemical-laden sludge -- the byproduct of chemical use.
- Re-consideration of the use of the lagoons that are currently used as influent flow equalization and sludge treatment basins.
- Draining and lining the lagoons if they are going to continue to be part of the treatment facilities or making other provisions for influent equalization if they are not.
- Potentially disposing of existing biosolids in the lagoons at an offsite facility.
- Further reduction of copper concentrations in the effluent.
- Addressing assumed, but undefined, contamination of groundwater occurring "as a result of sludge and other wastewater solids that were deposited in the unlined lagoons," noting that the Commonwealth of Massachusetts (Commonwealth) and not EPA has jurisdiction over regulating the Commonwealth's groundwater resources, and thus such requirements are misplaced in an NPDES permit.

The Draft Permit, if left unchanged, would require a very significant capital improvements project for the treatment of the Town's wastewater. An initial engineering estimate of the capital cost of these improvement ranges from $20 million to over $30 million. The range reflects both use of different approaches to facilities needed to comply with permit requirements and assumptions about the ease and cost of implementation (especially offsite disposal costs for the existing biosolids if these need to be removed from the lagoons). The estimate does not include any costs to address the assumed, but

undefined, groundwater contamination, nor do they include the operations and maintenance costs of the new facilities.

In addition to treatment facilities upgrades, the Draft Permit mandates the Town to comply with requirements for operating and maintaining the sewer collection system; Capacity, Management, Operations, and Maintenance (CMOM). It is estimated that approximately $400,000 would be needed to implement programs to meet the new CMOM requirements followed by a 10-year program compliance cost of about $1.2M.

As documented in the comments below, the Town disputes the both the legal and technical rationale for imposition of new requirements in the Draft Permit as provided in the Draft Permit and Fact Sheet. The Town believes these changes are unwarranted, with rationales based on flawed and unsupported analyses. The available scientific information confirms that no material change in plant growth or eelgrass extent would be expected to occur in response to the new restrictions the draft permit seeks to impose. Some statements contained in the Fact Sheet draw from a report prepared for the Buzzards Bay Coalition —a report that has been demonstrated to be fundamentally flawed—yet EPA used those same statements and calculations as part of the basis for the Draft Permit as if they were scientifically reliable, documented facts. The Draft Permit would also require abandonment of the current biosolids treatment process, which is the very definition of sustainable – as for over 40 years the WPCF's biosolids have been anaerobically digested onsite without the addition of any chemicals, excessive solids accumulation, or energy expenditures for sludge processing beyond the aeration system in the lagoons. EPA's action in this regard is unprecedented and beyond its statutory authority as EPA my not dictate plant design or regulate alleged groundwater impacts under the Clean Water Act. See, e.g., *Iowa League of Cities v. EPA* (8th Cir. 2013).

Moreover, assuming that the proposed permit requirements were justified, the Town finds it problematic and objects to the fact that the Draft Permit envisions only one path forward for compliance with the new limits – as outlined in the Compliance Schedule - when several feasible options, not included in the Draft Permit, exist. In accordance with its responsibility to provide the sewer rate payers and citizens of Marion with cost-efficient wastewater services, the Town must have the time and ability to evaluate all alternatives – and not just those envisioned in the Draft Permit. Two clearly available alternatives that are not included in the permit involve changes to the discharge point of treated effluent, a common response to proposals for more restrictive effluent limitations. Very initial cost estimates suggest that these alternatives would offer the Town significant cost savings.

1. *Alternative 1 - Extend the existing outfall pipe to discharge at the head of saltmarsh that fronts Aucoot Cove.* Implementation would only require a modest pipe extension and it should eliminate the need for a phosphorus limit in the permit because the treated effluent would no longer discharge to Effluent Brook. While the capital cost of facilities to reduce phosphorus are modest on the scale of all the facilities upgrades envisioned with this permit, they are nonetheless sizable; and the O&M costs are significant primarily because the lagoons could no longer be used to treat the biosolids and offsite disposal of the greater volume of chemical-laden sludge would be required.

2. *Alternative 2 - Extend the existing outfall pipe into Outer Aucoot Cove.* A very preliminary concept is shown in **Figure 1** attached – actual routing of the land-side pipe and terminus for the discharge would need to be evaluated in greater detail. This option only became permissible in

August 2014 when the Legislature passed an amendment to the Ocean Sanctuaries Act. Prior to this amendment, (non-vested) municipal wastewater discharges were prohibited in some ocean sanctuaries, while in others the applicant was required to demonstrate that there was no feasible alternative to ocean discharge. The 2014 amended Act allows new or modified discharges from municipal wastewater treatment plants to an ocean sanctuary provided:

a. a series of 10 conditions are met (Section 6G, Chapter 259 of Acts of 2014 §§28-45); (Marion currently meets most, if not all, of these requirements)
b. the wastewater treatment plant provides advanced treatment and disinfection to remove nutrients and pathogens (Marion's current facility meets this requirement)
c. the application be accompanied by a series of designated studies including a Comprehensive Wastewater Management Plan (CWMP) with Environmental Impact Report (EIR); benthic survey and fish habitat evaluation of the receiving water, 24 months of baseline nutrient water quality monitoring, a site-specific hydrodynamic model and an aquifer evaluation (this latter item would appear not be applicable to Marion's circumstance).

Some advantages of a mid-cove ocean discharge should include elimination of permit limits for nitrogen and phosphorus and relief, if not elimination, of the copper limit.

Additional options that could or must be evaluated and are not included in the compliance schedule for the permit include alternatives to using the lagoons for influent equalization, the possibility of downsizing the volume for flow equalization and repurposing one or more lagoons for another use such as a constructed wetland, and alternatives to lining the lagoons such as constructing a leachate collection system.

Assuming EPA does not modify the permit requirements in response to the City's comments, it is critical that EPA delay issuance or re-write and re-structure the Town's Draft Permit to allow the Town to investigate whether these or other similar cost savings options would provide cost-effective solutions while also protecting the environment and human health.

The compliance schedule offered in the Draft Permit is incomplete, does not allow for consideration of alternative approaches and does not allow sufficient time or flexibility to properly plan, permit, design, and construct selected alternatives. The steps the Town believes would constitute a sound program of wastewater improvements, along with a proposed schedule, are found in the comments on the compliance schedule below.

The importance of taking these steps in a rational, stepwise fashion is underscored by fact that today the WPCF periodically produces effluent quality that would meet the proposed permit limit of 3 mg/l total nitrogen (effluent total nitrogen has ranged from 1.7 to 7.4 mg/l). EPA has included a provision in the Draft Permit (page 13; and copied below) "allowing" for potential to modify the permit, when EPA must clearly understand that no such opportunity will ever exist should the permit be issued with a limit of 3 mg/l total nitrogen.

> *If, at any time, the Permittee can make a demonstration that nonpoint source and stormwater nitrogen improvements are sufficient to achieve water quality standards without further point source nitrogen reductions, the Permittee may submit a request for a permit modification*

If the permit were to be issued final as is, the Town would lose the flexibility to evaluate and select the best options for wastewater improvements since the present schedule suggested by EPA would not allow for that to occur.

Comments on the Draft Permit

The Town of Marion (Town) offers the following specific comments on the Draft Permit.

Flow

The flow limitation in the permit should be removed or be designated as a "report only" requirement. EPA has long recognized that flow is not a regulated parameter because it is not a "pollutant" and as such should not be included with a limit in the permit. This understanding is reflected in NPDES permits issued all over the Country. The Fact Sheet improperly EPA describes effluent flow as a "non-conventional" pollutant on Page 11 of the Fact Sheet, citing the Clean Water Act (CWA):

> *The term "pollutant" means dredged spoil [sic], solid waste, incinerator residue, sewage, garbage, sewage sludge, munitions, chemical wastes, biological materials, radioactive materials, heat, wrecked or discarded equipment, rock, sand, cellar dirt and industrial, municipal, and agricultural waste discharged into water.*
>
> 33 U.S.C. §1362(6)

However, EPA's identification of "non-conventional *pollutants"* as defined in federal rules at 40 C.F.R. § 439.1(n) —does not identify flow as such a parameter – it only identifies "pollutants". In essence, the draft permit is seeking to not only re-write the adopted NPDES rules, it is seeking to re-write the Clean Water Act to regulate flow, regardless of the pollutant levels present – that is simply not permissible as federal courts have repeatedly confirmed. *See, e.g., Iowa League of Cities v. EPA* (8th Cir. 2013).

The Town of Marion (Town) disagrees with EPA's assertion that the flow of water is considered a pollutant in 33 U.S.C. §1362(6). Marion's opinion is supported by a US District Court decision in the case Virginia Department of Transportation *et al.* vs. EPA, where the Court decided in favor of Virginia DOT that stormwater cannot be considered a pollutant as a surrogate for sediment load. The Court affirms that there is "no ambiguity in the wording" of 33 U.S.C. §1362(6), stating on Page 9 that "Stormwater runoff is not a pollutant, so EPA is not authorized to regulate it via TMDL." The Court goes on to state that

> *Claiming that the maximum stormwater load is a surrogate for sediment, which is a pollutant and therefore regulable, does not bring stormwater within the ambit of EPA's TMDL authority. Whatever reason EPA has for thinking that a stormwater flow rate TMDL is a better way of limiting sediment load than a sediment load TMDL, EPA cannot be allowed to exceed its clearly limited statutory authority.*
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> Virginia DOT *et al. vs.* EPA, 2013

This decision is applicable to Marion's case in that EPA intends to use "design flow as a reasonable and important worst-case condition," or, in other words, as a surrogate for the load of pollutants to Effluent Brook, when in fact EPA has included for the first time in this Draft Permit load limits for ammonia, total

nitrogen, total phosphorus, and total copper. Putting aside the factual validity of EPA's assertion, as with Virginia DOT *et al. vs.* EPA, EPA cannot exceed its statutory authority even if it believes that flow is a reasonable and efficient mechanism for limiting nutrient and other loads to Aucoot Cove.

Furthermore, EPA justifies the flow limit in the context of instream dilution within Effluent Brook, stating "Should the effluent discharge flow exceed the flow assumed in these calculations, the instream dilution would decrease and the calculated effluent limits would not be protective of WQS." While this observation is true from a mathematical perspective in some situations where dilution of an effluent into a stream is a major consideration, EPA's assertion is not even factually accurate as a general principle given the specific circumstances and structure of the permit. First, EPA states on page 13 of the Fact Sheet that the 7Q10 flow is considered zero. Therefore, EPA's concern about the reduced instream dilution caused by an increased effluent discharge flow is irrelevant to this discussion because there is no mixing available. In addition, if the load limits associated with the Draft Permit are maintained, discharging flow in excess of the proposed limit in the Draft Permit would necessitate lower effluent concentrations which, assuming no dilution, would produce better overall conditions in the receiving water.

Consequently, the Town requests that the flow limit in its permit be deleted, recognizing that EPA does not have the authority to regulate its effluent flow and that the proposed flow limit is not protective of the environment.

Furthermore, on Page 9 of the Fact Sheet, EPA discusses the conditions under which the permit writer can establish the permit level at the criteria level. We note that under 40 C.F.R. § 122.44(d) EPA is required to account for any available dilution as well as other pollutant load sources based on current and reliable information when calculating effluent limitations. EPA did not account for dilution in the marine receiving water while setting the total nitrogen and new bacteria requirements using the relevant averaging period for the criteria that were selected. Furthermore, EPA did not account for the change in total nitrogen level that occurred in the past 7 years when assessing the possible impacts on eelgrass populations, including the "safe" level of TN for eelgrass growth. These are both serious deficiencies that require resolution to ensure that the proper limitations are set.

Dissolved Oxygen Limit

The Draft Permit and Fact Sheet are inconsistent with respect to the timeframe for the seasonal dissolved oxygen (DO) limit. The Draft Permit states that the seasonal dissolved oxygen (DO) limit is in effect from April – October; however, the Fact Sheet (Page 11) states that "The Draft Permit includes a seasonal (June – October) limitation." The Draft Permit should be made consistent with the statement in the Fact Sheet that the seasonal limit be applicable from June 1st to October 31st, which is consistent with provisions in the current permit. It should be noted that given the lower temperatures present in April and May, which naturally increase DO saturation, DO related issues would not be expected to occur in this period.

On Page 17 of the Fact Sheet, EPA cites numerous violations of the 6 mg/l DO criteria at several Buzzards Bay Coalition monitoring locations throughout Aucoot Cove, including station AC1 located in an arm of the cove reaching into the heart of the saltmarsh, presumed on Page 15 of the Fact Sheet to be causally related to algae growth. This conclusion is based upon weekly grab samples taken by Buzzards Bay Coalition volunteers. This data is not sufficient to conclude that:

- DO violations exist,
- Such violations are caused by nutrient loadings from Marion, or
- Any ecological impairment is associated with this condition.

Further, EPA does not state whether the Buzzards Bay Coalition's data program has appropriate QA/QC protocols for its data collection efforts. If these data are not subjected to QA/QC they should not be used to set describe violations of the state dissolved oxygen standard in Aucoot Cove. Examination of the data indicates some low oxygen level found at the surface in the middle of the outer Aucoot Cove, which is a well-flushed embayment. These values are implausible and should result in a detailed assessment of the reliability of all the data. Marion requests that EPA provide the Buzzards Bay Coalition QA/QC procedures and confirm that the data used in its analysis conform to these procedures.

Continuous, diurnal DO is required to show that algae is actually causing the low DO concentrations measured; since only grab samples exist, it is not possible to determine whether the low DO concentrations are linked to excess nitrogen loads to Aucoot Cove. More rigorous monitoring must be performed in order to demonstrate that some form of excessive plant growth is the reason periodic low DO has been encountered in Aucoot Cove before it is possible to tie such conditions to excess nutrient concentrations.

Neither the Clean Water Act (CWA) nor Commonwealth of Massachusetts (Commonwealth) law regulate water quality that is caused by natural conditions (314 CMR 4.03(5). Consequently, such conditions are considered "in compliance" with adopted standards and the CWA. This provision is important as it is probable that whatever DO is occurring in the Cove, it is natural, given the significant tidal flushing that occurs every day in this area. The saltmarsh along the northern inner edge of Aucoot Cove is a likely source of low DO in this region. A saltmarsh is an example of a system that has naturally low dissolved oxygen concentrations. An example of this local to Marion is the Namskaket salt marsh system in Nantucket. This system was studied by Brian Howes and the Massachusetts Estuaries Project (MEP). This analysis found that "the central tidal salt marsh creek of the extensive Namskaket salt marsh system has periodic oxygen depletion to 2 mg/l." The authors note that "salt marshes are nutrient and organic matter enriched as part of their ecological design, which makes them such important nursery areas for adjacent offshore waters; however, a natural consequence of their organic rich sediments is periodic oxygen depletion within the tidal creeks, particularly during the summer." (MEP, 2007). Thus, before EPA can leap to the conclusion that low DO is an excess plant growth, nutrient induced condition, the expected impact of the salt marsh on the DO regime must be investigated. This sampling approach is straightforward. The natural DO deficit would need to be confirmed through DO sampling throughout the salt marsh to determine whether this is indeed a source of low DO water and in the receiving waters at high, low, and Ebb tides. The Town proposes sampling to establish that the salt marsh is a potential cause of low DO in Aucoot Cove, and would like EPA to recognize that low DO and its total nitrogen discharge may not be casually related.

Another note relative to the contribution relative to Marion's effluent is related to whether Effluent Brook ever violates DO standards. Effluent Brook is almost entirely comprised of Marion's effluent during dry weather, and no DO violations have been observed (*e.g.,* Horsley Witten, 2011). Thus, during dry weather the DO concentration in stream is representative of the effluent, which is always in compliance with the regulations. How the low DO in Aucoot Cove could manifest itself given this reality is unclear, but certainly does not appear to tie back to the effluent.

In addition, given the well mixed nature of Aucoot Cove, it is impossible that Marion's discharge could cause low DO throughout a wide area or generate the type of excess algal growth that would be needed to alter the DO of such a large volume of water. First, the well flushed bay has significant tidal exchange that refreshes the water volume frequently, limiting the amount of time that oxygen demanding substances can consume oxygen within the embayment or that nutrients could cause phytoplankton growth. Unless such algal growth creates some type of elevated sediment oxygen demand, the means for total nitrogen (TN)-induced low DO is not apparent. Second, there is a low level of oxygen demanding inputs to Aucoot Cove, further limiting the effect of Marion's effluent.

The available information simply does not provide a credible basis for asserting that the Town's effluent is responsible for DO conditions in Aucoot Cove. Simply speculating that the DO was caused by nitrogen inputs is not scientifically defensible. Further investigation, not imposition of effluent limitations, should occur at this point.

Whole Effluent Toxicity Testing

The Town of Marion (Town) water pollution control facility (WPCF) treated effluent has passed its last nine consecutive Whole Effluent Toxicity (WET) tests (over two years). Both the current permit (Page 5) and Draft Permit (Page 5) state that "After submitting one year and a minimum of four consecutive sets of WET test results, all of which demonstrate compliance with the WET permit limits, the permittee may request a reduction in the WET testing requirements." Marion requests a reduction in the testing frequency to annually be included in this permit renewal recognizing that it has passed nine consecutive WET tests.

There is inconsistency in the Draft Permit (Item 11, Page 5) about the timing for whole effluent toxicity tests, where the text requires tests be performed the second week of February, May, August and November, while the table below requires testing in the second week of March, June, September, and December; note the latter set of months matches the Town's current permit.

The inconsistency notwithstanding, the Town would like to request that testing be changed to January, April, July, and October (or a subset of one or more of these months assuming the Town's request for reducing the testing frequency is granted). The reason for the request is December has proven problematic with the lab given the conflicts with holiday scheduling. In addition, the Town requests that language requiring testing in the second week of the month to be changed to allow testing to take place in the first or third week of the month if any state or federal holiday falls within the second week.

Both the current permit (Pages 5-6) and Draft Permit (Pages 5-6) state that "If toxicity test(s) using receiving water as diluent show the receiving water to be toxic or unreliable" the permittee can follow certain procedures to obtain "approval for use of an alternate dilution water." The receiving stream has proven to be both unreliable and occasionally non-existent. Page 13 of the Fact Sheet notes that "the unnamed brook to which Marion WPCF discharges has minimal or no flow of its own during dry periods," and Page 25 of the Fact Sheet states that "no dilution of the discharge occurs in the unnamed brook." Because EPA has recognized that the stream may be dry during periods of dry weather, the Town requests the Draft Permit include approval for the use of an alternate dilution water.

Ammonia Limit

The Fact Sheet (Page 13) misstates the ammonia applicable dates of the limits in the current permit. The fact sheet states that the average month limit of 1.74 mg/l applies form June 15th to October 15th, when

in the current permit the actual dates are June 1st to October 31st. Similarly the average month limit of 2.6 mg/l is stated as applying from May 1st to June 14th when they actually apply from May 1st to May 31st. The Fact Sheet should be corrected.

Total Nitrogen Limit

The need for a total nitrogen (TN) limit has not been demonstrated and it should be removed from the permit until appropriate analysis and investigation on the efficacy of further reducing this parameter occurs. This section offers a brief discussion of the Town of Marion's (Town) key objections and comments relative to the total nutrient limit proposed in the Draft Permit followed by a more in-depth discussion of specific issues.

Overview

The TN permit limit is predicated on assumed degradation to eelgrass in Inner Aucoot cove and dissolved oxygen (DO) violations. However, nitrogen is one of many variables that can limit eelgrass growth and cause low DO.

The data available for Aucoot Cove do not show that total nitrogen has caused this absence/ degradation and the weight of evidence indicates this parameter is not precluding eelgrass growth in the inner cove. EPA's analysis assumes that eelgrass should grow in this area based on depth, but available data do not show that eelgrass could even grow in the areas of Inner Aucoot Cove that EPA cites as justification for the total nitrogen discharge limit. The aerial maps of eelgrass growth, in areas of both elevated and "safe" TN concentration show that eelgrass do not inhabit the shallows, throughout the entire area. This occurs both in Aucoot Cove and nearby coves. This is rather obvious "proof" that factors, other than TN concentration are restricting plant growth since the shallower waters must have greater, not lesser light availability. One possibility is that ice cover scours these shallower waters every year, eliminating what little seed deposition that may occur in this area from flowering eelgrass beds in the deeper waters. As such, there is no proof or guarantee that a reduction in Marion's total nitrogen concentration will cause any change in eelgrass growth in this area of Aucoot Cove. This limit is overly restrictive and will present a significant and unreasonable economic burden to the town.

After eelgrass, DO impairment is the second reason EPA provides for further restricting nitrogen in the Draft Permit. As with eelgrass, EPA has not established a causal relationship between the current nitrogen levels and low values of DO found in Inner Aucoot Cove. Two of the most common scenarios for low oxygen waters in near-shore coastal waters with wastewater discharges are not valid in Aucoot Cove:

- Scenario 1 - High levels of oxygen demanding substances express themselves upon being discharged to the receiving water. Marion's treated effluent contains very low level of oxygen demanding substances, of which nitrogen will be further reduced by flowing through the saltmarsh at the head of the cove.

- Scenario 2 - Treated effluent grows excessive algae that dies and creates an oxygen demand. The short residence time (strong flushing) documented for Aucoot Cove will severely restrict the buildup of algae and its subsequent decay that can cause decreased oxygen levels.

As noted earlier, a more probable explanation is that the low levels of oxygen measured in Inner Aucoot Cover are due to low oxygen concentrations in the waters ebbing from the saltmarsh itself. Monitoring

programs in Buzzards Bay, the Cape and Islands for coastal water with bordering saltmarsh (e.g., MEP, 2007) and EPA's own TMDL studies (SCDHEC, 2013) account for this factor.

Footnote 7 of the Draft Permit (Page 4) adds an interim TN limit from April to October of 5 mg/l. The Fact Sheet provides no basis for the selection of this interim limit, nor does the footnote clearly indicate how compliance with this interim limit is to be calculated (e.g., seasonal average, average monthly, or other). Consequently, this restriction must be eliminated from the permit as it is not based on any demonstrated need to achieve applicable standards as required by CWA Section 301(b)(1) (C) and 40 CFR 122.44(d). The current permit does not include a limit for TN but does require the water pollution control facility (WPCF) to operate with a "target effluent quality projected" at 7 and 10 mg/l. These targets were to be achieved "whenever possible" and they are "not considered a numerical effluent limit." Given that no changes will be made to the WPCF before the intended upgrades to comply with the new permit limit of 3 mg/l, it is unclear what rationale is being used to impose (1) a quantitative interim limit and (2) a limit more stringent than the target the plant has been designed to achieve. While the existing WPCF has been able to achieve excellent TN removal (average 3.46 mg/l from September 2010 to August 2014), individual samples have ranged from 1.7 to 7.4 mg/l. This range in performance could cause the plant to be in non-compliance with its permit limits in the first month of the new permit; a situation that is unacceptable to the Town. While the Town will continue to run the WPCF as it has in the past to achieve the best possible reduction of nitrogen, the Town objects to any interim limit being included in the permit and requests that EPA remove it.

Footnote 8 (page 4) of the Draft Permit requires that the WPCF be operated to reduce the discharge of TN to the maximum extent possible, excepting the use of an additional carbon source. The basis for this requirement is not provided and this is not a requirement of the Clean Water Act. The Act and implementing regulations only require a facility to meet applicable permit limits designed to achieve effluent limitations. Nor does the requirement make sense relative to the dynamics of nutrients during the winter season and the strong flushing that is experienced in Aucoot Cove. This requirement should be removed from the permit as EPA has not established a reasonable basis for this requirement.

Finally, in the event that EPA somehow fails to modify the permit based on the above comments, we at least request the concentration limit be removed for the permit and that nitrogen be regulated solely based on mass. This is certainly appropriate and is consistent with other recent NPDES permits issued for Massachusetts treatment plants.

Eelgrass Die-off Conclusions are Misplaced

EPA states that one justification for revising the Town of Marion's (Town) water pollution control facility's (WPCF) nitrogen effluent limit is the condition of eelgrass beds within Aucoot Cove observed during a recent site visit. EPA writes on Page 18, "During a site visit on September 10, 2014, EPA staff observed eelgrass beds in Aucoot Cove that appeared patchy, yellowed, and shaded by attached algae. Some die-off may be expected late in the growing season. However, the thick algal cover seems to be the immediate cause of the poor condition of the eelgrass beds." The Fact Sheet does not cite any sources or proof that the observed die-off is due to algal cover and not simply because the field visit occurred late in the growing season when eelgrass is naturally degraded. The claims of epiphyte presence does not demonstrate that epiphytes are present at a level impairing eelgrass within the area of concern; therefore, these observations cannot be used to justify the causal relationship between

Marion's total nitrogen load and the condition of the eelgrass without a strong and substantive proof that any die-off and degradation is not purely a natural phenomenon.

EPA also justifies the need for nitrogen limits on the Marion WPCF by referencing the declining extent of the eelgrass within Aucoot Cove. Specifically, EPA states on Page 18 of the Fact Sheet that "Eelgrass continues to grow in middle Aucoot Cove, but is receding from inner Aucoot Cove. […] GIS data collected by MassDEP and analyzed by EPA indicate that eelgrass coverage in Aucoot Cove has retreated from its historical extent. (see Figure 5)." A number of eelgrass surveys have been performed in Aucoot Cove since the 1980s; Joe Costa surveyed eelgrass in Aucoot Cove as part of his PhD dissertation[1] (Costa, 1988), and MassDEP surveyed eelgrass in 1995, 2001, 2007, and 2010 (Costello and Kenworthy, 2011); maps showing these surveys are included in **Figure 2** and a comparison of the change in eelgrass extent between 1995 and 2001 in **Figure 3**. A close examination of available eelgrass surveys within Aucoot Cove shows, in apparent contrast to the statements in the Fact Sheet, that the eelgrass is receding along the outer edge ("middle Aucoot Cove") but is fairly constant along the inner edge ("inner Aucoot Cove") where *higher TN concentrations would exist*. This holds true even between the 1995 and 2001 MassDEP surveys, where the average total nitrogen concentration at site AC2 between 1995 and 2005 was 0.50 mg/l (Buzzards Bay Coalition, 2014, via Robin Johnson, EPA). Furthermore, between the Costa 1980 survey and the 1995 MassDEP survey the eelgrass extent within Aucoot Cove actually increased, with the greatest gains in eelgrass habitat occurring along the outer edge that has seen habitat reduction in the years since. The receding eelgrass along the outer edge has occurred in an area of Aucoot Cove with *lower* total nitrogen concentrations than have been observed along inner Aucoot Cove where the eelgrass has been relatively stable. This evidence suggests that the nitrogen load from Marion is not a cause of eelgrass declines in Aucoot Cove, and presents a direct contradiction to the statements presented in the Fact Sheet. In fact, as eelgrass beds have been generally constant or expanding, there is no objective basis to assert that TN is having any adverse impact on the location or health of eelgrass beds in Aucoot Cove.

The apparent contradiction between the available eelgrass survey data and the data cited in the Fact Sheet may amount to EPA selecting a different baseline year for its analysis. Figure 5 of the Fact Sheet clearly states that EPA considers the historical extent to mean the "estimated eelgrass cover circa 1600." While the caption states that "this is a purely speculative exercise," EPA simply assumes the presumed pre-Colonial eelgrass coverage to be undeniable fact even though the hypothetical pre-Colonial eelgrass distribution does not account for any of the other numerous factors that could have caused changes in eelgrass coverage over the past 400 years. This purely speculative and unsupported exercise should not be used to conclude that the eelgrass is retreating from its historical extent within the Inner Aucoot Cove relative to recent survey data. Further supporting the assertion that the pre-Colonial analysis should not be used as a baseline year is a comparison of the baseline year used in peer-reviewed studies of eelgrass in Buzzards Bay. Kenworthy *et al*. (2013) elected to use the peer-reviewed 1995 MassDEP eelgrass mapping data as their baseline even though historical photographic records of eelgrass distribution exist going back to 1950; the historic photographs were not considered reliable enough to quantify eelgrass extent because "the quality of the older imagery is poor and the methods used to interpret and verify the benthic habitat signatures were qualitative and unreliable," a viewpoint the

[1] Digitized GIS data based on Costa's 1980s eelgrass surveys are available at http://buzzardsbay.org/eelgrass-gis-data.htm.

authors attribute to Charles Costello at MassDEP. Therefore, there is no credible scientific information indicating present eelgrass impairment, let alone significant impacts due to the low levels of nitrogen present in the system.

If the methodology cited in the Fact Sheet was indeed a reliable and accurate way to determine the baseline eelgrass level then MassDEP should have recommended that the study authors (Kenworthy *et al.*) use the pre-Colonial study or similar methodology to set the baseline value instead of the 1995 MassDEP survey results given the relative unreliability of the 1950s photographic records. Marion requests that EPA provide the basis and documentation for its claim that eelgrass has been receding from inner Aucoot Cove and allow for public review.

In addition to the objections to the threshold total nitrogen concentrations noted herein, we also note that the total nitrogen concentration is largely irrelevant because Aucoot Cove is well flushed and has a very short detention time. This means that only the dissolved inorganic nitrogen is important relative to algal production and possible epiphytic growth. Given the short detention time in Aucoot Cove, there is not enough time for other nitrogen species included in the total nitrogen concentration to be converted to bioavailable forms.

Eelgrass Habitat Suitability Requirements

While the Fact Sheet asserts that "based on its depth, strata, and other characteristics the inner cove would be expected to support eelgrass," none of the data available presented in the Fact Sheet demonstrates that eelgrass could grow in the innermost portion of Aucoot Cove even if lower total nitrogen concentrations are attained. A comprehensive study of eelgrass habitat suitability in Aucoot Cove would need to also look at sediment composition, light availability, and the physical properties of the watershed and the embayment before unilaterally concluding that the reason eelgrass has *never* been recorded in the innermost portion of Aucoot Cove is excess total nitrogen concentrations. It is therefore inappropriate to suggest that simply reducing the Marion WPCF's total nitrogen effluent limit will increase the area of suitable eelgrass habitat. NPDES permits and Clean Water Act decision making is not to be made on "guesswork". *Leather Industries of America v. EPA*, 40 F. 3d 392 (D.C. Cir. 1994). As EPA is simply "guessing" that TN levels are the cause of eelgrass changes, this proposed requirement must be withdrawn.

The assumed approach in the Fact Sheet is that total nitrogen causes enhanced phytoplankton and epiphyte productivity which shades eelgrass limiting or preventing growth and eliminating habitat suitability. This approach is quite simplistic in its assumption that eelgrass habitat suitability is solely based on whether total nitrogen is above or below a threshold value, which ample data from estuarine settings throughout the New England Area confirm is simply not true. There are a number of other factors that contribute to eelgrass habitat suitability beyond total nitrogen. Other relevant factors include:

- light availability
- sediment composition
- hypoxia, which can cause buildup of ammonium, nitrate, and sulfide concentrations in sediment that may be toxic to eelgrass

- high organic matter content in sediment
- channel and embayment morphology and configuration
- ice cover and impingement
- Grazing by geese

Light is an essential eelgrass habitat requirement, and numerous studies have investigated the correlation between light availability and eelgrass health. Benson *et al.* (2013) examined the relationship between light, total nitrogen, and eelgrass. The authors found that healthy eelgrass beds were found where the average total nitrogen concentration was 0.42 mg/l and degraded eelgrass beds where the average total nitrogen concentration was in excess of 0.6 mg/l. In addition, this study also examined conditions under which transplanted eelgrass survived. The authors found that over 75% of eelgrass colonies survived when total nitrogen was less than 0.39 ± 0.03 mg/l, and over 50% of eelgrass colonies survived when the total nitrogen concentration was 0.49 ± 0.12 mg/l. As EPA is also well aware, extensive eelgrass beds exist in Great Bay, NH with TN concentrations ranging 0.35 – 0.42 mg/l. This real world, field data confirms that the range of acceptable eelgrass habitat is not limited to total nitrogen concentrations below 0.35 mg/l and that a concentration of 0.45 mg/l in the Cove could not possibly eradicate all eelgrass populations from that are.

Kenworthy *et al.* (2013) examined the relationship between light attenuating substances (*i.e.,* algae, turbidity), eelgrass impairment, and sediment conditions. Several key conclusions from this study are summarized below.

- Minimum light requirements for eelgrass growth varies and is site specific. The authors state "Our data suggest that using a fixed estimate for the light requirement of eelgrass across a wide range of embayments may not be appropriate for generalized computations or application."
- Recovery of eelgrass beds is not necessarily an immediate consequence of reductions in nitrogen loadings. In Marion, the nitrogen point source load decreased significantly after the WPCF was upgraded in 2005. Again, the Kenworthy *et al.* state "if the high apparent light requirements are due solely to shading by epiphytes and macroalgae, then success at curtailing algal blooms by reduction of N loading might be expected to restore seagrass on normal time scales of eelgrass recruitment and expansion rates. If, however, epiphyte and macro algal blooms and chronic organic matter loading to the sediments leads to reduced light utilization efficiency, sulfide and ammonium toxicity, or increases in sediment re-suspension, we might expect some delay in recovery…"
- High organic matter in sediment can inhibit eelgrass growth. In addition, hypoxic conditions, which are not uncommon in sediments, can cause buildup of ammonium, nitrate, and sulfide concentrations in sediment that may be toxic to eelgrass.

Studies have also found a significant relationship between estuary geometry and watershed characteristics and the growth of submerged aquatic vegetation. Li *et al.* (2007) examined 101 small sub-estuaries within Chesapeake Bay to determine how submerged aquatic vegetation is affected by parameters such as watershed size and characteristics, estuary perimeter, estuary surface area, and wave height. The authors found strong, significant relationships between aquatic vegetation growth and

the ratio of estuary perimeter to estuary surface area (fractal dimension), dominant land cover, mean tidal range, ratio of watershed area to estuary surface area, and mean wave height.

The results of the studies cited herein confirm that conditions that limit eelgrass habitat suitability are far more complex than the simple total nitrogen threshold suggested in the Fact Sheet. More study is required to determine whether eelgrass growth is indeed limited by total nitrogen in inner Aucoot Cove. This study should look at sediment composition, the relative impacts of channel morphology on eelgrass throughout the region, the effects of naturally hypoxic conditions from the salt marsh, and whether light is a limiting factor within inner Aucoot Cove. If this study determines that total nitrogen adversely affects eelgrass habitat viability, this study needs to determine a cost-effective approach to reducing nitrogen and thus, whether a reduction in Marion's total nitrogen limit would cause an expansion of eelgrass in Aucoot Cove.

Total Nitrogen and Chlorophyll *a* Threshold

The Fact Sheet states that "The Massachusetts Department of Environmental Protection (MassDEP) has identified total nitrogen levels believed to be protective of eelgrass habitats as less than 0.39 mg/l and ideally less than 0.3 mg/l and chlorophyll *a* levels as 3-5 µg/l and ideally less than 3 µg/l" citing a MassDEP and University of Massachusetts at Dartmouth School for Marine Science and Technology report titled *Massachusetts Estuaries Project: Site-specific Nitrogen Thresholds for Southeastern Massachusetts Embayments: Critical Indicators, Interim Report* (MEP, 2003). This interpretation of this report is completely inaccurate and is entirely inconsistent with the report's conclusions. The report does cite several total nitrogen thresholds in Table 1, where the "Excellent" water quality category was observed to be less than 0.30 mg/l total nitrogen and the "Excellent/Good" category less than 0.39 mg/l total nitrogen. While these values do provide an initial suggestion of a possible numeric threshold for total nitrogen, the authors of this report state on Page 12:

> *Loss of bed area and/or thinning of beds (decreases in density) are generally both linked to nutrient enrichment. This linkage between eelgrass loss and nutrient enrichment needs to be corroborated on an embayment specific basis, as there are factors other than nutrients which have been linked to eelgrass declines (disturbance, disease, animal interactions, etc.).*

The authors go on to state in the caption to Table 1, "Threshold values need to be site-specific, the values presented are for Great, Green and Bournes Ponds in the Town of Falmouth." As such, the citation of the total nitrogen thresholds in the Fact Sheet is a gross misrepresentation of the discussion in this report, as these numbers are meant to be an example of site-specific numeric thresholds observed in several recent studies of nutrient enrichment and eelgrass growth. Therefore, these values are irrelevant to the site-specific conditions of Aucoot Cove and cannot be credibly cited in relation to Aucoot Cove eelgrass habitat suitability.

Furthermore, the Fact Sheet's assertion that this study identified protective chlorophyll *a* levels is also a gross misrepresentation of the discussion in the Massachusetts Estuaries Project *Interim Report.* In the *Interim Report*, the authors discuss "a preliminary attempt at integrating quantitative and qualitative information on the key indicators," suggesting generalized characteristics of "Excellent" and "Excellent/Good" waters. "Excellent" waters have chlorophyll *a* concentrations "typically less than 3 µg/l," and "Excellent/Good" waters have chlorophyll *a* concentrations "in the 3 to 5 µg/l range." Thus, while eelgrass habitat suitability may coincide with the "Excellent" or "Excellent/Good" classifications,

the *Interim Report* does not state that these concentrations are required to be protective of eelgrass populations. It is inappropriate to interpret this statement to mean that eelgrass cannot survive with chlorophyll *a* concentrations in excess of 5 µg/l, and this statement is again irrelevant to Aucoot Cove and demonstrably false based on data from other estuarine systems.

The applicability of these thresholds is especially questionable because the chlorophyll *a* observed in the reference location (AC3) is *above* the threshold of 5 µg/l cited in the Fact Sheet. If a chlorophyll *a* concentration above 5 µg/l cannot support eelgrass then the reference location should be devoid of eelgrass growth. The fact that there is a healthy eelgrass population in this location suggests that the chlorophyll *a* threshold proposed in the Fact Sheet is unnecessarily low (and, by proxy, at least insinuates that the total nitrogen threshold is similarly unnecessarily low) in order to be protective of eelgrass habitat.

Yet another point of comparison comes from a compilation of protective total nitrogen concentrations assessed by the Massachusetts Estuaries Project. **Table 1** presents a comparison of these values considered protective of eelgrass habitats. The "protective" total nitrogen limits ranged from 0.34 to 0.48 mg/l total nitrogen, with an average total nitrogen threshold of 0.40 mg/l. (Hall & Associates, 2013).

Table 1: Comparison of Total Nitrogen Limits Protective of Eelgrass in Massachusetts Estuaries Project Reports[1]

Report Title	Date	Total Nitrogen Limit (mg/l)
Great Pond, Falmouth	2005	0.40
Green Pond, Falmouth	2005	0.40 – 0.42
Bournes Pond, Falmouth	2005	0.42 – 0.45
Little Pond, Falmouth	2006	0.45
Three Bays, Barnstable	2006	0.38 – 0.40
West Falmouth Harbor, Falmouth	2006	0.35
Phinneys Harbor and Back River, Bourne	2006	0.35
Centerville River, Barnstable	2006	0.37
Nantucket Harbor, Nantucket	2006	0.35
Lewis Bay, Barnstable	2008	0.38
Sengekontaket Pond, Oak Bluffs and Edgartown	2011	0.35
Farm Pond, Oak Bluffs	2010	0.45
Madaket Harbor and Long Pond, Nantucket	2010	0.45
Swan Pond River, Dennis	2012	0.40
Wild Harbor, Falmouth	2013	0.35
Quissett Harbor, Falmouth	2013	0.34
Harwich	2013	0.48

Note: 1. Table modified from Hall & Associates, 2013

This significant variation noted in **Table 1** suggests several key points. First, these results corroborate the statement that total nitrogen concentrations deemed protective of eelgrass are site- and resource-specific. Second, the variation shown in these results suggests that total nitrogen may not be the only factor controlling eelgrass growth or degradation. Nonetheless, these results indicate that a total nitrogen concentration of 0.42 (the median concentration at the "impaired" monitoring site AC2) is certainly not preventing eelgrass from growing, and suggest that potentially other factors are causative with respect to the observation that eelgrass grow at site AC3 but not at site AC2.

We request that EPA revise its discussion of permissible total nitrogen concentrations that are supportive of eelgrass to: (1) incorporate the fact that site-specific constraints have a demonstrable effect on the relationship between total nitrogen and eelgrass, (2) to reflect the fact that the numbers cited in MEP (2003) are not meant to be used as a universally applicable eelgrass-total nitrogen threshold relationship, and (3) that more recent and credible peer reviewed studies have demonstrated that total nitrogen concentrations significantly higher than those cited in the Fact Sheet have been shown to be protective of eelgrass in Massachusetts estuarine environments.

Misapplication of Stressor-Response and Reference Water Methods

The methodology cited in the Fact Sheet states that an implementation of the reference condition and the stressor-response methodology was used to determine the allowable total nitrogen concentration within Aucoot Cove that is supportive of eelgrass. This approach is described at the top of Page 18 of the Fact Sheet, where EPA identifies a reference waterbody that "provides appropriate values upon which criteria can be based." The stressor-response methodology is used to link the stressor (in this case, total nitrogen) to the response (in this case, eelgrass degradation).

To implement this methodology, EPA cites data from two Buzzards Bay Coalition data sampling sites. Site AC2, located close to the salt marsh near Effluent Brook, has a median total nitrogen concentration of 0.46 mg/l[2] and does not have eelgrass. Site AC3, located farther offshore, has a median total nitrogen concentration of 0.35 mg/l and does have eelgrass. EPA uses this limited data based on a single stressor variable to determine that a total nitrogen concentration of 0.35 mg/l should be the water quality target, as, the Fact Sheet implies, this is the threshold value at which eelgrass can survive. Thus, the EPA analysis is devoid of any consideration of any other factors but simply assumes that TN is the cause of the difference in eelgrass populations at the different sites.

EPA supports using the long-term median AC3 total nitrogen concentration of 0.35 mg/l by stating that "this value is consistent with TN concentration thresholds to protect eelgrass beds in other estuaries" but does not cite or reference any studies to support this claim. Marion requests EPA provide the studies referenced here for review and comment. In addition, EPA does not state whether the Buzzards Bay Coalition's data program has appropriate QA/QC protocols for its data collection efforts. If these data are not subjected to QA/QC they should not be used to set nutrient limits in Marion's NPDES permit or as a basis for reaching any other regulatory conclusions. Marion requests that EPA provide the Buzzards Bay Coalition QA/QC procedures and confirm that the data used in its analysis conform to these procedures.

The EPA Science Advisory Board (SAB) reviewed this type of methodology with respect to its use for setting numeric nutrient criteria (EPA, 2010). While the stressor-response method was not explicitly applied by EPA in its development of Marion's Draft Permit, numerous points made by the SAB relate to EPA's misapplication of the reference condition and stressor-response methodologies to Marion's discharge. While the SAB does notes that "the stressor-response method is a legitimate, scientifically based method for developing numeric nutrient criteria *if the approach is appropriately applied*," EPA

[2] EPA incorrectly states in the fact sheet that the median total nitrogen concentration, 2007-2012 is 0.47 mg/l. A follow up message from Robin Johnson, EPA NPDES Permit Writer stated that the median concentration is 0.45 mg/l. We found that this calculation erroneously included one sample from site AC1A. The correct 2007-2012 median total nitrogen at site AC2 is 0.46 mg/l.

grossly misinterpreted the approach, considered none other physical habitat, chemical or biological factors that could also fully explain the presence or absence of eelgrass at a particular location. Thus, EPA has applied this otherwise scientifically defensible methodology in an entirely unreasonable and scientifically indefensible manner. Marion notes the several points raised by the SAB and incorporated by EPA into the revised "Stressor –Response Guidance" (EPA 2010) confirm that EPA's approach to identifying the nutrient objectives for calculating the Marion permit requirements constitute a scientifically indefensible application of the reference condition and stressor-response methodologies. "When an agency adopts a regulation based on a study not designed for the purpose and which is limited and criticized by its authors on points essential to the use sought to be made of it, the administrative action is arbitrary and capricious and a clear error in judgment." *Humana of Aurora, Inc. v. Heckler*, 753 F.2d 1579, 1583 (10th Cir. 1985) (citing *Almay, Inc. v. Califano*, 569 F.2d 674 (D.C. Cir. 1977)); *accord St. James Hospital v. Heckler*, 760 F.2d 1460, 1468 (7th Cir. 1985); *Menorah Medical Center v. Heckler*, 768 F.2d 292 (8th Cir. 1985). As discussed below, since EPA has thoroughly misapplied its applicable guidance for identifying defensible nutrient criteria, the action is arbitrary and capricious.

We first challenge the selection of a single site as a "reference condition" suitable for inferring whether the stressor variable is supportive of eelgrass habitat. The SAB comments partially address this issue, both in terms of the link between the measurement of a nutrient concentration at a point compared with a biologic response variable and with respect to a mismatch between the timescales that data are collected that describe total nitrogen and eelgrass extent. In its comments, the SAB notes that "A basic conceptual problem concerning selection of nutrient concentrations as stressor variables […] is that nutrient concentrations directly control only point-in-time, point-in-space kinetics, not peak or standing stock plant biomass." (EPA, 2010). Furthermore, the SAB warns of mixing data collected at different time scales. The example given in the SAB report is comparing seasonally averaged chlorophyll *a* concentrations with total phosphorus grab samples, as this introduces a significant amount of uncertainty. A similar parallel exists between total nitrogen samples – computed as a median summer concentration – and eelgrass, sampled sporadically on an annual timescale. This mismatch between the data collection timelines introduces significant error to any causative relationship that may exist between these two variables.

A similar comment was made by Dr. Stephen Chapra in his critique of a similar methodology used to derive a numeric total nitrogen criteria for the Taunton Wastewater Treatment Plant's draft NPDES permit. His assessment leans heavily on the 2010 SAB analysis to conclude that "the use of a single station by the present study [Taunton River Estuary] without any documentation that the other locations of the estuary are similar in hydrology/ hydrodynamics provides little confidence that the oxygen objective will be met…" (Chapra, 2014).

Second, we question whether total nitrogen is an appropriately defined stressor variable. Numerous studies examining eelgrass habitat suitability have shown that total nitrogen is not the only variable affecting eelgrass habitat suitability (*e.g.,* Benson *et al.*, 2013; Kenworthy *et al.*, 2013; Li *et al.*, 2007). One significant criticism of the stressor-response guidance that is relevant to Marion's situation is "The absence of a direct causative relationship between stressor and response." One of the key general criticisms of the guidance document is that "statistical associations may not be biologically relevant and do not prove cause and effect." The authors continue, stating

> *Without a mechanistic understanding and a clear causative link between nutrient levels and impairment, there is no assurance that managing for particular nutrient levels will lead to the desired outcome. There are numerous empirical examples where a given nutrient level is associated with a wide range of response variables due to the influence of habitat, light levels, grazer populations, and other factors. If the numeric criteria are not based upon well-established causative relationships,* ***the scientific basis of the water quality standards will be seriously undermined****. [emphasis added].*
>
> EPA, 2010

One observation particularly applicable to Marion is that

> *The problem of eutrophication is complex, involving multiple causal variables, multiple response variables, and feedback among the variables. […] A change in a response variable [i.e., eelgrass] is unlikely to be satisfactorily described by changes in a single "causal" variable (e.g., total nitrogen […] or total phosphorus. […] For example, the stressor-response relationship is relatively strong and well-established in lakes and reservoirs as opposed to streams and rivers where the relationship is more complex and influenced by many factors (e.g., shading, sediment, flow regime).*
>
> EPA, 2010

The basic premise of the SAB comments on the stressor-response guidance is that it is imperative that nutrient criteria be based upon a mechanistic conceptual model that describes the clear causative link between the stressor and response variables. As there are many stressor variables that may affect eelgrass habitat suitability (*e.g.*, sediment composition, light, channel morphology), it is far too simplistic to assume that the only variable controlling eelgrass growth or degradation is total nitrogen. Indeed, the SAB speaks to this point, stating that "Single variable stressor-response relationships […] that explain a substantial amount of variation are likely to be uncommon for most aquatic ecosystems (in particular, streams)." (EPA, 2010). The SAB report also states, "In order to be scientifically defensible, empirical methods must take into consideration the influence of other variables." This suggests that basing a numeric nutrient criteria on the cause and effect relationship between total nitrogen and eelgrass - regardless of any correlations that may exist - is not scientifically defensible unless a clear conceptual model that causally links these two variables is developed. It is also important to note that Massachusetts state narrative nutrient criteria require that a reasonable causal demonstration that nutrients are resulting in an impairment (314 CMR 4.00).

In light of the issues identified about EPA's methodology for developing the numeric total nitrogen criteria, we request that EPA share its conceptual model—or any evidence—that reliably links total nitrogen to eelgrass degradation in Aucoot Cove.. We also note that the logic used to claim that total nitrogen concentrations sufficiently protective of eelgrass is fundamentally flawed, as it is difficult if not impossible to justify using a temporally and spatially limited dataset to compare to eelgrass growth over annual time scales. Marion is committed to protecting the health of Aucoot Cove, but needs assurance, and the law requires, that reducing its nitrogen limit at an estimated capital cost of over $10 million will have a beneficial effect on eelgrass within Aucoot Cove. As EPA's assertion that TN is the sole cause of the absence of eelgrass in the inner cove and that assessment is not based on any credible scientific assessment, the proposed TN limitations should be withdrawn.

Watershed Load

In lieu of a detailed watershed load calculation, EPA uses the "nonpoint source and stormwater point source areal loading rate calculated for the Segreganset [sic] River watershed, which has similar land use patterns as Marion"; this work was the basis of the draft NPDES permit issued by EPA in March 2013 for the Taunton WWTP. EPA justifies using the Seregansett River areal load rate for Marion's draft permit because "a planned nitrogen loading study under Massachusetts Estuary Project (MEP) for Aucoot Cove has not been completed, nor is it expected in the near future."

EPA's analysis does not acknowledge work done by the BBNEP (1999). The BBNEP has developed watershed loading estimates using the methodology similar to that used by the MEP, and estimated nitrogen load from the Aucoot Cove watershed nitrogen load in 1999. This analysis found that the non-point source load is approximately 30 lbs/day.

The BBNEP load estimate is over three times larger than the transposed load proposed in the Fact Sheet. Therefore, the Marion WPCF contribution to the overall nitrogen load to Aucoot Cove is significantly less than is implied in the Fact Sheet. Obviously, this shows the lack of understanding of the actual, up-to-date nonpoint source and stormwater load in Aucoot Cove. In the face of these quite different estimates, the only reasonable action is to undertake a new assessment of watershed load, and certainly not transform an overall nitrogen areal loading rate from one watershed to another.

This is particularly important because it changes the perspective of the amount of nitrogen load to Aucoot Cove that could be coming from the wastewater treatment plant. Thus establishing a reasonable estimate of watershed load will allow the Town to properly decide how to cost effectively mitigate nitrogen load to the cove, should this prove to be needed.

Allowable Effluent Load

EPA's methodology for computing the allowable total nitrogen effluent load required to maintain a concentration of 0.35 mg/l in inner Aucoot Cove is overly simplistic and grossly understates the allowable load to the cove that is protective of eelgrass and other designated uses. This proposed methodology is not sufficient to compute the allowable load required to achieve the stated water quality goals in Aucoot Cove because it ignores key elements required to accurately estimate the allowable load. Elements that must be added to this calculation are other drivers besides total nitrogen that affect eelgrass habitat suitability, estuarine mixing and exchange, total nitrogen load from the ocean, and dilution of the effluent into the full volume within the reference area.

EPA used the following procedure to compute the allowable load to Aucoot Cove. Our comments on the proposed approach are interspersed between the enumerated steps.

1. Assume the impaired area to be the 0.05 square mile area closest to the shoreline and the reference area to be the 0.1 square mile area extending to sampling point AC3 as shown in Fact Sheet Figure 6.

The assumption that the inner Aucoot Cove area is "impaired" due to the lack of eelgrass needs to be conclusively linked to total nitrogen. Light availability, sediment composition, and embayment morphology have all been linked to eelgrass habitat suitability (*e.g.,* Benson *et al.*, 2013; Kenworthy *et al.*, 2013; Li *et al.*, 2007), so the lack of eelgrass in a certain area of Aucoot Cove is not a prima facie indication that the habitat is unsuitable due to excess total nitrogen. Therefore, Marion rejects the use

of the proposed impaired and reference areas for determining an allowable total nitrogen load because factors other than total nitrogen may prevent eelgrass from growing in the proposed impaired area.

2. Determine the load rate per unit area for the reference area by dividing the computed loading rate by the surface area of the reference area. This assumes that "the nitrogen loading is not causing an impairment" to the reference area. This load rate is 689 lbs/day/sq. mi. Apply the areal load rate computed for the reference area to the impaired area to determine the allowable nitrogen load in pounds per day. Note that this calculation is equivalent to a 50% reduction in combined nonpoint source, WPCF, and lagoon loads because the impaired area is one half of the reference area. The target load rate using this methodology is 34.45 lbs/day total nitrogen.

Several important elements are missing from this calculation. First, while the surface area of the impaired area is 50 percent of the reference area, the volume of the impaired area is significantly less than 50 percent of the reference area volume. Wind action, wave action, and tidal forcing will cause the water in Aucoot Cove to mix throughout the vertical dimension. Furthermore, the water volume in Aucoot Cove will mix within the larger Buzzards Bay, transporting nitrogen out of Aucoot Cove. Studies have found that "Aucoot Cove is one of the deepest, well flushed embayments in Buzzards Bay." A tidal prism model suggests that the flushing time for Aucoot Cove is 1.4 days, and Costa asserts that "it is unlikely that the residence time of the upper 1/3 of Aucoot Cove is no more than 3 days…" (Costa, 1998). This means that any nitrogen load from the Marion WPCF will be well mixed with the much larger volume of the Cove and much of the nitrogen will be flushed out of Aucoot Cove before significant phytoplankton growth can occur, further minimizing the effect of the minimal load reduction realized by changing the summer-average total nitrogen effluent concentration from 3.8 mg/l to 3.0 mg/l.

3. Assume no nonpoint source reduction, so the required load reduction is 25.05 lbs/day total nitrogen, subtracting the assumed 9.4 lbs/day nonpoint source load.

The Buzzards Bay National Estuary Project (BBNEP) estimated the Aucoot Cove nonpoint source load to be 30 pounds per day, which is three times larger than EPA's nonpoint source load estimate. This updated represents a significant portion of the total load to Aucoot Cove. Marion believes that it is unacceptable to suggest that a minor load reduction from one of the minor sources to Aucoot Cove while ignoring the larger nonpoint source load source that may be a more cost effective solution for reducing overall total nitrogen loads. We request that EPA revisit the load calculation to make it more scientifically defensible. This includes accounting for dilution and mixing within the estuary and using published load estimates for nonpoint sources from Aucoot Cove instead of transposing a load from a different watershed that may not be comparable to Aucoot Cove. We believe that this would provide a much better basis for setting a nitrogen limit, if needed, that would be protective of eelgrass within Aucoot Cove without unnecessarily imposing a regulatory burden predicated on a flawed analysis that will cause significant economic harm to the community.

EPA Miscalculated the "Safe" TN Concentration and Impact of The City's Discharge

In addition, Page 18 of the Fact Sheet states that Marion's "[annual] average effluent concentration of 3.46 mg/l is still ten times higher than the concentration needed to support eelgrass in the cove." This statement ignores any denitrification that occurs as the treated effluent pass through both wooded wetland and the salt marsh (Figure 1) and the subsequent dilution that occurs as the effluent mixes into

the Cove. We believe it simply wrong to assume no denitrification and no dilution when the effluent moves from channelized Effluent Brook to the wetland and then the well-flushed Aucoot Cove. Therefore, we request that EPA remove this statement from the Fact Sheet. EPA's failure to consider dilution in assessing the need for a water quality-based limit, violates the requirements of 40 CFR 122.44(d) which specifies that dilution must be accounted for when available.

Further supporting the need to account for mixing and dilution that occurs within Aucoot Cove comes from a detailed look at the history of Marion's effluent discharge. Prior to the 2005 plant upgrade no substantive nitrogen removal occurred besides some settling in the lagoons. Our best estimate is that between 25 and 50 percent of the influent nitrogen concentration was removed through settling in these lagoons. Sampling of the present-day influent indicates that its total nitrogen concentration is approximately 20 mg/l. Conservatively assuming 25 percent total nitrogen removal yields an effluent discharge of 15 mg/l, which is significantly larger than the present annual average effluent concentration of 3.46 mg/l. This conservative assumption means that pre-upgrade the plant contributed on the order of four times more total nitrogen load to Aucoot Cove. Therefore, the TN concentration where "healthy" eelgrass populations existed in 1995 had to be higher than the concentration measured by EPA, post WWTP improvements. EPA's analysis completely failed to account for this factor.

While the total nitrogen load to Aucoot Cove from Marion's treatment plant has decreased significantly since 2005, the eelgrass extent has been relatively constant. Most notably, as mentioned above, the edge of the eelgrass closest to Effluent Brook has been unchanged since the Costa's 1980s eelgrass survey of Aucoot Cove. The fact that the load from Marion has decreased by a factor of four with the upgrade of the treatment plant that went online in 2005 with no apparent influence on the eelgrass extent closest to Effluent Brook suggests that further reducing Marion's load by a nominal amount will most certainly not result in a sudden regeneration of the eelgrass anywhere in this system. Moreover, this information confirms that the City's discharge is not "causing or contributing" to eelgrass declines or any absence of eelgrass. If the major TN reductions had no effect on eelgrass populations even over a 5 year period, there is no credible basis to claim that the remaining TN load is somehow critical to eelgrass propagation in this system.

TN Concentrations and Eelgrass have not responded to Improvements at Marion

Another key aspect of the historic total nitrogen concentration at sites AC2 and AC3 is the relative consistency of the concentrations despite significant reductions in treatment plant total nitrogen. The Buzzards Bay Coalition has been collecting data since 1992, which allows a comprehensive picture of the health of Aucoot Cove relative to total nitrogen concentrations over time. The long-term median total nitrogen concentration at AC2 between 1992 and 2005 was 0.42 mg/l, compared with the median concentration between 2007 and 2012 of 0.46 mg/l. This suggests that total nitrogen concentrations in Aucoot Cove have actually *increased* even though the load from the Marion treatment plant has decreased. Furthermore, the eelgrass extent closest to Effluent Brook has not changed over this time period based on the Costa and MassDEP eelgrass survey, showing that the eelgrass is not responding positively or negatively to this concentration. A similar comparison can be made of the total nitrogen trends at AC3. The long-term median concentration between 1992 and 2005 was 0.34 mg/l, which is almost identical to the median concentration of 0.35 mg/l observed between 2007 and 2012. This result suggests that significant dilution and mixing occur within Inner Aucoot Cove, since the concentration is essentially unchanged despite significant load decreases from the Marion treatment plant. This evidence

also indicates that the effect of Marion's effluent on the eelgrass is negligible, and the mixing and dilution within Aucoot Cove is an essential element of a rigorous analysis.

Finally, the use of the 5-year average to create a monthly maximum load is improper. Criteria must be applied as derived (EPA, 1985). Within the 5-year average, higher and lower monthly total nitrogen conditions can safely occur; difference between 5-year average and monthly maximum (assuming a coefficient of variation of 0.6) would mean monthly maximum could be up to 0.5 mg/l total nitrogen per EPA Technical Support Document procedures (EPA, 1991). The effluent limits need to be adjusted to reflect the large difference in criteria versus permit limit averaging period.

Antibacksliding

The Draft Permit proposes a 48-month compliance schedule for meeting the 3 mg/l total nitrogen effluent limit, including the opportunity to use stormwater and nonpoint source reductions to "attempt to offset and [sic] WPCF reductions and documents that WPCF nitrogen limits need not be reduced to 3.0 mg/l." The draft comment letter continues, stating that "If other nitrogen reductions obviate the need to go to 3.0 mg/l, the Town can request a permit modification." The Town of Marion notes that its average total nitrogen discharge between the months of May and October is 3.8 mg/l, close to the proposed 3 mg/l effluent limit. In some months the average total nitrogen discharge is below 3.0 mg/l (individual samples have range from 1.7 to 7.4 mg/l). The Clean Water Act, Section 402(o) covers anti-backsliding and states that a permit cannot be "renewed, reissued, or modified […] to contain effluent limitations which are less stringent than the comparable effluent limitations in the previous permit." Marion believes this provision of the Clean Water Act would prevent such a permit modification from occurring if its WPCF meets the 3.0 mg/l total nitrogen limit even if significant nonpoint source reduction is realized. EPA's clarification on the ability to amend the permit in the future is requested. Statements in the Fact Sheet (Page 13) on ammonia indicate that this indeed is how EPA will interpret the any request to change the permit limit after the plant meets an imposed 3 mg/l limit, as the historic data suggest the plant has been able to achieve: "The draft permit retains the limits that were established to ensure attainment of the 1994 ammonia criteria, and these limits have been retained to ensure consistency with antibacksliding requirements.

Effect of Stormwater & Nonpoint Sources

Related to the above referenced discussion relating using stormwater and nonpoint source reductions to offset WPCF reductions, Page 24 of the Fact Sheet states that "The Draft Permit recognizes that there may be an appropriate pause point in the future when stormwater and nonpoint sources of nitrogen are adequately accounted for and remedied and field data indicates that all of the Aucoot Cove ecosystem has recovered to a healthy state free of cultural eutrophication." This statement is overly ambiguous. First, EPA does not state the conditions under which stormwater and nonpoint sources of nitrogen are "adequately accounted for." Second, EPA does not state the data and requirements necessary to deem that "the Aucoot Cove ecosystem has recovered to a healthy state free of cultural eutrophication." Marion asks for clarification on these points.

Additionally, EPA's discussion on stormwater and nonpoint source controls is predicated on the unsupported presumption that Aucoot Cove is impaired. The justification for this impairment as presented in the Fact Sheet is the lack of eelgrass in the inner portion of Aucoot Cove. As discussed elsewhere in this comment letter, many other factors besides total nitrogen affect eelgrass habitat suitability. EPA has not conclusively shown that the eelgrass in Aucoot Cove is degraded nor has EPA

shown Marion's total nitrogen effluent has degraded eelgrass in Aucoot Cove. How does EPA propose showing that the Aucoot Cove ecosystem has "recovered to a healthy state" without first conclusively proving that it is degraded?

Total Phosphorus Limit

Similar to the objections noted above with respect to nitrogen limitations, the need for a limit on phosphorus has not been demonstrated, no support for the same exists beyond generalized observations and, accordingly, this requirement should be removed from the permit. No measurements are presented for levels of algae or other parameters that would indicate an impairment to an existing or designated use as required under the Commonwealth of Massachusetts's (Commonwealth) narrative nutrient criteria. Furthermore, we note that all streams can have periphyton, and its presence does not mean that a nutrient impact is occurring. Periphyton can grow well with a total phosphorus concentration of 10 µg/l, and natural conditions likely exceed this level (Smith *et al.,* 2003; Chapra, 2014b).

Figure 4 – Clear bottom and water of Effluent Brook at Outfall Pipe discharge.

Effluent Brook flows beneath a relatively thick forest canopy causing the brook to be in deep shade resulting in light being the limiting conditions for growth of algae. As shown in **Figure 4**, during a site visit with EPA in late summer 2014, the brook was clear with a sandy bottom and showed no visible signs of eutrophication. In addition, Effluent Brook is not included on the most recent 303D List of Impaired Waters in the Commonwealth.

In 2007, the Massachusetts Department of Environmental Protection (MassDEP) conducted a macroinvertebrate sampling program of the brook and found organisms upstream and downstream of the discharge point were comparable, indicating that the effluent discharge itself is not causing an impairment (MassDEP, 2007). The assemblages in all locations indicated those of a pollution tolerant community. This type of rapid bioassessment protocol is usually aimed at determining if there is evidence of eutrophication in the stream, which is not the case in Effluent Brook; conditions such as low dissolved oxygen (DO) levels and prolific algal growth are not present. Thus, the cause of the pollution tolerant assemblages is likely the stress on the organisms due to the intermittent nature of the stream itself; this is a natural condition as the stream is ephemeral with little or no flow regularly occurring during the summer months. Under dry conditions, there is no water in the brook upstream of the discharge and the treated effluent is the only source of water. Since the WPCF operates as a batch reactor with 10 cycles per day and utilizes a downstream flow equalization tank, the Town of Marion's (Town) process engineer estimates that flow may discharge from the current outfall pipe only about 50% of time under the low flow conditions of summer and early fall. Indeed, lack of streamflow is a well-recognized cause and condition of impairment of macroinvertebrate community structure (e.g., NJ DEP's Ambient Biomonitoring Network Generalized Executive Summary). Fritz and Dodds (2004) studied the effects of drying cycles (and floods) on macroinvertebrate assemblages and found significant impacts relative to pre-drying assemblages. As an example, a 2-month drying period reduced species richness by half. While not directly analogous to

the more frequent wetting/drying that occurs in Effluent Brook during the summer, studies such as these show that stress tolerant organisms should be expected to be the normal condition in streams with naturally dry periods.

The discharge of plant effluent could be seen as enhancing the habitat in Effluent Brook, which is otherwise ephemeral. This hypothesis was supported by the conclusions of the MassDEP macroinvertebrate study which indicated: "It is possible that the discharge is actually improving conditions for benthic macroinvertebrates by increasing flow within Effluent Brook (e.g., creating riffle habitats)."

The claim that nutrients are causing adverse impacts in Effluent Brook is inconsistent with the available studies. There is no evidence that phosphorus is limiting any form of plant growth in this system nor affecting the macroinvertebrate community nor is there information indicating that a narrative criteria violation is occurring due to the TP discharge (a prerequisite for triggering limitations under 40 CFR 122.44(d).

Ignoring all these lines of evidence for a lack of impairment, EPA instead relied on nutrient guideline concentrations from the Gold Book because (Page 25 of the Fact Sheet) "its effects based approach … is more directly associated with an impairment to a designated use (e.g. fishing). The effects-based approach provides a threshold value above which water quality impairments are likely to occur." Further, EPA justifies increasing the Gold Book threshold value for exactly the same reasons that there is no demonstrated impairment of a narrative nutrient criteria (i.e., sandy bottom, canopy shading making light – and not phosphorus – the limit variable in algal growth, EPA's own field observations of "minor amounts of aquatic plant and algal growth"). The simple presence of phosphorus in a receiving water without any evidence of impact is an entirely insufficient and unfounded reason for including a permit limit for total phosphorus. EPA's argument seems to be that because concentrations are above a "threshold" value, there simply must be an impairment that, however, is precisely what the Gold Book criteria states is NOT true.

The Gold Book discusses the need to regulate phosphate phosphorus for eutrophication in some situations but specifically states that "a total phosphorus criterion to control nuisance aquatic growths is not presented". Therefore, claiming that the Gold Book created nutrient criteria that should be presumed applicable in this instance, in accordance with 40 CFR 122.44(d), is plainly in error. While the Gold Book *suggests* TP criteria of 100 µg/L may be appropriate for some streams, the Gold Book observes also that "there may be waterways wherein higher concentrations or loadings of total phosphorus do not produce eutrophy […]". Such conditions are influenced by natural confounding factors such as "naturally occurring phenomena [which] may limit the development of plant nuisances", "natural silts or colors which reduce the penetration of sunlight needed for plant photosynthesis", "morphometric features of steep banks, great depth, and substantial flows [which] contribute to a history of no plant problems", and "nutrient[s] other than phosphorus […] limiting plant growth". The Gold Book specifically indicates the need to consider such site-specific factors, not that such factors or lack of response be ignored in setting nutrient limitations for phosphorus. The phosphate phosphorus discussion ends with a reiteration that "no national criterion is presented for phosphate phosphorus for the control of eutrophication."

As noted earlier, implementing a requirement inconsistent with the very recommendations and limitations presented in the expert report is, *per se*, arbitrary and capricious. As EPA's reference

document specifically notes that TP does not cause uniform impacts in streams and site-specific response should control decision making, EPA decision to include TP reductions even where an adverse stream response is not found is not a defensible action.

Proposed Limitations will have no Effect on Plant Growth

EPA created a technology based limit of 0.2 mg/l total phosphorus stating that EPA "believes this limit will ensure attainment of the narrative nutrient criteria applicable to this particular receiving stream." This logic disregards the actual site-specific conditions of Effluent Brook, which has long had much higher concentrations than 0.2 mg/l without experiencing a documented impairment due to Marion's discharge. Lacking an actual demonstration of an impairment, phosphorus limits should be removed from the permit. Moreover, as repeatedly confirmed by leading experts, a concentration of 0.2 mg/l TP, instream, will control nothing (Chapra, 2014b; Hall and Hall, 2009). Thus, assuming that there was some need to control plant growth, the selected water quality target will be thoroughly inadequate for ensuring narrative criteria compliance. Fortunately, it is not needed under the circumstances.

An alternative methodology of setting a site-specific total phosphorus (TP) limit that is protective of aquatic life and will not cause excess periphyton growth is described by Chapra *et al.* (2014b). In this study, the authors developed and applied a mechanistic model of a point source discharge to a stream. This methodology is suggested to be an excellent "screening tool for assessing individual point sources" and as "the basis for establishing nutrient criteria." The Town notes that this is a more robust and scientifically defensible mechanism for establishing a numeric nutrient criteria within Effluent Brook as it takes into account site-specific characteristics of Effluent Brook. The use of such a model will allow the selection of a numeric nutrient criteria protective of designated uses within the stream but not overly protective so as to require significant treatment upgrades without a significant environmental benefit.

Some of the issues surrounding setting TP effluent limits in flowing streams as a means to control periphyton and algae growth are illustrated by numerous case studies. Hall and Hall (2009) examined several recent TMDL studies where TP limits were set for point sources. In Pennsylvania, a TMDL was set based on a generic regression analysis to set an endpoint TP estimate of 0.20 mg/l in effluent dominated streams. Data show that the algae growing in this stream could thrive "even in the cleanest of waters," and the generic regression did not match site-specific data linking chlorophyll *a* and TP concentrations. The 0.2 mg/l total phosphorus level was not effective at limiting algae growth to target levels, which the authors note is not surprising because "the regression factor indicated that over 80 percent of the variability in periphyton biomass was attributed to factors *unrelated* to nutrient concentration." In yet another example, in the Jackson River in Virginia, a TMDL was developed based on a regression between total dissolved phosphorus and periphyton biomass. Following the implementation of the TMDL, in-stream TP averaged about 0.02 mg/l, but "there was *no* material change in the periphyton biomass between 2001 and 2006 (Hall and Hall, 2009). This suggests that other factors control periphyton and algal productivity within streams, and setting a stringent phosphorus limit to below natural background conditions may not have any effect whatsoever on growth in the stream.

TP Compliance Schedule

Footnote 9 (Page 4 of the Draft Permit) references the compliance schedule for meeting the proposed phosphorus limit and establishes an interim limit from April to October of 1 mg/l. The logic provided in the Fact Sheet for the duration of the compliance schedule is flawed. The schedule assumes that the only WPCF upgrade needed to meet the proposed total phosphorus limit is the addition of chemical

storage and dosing facilities. EPA believes 24 months allows sufficient time to evaluate**,** jar test, and pilot these facilities. Additional upgrades will be needed to meet this limit and include: rapid-mix facilities (potentially, if testing indicates rapid mixing is required), some modification to the filters themselves, and new sludge handling facilities. The need for the sludge handling facilities arises because use of a chemical for phosphorus precipitation will create a chemically-laden (non-biodegradable) sludge that will need to be processed on site and held for off-site disposal.

Phosphorus levels in the treated effluent from September 2010 to August 2014 averaged 1.6 mg/l and ranged from 0.54 to 3.79 mg/l. The current plant, without chemical addition facilities and associated improvements, cannot meet the proposed interim limit of 1 mg/l. Given that the Town will be unable to change its treatment processes to reduce phosphorus levels prior to constructing any upgrades, it is completely unreasonable to select an interim limit of 1 mg/l knowing that this limit could cause the discharge to be immediately out of compliance with the permit. No rationale is provided in the Fact Sheet for imposing any interim limit, nor for selecting an interim limit of any magnitude (not less one greater than the current average discharge concentration). As there is no demonstrated impairment in Effluent Brook (See **Figure 2** above), there should be no interim limit in the permit and the Town requests that EPA remove the same.

The Draft Permit cites a winter (November 1 – March 31) total phosphorus limit of 1 mg/l. In contrast to the summer limit of 0.2 mg/l, there is no stated basis for imposing this wintertime limit or any analysis showing that TP reduction is required in the winter to meet state narrative criteria as mandated by 40 CFR 122.44(d). This period is associated with low algal productivity, and it is not necessary to limit phosphorus in order to prevent algae from growing in Effluent Brook. The Town requests EPA remove the winter total phosphorus limit from the permit.

In the event that EPA somehow fails to modify the permit based on the above comments, at a minimum, the Town requests the concentration limit be removed for the permit and that phosphorous be regulated based on mass. This is certainly appropriate and is consistent with other recent NPDES permits issued for Massachusetts treatment plants.

Total Copper Limit

The Draft Permit contains revised concentration limits and a new mass limit for total copper. The revised concentration limits are based on marine water quality standards and assume no dilution of copper prior to discharge to Aucoot Cove, and no dilution upon reaching marine waters. This logic is flawed on several points as follows:

- The Fact Sheet is inconsistent as to whether the dilution is afforded to the discharge to Effluent Brook. At various points it states there is no dilution at 7Q10 conditions and then uses the United State Geological Survey (USGS) StreamStats program to calculate a dilution at 7Q10 conditions. As the permit limits that are being imposed are for saltwater, dilution at 7Q10 conditions is not relevant but rather dilution upon mixing with the receiving water needs to be evaluated.

- As part of the analysis, EPA cites (Table 4 in the Fact Sheet) a series of background concentrations from 2011 to 2013 and uses a median value as part of its analysis. The concentrations in this table show a steady and remarkable decrease in values from 64 to 5 µg/l over time. Such a trend indicates that the median is not going to be a reflective value and

instead the data needs to be reviewed to understand why there has been a continuous decrease in concentrations to select a representative value for current conditions.

Notwithstanding the above discussion about the inappropriate calculations resulting in an overly restrictive permit limit, the Town of Marion (Town) questions the need for a limit at all. Several studies (*e.g.*, Hall *et al.,* 1997) have been conducted showing that copper in municipal effluents is not discharged in toxic form. The Town intends to petition the Commonwealth to allow regulatory relief from the copper permit limit to use the simplified water effects ratio procedure.

The Draft Permit contains revised concentration limits and a new mass limit for total copper. The revised concentration limits are based on marine water quality standards and assume no dilution of copper prior to discharge to Aucoot Cove. This logic is flawed on several points. First, while the Fact Sheet asserts that there is limited dilution in the freshwater section the permit limits that are being imposed are for saltwater. Thus, dilution at 7Q10 conditions is not relevant but rather tidally averaged dilution upon mixing with the receiving water in the cove needs to be evaluated. As part of the analysis, EPA cites (Table 4 in the Fact Sheet) a series of background concentrations from 2011 to 2013 and uses a median value as part of its analysis. The concentrations in this table show a steady and remarkable decrease in values from 64 to 5 µg/l over time. Such a trend indicates that the median is not going to be a reflective value and instead the data needs to be reviewed to understand why there has been a continuous decrease in concentrations to select a representative value for current conditions.

Notwithstanding the above discussion about the inappropriate calculations resulting in an overly restrictive permit limit, the Town questions the need for a limit at all. Dozens of studies have been conducted showing that copper in municipal effluents is not discharged in toxic form (see, e.g., Hall et al. 1996) Consequently, EPA has published guidance on conducting simplified water effect ratios for copper due to the recognition that copper complexation is the norm for municipal discharges (EPA, 2001). The Town intends to petition the state to allow regulatory relief from the copper permit limit to use the simplified water effects ratio procedure.

Monitoring Frequency

As summarized in **Table 2** below, The Draft Permit includes revised, more frequent or new monitoring of several parameters than the current permit, as follows:

Table 2: Summary of Monitoring Requirements

Parameter	Monitoring Requirement – Draft NPDES Permit	Monitoring Requirement – Current NPDES Permit	Additional Yearly Samples
Enterococci	2/week	NA	104
Dissolved oxygen	1/day	1/week	140 or 201*
Total aluminum during WET tests	4/year	NA	4
Total Kjeldahl Nitrogen#	3/week	1/month	67
Total Nitrate Nitrogen#	3/week	1/month	67
Total Nitrite Nitrogen#	3/week	1/month	67
Total Kjeldahl Nitrogen**	1/week	1/month	20
Total Nitrate Nitrogen**	1/week	1/month	20
Total Nitrite Nitrogen**	1/week	1/month	20
Total Phosphorus#	1/week	2/month	52
Total Phosphorus**	1/month	2/month	(6)
Copper, Total Recoverable	1/week	1/month	40

* Depends on which monitoring period is required; # From April 1 to October 31; ** November 1 to March 31

We estimate that this increased sampling regimen will add 455 extra laboratory samples at an estimated operating expense of approximately $12,000 per year not including the labor costs for Town of Marion (Town) employees to collect the samples. The cost of additional sampling for dissolved oxygen at the outfall is even greater at $26,000 which will require two water pollution control facility (WPCF) staff to make up to 201 additional trips to the remote outfall location. Below we provide our requests and reasons for changing the monitoring frequency for many of these parameters.

Dissolved Oxygen – Collection of daily readings of dissolved oxygen (DO) would require a significant expenditure of limited WPCF staff time and budget, particularly given the change in requirement that the sample be collected "at the point of entering the unnamed brook." (Page 3 of the Draft Permit) Previously, the samples were collected at the UV facility only taking a few minutes on a weekly basis. This new provision could require at least an hour every day for two staff (It is Marion's practice that an operator not to travel to the outfall unaccompanied for both safety and security reasons.) to drive from the WPCF, walk to the end of the outfall pipe, collect the reading, and return to the WPCF. In addition, there will be days, particularly during the inclement weather or deep snow cover, when collection of the sample poses an additional unnecessary hazard for sampling personnel. As noted in the Fact Sheet [Page 11], no samples in four years have violated permit limits. No legal or scientific justification has been provided for increasing the monitoring frequency for DO, and the Town requests that the frequency be returned to once per week. We also request that the sampling location be changed to the UV facility. Note that the Fact Sheet (page 11) incorrectly states that the current monitoring frequency is once per day.

Total Cadmium, Total Lead, Total Nickel and Total Zinc – Per the analysis in the Fact Sheet (Page 27), no reasonable potential exists for these parameters to exceed water quality standards. Monitoring for these parameters as part of the whole effluent toxicity testing should thus be removed from the permit.

Total Aluminum – The Draft Permit requires analysis for total aluminum as part of Whole Effluent Toxicity (WET) testing. As explained in the Fact Sheet (Page 28), this sampling requirement is predicated on the assumption that the Town will implement a treatment process modification that uses alum to meet the new phosphorous limit. Since no such decision has been made at this time (many treatment plants choose to use ferric chloride instead for economic reasons), nor has EPA demonstrated that such use of alum would create a reasonable potential to exceed the aluminum water quality standards, this requirement should be removed from the permit. If EPA insists on continuing with the requirement, then at a minimum the analysis should not be required until and at as such time alum is used at the WPCF.

Total Copper – The Town requests the sampling frequency be returned to once per month. The Fact Sheet (Page 29) simply states a different monitoring frequency without providing any justification for the change. Further, the Town knows of no other Massachusetts discharge permit for a small treatment plant that requires monitoring for copper at a frequency greater than once per month, including those recently released as draft permits. The increased frequency of testing places an arbitrary and unsupported burden on the Town of Marion.

Nutrient Parameters - As stated in the Fact Sheet, the monitoring for the nitrogen species (other than ammonia) is being done because of eutrophication concerns. As these concerns are only manifested in the summer season, it does not make sense to spend the Town's limited resources to collect this data for nitrogen at a 4-fold increased frequency and phosphorus at 2-fold frequency during the winter season. The Town requests that TKN, nitrate, nitrite, and phosphorus be returned to once a month for the period of October through May.

The Town also requests the analytical result for nitrate and nitrite be allowed to be reported as a combined result (nitrate + nitrite). The goal of nitrogen monitoring is to determine total nitrogen. The combined analytical test achieves this objective and is less costly.

Comments on Part I.A.1.a through I.A.1.h

Parts 1.A.1.a through 1.A.1.h of the Draft Permit includes several provisions in this section. The Town of Marion's (Town) comments on these provisions are as follows:

- Item b. The previous permit included the following phrase at the end of sentence "unless these values are exceeded due to natural causes or as a result of the approved treatment processes." This phrase should again be included in the permit.

- Item g. This item requires the Town to develop a plan to describe how it will handle increases in flow once the plant exceeds 80 percent of the design flow. Though we recognize that this is "template" language in many NPDES permits, reaching 80 percent of the facility's design flow is not a violation of the Draft Permit, and reaching this value should not trigger a required response by the Town. The Town requests that this provision be removed from the permit.

- Item h. This item prohibits the use of chlorine. This provision is simply too broad to be included in the permit, and the Town requests it be removed. Bleach is a form of chlorine and this provision would prohibit its use in the treatment facility for disinfection of workspaces and bathrooms, where the use of bleach is a reasonable cleaning technique to protect the health of workers at the water pollution control facility (WPCF).

In addition, as part of the process operations themselves, chlorine has a necessary and important uses at the WPCF. Bleach is used on rare, but necessary, occasions to control filamentous bacteria. Chlorine is used for periodic cleaning of the disc filters. Periodic soaking of the filters in a hypochlorite solution is necessary to preserve the long-term performance of the disc filters. Without this soaking procedure, the filter media will become fouled, leading to reduction in throughput capacity and treatment ability. When the plant takes one of their filter basins off-line for soaking, the spent chlorine solution is then drained back to the head of the plant (in this case at least for now, the lagoons), and is not discharged. This practice will have to continue in some manner. Hypochlorite is definitely the chemical of choice for cleaning the media. Perhaps other chemicals could work, but would be breaking new ground. And, in any case, the spent soak water would be returned to the head of the plant.

Toxics Control

The Draft Permit (Page 7, Provision 4) includes a new provision and restriction on toxics control. There is no basis in federal or state law for imposing these provisions as general requirements given that the permit already assessed for "reasonable potential" and the Wet Effluent Toxicity (WET) test requirement is intended to address other non-regulated pollutants. The Town requests that EPA remove this provision from the permit as it is unenforceable since it would be void for vagueness. Further, WET testing is intended to mitigate this concern, and additional narrative provisions for toxic control are not needed nor authorized. Requiring a reopener, where new information indicates additional parameters may require control is appropriate. Holding the City responsible for matters it has not received notice of and has no means to determine or control, is not reasonable.

Unauthorized Discharges

The Draft Permit (Page 7) includes language concerning unauthorized discharges from the Town of Marion's wastewater system. The City agreed that overflows and other discharges are generally prohibited. However, this does not preclude the application of upset and bypass defenses where conditions beyond the City's control (e.g., flood) cause overflows in the collection system. This provision must be applicable in conjunction with federal upset or bypass rules from events beyond the reasonable control of the permittee. If this is an absolute provision, EPA has not presented the required technology-based or water quality based analysis in support of this provision.

Operation and Maintenance of the Collection System

The Draft Permit (Pages 7 to 10) includes many new requirements regarding the operations and maintenance (O&M) of the collection system. The provisions provided are what are typically included in Capacity Management Operations and Maintenance (CMOM) programs as defined within EPA's Guide for Evaluating Capacity, Management, Operations, and Maintenance (CMOM) Programs at Sanitary Sewer Systems (EPA 305-B-05-002) dated January 2005. The Town of Marion has been proactive in the maintenance and up-keep of their wastewater collection system. In fact, they are at the fore-front of I/I and the removal of private inflow sources within the Commonwealth with the current programs and initiatives that are on-going. The Town over the past 10 years has spent in excess of $500,000 in studies, engineering designs, inspections and investigations, monitoring and measuring flows, infiltration and inflow (I/I) analysis, addressing private inflow sources, adopting new I/I regulations, developing enforcement guidelines within the Town's sewer use regulations, and constructing improvements to

their wastewater collection system. These improvements, and the documented I/I reduction rates have been clearly documented within the Town's Annual Infiltration and Inflow report submitted to the MassDEP as part of their current permit.

The Town requests that the entire provisions be withdrawn as they have been pro-active in the upkeep and operation of their system and the additional financial burden imposed by the additional CMOM provisions will inhibit the on-going programs by redirecting limited funds away from those programs to meeting compliance with CMOM provisions within the draft permit.

- Any facility planning provisions of the permit are state-level provisions beyond the federal program and must be so identified so federal enforcement is not triggered over this provision.

- The provisions were not part of adopted NPDES rules, and they never have been presented for public notice and comment.

- EPA has provided no data demonstrating that the current Town program is insufficient, nor does the reported SSOs to the EPA and Massachusetts Department of Environmental Protection (MassDEP) within the system document that the Town's program is insufficient for maintenance.

- EPA has provided no basis for the individual program requirements that are being imposed as necessary to achieve technology or water quality based requirements.

- The provisions represent an unlawful amendment of the O&M rule which is to ensure effluent quality is met. EPA has changed the requirement to mandate that the collection system, regardless of plant performance must be operated and managed in a specific fashion.

- The NPDES program has never established sewer system operational requirements nor demonstration necessary to meet technology or water quality-based limitations. Inclusion of these requirements is ultra vires.

- EPA has no legal authority to mandate I/I reduction program or a specific type of collection system map or new reporting requirements that are unrelated to effluent limitation provisions.

To the degree EPA is claiming that the adopted NPDES rules mandate these requirements, EPA has unlawfully modified the adopted rules. To the degree EPA is claiming that the plan language of the rule allows EPA to impose such requirements, EPA's reading of the rule in unsupported. Finally, to the degree EPA is attempting to dictate the management of the facility, EPA is operating beyond statutory authority. See, *Iowa League of Cities v. EPA* (8th Cir. 2013).

Biosolids Conditions

The Draft Permit requires the Town to stop using the water pollution control facility's lagoons for biosolids processing, and the Fact Sheet indicates that "*EPA has determined that the lagoons are functioning as sludge disposal rather than treatment or storage sites under 40 CFR Part 503 Regulations*." The Town dispute this determination and asks that this requirement be removed from the final permit. The Fact Sheet does not cite any specific language in Part 503 that provides that the basis for this determination. This action is contrary to EPA's longstanding recognition that such treatment

lagoons are exempt from Section 503 requirements. Anaerobic digestion of the waste activated sludge that is pumped to the lagoons is an important part of the overall plant's treatment processes, and results in low-cost, environmentally sound sludge volume reduction and stabilization.

That anaerobic digestion and sludge stabilization occur in the bottom layers of all facultative lagoons cannot be disputed. Innumerable technical literature sources can be cited as evidence; however, for the purposes of this comment, we simply cite EPA's own *Wastewater Technology Fact Sheet - Facultative Lagoons, EPA Document EPA-832-F-02-014* (September 2002), which states "Anaerobic fermentation is the dominant activity in the bottom layer in the lagoon," and "Removal of pathogens and coliforms can be effective, depending on temperature and detention time."

Further, EPA's *A Plain English Guide to the EPA Part 503 Biosolids Rule, EPA Document EPA/832/R-93/003* (September 1994) states on page 59 that "**The surface disposal provisions of the Part 503 rule do not apply when biosolids are treated on the land, such as in a treatment lagoon or stabilization pond, and treatment could be for an indefinite period.**" Therefore, given EPA's own published interpretation, Part 503 does not apply to the lagoons at the Town's WPCF. This citation is also consistent with EPA's *Biosolids Management Handbook*, EPA Region VIII, by Robert Brobst, which indicates that operating lagoons used in wastewater treatment are not covered in Part 503. According to this EPA document, lagoons are not "surface disposal sites", and moreover, there is no liner mandate. Referring to §503.6 Exclusions, in Section 1.17-8, 10 of the Biosolids Management Handbook:

> **(a) Treatment processes. This part does not establish requirements for processes used to treat domestic sewage or for processes used to treat sewage sludge prior to final use or disposal, except as provided in §503.32 and §503.33.**
>
> (b) Selection of a use or disposal practice. This part does not require the selection of a sewage sludge use or disposal practice. The determination of the manner in which sewage sludge is used or disposed is a local determination.
>
> (c) Co-firing of sewage sludge. This part does not establish requirements for sewage sludge co-fired in an incinerator with other wastes or for the incinerator in which sewage sludge and other wastes are co-fired. Other wastes do not include auxiliary fuel, as defined in 40 CFR 503.41(b), fired in a sewage sludge incinerator.
>
> (d) Sludge generated at an industrial facility. This part does not establish requirements for the use or disposal of sludge generated at an industrial facility during the treatment of industrial wastewater, including sewage sludge generated during the treatment of industrial wastewater combined with domestic sewage.
>
> (e) Hazardous sewage sludge. This part does not establish requirements for the use or disposal of sewage sludge determined to be hazardous in accordance with 40 CFR part 261.
>
> (f) Sewage sludge with high PCB concentration. This part does not establish requirements for the use or disposal of sewage sludge with a concentration of polychlorinated biphenyls (PCBs) equal to or greater than 50 milligrams per kilogram of total solids (dry weight basis).
>
> (g) Incinerator ash. This part does not establish requirements for the use or disposal of ash generated during the firing of sewage sludge in a sewage sludge incinerator.

(h) Grit and screenings. This part does not establish requirements for the use or disposal of grit (e.g., sand, gravel, cinders, or other materials with a high specific gravity) or screenings (e.g., relatively large materials such as rags) generated during preliminary treatment of domestic sewage in a treatment works.

(i) Drinking water treatment sludge. This part does not establish requirements for the use or disposal of sludge generated during the treatment of either surface water or ground water used for drinking water.

Thus, it is clear from the federal rules that the proposed action is beyond regulatory and statutory authority. EPA cannot mandate the closure of our wastewater operations under the guise of Section 503 authority. This permit provision, in its entirety, must be removed.

Special Conditions related to Lagoon Operations

Part E of the Draft Permit requires that the Town cease using the existing lagoons as they were designed to function in accordance with an approved Comprehensive Wastewater Management Plan (CWMP) dated May 2001, the water pollution control facility (WPCF) design, and the 2006 NPDES permit. Further, the Draft Permit requires abatement any ongoing contamination of groundwater as a result of "sludge or other wastewater solids that were deposited in the unlined lagoons."

EPA provides no credible information, data, or supporting facts to include such a mandate in the permit. EPA has authority to regulate effluent limits and disposal of biosolids, not the internal working of a wastewater facility. See, *Iowa League of Cities v. EPA* (8th Cir. 2013).

As discussed above, the Town is using the lagoons in lawful compliance with the provisions of Section 503 of the Clean Water Act. Further, there is no credible evidence that the lagoons have caused contamination to the groundwater, or indeed how EPA would intend for contamination to be defined.

If the lagoons were to be found to be discharging to groundwater, their regulation is not in the province of an EPA-issued NPDES permit (which strictly regulates discharges to surface water), but rather would be the responsibility of Massachusetts DEP, and then only if the any such leakage would exceed the threshold for permitting.

The Town requests Part E of the Draft Permit be removed in its entirety.

One of the justifications given for including the lagoons in the Draft Permit is a study on groundwater leakage from the lagoons into nearby embayments by Horsley Witten Group, Inc. prepared on behalf of the Buzzards Bay Coalition titled *Environmental Assessment of the Marion Wastewater Treatment Plant Sewage Lagoons* (Report) dated April 2011 (Horsley Witten, 2011). While the Town commends the Buzzards Bay Coalition for spearheading the important work of helping protect receiving waters of Buzzards Bay; based on a peer review of the report by the Town's consulting engineer, the report contains a number of critical logical and scientific flaws and some curious potential data anomalies that cast doubt on the report's principal conclusions. In fact, the conclusions of the report regarding the degree of lagoon leakage are physically impossible.

Rather than assess the wastewater flows at the plant, the report uses information on water levels and water quality samples collected at a series of nested piezometers that were installed on or near the WPCF site together with water levels and water quality samples for surface streams to find that

"effluent from the Marion WPCF sewage lagoons appears to be infiltrating into underlying groundwater" and recommend that the "lagoons be lined with an impermeable geotextile membrane to prevent further leaking from the bottom and sides of the sewage lagoons." The analysis to support this recommendation concludes that leakage occurs at a rate of 1 inch per day, discharging 33,400 pounds of nitrogen (equal to 1,965 homes with septic systems) to the aquifer each year.

The findings in the Report are overstated and the estimates of leakage from the lagoons do not match the operating experience and data at the WPCF. Major comments are provided below:

1. Seepage from the lagoons – The report uses an estimated leakage rate of 1 inch/day through the lagoon bottoms and applies this over the approximate 20 acres of lagoons on the treatment plant site. This leakage rate over the entire lagoon area is equal to 0.5 mgd, **which is slightly more than the average daily flow to the WPCF, 0.48 mgd between September 2011 and August 2014**. Since the treatment plant has an effluent discharge of about this amount, the rate assumed for seepage is certainly not a competent estimate.

Further, the Marion WPCF operators indicate that there are long stretches of the summer when flow to the treatment plant is sufficiently small that they do not have to divert water to the lagoons (which function as an influent equalization basin), and that the water level in the lagoons does not change significantly during this period, counter to what would occur if the leakage were actually 1 inch/day.

2. Nitrogen loading – The assumption made for nitrogen loading is unreasonably high and without support. The Report estimates that this load would be the equivalent that generated by 1,965 homes on septic systems. This is larger than the number of homes in Marion cited in the Report as 1,700 single family homes from the 2005-2009 census. Given that less than half of all the homes in Marion are connected to the public sewerage system, the nitrogen load is over estimated. It is also approaching the total influent nitrogen load to the plant, and therefore does not consider the fact that the plant provides a high level of nitrogen removal. Under this report's assumptions, Marion is actually creating far more nitrogen than it is receiving.

3. Use of boron as an indicator of human wastewater – The report uses boron as an indicator of human wastewater stating the boron indicates the presence of detergents. Two of the surface water sampling locations (HGSW1 and HGSW2) are located on Effluent Brook, a stream whose flow is dominated by treated wastewater effluent from the Marion plant. The boron concentrations in four of the six samples at these locations were not detected. Further, a detailed study by Dr. Robert Pitt (no date) of the University of Alabama of chemical indicators of wastewater found that "boron was "a poor indicator of sewage possible due to changes in modern laundry detergents' formulations."

4. Boron detection limits – The report states that boron concentrations occur in nature at very low levels (0.02 mg/l) and "any concentrations greater than this typically represents the presence of detergents found in wastewater." The detection limit for the boron analysis appears to be 0.05 mg/l, which is higher than typical background concentrations. This high detection limit does not allow for the typical background concentration in Marion to be determined. Also, the results of analytical measurements are generally less reliable when concentrations are measured near detection limits, with a factor of five times the detection limit indicating a level where confidence in measurements increase. All but one boron result detected above five times the detection limit is within this range of increased uncertainty about the magnitude of the result.

5. Water table map – The water table map provided in Figure 3 within the report does not account for all the surface water features of the site, such as the portion of the brook south of staff gauge location HWSG5. As shown in the cross section in Figure 5 within the report, the stream is conceptualized as a full penetrating stream meaning the groundwater from the treatment plant site will discharge there. Without further information it is reasonable to assume this would also be the case for the upgradient portion of the stream.

6. Distribution of groundwater flow – Figure 4 in the Report uses water table contours to define the proportion of groundwater flow is assumed to reach major surface water resources. This approximation does not account for interception of groundwater by streams and wetlands nor potential differences in aquifer properties that would cause flow to be distributed differently.

The head measured at monitoring HWMW 4, where higher TN concentrations are found is actually 3 feet lower than the head measured at HWMW 6, which is 300 feet east of the nearest lagoon. The head at well 5, where TN concentrations of 1.1 mg/l or less do not indicate significant lagoon leakage, is also approximately 3 feet higher than the head at HWMW 4. Hence, the data do not indicate that the quantity of lagoon leakage is significant enough to create a groundwater mound, something that would be anticipated if the lagoons were indeed leaking significant quantities of water (understanding that a detailed hydrogeologic report on the area has not been prepared to understand local geology). The lagoons are located near a natural topographic high in the area and it would not be unreasonable to expect that water table to have a correspondingly high local elevation. Nonetheless, the water table maps in the Report (Figures 3 and 4 interpret the groundwater high as being located to the south southeast of the lagoons. This result is unexpected given the Report's assumption that the lagoons leak one inch per day (or 365 inches per year). If this quantity of water were leaking from the lagoons the water table would surely reflect it, and the local high point would not be located south southeast quantity of leakage from the lagoons cannot therefore be significantly greater than natural groundwater recharge in the area (which would likely be in the range of 10 to 20 inches/year), all other things being equal.

Water level data provided in the Report indicate discharge of groundwater into the stream associated with HWSG 5a. In general, it is reasonable to assume that a very substantial portion of shallow groundwater in the vicinity of the lagoons discharges to streams, wetlands, or ponds before reaching the shore. Hence, most of the shallow groundwater in the vicinity of the lagoons is probably not reaching the shore as groundwater, and the average travel time is probably much less than suggested within the Report. Residence time in streams, ponds and wetlands provides opportunity for attenuation of nitrogen through denitrification.

7. Travel times – The report travel times calculated in the report do not account for the interception of groundwater flow by the many surface water features (streams and wetlands) present in the project area.

8. Nitrogen attenuation – Groundwater flow that is intercepted by surface water features will undergo some nitrogen attenuation through denitrification in stream bottoms and wetlands reducing the amount of nitrogen discharges to surface water. Estimates of attenuation from studies in southeastern Massachusetts generally range from 50 to 60 percent (a detailed analysis of nitrogen loads to the Agawam River in the adjacent Town of Wareham suggested the removal of nitrogen in freshwater ponds and streams was 53 to 61 percent). Studies of denitrification in ponds by the Massachusetts Estuaries

Project have found a range of values. In Falmouth, MEP sampling found that the nitrogen load attenuation ranged between 26 and 69% (MEP, 2005), whereas in Namskaket Creek in Nantucket sampling found the nitrogen load attenuation ranged between 50 and 82% (MEP, 2007).

9. Plume of nitrogen – Page 9 of the report mentions that even if seepage from the lagoons was stopped "the plume underneath the sewage lagoons would continue to migrate" to surface waters for many years to come. The report does not demonstrate that there is a "plume" of nitrogen emanating from the Marion lagoons.

The data show that HWMW 2, 4 and 8, all of which are located adjacent to the lagoons are the only wells with concentrations greater than 3 mg/l total nitrogen. This concentration – 3 mg/l total nitrogen – is at the low end of effluent discharge limits (3 to 7 mg/l total nitrogen) given to the advanced wastewater treatment plants discharging to sensitive waters.

Elevated TN concentrations (up to 10 mg/l) observed at monitoring wells HWMW 4 and 8 immediately adjacent to the lagoons is consistent with downward seepage of wastewater from the lagoons to the groundwater. Elevated TN concentrations (up to 5 mg/l) at monitoring well HWMW2 approximately 500 feet north of the lagoons, adjacent to the treatment plant, could be the result of downgradient transport of groundwater impacted by lagoon seepage. HWMW 2 is downgradient of the lagoons, with a head approximately 5 feet lower than the groundwater head at HWMW 4 and 8 near the lagoons.

In contrast to monitoring wells 4 and 8, however, TN concentrations at HWMW5, also immediately adjacent to the lagoons but on the southeast side of Lagoon 2, have been 1 mg/l or less. There appears to be no significant leakage of wastewater near this well. Other monitoring wells sampling groundwater potentially tributary to Aucoot Cove, HWMW 3, 6 and 7, all have had measured TN concentrations less than 1.5 mg/l. Hence, there is no data indicating the presence of a significant TN groundwater plume migrating towards Aucoot Cove.

While sampling and analysis of groundwater at a few monitoring wells indicates elevated TN consistent with some downward leakage from the lagoons, the water level data do not indicate the presence of a groundwater mound at these locations. Therefore, as described below, the rate of leakage is likely much less than estimated in the 2011 Report. Further, there is no data indicating the presence of a significant TN groundwater plume migrating towards Aucoot Cove. This evidence suggests that any nitrogen contribution from the lagoons to groundwater is at best overstated.

Given the substantive issues associated with the Horsley Witten's characterization of the potential groundwater flow from the lagoons to Aucoot Cove, we request that EPA remove the discussion of the Horsley Witten report from the Draft Permit. The numerous logical and scientific shortcomings of the report call into question the validity of using the results as the basis for establishing conditions for the WPCF's permit. As this analysis formed the basis for EPA's concerns regarding lagoon operations and the report plainly has no credible scientific basis, further requirements related to this issue should cease.

Compliance Schedule

As noted in the overview to this comment letter, the compliance schedule included in the Draft Permit is incomplete, internally inconsistent, and offers an inadequate time and inflexible schedule to address any improvements that prove necessary. Nor does the compliance schedule address the potential limitations

on implementation that could be placed based on their value (plus other reasonably included expenditures per EPA guidance) per EPA's affordability guidelines.

Specific Comments on Proposed Compliance Schedule

Page 12 of the Draft Permit states that within 12 months of draft permit's effective date, a plan for bringing lagoons into compliance must be filed, and that "The plan must achieve compliance with the lagoon related permit requirements as soon as possible, but no later than forty-eight (48) months from the effective date of the permit." The permit does not state whether the plan must be approved by EPA and MassDEP, nor does it give a timetable for any potentially needed approval.

Furthermore, Page 13 states that there are only 36 months after the effective date to "complete construction of the lagoon liners." 36 months is also the deadline for constructing all necessary facilities to cease the disposal of sludge, and cease the use of the unlined lagoons. This is a direct contradiction of the statements on Page 12 which state that compliance schedule of up to 48 months is available for compliance with the lagoon-related permit requirements.

Also, requirements in the nitrogen and phosphorus compliance timetables (page 13) have the same issue where there is a deadline to submit a plan for compliance, no mention of a timetable for EPA/DEP approval of that plan, but a very tight 2-year window to finish engineering, bid(s) solicitation, financing and construction.

The Town has reviewed the proposed compliance schedule for the actions that the permit mandates (and not the alternatives that the Town also thinks needs to be considered) and requests revisions to the compliance schedule for these items as follows:

Table 3: Suggested NPDES Permit Compliance Schedule

Permit Section	NPDES Permit Item	Draft Deadline	Suggested Deadline
F.1	Report on Lagoon/Aucoot Cove Compliance	12 months	18 months
F.3	Facilities Plan Amendment	12 months	24 months
F.3	Evaluation/Facilities Plan on TN, TP Limits	12 months	24 months
F.4	Comply with TP Limit (Design/Construction)	24 months	42 months
F.6.a	Progress Report on Lagoons/Sludge Handling	24 months	42 months
F.6.b	Complete Lagoon Liner or Alt. Sludge Handling	36 months	60 months
F.7	Complete Design of Modifications for TN	36 months	48 months
F.6.b	Comply with Lagoon Requirements (Sludge Management Facilities Design/Construction)	48 months	72 months
F.8	Progress Report on Modifications to Meet TN	48 months	60 months
F.9	Comply with TN Limit (Construction)	60 months	72 months
C.4	Collection System Mapping	30 months	36 months
C.5.a	Phase 1 – Collection System O&M Plan	6 months	12 months
C.5.b	Phase 2 – Collection System O&M Plan	24 months	48 months
C.6	Annual CMOM Reporting	Annually	Annually*

* Notes – the Town requests that EPA combine the reporting requirements under the CMOM program and on Page 6 within the Draft Permit into a single report to reduce the reporting requirements and burden on the Town. The schedule also assumes timely review and approval of documents by the regulatory agencies.

A Different Plan

As summarized below, the Town has proposed what it believes to be a legally supported, common sense, cost-effective approach to determining which, if any, improvements are needed to the Town's WPCF to meet the requirements of the CWA.

The Town suggests the following actions be taken to address the potential issues raised in the permit:

1. Conduct a study of the suitability of Inner Aucoot Cove to support eelgrass to determine if there is validity for the assumption in the Draft Permit that eelgrass is the most sensitive use for which this surface water should be enhanced, maintained or protected; and, if the habitat is found to be suitable for eelgrass, assess the quantity of nitrogen that can be present in Inner Aucoot Cove to support this resource.

2. Modify data collection at the treatment plant (e.g., electronic staff gauges in stilling wells) to obtain more rigorous data for a water mass balance at the lagoons to estimate if leakage could be occurring from the lagoons, and if so, what quantity of leakage could be occurring from the lagoons.

3. Prepare a detailed cost estimate for upgrades at the treatment plant assuming changes suggested by permit need to be implemented.

4. Evaluate the feasibility of changing the discharge location of treated effluent to be either the head of the saltmarsh in Aucoot Cove or in Outer Aucoot Cove, including establishing which studies that would be required to meet new Ocean Sanctuaries Act, performing a concept analysis and a detailed cost estimate.

5. If needed, prepare an analysis of nitrogen loading to Aucoot Cove to understand the relative contributions from the point source (wastewater treatment facility) and non-point sources (septic systems, stormwater runoff, cranberry bogs etc.)

6. If needed, evaluate alternatives for controlling non-point sources of nitrogen to Aucoot Cove to determine the degree to which sources are affected. Determine which sources of nitrogen can be most cost effectively controlled.

7. Subject the planned improvements to EPA's affordability guidelines and then seek agreement on an implementation schedule that matches these guidelines.

8. Conduct a simplified water effects ratio study on copper to seek regulatory relief from the copper limit in the permit.

Compliance Schedule for New Fecal Coliform and Enterococci Limits

The UV disinfection system was designed to meet the current permit limits of 14/43 cfu/100 ml for fecal coliform. This system provides effective treatment at the current permit levels. The Draft Permit proposes to reduce the fecal coliform limits and introduce limits for *Enterococci*. As noted earlier, the proper calculation of bacteria limitations should have included dilution available over the tidal cycle ion the Cove.

The Town is concerned that it could have difficulty meeting revised permit limits and thus requests that the compliance schedule included in Section F of the Draft Permit be modified to allow a one-year compliance period for *Enterococci* and the more stringent fecal coliform bacteria. In this way, the Town will be able to determine the most cost-effective solution to meet both of the new limits for pathogens.

Annual Reporting Requirement

Part I.A.1(g) of the Draft Permit states that "If the average annual flow in any calendar year exceeds 80 percent of the facility's design flow, the permittee shall submit a report to MassDEP by March 31 of the following calendar year describing its plans for further flow increases and describing how it will maintain compliance with the flow limit and all other effluent limitations and conditions."

The WPCF regularly has a 12-month rolling average in excess of 0.4704 MGD (which is 80% of 0.588 MGD). For calendar year 2014, the 12-month rolling average was 0.531 MGD; this is before the addition of flows from a new 40-B project and a new dormitory at Tabor Academy.

Marion has several objections to this requirement of the Draft Permit as follows:

- As described in comments above, EPA lacks statutory authority to regulate flow in a NPDES permit. Therefore, EPA has no basis to set a flow limit within this permit and thus has no basis to require actions to be taken when the plant approaches this limit.

- Reaching 80 percent of the facility's design flow is not a violation of the Draft Permit, and reaching this value should not trigger a required response by the Town.

In addition to the requirements listed on Page 6 of the Draft Permit, Page 10 of the Draft Permit discusses the annual "Collection System O & M Plan" report, due to be submitted to MassDEP and EPA by April 15. The separate report lists further requirements for when the WPCF 80 percent of the design flow, including separate calculations of "maximum daily, weekly and monthly" inflow and infiltration. EPA lacks statutory authority to regulate treatment plant flow. Further, the reporting requirements listed on Page 6 and Page 10 necessitate two separate reports to be submitted at different times.

Marion requests that the requirement for action when the WPCF reaches 80 percent of its design flow be removed from the Draft Permit. Marion also requests that EPA seek to reduce the burden of report submittals to the best of its ability; an example would be to require *one* report containing all of the requested information on Page 6 and Page 10.

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Old Indian Trail
Parlowtown Road
Rose Cottage Lane
Pitcher Street
Vine Street
Pleasant Street
Front Street
Water Street
Clark Street
Holmes Street
Allen Street
Crapo Street
Lewis Street
Zora Road
Abels Way
Outfall Extension Alternative 2
Beach Street
Cove Street
Olde Sheepfield Road
Mill Street
Outfall Extension Alternative 1
Puckerbrush Lane
Jobs Cove Road
Bayview Road
Converse Road
Holly Lane
Thistle Lane
Kabeyun Road
Wianno Road
Indian Cove Road

Legend

- 2013 MassDEP Eelgrass Extent
- Wooded Marsh
- Salt Marsh
- Open Water

Figure 1 - Conceptual Layout of Wastewater Treatment Plant Outfall Extension Alternatives Marion, Mass.

Source: MassGIS

CDM Smith

The outfall pipe routes and discharge locations shown have not been subjected to technical analysis, and are presented solely to assist the written description of these potential options. Signficant further study would be required to examine and finalize alternative routes and the outfall terminus.

N

0 175 350 700 Feet

1 inch = 350 feet

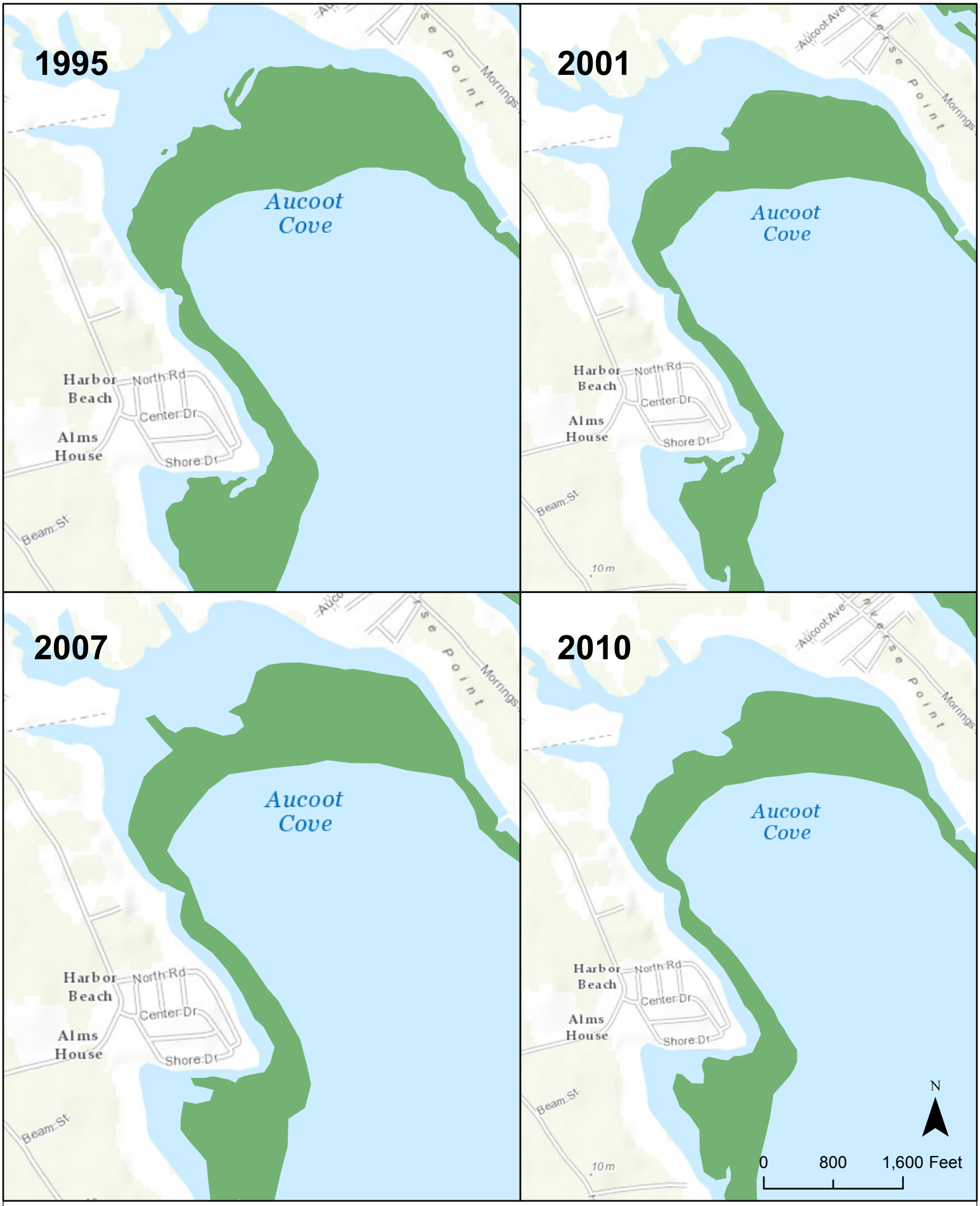

Figure 2: Comparison of 1995, 2001, 2007, and 2010 MassDEP Eelgrass Surveys in Aucoot Cove

Sources: Esri, DeLorme, NAVTEQ, TomTom, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, and the GIS User Community
Sources: Esri, GEBCO, NOAA, National Geographic, DeLorme, HERE, Geonames.org, and other contributors. Eelgrass mapping: MassGIS and

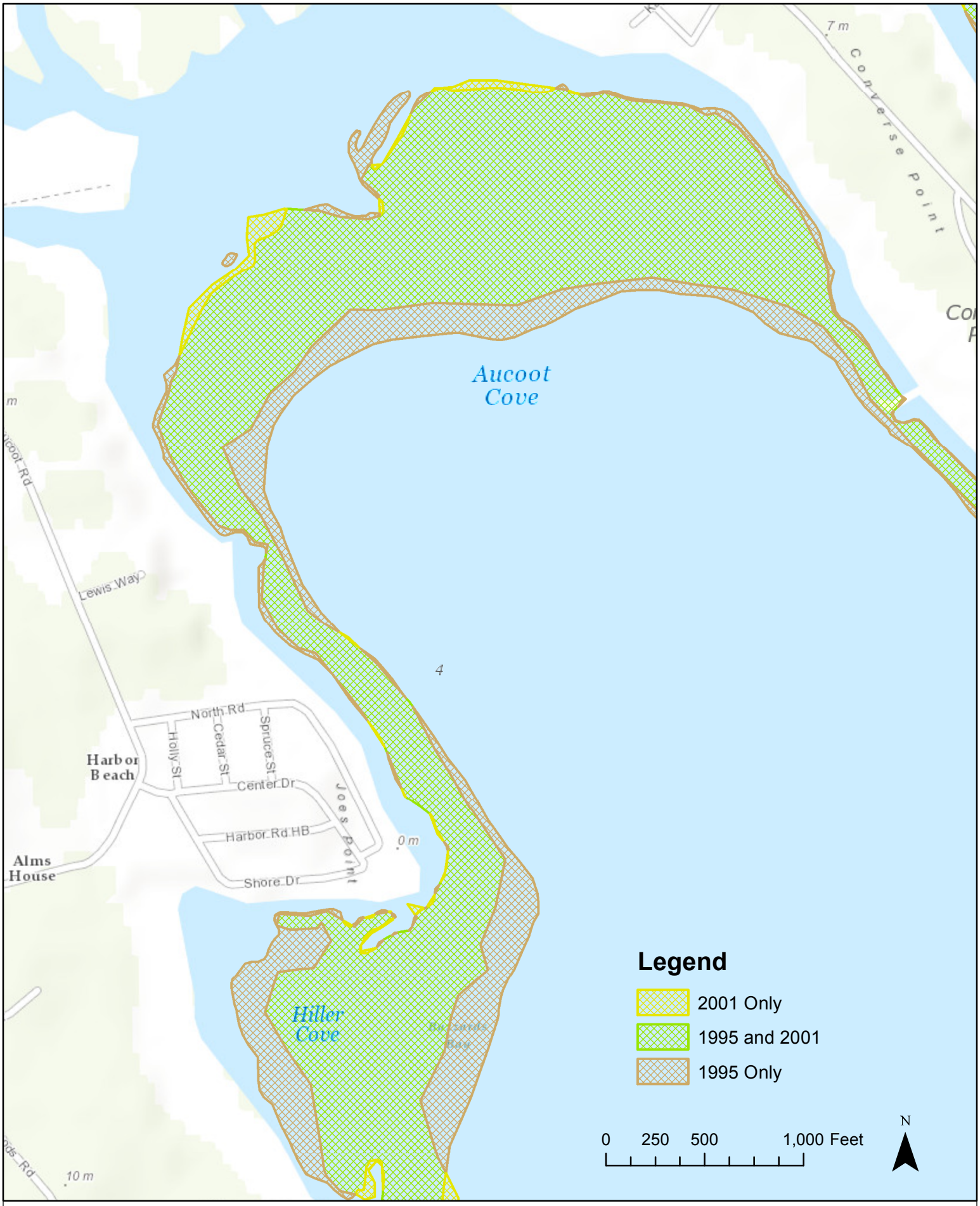

Figure 3: Comparison of 1995 and 2001 MassDEP Eelgrass Surveys in Aucoot Cove

Sources: Esri, DeLorme, NAVTEQ, TomTom, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, and the GIS User Community
Sources: Esri, GEBCO, NOAA, National Geographic, DeLorme, HERE, Geonames.org, and other contributors. Eelgrass mapping: MassGIS and