

September 24, 1999

Dear Colleague:

In 1990, the Buzzards Bay Project, a participant in the U.S. Environmental Protection Agency's National Estuary Program, developed a Total Maximum Annual Loads (TMALs) strategy to manage anthropogenic nitrogen inputs to coastal embayments in Buzzards Bay. This strategy was contained in the 1991 Buzzards Bay Comprehensive Conservation and Management Plan.

The objective of this management strategy was to protect and restore water quality and living resources in small coastal embayments common in Buzzards Bay and elsewhere in the region. The recommended TMAL approach to manage point and non-point sources was empirically based on a comparison of embayment conditions to estimated nitrogen loads, together with a synthesis of previous studies of loading and ecosystem response. Existing nitrogen loads were based on land use data contained in a Geographic Information System, and a well defined set of nitrogen loading assumptions for different kinds of land uses and sewage disposal. The recommended embayment TMAL limits were established with a tiered system that incorporated existing regulatory water quality classifications, together with embayment area or volume and hydraulic turnover time and depth, so that embayment specific TMALs were established.

The Buzzards Bay Project's mass loading approach and tiered system of allowable loading limits for coastal embayments, using existing state and federal water quality classifications, has proved to be a useful management tool. Since the Buzzards Bay CCMP was approved in 1992, the Buzzards Bay Project, towns, and regulatory agencies have been using this management strategy to manage impacts of growth or review discharge permits.

Recognizing that better information was needed on existing water quality in Buzzards Bay embayments, in 1992, the Buzzards Bay Project established, in partnership with the citizens group the Coalition for Buzzards Bay and Dr. Brian Howes, a water quality monitoring program to evaluate nitrogen loading impacts in Buzzards Bay. The purpose of this monitoring program was to not only document water quality conditions and trends in Buzzards Bay embayments, but to also evaluate the appropriateness of the specific nitrogen loading limits recommended in 1991.

The Buzzards Bay Project has completed a review of seven years of the Buzzards Bay citizen's water quality monitoring program. This information is contained in the enclosed draft final report titled "Managing anthropogenic nitrogen inputs to coastal embayments: Technical basis and evaluation of a management strategy adopted for Buzzards Bay" by J. E. Costa, B. L. Howes, D. Janik, D. Aubrey, E. Gunn, A. E. Giblin and dated September, 24, 1999. This report, and various supporting data sets are being made available on the Buzzards Bay Project's web site, [www.buzzardsbay.org](http://www.buzzardsbay.org).

The findings in this report demonstrate that nitrogen loading limits that are based on bay flushing times and water volumes are scientifically defensible. However, the correlation between ecosystem response and loading characterized by the so-called "aerial scale" is weaker. In addition, the findings also

suggest that the limits proposed in 1991 appear too high to be protective for many embayments, and that lower limits may be appropriate.

Based on these observations, and additional information contained in the report, and other recent work, the Buzzards Bay Project is proposing the following changes to its TMAL nitrogen management strategies:

1) Abandonment of the “aerial” loading limit scale. Limits will be defined by bay volume and flushing time alone. The Vollenweider flushing term adjustment to flushing is retained.

2) Acceptable recommended nitrogen limits (TMALs) will be reduced by as much as 50% in some categories, and the original tiered loading table will be replaced with the following tiered loading limit table:

Table 1. Revised nitrogen loading rate limits to coastal waters for Buzzards Bay embayments proposed by the Buzzards Bay Project. Shallow is any embayment with an average MLW depth of 2.0 m, or having 40% or more of the bottom less than 2 m.

| Embayment type | SB Waters                               | SA Waters                               | Outstanding Resource Waters            |
|----------------|---|---|--|
| Shallow        | 300 mg m <sup>-3</sup> Vr <sup>-1</sup> | 150 mg m <sup>-3</sup> Vr <sup>-1</sup> | 50 mg m <sup>-3</sup> Vr <sup>-1</sup> |
| Deep           | 400 mg m <sup>-3</sup> Vr <sup>-1</sup> | 200 mg m <sup>-3</sup> Vr <sup>-1</sup> | 75 mg m <sup>-3</sup> Vr <sup>-1</sup> |

3) A background loading term for precipitation to forest and other undeveloped land use types will be employed at the rate of 0.17 kg ha<sup>-1</sup>, equivalent to a ubiquitous 2 uM DIN groundwater concentration.

4) A 30% attenuation loss term as an average for “upper” watershed loadings to account for uptake by wetlands streams, and ponds. The criteria for defining these areas will subsequently be issued.

5) Cranberry Bog loadings using Mass GIS land use coverage is reduced to 17.6 kg ha<sup>-1</sup> (from 18.0) but if actual production area is used, loading will be 24.7 kg ha<sup>-1</sup>.

The Buzzards Bay Project is a planning and technical assistance agency, not a regulatory agency. However, because our recommended limits may have farther reaching implications for coastal management, we are inviting comments on this report and the method changes identified in this cover letter. Comments are welcome until 5 PM Tuesday, November 23, 1999, after which the report will be finalized, and the Buzzards Bay Project will provide technical and planning assistance based on these new standards.

Please note that the draft final report is presently in “journal” format with the figures and tables at the end. The final revised report will have the tables and figures integrated within the text.

Sincerely,

Joseph E. Costa, Ph.D.  
Executive Director