Rhode Island Department of Environmental Management
Office of Water Resources
Plan for Development and Adoption of
Nutrient Criteria for Lakes/Ponds and
Rivers/Streams

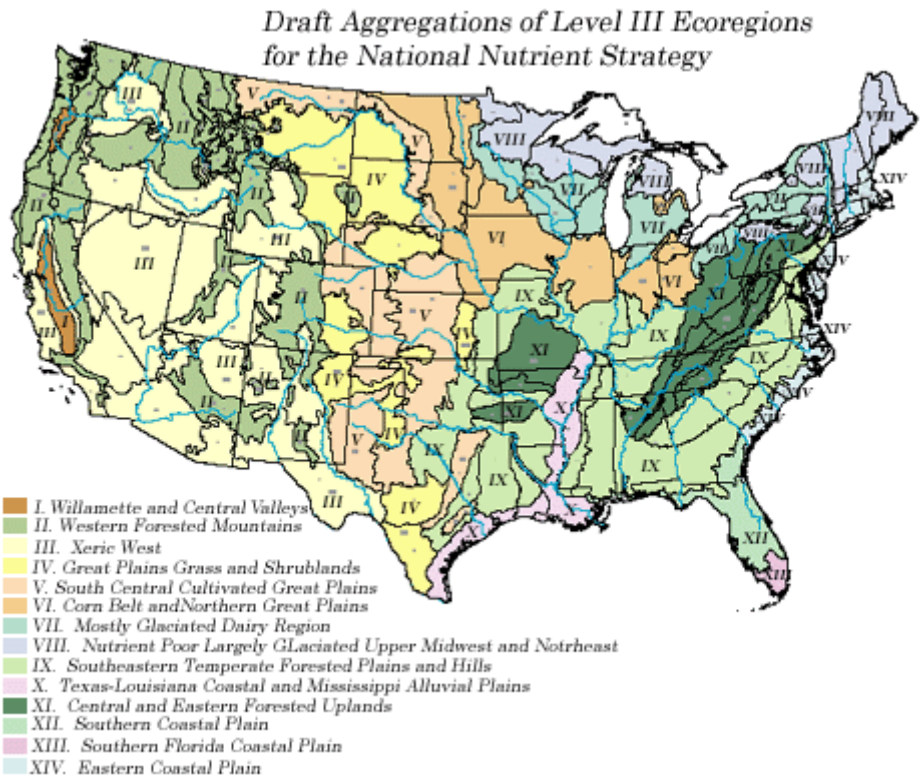
A. Introduction

In February 1998, President Clinton and Vice President Gore released a comprehensive Clean Water Action Plan. This Action Plan provided a blueprint for Federal agencies to work with States and other stakeholders in restoring and protecting the Nation's water resources. A key part of the Action Plan provided for expanded efforts to reduce nutrient over-enrichment of waters. The Action Plan called for EPA to accelerate the development of scientific information concerning the levels of nutrients that cause water quality problems and to organize this information by different types of waterbodies (streams, lakes, coastal waters, wetlands) and by geographic regions of the country (ecoregions).

In June 1998, EPA published the *National Strategy for the Development of Regional Nutrient Criteria*. The Strategy described the approach EPA would follow in developing nutrient information and working with States to adopt nutrient criteria as part of State water quality standards. A major element of the Strategy is the development of waterbody-type guidance documents describing the techniques for assessing the trophic state of a waterbody and methodologies for developing nutrient criteria on an ecoregional basis. Utilizing the technical guidance EPA proposed to develop recommended nutrient criteria for each waterbody type in each ecoregion. Each nutrient water quality criteria document would present recommended criteria for causal parameters (total phosphorus and total nitrogen) and response variables (chlorophyll *a* and some form of turbidity). EPA proposed that these recommended criteria would be a starting point for states to develop more refined nutrient criteria, as appropriate, using EPA waterbody specific technical guidance manuals and other scientifically defensible approaches. The Strategy called for States to adopt or revise EPA's nutrient criteria into their water quality standards by the end of 2003. (In December 2000, EPA modified the adoption date to the end of 2004).

EPA published the *Nutrient Criteria Technical Guidance Manual for Lakes and Reservoirs* in April 2000 and the *Nutrient Criteria Technical Guidance Manual for Rivers and Streams* in July 2000. EPA expects States and Tribes to use these manuals as the basis for developing State water quality standards for nutrients, to help identify water quality impairments, and to evaluate the relative success in reducing cultural eutrophication. In addition to developing these waterbody-type specific manuals, EPA is developing nutrient criteria guidance under section 304(a) for each of the 14 ecoregions it has identified in the continental United States (See Figure 1). EPA expects States and Tribes to use these manuals, other information, and local expertise to refine EPA's 304(a) nutrient criteria guidance so that the nutrient water quality criteria eventually adopted by States and Tribes are tailored to more localized conditions. In order to assist States in this undertaking, as well as to verify section 304 (a) nutrient criteria guidance, and to provide national consistency wherever possible, EPA has established Regional Technical Assistance Groups (RTAGs). RTAGs are a collection of EPA, other Federal agencies, State, and Tribal representatives who are working together to use EPA's section 304(a) nutrient criteria guidance as a starting point for developing more refined ecoregional nutrient criteria. In Region I, the RTAG group consists of members from all the states, EPA and is coordinated by the NEIWPCC.

Figure 1


Draft Aggregations of Level III Ecoregions
for the National Nutrient Strategy
I. Willamette and Central Valleys
II. Western Forested Mountains
III. Xeric West
IV. Great Plains Grass and Shrublands
V. South Central Cultivated Great Plains
VI. Corn Belt andNorthern Great Plains
VII. Mostly Glaciated Dairy Region
VIII. Nutrient Poor Largely GLaciated Upper Midwest and Notrheast
IX. Southeastern Temperate Forested Plains and Hills
X. Texas-Louisiana Coastal and Mississippi Alluvial Plains
XI. Central and Eastern Forested Uplands
XII. Southern Coastal Plain
XIII. Southern Florida Coastal Plain
XIV. Eastern Coastal Plain

In December 2000, EPA published seventeen nutrient water quality criteria documents for lakes and reservoirs, rivers and streams, and wetlands within specific geographic regions (ecoregions) of the United States. Each document presented recommended criteria for causal parameters (TP and TN) and response variables (chl *a* and some form of turbidity). EPA again noted that states should use these ecoregional nutrient criteria documents as starting points to identify more precise numeric levels for nutrient parameters needed to protect designated uses on a site-specific or subregion-specific conditions. The publication also stated that EPA expects states to develop a plan for developing and adopting nutrient criteria into water quality standards within one year of publication of the recommended criteria (December 2001) and to adopt or revise numeric nutrient criteria, published in 2000 and 2001, into water quality standards by 2004.

RI is located entirely in ecoregion XIV, The Eastern Coastal Plain which incorporates coastal waters from Maine to Georgia. EPA published nutrient criteria for rivers and streams in ecoregion XIV in December 2000. Nutrient criteria for lakes and ponds in ecoregion XIV were released as draft in November 2001.

The EPA Region I states fall into ecoregion XIV and/or VIII. The EPA Region I RTAG has been meeting since 1998. The initial and main focus of the RTAG has been on lake nutrient criteria development. Work on river and streams nutrient criteria development is underway and the RTAG for estuarine nutrient criteria development has only convened on two occasions so far. RIDEM has been participating in the Region I RTAG since its initiation. The RTAG has generated a lakes database and is in the process of generating a rivers database of regional nutrient data provided by the states, federal agencies (eg., USGS) and non-profit organizations (eg., Watershed Watch) The group hired ENSR to develop the databases and evaluate the data in accordance with the methodologies presented in EPA's *Nutrient Criteria Technical Guidance Manual for Lakes and Reservoirs* and the *Nutrient Criteria Technical Guidance Manual for Rivers and Streams*. Much of the strategy RI proposes for lake and river nutrient criteria development comes from work conducted through the RTAG.

B. Nutrient Criteria Development in Rivers and Streams

1. Nutrient Criteria Technical Criteria Guidance Manual for Rivers and Streams

EPA published the *Nutrient Criteria Technical Guidance Manual for Rivers and Streams* in July 2000. A major focus of this manual is EPA's classification of streams for water quality assessment and nutrient criteria development. EPA has classified streams based upon a national geographic scheme. The nation has been divided into 14 nutrient ecoregions (Omernik 2000) based on landscape-level geographic features including climate, topography, regional geology and soils, biogeography, and broad land use patterns. The technical guidance describes the classification as a framework for states to work with to establish appropriate subdivisions. The classification process involves physical classification based on variation in natural characteristics and nutrient gradient classification schemes for identifying similarities within stream system types. The intent of classification is to identify groups of rivers or streams that have comparable characteristics.

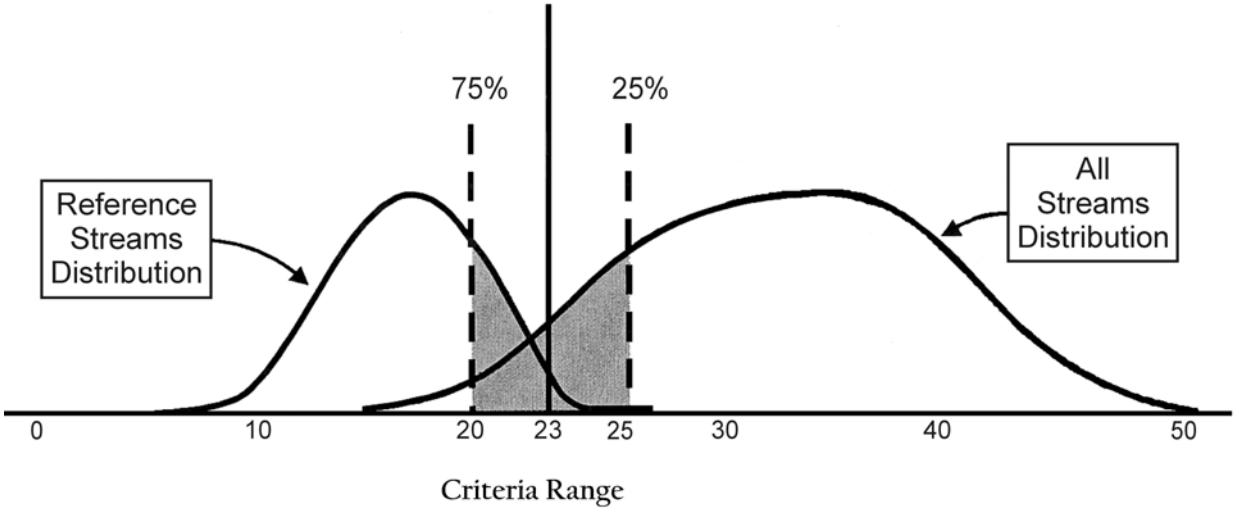
The technical guidance presents several approaches that can be used to develop numeric nutrient criteria for rivers. The approaches include the use of reference streams, applying predictive relationships to select nutrient concentrations that will result in desirable levels of aquatic growth, and deriving criteria from thresholds established in the literature.

Three ways of using the reference approach for establishing nutrient and algal criteria are presented which include the following:

1) Characterize reference reaches for each stream class within the area using BPJ and use these reference conditions to develop criteria.
2) Identify the 75th percentile of the frequency distribution of reference streams for a class of streams and use this percentile to develop the criteria.
3) Calculate the 25th percentile of the frequency distribution of the general population of a class of streams and use the 25th percentile to develop the criteria.

Determination of the 75th percentile of reference streams and the 25th percentile of all streams produces a potential criteria range which can be utilized to develop a criterion as shown in Figure 2 below.

Figure 2
Frequency Distributions of Reference Streams and All Streams
To Produce a Potential Criteria Range



A compilation of these three methods of applying the reference approach was utilized by the Region I RTAG in the evaluation of nutrient criteria development for lakes and ponds.

The Manual also provides technical guidance on designing effective sampling programs; development of a nutrient and algal database; data analysis; and continual monitoring programs.

2. EPA Ambient Water Quality Criteria Recommendations for Rivers and Streams in Ecoregion XIV

In December 2000, EPA published *Ambient Water Quality Criteria Recommendations for Rivers and Streams in Nutrient Ecoregion XIV*. In this document, EPA presented criteria for TP, TN, chl *a*, and turbidity for rivers located in Ecoregion XIV, the Eastern Coastal Plain. EPA utilized data sets from Legacy STORET, NASQUAN, NAWQA, NYCDEP, and EPA Regions 1 and 3 to assess nutrient conditions from 1990 to 1999. EPA followed the reference approach described in the Technical Guidance Manual. EPA's preferred method to establish a reference condition is to choose the upper 25th percentile of a reference population of streams. When reference streams are not identified, the second method described is to determine the lower 25th percentile of the entire population of streams. Because reference streams were not necessarily identified in the available data sets, EPA utilized the lower 25th percentile of the entire population of streams as a surrogate for an actual reference population in the calculation of nutrient criteria for Ecoregion XIV. Table 1 presents EPA's recommended nutrient and algal criteria for rivers and streams in Ecoregion XIV following the reference approach outlined above.

Table 1
EPA Recommended Nutrient Criteria for Rivers and Streams in Ecoregion XIV
(median annual values)

Parameter	Concentration
TP ug/l	31.25
TN mg/l	0.71
Chl *a* ug/l	3.75
Turbidity NTU	1.94

3. Plan for Nutrient Criteria Development for Rhode Island Rivers and Streams

Background

Nutrient enrichment of Rhode Island rivers and streams has been characterized through DO swings and algal blooms. In addition, nutrient enrichment from cultural eutrophication is presumed to be the cause of some biodiversity impairments observed in rivers around the state. Nutrient impaired waters can cause problems that range from annoyances to serious human health concerns. Nuisance levels of algae and macrophytes can interfere with aesthetic and recreational uses of rivers. Human health problems can be attributed to nutrient enrichment. The density of algae and the level of eutrophication in a raw water supply has been correlated with the production of trihalomethanes. Elevated levels of nitrates in drinking water can cause low oxygen levels in the blood when ingested by infants.

Establishing numeric criteria for levels of TP and TN that will result in acceptable levels of chlorophyll *a* and water clarity is a difficult process. The Department believes that development of nutrient criteria will assist in providing clearer goals that will serve as benchmarks for evaluating water quality, maintaining current adequate water quality conditions, and in the restoration of nutrient over-enriched waters.

As noted in the EPA Technical Guidance Manual, variability within each of their 14 ecoregions may be higher than variability within the level III aggregate regions and even less within a state. RI is proposing to evaluate data within the state's rivers and streams to eliminate much of the variability in development of nutrient criteria, following the approach outlined below. The approaches discussed below and the RIDEM, Office of Water Resources' (OWR) Plan for development of nutrient criteria for rivers and streams, are considered as working options within a dynamic Plan. We anticipate that there may be changes to the approaches and Plan as we consider new information, encounter unanticipated problems, and implement the steps toward the development of nutrient criteria.

Proposed Approach

RIDEM's goal is to address over-enrichment in the rivers that truly have nutrient related impairments. The Department's intention is to develop nutrient criteria for riverine systems that will address real problems of nutrient over-enrichment in rivers of the state. The Department anticipates that these criteria will prevent nutrient over-enrichment, allow for identification of rivers that are impaired by nutrients, and set goals for loading estimates.

The OWR proposes to implement a phased approach to developing nutrient criteria for RI rivers and streams. Evaluation of the currently available data and subsequently collected data, utilizing several of the approaches presented by EPA in the Technical Guidance Manuals, will provide a more thorough statewide representation of the issue. This state-specific information will allow for development of more precise numeric nutrient criteria for RI rivers and streams.

- Initially, the currently available data for all rivers will be evaluated using a frequency distribution approach. This data is housed in an Access database which will make evaluation of the data much easier.

- For the sites with currently available data, identification of reference streams will be attempted using land use, biological data and Best Professional Judgement (BPJ). For each parameter for which there is currently data available, a frequency distribution for reference rivers and a frequency distribution for all rivers will be plotted. Various percentiles of both sets of data will be calculated for review.

- Data will be compiled to classify streams according to <u>physical factors</u> (land use, stream order, geology, etc), hydrology (slope, velocity, elevation, etc), point source location, etc. If possible, an attempt will be made to classify the streams based on <u>nutrient gradients</u> (measured nutrient concentrations and algal biomass) to help identify similarities within stream system types. A trophic classification scheme, based upon the Dodds et al approach outlined in the technical guidance manual, will be evaluated. Potential existing sources of information to classify streams include DEM Fish and Wildlife (bottom type, canopy cover), GIS data (stream order, landuse, soil types), USGS and NRCS for stream hydrology (velocity, slope, elevation) information, and the DEM baseline monitoring programs (chemical and biological) for information on bottom substrate type and flow. Additional data may have to be collected to allow for classification of the rivers and streams.

- The rivers and streams for which there is data will be sorted into the classes determined above. Reference streams within each class will be identified. Frequency distributions of reference rivers and all rivers will be generated to evaluate potential criteria ranges for each class of streams.

- The OWR will have to collect additional data on the candidate variables. Currently, data is available for TN, TP and turbidity in some rivers of the state. A majority of this data is confined to the larger streams of the state which do have WWTF discharges. The OWR will investigate adding sampling and analysis of TN at the 25 chemical baseline stations. These stations are sampled quarterly for water chemistry and are analyzed for conventional (including TP and turbidity) and toxic parameters. The OWR does not have data for chlorophyll *a* in rivers. Evaluation of the suitability of sampling for chlorophyll *a* will be discussed given the concerns of macrophyte growth in RI rivers. Current observations indicate that water column and periphyton levels of chlorophyll *a* may not reveal the actual ambient conditions. Instead, macrophyte growth from sediment-to-plant cycling appears to be more of an issue related to nutrients loadings. Observations of macrophyte growth at stations where TP and TN are collected may be attempted. The OWR will investigate the addition of turbidity sampling at the five USGS gaging stations located within Rhode Island. Monitoring of 24 hour DO and pH levels may be added to supplement the nutrient data. The collection of data should proceed over the course of a year to capture seasonal conditions.

- In addition to the collection of data on the candidate variables, there may be a need to collect data on physical factors of the rivers and streams to allow for stream classification.

- An evaluation of gathered data (existing and new) will be conducted. The data will be evaluated using frequency distributions of reference rivers and all rivers. The data will be sorted into various classes and the frequency distributions for each class will be determined. The data will be evaluated for relationships between the critical response variables (turbidity, chl a, pH, DO) and observed nutrient (TP, TN) concentrations.

- A final evaluation of the data will be based upon Best Professional Judgement, EPA's proposed criteria, and designated use attainment. Using all of the collected information and review of the data, the OWR will propose nutrient criteria for rivers and streams.

Implementation of Rivers Nutrient Criteria

- Because trophic state is a function of many variables, RI proposes to evaluate attainment of nutrient criteria by looking at all nutrient parameter data points, and multi-year data, for individual rivers.

- Future monitoring work may lead to revised river-specific nutrient criteria which may even address nutrient levels/loadings using other parameters such as dissolved oxygen.

- To account for potential downstream nutrient enrichment in estuarine waters where quantified nutrient standards have not yet been established, the OWR proposes an interim approach to address the issue. In estuarine waters where significant loss of SAV, DO swings, fish kills and/or algal blooms are observed, the riverine loadings will be evaluated and nutrient load reduction strategies will be suggested. It is anticipated that these estuarine waters are or would be listed on the 303(d) List of Impaired waters for these types of numeric (DO) and/or narrative (fish kills, loss of SAV, algal blooms) causes of impairment. Therefore, the full evaluation and remediation work would be accomplished through the TMDL program.

C. Lakes and Ponds

1. Nutrient Criteria Technical Criteria Guidance Manual for Lakes and Ponds

EPA published the *Nutrient Criteria Technical Guidance Manual for Lakes and Ponds* in April 2000. As with rivers, EPA proposed development of nutrient criteria within the 14 delineated national nutrient ecoregions. However, the Technical Guidance Manual describes that nutrient criteria may be developed at the State, regional or even individual waterbody levels to develop more refined criteria. Information on classifying waterbodies and methods for developing appropriate criteria are presented. Also included is information on sampling, data processing and appropriate management techniques. The methods for developing criteria include the reference approaches (75th percentile for reference lakes and 25th percentile of all lakes) described above for rivers and streams.

2. New England RTAG Review of Regional Lakes Data

The Region I RTAG followed EPA's reference (statistical) approach and the designated use approach in the initial evaluation of nutrient criteria development for the New England states. Available data for lakes within Region I was compiled into a database. The data was reviewed according to the Level 3 Aggregated ecoregions. The largest three of the five level III aggregate ecoregions: Laurentian Plains and Hills (LPH), North Eastern Highland (NEH), and North Eastern Coastal Zone (NECZ), were used to sort and evaluate the data. Rhode Island falls entirely within the NECZ. The NECZ consistently showed to be statistically different from the other two ecoregions suggesting that underlying patterns exist for nutrient concentrations in the waterbodies among ecoregions. The NECZ had higher levels of nutrients and shallower lakes . A determination of reference lakes and impacted lakes was made by the state coordinators. The data was reviewed using the statistical approach of 75th percentile of reference lakes and 25th percentile of all lakes to present a potential criteria range. For phosphorus, the midpoint value was approximately 10 ug/l. Further review of the data showed that additional classifications should be considered to refine the criteria. For example there was a tendency for higher nutrient concentrations in shallower lakes. A question of lake color was also posed but not reviewed under this exercise.

The Designated Use Approach was also evaluated for nutrient criteria development in New England lakes. For this method, scientific literature and BPJ are used to identify potential nutrient concentrations that may result in the loss or impairment of a designated

use. A set of Trophic State Indices (TSI) were selected and associated with various uses and concentrations of TP. Based on impairment of designated uses, a TSI of <50 was chosen to represent the line between "acceptable" and "unacceptable". A TSI of 50 represents the Carlson trophic state index between mesotrophic and eutrophic lakes. At a TSI of 50, the associated concentration of TP is 24 ug/l.

3. EPA Draft Ambient Water Quality Criteria Recommendations for Lakes and Ponds in Ecoregion XIV

In November 2001, EPA drafted *Ambient Water Quality Criteria Recommendations for Lakes and Reservoirs in Nutrient Ecoregion XIV*. In this document, EPA presented criteria for TP, TN, chl *a*, and turbidity for lakes located in Ecoregion XIV, the Eastern Coastal Plain. EPA utilized data sets from Legacy STORET, NASQUAN, NAWQA, NYCDEP, and EPA Regions 1 and 3 to assess nutrient conditions from 1990 to 2000. EPA followed the reference approach described in the Technical Guidance Manual. EPA's preferred method to establish a reference condition is to choose the upper 25th percentile of a reference population of lakes. When reference lakes are not identified, the second method described is to determine the lower 25th percentile of the entire population of lakes. Because reference lakes were not necessarily identified in the available data sets, EPA utilized the lower 25th percentile of the entire population of lakes as a surrogate for an actual reference population in the calculation of nutrient criteria for Ecoregion XIV. Table 2 presents EPA's recommended nutrient and algal criteria for lakes in Ecoregion XIV following the reference approach outlined above.

Table 2
EPA Recommended Nutrient Criteria for Lakes in Ecoregion XIV

Parameter	Concentration
TP (ug/l)	8.75
TN (mg/l)	0.32
Chl *a* (ug/l)	2.88
Secchi depth (m)	4.49

4. Plan for Development of Nutrient Criteria in Rhode Island Lakes and Ponds

Background

RIDEM adopted a TP criteria of 25 ug/l for lakes, into the RI Water Quality Regulations in 1997. OWR applied a Designated Use Approach in the development of this criteria. OWR staff worked with staff of URI's Watershed Watch Program to develop this criteria. The Watershed Watch Program has monitored water quality in lakes and tributaries around the state using a volunteer monitoring program since 1988. Evaluation of nine years of lakes data was used to match the staff scientists' and volunteer monitors' perception of impairment against the concentration of TP observed in lakes.

RI lakes are classified according to Carlson's Trophic Index (see Table 3). State lakes experts evaluated the trophic index data for nine years of data from lakes around the state. The levels of phosphorous measured in lakes was reviewed relative to a BPJ determination of impaired or reference conditions for each lake. It was determined by the RI lakes experts, that impaired lakes fell into the eutrophic classification. The associated TP level of 25 ug/l was established following the Carlson TP level for eutrophic lakes. Use of this criteria over the past four years to define impaired waters in need of restoration has been successful.

Table 3
Carlson Index Trophic Classification

Water Quality Measurement or Term	Oligotrophic	Mesotrophic	Eutrophic
Secchi Depth Transparency	greater than 4 meters greater than 13 feet	2 – 4 meters 6.3 – 13 feet	Less than 2 meters Less than 6.3 feet
Chlorophyll content	Less than 2.6 ug/l	2.6 – 7.2 ug/l	More than 7.2 ug/l
Total Phosphorus	Less than 12 ug/l	12 – 24 ug/l	More than 24 ug/l
Trophic State Index	Less than 40	40 – 50	More than 50

Proposed Approach

- RI proposes to maintain the TP criteria of 25 ug/l for lakes. The associated Carlson Index ranges for secchi depth and chl *a* will be examined in conjunction with 13 years of RI lakes data to establish a criteria for each parameter. The URI Watershed Watch Program has collected TN data on lakes in the state for over 13 years. The TN data will be reviewed relative to the levels of the other 3 nutrient criteria parameters and the trophic status information. A regression relating TN to TP may also be evaluated to assist in establishing a TN criteria.

- To further examine the data, an attempt will be made to classify the lakes of the state. Physical characteristics, independent of most cultural enrichment sources, including lake size, depth, color and inherent characteristics such as reservoirs or impoundment situations, will be used to classify the lakes.

- Determine reference lakes within each class and impaired lakes within each class using BPJ of state lakes experts and volunteer perception information.

- Water quality data will be entered into a database to assist in the evaluation and development of criteria.

- An evaluation of frequency distributions of reference lakes data and frequency distribution of all lakes data will be conducted to present a criteria range. The data generated from this reference approach will be used as supplemental information in the development of criteria for TN, chlorophyll *a*, and secchi depth.

- All information generated from the different approaches will be evaluated and criteria for TN, chlorophyll *a*, and secchi depth, will be proposed.

Implementation of Lakes Nutrient Criteria

- Because trophic state is a function of many variables, RI proposes to evaluate attainment of nutrient criteria by looking at all nutrient parameter data points.

- In general, RI lakes fall into three categories: run-of-the-river, shallow lakes, or very deep kettle holes. Given the various types of lakes in the state, BPJ has shown that different systems react differently to different weather patterns. Some lakes will have nutrients flushed out in wet years while others accumulate nutrients with runoff. Some lakes become very darkly colored with natural tannins during rain events resulting in skewed secchi depth results. These varying responses indicate that often a single season of data is not sufficient to assess in-lake processes and the attainment of water quality standards. Therefore, RI will not only evaluate all nutrient parameter data points to evaluate attainment, but will also evaluate individual lakes using multi-year data.

- The criteria generated will not apply to shallow (less than 2 meters), macrophyte dominated lakes. The link between macrophytes and nutrient enrichment are more indirect than with algae and are not addressed in EPA's Technical Guidance Manuals. In addition, the uses associated with this class of lakes can differ from deeper lakes. This class of lakes will be managed based upon BPJ, DO and pH levels, and management of nutrient levels in tributaries to lakes through the adoption of river nutrient criteria. Discussions of developing a percent macrophyte coverage standard will be held among OWR staff and URI personnel.

- Criteria developed will apply to the sampling index period, May to October to correspond to the URI Watershed Watch sampling schedule.

- The criteria developed will only apply to lakes greater than 10 acres. The available data does not include much information on smaller lakes. Furthermore, the OWR's draft Monitoring Strategy proposes sampling of lakes greater than 10 acres as a goal.

- Water quality in reservoirs and impoundments may have to be evaluated differently from lakes and ponds. Application of the nutrient criteria developed for lakes and ponds may not be appropriate for reservoir and impoundment systems. These systems may respond more like rivers and therefore, the river nutrient criteria may be more appropriate to apply. Evaluation of this issue will be discussed among OWR staff and the lake and riverine experts at URI.

D. Plan Implementation Details

1. Milestones - Dependent upon staffing and funding resource availability

   During calendar year 2002: compile existing data into databases and evaluate all data of all waterbodies for each waterbody type (lakes and rivers) for each parameter. Attempt determination of reference rivers and lakes. Attempt classification of rivers and lakes. Develop monitoring strategy for known missing parameters and other data gaps such as velocity, slope, bottom type, canopy cover, etc).

   Initiate collection of new data late in 2002 as funding and contractual capabilities allow and continue through 2003. Evaluate data throughout the period.

   During early 2004 conduct final data evaluation and propose criteria my mid-year. Public Notice proposed criteria and hold Public Hearing to amend the Water Quality Regulations.

2. Staff involvement

   The OWR will establish a workgroup of staff to assist in the critical decision making processes associated with the development of a monitoring strategy, data collection, analyses and evaluation. Outside expertise may be solicited from personnel at the local universities.

3. Staffing and resources needs

   The OWR does not currently have personnel on staff with expertise on nutrients in freshwaters. Additional funds will be needed to complete the supplementary sampling and analyses. The availability of these staffing and funding resources will determine the overall schedule of data collection and evaluation.

4. Public participation and stakeholder involvement

   During the data compilation and evaluation phases of nutrient criteria development for lakes and rivers, OWR will confer with state experts, the interested public and organizations. OWR will hold a Public Hearing for the adoption of the nutrient criteria into the Water Quality Regulations.