

**NITROGEN CREDIT TRADING FOR**  
**LONG ISLAND SOUND WATERSHED**

**WATER ENVIRONMENT RESEARCH FOUNDATION**  
**Watershed-Based Trading Demonstration Project**  
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## **NITROGEN CREDIT TRADING FOR LONG ISLAND SOUND**

The demonstration project has developed a nitrogen credit trading program for the reduction of nitrogen in Connecticut point and potentially, non-point sources to Long Island Sound incorporating the current financing practices and capacity of the State's Clean Water Fund (the state SRF) and utilizing a watershed based permit to drive implementation in order to achieve the Total Maximum Daily Load (TMDL) and waste load allocations to the Sound.

### **Background**

The Comprehensive Conservation and Management Plan (CCMP) for the Long Island Sound National Estuary Program, or the Long Island Sound Study (LISS), calls for the reduction of nitrogen from all sources throughout the watershed to affect the increase of dissolved oxygen in the Sound's waters to a level which will support a balanced and healthy ecosystem eliminating the current impacts of hypoxia.

The CCMP, adopted by the Governors of Connecticut and New York and US EPA Regional Administrators, calls for the reduction of 58.5 % of the total enriched nitrogen load from point and non-point sources from the 1990 established base load of nitrogen from the two states within the next 15 years. This reduction is expected to achieve significant progress towards a target goal of 5.0 mg/l on the surface and 3.5 mg/l average in the bottom waters with no event below 2.0 mg/l. The implementation calls for the adoption of a Total Maximum Daily Load (TMDL) and Waste Load Allocations (WLA) and Load Allocations (LA) by 2000 for all sources. A draft TMDL is under review at this date.

The plan calls for the equal reduction in each of the 11 management zones despite the differing levels of contribution and impact. While the contribution of NPS is quantifiable in terms of empirical data, accurate and enforceable control strategies are not currently available, therefore the reductions necessary, except for a token reduction in NPS, are expected to be achieved by the point sources alone. In Connecticut, this results in a nitrogen reduction at 84 municipal treatment facilities of over 70% from their 1990 established base load to the Sound. The CCMP further calls for this reduction to be reached in five year targets of 40%, 75 % and 100% of the goal to maintain progress.

The estimated cost of this management approach in Connecticut is expected to cost over \$971,000,000 over the next 15 years for construction of treatment at all of its municipal wastewater treatment facilities..

## **II. Nitrogen Credit Trading - for Connecticut**

The CCMP also allows for the consideration of a nitrogen credit trading program as an alternative to the current management plan described. The Connecticut Department of Environmental Protection has supported the use of this demonstration project as the vehicle to develop a watershed-based trading program for the nitrogen sources within the Connecticut portion of the basin by their active participation in the study.

### A. Baseline Conditions

The conditions of the development of the trading program are that it has to (1) achieve the same 58.5 % reduction from the 1990 base load within 15 years, (2) achieve the same resultant improvements in the dissolved oxygen in the Sound, (3) accomplish the program through point source reductions with, (4) minimal reliance on NPS reductions but accommodate NPS trading, (5) utilize the Clean Water Fund (CWF) as the mechanism to finance the construction of municipal nitrogen reductions, (6) achieve the 40%, 75% and 100% five year targets and, (7) the WLA limits will be enforceable and the final discharge limit.

### B. Trading - General

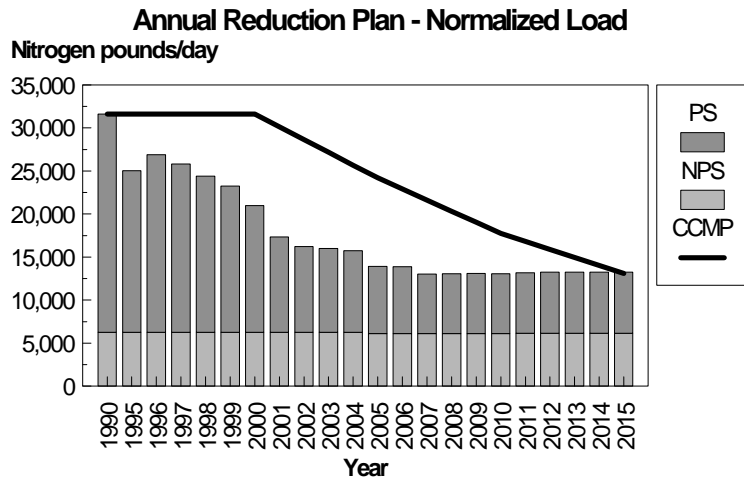
Nitrogen credits are established by reducing discharge levels below the required limit, or Aover controlling@. Credits, measured in pounds per day, are determined by the difference between the discharge limit and the actual discharge over a set period. Trading is the exchange or sale of credits between sources or between a source and a Abank@. A source which does not meet its discharge limit will be allowed to purchase credits in the amount necessary to meet the limit in lieu of constructing facilities.

### C. Annual Limits - Watershed Permit

To establish the basis for trading a cap on the amount of nitrogen discharged must be established. Under the LIS program a A~~no~~ net increase@ in nitrogen was adopted in 1990 fixing the discharge levels at that amount. The 1990 nitrogen level becomes the first cap. The 58.5% reduction reflected in the TMDL and WLA@s becomes the final cap in 2015. Annual reduction limits will be established through the issuance of a AWatershed Permit@ to the state under the NPDES program and general permit authority of the State. The permit will include all 84 municipal point sources and 2 industrial sources as sub-discharges. The permit will establish the total nitrogen limits to the Sound and will be reduced each year from 2000 through 2015 until the state reduction goal is achieved. The individual point sources (sub-discharges) in the permit will be reduced by their proportional share of the annual percentage reduction. The permit will include only nitrogen limits and related monitoring and reporting requirements, all other discharge requirements will remain in the sources NPDES permit.

The graph, *Nitrogen Credit Trading Reduction Plan - Normalized*, shows the levels of nitrogen reduction from 1990 through 1998 in CT Anormalized@ to an equivalent loading based on Management Zone 6 as unity, and the levels anticipated through 2002 based on current facility construction. From 2002 through 2007 it shows the anticipated reduction levels based on the completion of construction of the most cost effective treatment facilities at anticipated CWF financing availability. No reduction in NPS is included.

## Nitrogen Credit Trading Reduction Plan - Normalized



The Watershed permit annual limits will be based on this resultant nitrogen loading following facility construction. Although following the curve of the reduction levels will produce equivalency in the amount of credits created versus those needed, some adjustment between this curve and the CCMP reduction line shown on the graph will most likely be adopted. The watershed permit will be reissued every two years to incorporate changes in CWF financing and actual reduction levels achieved. All credit creation or need will be determined by the difference in the sources' annual reduction limit and the sources' average annual actual discharge in lbs/day of nitrogen.

### D. Trading - Annual Trading Requirements

Trading occurs annually to meet the annual reduction in discharge limits of the Watershed Permit. Credits may be sold or purchased from the bank, the Nitrogen Credit Exchange (NCE) or between sources. Long term contracts for the sale or purchase may be made and the NCE will offer to buy any credits produced and may sell credits held and may accrue a deficit of Aequivalent@credits to meet transaction commitments. Aequivalent@credits are created out of the 20% grant portion of the CWF financing which will be retained by the NCE. Trading transactions are enforceable contract agreements. Trades will occur on July 1 of each year based on the previous year ending December 31 following an audit of the nitrogen discharged. All trades will be based on the attenuation and equivalency values as determined by their locations and will have a one year life.

#### E. The Clean Water Fund and the Bank.

The CT DEP will fund the most cost effective (lowest cost per pound) construction of nitrogen treatment facilities in priority process utilizing the current CWF financing procedures. The Clean Water Fund provides full financing of all wastewater facility construction through a 20% grant and a loan for the 80 % balance at 2% interest over twenty years. The state utilizes general obligation bonds to fund the grant portion and revenue bonds for the loans. The credits created as a result of the 20% grant will be assigned as equivalent A credits to the NCE and not retained by the municipality. The Watershed permits annual reduction limits will be based on the anticipated completion of projects financed. The NCE may buy or sell credits based on the estimated average costs of credits in the year. It serves as party to all trades and will assure audit compliance. It will be an office in the DEP reporting to an independent appointed board.

#### F. Enforcement

Any source not meeting its annual limit or not purchasing an appropriate amount of credits will be required to purchase the balance and pay a surcharge to the NCE by the enforcement protocols of the watershed permit. Other penalties for noncompliance are also imposed through the permit, and contract agreements. Anti-backsliding provisions of the Clean Water Act will not be invoked against discharger which alters performance within the annual discharge limit. *Trading will not be allowed to meet any local river or harbor water quality requirements or nitrogen limits.* Sources may sell credits produced if as a result of attempting to meet a local water quality limit the nitrogen discharge level is below the annual limit for the LIS watershed permit.

#### G. New sources and growth.

New point source will be required to install the maximum level of technology for nitrogen removal and the 1990 base level will equal zero, requiring the purchase of credits to offset any remaining nitrogen. Credits or additional treatment must be provided to offset growth and increases in flow.

#### H. Non-Point Sources.

Credit sales from non-point source reductions are allowed if measurable on an annual basis, monitored, substantiated, and a responsible entity is accountable. A permit or other enforceable authorization specifying the nitrogen limit is required. The total NPS baseline is the 1990 load as calculated in the LIS 3.0 model and shown above. The number of credits created by NPS is equal to the difference between the estimated baseline for the area and the current estimated discharge reduction. The reduction must be continuous. An equivalency factor may be adopted to establish a weight of the credit against a point source credit if the above criteria cannot be met.

## J. Financial Impacts

The construction costs for nitrogen removal were developed for each of the 84 treatment facilities based on achieving an effluent level of 8 mg/l total nitrogen (referred to the low level reduction) and the cost to achieve 4 mg/l total nitrogen (referred to as high level reduction) for the same facilities. The total of these two capital costs is the \$971 million. Both levels of treatment at all facilities would be required to meet the current CCMP basin reduction requirements.

The cost of the removal of a an equivalent pound of nitrogen per day at each treatment facility or the cost of a *credit*. This cost, ranges from \$1.56 per pound in the first year to \$29.84 per pound at the point when the nitrogen reduction goal of 58.5% total reduction to the Sound is achieved. Funding projects in this manner results in 65 less projects being constructed (mostly high level reduction additions, but low level as well in the far reaches of the Basin) and at a total savings over \$200 million. The financial model continues to evaluate the earnings of the potential sellers and the costs to the buyers of the credits. The cost to the buyers can be compared to the annual avoided capital and operation costs realized by the purchase of credits.

This analysis has shown that a nitrogen credit trading program linked to the state Clean Water Fund financing program for municipal wastewater facilities, utilizing a watershed permit to require annual nitrogen reductions at all sources can produce a significant savings in the cost of nitrogen reduction for Long Island Sound and the cost to the municipal sources. Further it can achieve the reduction in less than fifteen years and each source will only be responsible for it equivalent loading to LIS and no more. Additionally, as the point source load is reduced in the later years the NPS contribution rises from 20 % to 50% of the total load, possibly making NPS reductions cost effective in light of maintaining the nitrogen level and avoid additional capital investments in treatment facilities.

