Table 1
SUMMARY OF FY2001 LISS FUNDING, CWA §119

LISS Budget Category	Task	Products/Services	Organization	2001 Final	Required Match
Coordination and Reporting of Environmental Actions/Results	LIS Office Administrative Support	SEEP support; phone; printing; photocopying; mail; supplies and materials	EPA LISO	$65,000	$0
	State Coordination/ Technical Assistance	Assist in all aspects of program development and support	NYSDEC	$105,629	$105,629
			CTDEP	$54,614	$54,614
	PI&E Coordination	LISS Public Outreach Coordinator	NEIWPCC	$75,058	$3,950
	Travel Support	Travel for CAC/TAC	NEIWPCC	$10,000	$10,000
			COORDINATION SUBTOTAL	**$310,301**	**$174,193**
Public Information and Education	Education Program	Newsletters, small grant/LISS fact sheets, presentations, press releases	NY Sea Grant	$118,527	$6,238
		LISS fact sheets, presentations, press releases/events, conferences,	CTDEP	$88,031	$4,633
		NEP Education Program Support	TBD	$10,000	$0
		LIS Economic Study	TBD	$67,000	$0
		Plants & Animals of LIS Reprint	CT Sea Grant	$20,000	$1,053
	Small Grants Program	Local public education and involvement projects	NY Sea Grant	$70,000	$3,684
	PI&E Program Support	Sound Health 2001 reprint/postage	LISO	$10,000	$0
		LISS Website enhancements	LISO	$5,000	$0
		LISS Public outreach products/projects	NEIWPCC	$49,712	$2,616
			COMMUNICATIONS SUBTOTAL	**$438,270**	**$18,225**
Monitoring, Modeling and Research	Monitoring	Field Surveys of LIS/phytoplankton	CTDEP	$354,576	$354,576
		SWEM	TBD	$80,000	$80,000
		MYSOUND	UCONN	$120,000	$120,000
		LIS Monitoring Conference	TBD	$10,000	$10,000
	Modeling	NE SPARROW model	USGS	$20,000	$0
	CCMP Research Priorities	LIS Research Grant Program	TBD	$350,000	$350,000
			MONITORING, MODELING & RESEARCH SUBTOTAL	**$934,576**	**$914,576**
CCMP Implementation Support & Technical Assistance	Habitat Restoration	Prioritized list of habitat restoration sites and implementation.	CTDEP	$74,888	$74,888
			NYSDEC	$103,585	$103,585
	Mapping	Eelgrass Mapping	CTDEP	$56,000	$56,000
	LIS Reserve	LIS Reserve Coordination	NAS-NYS	$20,000	$20,000
		LIS Reserve Ecological Component	USFWS	$32,380	$0

Table 1
SUMMARY OF FY2001 LISS FUNDING, CWA §119

		Ecological Component Support	NYSDEC	$10,000	$10,000
		Ecological Component Support	CTDEP	$10,000	$10,000
	Technical Assistance	Habitat Technical Documents	TBD	$20,000	$0
		LIS Watershed Collaboration	NRCS CT	$40,000	$0
		NY NEMO	NY Sea Grant	$75,000	$3,947
	CCMP Implementation Projects	Assistance to Distressed CT Towns	CTDEP	$1,580,000	$1,580,000
		CCMP Implementation Projects	NYSDEC	$1,580,000	$1,580,000
		Other Projects	TBD	$34,700	$0
		IMPLEMENTATION SUPPORT SUBTOTAL		**$3,636,553**	**$3,438,420**
		TOTAL		**$5,319,700**	**$4,545,415**

Table 2
Summary of 2001 LISS Funding by Organization

ORGANIZATION	2001 Final Budget	2001 Required Match
EPA LISO	**$65,000**	**$0**
NYSDEC	**$1,799,214**	**$1,799,214**
CTDEP	**$2,218,109**	**$2,134,711**
NEIWPCC	**$134,770**	**$16,567**
USFWS	**$32,380**	**$0**
NAS/NYS	**$20,000**	**$20,000**
NRCS CT	**$40,000**	**$0**
NY NEMO	**$75,000**	**$3,947**
NYSEA	**$188,527**	**$9,922**
USGS-CT	**$20,000**	**$0**
UCONN	**$120,000**	**$120,000**
CTSEA	**$20,000**	**$1,053**
LIS RESEARCH	**$350,000**	**$350,000**
LIS Miscellaneous/TBD	**$236,700**	**$90,000**
TOTAL	**$5,319,700**	**$4,545,415**

LONG ISLAND SOUND STUDY

A Partnership to Restore and Protect the Sound

1999 CCMP IMPLEMENTATION TRACKING REPORT

January-December 1999

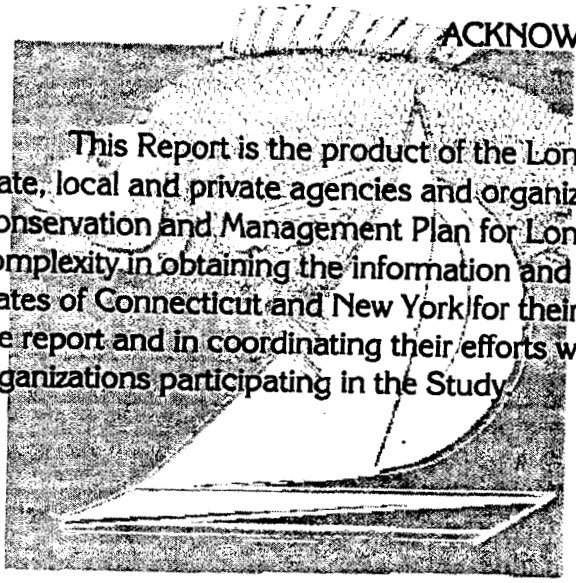
The Comprehensive Conservation and Management Plan

May 2000

THE LONG ISLAND SOUND STUDY

ACKNOWLEDGMENTS

This Report is the product of the Long Island Sound Study partnership of Federal, state, local and private agencies and organizations. The diversity of the Comprehensive Conservation and Management Plan for Long Island Sound increases the difficulty and complexity in obtaining the information and data for this report. We wish to thank the states of Connecticut and New York for their invaluable assistance in compiling the data for the report and in coordinating their efforts with the many other state and local agencies and organizations participating in the Study.



LONG ISLAND SOUND STUDY

Index

Foreword

This 1999 report documents the fifth year of implementation of the *Long Island Sound Study (LISS) Comprehensive Conservation and Management Plan (CCMP)* for Long Island Sound (LIS). This Report summarizes the continuing work of the LISS *Management Conference* partners in carrying out the 232 commitments and recommendations in the CCMP.

The LISS Management Conference is sponsored by the U.S. Environmental Protection Agency (EPA), the New York State Department of Environmental Conservation (NYSDEC), and the state of Connecticut Department of Environmental Protection (CTDEP). Additional partners include the:

- Interstate Sanitation Commission (ISC);
- U.S. National Oceanic and Atmospheric Administration (NOAA) National Marine Fisheries Service (NMFS);
- New York City Department of Environmental Protection (NYCDEP);
- U.S. Department of Agriculture Natural Resource Conservation Service (NRCS);
- New York State Department of State;
- LISS Technical Advisory Committee (TAC); and the
- LISS Citizens Advisory Committee (CAC).

Many other federal, state, municipal academic, and local public and private organizations contribute to implementation of the CCMP. Among these are the:

U.S. Army Corps of Engineers (ACOE);

U.S. Department of the Interior's Fish and Wildlife Service (USFWS) and Geological Survey (USGS);

U.S. Department of Agriculture's Cooperative Extension Service;

Connecticut Department of Agriculture Bureau of Aquaculture (CTDOA/BA);

New York State and State of Connecticut Departments of Health;

New York and Connecticut Sea Grant programs;

New England Interstate Water Pollution Control Commission;

University of Connecticut (UConn) campuses; and

State University of New York (SUNY) campuses.

Together, these Federal, state, local, academic, and citizen partners combine their efforts to achieve the common CCMP vision for the long-term health, restoration, and economic well-being of Long Island Sound, its watersheds and tributaries, and living marine and marine-dependent resources.

Executive Summary

Summary of 1999 CCMP Accomplishments

The most significant CCMP implementation accomplishment in 1999 was the development of a draft Total Maximum Daily Load (TMDL) for nitrogen in Long Island Sound. In November 1999 the states of New York and Connecticut released the draft TMDL for public comment, and extended the comment deadline into early 2000. The states and EPA are continuing work to finalize and issue the TMDL in 2000.

Interim to the final TMDL, both states have continued their commitment to reduce nitrogen loads from sewage treatment plants (STPs), and the loading trend from these point sources continues downward.

Nitrogen Loading Down

In 1999 the total point source nitrogen load to the Sound was estimated at 151,245 lbs/day, a decrease of nearly 36,000 lbs/day from 1990 levels, and nearly 10,000 lbs/day less than 1998. New York loadings totalled 105,759 lbs/day; Connecticut loads totalled 45,486 lbs/day.

Hypoxia Monitoring Continued

As LIS nitrogen loads continued to decrease in 1999, the primary indicator of excessive nitrogen, low (<3mg/l) dissolved oxygen (DO) lessened in the Sound in 1999. The maximum area of low DO in LIS was estimated at 314 square kilometers (km^2)(121mi^2), with an overall duration of 50 days. This was less than the 1998 levels of 436 km^2 (167 mi^2) and 73 days, and less than the 10 year averages of 470 km^2 (181 mi^2) and 57 days.

Progress on Habitat Goals

The States of Connecticut and New York made good overall progress toward the LISS goal of restoring 2000 acres of tidal wetlands and 100 miles of river corridors for anadromous fish access within 10 years. To date, Connecticut has restored 68 acres of tidal wetland habitat, treated or retreated many acres of phragmites-infested habitat, and restored 22.5 miles of river corridor to anadromous fish access. The state of New York Department of Environmental Conservation awarded over $2.5 million in 1999 Bond Act funds to communities on Long Island and in Bronx and Westchester counties for 9 projects to restore over 85 acres of aquatic habitat.

The LISS selected 373 sites for restoration, 228 in Connecticut, and 145 in New York, from the 450 sites nominated in both states. A total of 111 sites in both states have been designated as high-priority sites.

Addressing Toxic Contamination, Pathogens and Floatable Debris

Communities on and around the Sound are continuing to adopt watershed management-based approaches to controlling sources of pollution to the Sound, including point and nonpoint sources, CSOs, and land use practices. Many communities have formed watershed management committees or groups that cross local, municipal, or even state jurisdictions, to work together in addressing environmental management problems that have no boundaries.

New LIS Research Fund

The Management Committee established a new research program fund in 1999. The committee approved an initial $100,000 for the fund from the LISS Federal appropriation. In addition, the New York and Connecticut Sea Grant programs contributed an additional $25,000 each for a total 1999 fund of $150,000. The LISS issued a Request for Proposals in November 1999 that netted 30 proposals totalling over $3,000,000 in funding. Research projects will be selected after peer review in early 2000.

Reaching and Educating the Public

The LISS outreach and education programs continued to conduct many meetings, conferences and workshops attended by hundreds of public officials and concerned citizens.

The Citizens Advisory Committee (CAC) met in March, June, September, and December in 1999, and developed key recommendations to the Policy Committee, especially endorsing the creation of a Long Island Sound Reserve system, as called for in the CCMP. The CAC supported increased Federal funding to match the significant state financial commitments to the Sound, and provided comments on the draft TMDL for the public record.

At the initiative of the CAC, the LISS produced and distributed 5,000 copies of a series of four nonpoint source management posters that use humor to persuade people to take personal action to pick up after their pets, repair automobile oil leaks, reduce use of home fertilizers, an use conservation techniques when washing the car.

The LISS produced and distributed many thousands of copies of its quarterly LIS newsletter, *UPDATE*, as well as fact sheets, publications, and brochures covering timely and critical LIS topics. Many of these documents were posted on the LISS web page: http://www.epa.gov/region01/eco/lis. The LISS webpage continued to be the most visited page on the EPA New England Region website, with over 35,000 hits in 1999, or nearly 3,000 per month.

LISS staff continued to provide LIS displays at annual public events, such as Earth Day and LIS Days in Connecticut and New York; the Norwalk Oyster Festival, New Haven County Conservation Fair; address scores of teachers, educators, school children, groups and classes; and issue press releases, make public service announcements, and give radio and press interviews on LIS issues.

About the 1999 Report

UNDERSTANDING THIS REPORT

As in 1998, this *1999 CCMP Implementation Tracking Report* is organized into seven sections, each corresponding to the seven priority management areas identified in the CCMP:

1) Continuing the Management Conference;
2) Hypoxia;
3) Pathogen Contamination;
4) Toxic Substances;
5) Floatable Debris;
6) Management and Conservation of Living Resources and Their Habitats; and
7) Public Involvement and Education.

Each of these sections contains a brief narrative that highlights accomplishments of the Management Conference in that area in 1999.

The charts following each narrative section in this report correspond to the appropriate table in the CCMP for each priority area. For tracking purposes, numbers have been assigned to each original CCMP action, e.g., H1-5 for Hypoxia, priority problem area number 1, action number 5, "Conduct feasibility studies and pilot demonstrations for nitrogen removal at 13 of 14 NYC STPs..."

The charts contain self-explanatory information on each of 232 action items identified in the CCMP, such as:

- *Responsible Parties*;
- *Status*;
- *Description*; and
- *Upcoming Action*

The charts distinguish actions under each of the seven priority areas as either:

Ongoing Programs or
CCMP Actions.

Ongoing Programs support CCMP commitments through the continuing environmental programs of the Management Conference, such as state permitting, enforcement, or monitoring programs.

CCMP Actions are specific activities described in the CCMP that directly implement the LISS, and are further identified by *Type* as:

- *Commitment*; or
- *Recommendation*.

Commitments are programs for which the CCMP identified existing funding sources;

Recommendations are programs for which no existing funding streams had been identified.

Estimated Cost is provided if the 1994 CCMP established projected funding for the proposed action item.

CCMP Actions with target dates are designated as:

- Complete;
- Ahead of Schedule;
- On Schedule;
- Behind Schedule;
- Partially Addressed;
- Not Initiated.

For the convenience of the reader, *CCMP Actions* that have been *Completed* are "greyed out" in the report.

Status for *Ongoing Programs* or continuing *CCMP Actions* is designated as:

- Fully Met;
- Substantive Progress;
- Partial Progress;
- Discontinued.

An Annual Snapshot of Progress

Because of the inherent long-term nature of initiating and assessing the results of environmental restoration and improvement efforts, this report should be viewed as a one-year snapshot of accomplishments against the 232 actions identified in the CCMP. This report is not an expression of environmental results.

Environmental Indicators

The LISS is continuing to develop a basic set of environmental indicators for Long Island Sound, with an ultimate goal of linking progress on the CCMP to actual environmental improvements in the Long Island Sound ecosystem. In this way, environmental results may be used in the future to assess the effectiveness of CCMP actions, and the Management Conference will be in a better position to consider and adjust CCMP plans, actions, and resources according to the environmental results desired or achieved.

The Management Conference partners plan to issue the first Long Island Sound environmental indicators report in 2000.

Implementing the Plan – 1999

Of the 232 action items identified in the CCMP, 28 percent (65) are being carried out by the Management Conference partners as part of their ongoing federal, state, or local environmental management programs. Substantive progress has been reported on the majority of *Ongoing Programs*.

The remaining 167 *CCMP Actions* represent 72 percent of the CCMP. Of these in 1999, 33 are reported as *Complete*; 38 are reported as *Substantive Progress/Fully Met*; 59 are reported as *Partial Progress/Behind Schedule*; and 34 are reported as *Not Initiated*. Three actions have been *Discontinued*.

Continuing the Management Conference

Carrying out the CCMP is the combined responsibility of the Management Conference partners. Through their ongoing programs and operations, and through Federal, state, local, and private LIS funding initiatives and activities, CCMP priorities are assessed and implemented.

Strategy:

The essential element of the CCMP implementation strategy was to continue the Management Conference partnership in carrying out the CCMP. There are 13 actions identified in the CCMP to address this strategy, many of which have been accomplished, and which were key to the viability of the LISS partnership. Federal legislation in 1990 created the EPA Long Island Sound Office to bridge the bi-state, multi-agency and public/private stakeholder efforts to restore and protect the Sound. The Long Island Sound Agreement, signed by the Governors of New York and Connecticut and the EPA Administrator in 1994, and updated in 1996, formally committed the agency and the states to the Management Conference as a primary means of coordinating CCMP work to restore and protect LIS. The Clean Water Act was amended in 1996 to extend the Management Conference and authorize continued federal funding.

Highlights:

- The New York and Connecticut Sea Grant Program Directors were added as full members of the Management Committee in 1999. This action enhances the capability of the LISS to communicate and address issues of concern to LIS stakeholders.
- The Citizens Advisory Committee provided comments for the public record concerning the draft nitrogen TMDL that was released for public comment in 1999. The CAC also strongly supported the creation of a Long Island Sound Reserve in testimony before Congress in October 1999.
- The Management Committee met quarterly in January, April, July, and October 1999. Management Committee meetings follow the quarterly CAC meetings, which enables committee members to more quickly consider and respond to issues identified by the CAC.
- The Management Committee continued to explore methods to increase local and municipal participation in the work of the Conference in 1999. The Committee approved funds in 1999 to conduct a second municipal conference to be co-hosted by the City of Stamford and the town of Glen Cove, Long Island in June 2000.

SUMMARY OF MANAGEMENT ACTIONS: CONTINUING THE MANAGEMENT CONFERENCE

1. SUPPORTING IMPLEMENTATION (CCMP TABLE 50, P. 141)

CCMP Action	Type[1]	Responsible Parties	When	Estimated Cost	Status[2]	Description	Upcoming Action
M1-1. Formally extend the Management Conference for a minimum of five years to continue coordination and oversee implementation of the management plan. The Citizens Advisory Committee will remain part of the Management Conference structure.	**C**	**EPA Administrator**	**Initiated upon approval of the plan. Completion date July 1, 1994.**	**Redirection of base program**	**Complete**	**The 1994 Long Island Sound Agreement committed the EPA and states to continue the Management Conference. §119 of the CWA was modified in 1996 to extend the Management Conference and authorize continued funding.**	
M1-2. Continue and expand the role of the EPA Long Island Sound Office, consistent with the requirements of the LIS Improvement Act of 1990. Funding is available in FY 1994, but will be required in future years.	**C**	**EPA Regions I and II**	**Ongoing. The office has facilities in Stamford, CT and Stony Brook, NY**	**Operational costs approximately $175,000 per year**	Fully Met	EPA continued to provide support for Long Island Sound Office under §119 and §320 of the CWA Act. In 1999, the EPA Administrator has proposed funding for the Long Island Sound Office as part of EPA's FY2001 budget.	
M1-3. Continue state program coordination and involvement in the Management Conference. Funding is available in FY 1994, but will be required in future years.	**C**	**EPA-LIS Office**	**Ongoing, starting in FY 1994.**	**$150,000 per year**	Fully Met	The Management Conference provided funding for state coordination efforts through FY 1999.	
M1-4. Maintain public involvement and education efforts with an added focus on local government involvement. Funding is available in FY 1994, but will be required in future years.	**C**	**EPA-LIS Office**	**Ongoing, starting in FY 1994**	**$150,000 per year**	Fully Met	The LISS has continued support for its public outreach and education program. See the *Public Involvement and Education* section for details.	
M1-5. Establish delegation of authority to allow the EPA Long Island Sound Office to support projects of studies as authorized by the Long Island Sound Improvement Act.	**C**	**EPA-Headquarters**	**Upon approval of the plan**	**Redirection of base program**	**Complete**	**Delegation of Authority No. 2-94 was authorized by the EPA Administrator November 1, 1994.**	
M1-6. Advocate modification to Clean Water Act § 320(g)(2) to allow the EPA to provide base funding through cooperative agreements to National Estuary Programs that complete their management plans.	**C**	**CTDEP, NYSDEC**	**Ongoing**	**Redirection of base program**	**Complete**	**EPA has provided post-CCMP funds to the Management Conference under CWA§320. Legislation passed in 1996 allows EPA to fund the Management Conference's implementation of the CCMP with federal funds.**	

Y

Type: Commitment; Recommendation

2) Status for dated actions: Complete, Ahead of Schedule, On Schedule, Behind Schedule, Partially Addressed, Not Initiated
Status for ongoing programs and ongoing CCMP actions: Fully Met, Substantive Progress, Partial Progress, Discontinued

1. SUPPORTING IMPLEMENTATION (CCMP TABLE 50, P. 141)

CCMP Action	Type[1]	Responsible Parties	When	Estimated Cost	Status[2]	Description	Upcoming Action
M1-7. Develop a coordinated monitoring plan to assess the effectiveness of implementation, considering innovative approaches and building upon existing programs.	C	LISS	Completed in early 1994	$25,000	Complete	**A LISS monitoring workshop was held in 1993. The workshop integrated findings of the LISS to develop a comprehensive, Sounwide monitoring plan. Portions of the Monitoring Plan are being implemented. Ongoing coordination is facilitated by a monitoring workgroup.** **A LIS Marine Monitoring Network of several moored, continuous data stations was established in 1999 under EPA's EMPACT program.**	
M1-8. Coordinate data management efforts between Long Island Sound and New York-New Jersey Harbor Estuary Program (HEP), including support for a systemwide data manager.	C	LISS and HEP Management Conferences	Funded for 1994	$25,000 per year from each program	Partial Progress	Both the HEP and LISS funded efforts to identify and load priority datasets onto a common Internet access server. The focus of efforts is to make data easily accessible over the Internet.	
M1-9. Modify the current structure of the LISS as needed to oversee implementation of the plan.	C	LISS Management Conference	Completed by the end of 1994	Redirection of base program	Complete	**The Management Conference has been refocused. The Citizen Advisory Committee has been expanded, the Technical Advisory Committee reestablished, and implementation teams and work groups have continued.**	
M1-10. Ensure that the LISS is consistent with existing state coastal zone management (CZM) policies.	C	EPA	Concurrent with the submittal of the plan to the Governors of New York state and Connecticut	Redirection of base program	Complete	**The LISS CCMP was judged to be consistent with the state coastal zone management policies.**	
M1-11. Incorporate relevant elements of the plan into the state CZM program for federal consistency review.	C	CTDEP NYSDOS	Complete by the end of 1994	Redirection of base program	Substantive Progress	NYSDOS's LIS Coastal Management program to incorporate water and habitat quality concerns identified in the LISS CCMP. NYSDOS convened a LIS Coastal Advisory Commission in 1999 to advise the NY Secretary of State on program implementation. CTDEP considers the LISS CCMP in carrying out its CZM policies. The CCMP was incorporated in the Coastal Nonpoint Pollution Control Program in CT.	

[1] ype: Commitment; Recommendation

2) Status for dated actions: Complete, Ahead of Schedule, On Schedule, Behind Schedule, Partially Addressed, Not Initiated
Status for ongoing programs and ongoing CCMP actions: Fully Met, Substantive Progress, Partial Progress, Discontinued

1. SUPPORTING IMPLEMENTATION (CCMP TABLE 50, P. 141)

CCMP Action	Type[1]	Responsible Parties	When	Estimated Cost	Status[2]	Description	Upcoming Action
M1-12. Continue to support and enhance data management, analysis and reporting.	R	LISS Management Conference	Ongoing	$200,000 per year	Substantive Progress	Data analysis and reporting of hypoxia monitoring by CTDEP, ISC, and NYCDEP have been expanded in 1999. Each agency continued its monitoring activities and made available all data. In addition, a monitoring work group completed a 1998 *State of the Sound* report and finalized its 1999 report in early 2000. CTDEP is storing data in the *ACCESS* computer program. These stored data will also be loaded into *STORET*.	CTDEP and NYSDEC are planning to participate in EPA's Coastal 2000 Initiative for LIS.
M1-13. Prepare an annual progress report on implementation including recommendations to redirect efforts.	R	LISS Management Conference	Ongoing	$35,000 per issue; included under operational costs of LIS Office.	Fully Met	An annual 1998 CCMP Implementation Tracking Report was completed in May 1999. The LISS successfully completed EPA's Biennial Review process in 1999.	The 1999 report will be finalized by May 2000.

:Y
Type: Commitment; Recommendation

2) Status for dated actions: Complete, Ahead of Schedule, On Schedule, Behind Schedule, Partially Addressed, Not Initiated
Status for ongoing programs and ongoing CCMP actions: Fully Met, Substantive Progress, Partial Progress, Discontinued

Eliminating Adverse Impacts of Low Dissolved Oxygen in the Sound

The Long Island Sound Study identified low dissolved oxygen (hypoxia) as the most significant water quality problem in LIS. Since 1990, EPA and the States of Connecticut and New York have implemented a phased program that first capped, and will subsequently reduce, human-caused nitrogen loads to LIS over a 15-year period.

Strategy:

The CCMP identified a five part strategy to address the elimination of adverse impacts of low dissolved oxygen in the Sound: 1) reducing nitrogen from sewage treatment plants (STPs) and other point sources; 2) reducing nitrogen loads from nonpoint sources; 3) continuing management of hypoxia; 4) funding implementation of hypoxia management plans; and 5) monitoring and assessing hypoxia. There are 8 *Ongoing Programs* and 35 *CCMP Actions* to implement this strategy. In 1999, of the 35 *CCMP Actions*, 13 are reported *Complete*, 8 *Substantive Progress/Fully Met*, 10 *Partial Progress/Behind Schedule*, 3 *Not Initiated*, and 1 *Discontinued*.

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Highlights:

- The states of New York and Connecticut released a draft Total Maximum Daily Load (TMDL) for nitrogen to public comment in November 1999. The TMDL is consistent with the July 1998 *Phase III Actions for Hypoxia Management*, a bi-state agreement calling for a 58.5 percent reduction in human-caused (anthropogenic) nitrogen loads to the Sound over a 15 year period beginning in 1999.

  The agreement includes interim targets to achieve 40 percent of the goal in 5 years, and 75 percent of the goal in 10 years. This level of reduction is expected to reduce the maximum area of the Sound that is unhealthy for fish and shellfish by 75 percent, and the duration of unhealthy conditions in the Sound by 85 percent.

- The estimated nitrogen load from STPs in the LIS drainage basin that entered the LIS in 1999 is approximately 151,245 lbs/day, a decrease of nearly 36,000 lbs/day from 1990 levels, and nearly 10,000 lbs/day less than 1998.

- New York's 1999 point source nitrogen loading was 105,759 lbs/day, compared with 110,595 lbs/day in 1998. Connecticut's point source nitrogen loading was 45,486 lbs/day in 1999 compared with 49,846 lbs/day in 1998. Figure 1 shows point source nitrogen load trends in New York and Connecticut since 1990.

- In 1999, the maximum area and duration of dissolved oxygen (DO) levels less then 3 mg/l in LIS was 314 km^2 (121 mi^2)and 50 days. This was less than the 1998 levels of 436 km^2 (168 mi^2)and 73 days, and below the 10 year average of 470km^2 (181 mi^2) and 57 days. Figure 2 shows the timing and duration of hypoxia in LIS since 1987; Figure 3 shows the maximum area of hypoxia in LIS since 1990; Figure 4 shows the percent of the total area of LIS hypoxic conditions from 1990.

- Both states continued to prioritize funding for nonpoint source pollution control projects benefitting the Sound.

- The Norwalk River Watershed Advisory Committee met monthly in 1999 to guide implementation of the Plan.

- The lawsuit initiated in 1998 by NYSDEC against New York City for violations at its sewage treatment facilities has been resolved. Under the resolution, New York City will pay $1.5 million ($50K penalty to NYS and $1 million into a trust account to be established by the Hudson River Foundation) and will undertake plant and sewer system upgrades.

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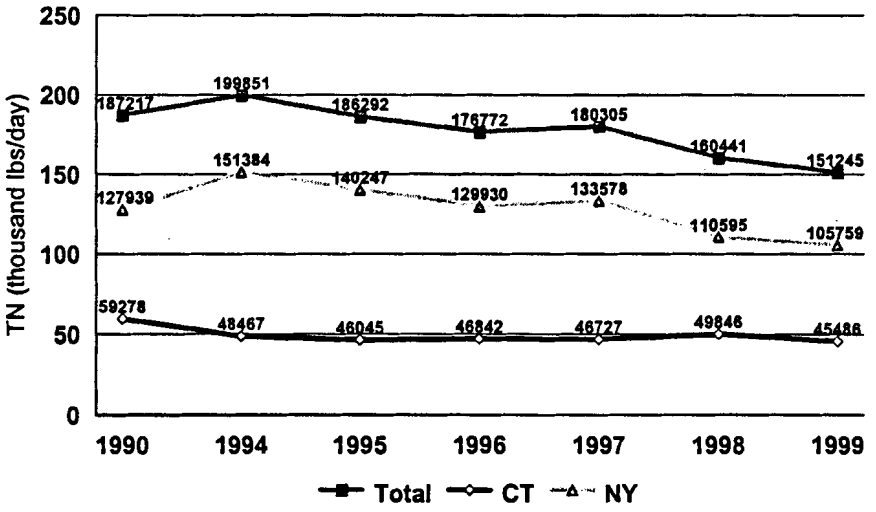
Point Source Nitrogen Load to Long Island Sound



These estimates include 98 municipal, 4 state, 3 private, and 4 industrial discharges = 109

Figure 1

Timing and Duration of Hypoxia in Long Island Sound

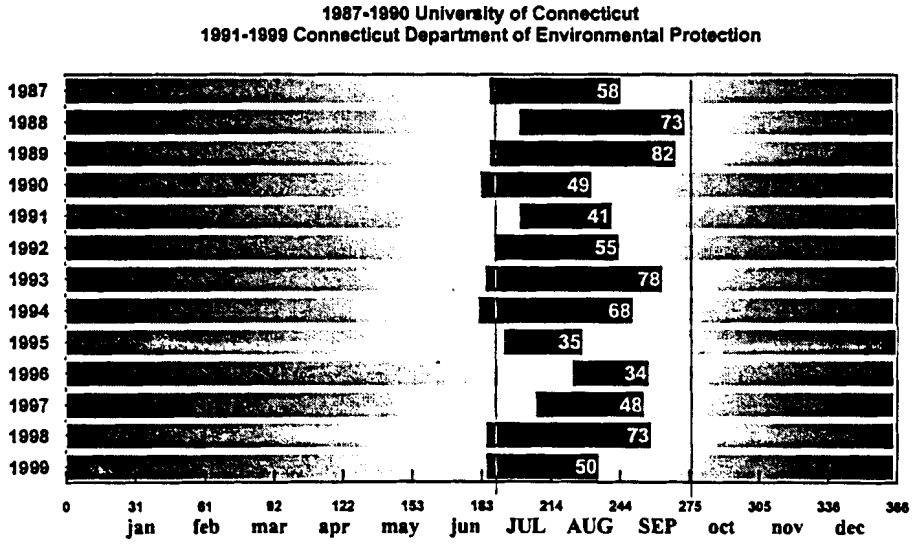


Figure 2

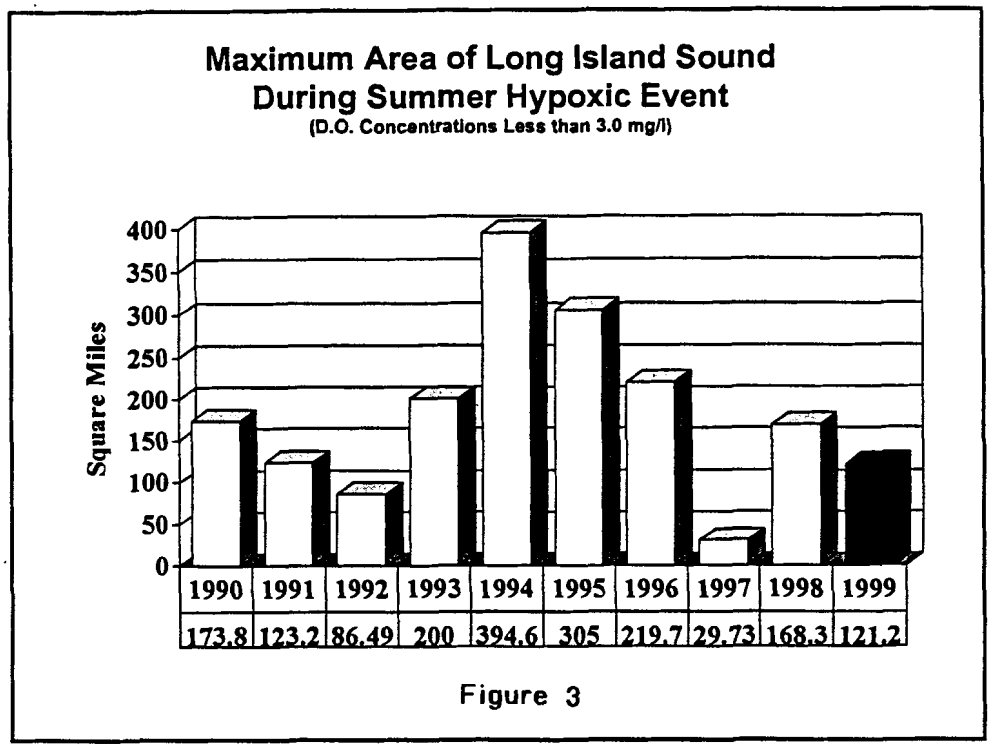


Figure 3

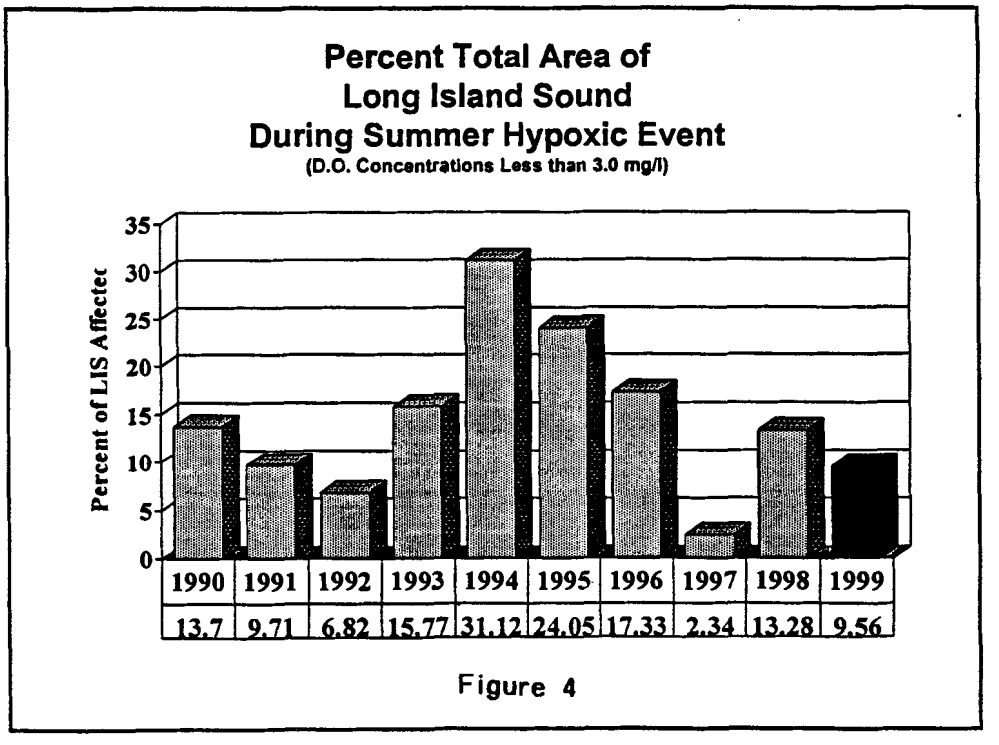


Figure 4

SUMMARY OF MANAGEMENT ACTIONS: HYPOXIA

1. REDUCING NITROGEN FROM SEWAGE TREATMENT PLANTS AND OTHER POINT SOURCES (CCMP TABLE 4, P. 32)

Ongoing Programs	Responsible Parties	Status[2]	Description	Upcoming Action
H1-1. The states of New York and Connecticut will continue their point and non-point source permitting and enforcement programs as a primary mechanism of pollutant load reduction. Fundamental to the direction of these programs are the states' water quality standards and classifications that provide the basis for management policies and decisions.	**CTDEP NYSDEC**	Substantive Progress	In Connecticut, CTDEP has used this authority to implement nitrogen retrofits at sewage treatment plants, encourage full upgrades for nitrogen removal at plants scheduled for reconstruction and reduce nitrogen loads at major industries. In New York, NYSDEC issued permits with nitrogen limits requiring compliance with 1990 "no-net-increase" load limits. Limits for the NYC STPs went into full effect on January 1, 1997. NYSDEC filed suit against NYCDEP in March 1998 for not meeting these limits. In June 1999, the suit was resolved. Through implementation of the NYCDEP nitrogen control program, the four Upper East River WPCPs are now operating well below the aggregate SPDES effluent limits for total nitrogen.	New denitrifying facilities are planned for Branford (2001), Fairfield (2001) and upgrade to the Stamford facility (2001). Nitrogen permit and trading programs are under development in Connecticut.
H1-2. The state of New York will ensure compliance with the consent order to upgrade the Newtown Creek plant to provide secondary treatment with biological nutrient removal retrofit modifications.	**NYSDEC NYCDEP**	Substantive Progress	A two track facility plan for upgrading Newtown has been approved by NYSDEC. The plan is to provide 50% influent nitrogen removal either through step denitrification or through the use of biofilters. Estimated project cost is $2 B, with construction to be completed by 2010. A $12 million biofilter evaluation (4 mgd capacity) began operation in December 1996. In 1997, the biofilter was evaluated and final design for Phase I common elements was completed. NYCDEP has submitted a track III facility plan (cost $1.3 B) which would achieve secondary treatment at Newtown Creek and the NYCDEP would remove additional nitrogen at the four Upper East River plants to meet the original intent of the Newtown Creek consent order. The NYSDEC is currently reviewing the track III proposal. Upgrading and expansion construction is continuing with Phase VI.	New additions planned for the facility include a new wing to the main building, a support and disinfection building, sludge handling facilities, a sludge force main/docking facility and aeration upgrades.
H1-3. The state of Connecticut will freeze nitrogen discharges and, if appropriate, explore opportunities to reduce nitrogen discharges at three industrial facilities with significant nitrogen discharges.	**CTDEP**	Fully Met	*Upjohn* has discontinued production, is no longer treating process water, and is currently conducting ground water remediation *Pfizer's* treatment facility has been in operation over 2 years and a manufacturing process has been discontinued which formerly had generated high nutrient waste. *Pfizer's* waste water nutrient loads are less than 25% of baseline. *Cytec* was issued a new permit (April 1998) which included language to conduct a scope of study to evaluate options for treatment of total nitrogen in its waste water. A report has been submitted to CTDEP. The Cytec permit expires 2003.	CTDEP will be reviewing the *Cytec* scope of study report.

Y: 1) Type: Commitment; Recommendation

2) Status for dated actions: Complete, Ahead of Schedule, On Schedule, Behind Schedule, Partially Addressed, Not Initiated
Status for *Ongoing Programs* and ongoing *CCMP Actions*: Fully Met, Substantive Progress, Partial Progress, Discontinued

1. REDUCING NITROGEN FROM SEWAGE TREATMENT PLANTS AND OTHER POINT SOURCES (CCMP TABLE 4, P. 32)

CCMP Action	Type[1]	Responsible Parties	When	Estimated Cost	Status[2]	Description	Upcoming Action
H1-4. The municipalities in the states of Connecticut and New York will implement biological nutrient removal retrofits to reduce the load of nitrogen to the Sound on an interim basis.	C	**CTDEP**	**By 1995**	**$18.1 M**	**Complete**	**CT State Clean Water Fund awarded $15 M to retrofit 11 southwestern Connecticut sewage treatment plants. All the projects have been completed and have resulted in achievement of the Phase II reduction goal of 850 tons per year.**	**Keep running the facilities as designed under the Phase II retrofit program.**
		NYSDEC	**1995 for 5 plants 1996 for 4 plants 2000 for centrate**	**$103.1 M**	Substantive Progress	NYCDEP presented a comprehensive progress report on its efforts at a December 1999 session. Biological Nutrient Reduction (BNR) retrofits at upper East River facilities resulted in attainment of permit limits by July 1998. The total point source nitrogen load to LIS in 1999 was 151,245 lbs/day, well-below the 1990 target of 187,217 lbs/day. In CT, the point source load to LIS was 45,486 lbs/day; in NY the point source load was 105,759 lbs/day. Three projects will be awarded approximately $38 M from NYS Bond Act funds in 2000. The County of Westchester Board of Legislators approved bonds to fulfill federal mandates and upgrade STPs. The STPs in Port Chester, Mamaroneck and New Rochelle will receive $2.6, $8, and $11.5 million dollars, respectively.	NYS Bond Act funds will continue to be awarded and more projects will be initiated.
H1-5. Conduct feasibility studies and pilot demonstrations for nitrogen removal at 13 of its [NYC] 14 sewage treatment plants, with actual design for Newtown Creek.	C	**NYCDEP**	**1994-1998**	**$5 M**	**Complete**	**NYCDEP completed a Nitrogen Control Feasibility Plan in December 1998 to identify the feasibility of removing nitrogen from each of its 14 STPs.**	**NYCDEP will continue conducting pilot work to test new processes and technologies.**
H1-6. Westchester County will investigate sludge rehandling at their four facilities to determine if opportunities exist for nitrogen load reduction.	C	**Westchester County**	**1993-1994**	**$500,000**	Substantive Progress	Westchester County will hire a contractor to haul away liquid sludge from its STP in Port CHester. The new contract means that trucks will haul the sludge produced at the Blind Brook and Port Chester plants, which is now burned in Port Chester, to a facility in New Jersey and turn it into a product that could be used either in landfills or for open space reclamation in Pennsylvania. This is expected to reduce the amount of nitrogen that the county dumps into Long Island Sound from Port Chester by 3 percent.	Westchester Count will begin phasing out the use of incinerators at the Port Chester STP by May 1, 2000.

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Status for *Ongoing Programs* and ongoing *CCMP Actions*: Fully Met, Substantive Progress, Partial Progress, Discontinued

1. REDUCING NITROGEN FROM SEWAGE TREATMENT PLANTS AND OTHER POINT SOURCES (CCMP TABLE 4, P. 32)

CCMP Action	Type[1]	Responsible Parties	When	Estimated Cost	Status[2]	Description	Upcoming Action
H1-7. The state of New York will continue to seek to reach agreement with Belgrave, Great Neck East Shore, Huntington, Oyster Bay, Port Washington, and Kings Park on permit modifications for implementing the *no net increase* in nitrogen policy.	**C**	**NYSDEC**	**1994**	**Redirection of base program**	**Complete**	**Agreement was reached in August 1994 on an aggregate limit to freeze the loads at 1990 levels.**	**None**

2. REDUCING NITROGEN LOADS FROM NON-POINT SOURCES (CCMP TABLE 5, P.34)

Ongoing Program	Responsible Parties	Status[2]	Description	Upcoming Action
H2-1. The states of Connecticut and New York will continue to use their existing authority to manage non-point source pollution and appropriate federal grants such as CWA§ 319, 304(b), and 104(b) to carry out projects that will help prevent increases and, to the extent practicable, achieve reductions in the non-point source loads from high priority drainage identified in the CT and NY portions of the watershed.	**CTDEP NYSDEC EPA**	Partial Progress	CTDEP is working to implement broad non-point source controls that include nitrogen benefits. Currently, 92 active §319 projects are being implemented from FY94-2000 grants, a watershed model is being developed, and a watershed program has been implemented with early emphasis on the Quinnipiac River. Watershed initiatives are being conducted for the Norwalk and Quinnipiac rivers and Sasco Creek. 19 projects funded under 319 were closed out in 1999. NYSDEC has completed §319 funded projects in Conscience Bay (Town of Brookhaven) and Goose Creek (Town of Southhold), and is implementing projects in Centerport Harbor (Town of Huntington) and Dyke Road (Town of Brookhaven). In addition, a §604(b) funded project is being implemented in Oyster Bay.	CTDEP will expand its watershed program and complete the watershed model. NYSDEC is awaiting response from Town of Oyster Bay on project design.
H2-2. The states of CT and NY are developing their coastal non-point source control programs, as required by §6217 of the Coastal Zone Management Act.	**EPA NOAA CTDEP NYSDOS**	Substantive Progress	CTDEP has received conditional approval for its Coastal Non-point Pollution Control Plan (CNPCP). NYSDOS has completed its LIS Coastal Management program report. A LIS Coastal Advisory Commission has been created in NYSDOS. The Commission met during 1999. USGS is preparing estimates of nitrogen load to Long Island Sound derived from ground water and surface water on the north shore of Long Island using historical water-quality data, model-simulated ground-water discharges, and mean annual streamflow discharges. The effect of land use in three selected areas along the north shore of Long Island on nitrogen load is also being evaluated.	CTDEP will be addressing conditions of the CNPCP. The NY plan is awaiting approval by the Governor.

Y: 1) Type: Commitment; Recommendation

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Status for *Ongoing Programs* and ongoing *CCMP Actions*: Fully Met, Substantive Progress, Partial Progress, Discontinued

2. REDUCING NITROGEN LOADS FROM NON-POINT SOURCES (CCMP TABLE 5, P.34)

Ongoing Program	Responsible Parties	Status[2]	Description	Upcoming Action
H2-3. The states of CT and NY will continue to implement general storm water permit programs to control the discharge of storm water from industrial, construction, and municipal activities, in accordance with EPA's national program regulations. These permits will regulate discharges from construction activity greater than five acres and from eleven industrial categories.	**CTDEP NYSDEC**	Substantive Progress	CTDEP has three general storm water permits (industrial, construction, and commercial) for which approximately 2000 registrants have been recorded. Presently, Stamford is the only community in CT that is covered under the EPA's Phase I municipal permit program. In December 1999, EPA released its Phase II regulations for smaller cities and construction sites. CT anticipates 40-50 municipalities will be required to obtain permits under the Phase II storm water regulations. NYSDEC has three general storm water permits (industrial, construction, and commercial).	
H2-4. The states of CT and NY will continue to implement their existing permitting programs, such as the inland and tidal wetland programs, to address non-point nutrient control with respect to LIS management needs, as appropriate.	**CTDEP NYSDEC**	Substantive Progress	Connecticut has virtually eliminated losses of existing tidal wetlands and has restored hundreds of acres in the past few years. Inland wetlands are strictly regulated based on restrictive soil categories with no minimum threshold size. The net area of vegetated tidal wetlands has increased in New York, partly due to the tidal wetlands permitting program.	
H2-5. The states of CT and NY will implement the requirements of the reauthorized Clean Air Act to achieve additional nitrogen emission controls. Major actions include reduction of nitrous oxide emissions through adoption of statewide enhanced vehicle inspection and maintenance programs and stricter emission controls for stationary sources such as power plants.	**CTDEP NYSDEC**	Partial Progress	CTDEP Air and Water Bureaus have been evaluating mutual ozone/nitrogen deposition needs. Nitrogen monitoring and research has been funded through UConn to detail sources and sinks of nitrogen and mercury. States, including CT and NY, have completed "NOx SIP Call" plans, which will result in significant nitrogen reductions from atmospheric sources to LIS and other East Coast estuaries.. NYS has adopted stricter standards for its automobile inspection program. NYS is ahead of schedule in its goal of reducing NOx emissions from electricity generating facilities by 35% by the year 2000.	New York State will continue to reduce NOx emissions by 20,000 tons annually.

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Status for *Ongoing Programs* and ongoing *CCMP Actions*: Fully Met, Substantive Progress, Partial Progress, Discontinued

2. REDUCING NITROGEN LOADS FROM NON-POINT SOURCES (CCMP TABLE 5, P.34)

CCMP Action	Type[1]	Responsible Parties	When	Estimated Cost	Status[2]	Description	Upcoming Action
H2-6. The EPA will make non-point source management of nitrogen and other pollutants identified by the LISS, through wetlands and riparian zone protection as well as best management practices implementation, high priorities for funding under §319, 104(b), and 604(b) of the Clean Water Act.	**C**	**EPA**	**Annually starting in 1994**		Substantive Progress	NYSDOS is soliciting applications for $4.5M in statewide 50/50 matching Environmental Protection Fund (EPF) grants for Local Waterfront Revitalization Projects. NYSDOS is focusing on EPF funds for planning and design projects. In addition to non-point source pollution control projects, activities may include restoration of former natural coastal areas or enhancement of existing natural coastal areas, stream corridor restoration plans, and designing public access improvements. NYSDOS has received applications for EPF funding in 1999. For FY99 EPA and CTDEP awarded funds for NPS control projects in the amount of $1,276,759 of which $617,500 went to Long Island Sound non-point control projects.	EPA and the states will continue to make NPS management of nitrogen and other LISS-priority pollutants a priority for funding under §319, §104(b)(3), and §604(b) of the Clean Water Act, taking into consideration the increased discretion the states have in directing grant funds under EPA's Performance Partnership Grant system. CT DEP anticipates similar funding for FY2000.
H2-7. Investigate expansion of storm water permitting programs to regulate communities with populations fewer than 100,000 that border Long Island Sound within high priority management zones.	**C**	**CTDEP NYSDEC**	**1994**	**Redirection of base program**	Behind Schedule	EPA issued Phase II storm water regulations in December 1999 that apply to communities less than100,000 population and to developments less than1 but greater than 5 acres. CTDEP has evaluated a general municipal storm water permit that would add cities that meet certain density and population criteria. CTDEP is implementing EPA's final Phase II storm water regulations for municipalities. It is expected that 40-50 municipalities will be issued General Storm water permits.	

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Status for *Ongoing Programs* and ongoing *CCMP Actions*: Fully Met, Substantive Progress, Partial Progress, Discontinued

2. REDUCING NITROGEN LOADS FROM NON-POINT SOURCES (CCMP TABLE 5, P.34)

CCMP Action	Type[1]	Responsible Parties	When	Estimated Cost	Status[2]	Description	Upcoming Action
H2-8. In cooperation with the state of New York, Westchester County is developing a non-point source management plan that will include implementing best management practices for non-point source nitrogen control, monitoring their effectiveness and establishing a Westchester County management zone (or bubble) for assessing compliance with the nitrogen load freeze. **The LISS will explore extending the bubble concept to other management zones throughout Connecticut and New York state portions of the Long Island Sound drainage.**	C	NYSDEC Westchester County EPA	1993 - 1996	$500,000 one time cost	Substantive Progress	The second full year of a 3-year sampling program was completed in 1999 as part of a $335,000 project by Manhattan College to analyze nutrient and pathogen loads from the Mamaroneck River and Blind Brook. The work will better identify baseline and storm water non-point source loads that can be managed under the Westchester County management zone "bubble". The Westchester County Dept. of Planning has applied for a state grant to analyze the data collected under the project through the LIS 3.0 model. Westchester County's intermunicipal watershed planning efforts to reduce nonpoint source pollution in LIS drainage basin are progressing. The watershed management plans for study areas 3 and 5 were completed in April 1998 and June 1997, respectively. Watershed planning is being initiated in Nassau and Suffolk counties to address local water quality concerns as well as nitrogen loads from these zones. In Nassau county, inter-municipal confederations of watershed communities around Hempstead Harbor and Manhasset Bay have been formed to control and abate non-point pollution in their respective water bodies. Hempstead Harbor Protection Committee released its Water Quality Improvement Plan in May 1998. The Manhasset Bay Protection Committee completed a final report and released it during November 1999 .	The project will be completed in May 2000. The plan for study area 4 will be completed by June 2000. The plan for study areas 1,2, and 6 will begin over the next several years. NYSDEC may provide funding to Suffolk County to coordinate watershed planning effort.
H2-9. Westchester County will implement the recommendations of the County Executive's Citizens Committee on Non-point Source Pollution in Long Island Sound.	C	Westchester County, Local Government	1993 initiation and continuing	$200K/year for the first 3 years $600K for implementation [Through 1997, $1.7 million has been received for preparation and implementation of the plans.]	Substantive Progress	The Westchester County Department of Planning is coordinating and providing technical and administrative assistance for the preparation of six subwatershed-specific plans to control nonpoint source pollution in the County's Long Island Sound watershed. [see H2-8]	

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Status for *Ongoing Programs* and ongoing *CCMP Actions*: Fully Met, Substantive Progress, Partial Progress, Discontinued

2. REDUCING NITROGEN LOADS FROM NON-POINT SOURCES (CCMP TABLE 5, P.34)

CCMP Action	Type[1]	Responsible Parties	When	Estimated Cost	Status[2]	Description	Upcoming Action
H2-10. Point and non-point nitrogen load estimates will be made in the City of Stamford to assess feasibility of a point/non-point source *trading* program. A cost-effective mix of management options will be proposed that may be used to help decide how nitrogen reduction targets can be met once they are established.	**C**	**CTDEP City of Stamford**	**1992-1994**	**$97,000 in EPA funds, 239,182 in match from Stamford and CH2MHill**	**Complete**	**Report completed by CH2M-Hill, the City of Stamford, and New England Interstate Water Pollution Control Commission. The information is being used to develop cost estimates for point source controls and to assess feasibility of non-point source management**	**None**
H2-11. New York state will pursue the expansion of the State Building Code to include provisions for erosion and sediment control and storm water practices for all construction activities in order to prevent increases in non-point nitrogen runoff.	**C**	**NYSDEC NYSDOS**	**1993-1994**	**Redirection of base program**	Behind Schedule	[See P2-5]	NYSDEC will try to address this through its storm water provisions.
H2-12. Provide technical assistance to coastal municipalities to address impacts of hypoxia in their municipal regulations and plans of development, as required by law.	**C**	**CTDEP**	**1993 and continuing**	**Redirection of base program**	Substantive Progress	Connecticut Public Act 91-170 mandated that coastal municipal zoning regulations and plans of development be established with regard to non-point source and potential pollution of coastal waters with specific reference to hypoxia, toxic contamination, pathogens, and floatable debris. In 1999 CTDEP continued to conduct workshops for local land use officials using its manual, *Coastal Water Quality: A Guide for Local Officials*. The manual, funded under §309 of the Coastal Zone Management Act, contains information on how and use decisions and development impact coastal water quality, and how officials can minimize development effects by requiring the incorporation of appropriate best management practices into proper site design, construction and maintenance. Also included in the manual are model ordinances pertaining to soil erosion and sediment control and storm water management for towns to adopt. The manual was based, in part, on a brochure developed by the Connecticut River Estuary Regional Planning Agency using FY1994 §319 funds.	In CT, municipal outreach will be enhanced through updated workshop materials in support of the municipal best management practices manual. Intended audiences will be expanded to include municipal engineering and public works departments in addition to planning and zoning commissions to focus on implementation as well as planning, to reduce hypoxia conditions in the Sound.

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Status for *Ongoing Programs* and ongoing *CCMP Actions*: Fully Met, Substantive Progress, Partial Progress, Discontinued

2. REDUCING NITROGEN LOADS FROM NON-POINT SOURCES (CCMP TABLE 5, P.34)

CCMP Action	Type[1]	Responsible Parties	When	Estimated Cost	Status[2]	Description	Upcoming Action
H2-13. Advocate the use of the June nitrate test on agricultural lands to ensure that fertilizer applications to crops do not exceed crop needs.	C	CTDEP NYSDEC	1993 and continuing	Redirection of base program	Partial Progress	The June nitrate and fall stalk tests have been found to effectively reduce the amount of nitrogenous fertilizers used on agricultural lands without affecting crop yield. The Housatonic Hydrologic Project, and projects for the Scantic, Quinnipiac, and Yantic Rivers involve June nitrate and fall stalk testing.	CTDEP, NRCS, CT Cooperative Extension, and Soil and Water Conservation Districts will continue to advocate its use.
H2-14. In addition to continuing general storm water permitting programs, the state of New York should determine if the general permit adequately regulates nitrogen from activities subject to national storm water regulations.	R	NYSDEC		$50,000	Not Initiated	Funding and staffing limitations.	
H2-15. Explore the expansion of current requirements for federally licensed or permitted projects to obtain a water quality certification in New York to protect water quality from sources of pollution to include all projects adjacent to wetlands and other sensitive areas (e.g., adjacent to wetlands) or those that exceed a minimum size (e.g., greater than one acre).	R	NYSDEC	1994-1995	$50,000	Not Initiated	Funding and staffing limitations.	
H2-16. The states of Connecticut and New York should develop a habitat restoration plan that includes a list of potential project sites and priorities. Wetland projects that are in close proximity to priority nitrogen management areas should be highlighted.	R	CTDEP NYSDEC NYSDOS	1996-1998	$300,000 to develop plan	Complete	**See Living Resources and Habitat section (Action L1-13.)**	
H2-17. Evaluate Maryland's *Critical Areas* regulations and the reported nutrient reduction benefits and make recommendations of the potential value of a similar program for Long Island Sound.	R	LISS	1993-1995	$50,000.	Not Initiated	Funding and staffing limitations.	

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Status for *Ongoing Programs* and ongoing *CCMP Actions*: Fully Met, Substantive Progress, Partial Progress, Discontinued

3. CONTINUING MANAGEMENT OF HYPOXIA (CCMP TABLE 6, P. 39)

CCMP Action	Type[1]	Responsible Parties	When	Estimated Cost	Status[2]	Description	Upcoming Action
H3-1. The LISS will complete work on the LIS 3.0 model and the necessary management scenario projection runs.	C	LISS	Complete by June 1994	LISS Funded	Complete	Management scenarios were run in summer of 1996. Model reports are available. Model results were summarized for the September 1997 public meetings on the nitrogen reduction targets.	
H3-2. Develop LIS 3.0-based dissolved oxygen targets and nitrogen load reduction targets for each management zone.	C	LISS	Propose by December 1994	Redirection of base program	Complete	The LISS proposed the nitrogen reduction targets in February 1997 and approved them after soliciting public comment in February 1998.	
H3-3. Establish a firm timetable for achieving, within 15 years, the load reduction targets by zone, with progress measured in five year increments.	C	CTDEP NYSDEC	Propose by December 1994	Redirection of base program	Complete	The TMDL for LIS was released for public comment in November 1999. The nitrogen reduction targets include a 15-year reduction schedule for both point and non-point sources, after providing for time to develop management zone plans and make permit modifications.	The TMDL is to be finalized and submitted to EPA for approval.
H3-4. Develop zone-by-zone plans to achieve the nitrogen load reduction targets.	R	CTDEP NYSDEC Local and County Governments	1995-1997* *modified to 8/99 in the Phase III Hypoxia Agreement	$1 M committed for three New York zones; $700,000 per year for three years needed	Behind Schedule	The TMDL released for public comment included a WLA/LA by zone. In CT, the TMDL and WLA/LA will serve as Zone Plans.	The final TMDL must include a facility-specific WLA. NY still intends to prepare more detailed zone-by-zone plans.
H3-5. Encourage and support development of innovative, cost-effective technologies to reduce point and non-point sources of nitrogen.	R	LISS	Ongoing	LISO Base Program	Partial Progress	CTDEP sponsored workshops BNR technologies.	
H3-6. Periodically recalibrate LIS 3.0 to reflect the changing conditions of the Sound and use it to explain these changing conditions and to evaluate proposals to modify the management plan, as necessary.	R	LISS	As Needed	$300,000 per recalibration	Substantive Progress	The LISS is participating in a system wide nutrient workgroup that will evaluate the system wide eutrophication model (SWEM) developed by NYCDEP. A Model Evaluation Group (MEG) has been formed to provide independent peer review. MEG and Nutrient Reduction Work Group Meetings were held during 1999 to assess calibration and validation procedures.	

Y: 1) Type: Commitment; Recommendation

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Status for *Ongoing Programs* and ongoing *CCMP Actions*: Fully Met, Substantive Progress, Partial Progress, Discontinued

4. FUNDING TO IMPLEMENT HYPOXIA MANAGEMENT PLANS (CCMP TABLE 7, P. 41)

CCMP Action	Type[1]	Responsible Parties	When	Estimated Cost	Status[2]	DESCRIPTION	Upcoming Action
H4-1. Increase funding of the Connecticut and New York State Revolving Fund Programs to meet statewide wastewater control needs, including Long Island Sound nitrogen control needs.	**R**	**Congress Connecticut New York**	**Over 20 years**	**Federal cost of $700 M per year. Cost to states of $175 M per year.**	Partial Progress	In 1996-99, CT committed $350 M for sewage treatment plant reconstruction projects that will benefit LIS and estimates that Clean Water Funding, if maintained at current levels, will be adequate to finance Phase III upgrade requirements. In CT the 1999 commitment was $75 M.	For FY2000 the CT Bond Commission approved over $26 M for the Branford STP upgrade and over $4 M for additional upgrades at the Stamford STP. Fairfield will begin upgrade construction with funds from the $30.4 M grant awarded in 1999.
H4-2. Appropriate $50 M to fund a *Long Island Sound Challenge Grant Program*, a significant portion of which would be used to ensure that the Phase III nitrogen control efforts get off to a fast start with full local government cooperation.	**R**	**Congress**	**Over five years**	**$50 M**	Partial Progress	Legislative proposals have been introduced into Congress that would fund implementation of the LISS. The Long Island Sound Restoration Act was reintroduced in November 1999 to extend authorization for the LISS to 2003 and authorize annual appropriations of $80 million, including grants for nitrogen reduction under CWA §119.	
H4-3. Fully fund the non-point source control programs under §319 of the Clean Water Act and §6217 of the Coastal Zone Act Reauthorization Amendments to support additional non-point source management activities.	**R**	**Congress**	**Ongoing**	**§ 319 - $130 M nationwide § 6217 - $12 M nationwide**	Partial Progress	§319 was funded at $200 M for FY 1999. As part of the Clean Water Action Plan, the administration has proposed FY 2000 funding of $200 M .	The LISS, through its citizen participants, will advocate for increased funding under §319.

5. MONITORING AND ASSESSMENT OF HYPOXIA (CCMP TABLE 8, P. 42)

CCMP Action	Type[1]	Responsible Parties	When	Estimated Cost	Status[2]	Description	Upcoming Action
H5-1. The states of Connecticut and New York, New York City, and the Interstate Sanitation Commission will monitor dissolved oxygen and nutrients in Long Island Sound, its major tributaries, and key sewage treatment plants.	**C**	**CTDEP NYSDEC NYCDEP ISC**	**1994**	**$340,000**	**Complete**	**Monitoring was performed as planned and the results summarized by each agency.**	

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Status for *Ongoing Programs* and ongoing *CCMP Actions*: Fully Met, Substantive Progress, Partial Progress, Discontinued

5. MONITORING AND ASSESSMENT OF HYPOXIA (CCMP TABLE 8, P. 42)

CCMP Action	Type[1]	Responsible Parties	When	Estimated Cost	Status[2]	Description	Upcoming Action
H5-2. Develop a coordinated monitoring plan to assess the effectiveness of implementation, considering innovative approaches and building upon existing programs.	C	LISS	Completed in early 1994	$25,000	Complete	A LISS monitoring workshop was held in 1993. The workshop integrated findings of the LISS to develop a comprehensive, Sound wide monitoring plan. Portions of the plan are being implemented.	
H5-3. As part of a combined National Estuary Program Action Plan Demonstration Project and a CTDEP Long Island Sound Research Fund project, the EPA and the state of Connecticut will complete a demonstration project designed to evaluate and quantify the benefits of a riparian zone in the denitrification process.	C	CTDEP	1992-1994	$100,000 for Phase I	Complete	This project will help quantify the benefits of vegetated riparian zones in nitrogen removal. Monitoring at the site was completed in June 1997. A final report is available. Interested parties should contact CT-DEP's Office of Long Island Sound Programs at (860) 424-3034.	
H5-4. The state of Connecticut, through its Long Island Sound Research Program, has solicited proposals to identify the role of riverine transport in attenuating the load of nitrogen delivered to the Sound in the Housatonic or Naugatuck Rivers. If an acceptable proposal is identified, it will be a priority for funding in 1994.	C	CTDEP	1993-1995	$150,000	Partially addressed	CTDEP was not successful in funding a comprehensive project to study a watershed in detail through the Long Island Sound Research Fund. Some projects are looking at portions of the problem. CTDEP hired a consultant using federal 104(b) funds to develop a comprehensive watershed model for the state. The project began in early 1997.	The Research Fund project is on hiatus. Continue development of the watershed model.
H5-5. The state of Connecticut, through its Long Island Sound Research Program, will continue to fund atmospheric deposition monitoring of nitrogen a two coastal locations through May, 1994.	C	CTDEP	1991-1994	$50,000 per year	Complete	Report for two years of atmospheric wet and dry deposition monitoring has been accepted by CTDEP. The original action has been completed but CT has continued the project and enhanced monitoring at 8 locations since 1997 with the University of Connecticut.	Monitoring is continuing through 2000 using SEP funds.
H5-6. The EPA Office of Research and Development will continue to develop regional dissolved oxygen criteria for marine and estuarine waters.	C	EPA	Complete 1994	Redirection of base program	Partially Addressed	EPA issued draft DO criteria for the Virginian Province in November 1999.	The public comment period is 45 days beginning January 27, 2000.
H5-7. The NYSDEC will complete its initial study on the effects of hypoxia and disease on Long Island Sound lobsters.	C	NYSDEC	1994	LISS Funded	Complete	A report is available from the EPA LIS Office or from the NYSDEC Division of Marine Resources.	

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5. MONITORING AND ASSESSMENT OF HYPOXIA (CCMP TABLE 8, P. 42)

CCMP Action	Type[1]	Responsible Parties	When	Estimated Cost	Status[2]	Description	Upcoming Action
H5-8. Continue long-term dissolved oxygen and nutrient monitoring of the Sound, its major tributaries, and key sewage treatment plants.	R	CTDEP NYSDEC ISC EPA NYCDEP	Continuing	$300,000 per year	Substantive Progress	Ambient monitoring was continued in 1999. CTDEP funds the USGS to monitor tributaries and both NYSDEC and CTDEP have expanded monitoring requirements for point source discharges. The ISC and NYCDEP also perform ambient monitoring of LIS.	Monitoring has been funded for 2000 EPA's EMPACT project will supplement monitoring efforts. EPA's Coastal 2000 program may fund CTDEP and NYSDEC for special monitoring in LIS, including several embayments in Summer 2000.
H5-9. Continue to monitor finfish and crustaceans of the Sound with emphasis on determining population response to low dissolved oxygen.	R	CTDEP	Continuing		Substantive Progress	Special studies to identify hypoxic impacts on fish distribution are completed and reports are available from CTDEP Marine Fisheries. See Living Marine Resources and Habitat (Action **L9-1.**)	CTDEP continues to monitor finfish and lobster resources, but the studies are analyzed now to manage the state of fish and lobster resource stocks in light of DO's role.
H5-10. Continue to monitor the effects of hypoxia on disease of lobsters.	R	NYSDEC	Continuing	$65,000	Discontinued	**See Living Marine Resources and Habitat (Action L9-8.) The LISS in partnership with NY and CT Sea Grant programs released a Request for Proposals covering research in November 1999.**	**Work under the RFP will commence in 2000. Additional FY2000 LISS funds will be reserved for research in 2000.**

KEY: 1) Type: Commitment; Recommendation

2) Status for dated actions: Complete, Ahead of Schedule, On Schedule, Behind Schedule, Partially Addressed, Not Initiated
Status for *Ongoing Programs* and ongoing *CCMP Actions*: Fully Met, Substantive Progress, Partial Progress, Discontinued

Controlling Major Sources of Pathogens

Pathogens can cause illness in people exposed through bathing in, or consuming fish or shellfish from, contaminated waters. Pathogen contamination results in closed beaches, fisheries, or shellfish areas, hurting local economies and damaging public perception of the ecological health of the Sound.

Strategy:

The CCMP identifies a seven part strategy to control pathogen contamination to LIS from various sources: 1) combined sewer overflows (CSOs); 2) non-point sources (NPS); 3) sewage treatment plants (STPs); 4) vessel discharges; and 5) individual on-site systems/discharges. The final two elements of the strategy are to control pathogen contamination through: 6) public education; and 7) monitoring and assessment of pathogens. There are 14 *Ongoing Programs* and 20 *CCMP Actions* in this section. In 1999, of the 20 *CCMP Actions*, 3 are reported as *Complete*, 3 are reported as *Substantive Progress*, 7 *Partially Addressed*, 1 *Behind Schedule*, 5 *Not Initiated*, and 1 *Discontinued*.

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Highlights:

- In December 1999 Connecticut adopted a Total Maximum Daily Load (TMDL) plan for Sasco Brook. This TMDL is unusual in that all the sources of impairment are nonpoint rather than point sources.
- EPA published Phase II storm water regulations for smaller cities and construction sites in December 1999.
- Phased combined sewer overflow (CSO) abatement projects to alleviate pathogen problems continued in both states in 1999.
- Connecticut anticipates spending of $560 million over the next 15 years to complete these CSO projects.
- New York City continues its $1.5 billion program to abate CSOs; NYC's comprehensive sewer abatement program is scheduled for completion between 2001and 2006.
- New York has increased capture of CSOs from 18 percent to 40 percent, and is in almost complete compliance with EPA's minimum standards for CSO controls.
- Both states are working on programs to control discharges from vessels. "No Discharge Zones" have been designated for Huntington/Lloyd Harbors, Port Jefferson, Mamaroneck, and the Village of Port Washington Harbor.
- As of 1999, Connecticut has 56 land-based pumpout facilities and 6 pumpout boats; 22 facilities have been constructed and boats purchased since 1993 under the Clean Vessel Act. In the NYS coastal area, four additional pumpout stations were completed during 1999. This brings the total number of pumpouts along LIS in NYS to 39.
- Four municipalities in New York and one in Connecticut continue to address pathogen problems through sanitary surveys or storm water improvements.
- Broader efforts are underway in both states to address nonpoint sources of pollution, and storm water management will also contribute to the control of pathogens to the Sound.

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SUMMARY OF MANAGEMENT ACTIONS: PATHOGEN CONTAMINATION

1. CONTROLLING PATHOGEN CONTAMINATION FROM COMBINED SEWER OVERFLOWS (CCMP TABLE 31, P. 83)

Ongoing Programs	Responsible Parties	Status[2]	Description	Upcoming Action
P1-1. Continue CSO implementation and update overall management plans to assure implementation addresses bathing beach and shellfish closures and is consistent with water quality standards.	**CTDEP NYSDEC**	Substantive Progress	CTDEP is working to abate CSOs with a focus on coastal cities of New Haven, Bridgeport, and Norwalk. Over the next 15 years, $560 M will be expended on statewide CSO abatement. Pursuant to a 1992 consent order with NYSDEC, NYCDEP is implementing a comprehensive CSO abatement program at an estimated cost of $1.5 billion. NYC continues to meet the nine minimum control measures established in EPA CSO policy. Structural and nonstructural solutions for CSO abatement at individual STPs are being evaluated and prioritized. The East River proposals include tributaries of the East River. In line storage is being planned for the Newton Creek STP; facility planning is underway.	Final implementation is scheduled between 2001 and 2006.

2. CONTROLLING PATHOGEN CONTAMINATION FROM NONPOINT SOURCES (CCMP TABLE 32, P. 84)

Ongoing Programs	Responsible Parties	Status[2]	Description	Upcoming Action
P2-1. Implement the state nonpoint source management initiatives supported from Section 319 funding	**CTDEP NYSDEC EPA**	Partial Progress	See Section 319 Nonpoint Source control efforts in items H2-1, H2-6 under the Hypoxia section.	
P2-2. Develop state coastal nonpoint source control programs, as per Section 6217 of the Coastal Zone Management Act to address the nonpoint source pathogen load from the LIS coastal zone.	**CTDEP NYSDOS NOAA EPA**	Fully Met	See Coastal Nonpoint Source control description in item H2-2, under the Hypoxia section.	
P2-3. Implement general storm water permit programs to control the discharge of storm water from industrial, construction, and municipal activities, as per EPA regulations.	**CTDEP NYSDEC EPA**	Substantive Progress	See general storm water permit program description in item H2-3, under the Hypoxia section.	
P2-4. Provide technical assistance to coastal municipalities to address impacts of pathogens in their municipal regulations and plans of development, as required by state law.	**CTDEP NYSDEC**	Substantive Progress	CTDEP has met with coastal communities regarding PA 91-170 requiring municipalities to consider pathogens in their plans of development and zoning regulations. See also item H2-12, under the Hypoxia section. NYSDEC staff serve in an ex-officio, advisory capacity for the Hempstead Harbor and Manhasset Bay Protection Committees.	CTDEP and NYSDEC staff are available for continuing consultation with municipalities.

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Type: Commitment; Recommendation 2) Status for dated actions: Complete, Ahead of Schedule, On Schedule, Behind Schedule, Partially Addressed, Not Initiated
Status for ongoing programs and ongoing CCMP actions: Fully Met, Substantive Progress, Partial Progress, Discontinued

2. CONTROLLING PATHOGEN CONTAMINATION FROM NONPOINT SOURCES (CCMP TABLE 32, P. 84)

CCMP Action	Type[1]	Responsible Parties	When	Estimated Cost	Status[2]	Description	Upcoming Action
P2-5. Pursue changes of the State Building Code to include provisions for storm water management.	C	NYSDEC NYSDOS	1994/1995	Redirection of base program	Behind Schedule	A legislative proposal has been developed by NYSDEC.	The proposal has been tabled for the 1999 legislative session.
P2-6. Initiate a pilot program to control storm water discharges using enforceable instruments (i.e., permits or consent agreements). Connecticut and New York will evaluate the effectiveness of the pilot program for more widespread implementation.	C	NYSDEC	Ongoing/ Continuous	$100,000	Partial Progress	EPA published Phase II storm water regulations for smaller cities and construction sites in October 1999. NYSDEC has an administrative order against Westchester County to require disinfection on two separate sewer outlets in the New Rochelle sewer district.	
P2-7. Expand current requirements for federally licensed or permitted projects to obtain a water quality certification to include all projects in sensitive areas or where a contaminant or parameter is found to exist at or exceeding a threshold value.	R	NYSDEC	1994/1995	See Hypoxia	Not Initiated	See Hypoxia action H2-15.	

3. CONTROLLING PATHOGEN CONTAMINATION FROM SEWAGE TREATMENT PLANTS (CCMP TABLE 33, P. 85)

Ongoing Programs	Responsible Parties	Status[2]	Description	Upcoming Action
P3-1. Minimize malfunctions of treatment systems and eliminate dry weather overflows and illegal hookups to storm sewers through aggressive management programs. Ensure prompt notification and response and take quick enforcement action.	CTDEP NYSDEC	Substantive Progress	New York City has greatly reduced dry weather overflows (from 1-2% to 0.02% of flow) by reducing illegal connections and replacing obsolete regulators.	

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Type: Commitment; Recommendation 2) Status for dated actions: Complete, Ahead of Schedule, On Schedule, Behind Schedule, Partially Addressed, Not Initiated
Status for ongoing programs and ongoing CCMP actions: Fully Met, Substantive Progress, Partial Progress, Discontinued

3. CONTROLLING PATHOGEN CONTAMINATION FROM SEWAGE TREATMENT PLANTS (CCMP TABLE 33, P. 85)

Ongoing Programs	Responsible Parties	Status[2]	Description	Upcoming Action
P3-2. Identify and take priority enforcement actions to control wet weather overflows from sewers caused by excessive infiltration and inflow.	**CTDEP NYSDEC**	Partial Progress	At the Newport STP, sewer lines identified with infiltration and inflow problems were cleaned and refitted.	The Port Chester STP will replace components and equipment to minimize overflows and spills. It also will install a sodium byproducts treatment system to replace the current chlorine gas treatment system.

3. CONTROLLING PATHOGEN CONTAMINATION FROM SEWAGE TREATMENT PLANTS (CCMP TABLE 33, P. 85)

CCMP Action	Type[1]	Responsible Parties	When	Estimated Cost	Status[2]	Description	Upcoming Action
P3-3. Implement a beach and shellfish closure action plan to take immediate corrective and priority enforcement actions addressing improperly treated municipal discharges. Preventable incidents involving beaches and shellfish areas will be emphasized.	**C**	**CTDEP NYSDEC EPA**	**Ongoing/ Continuous**	**Redirection of base program**	Partial Progress	CTDEP and CTDOA/AD continue cooperate with municipalities to address pathogen problems that result in beach or shellfish bed closures as they occur. A predictive model of the impact of sewage spills on pathogens has been developed to assess risks and guide the closure of beaches and shellfish beds. It is being used as part of a multi-state sewage spill notification protocol by NYSDEC, NYCDEP, and CTDEP.	

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Type: Commitment; Recommendation 2) Status for dated actions: Complete, Ahead of Schedule, On Schedule, Behind Schedule, Partially Addressed, Not Initiated
Status for ongoing programs and ongoing CCMP actions: Fully Met, Substantive Progress, Partial Progress, Discontinued

4. CONTROLLING PATHOGEN CONTAMINATION FROM VESSEL DISCHARGES (CCMP TABLE 34, P. 86)

Ongoing Programs	Responsible Parties	Status[2]	Description	Upcoming Action
P4-1. During the permitting process, minimize the impacts of boat dockage facilities and temporary live-aboard anchorages by considering their proximity to productive and certified shellfish waters, existing boat channels, wetlands, and critical habitat areas, and tidal flushing.	**CTDEP NYSDEC NYSDOS**	Substantive Progress	Marine sanitation in general and pumpout/dump station installation specifically are considered during review of each coastal structures and dredging permit application for new boat berthing facilities and for substantial modification of existing boat berthing facilities. Permits are conditioned to require pumpout and/or dump station installation where necessary. The CT Department of Agriculture/Bureau of Aquaculture comments to CTDEP on potential impacts of proposed development on water quality as it relates to the status of shellfish growing water classification. The closure of shellfish beds to direct consumption harvesting or other lowering of the existing shellfish growing water quality classification resulting from an increase in boat berthing, constitutes an adverse impact on water quality and would be a violation of the anti-degradation policy in the CT Water Quality Standards. Permits are not issued for projects that violate the state's Water Quality Standards. In its Tidal Wetlands Permitting Program, NYSDEC generally includes installation of a marine pumpout station as a condition for marina expansion or as a term of an order of consent for a violation.	
P4-2. Consider the impacts of vessel discharges through appropriate resource management and recovery programs and limit or condition the siting or operation of boating facilities as necessary to minimize such impacts.	**CTDEP NYSDEC**	Fully Met	These factors are considered for each marina's expansion and new marinas as part of the Tidal Wetlands Permitting Program.	A decision on Federal FY 2000 funding for CT is anticipated in April 2000.

4. CONTROLLING PATHOGEN CONTAMINATION FROM VESSEL DISCHARGES (CCMP TABLE 34, P. 86)

CCMP Action	Type[1]	Responsible Parties	When	Estimated Cost	Status[2]	Description	Upcoming Action
P4-3. New York and Connecticut will apply to the EPA to create vessel *No Discharge* areas in specific embayments and harbors after ensuring the sufficient availability of pump-out stations and treatment facilities.	**C**	**CTDEP NYSDEC EPA Municipalities**	**Ongoing/ Continuous**	**Redirection of base program**	Substantive Progress	CTDEP continued efforts in 1999 to install and operate pump-out facilities using Clean Vessel Act (CVA) funds. In 1999 there are 22 more pumpout facilities in existence than in 1993 when the federally approved *Plan for Constructing Pumpout Stations...* was prepared. CTDEP is encouraging municipalities and non-profits to operate pumpout boats. NYS recognized several embayments on Long Island Sound (Huntington, Lloyd, Mamaroneck, and Port Jefferson harbors) as No-Discharge Zones. In addition, local communities have the option to develop legislation to reduce pathogen loadings in their waterways (e.g., prohibitions against overnight moorings, limiting numbers of boats in raft-ups, etc.).	CTDEP will continue to evaluate the success of the CVA program and will make and/or assist municipalities to make application to EPA for no-discharge area status for selected embayments and harbors when the criteria are met and as staff resources allow.

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ype: Commitment; Recommendation 2) Status for dated actions: Complete, Ahead of Schedule, On Schedule, Behind Schedule, Partially Addressed, Not Initiated
Status for ongoing programs and ongoing CCMP actions: Fully Met, Substantive Progress, Partial Progress, Discontinued

4. CONTROLLING PATHOGEN CONTAMINATION FROM VESSEL DISCHARGES (CCMP TABLE 34, P. 86)

CCMP Action	Type[1]	Responsible Parties	When	Estimated Cost	Status[2]	Description	Upcoming Action
P4-4. New York state has identified Huntington and Lloyd Harbors as areas requiring additional protection and the EPA has Public Noticed its tentative determination that there are adequate pump-out facilities in these areas.	C	NYSDEC EPA	1993/1994	Redirection of base program	Complete	Huntington and Lloyd Harbors have been designated as vessel no-discharge areas.	
P4-5. Connecticut, through a 319 grant, will ensure completion of a marina and mooring area water quality assessment guidance document. Connecticut has also completed a marinas *best management practices* project report for nonpoint sources of pollution, which may be used to develop requirements for use of certain best management practices at marinas. New York state will review these documents for potential incorporation into state management programs.	C	CTDEP NYSDEC	Ongoing/ Continuous	Redirection of base program	Complete	Both documents have been completed, the Best Management Practices manual in 1992 and the Marina Water Quality Assessments document in 1993. NYSDEC developed and distributed a marina best management practices guide in March 1996.	Use guidance for technical outreach to marinas and coastal municipalities and to establish some permit conditions.
P4-6. Complete regulations to require pump-out facilities as required by, and in accordance with, state law.	C	CTDEP	Ongoing/ Continuous	Redirection of base program	Discontinued	A determination has been made that existing permit condition authority allows for requirement of installation of necessary sanitary waste handling facilities at marinas and other boating facilities. Regulations are not required at this time. Decision will be periodically reevaluated.	

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Type: Commitment; Recommendation

2) Status for dated actions: Complete, Ahead of Schedule, On Schedule, Behind Schedule, Partially Addressed, Not Initiated
Status for ongoing programs and ongoing CCMP actions: Fully Met, Substantive Progress, Partial Progress, Discontinued

4. CONTROLLING PATHOGEN CONTAMINATION FROM VESSEL DISCHARGES (CCMP TABLE 34, P. 86)

CCMP Action	Type[1]	Responsible Parties	When	Estimated Cost	Status[2]	Description	Upcoming Action
P4-7. The states of Connecticut and New York have received funding from the Federal Clean Vessel Act to conduct a pump-out needs survey, determine the effectiveness of existing facilities, develop and implement plans for construction of additional pump-out stations by marinas and prepare education/information plans.	**C**	**CTDEP NYSDEC Marina Operators Municipalities Non-profit entities**	**Initiated 1993/ Completion 1999**	**$ 3,468,000 for NY** **Projected Total Project Cost in Connecticut over 10 years is $6,26M. Anticipated federal funding of project over 10 years is $4,695M. $1,697M in federal funding received to date.**	Substantive Progress	There are 39 Marine Pumpout stations in NY waters on LIS and its tributaries. On the NYS coastal area, four additional pumpout stations were completed during 1999. In CT, seven additional pumpouts are under development. Twenty-five additional pumpouts/dump stations and four additional pumpout boats are proposed utilizing new funds through FFY2003. The total number of pumpouts anticipated to be available following completion (2003) of the CVA project in Connecticut is eighty-six. The total number of pumpout boats anticipated to be available by 2003 in Connecticut is eleven. CTDEP will also continue to offer operation and maintenance grants to pumpout/dump station facility operators as federal funding allows. The Clean Vessel Act (CVA) Grant Program has been ongoing in Connecticut since initiation of the program by the U.S. Fish And Wildlife Service in 1993. Four grant agreements between the U.S. Fish and Wildlife Service and CTDEP have been executed during this time frame. The CTDEP has successfully implemented the program through the issuance of grants to fund the installation of new pumpouts and dump stations at public and private boating facilities, issuance of grants to fund the purchase, operation and maintenance of pumpout boats by CTDEP, the City of Bridgeport and The Long Island Sound Keeper Fund, Inc. and through the implementation of an education and outreach program to boaters, boating facility operators and the general public. The CTDEP received a five-year award of $467,000 from the USFWS in FY 1999. Fifty-six land based pumpouts are functional along the Connecticut coast and six pumpout boats are operational. The CTDEP anticipates that up to three additional boats will be operational for the 2000 boating season. Three dump stations exist at sites without pumpouts (including one floating restroom). Many of the pumpouts also have a wand attachment to allow disposal of waste from portable toilet holding tanks and approximately 10 sites have both a pumpout and a dump station.	CTDEP pumpout boat "Sound Choice" will be donated to the town of Groton for operation in the Mystic Harbor area In 2000, CTDEP will purchase an additional pumpout boat for education and outreach purposes and servicing boaters in the Lower Connecticut River, the Niantic River and the Thames River. The Clean Vessel Assistance Program, through the Transportation Equity Act for the 21st Century (TEA-21) has been extended through September 2004.

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Type: Commitment; Recommendation 2) Status for dated actions: Complete, Ahead of Schedule, On Schedule, Behind Schedule, Partially Addressed, Not Initiated
Status for ongoing programs and ongoing CCMP actions: Fully Met, Substantive Progress, Partial Progress, Discontinued

4. CONTROLLING PATHOGEN CONTAMINATION FROM VESSEL DISCHARGES (CCMP TABLE 34, P. 86)

CCMP Action	Type[1]	Responsible Parties	When	Estimated Cost	Status[2]	Description	Upcoming Action
P4-8. Collect information on sewage discharge controls in Long Island Sound, disinfection chemicals used, boater education and sewage treatment plant acceptance of pump-out wastes. Evaluate availability of treatment capacity for pump-out wastes and secure commitments from municipalities to accept these wastes.	**C**	**NYSDEC Municipalities**	**Initiated 1994/ completion 1994**	**$42,000.**	**Complete**	**A survey was conducted on marine sanitation device (MSD) holding tanks to help implement vessel discharge controls in Long Island Sound. The report documented that acceptance of waste from MSDs by STPs poses no threat to their operation and should therefore be encouraged.**	

5. CONTROLLING PATHOGEN CONTAMINATION FROM INDIVIDUAL ON-SITE SYSTEMS/DISCHARGES (CCMP TABLE 35, P. 87)

Ongoing Program	Responsible Parties	Status[2]	Description	Upcoming Action
P5-1. Connecticut and New York are coordinating management actions with local governments when on-site septic systems are found to be failing and impacting shellfish growing areas and bathing beaches.	**CTDEP NYSDEC local municipalities health agencies.**	Fully Met	In Connecticut, the combined efforts of Department of Agriculture/Bureau of Aquaculture, local officials, and Department of Health address these problems as they are uncovered. CT is working with the Town of Greenwich on its sewering plan for the Mianus River area. NYSDEC reports any discoveries of failing septic systems to the appropriate county health department.	

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Type: Commitment; Recommendation 2) Status for dated actions: Complete, Ahead of Schedule, On Schedule, Behind Schedule, Partially Addressed, Not Initiated
Status for ongoing programs and ongoing CCMP actions: Fully Met, Substantive Progress, Partial Progress, Discontinued

5. CONTROLLING PATHOGEN CONTAMINATION FROM INDIVIDUAL ON-SITE SYSTEMS/DISCHARGES (CCMP TABLE 35, P. 87)

CCMP Action	Type[1]	Responsible Parties	When	Estimated Cost	Status[2]	Description	Upcoming Action
P5-2. Continue and enhance management actions with local governments when on-site septic systems are found to be failing and impacting shellfish growing areas and bathing beaches.	**R**	**CTDEP NYSDEC Local municipalities and health agencies to administer the program. Repairing or upgrading the systems will be at property owner expense.**	**Ongoing/ Continuous**	**Redirection of base program. Enhancement costs: $100,000 to increase staff; $60,000 for administrative costs per year per state.**	Substantive Progress	As described in an earlier action, CTDEP works with the Dept. of Agriculture's Bureau of Aquaculture and municipalities to address shellfish and beach closure problems as they occur. Solutions are varied and may warrant septic system corrections or sewering of areas. NYSDEC has worked with the Town of Huntington and Coöperative Extension Marine Program to identify specific nonpoint source problems in Centerport Harbor. Presently, a total of 90 acres of shellfish bed in Centerport Harbor are seasonally certified.	Continue cooperative efforts.
P5-3. Evaluate existing septic system controls (including system monitoring, required maintenance and repair and replacement of failing systems) to determine if they are sufficient to protect coastal ecosystems and recommend changes to local governments.	**R**	**NYSDEC**	**Continuous based upon availability of funding**	**$120,000 to increase staff; $200,000 for field and laboratory expenses; $30,000 for administrative costs.**	Not Initiated	Funding and staffing limitations.	

6. CONTROLLING PATHOGEN CONTAMINATION THROUGH PUBLIC EDUCATION (CCMP TABLE 36, P. 88)

CCMP Action	Type[1]	Responsible Parties	When	Estimated Cost	Status[2]	Description	Upcoming Action
P6-1. Develop and implement a public education plan, targeting specific audiences, in cooperation with federal, state and local public outreach experts and environmental education.	**R**	**LISS Management Conference**	**Upon available funding**	**$20,000; See Public Involvement and Education**	Partially Addressed	The LISS public information and education program stresses actions that individuals can take to reduce pathogen contamination.	

Y
Type: Commitment; Recommendation 2) Status for dated actions: Complete, Ahead of Schedule, On Schedule, Behind Schedule, Partially Addressed, Not Initiated
Status for ongoing programs and ongoing CCMP actions: Fully Met, Substantive Progress, Partial Progress, Discontinued

7. MONITORING AND ASSESSMENT OF PATHOGENS (CCMP TABLE 37, P. 89)

Ongoing Programs	Responsible Parties	Status[2]	Description	Upcoming Action
P7-1. Review existing data and reports and the recommendations of the Monitoring Workshop to identify shell fishing or bathing area in need of further assessment.	**CTDEP CTDA/BA NYSDEC municipalities**	Partial Progress	CTDEP works closely with the CTDA/BA, the CTDOH, and local health authorities for monitoring and abatement. NYSDEC works closely with NYSDOH and local health authorities for monitoring and abatement, and performs in-house analyses for pathogens at shellfish beds.	
P7-2. Perform bacterial surveys of harbors and embayments to identify contaminated shellfish areas and potential sources of pathogens as required by the National Shellfish Sanitation Program.	**CTDA/BA NYSDEC**	Fully Met	Surveys are regularly conducted by the CTDA/BA and regulatory actions are taken based on the data. NYSDEC conducts routine water quality studies to evaluate the sanitary conditions of shellfish growing areas and determine compliance with NY state and national Shellfish Sanitation Program criteria. During 1999, NYSDEC expanded its analysis of shellfish waters to include vibrio testing. Coordinated by the NYSDEC, in 1999 the ISC and area health departments collected water quality samples to determine the presence of a toxic dinoflagellate, *Pfiesteria piscicida*.	
P7-3. Use seasonal or conditional certification of shellfish harvest areas, as may be warranted by water quality variations, under guidelines provided by the National Shellfish Sanitation Program.	**CTDA/BA NYSDEC**	Partial Progress	In CT and NY, some coastal areas use seasonal restrictions or conditional closures based on rainfall. NYSDEC conducts water quality studies of seasonally and conditionally certified harvest areas. Currently, the National Shellfish Sanitation Program requirement to sample all such areas once/month when open are not being met. At the request of NYSDEC, the ISC continued a sampling program in selected Westchester County harbors in LIS, an area that NYSDEC wants to designate for a shellfish transplant program.	
P7-4. Meet annually with health directors of coastal municipalities to refine monitoring and bathing beach closure protocols and share information	**CTDEP NYSDOH Local Health Departments**	Fully Met	CTDEP continues to meet annually with CTDOH and municipalities	

7. MONITORING AND ASSESSMENT OF PATHOGENS (CCMP TABLE 37, P. 89)

CCMP Action	Type[1]	Responsible Parties	When	Estimated Cost	Status[2]	Description	Upcoming Action
P7-5. Evaluate existing monitoring programs and, as necessary, make recommendations for enhancements.	**C**	**LISS CTDEP NYSDEC**	**Initiated 1993/ Completion 1994**	**Base program redirection**	Partial Progress	CTDEP meets annually with the CTDOHS and the coastal municipalities to review the latest information on beach monitoring methods and closure criteria. NYSDEC is currently not meeting some of the minimum requirements of the National Shellfish Sanitation Program, especially for seasonally and conditionally certified waters, due to inadequate sampling frequency.	Continue to meet annually and address problems as they arise

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Type: Commitment; Recommendation 2) Status for dated actions: Complete, Ahead of Schedule, On Schedule, Behind Schedule, Partially Addressed, Not Initiated
Status for ongoing programs and ongoing CCMP actions: Fully Met, Substantive Progress, Partial Progress, Discontinued

7. MONITORING AND ASSESSMENT OF PATHOGENS (CCMP TABLE 37, P. 89)

CCMP Action	Type[1]	Responsible Parties	When	Estimated Cost	Status[2]	Description	Upcoming Action
P7-6.Conduct a workshop to determine appropriate and consistent methods for bathing beach monitoring and laboratory analysis and work to adopt, if feasible, common methods.	**R**	**LISS Management Conference**	**Upon availability of funding**	**$5,000**	Not Initiated		
P7-7. Implement the recommendations of the LISS Monitoring Plan to enhance pathogen monitoring.	**R**	**CTDEP NYSDEC**	**Upon availability of funding**	**$10,000**	Partial Progress	CTDEP and the CT Dept. of Agriculture's Bureau of Aquaculture, as well as municipal health departments are meeting recommendations for the minimalist program. NYSDEC is not meeting the minimum requirements of guidelines set by the National Shellfish Sanitation Program.	Continue monitoring efforts.
P7-8.Develop and conduct a dry and wet weather sampling program for specific drainage basins. Both states will evaluate this pilot program for possible expansion.	**R**	**CTDEP NYSDEC**	**Upon availability of funding.**	**$250,000**	Partial Progress	CTDEP is involved in funding two projects that meet some of these needs. The USGS has completed wet and dry weather sampling on Sasco Brook. The USGS is conducting wet and dry weather sampling on the Quinnipiac and West Rivers and UCONN researchers are conducting sampling as part of a National Monitoring Project in Waterford. UConn is also assisting CTDEP in evaluating removal efficiencies of four storm water devices in the Fenger Brook, Scantic, Hockanum, and Jordan Cove watersheds.	Similar monitoring efforts in new watershed projects such as the Norwalk River should enhance understanding.
P7-9. Assess the impacts of identified point and nonpoint sources and assign priorities to areas where management actions are most likely to be beneficial. Priority criteria will include viability of the resource, feasibility and cost-effectiveness of management. Enhance state bacterial surveys of harbors and embayments to identify contaminated shellfish areas and potential sources of pathogens.	**R**	**CTDEP CT Dept. Of Agriculture/ Aquaculture Division NYSDEC**	**Upon availability of funding**	**$150,000 per year for each state**	Partially Addressed	A draft TMDL for Sasco Brook was released for public comment in September 1999. Comments were received by October 15, 1999; the TMDL was formally adopted by the State of Connecticut in December 1999 and is currently under review by EPA. Implementation of a Comprehensive Watershed Management Plan has begun, which includes routine monitoring by the towns in the watershed, storm drain upgrading and retrofits, and buffer area enhancement projects.	Formal approval of the TMDL by EPA.
P7-10. Support the efforts to develop a better understanding of the relationship between pathogen indicators and the risk to public health such as the National Indicator Study.	**R**	**LISS Management Conference**		**Not estimated**	Not Initiated	The National Indicator Study is no longer funded by the Federal Department of Agriculture or the Interstate Shellfish Sanitation Commission.	

Y
Type: Commitment; Recommendation 2) Status for dated actions: Complete, Ahead of Schedule, On Schedule, Behind Schedule, Partially Addressed, Not Initiated
Status for ongoing programs and ongoing CCMP actions: Fully Met, Substantive Progress, Partial Progress, Discontinued

7. MONITORING AND ASSESSMENT OF PATHOGENS (CCMP TABLE 37, P. 89)

CCMP Action	Type[1]	Responsible Parties	When	Estimated Cost	Status[2]	Description	Upcoming Action
P7-11. Along with supporting the National Indicator Study, investigate funding for a regional epidemiological survey to determine the relationship between waters of varying indicator quality and public health.	**R**	**CTDEP NYSDEC EPA State and local health departments**	**Upon availability of funding**	**$500,000**	Not Initiated	Funding and staffing limitations	

Y

1) Type: Commitment; Recommendation

2) Status for dated actions: Complete, Ahead of Schedule, On Schedule, Behind Schedule, Partially Addressed, Not Initiated
Status for ongoing programs and ongoing CCMP actions: Fully Met, Substantive Progress, Partial Progress, Discontinued

Protecting the Sound from the Adverse Effects of Toxic Substances

Toxic substances can cause adverse human and ecosystem health risks, and can result in significant negative economic impacts on the value of the natural resources of the Sound.

Strategy:

The CCMP strategy to address toxic contamination in LIS has five principal elements: 1) toxic contaminant source controls and prevention; 2) addressing sediment contamination; 3) improving human health risk management; 4) monitoring and assessment of toxic contaminants; and 5) research to investigate toxic contamination. There are 5 *Ongoing Programs* and *26 CCMP Actions* for this priority area. In 1999, of the 26 *CCMP Actions*, 5 are *Complete*, 4 are either *Partially Addressed*, or *Behind Schedule*, 13 are classified as *Not Initiated*, 3 are reported elsewhere in this report.

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Highlights:

- EPA and ACOE signed a Letter of Agreement in April 1998 to designate open water disposal sites under the Marine Protection, Research and Sanctuaries Act (MPRSA). The agencies jointly held public meetings in Connecticut and New York in1999 to gather public comment and input on the site designation process, proposed workplan, and site selection evaluation criteria and methodology. The designation process is expected to be completed by March 2002.

- The LISS held a *Dredging and the Environment* workshop in March 1999 for Connecticut and New York residents to increase the opportunity for public discussion, input and feedback to the regulatory agencies on dredged material management in LIS. The workshop complemented efforts by EPA and the ACOE to begin the process of designating dredged material disposal sites in LIS.

- In 1999 CTDEP received a fellowship award from NOAA's Coastal Services Center for development of a Long Island Sound Sediment Quality Information Database (SQUID) using GIS and associated databases, which include such spatial and attribute data as: sewer treatment outfalls; combined sewer outfalls; industrial discharges; oil & chemical spills; landfills; stormwater outfalls; and locations in the Sound and harbors where sediment testing has been conducted. The Coastal Management Fellow began work at DEP in November 1999.

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SUMMARY OF MANAGEMENT ACTIONS: TOXIC SUBSTANCES

1. TOXIC CONTAMINANT SOURCE CONTROLS AND POLLUTION PREVENTION (CCMP TABLE 21, P. 65)

Ongoing Program	Responsible Parties	Status[2]	Description	Upcoming Action
T1-1. The states of Connecticut and New York and the Army Corps of Engineers will continue to regulate dredging and the disposal of dredged sediments through the existing permit programs.	**CTDEP NYSDEC NYSDOS NYSDOH ACOE EPA**	Fully Met	The LISS sponsored a *Dredging and the Environment* workshop on March 19, 1999 to facilitate public discussion and input to enable the states of NY and CT to propose a final Plan for Disposal of Dredged Material in Long Island Sound. EPA/ACOE held a series of public meetings in NY/CT in 1999 to obtain public input into the dredged material EIS process. The states of Connecticut and New York continue to regulate and enforce dredging activities. CTDEP, with LISS funding produced a report in 1998, *Long Island Sound Dredged Material Management Approach*. Dredging of Mamaroneck Harbor and disposal of dredged material was completed in 1999. EPA and ACOE signed a Letter of Agreement in 1998 on site designation under MPRSA in LIS, which schedules completion of the process by March 2002.	LISS will develop recommendations on whether to update the interim Plan for Disposal of Dredged Material in LIS. EPA will conduct public workshops in 2000 as part of the EIS workplan.
T1-2. The states of Connecticut and New York and the EPA will continue their pretreatment programs to ensure that toxic discharges to sewage treatment plants are controlled. The states of Connecticut and New York, through their Pollution Discharge Elimination System Programs, will continue to ensure that facilities comply with their permit limits.	**CTDEP NYSDEC EPA**	Substantive Progress	CTDEP's municipal facilities program continues to oversee municipal reports of monitoring discharges to ensure toxic contaminants are within individual permit limits. The NYC pretreatment of influent is being implemented.	
T1-3. The states of Connecticut and New York and the EPA will apply pollution-prevention techniques, as appropriate, to both direct and indirect discharges of toxic substances by emphasizing wastewater minimization, recycling of wastewater, and alternative processes and chemicals to reduce toxicity and toxics loads and to minimize effects on all environmental media.	**CTDEP NYSDEC EPA**	Partial Progress	Connecticut's policy is embodied in state legislation (P.A. 91-376). CTDEP published its Pollution Prevention Plan in October 1996, targeting consumers, industry, and government to control targeted substances. A special section on nonpoint source runoff to LIS highlights these needs. NYSDEC launched an enforcement initiative designed to bolster compliance with regulations requiring registration and tightness testing of petroleum bulk storage tanks. In NYS, as a result of a negotiated regulatory rule making during 1999, dry cleaners were required to control emissions of toxic perchloroethylene.	

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Type: Commitment; Recommendation

2) Status for dated actions: Complete, Ahead of Schedule, On Schedule, Behind Schedule, Partially Addressed, Not Initiated
Status for *Ongoing Programs* and ongoing *CCMP Actions*: Fully Met, Substantive Progress, Partial Progress, Discontinued

1. TOXIC CONTAMINANT SOURCE CONTROLS AND POLLUTION PREVENTION (CCMP TABLE 21, P. 65)

Ongoing Program	Responsible Parties	Status[2]	Description	Upcoming Action
T1-4. The states of Connecticut and New York will review municipal and industrial discharge permits to surface waters to reduce the allowable concentrations of toxic pollutants from the previous permitted values.	**CTDEP NYSDEC EPA**	Partial Progress	NYSDEC analyses municipal and industrial discharge permits in response to applications and renewal applications on a regular schedule. CTDEP, through permitting and enforcement programs, regularly reviews and monitors permit compliance. An aggressive tracking and testing (bioassay) program is in place for municipal, industrial and storm water permittees to ensure point source discharges are adequately treated and protective of aquatic resources. TMDL analyses will further reduce toxic contaminant loads, where needed. Eighty-five municipal and more than 20 private and/or state facilities are covered by this program. From 1989-1999 approximately 4,700 toxicity tests have been performed and results reported to DEP. A 75 percent reduction in the number of CT facilities discharging potentially toxic effluent has been observed over the last ten ears.	Two facilities upgrading treatment of effluent. It is anticipated that these upgrades will follow the current (historical) trend of non-toxic effluents observed at upgraded facilities. CTDEP will continue toxicity testing of STP discharges in 2000.

1. TOXIC CONTAMINANT SOURCE CONTROLS AND POLLUTION PREVENTION (CCMP TABLE 21, P. 65)CCMP

CCMP Action	Type[1]	Responsible Parties	When	Estimated Cost	Status[2]	Description	Upcoming Action
T1-5. The LISS will encourage adequate funding to continue and expand pollution prevention site visit programs targeting industrial dischargers to the Sound and its tributaries.	**C**	**LISS**	**Initiated 1993/ Continuing**	**Minimal staff time**	**Complete**	**EPA awarded $105,000 in FY94 to the Connecticut Hazardous Waste Management Service's Technical Assistance Program (ConnTAP) to target its existing pollution prevention site visit program at industries with direct and indirect wastewater discharges to Long Island Sound and its tributaries. The grant funds were supplemented with several other funding sources for a total of $253,500. ConTAP completed the project in June 1997 and submitted a final report in January 1998. ConTAP was eliminated from State budget effective July 1, 1997.**	
T1-6. As part of the NY-NJ Harbor Estuary Program, total maximum daily loads, wasteload allocations for point sources, and load allocations for nonpoint sources will be developed to ensure that water quality standards for mercury are met in the Harbor, the East River, and Long Island Sound.	**C**	**HEP NJDEP NYSDEC EPA**	**1994**	**Redirection of base program**	**Complete**	**Phase I TMDL for mercury has been completed. EPA, NYSDEC, and NJDEP convened a workgroup in 1998 to develop Phase II mercury TMDL and TMDLs as necessary for toxic organics.**	

Y

Type: Commitment; Recommendation

2) Status for dated actions: Complete, Ahead of Schedule, On Schedule, Behind Schedule, Partially Addressed, Not Initiated

Status for *Ongoing Programs* and ongoing *CCMP Actions*: Fully Met, Substantive Progress, Partial Progress, Discontinued

1. TOXIC CONTAMINANT SOURCE CONTROLS AND POLLUTION PREVENTION (CCMP TABLE 21, P. 65)CCMP

CCMP Action	Type[1]	Responsible Parties	When	Estimated Cost	Status[2]	Description	Upcoming Action
T1-7. As part of the New York - New Jersey Harbor Estuary Program, the states of New York and New Jersey will establish water quality-based effluent limits for copper, mercury, and six other toxic metals, as necessary. Permits will be subsequently modified.	C	NJDEP NYSDEC	Complete by 12/94	Redirection of base program	Complete	NYSDEC has modified NYC sewage treatment plant permit limits for metals. Additional WLAs will be developed through the TMDLs described in T1-6.	
T1-8. Support education on the environmental impact of using home, garden, and commercial hazardous chemicals and pesticides and continue to provide guidance on how to minimize use of these chemicals and properly dispose of them through household hazardous waste collection.	R	LISS	Initiated 1993/ Continuing	$20,000. See Public Involvement and Education		See Public Involvement and Education.	
T1-9. Evaluate mass loadings of toxic contaminants and determine their relationship to ambient water and sediment quality.	R	LISS CTDEP NYSDEC		$200,000 per year	Partially Addressed	In 1999 CTDEP received a fellowship award from NOAA's Coastal Services Center for development of a Long Island Sound Sediment Quality Information Database (SQUID) using GIS and associated databases, which include such spatial and attribute data as: sewer treatment outfalls; combined sewer outfalls; industrial discharges; oil & chemical spills; landfills; stormwater outfalls; and locations in the Sound and harbors where sediment testing has been conducted. The Coastal Management Fellow began work at DEP in November 1999.	For 2000 it is expected the SQUID project will have a base GIS established and completion of a bulk chemistry database.
T1-10. Identify and assign priorities to toxic substances which should be banned from use and for which *virtual elimination of discharge* should be the goal.	R	LISS CTDEP NYSDEC		$200,000 per year	Not Initiated	Funding and staffing limitations.	

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Type: Commitment; Recommendation

2) Status for dated actions: Complete, Ahead of Schedule, On Schedule, Behind Schedule, Partially Addressed, Not Initiated

Status for *Ongoing Programs* and ongoing *CCMP Actions*: Fully Met, Substantive Progress, Partial Progress, Discontinued

2. ADDRESSING SEDIMENT CONTAMINATION (CCMP TABLE 22, P. 67)

CCMP Action	Type[1]	Responsible Parties	When	Estimated Cost	Status[2]	Description	Upcoming Action
T2-1. The LISS will review the National Oceanic and Atmospheric Administration (NOAA) 1991 sediment chemistry and toxicity survey results of harbors and embayments, when available in the Spring 1994.	C	LISS NOAA	Upon report completion	Existing staff to be used	Not Initiated	Funding and staffing limitations.	
T2-2. The LISS will provide a preliminary review of the data on sediment contamination on a site-by-site basis. State and federal experts will evaluate the problem at each site and recommend additional assessments needed to fully characterize the problem, ascertain the need for and feasibility of remediation and prepare a remediation plan.	C	LISS	Ongoing	Existing staff to be used	Not Initiated	Funding and staffing limitations.	
T2-3. The City of Glen Cove plus their Review Committee will evaluate the contamination of Glen Cove Creek.	C	NYSDEC City of Glen Cove	1994/1995	$250,000.	On Schedule	In 1999, dredging was completed in the mouth and downstream portions of Glen Cove Creek. The City was awarded $1.4 million as part of a Federal initiative to restore polluted industrial sites for subsequent development for human use. Glen Cove and Stamford, CT are two of 16 communities in the U.S. chosen as Brownfields Showcase Communities. Bulkheading portions of Glen Cove Creek to permit further dredging was completed in 1999.	Dredging of mid- and upper portions of Glen Cove Creek to be completed. Stamford plans to reclaim the harbor area as an economic and recreational resource.
T2-4. The LISS will review and evaluate sediment remediation approaches developed in the Great Lakes ARCS Program and HEP.	C	LISS	1994/1995	Existing staff to be used	Not Initiated	Funding and staffing limitations.	

Y
Type: Commitment; Recommendation

2) Status for dated actions: Complete, Ahead of Schedule, On Schedule, Behind Schedule, Partially Addressed, Not Initiated
Status for *Ongoing Programs* and ongoing *CCMP Actions*: Fully Met, Substantive Progress, Partial Progress, Discontinued

2. ADDRESSING SEDIMENT CONTAMINATION (CCMP TABLE 22, P. 67)

CCMP Action	Type[1]	Responsible Parties	When	Estimated Cost	Status[2]	Description	Upcoming Action
T2-5. Conduct further assessments and develop site plans addressing the feasibility, technical approach, cost and value of conducting remediation activities for Black Rock Harbor and Glen Cove Creek, where data may be sufficient to conduct case study analyses. Recommend other harbors for characterization and feasibility studies to be conducted at a rate of two harbors per year.	**R**	**LISS**	**Ongoing**	**$250,000 per harbor or $500,000 per year.**	Partial Progress	A contract for excavating and removing landfill at the Captain's Cove facility in Glen Cove was awarded in 1999. Demolition of shell structures for previously planned condominiums at the Captain's Cove facility were demolished in April 1999.	Demolition of the Captain's Cove site to be completed.

3. IMPROVING HUMAN HEALTH RISK MANAGEMENT (CCMP TABLE 23, P. 68)

CCMP Action	Type[1]	Responsible Parties	When	Estimated Cost	Status[2]	Description	Upcoming Action
T3-1. The LISS will advocate the coordination between the states of Connecticut and New York to review health risk and advisory recommendations and formulate plans to ensure consistency.	**C**	**LISS CTDEP CTDOHS NYSDEC NYSDOH**	**Initiated 1994/ Continuing**	**No Cost**	Not Initiated	Funding and staffing limitations.	
T3-2. Develop strategies for controlling loadings of contaminants for which seafood consumption advisories have been issued.	**R**	**LISS CTDEP NYSDEC**		**$150,000 per year.**	Partially Addressed	CTDEP is using SEP and Long Island Sound Research Funds to support: 1) a study of Hg abundances in LIS sediments(Complete); 2) an evaluation of seafood consumption rates in CT since national estimates of consumption may be too low and consumption advisories are based on these rates (Complete); and 3) an evaluation of Hg sources and cycling in LIS (On schedule). Also funded was a study of Hg levels in fish from LIS and the CT River.	Complete the third study. Continue monitoring Hg deposition in LIS (UCONN) in 2000.

KEY

Type: Commitment; Recommendation

2) Status for dated actions: Complete, Ahead of Schedule, On Schedule, Behind Schedule, Partially Addressed, Not Initiated

Status for *Ongoing Programs* and ongoing *CCMP Actions*: Fully Met, Substantive Progress, Partial Progress, Discontinued

3. IMPROVING HUMAN HEALTH RISK MANAGEMENT (CCMP TABLE 23, P. 68)

CCMP Action	Type[1]	Responsible Parties	When	Estimated Cost	Status[2]	Description	Upcoming Action
T3-3. Develop a strategy for identifying toxic substances of human health risk concern in Long Island Sound seafood species and tolerance levels for those substances.	**R**	**LISS**		**$150,000 per year.**	Not Initiated	Funding and staffing limitations.	

4. MONITORING AND ASSESSMENT OF TOXIC CONTAMINANTS (CCMP TABLE 24, P. 71)

Ongoing Programs	Responsible Parties	Status[2]	Description	Upcoming Action
T4-1. The mussel watch and benthic surveillance components of NOAA's Status and Trends Program and the EPA's Environmental Monitoring and Assessment Program provide regular and systematic sampling of contaminant levels in the Sound.	**NOAA EPA**	Partial Progress	NOAA's Status and Trends Program has continued. However, new sampling under EPA's EMAP program has been scaled back. The program is now focusing on data analysis and environmental indicator development.	CTDEP will participate in EPA's Coastal 2000 monitoring program that builds upon EMAP.

4. MONITORING AND ASSESSMENT OF TOXIC CONTAMINANTS (CCMP TABLE 24, P. 71)

CCMP Action	Type[1]	Responsible Parties	When	Estimated Cost	Status[2]	Description	Upcoming Action
T4-2. A monitoring workshop was held to integrate findings of the LISS and develop a comprehensive, Soundwide monitoring plan for toxic substances.	**C**	**LISS**	**Initiated 1993/ Completed 1994**	**$25,000**	**Complete**	**See Action M 1-7.**	

Y
Type: Commitment; Recommendation

2) Status for dated actions: Complete, Ahead of Schedule, On Schedule, Behind Schedule, Partially Addressed, Not Initiated
Status for *Ongoing Programs* and ongoing *CCMP Actions*: Fully Met, Substantive Progress, Partial Progress, Discontinued

4. MONITORING AND ASSESSMENT OF TOXIC CONTAMINANTS (CCMP TABLE 24, P. 71)

CCMP Action	Type[1]	Responsible Parties	When	Estimated Cost	Status[2]	Description	Upcoming Action
T4-3. Under the auspices of the New York- New Jersey Harbor Estuary Program (HEP), the U.S. Army Corps of Engineers has agreed to develop a work plan and budget to develop systemwide models for PCBs, mercury, and other toxic pollutants that will provide the technical foundation for comprehensive efforts to eliminate these contamination problems in the Sound-Harbor-Bight system. The Corps of Engineers and other participants have agreed to seek the funding necessary to complete these models. Special attention will be directed to fully account for nonpoint sources of mercury.	C	HEP USACOE	1994	Existing staff to be used	Partial Progress	A systemwide model has been developed (Farley-Thomann Model). Field sampling for HEP Contaminant Assessment Reduction Program (CARP) in support of Farley-Thomann Model improvement and validation began in 1999. This includes some sampling in LIS as boundary conditions to NY/NJ Harbor.	Additional modules or sub-models are to be developed. Also, improvements in the model's detail are planned.
T4-4. Monitoring initiatives will be coordinated with the EPA Regional - Environmental Monitoring and Assessment Program (R-EMAP) to further the understanding of sediment toxicity and benthic community structure gradients in western Long Island Sound.	C	CTDEP NYSDEC EPA	Field Work Initiated 1993/ Completed 1994	$200,000	Complete	A final *report Sediment Quality of the NY/NJ Harbor System* was issued in March 1998. The study area extended into western LIS.	
T4-5. Conduct site-specific characterization surveys of water, sediment and biota in harbors where active sources of toxic substances are believed to persist at a rate of two harbors per year.	R	CTDEP NYSDEC		$200,000 per harbor; or $400,000 per year.	Not Initiated	Funding not identified.	
T4-6. Identify sources and sites of PCB loadings to the Sound ecosystem from in-Sound and NY-NJ Harbor Estuary sources. Focus on reducing and eliminating PCB loadings on a priority basis, concentrating on areas of known contamination such as Black Rock Harbor.	R	CTDEP NYSDEC EPA		$200,000 per year	Not Initiated	Funding not identified.	

Y

Type: Commitment; Recommendation

2) Status for dated actions: Complete, Ahead of Schedule, On Schedule, Behind Schedule, Partially Addressed, Not Initiated

Status for *Ongoing Programs* and ongoing *CCMP Actions*: Fully Met, Substantive Progress, Partial Progress, Discontinued

4. MONITORING AND ASSESSMENT OF TOXIC CONTAMINANTS (CCMP TABLE 24, P. 71)

CCMP Action	Type[1]	Responsible Parties	When	Estimated Cost	Status[2]	Description	Upcoming Action
T4-7. Monitor contaminant levels in selected estuarine organisms to ascertain their effects on the biology of the species and their effects on the edibility of the species.	R	LISS CTDEP NYSDEC EPA NMFS USFWS		$300,000 per year	Not Initiated	CTDEP periodically assesses tissue contaminant levels for key seafood species.	Mercury study listed in T3-2 complete. Coastal 2000 will include tissue analysis of finfish.
T4-8. Implement the recommendations from the LISS Monitoring Plan to improve contaminant monitoring.	R	LISS		$15,000.	Not Initiated	Funding not identified.	

5. RESEARCH TO INVESTIGATE TOXIC CONTAMINATION (CCMP TABLE 25, P. 73)

CCMP Action	Type[1]	Responsible Parties	When	Estimated Cost	Status[2]	Description	Upcoming Action
T5-1. The relationship between organism body burdens and their toxic response needs to be investigated as an important mechanism of toxic impact.	R	University Research		$250,000 per year	Not Initiated	Funding not identified.	
T5-2. Trophic level transfer and bioaccumulation effects of contaminants up the food chain need to be quantified to better manage both the aquatic community and human health risk.	R	University Research - State Health Risk Agencies		$500,000 per year	Not Initiated	Funding not identified.	
T5-3. While toxicity testing of sediments and waters is an efficient means of identifying toxicity problems, the relationship between toxicity and specific causative agents needs to be determined.	R	University Research/ Research Lab		$500,000 per year	Not Initiated	Funding not identified.	

Y
Type: Commitment; Recommendation

2) Status for dated actions: Complete, Ahead of Schedule, On Schedule, Behind Schedule, Partially Addressed, Not Initiated
Status for *Ongoing Programs* and ongoing *CCMP Actions*: Fully Met, Substantive Progress, Partial Progress, Discontinued

5. RESEARCH TO INVESTIGATE TOXIC CONTAMINATION (CCMP TABLE 25, P. 73)

CCMP Action	Type[1]	Responsible Parties	When	Estimated Cost	Status[2]	Description	Upcoming Action
T5-4. Evaluate the use of an ecological risk assessment approach, demonstrated in the LISS Black Rock Harbor Action Plan Demonstration Project, for more widespread application to identify toxicity and its sources in embayments and harbors of the Sound.	**R**	**LISS CTDEP NYSDEC EPA**		**$100,000**	Not Initiated	Funding not identified.	
T5-5. Continue to monitor finfish and crustaceans of the Sound with emphasis on determining population response to low dissolved oxygen.	**R**	**CTDEP**	**Continuing**	**See Living Marine Resources and Habitat**		(See Action L9-1)	

Y
Type: Commitment; Recommendation

2) Status for dated actions: Complete, Ahead of Schedule, On Schedule, Behind Schedule, Partially Addressed, Not Initiated
Status for *Ongoing Programs* and ongoing *CCMP Actions*: Fully Met, Substantive Progress, Partial Progress, Discontinued

Reducing Floatable Debris in the Sound

Litter, debris, and trash floating in LIS coastal waters and washing up on LIS shorelines can be a nuisance to, or hazard for boaters, beach-goers, bathers, fishermen, and other recreational or commercial LIS users, and can harm wildlife and reduce aesthetic enjoyment of the Sound.

Strategy:

This CCMP priority area has two principal management actions: 1) controlling floatable debris from combined sewer overflows (CSOs) and storm water sewers; and 2) increasing floatable debris cleanup efforts. There are a total of 14 action items in this category: 5 *Ongoing Programs*, and 9 *CCMP Actions*. In 1999, of the 5 *Ongoing Programs*, 4 are reported as *Fully Met/Substantive Progress;* 1 reported as *Partial Progress*. Of the 9 *CCMP Actions*, 6 are reported as *Completed, Substantive Progress*, or *Fully Met*; 3 are reported as *Not Initiated*.

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Highlights:

- Efforts to control combined sewer overflows and improve stormwater management, described under *Pathogens*, are also helping to reduce the amount of litter reaching the Sound. Communities around the Sound are adopting a watershed management approach to controlling sources of pollution to the Sound, including point and nonpoint sources, CSOs, and land use practices. Many communities have formed watershed management committees or groups to work together in addressing environmental management problems that have no jurisdictional boundaries.

- In 1999, 1,264 volunteers from NYS removed 25,078 lbs of debris from the shoreline along the Sound. In Connecticut, over 598 volunteers removed over 6,680 pounds of trash from 23 miles of shoreline. There were fewer volunteers than in 1998 due to public concerns over mosquitos in the Fall 1999.

- Since 1991, over 18,650 storm drains have been stenciled with the message: *Don't Dump -- Drains to Long Island Sound.*

- In New York, over 3,330 drains have been stenciled with a bi-lingual (Spanish/English) *"Clean Streets = Clean Beaches"* slogan.

- The CT DEP is implementing the EPA Phase II Municipal Stormwater permit system. It is expected that 40 to 50 CT municipalities will be issued municipal general storm water permits.

- In December 1999 CTDEP released its Proposed Solid Waste Management Plan for the 21st Century for public comment. DEP plans hearings in early 2000 and will begin implementing the Plan in 2000.

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SUMMARY OF MANAGEMENT ACTIONS: FLOATABLE DEBRIS

1. CONTROLLING FLOATABLE DEBRIS FROM CSOs AND STORMWATER SEWERS (CCMP TABLE 38, P. 96)

Ongoing Programs	Responsible Parties	Status[2]	Description	Upcoming Action
F1-1. Continue implementation of long-term CSO abatement programs to manage or eliminate all CSO areas remaining in the Long Island Sound region.	**CTDEP NYSDEC NYCDEP and local municipalities**	Substantive Progress	See CSO program description in item PI-1, under the Pathogens section.	
F1-2. Control discharge of stormwater from industrial, construction, and municipal activities in accordance with EPA's national program regulations.	**EPA NYSDEC CTDEP local municipalities**	Partial Progress	CTDEP's three general stormwater permits for industrial, construction, and commercial activities address floatable debris and now have more than 2,000 registrants. The City of New Rochelle has received grants from the State of New York to construct grit and floatable removal on storm sewer outlets (SSOs). In addition, NYSDEC has an administrative order against Westchester County to require construction of settling and floatable removal devices on two SSOs in the New Rochelle sewer district. The system will be designed to handle an approximate two year storm. The City of Larchmont is operating its floatable debris boom at the mouth of Pine Brook..	The CT DEP is implementing the EPA Phase II Municipal Stormwater permit system. It is expected that 40 to 50 CT municipalities will be issued municipal general storm water permits.

2. INCREASING FLOATABLE DEBRIS CLEANUP EFFORTS (CCMP TABLE 39, P. 99)

Ongoing Programs	Responsible Parties	Status[2]	Description	Upcoming Action
F2-1. Continue to implement the *Pack It In/Pack It Out* anti-litter campaign.	**CTDEP and the public**	Fully Met	CTDEP's Parks Division sponsors the "Pack it in-Pack it out" anti-litter campaign, which has led to the elimination of all trash barrels at state parks, including state beaches, except at campground areas. A single trash collection site is provided, which includes a dumpster and marked recycling bins, for people who don't want to transport their trash home. The program has been very successful with no noticeable increase in litter at the parks and beaches.	
F2-2. The New York-New Jersey Harbor Estuary Program has developed detailed short- and long-term floatable debris action plans for the New York-New Jersey Harbor.	**USACOE NYSDEC NYCDEP NJDEP**	Fully Met	The floatable debris action plan continues to be implemented. A Floatables Action Plan Assessment Report for the 1995-97 period was finalized by EPA Region II in March 1998.	

Y
Type: Commitment, Recommendation

2) Status for dated actions: Complete; Ahead of Schedule, On Schedule, Behind Schedule, Partially Addressed, Not Initiated
Status for *Ongoing Programs* and ongoing *CCMP Actions*: Fully Met, Substantive Progress, Partial Progress, Discontinued.

2. INCREASING FLOATABLE DEBRIS CLEANUP EFFORTS (CCMP TABLE 39, P. 99)

Ongoing Programs	Responsible Parties	Status[2]	Description	Upcoming Action
F2-3. National Beach Cleanup Program. As part of this program, annual cleanups of Long Island Sound shorelines have taken place since 1988. This program costs $10,000 per year per state to coordinate and support volunteer efforts.	**NYSDEC CT Sea Grant Program American Littoral Society Volunteers**	Fully Met	In Connecticut, the cleanups are coordinated by CT Sea Grant. In New York, data on debris is compiled and stored by the American Littoral Society and NYSDEC. The beach cleanup includes land and underwater cleanups. In addition, various non-profit LIS groups have clean-ups on a regular basis with CTDEP assistance. In 1999, 1,264 volunteers from NYS removed 25,078 lbs of debris from the shoreline along the Sound. In Connecticut, 598 volunteers removed 6,680 pounds of trash from 23 miles of shoreline. The number of volunteers was reduced from 1998 due to public concerns over mosquitos in the Fall 1999.	The next event is scheduled for September 2000.

2. INCREASING FLOATABLE DEBRIS CLEANUP EFFORTS (CCMP TABLE 39, P. 99)

CCMP Action	Type[1]	Responsible Parties	When	Estimated Cost	Status[2]	Description	Upcoming Action
F2-4. Continue to implement *Clean Streets/Clean Beaches* anti-litter campaign.	**C**	**Coalition of public and private groups in New York and New Jersey**	**This action was initiated in 1992 and is ongoing.**	**$100,000 grant from the EPA**	Substantive Progress	NY Sea Grant developed stencils in English and Spanish with support from an EPA grant, and continues to distribute stencils in NY.	
F2-5. Conduct a demonstration project to encourage proper solid waste handling and recycling at five marinas.	**C**	**NYSDEC**	**1991**	**$71,000 grant from the EPA**	**Complete**	**Actions include recycling of materials and disposal of used fishing gear.**	
F2-6. Expand involvement in *Coastweeks* program to include a second beach cleanup in the spring, prior to the beach season.	**R**	**LISS Management Conference**		**$20,000 per year**	Not Initiated		
F2-7. Continue to coordinate volunteers to paint stenciled messages on storm drains, such as *Don't Dump - Drains to Long Island Sound.*	**R**	**NY Sea Grant LISS Volunteers**	**Ongoing**	**$5,000. See Public Involvement and Education**	Fully Met	CTDEP has funded storm drain stenciling through §319 funding and the CT License Plate Fund. More than 6,250 storm drains have been stenciled to date in Connecticut. NY Sea Grant distributed 92 stencils to 5 groups in 1999. Save the Sound, Inc. distributes stencils in Connecticut.	NY Sea Grant and Save the Sound, Inc. will continue the storm drain stenciling program. Possible storm drain stenciling is planned for the Vernon/Manchester and East Hartford area of the Hockanum River.

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Type: Commitment, Recommendation

2) Status for dated actions: Complete; Ahead of Schedule, On Schedule, Behind Schedule, Partially Addressed, Not Initiated
Status for *Ongoing Programs* and ongoing *CCMP Actions*: Fully Met, Substantive Progress, Partial Progress, Discontinued.

2. INCREASING FLOATABLE DEBRIS CLEANUP EFFORTS (CCMP TABLE 39, P. 99)

CCMP Action	Type[1]	Responsible Parties	When	Estimated Cost	Status[2]	Description	Upcoming Action
F2-8. Maintain clean beaches and minimize resuspension of debris back into Long Island Sound waters by: **-Cleaning beaches in the evening to prevent resuspension overnight.** **-Using solid waste receptacles with lids instead of the open mesh type.** **-Providing recycling containers in convenient locations.** **-Using environmentally responsible containers for food and beverages at concession stands.**	R	State and local governments	Ongoing	Varies with facility.	Substantive Progress	Many of the actions listed are being undertaken at local beaches throughout Long Island.	Continue program
F2-9. Distribute a directory of volunteer groups in the Long Island Sound watershed that work on projects and activities to reduce marine debris.	R	LISS		See Public Involvement and Education	Not Initiated		
F2-10. Encourage the public and manufacturers to promote recycling, use less packaging, and substitute products made from degradable material whenever possible.	R		Ongoing		Substantive Progress	The CTDEP proposed *Solid Waste Management Plan for the 21st Century* has set goals to reduce the quantity and toxicity of solid waste. Implementation includes developing packaging regulations to reduce the volume and weight of packaging and educating consumers and businesses to products with less toxicity and with recycled material content.	Finalize the Plan and implement most of the Plan elements by 2005.
F2-11. Encourage marina operators to accept responsibility for litter control and recycling.	R	NYSDEC CTDEP	Ongoing		Substantive Progress	NYSDEC's *Marina Management Guide* addresses a number of issues, including floatable debris NYSDEC uses the *Guide* in its *Tidal Wetlands and Protection of Waters* permitting operations CTDEP's *Marina Best Management Practices* manual addresses many potential pollution problems including litter.	
F2-12. Require floatation materials that are resistant to decomposition and fragmentation.	R	NYSDEC Local Municipals			Not Initiated		

[1] Type: Commitment, Recommendation

[2] Status for dated actions: Complete; Ahead of Schedule, On Schedule, Behind Schedule, Partially Addressed, Not Initiated
Status for *Ongoing Programs* and ongoing *CCMP Actions*: Fully Met, Substantive Progress, Partial Progress, Discontinued.

Managing and Conserving Living Resources and Their Habitats

Restoring and protecting the overall abundance and diversity of habitats and living marine resources in the Sound ultimately improves both its ecological balance and economic well-being. Years of neglect, mismanagement, and damaging actions have diminished the abundance and diversity of habitats and marine resources, causing water quality problems, adversely affecting land use, and contributing to damaging economic impacts from flooding, erosion and runoff pollution.

Strategy:

The LIS Habitat Restoration Strategy was adopted by the LISS in February 1998. Its goals are to: 1) continue the active partnership among Federal agencies, states, local municipalities, and the public through the New York Sea Grant, the CAC, and environmental groups; 2) restore the ecological functions of degraded and lost habitat; 3) restore at least 2,000 acres and 100 miles of river corridor to anadromous fish within the first ten years of the initiative; and 4) complete a habitat restoration manual by Spring 1998.

There are 26 *Ongoing Programs* and 48 *CCMP Actions* in this priority area. In 1999, the majority of *Ongoing Programs* are reported as *Substantial Progress*; of the 48 *CCMP Actions*, 3are reported as *Complete*; 34 *Substantive Progress/Fully Met/ Partial Progress;* 2 *Behind Schedule*; 8 *Not Initiated*; 1 *Discontinued.*

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Highlights:

- The single most noteworthy event of 1999 affecting living resources in Long Island Sound was the significant loss of the American lobster, *Homarus americanus*, in the western Sound. At the urging of lobstermen, and at the request of the Governors of New York and Connecticut, the Secretary of Commerce declared a lobster fishery failure in the Sound. This opened the way for further Congressional action to provide Federal disaster relief to lobster fishers from both states, and research funds to assist in the investigation of the cause of the mortalities.

  As of this writing, the cause of the lobster mortalities has not yet been determined by scientists and researchers engaged in studies and tests on affected western Long Island Sound lobsters. Scientists at the University of Connecticut have identified a parasite, *paramoeba,* in nerve tissues of affected lobsters. The exact species of this parasite, and its relationship to the lobster deaths has not of yet been scientifically established.

- The LISS issued a Request for Proposals in November 1999 to study, among other topics, the causes of the lobster mortalities in the Sound. In 1999, the Management Committee reserved funds to create a LIS research program to address basic understanding of the Sound as an ecosystem. The Connecticut and New York Sea Grant programs are partners in this effort, committing funds to the research program in 1999.

- The states of Connecticut and New York made excellent overall progress toward the goals of the Habitat Restoration Strategy. Connecticut has restored over 68 acres of tidal wetland and 22.5 miles of river corridor has been reopened to anadromous fish. New York has provided over $2.5 million in state Bond Act funds in 1999 to restore 85 acres of aquatic habitat. The Baxter Pond project was completed in 1999.

Long Island Sound Study

- During 1999, Connecticut acquired 2,910 acres for open space at a cost of nearly $10.6 million, while assisting municipalities, land trusts, and water companies with the purchase of another 4,203 cares with $10 million through the state DEP open space grant program.

- The Long Island Sound Watershed Alliance (LISWA) passed a Resolution at its April 1999 meeting supporting the creation of a Long Island Sound Reserve system, as called for in the CCMP.

1999 CCMP Tracking Report

- The CAC sent a letter to the Policy Committee in June 1999 supporting the creation of a LIS reserve that would identify and protect open space and underwater habitats in the Sound. A coalition of interest groups is working to implement this CCMP action.

SUMMARY OF MANAGEMENT ACTIONS: MANAGEMENT AND CONSERVATION OF LIVING RESOURCES AND THEIR HABITATS

1. RESTORATION AND ENHANCEMENT OF AQUATIC AND TERRESTRIAL HABITATS (CCMP TABLE 40, P.107)

Ongoing Programs	Responsible Parties	Status[2]	Description	Upcoming Action
L1-1. Connecticut, New York, and federal agencies will continue to pursue restoration of degraded habitat.	**NYSDEC NYSDOS CTDEP CTDOT USFWS USACE USEPA**	**Substantive progress**	The LIS Habitat Restoration Plan to restore 2,000 acres of habitat and 100 miles of riverine migratory corridor is being implemented by an interagency team. In Connecticut for 1999, 5 tidal wetland restoration projects were competed for a total of 68 acres and 11 riverine migratory corridor projects were completed for a total of 22.5 miles. Significant progress was made in the development of a scope of work and the design contract language for the Old Field Creek wetland restoration that is funded through ISTEA and EP"s Coves and Embayments Program. DEP and NOAA have selected two riverine migratory projects that will be funded with oil spill recovery funds. The USACE reconnaissance study and associated scope of work was completed and evaluated by CTDEP. Due to funding constraints, only one of the riverine migratory corridor projects will enter the design stage. The Wetland Team and Riverine Migratory Team have each identified work priorities for the year 2000. DEP identified two new populations of the invasive water chestnut on the tidal Connecticut River in the Hartford area. One population was harvested and the second population was located too late to begin control measures.	Third phase of Orient Point County (NY) Park grassland restoration project scheduled to begin Spring 2000.
L1-2. Through Connecticut's coastal permit programs and consistency with the CT Coastal Management Act, applicants may be required to protect, restore or enhance aquatic resources.	**CTDEP**	**Substantive progress**	Through the requirements of the Coastal Zone Management Act and permitting programs, tidal wetlands, intertidal flats, submerged aquatic plants, and beaches and dunes are preserved. During 1999 several permitted activities resulted in a net positive impact of 90 acres of tidal wetlands.	
L1-3. Connecticut preparing a tidal wetland management plan that includes an identification of potential wetland restoration sites.	**CTDEP**	**Complete**	**A wetland restoration plan has been developed that identifies restoration goals, strategies, and includes an inventory of potentially restorable sites. This inventory has been upgraded to include the delineation of the identified sites in GIS as part of the LISS habitat restoration initiative.**	
L1-4. Connecticut will continue the Coves and Embayments Restoration program to restore degraded tidal and coastal embayments and coves.	**CTDEP**	**Fully Met**	CTDEP continued its Coves and Embayments program in 1999. The 5 wetland projects completed in 1999 and reported in L1-1 were funded in part by the Coves and Embayment program. These include 2 sites within Hammonassett State Park in Madison, the East River in Guilford, Mill Meadows in Old Saybrook and Davis Pond marsh in East Lyme. The Mill Meadow project represents the second wetland restoration project in the Nation to be completed with matching funds from DOT's ISTEA.	Coves & Embayments program is beginning to automate project database and considering a web site in the future for sharing information on restoration projects.

Y: 1) Type: Commitment, Recommendation

2) Status for dated actions: Complete, Ahead of Schedule, On Schedule, Behind Schedule, Partially Addressed, Not Initiated
Status for *Ongoing Programs* and ongoing *CCMP Actions*: Fully Met, Substantive Progress, Partial Progress, Discontinued

1. RESTORATION AND ENHANCEMENT OF AQUATIC AND TERRESTRIAL HABITATS (CCMP TABLE 40, P.107)

Ongoing Programs	Responsible Parties	Status[2]	Description	Upcoming Action
L1-5. Connecticut, New York, and federal agencies currently administer programs for the restoration of habitats other than tidal wetlands such as dunes, submerged aquatic vegetation, and coastal woodlands.	**CTDEP NYSDEC USFWS**	**Fully Met**	See Ongoing Program L1-1.	
L1-6. New York is phasing out, and Connecticut prohibits, maintenance ditching of mosquito ditches in favor of selective use of open marsh water management techniques to control mosquitos and restore pools and ponds on tidal wetlands.	**CTDEP NYSDEC federal agencies**	**Fully Met**	Grid ditching was discontinued in Connecticut in 1985 and replaced with open marsh management. Ditches are gradually filling and restoring marsh habitat. In some cases, ditches are plugged with soil. On NYS property, remnant mosquito ditches are being used to control mosquito reproduction and minimize Phragmites colonization through salt water retention.	

1. RESTORATION AND ENHANCEMENT OF AQUATIC AND TERRESTRIAL HABITATS (CCMP TABLE 40, P.107)

CCMP Action	Type[1]	Responsible Parties	When	Estimated Cost	Status[2]	Description	Upcoming Action
L1-7. Coastal America, a cooperative effort of several federal agencies, is conducting a study in Connecticut to evaluate the impacts of transportation facilities upon ten tidal wetland sites. This study is sponsored by the CTDEP and undertaken by the USACE. When the study is completed, restoration plans will be developed for those sites where a transportation facility is shown to be the cause of degradation. Restoration is expected to be implemented through a combination of ISTEA, Water Resources Development Act, Long Island Sound Cleanup Account funds, New York's Environmental Protection Fund, and, where appropriate, natural resources damages recovered under CERCLA or OPA90.	**C**	**CTDEP CTDOT Coastal America Partners**	**Study was completed in 1994; restoration projects will proceed as funding is approved.**	**$100,000 for the initial study; restoration costs will vary for each project site.**	Study Complete	The study identified 5 tidal wetlands that were degraded as a result of transportation facilities. CTDEP developed a justification for restoring these sites using ISTEA funds and Coastal America and CTDOT received funding. One of the original restoration projects identified in the Coastal America study has been completed by CTDEP. Mill Meadows in Old Saybrook was completed through a CTDEP, CTDOT and town of Old Saybrook partnership. The CT Coves and Embayment Program and DOT's ISTEA program provided the funding for this project.	Continue to implement the remaining 3 projects and present new ones to Coastal America for consideration.

KEY: 1) Type: Commitment, Recommendation

2) Status for dated actions: Complete, Ahead of Schedule, On Schedule, Behind Schedule, Partially Addressed, Not Initiated
Status for *Ongoing Programs* and ongoing *CCMP Actions*: Fully Met, Substantive Progress, Partial Progress, Discontinued

1. RESTORATION AND ENHANCEMENT OF AQUATIC AND TERRESTRIAL HABITATS (CCMP TABLE 40, P.107)

CCMP Action	Type[1]	Responsible Parties	When	Estimated Cost	Status[2]	Description	Upcoming Action
L1-8. Connecticut's Coves & Embayments Program will complete nine restoration projects in progress and commitments to begin three new projects.	**C**	**CTDEP in cooperation with the municipal sponsor**	**Varies depending on project**	**$263,625 for projects in progress and $123,475 for projects to commence**	**Complete**	**See Ongoing Program L1-1 and L1-4**	
L1-9. Connecticut and New York should continue to pursue the use of funds from the following programs, and explore additional funding sources, to support restoration and enhancement activities described in the previous recommendation: The Land and Water Conservation Fund, the Intermodal Surface Transportation Efficiency Act (ISTEA) Enhancement Program, the Partners in Wildlife Program,§ 319 of the Clean Water Act, Army Corps of Engineers Section 22 Planning Funds, the Water Resources Development Act, National Coastal Wetlands Conservation Grants, the North American Waterfowl Management Plan, Connecticut's Long Island Sound Cleanup Funds, and the Coastal Zone Management Act.	**R**	**CTDEP CTDOT NYDOT NYSDEC NYSDOS EPA USACE USFWS**	**Ongoing**	**Existing staff will be used; project costs vary from site to site**	Substantive progress	CTDEP has a number of tidal wetland projects in progress using cited funds. With a §319 NPS grant CTDEP completed projects in 1999 at: Hammonasset Beach State Park; Higganum Cove, a tidal wetland in the Connecticut River estuary; and Jordan Cove. CT state Oil Spill funds restored Davis Pond, East Lyme. NYSDEC and USFWS are pursuing grants cooperatively through local governments for various habitat restoration projects to be funded by the USFWS.	CT is continuing to complete projects and is discussing other potential wetland restoration sites. Additional funding is being sought through the EPA Five Star Restoration Challenge Grant Program to conduct restoration of Lord's Cove on the lower CT River in Lyme. The LISS will continue to work to identify and secure funding for habitat restoration and enhancement activities on Long Island Sound.

Y: 1) Type: Commitment, Recommendation

2) Status for dated actions: Complete, Ahead of Schedule, On Schedule, Behind Schedule, Partially Addressed, Not Initiated
Status for *Ongoing Programs* and ongoing *CCMP Actions*: Fully Met, Substantive Progress, Partial Progress, Discontinued

1. RESTORATION AND ENHANCEMENT OF AQUATIC AND TERRESTRIAL HABITATS (CCMP TABLE 40, P.107)

CCMP Action	Type[1]	Responsible Parties	When	Estimated Cost	Status[2]	Description	Upcoming Action
L1-10. The rapid displacement of native brackish and fresh tidal plant communities on the Connecticut River has been identified as the single most significant habitat problem in this estuary. A specific restoration program for the control of common reed in these tidal wetlands needs to be implemented to check and reverse the spread of common reed and develop the most efficient means of effecting this restoration. Control techniques need to be evaluated for the full range of wetland habitat types on the river. Baseline surveys will be established and post-control monitoring over multiple years will be conducted.	R	CTDEP USFWS	3 years	$130,000 for amphibious mulching machine and $100,000 for staff, supplies, and monitoring.	Substantive Progress	The restoration of degraded brackish marshes is ongoing in the lower Connecticut River. Restoration has begun on Nott Island WMA in Lyme. A $224,000 matching grant through North American Waterfowl and Wetlands, and North American Wetlands Conservation Grant will be used to restore 350 acres of phragmites-dominated habitat on Great Island and Upper Island, Lyme. Research funds from the LIS License Plate Program were awarded to Yale University to study the genetic structuring of common reed on the tidelands of the CT River. A phragmites working group consisting of managers, scientists, and other interested parties has been established to develop a strategy for dealing with phragmites invasion, particularly on the lower CT River. Two populations of the invasive water chestnut (See L1-1) were identified in the tidal Connecticut River. One population was harvested in Glastonbury in 1999 and the other was found too late in the season to harvest.	
L1-11. New York should continue to phase out maintenance ditching for mosquito control. These programs should receive additional support for selective use of open marsh water management techniques to control mosquitos and restore pools and ponds on tidal wetlands.	R	NYSDEC in cooperation with mosquito control agencies		$1,000 per acre for open marsh water management	Partial Progress	This activity is ongoing in Suffolk County with cooperative efforts between Suffolk County Vector Control, NYSDEC, and USFWS.	Program is continuing. (See L1-6)
L1-12. Obtain long-term funding for Connecticut wetland restoration staff.	R	CTDEP	Upon approval of funding	$250,000 per year for staff	Not Initiated	The Wetland Restoration staff remains funded by municipal and state funds on a project by project contractual basis.	Continue efforts to secure permanent, continuing funding.

KEY: 1) Type: Commitment, Recommendation

2) Status for dated actions: Complete, Ahead of Schedule, On Schedule, Behind Schedule, Partially Addressed, Not Initiated
Status for *Ongoing Programs* and ongoing *CCMP Actions*: Fully Met, Substantive Progress, Partial Progress, Discontinued

1. RESTORATION AND ENHANCEMENT OF AQUATIC AND TERRESTRIAL HABITATS (CCMP TABLE 40, P.107)

CCMP Action	Type[1]	Responsible Parties	When	Estimated Cost	Status[2]	Description	Upcoming Action
L1-13. Connecticut and New York should develop a restoration plan for the full range of coastal terrestrial and estuarine aquatic habitats adjacent to and in Long Island Sound. The restoration plan will include a list of potential restoration projects and a priority listing of projects to be implemented. Preliminary sites identified for future restoration in New York include: City Island ($300,000); Pelham Bay Park ($400,000); Wading River ($50,000); Sunken Meadow Creek ($50,000); Crab Meadow ($50,000); and Mattituck Creek ($100,000). Other sites in New York where costs have not been estimated include Pugsley Creek, Udall's Cove, Oak Neck Creek, Frost Creek, and East Creek. Connecticut has estimated that ten priority sites could be restored for $750,000, or approximately $75,000 per site.	R	CTDEP NYSDEC NYSDOS EPA NOAA USACE USFWS	3 years - (1996-1998)	$50,000 per year for each state for three years; restoration costs will vary depending upon project type.	Complete	The initiative is being implemented through an interagency team focusing on 12 terrestrial and aquatic habitat types. See Ongoing Program L1-1.	
L1-14. New York should strengthen their capabilities for implementing programs that restore degraded habitats. This should be undertaken in cooperation with the implementation of the Long Island Sound Regional Coastal Management Plan.	R	NYSDEC NYSDOS		$250,000 per year	Partial Progress	The NY State Clean Water/Clean Air Bond Act will fund some aquatic restoration projects. See L1-1.	The LIS Coastal Advisory Commission action plan is expected to be released in Spring 2000.

Y: 1) Type: Commitment, Recommendation

2) Status for dated actions: Complete, Ahead of Schedule, On Schedule, Behind Schedule, Partially Addressed, Not Initiated
Status for *Ongoing Programs* and ongoing *CCMP Actions*: Fully Met, Substantive Progress, Partial Progress, Discontinued

2. HABITAT PROTECTION AND ACQUISITION (CCMP TABLE 41, P.110)

Ongoing Programs	Responsible Parties	Status[2]	Description	Upcoming Action
L2-1. The states of Connecticut and New York and the USACE will continue to implement their permit programs and coastal consistency provisions of states' Coastal Management Programs to regulate use and development of aquatic resources and critical habitats such as tidal and freshwater wetlands, intertidal flats, submerged aquatic vegetation beds, beaches, and dunes. **These programs also regulate dredging and the disposal of dredged sediments at designated sites in Long Island Sound. Open water disposal is only permitted at the designated open water sites and may only occur if the disposal will not cause adverse impacts to estuarine organisms.**	**CTDEP** **NYSDEC** **NYSDOS** **USACE** **EPA**	Substantive Progress	CTDEP continues to implement its coastal permitting and Federal consistency review programs. During 1999, there were 314 permit and 6 Federal consistency actions. In addition, several new enhancements have occurred during this period. NYSDEC regulates dredging activities through its Tidal Wetlands and Protection of Waters Regulations.	SAV maps are being finalized for distribution to towns and Federal agencies.
L2-2. Connecticut will continue to reduce habitat degradation caused by storm water runoff projects (e.g. chronic dilution effects and sedimentation) through the goal of retaining the first one-inch of runoff.	**CTDEP**	Substantive Progress	This issue is addressed by the CTDEP in the review of any municipal project along the coast requiring mandatory coastal site plan review. The coastal permit program addresses this issue only when the discharge is directly into tidal wetlands and coastal waters. This provision has also been incorporated into the storm water general permits for industrial and construction activity.	Coastal municipalities applying for Phase II municipal storm water permits will work with CTDEP storm water permitting.

KEY: 1) Type: Commitment, Recommendation

2) Status for dated actions: Complete, Ahead of Schedule, On Schedule, Behind Schedule, Partially Addressed, Not Initiated
Status for *Ongoing Programs* and ongoing *CCMP Actions*: Fully Met, Substantive Progress, Partial Progress, Discontinued

2. HABITAT PROTECTION AND ACQUISITION (CCMP TABLE 41, P.110)

Ongoing Programs	Responsible Parties	Status[2]	Description	Upcoming Action
L2-3. Connecticut and New York have programs to acquire by easement, fee simple acquisition, or other means habitats important for populations of plants and animals. These programs include the development of priority listings for acquisition and protection. **Connecticut and New York have land acquisition and management programs that use state funds and federal fund programs such as the Land and Water Conservation Fund, the National Coastal Wetland Conservation Program, and the North American Waterfowl Management Plan to protect and acquire coastal lands and wetlands.**	**CTDEP**	Partial Progress	Land acquisition of open space in CT continues under the Recreation and Natural Heritage Trust Program (RNHT) using state bond funds. The RNHT plans to provide $166 million in state bond funds for open space acquisitions by the year 2023. During 1999 CTDEP acquired 2,910 acres at a cost of nearly $10.6 million while assisting municipalities, land trusts, and water companies with the purchase of another 4,203 acres with $10 million through DEP's open space grant program CTDEP manages real property interests for over 211,000 acres of forest, park, wildlife, fishery, water access and natural areas. The state's goal is to reserve not less than 10percent of open/preserved space in Connecticut under DEP ownership and 21percent open/preserved space combined (federal, municipal, and nonprofit).ownership by the year 2023. The open space acquisitions made during 1999 bings Connecticut closer to the goal of 673,210 acres. Currently, an estimated 438,900 acres of open space are owned by the state, Federal government, municipalities, water companies and land conservation organizations (65% of goal). Highlights of land acquired include: Trout Brook Valley in Easton and Weston, acquired in partnership with the Aspetuck Land Trust and the Nature Conservancy; which added over 685 acres of open space to Connecticut providing vistas of LIS and the Saugatuck Reservoir; Oppell property, 2.26 acres: parcel fronts on the Connecticut River and within area of international significant wetlands; Hull property, 7.5 acres: donation of inaccessible property adjacent to Plum Bank Marsh Wildlife Area; Jordan Cove Property, 7 acres: property located in Jordan Cove-Pleasure Beach area of Waterford. Critical habitat located on the site, which includes piping plovers.	CTDEP is committing $6 million for the first round of 2000 and will apply for $12 million under RNHT before the State Bond Commission. NY is updating its open space plan in 2000 to include specific recommendations for LIS acquisition sites.
L2-4. The USFWS maintains a national system of refuges, which includes the Stewart B, McKinney National Wildlife Refuge in Connecticut (i.e., Salt Meadow, Chimon Island, Sheffield Island, Goose Island, Milford Point and Falkner Island Units) and Long Island National wildlife Refuge Complex in New York (i.e., Oyster Bay and Target Rock Units).	**USFWS**	Substantive Progress	USFWS continues to maintain its refuges in CT and NY.	

Y: 1) Type: Commitment, Recommendation

2) Status for dated actions: Complete, Ahead of Schedule, On Schedule, Behind Schedule, Partially Addressed, Not Initiated
Status for *Ongoing Programs* and ongoing *CCMP Actions*: Fully Met, Substantive Progress, Partial Progress, Discontinued

2. HABITAT PROTECTION AND ACQUISITION (CCMP TABLE 41, P.110)

Ongoing Programs	Responsible Parties	Status[2]	Description	Upcoming Action
L2-5. Congress has authorized the creation of the Silvio Conte Connecticut River National Fish and Wildlife Refuge within the Connecticut River Watershed for the purpose of conserving, protecting and enhancing the Connecticut River Valley populations of plants, fish, and wildlife; preserving natural diversity and water quality; fulfilling international treaty obligations relating to fish and wildlife; and providing opportunities for scientific research and education.	**USFWS**	Substantive Progress	The USFWS has identified 48 focus areas within the 7.2 million acre, 4 state Connecticut River watershed, that support natural diversity in the watershed. The 180,000 acres in the focus areas are targeted for additional protection and management. The Refuge emphasizes partnerships and challenge grants to achieve its goals. In February 2000, the Refuge announced the award of $88,922 to fund 22 projects in the Connecticut River watershed. (www.fws.gov/r5soc/)	
L2-6. Connecticut has established a Migratory Bird Conservation Stamp Program, the proceeds of which can be used for acquisition and management. The newly created state income tax form check off for endangered species, natural areas preserves, and watchable wildlife creates a fund that can be used for the identification, protection, conservation, management, and education activities related to the above listed wildlife and habitats.	**CTDEP**	Substantive Progress	Conservation Stamp program funds were used, in addition to other state and Federal program funds for the following tidal wetland restoration activities in 1999: Cromwell Meadows Wildlife Management Area (WMA) in Cromwell; Nott Island WMA Habitat Restoration (Phase I - Phragmites control) in Lyme, and the East River (WMA) Marsh Restoration Project in Guilford, and the Quinnipiac River and South Cove in Old Saybrook.	Projects expected to be completed in 2000: Great Meadow Marsh; the Housatonic River Marshes in Stratford, and the Great Island Complex WMA March restoration project in Old Lyme.

KEY: 1) Type: Commitment, Recommendation

2) Status for dated actions: Complete, Ahead of Schedule, On Schedule, Behind Schedule, Partially Addressed, Not Initiated
Status for *Ongoing Programs* and ongoing *CCMP Actions*: Fully Met, Substantive Progress, Partial Progress, Discontinued

2. HABITAT PROTECTION AND ACQUISITION (CCMP TABLE 41, P.110)

CCMP Action	Type[1]	Responsible Parties	When	Estimated Cost	Status[2]	Description	Upcoming Action
L2-7. Create a Long Island Sound Reserve System consisting of areas of land and water of outstanding or exemplary scientific, educational, or biological value to reflect regional differentiation and variety of ecosystems and to include representatives of all of the significant natural habitats found in the Sound. Where appropriate, sites will be selected from existing lands and wetlands held for conservation purposes so that acquisition funds will be directed towards those lands in private ownership that are needed to complete the reserve system. **The primary activities in the recommendation include site identification (2 years) and site protection through the development of management plans, acquisition where necessary, and site management.**	R	**CTDEP NYSDEC NYSOPRHP USFWS Long Island Sound Bi-state Committee**		**$50,000 per year for each state for staff to identify sites, develop acquisition strategies and manage the reserve complex. Acquisition costs will depend upon areas identified for protection through purchase.**	Partial Progress	The Long Island Sound Watershed Alliance (LISWA) prepared a resolution at its April 1999 meeting to support the creation of a LIS reserve. In June 1999 the LISS Citizens Advisory Committee (CAC) sent a letter to the LISS Policy Committee highlighting the creation of a LIS reserve as a priority action. A work group began meeting in July 1999 to work out the details of identifying a LIS reserve, criteria for habitat acquisition, funding options, and which agencies will have oversight responsibilities.	A coalition of groups is planning further action in 2000 to assess citizen involvement and participation in the LIS reserve process.
L2-8. Connecticut and New York should continue to acquire or protect through less than fee simple means, significant coastal habitats through funding sources such as the Land and Water Conservation Fund, the National Coastal Wetland Conservation Program, the North American Waterfowl Management Plan, Connecticut's Recreation and Natural Heritage Trust Program, Connecticut's Migratory Bird Conservation Stamp Program, New York's Environmental Protection Fund, and, where appropriate, natural resource damages recovered under CERCLA or OPA90.	R	**CTDEP NYSDEC Assistance of local governments, environmental groups and federal granting agencies.**		**$50,000 per year for each state for staff.**	Partial Progress	As an example of habitat protection through less than fee-simple, more than 70 acres of high quality tidal marsh on the CT River in the Cromwell Meadows was donated to the CT Audubon as part of an supplemental environmental penalty. See L2-3.	CTDEP will continue to use RNHT to fund habitat land acquisition in Connecticut.

Y: 1) Type: Commitment, Recommendation

2) Status for dated actions: Complete, Ahead of Schedule, On Schedule, Behind Schedule, Partially Addressed, Not Initiated
Status for *Ongoing Programs* and ongoing *CCMP Actions*: Fully Met, Substantive Progress, Partial Progress, Discontinued

2. HABITAT PROTECTION AND ACQUISITION (CCMP TABLE 41, P.110)

CCMP Action	Type[1]	Responsible Parties	When	Estimated Cost	Status[2]	Description	Upcoming Action
L2-9. Acquire and protect those sites that are considered for acquisition in the New York State Open Space Conservation Plan. Sites include Oyster Bay Harbor ($5 million); Porpoise Channel ($2 million); Plum Point ($1 million); Udall's Cove ($8 million). Other sites on Long Island Sound that are among the state's highest priority acquisition sites include: Bronx River Trailway, Udall's Ravine, Alley Creek ($750,000); Long Creek and Mattituck Creek ($340,000); Premium River ($750,000); and Cedar Beach Creek ($186,000).	**R**	**NYSDEC NYSOPRHP**		**Priority sites for acquisition total $16 million**	Partial Progress	New York has made allocations for land acquisitions through the Clean Air/Clean Water Bond Act.	New York State is updating its open space plan in 2000 with a focus on LIS areas.
L2-10. Acquire and protect those sites that are considered priorities for acquisition in Connecticut. The Great Meadows site is the highest priority. (See also Ongoing Programs portion of this table in the CCMP.)	**R**	**CTDEP USFWS**		**$14 million**	Partial progress	The lower CT River, designated as a Wetland of International Importance, is a priority. See action L2-8.	
L2-11. Encourage activities of existing Long Island Sound-specific land trusts and encourage formation of new trusts, to seek donations and easements of localized habitat areas for the plants and animals of Long Island Sound.	**R**	**NYSDEC EPA-LIS Office**		**Redirect base program**	Not Initiated		

KEY: 1) Type: Commitment, Recommendation

2) Status for dated actions: Complete, Ahead of Schedule, On Schedule, Behind Schedule, Partially Addressed, Not Initiated
Status for *Ongoing Programs* and ongoing *CCMP Actions*: Fully Met, Substantive Progress, Partial Progress, Discontinued

3. INVENTORIES AND MANAGEMENT STRATEGIES FOR AQUATIC AND TERRESTRIAL HABITATS (CCMP TABLE 42, P.112)

Ongoing Programs	Responsible Parties	Status[2]	Description	Upcoming Action
L3-1. Connecticut, New York and The Nature Conservancy will continue the Natural Diversity Database in Connecticut and the Natural Heritage Program in New York. These programs collect, maintain, and update information pertaining to significant terrestrial and aquatic habitats.	**CTDEP NYSDEC NYSOPRHP**	Fully Met	CTDEP's natural diversity database maintains information about locations of state listed species (plants, vertebrates, invertebrates), populations and status, including population size, threats, and dates observed. NYSDEC maintain a database concerning significant fish, wildlife, and plant resources and significant ecological areas. The NY State Office of Parks, Recreation and Historic Preservation (NYSOPRHP) established its own natural resources inventory unit which will be closely coordinated with the National Heritage Database.	
L3-2. The USFWS will continue the Southern New England-New York Bight Coastal and Estuary Project. The project focuses on assessing and monitoring the regional geographic distribution and population status of a large number of key species called *Species of Special Emphasis* and their habitats including evaluating the threats to physical integrity of these habitats and the viability of species populations. Primary objectives are to determine and delineate those regionally important habitats and species populations requiring both immediate and long term protection, conservation, enhancement, and restoration.	**USFWS**	Substantive Progress	The Project, located in Charlestown, Rhode Island, coordinates FWS coastal activities. Its 5 tasks are: 1) inventorying and assessing the status of living coastal resources and habitats in the coastal region; 2) identifying and assessing threats to these resources; 3) developing regional or estuary-wide strategies to protect, restore and enhance living resources and their habitats; 4) coordinating and facilitating the implementation of resource protection enhancement, and restoration strategies; and 5) promoting environmental education and public awareness of coastal living resources, the threats they face, and the opportunities for the public to become involved in the solutions. In 1999, Project staff have actively participated in the LISS Habitat Restoration initiative and in discussions on a LIS reserve system. In 1999, Project staff participated on the LISS public information and education program Small Grants Review Team.	

Y: 1) Type: Commitment, Recommendation

2) Status for dated actions: Complete, Ahead of Schedule, On Schedule, Behind Schedule, Partially Addressed, Not Initiated
Status for *Ongoing Programs* and ongoing *CCMP Actions*: Fully Met, Substantive Progress, Partial Progress, Discontinued

3. INVENTORIES AND MANAGEMENT STRATEGIES FOR AQUATIC AND TERRESTRIAL HABITATS (CCMP TABLE 42, P.112)

CCMP Action	Type[1]	Responsible Parties	When	Estimated Cost	Status[2]	Description	Upcoming Action
L3-3. The NYSDEC will, on a pilot basis, develop a site-specific habitat management strategy for the Oyster Bay/Cold Spring Harbor complex. Phase II will entail implementation of the identified strategy.	**C**	**LISS NYSDEC**	**Initiated in fall 1992, strategy to be completed in winter 1994**	**$50,000 of LISS funds for the development of the strategy. Implementation costs to be determined**	Behind Schedule	A final draft has been submitted to EPA-LISO for final review. Work continues on development of a habitat management strategy for Milton Harbor in Rye, NY. Work has been completed on a habitat management strategy for Mt. Sinai Harbor, NY.	A draft habitat management strategy for Milton Harbor is expected in Summer 2000.
L3-4. Connecticut is identifying wetland complexes of statewide significance and general wetland protection strategies for areas located in Long Island Sound and the Connecticut River. This project has been funded by the EPA under §104(b) of the Clean Water Act.	**C**	**CTDEP**	**Fall 1994**	**$62,500.**	Behind Schedule	CTDEP has completed the identification of wetland complexes of statewide significance and general wetland protection strategies. Staff are in the process of completing a draft report.	Continue efforts to complete report
L3-5. Develop a nomination document to recommend the designation of the Connecticut River estuary as a *Wetland of International Importance* for the purpose of establishing a formal designation of this area to recognize the ecological significance of this ecosystem and to foster increased protection of its significant habitat complex and living resources.	**C**	**CTDEP**	**Fall 1994**	**$25,000**	**Complete**	**The nomination document was completed in summer 1994 and submitted to the Ramsar Convention Bureau in Switzerland. The nomination was approved and the portions of the tidal wetlands and all of the tidal waters on the lower river were designated as a Wetland of International Importance in October 1994. Subsequently, several new parcels owned by three new partners were added to the designation. To celebrate the 25th anniversary of the Ramsar Convention, a series of public outreach efforts were sponsored in 1996 by CTDEP and USFWS.**	
L3-6. Develop a strategic plan for the estuarine portion of the Connecticut River that will identify habitat and species issues/problems, monitoring, and research needs and recommendations to foster increased protection of this nationally significant ecosystem.	**C**	**CTDEP**	**2 years**	**$50,000 per year for two years**	Substantive Progress	CTDEP continues to make progress in the development of a Special Area Management Plan for the lower Connecticut River. The emphasis of this effort is to develop a management plan that promotes the conservation and restoration of living resources and their habitats. A task force has been assembled to provide advice and recommendations to CTDEP. Meetings were held to solicit ideas.	

Y: 1) Type: Commitment, Recommendation

2) Status for dated actions: Complete, Ahead of Schedule, On Schedule, Behind Schedule, Partially Addressed, Not Initiated
Status for *Ongoing Programs* and ongoing *CCMP Actions*: Fully Met, Substantive Progress, Partial Progress, Discontinued

3. INVENTORIES AND MANAGEMENT STRATEGIES FOR AQUATIC AND TERRESTRIAL HABITATS (CCMP TABLE 42, P.112)

CCMP Action	Type[1]	Responsible Parties	When	Estimated Cost	Status[2]	Description	Upcoming Action
L3-7. Develop and periodically update a list of significant habitats, habitat complexes, and sensitive areas for protection and management. When completed, habitat management plans will be developed for these areas. In New York this should be undertaken in cooperation with the implementation of the NYSDOS Long Island Sound Regional Coastal Management Plan.	**R**	**CTDEP NYSDEC NYSDOS**	**Started in 1995.**	**$50,000 per year for each state**	Substantive Progress	See Action L1-13. NYSDOS is updating its Significant Fish and Wildlife Habitat descriptions. A draft narrative document is currently under agency review with NYSDOS.	NYSDOS will circulate the narrative document to outside local, state, and federal agencies in Fall 2000.
L3-8. Expand the Southern New England-New York Bight Coastal and Estuary Project to: 1) include the watersheds of Long Island Sound; and 2) reexamine the habitat complexes previously identified in Long Island Sound based upon the most current listing of Species of Special Emphasis. Examine the complexes more carefully to fine tune the management recommendations and implement these recommendations through state, county and municipal agencies.	**R**	**USFWS**	**Ongoing**		Partial Progress	USFWS continued as an active participant in the LISS Habitat Restoration Initiative providing data on some key habitats in 1999.	
L3-9. Federal habitat programs should develop a watershed approach to protection of living resources of Long Island Sound and their habitats, such as development of a Connecticut River/Long Island Sound Management Unit by the USFWS.	**R**	**USFWS**	**Ongoing**		Partial Progress	USFWS has formed a CT River team, bringing different service units together with a watershed focus.	

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Status for *Ongoing Programs* and ongoing *CCMP Actions*: Fully Met, Substantive Progress, Partial Progress, Discontinued

3. INVENTORIES AND MANAGEMENT STRATEGIES FOR AQUATIC AND TERRESTRIAL HABITATS (CCMP TABLE 42, P.112)

CCMP Action	Type[1]	Responsible Parties	When	Estimated Cost	Status[2]	Description	Upcoming Action
L3-10. Designate portions of the Connecticut River estuary as a National Estuarine Research Reserve. A reserve designation will result in promoting research that is directed towards resource management issues and provide facilities and programs for public education and interpretation.	**R**	**CTDEP NOAA**	**3 years for selection of sites and the development and approval of the management plan**	**$150,000**	Partial Progress	The Connecticut River was declared a river of significance under the American Heritage Rivers (AHR) Initiative in July1998. AHR status includes an Action Plan and 29 specific projects focused on conserving and enhancing the economic, cultural heritage and environmental resources of the River and its watershed. The plan involves communities and groups up and down the length of the River supported by federal agencies, from EPA to HUD. There are several first steps. A formal partnership agreement between the local AHR project sponsors and their federal agency partners has to be drafted. A lead federal agency needs to be selected, and a River Navigator chosen. All of these steps involve the local sponsors and representatives from the Council on Environmental Quality and the principal federal agencies already actively working in the Watershed.	The expectation is to have the partnership agreement signed and the lead agency and River Navigator selected by the end of 2000.

KEY: 1) Type: Commitment, Recommendation

2) Status for dated actions: Complete, Ahead of Schedule, On Schedule, Behind Schedule, Partially Addressed, Not Initiated
Status for *Ongoing Programs* and ongoing *CCMP Actions*: Fully Met, Substantive Progress, Partial Progress, Discontinued

4. MANAGING ENDANGERED AND THREATENED SPECIES (CCMP TABLE 43, P.116)

Ongoing Programs	Responsible Parties	Status[2]	Description	Upcoming Action
L4-1. Connecticut, New York, and federal agencies will continue to implement their Endangered Species Programs in order to protect endangered and threatened species that live in and adjacent to Long Island Sound.	**CTDEP NYSDEC**	Substantive Progress	CTDEP's National Diversity Database (NDD) reviews all coastal permits for impacts to state and federal listed endangered, threatened and special concern species. A LIS License Plate Fund project provided the NDD with funding to prepare 25 endangered, threatened, and special concern plant fact sheets for coastal areas. The NDD has provided all coastal towns with generalized maps of locations of state listed species to be used for municipal plans of conservation and development, land protection activities and environmental planning, including local inland wetland permits. In New York, impacts to state and federal endangered, threatened, and special concern species are considered during the permitting process. As described in L3-1, NYSDEC maintains a database containing information about significant fish, wildlife, and plant resources and significant ecological areas.	

4. MANAGING ENDANGERED AND THREATENED SPECIES (CCMP TABLE 43, P.116)

CCMP Action	Type[1]	Responsible Parties	When	Estimated Cost	Status[2]	Description	Upcoming Action
L4-2. Develop a list of endangered and threatened invertebrates. Maintain and update the diversity database. Periodically revise the list of threatened and endangered species. Expand the monitoring program, identify essential habitats, and develop recovery plans.	**R**	**CTDEP**		**$150,000 per year for staff; $200,000 per year for least tern and piping plover nest site restoration**	Fully Met	CTDEP's Natural Resources Center maintains a natural diversity database that provides up to date information and data on the State's threatened and endangered species..	CTDEP will continue to keep the database current.
L4-3. Develop legislation or regulations in New York state that will minimize disturbance to the essential habitats of rare plants and animals.	**R**	**NYSDEC**		**Redirect Base Program**	Not Initiated		
L4-4. Revise and publish a list of rare and sensitive species associated with the coastal lands and waters of Long Island Sound.	**R**	**NYSDEC**	**Every 5 years**	**$50,000**	Partial Progress	NYSDEC staff are compiling a list of rare plants associated with wetlands in Long Island Sound as part of the LISS Habitat Restoration Initiative.	This list is intended to be included in an appendix to the freshwater wetlands technical document to be produced by the LISS Habitat Restoration Initiative.

Y: 1) Type: Commitment, Recommendation

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Status for *Ongoing Programs* and ongoing *CCMP Actions*: Fully Met, Substantive Progress, Partial Progress, Discontinued

5. MANAGING HARVESTED SPECIES (CCMP TABLE 44, P.117)

Ongoing Programs	Responsible Parties	Status[2]	Description	Upcoming Action
L5-1. Development and implementation of fishery management plans, including research, monitoring, and conservation law enforcement activities.	**NYSDEC**	Fully Met	NYSDEC, as mandated by the Atlantic States Marine Fisheries Commission, has amended marine fishing regulations affecting recreational and commercial harvest of summer flounder (fluke), tautog (blackfish), and black se NYSDEC accepted written comments on changes to the regulations for summer flounder, tautog, and black sea bass until June19, 1998. This was done in order to restore healthy populations of these species. There are ongoing monitoring programs for striped bass, weakfish, winter flounder, fluke and scup. Statistics on other species taken in these surveys are crabs and bait fish. Party boat sampling for blackfish is also conducted.	NYSDEC is initiating an American eel management program focused on young-of-the-year recruitment
L5-2. Management of shellfish aquiculture activities including resource monitoring.	**CTDOA, Bureau of Aquiculture.**	Fully Met	CT DA/BA regularly monitors, manages and enhances shell fisheries in the state.	
L5-3. Improvement of anadromous fish passage opportunities including associated research and monitoring activities.	**CTDEP**	Substantive Progress	The Habitat Restoration Initiative targets river migratory corridors for anadromous fish passage as one of the targeted habitat types. CTDEP used §319 funds to restore fish passage in Connecticut streams. Approximately $170,000 has been spent or committed in the past year to build a fishway on a tributary to the CT River in Old Lyme; plan a fish ladder on the Quinnipiac River; breach a dam on the Naugatuck River; and restore fish passage on a tributary to the Farmington River. The Mianus fish passage project was completed with funding from CTDEP's Coves and Embayments program.	As part of a NY Clean Air/Clean Water Bond Act award, the Town of Huntington, in cooperation with USFWS will be installing a fish ladder at Betty Allen Nature Preserve.
L5-4. Wildlife management, including research and monitoring activities in support of management programs.	**USFWS CTDEP NYSDEC**	Fully Met	Agencies continue their wildlife management, research and monitoring programs.	
L5-5. Activities that minimize mortality due to entrainment and impingement of eggs, larvae, and juvenile and adult aquatic organisms at industrial facilities.	**CTDEP**	Fully Met	CTDEP works through the permit process to see that location/operation of intakes minimize entrainment and impingement where practicable. In 1999 staff from CTDEP began to work on permit modifications to better enforce entrainment and impingement provisions in permits.	

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Status for *Ongoing Programs* and ongoing *CCMP Actions*: Fully Met, Substantive Progress, Partial Progress, Discontinued

5. MANAGING HARVESTED SPECIES (CCMP TABLE 44, P.117)

CCMP Action	Type[1]	Responsible Parties	When	Estimated Cost	Status[2]	Description	Upcoming Action
L5-6. Define, revise, and coordinate the establishment of seasonal restrictions for dredging that minimize adverse effects on aquatic organisms, especially finfish and shellfish and their habitats.	**C**	**LISS CTDEP NYSDEC NYSDOS EPA NOAA USACE USFWS MSRC/SUNY**	**1994**	**Redirection of base program**	Fully Met	CTDEP incorporates seasonal restrictions on dredging and disposal activities into permit authorizations for a number of sensitive living resources including anadromous finfish, winter flounder, and shellfish. CTDEP's Long Island Sound Research Fund supported research on the effects of suspended sediments on survival of winter flounder eggs and larvae. The Fisheries Division has surveyed five rivers and harbors for occurrence of winter flounder larvae and the Department of Transportation has funded studies of noise associated with bridge work. These activities improve our ability to assess the need for and timing of seasonal restrictions on dredging and other construction activities to protect living resources. The LISS co-sponsored a LIS Dredged Material Management workshop in March 1999. NYSDEC incorporates seasonal restrictions on dredging and disposal activities into permit conditions to protect a number of sensitive living resources, including finfish and shellfish, and for restrictions on shore disposal activities to protect sensitive species of shorebirds.	
.5-7. Enhance implementation of nterstate fishery management plans for .ong Island Sound fishery resources.	**R**	**CTDEP NYSDEC NMFS USFWS**	**To be initiated upon approval of funding**	**$250,000 per year per state will be used to fund fishery management staff and, in Connecticut, law enforcement officers.**	Partial Progress	New York passed legislation in 1998 to further restrict commercial purse seine vessel activity in NY waters of LIS.	The LIS menhaden moratorium was extended to July 2001.

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Status for *Ongoing Programs* and ongoing *CCMP Actions*: Fully Met, Substantive Progress, Partial Progress, Discontinued

5. MANAGING HARVESTED SPECIES (CCMP TABLE 44, P.117)

CCMP Action	Type[1]	Responsible Parties	When	Estimated Cost	Status[2]	Description	Upcoming Action
L5-8. Expand efforts to bypass obstructions to anadromous finfish migrations on Connecticut tributaries to Long Island Sound and the Connecticut River by constructing or installing fishways or fishlifts.	**R**	**CTDEP Municipal governments and environmental organizations USFWS NMFS**	**To be initiated with enhanced funding**	**$100,000 per year for CTDEP staff to administer activities and construct small tributary fishways. Costs to be determined as project opportunities arise.**	Substantive Progress	Anadromous fish passage is being enhanced through cooperative efforts of CTDEP, municipalities and dam owners. Also see LR&H5-3. Eleven riverine migratory corridor projects (see LR&H1-1) were completed or placed into service in 1999. Four dam removal projects opened up over 15 miles to fish migration. Three dams, Anaconda, Union City, and Freight Street, were completely removed and the breached opening of the Platts Mill Dam was widened to expedite fish passage during 1999 (all on the Naugatuck River). Seven fish passage projects were completed or placed in operation in 1999: 1) modification of the existing pool and weir fishway by adding a steep pass extension at the Lower Pond Dam fishway in Lyme; 2) installation of a pool and weir fishway at Lower McCulloch Dam in Old Lyme; 3) construction of a pool and weir fishway at Chalker Millpond Dam in Old Saybrook; 4) construction of a Denil Fishway and downstream bypass at the Kinneytown Dam in Seymour; 5) installation of a steeppass fishway at Trading Cove Dam in Montville; and 7) construction of a Denil Fishway around Versailles Pond Dam in Sprague. A total of 22.5 miles of riverine migratory corridors were opened up as a result of these completed projects.	
L5-9. Enhance municipal shellfish restoration programs.	**R**	**Municipal governments**	**Upon funding**	**$100,000 per state per year for a number of small grants to municipalities to enhance oyster, clam and bay scallop restoration efforts.**	Partially Addressed	Several municipal governments in Connecticut are carrying out small programs using existing resources at the local level.	

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Status for *Ongoing Programs* and ongoing *CCMP Actions*: Fully Met, Substantive Progress, Partial Progress, Discontinued

5. MANAGING HARVESTED SPECIES (CCMP TABLE 44, P.117)

CCMP Action	Type[1]	Responsible Parties	When	Estimated Cost	Status[2]	Description	Upcoming Action
L5-10. Enhance the Connecticut Oyster Restoration Program on public beds in state waters by stocking settling habitat (cultch) and conducting related activities (e.g., resource sampling).	R	**CTDOA, Bureau of Aquiculture**	**To be initiated with enhanced funding. On-going.**	**$100,000 per year for staff and $400,000 per year for purchase of cultch for maintenance of restored beds.**	Partially Addressed	CT DOA, the shellfish industry, and the former United Illuminating Company joint venture was established to manage cultures on public beds, with a budget of $100,000 in 1999.	
L5-11. Develop a marine biotoxin assessment program for shellfish.	R	**CTDOA, Bureau of Aquiculture NYSDEC**	**To be initiated upon approval of funding. On-going.**	**$300,000 per year in Connecticut and $150,000 per year in New York for staff and laboratory costs.**	Partially Addressed	CT DOA initiated monitoring using existing agency resources. Fixed stations are monitored in susceptible areas and laboratory analyses are conducted.	CT Department of Agriculture training volunteers to monitor phytoplankton in LIS.
L5-12. Develop artificial reefs in appropriate areas of New York waters to increase fishing opportunities, consistent with the New York State Artificial Reef Development Plan. Plans have been developed to construct reefs in New York waters of Long Island Sound off Matinecock Point, Eatons Neck, Miller Place/ Mt. Sinai, and Mattituck Inlet.	R	**NYSDEC and Cooperators**	**To be initiated upon approval of funding**	**Approximately $100,000 for each of four reefs planned for Long Island Sound.**	Not Initiated	In the absence of funding and staff necessary to develop additional artificial reefs, NYSDEC's Artificial Reef Program has been focused on existing artificial reefs.	The feasibility of building an oyster reef in Port Jefferson Harbor will be explored.

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5. MANAGING HARVESTED SPECIES (CCMP TABLE 44, P.117)

CCMP Action	Type[1]	Responsible Parties	When	Estimated Cost	Status[2]	Description	Upcoming Action
L5-13. Develop methods to reduce the incidental take of nontarget species and undersized individuals in fishing activities.	**R**	**CTDEP NYSDEC NMFS USFWS Atlantic States Marine Fisheries Council New England and Mid-Atlantic Fishery Management Councils Commercial and recreational fishing organizations.**	**To be initiated upon approval of funding**	**$50,000 per year per state for staff and $10,000 - $20,000 per year for test materials and equipment.**	Partially addressed	State agencies, the Atlantic States Marine Fisheries Commission, and fishery management councils have reduced the incidental take of juveniles and some non-target species through increased cod end mesh size restrictions in otter trawls and escape vents in certain pot and trap fisheries for lobsters and finfish.	

Y: 1) Type: Commitment, Recommendation

2) Status for dated actions: Complete, Ahead of Schedule, On Schedule, Behind Schedule, Partially Addressed, Not Initiated
Status for *Ongoing Programs* and ongoing *CCMP Actions*: Fully Met, Substantive Progress, Partial Progress, Discontinued

6. MANAGING EXOTIC AND NUISANCE SPECIES (CCMP TABLE 45, P.120)

CCMP Action	Type[1]	Responsible Parties	When	Estimated Cost	Status[2]	Description	Upcoming Action
L6-1. Develop measures to prohibit or prevent the induction or release to Long Island Sound and its watershed of known or potentially undesirable species.	**R**	**CTDEP NYSDEC USFWS U.S. Coast Guard Shipping Companies**	**To be initiated as soon as possible**	**$50,000 per year per state for staff to develop and manage program**	Partial Progress	Through its coastal permit programs, CTDEP prohibits the introduction of non-indigenous plant stock for aquatic restoration projects such as tidal wetlands and eelgrass. Only plant stock collected in LIS is allowed. DEP discourages the use of beach grass in dunegrass restoration that is not derived from the shores of the Sound. PA 97-32 established the authority for the CTDOA to control the importation, cultivation, or raising of aquatic plants or animals that are not native to the state that might have adverse impacts upon living resources or aquatic habitats. CTDEP is working with USFWS and other organization in Massachusetts to remove an infestation in the Connecticut River in Holyoke, MA. NYSDEC, in its Tidal Wetlands Permitting Program, expressly discourages introduction of exotic species to the coastal environment.	CTDEP and East Hartford officials are working towards an eradication plan for the Hockanum River infestation site for the summer of 2000.
L6-2. Implement a management program to reduce abundance of mute swans that are causing losses of certain aquatic habitat types such as submerged aquatic vegetation and certain types of emergent tidal wetland vegetation.	**R**	**CTDEP**	**To be initiated as soon as possible**	**To be included within costs of above item.**	Not Initiated		

KEY: 1) Type: Commitment, Recommendation

2) Status for dated actions: Complete, Ahead of Schedule, On Schedule, Behind Schedule, Partially Addressed, Not Initiated
Status for *Ongoing Programs* and ongoing *CCMP Actions*: Fully Met, Substantive Progress, Partial Progress, Discontinued

7. EDUCATING THE PUBLIC ABOUT THE PLANTS AND ANIMALS OF LONG ISLAND SOUND (CCMP TABLE 46, P.120)

CCMP Action	Type[1]	Responsible Parties	When	Estimated Cost	Status[2]	Description	Upcoming Action
L7-1. Develop an outreach program to inform and educate the public about the plants and animals in Long Island Sound.	R	**Federal, state, and local governments, educational systems, organizations, and environmental organizations**		**See Public Involvement and Education Section**	Substantive Progress	CTDEP continues to promote public involvement and education through many of its programs, especially use of LIS License Plate Funds. Examples include: Tidal Marshes of LIS; A Guide to the Housatonic River; Tidelands of the Connecticut River; the placement of interpretive signs or observation platforms at 12 coastal locations; displays and equipment at the Meigs Pont Nature Center; LIS Video for elementary through high school students; A Living Harvest: Oystering in LIS; Celebrating the Sea classroom programs; a mobile environmental library for the Old Saybrook schools; Birds of the CT Coast on display at the CT Museum of Natural History; Marine Animals of Southern New England and New York: an identification key; Long Island Sound Alive: a laser disc production showing the resources of LIS; the salt marsh laboratory at CT Audubon Coastal Center; fact sheets about endangered species; and development of an interpretive trail at Cove Island State park. NY Sea Grant/CT Sea Grant produced a slide show, script, and booklet on the plants and animals of LIS that are available to groups.	CTDEP will produce three brochures on CT's Coastal Management Program to be issued by May 2001.
L7-2. Develop a citizens monitoring program specific to the plants and animals of Long Island Sound sufficient to aid managers in identifying problems and assessing the effects of management efforts.	R	**Federal, state and local governments, educational and environmental organizations and private citizens.**		**See Public Involvement and Education Section**	Partially Addressed	CTDEP works with citizens monitoring groups to promote reliable and accurate field and laboratory efforts, including a volunteer Secchi disk monitoring program to determine long term changes in water clarity resulting from nitrogen enrichment and management and benefits for eelgrass beds. CTDEP is reviewing Secchi disk data from 1998/1999. Only one volunteer monitoring group submitted data from one site in 1999. The program has experienced turnover and decline in volunteer monitors and CTDEP is currently soliciting citizens to join as new volunteer monitors.	The Secchi disk program is ongoing and seeks to add more volunteer monitors in 2000

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Status for *Ongoing Programs* and ongoing *CCMP Actions*: Fully Met, Substantive Progress, Partial Progress, Discontinued

8. DEVELOPING AN INFORMATIONAL DATABASE ABOUT LIVING RESOURCES AND THEIR HABITATS (CCMP TABLE 47, P.122)

Ongoing Programs	Responsible Parties	Status[2]	Description	Upcoming Action
L8-1. Connecticut will continue its statewide Geographic Information System (GIS) Program to digitize spatial information and data for resource management purposes.	**CTDEP**	Fully Met	CTDEP's Natural Resources Center continues its efforts to develop data layers on the State's GIS, useful for resource management purposes.	
L8-2. Connecticut has created a Long Island Sound Resources Center for the purpose of : 1) developing the full potential of estuarine related GIS applications; 2) computerizing pertinent literature and data for rapid access through standard word search and spatial basis; and 3) completion of the estuarine geology of Long Island Sound. Additionally, this Center is taking a leadership role in the development of side scan sonar mapping of Long Island Sound that is now being overlaid with benthic community information. This will become the foundation of future living species and habitat management programs.	**CTDEP**	Fully Met	The collection is now on-line and searchable via the world-wide-web. A new survey of LIS sedimentary habitats is nearing publication. The Center is working on a public access database. A compact disc (CD) of LIS environmental studies -- sidescan sonar, seismic reflection, bathymetric, sediment and bibliographic data and interpretations is available from Woods Hole Institute. (Open file Report 98-502)	

Y: 1) Type: Commitment, Recommendation

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8. DEVELOPING AN INFORMATIONAL DATABASE ABOUT LIVING RESOURCES AND THEIR HABITATS (CCMP TABLE 47, P.122)

CCMP Action	Type[1]	Responsible Parties	When	Estimated Cost	Status[2]	Description	Upcoming Action
L8-3. Identify spatial data for living resources and habitat on a Sound wide basis and digitize priority data sets for incorporating into a Sound wide Geographical Information System.	**C**	**LISS**	**Initiated in winter of 1993-1994; completion date is winter 1994-1995**	**$97,000 LISS Funds**	Substantive Progress	Through funding provided by the LISS, an electronic base map for all of LIS that incorporates the most current bathymetry has been created. CTDEP is developing GIS projects and resource coverages. CTDEP encouraged NOAA to update the 1984 Environmental Sensitivity Index mapping project that is used to support oil spill planning and response. NOAA secured funding for that project, scheduled to begin January 2000. CTDEP continues to expand the Oil Spill GIS project. The waterfowl coverage was radically revised and enhanced. The waterfowl boundary areas have been revised and data about waterfowl use has been added to the data tables. Staff updated all of the existing projects to be compatible with the new GIS server and convert data to the new system.	
L8-4. Expand the data layers for living resources and their habitats on a Sound wide basis.	**R**	**EPA-LIS Office**	**5 years**	**$75,000 per year**	Not Initiated		
L8-5. Develop and maintain state databases and an integrated Long Island Sound database describing the living resources of Long Island Sound and their habitats.	**R**	**CTDEP NYSDEC**		**$50,000 per year for each state for staff and $100,000 one-time only for data processing hardware/ software**	Partially Addressed	CTDEP maintains statistical databases on Long Island Sound marine resource surveys, inshore seine surveys, and lobster studies. NYSDEC maintains statistical databases on lobster, seine surveys, anadromous fish, and party/charter boat surveys in Long Island Sound.	

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Status for *Ongoing Programs* and ongoing *CCMP Actions*: Fully Met, Substantive Progress, Partial Progress, Discontinued

8. DEVELOPING AN INFORMATIONAL DATABASE ABOUT LIVING RESOURCES AND THEIR HABITATS (CCMP TABLE 47, P.122)

CCMP Action	Type[1]	Responsible Parties	When	Estimated Cost	Status[2]	Description	Upcoming Action
L8-6. Expand the side scan sonar/benthic habitat mapping program in order to create baseline information for management and conservation purposes.	**R**	**CTDEP USGS**		**$100,000 per year for 5 years**	Partially Addressed	The USGS and Coastal and Marine Geology Program, in cooperation with CTDEP initiated a multidisciplinary project designed to understand the distribution of bottom contaminants and benthic habitats in LIS. Benthic mapping was an integral part of the program. This project prompted a number of studies that were focused on regional processes, conditions and characteristics of the LIS floor. For 1999-2000, ten research papers have been completed and are under review by the CTDEP. The side scan sonar mapping for this project has been completed.	The CTDEP, in cooperation with USGS expects to publish a series of ten LIS research papers in the Journal of Coastal Research for the winter of 2000-2001. A new CD will be produced by 2001 containing new maps and data
L8-7. Maintain and enhance the Long Island Sound literature, indexing and GIS capabilities of the Marine Sciences Research Center at SUNY, Stony Brook.	**R**	**MSRC/SUNY**		**$75,000 per year**	Not Initiated		

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9. SOUND WIDE AND SITE-SPECIFIC RESEARCH AND MONITORING (CCMP TABLE 48, P.123)

Ongoing Programs	Responsible Parties	Status[2]	Description	Upcoming Action
L9-1. Connecticut conducts a Sound wide open water fishery survey that has become an integral component of the LISS monitoring and Management programs. In addition, Connecticut conducts a nearshore finfish survey, and surveys of lobster, shad, anadromous herrings, Atlantic sturgeon, and shortnose sturgeon (the latter is listed by the federal government as an endangered species). Other marine surveys include a survey of oyster recruitment (Connecticut Department of Agriculture, Aquiculture Division) and recreational and commercial fishery statistics activities.	**CTDEP**	Substantive Progress	Enhancements to recreational and commercial fishing statistics are being developed through Atlantic States Marine Fisheries Commission (ASMFC), Atlantic Coast Cooperative Statistics Program (ACCSP), NMFS and coastal states taking part. CTDEP applies for Federal funds under the Federal Aid in Sport Fish Restoration Act for five-year projects. Each year CTDEP produces an annual report on the LIS Soundwide surveys; at the end of the project period, it produces a final report. In 1999 CTDEP completed a five year project and reported its Soundwide survey data in *A Study of Marine Recreational Fisheries in Connecticut*. The report for March 1994-February 1999 is available upon request. The program allocated over $2 million for the project period 1994-1999.	CTDEP has applied for the next round of project funds and is beginning the next round of surveys for 2000. The next 5 year report will be prepared and available to the public for the year 2001.
L9-2. Connecticut conducts nesting surveys of colonial water birds, Least Tern and Piping Plover, Osprey, waterfowl, a mid-winter eagle survey, and surveys of diamond-backed terrapin, threatened and endangered terrestrial species, and other species of special concern.	**CTDEP**	Substantive Progress	CTDEP's Natural Diversity Database maintains "Heritage" information and develops GIS coverages resulting from Wildlife Division surveys of avifauna.	
L9-3. New York conducts an American lobster mortality project funded by the LISS. In addition, New York conducts the NMFS's Recreational Fishery Statistics Survey, surveys of commercial fishery landings, seabird surveys, (e.g., ospreys, piping plovers, east terns), surveys of threatened and endangered species and species of special concern, and other surveys as needed.	**NYSDEC USNMFS**	Substantial Progress	NYSDEC and CTDEP are working together to address concerns over the NMFS's proposed regulations on lobster size. NYSDEC is funding an effort to determine genetic differences of western LIS lobsters to enhance management capabilities. If it can be demonstrated that LIS lobsters migration and reproductive cycles differ from that of east coast populations, better fisheries management policies may be developed and implemented for LIS populations. A final report for the LISS-funded lobster mortality project is available. NYSDEC and CTDEP have funded and conducted lobster mortality research related to the 1999 mortalities observed in LIS. Identification of a paramoeba infecting lobsters has been the subject of current research.	CT and NY are pursuing Federal funding for additional lobster mortality research.

Y: 1) Type: Commitment, Recommendation

2) Status for dated actions: Complete, Ahead of Schedule, On Schedule, Behind Schedule, Partially Addressed, Not Initiated
Status for *Ongoing Programs* and ongoing *CCMP Actions*: Fully Met, Substantive Progress, Partial Progress, Discontinued

9. SOUND WIDE AND SITE-SPECIFIC RESEARCH AND MONITORING (CCMP TABLE 48, P.123)

CCMP Action	Type[1]	Responsible Parties	When	Estimated Cost	Status[2]	Description	Upcoming Action
L9-4. Connecticut should pursue the construction and staffing of a marine science technology center at Avery Point with a research focus on Long Island Sound.	R	CTDED CTDEP CTDOA University of Connecticut		$33 million in capital costs; $4 million per year in operating costs	Partially Addressed	Through the UCONN 2000 bonding program, the marine sciences technology program at Avery Point is expanding, including addition of new professional staff and facility renovation and expansion. A new Marine Science and Technology Center at Avery Point was under construction in 1999.	The new MSTC building will be completed in Fall 2000.
L9-5. Enhance wildlife monitoring activities (e.g., seabirds, waterfowl, and marine turtles).	R	CTDEP		$50,000 per year for staff, interns and contract work	Partially Addressed	The Norwalk Maritime Center and Mystic Aquarium s conducting periodic surveys of seal populations in western LIS. CTDEP conducts colonial waterbird surveys at approximately 72 sites, most of which are located offshore. During 1999 only a partial survey was conducted. CTDEP is reviewing and tabulating 1999 results.	CTDEP will conduct another partial survey in 2000 and will solicit the public to participate as volunteer monitors.
L9-6. Monitor the status and trends of eelgrass in the Sound and all species of submerged aquatic vegetation in the Connecticut River using remote sensing and ground surveys.	R	CTDEP EPA	To be initiated upon funding	$100,000 per year for photography, field surveys, and boundary delineations	Partially Addressed	Baseline mapping for eelgrass in the Sound and submerged aquatic vegetation in the Connecticut River have been completed. No new remote sensing has been conducted to determine trends. A volunteer Secchi disk monitoring program has been implemented to evaluate trends in water clarity to guide eelgrass restoration efforts.	
L9-7. New York should initiate a nearshore fishery independent survey of Long Island Sound.	R	NYSDEC	To be initiated upon funding	$150,000 per year	Not Initiated		
L9-8. Continue the lobster mortality and disease monitoring project in Long Island Sound.	R	NYSDEC	Annually	$65,000 per year	Not Initiated		

Key: 1) Type: Commitment, Recommendation

2) Status for dated actions: Complete, Ahead of Schedule, On Schedule, Behind Schedule, Partially Addressed, Not Initiated
Status for *Ongoing Programs* and ongoing *CCMP Actions*: Fully Met, Substantive Progress, Partial Progress, Discontinued

10. LIVING RESOURCES AND HABITAT RESEARCH (CCMP TABLE 49, P.124)

Ongoing Programs	Responsible Parties	Status[2]	Description	Upcoming Action
L10-1. Connecticut will continue the Long Island Sound Research fund. This fund is used to foster research that addresses priority management issues in Long Island Sound including living species and their habitats.	CTDEP	Discontinued	Funds were not available for 1996-98.	A list of living resource research priorities was included with the License Plate Program RFP for the 1999 and 2000 funding rounds

10. LIVING RESOURCES AND HABITAT RESEARCH (CCMP TABLE 49, P.124)

CCMP Action	Type[1]	Responsible Parties	When	Estimated Cost	Status[2]	Description	Upcoming Action
L10-2. Connecticut has funded the following living resources and habitat research: evaluation of the causes of declines of eelgrass; assessment of contaminant levels in the greater scaup; changes in the phytoplankton community resulting from nitrogen enrichment; effects of hypoxia on bottom feeding fish; vegetation changes in a restoring tidal wetland; and mapping of benthic communities.	C	CTDEP and various Connecticut researchers	Each research topic has a different completion date from 1994 to 1998.	$1,500,000	Some are Completed, some are Behind Schedule. See Description.	Projects funded that are complete include: a study of water quality impacts of degraded marshes; statewide land cover mapping; benthic community mapping and characterization; dredging impacts on winter flounder; impacts of phragmites on the lower CT River; sediment accumulation in coastal coves; changes in phytoplankton community resulting from nitrogen enrichment; mapping of submerged aquatic vegetation in lower CT River; and a study of fish and seafood consumption in CT. Projects that are behind schedule are: an evaluation of causes of eelgrass decline and methods of restoration; and effects of hypoxia on bottom-feeding fish.	Complete remaining projects.
L10-3. Identify priorities for management-oriented research about the living resources of Long Island Sound and their habitats.	R	CTDEP NYSDEC EPA EPA-LIS Office NMFS USFWS Academic Institutions		$5,000 workshop	Partial Progress	A symposium on the health of LIS lobster was held in April 2000 in Stamford in response to the 1999 lobster die-off in Western LIS.	Complete a research and management plan.

Y: 1) Type: Commitment, Recommendation

2) Status for dated actions: Complete, Ahead of Schedule, On Schedule, Behind Schedule, Partially Addressed, Not Initiated
Status for *Ongoing Programs* and ongoing *CCMP Actions*: Fully Met, Substantive Progress, Partial Progress, Discontinued

Raising Public Awareness and Participation through Education and Outreach

A significant factor toward long-term CCMP effectiveness is the ability to increase the public's awareness of and participation in activities designed to protect the LIS. Educating LIS watershed residents and increasing the number of people that take an active interest in protecting and restoring the Sound helps to nurture long-term stewardship ideals in the local communities. As the LIS is restored to a more healthy ecosystem these ideals will help ensure its maintenance well into the future.

Strategy:

The CCMP public awareness and outreach strategy has six major elements: 1) increasing community awareness and stewardship; 2) promoting understanding; 3) facilitating public participation; 4) increasing communication and cooperation; 5) enhancing education at all levels; and 6) securing funding. The CCMP identifies 7 *Ongoing Programs* and 16 *CCMP Actions* to address these goals. Of the 16 *CCMP Actions*, 8 are reported as *Complete/Fully Met/Substantive Progress*; 5 are reported as *Partial Progress*; 2 are reported as *Not Initiated*; and 1 *Discontinued*.

Highlights:

- In 1999, the LISS outreach program responded to 582 information requests, developed and staffed displays at 9 public events that reached 10,420 people; and provided 21 presentations to combined audiences of 428.

- The LISS public education and outreach program developed and distributed quarterly LISS Newsletters covering timely LIS topics to over 4,000 addressees in 1999: 1) *Marine Fisheries;* 2) *Watershed Protection*; and 3) *Dredged Material Management*.

- CTDEP launched a new newsletter in 1999, *Sound Outlook*, which is supported by Coastal Zone Management Act and EPA LISS funds. The newsletter has a circulation of 2,300.

- LISS promotional and educational materials were displayed and handed out at the 1999 Earth Day celebrations in Connecticut and New York, the 1999 New Haven County Conservation Fair, and 1999 Norwalk Oyster Festival.

- The CTDEP License Plate Fund supports four categories of activities for outreach efforts, including public access, public education, habitat restoration, and research. In 1999, the Fund supported 21 projects totaling $311,509. Since 1993 the Fund has provided over $2.6 million for 161 projects.

- In 1999, the LISS World Wide Web page was the most popular site on the EPA Region I host server, with nearly 36,000 "hits." The LISS site includes LIS fact sheets, slide shows, newsletters, LIS links, and key federal and state LIS personnel contact information. The LISS web page address is: www.epa.gov/region01/eco/lis.

- NYSDEC, CTDEP, and EPA provided outreach on LIS programs to local governments and local officials through workshops, seminars, symposia, and conferences held in various locations throughout the LIS area during 1999.

- Through 1999, the LISS Small Grants Program has provided funds for 41educational, informational and construction projects totaling $131,952. These projects assisted hundreds of teachers and thousands of school children, and produced over15,000 pieces of LIS literature. In 1999, the LISS provided funds totaling $50,000 for 10 local community environmental projects in New York and Connecticut.

- The UCONN Cooperative Extension Service's Nonpoint Education for Municipal Officials (NEMO) project continued to present its four-part series on nonpoint source pollution prevention and the link between land use and water quality. NEMO conducted 33 workshops with more than 900 persons in attendance during 1999. Municipal representatives included town selectmen/women, planning and zoning boards, health departments, conservation and environment commissions, highways and parks and recreation departments. Since its inception in September 1997, the NEMO project has provided more than 50 workshops in New York and Connecticut LIS watershed communities.

SUMMARY OF MANAGEMENT ACTIONS: PUBLIC INVOLVEMENT AND EDUCATION

1. COMMUNITY AWARENESS AND STEWARDSHIP (CCMP TABLE 51, P.146)

Ongoing Programs	Responsible Parties	Status[2]	Description	Upcoming Action
E1-1. The LISS and state public involvement and education programs are: developing printed and other educational materials for specific audiences; exhibiting LIS materials at regional and local fairs and events; encouraging education and information on the Sound for urban populations; promoting the importance of the Sound's resources to children in the region; and, using public educational material of non-profit organizations.	**CTDEP NYSDEC NY Sea Grant EPA**	Fully Met	The LISS Outreach Program responded to 582 information requests, developed and staffed displays at 9 public events that reached 10,420 people; and provided 21 presentations to combined audiences of 428. CTDEP launched a new newsletter in 1999 entitled *Sound Outlook*, which is supported by CZMA and EPA NEP funding. CTDEP continued to participate in and display LIS materials in local events, Earth Day, Coast Guard Day, Oyster Festivals, and school events. CTDEP has also targeted urban education on LIS using the LIS License Plate Fund. In 1999 CTDEP produced the following new publications: 1) CT Coastal Access Guide (a public access map); 2) Invasive Plant Alert! Water Chestnut (factsheet); 3) Monitoring Long Island Sound, Hypoxia 1999 (fact sheet); and 4) Sound Outlook (DEP newsletter, circulation of 2300). Other CTDEP programs support LIS topics and projects, including: 1) *River Rundown*, a quarterly newsletter with a circulation of approximately 550 and 2) *Connecticut Wildlife*, a bimonthly with a circulation of 6,400. Each publication produces extra copies for distribution at conservation fairs, Earth Day events, and other public events and activities. The Connecticut LIS License Plate Fund supports four categories of activities: public access, public education, habitat restoration, and research. Since 1993, the Fund has provided over $2.6 million for 161 projects. In 1999 21 projects totaling $311,509 were funded.	The NY Sea Grant Program will continue outreach programs and the Small Grants awards. CTDEP plans to continue Sound Outlook and public outreach activities through the LISS outreach program.

Type: (C)ommitment, (R)ecommendation, (N)ew (A)ction

2) Status for ongoing programs and actions: Fully Met, Substantive Progress, Partial Progress, Discontinued
Status for dated actions: Complete, Ahead of Schedule, On Schedule, Behind Schedule, Partially Addressed, Not Initiated

1. COMMUNITY AWARENESS AND STEWARDSHIP (CCMP TABLE 51, P.146)

Ongoing Programs	Responsible Parties	Status[2]	Description	Upcoming Action
E1-2. Support research conferences such as: the CTDEP conference to highlight its LIS Research Grant Program; the LIS Watershed Alliance *Citizens' Summit* annual conference on the Sound; and the bi-state LIS research conference sponsored by local universities, Sea Grant programs, and the states.	**CTDEP NYSDEC LISWA EPA CAC Sea Grant Universities**	Fully Met	The ongoing research conferences were successfully held including the Biennial bistate LIS Research Conference in November 1999, and the annual LISWA Conference in April 1999. The LIS Research Grant Conference was held January 1999 at Connecticut College and focused on tidal wetland restoration. Over 150 people attended this highly successful conference. In 1999 NY/CT LISS staff participated on the planning committee for the LIS 2000 Research Conference.	LIS Research Conference planned for November 2000. The CT/NY Sea Grant programs in cooperation with CTDEP/NYSDEC plan to host a LIS Lobster research conference in April 2000. LIS Watershed Association conference planned for April 2000. A LIS Educators Conference will be hld March 2000 in cooperation with the Maritime Aquarium and other LISS partners.
E1-3. *Coastweeks*, an annual three week celebration of marine and coastal environments is supported by both states.	**CTDEP NYSDEC**	Fully Met	The current focus of this program is the National Beach Cleanup Day, which is coordinated by CT Sea Grant in CT and the American Littoral Society in NY.	LIS Beach Clean-Up Day is planned for September 2000.

:Y
Type: (C)ommitment, (R)ecommendation, (N)ew (A)ction

2) Status for ongoing programs and actions: Fully Met, Substantive Progress, Partial Progress, Discontinued
Status for dated actions: Complete, Ahead of Schedule, On Schedule, Behind Schedule, Partially Addressed, Not Initiated

1. COMMUNITY AWARENESS AND STEWARDSHIP (CCMP TABLE 51, P.146)

CCMP Action	Type[1]	Responsible Parties	When	Estimated Cost	Status[2]	Description	Upcoming Action
E1-4. Enhance the LISS and state public involvement and education programs to provide additional funding to build upon the current outreach and education activities with a new focus on interpretation and implementation of the management plan.	**R**	**CTDEP NYSDEC EPA**	**Ongoing**	**$200,000/yr**	Substantive Progress	This CCMP Implementation Tracking Report was updated in for 1999 and has been used to update the CAC on implementation status. In 1999, the LISS www site (www.epa.gov/region01/eco/lis), has been among the most visited of EPA Region I web server pages with over 35,000 hits in 1999, nearly 5,000 above 1998 and over 10.000 more hits than 1997. The web site includes fact sheets, slide shows, newsletters, LIS links and contact information. The LISS hired a communications coordinator in August 1999. NY Sea Grant hired a student intern in 1999 to assist with the LISS Small Grants program through new funding provided by NYSDEC.	Plans for promotional activities and updated fact sheets in celebration of the 15th anniversary of the LISS will be part of the outreach activities in 2000. CTDEP plans to unveil its *Hypoxia* page on the CTDEP webiste in 2000.

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ype: (C)ommitment, (R)ecommendation, (N)ew (A)ction

2) Status for ongoing programs and actions: Fully Met, Substantive Progress, Partial Progress, Discontinued
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2. PROMOTING UNDERSTANDING (CCMP TABLE 52, P.147)

Ongoing Program	Responsible Parties	Status[2]	Description	Upcoming Action
E2-1. Incorporate LIS information into all related programs conducted by state staff wherever possible.	**CTDEP NYSDEC**	Substantive Progress	Both states have continued efforts to expand and incorporate LIS information and priorities into existing programs and to seek new opportunities for communicating LIS information. For example, CTDEP added LIS information to the Project Wet curriculum and coordinates teacher workshops and materials as part of the program. CTDEP also includes LIS information on its web site, and in publications.	Continue to add LIS information in the CTDEP web site. CTDEP will be putting together a series of events for LIS Day, May 26, 2000 to celebrate the 20th anniversary of CT's Coastal Management Program and the 15th anniversary of the LISS.

2. PROMOTING UNDERSTANDING (CCMP TABLE 52, P.147)

CCMP Action	Type[1]	Responsible Parties	When	Estimated Cost	Status[2]	Description	Upcoming Action
E2-2. Provide information to all municipalities on the LISS and the importance of protecting and restoring the Sound. Special attention will be given to coastal municipalities in the form of briefings by state officials to explain exactly how implementation of the plan will affect that particular city or town and how to work cooperatively together to implement the management plan. Briefings will also be held for specific user groups, local officials, and elected representatives.	**C**	**CTDEP NYSDEC**	**Initiated upon signature of the plan by the state Governors and the EPA Admin-istrator**	**Redirection of base program**	**Complete**	**NYSDEC, CTDEP, and EPA staff held a municipal conference for coastal NY/CT officials on CCMP implementation issues.**	**NB: OTHER ITEMS MOVED TO E2-3. The LISS will support a follow up conference for coastal municipalities in June 2000.**

KEY
Type: (C)ommitment, (R)ecommendation, (N)ew (A)ction

2) Status for ongoing programs and actions: Fully Met, Substantive Progress, Partial Progress, Discontinued
Status for dated actions: Complete, Ahead of Schedule, On Schedule, Behind Schedule, Partially Addressed, Not Initiated

2. PROMOTING UNDERSTANDING (CCMP TABLE 52, P.147)

CCMP Action	Type[1]	Responsible Parties	When	Estimated Cost	Status[2]	Description	Upcoming Action
E2-3. Assess opportunities for training and educating the environmental decision-making community and provide technical information and assistance on implementation of the plan to the regulated community.	C	CTDEP NYSDEC	Ongoing	Redirection of base program	Substantive Progress	CTDEP works regularly with the municipalities regarding nutrient removal at sewage treatment plants. CTDEP also provides technical outreach for a large range of nonpoint source matters through technical guidance and workshops. See also E2-2 for municipal wordshops on Phase III. CTDEP held two operator denitrification training workshops in January and May 1999. In 1999 CTDEP continued to conduct workshops for local land use officials using the manual *Coastal Water Quality: A Guide for Local Officials*. CTDEP hired staff for four of five watershed coordinator positions to strengthen water quality management and outreach on a watershed basis. Norwalk, Quinnipiac, and other watershed projects continue. The LISS-supported UCONN Cooperative Extension-sponsored Nonpoint Education for Municipal Officials (NEMO) project continued to conduct a series of 4 presentations on nonpoint source reduction methodologies to local officials in Westchester and Fairfield counties on the effects of impervious surfaces; innovative land development techniques; conserving open space; and geographic information systems. In 1999, NEMO held meetings on Long Island to explore expansion of the program to Manhasset and Hempstead communities.	CTDEP anticipates sponsoring additional operator denitrification workshops in 2000. CTDEP will continue to provide §319 funding for NEMO workshops. CTDEP will continue watershed program development.
E2-4. Utilize the Bi-state Marine Resources Committee to ensure Long Island Sound related legislation moves on a parallel track in both Connecticut and New York and to help educate local governments and the public about the importance of the Sound and the successful implementation of the LISS recommendations.	C	CTDEP NYSDEC NYSDOS	Ongoing	Redirection of base program	Partial Progress	The Committee last met in January 1997. Legislation relating to the Menhaden fishery in LIS was passed in 1997. As a result of this meeting, both states passed legislation restricting commercial Menhaden harvesting in LIS for a two-year period. While the Committee did not meet in 1998 or 1999, CT passed Public Act 99-78 that extended the moratorium on the taking of menhaden to July 1, 2001.	The CT General Assembly is considering House Bill 5584 to make a ban on the taking of menhaden by any size boat and purse seine, permanent.

[1] Type: (C)ommitment, (R)ecommendation, (N)ew (A)ction

[2] Status for ongoing programs and actions: Fully Met, Substantive Progress, Partial Progress, Discontinued
Status for dated actions: Complete, Ahead of Schedule, On Schedule, Behind Schedule, Partially Addressed, Not Initiated

2. PROMOTING UNDERSTANDING (CCMP TABLE 52, P.147)

CCMP Action	Type[1]	Responsible Parties	When	Estimated Cost	Status[2]	Description	Upcoming Action
E2-5. Pursue reestablishment of funding for the Long Island Sound Resource Center at Avery Point and further development of a similar resource center in New York to serve as clearinghouses and depositories for information about the Sound and investigate ways to improve funding for these centers.	R	CTDEP NYSDEC EPA	Ongoing	$150,000 per year for Connecticut Long Island Sound Resource Center; $60,000/ year for a New York facility	Partially Addressed	No new funding has been secured. The LIS Resource Center continues to operate with GIS and library functions.	

3. FACILITATING PUBLIC PARTICIPATION (CCMP TABLE 53, P.148)

Ongoing Program	Responsible Parties	Status[2]	Description	Upcoming Action
E3-1. Encourage public participation in activities relating to the cleanup and protection of the Sound and provide support for activities including storm drain stenciling, beach grass planting, and beach cleanups.	CTDEP NYSDEC EPA Sea Grant	Substantive Progress	This action is being met primarily through the Connecticut LIS License Plate Fund and the LISS Small Grants program (31 projects have been funded to date under the Small Grants Program). Also, state §319 funds are put into these activities. In Connecticut, §319 watershed projects in the Hockanum, Mattabasett, Norwalk, Quinnebaug, Quinnipiac, and West Rivers provide the following public participation activities: 1) volunteer monitoring, 2) streambank restoration/riparian plantings, 3) river clean up days, and 4) stream walk assessments. Staff give numerous presentations to the general public each year. For example, New York Sea Grant continues to provide information on storm drain stenciling. Eight different stencils are available depending on the water body being stenciled. Also, Sea Grant has created a Sound Gardening Demonstration Garden in Oyster Bay funded through §319 funds. The CT LIS License Plate Fund is funding water quality sampling projects to volunteers in three CT harbors. NY Sea Grant developed 3 planting guides – native grasses, smooth cordgrass and American beach grass.	LISS Small Grants funded 17 projects for FY2000. The Norwalk Maritime Aquarium is completing a video for students to increase environmental awareness of LIS. Public participation will also be sought in the development of a total maximum daily load (TMDL) for Sasco Creek watershed.

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ype: (C)ommitment, (R)ecommendation, (N)ew (A)ction

2) Status for ongoing programs and actions: Fully Met, Substantive Progress, Partial Progress, Discontinued

Status for dated actions: Complete, Ahead of Schedule, On Schedule, Behind Schedule, Partially Addressed, Not Initiated

3. FACILITATING PUBLIC PARTICIPATION (CCMP TABLE 53, P.148)

CCMP Action	Type[1]	Responsible Parties	When	Estimated Cost	Status[2]	Description	Upcoming Action
E3-2. The LISS Citizens Advisory Committee will continue to provide guidance to the Management and Policy Committee and serve as a link between the public and LISS management agencies. The CAC has been instrumental in providing guidance to the Study and serving as a conduit between the Management Conference and the public.	**C**	**CAC**	**Immediately**	**Costs are $4,000 per year for expenses and travel and would be covered under the basic cost of maintaining the Management Conference**	Fully Met	The CAC has expanded its membership to 60; has formed subcommittees to provide focused input on specific areas, and has continued to be very active in providing counsel to the Management Conference. The CAC provided its annual priorities to the Policy Committee by letter in June 1999; briefed the new Congress on LIS issues and accomplishments in October1999; and provided its comments on the draft TMDL for the public record in November 1999.	The CAC will meet quarterly in 2000 in March, June, September and December.
E3-3. Enhance funding for hands-on activities such as storm drain stenciling, beach grass planting and beach cleanups to allow the public to actively participate in the cleanup and restoration of the Sound and learn more about its ecosystem.	**R**	**CTDEP NYSDEC EPA Sea Grant**	**When funding becomes available**	**$25,000 per year**	Fully Met	CTDEP has funded storm drain stenciling activities with grants from the Long Island Sound License Plate Fund and through watershed projects funded by §319 funds from the EPA. Save the Sound, Inc. manages storm drain stenciling in Connecticut. The LISS has funded the Small Grants program to support local implementation and education efforts. The Small Grants program funding was increased to $50,000 in 1999. 10 projects were funded. CT DEP's Long Island Sound VISA card contributes funds to the LIS License Plate Fund. CT DEP continues a successful partnership with the LIS VISA card.	Continue efforts to promote public awareness.

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ype: (C)ommitment, (R)ecommendation, (N)ew (A)ction

2) Status for ongoing programs and actions: Fully Met, Substantive Progress, Partial Progress, Discontinued
Status for dated actions: Complete, Ahead of Schedule, On Schedule, Behind Schedule, Partially Addressed, Not Initiated

3. FACILITATING PUBLIC PARTICIPATION (CCMP TABLE 53, P.148)

CCMP Action	Type[1]	Responsible Parties	When	Estimated Cost	Status[2]	Description	Upcoming Action
E3-4. Promote citizen involvement in educational and monitoring activities in and around the Sound and consider: -Providing technical assistance to citizen monitoring groups; -Developing a reward system for citizens participating in Long Island Sound protection and restoration programs; -Developing environmental habitat kits and guide maps; -Production and distribution of videos of Long Island Sound research cruises.	R	CTDEP NYSDEC EPA	When funding becomes available	$75,000 per year	Substantive Progress	CTDEP assists to the extent possible supporting citizens monitoring groups with technical staff for planning programs, grants to support efforts, and review of reports and data. CTDEP supports public involvement in the recently implemented Quinnipiac and Norwalk River Watershed programs. The LIS volunteer water monitoring workgroup assisted in coordinating citizen water quality monitoring around LIS.	The CTDEP web site will provide information on LIS License Plate fund projects which may be used by other school groups for water quality monitoring, curricula, and other related projects.

4. INCREASE COMMUNICATION AND COOPERATION (CCMP TABLE 54, P.150)

CCMP Action	Type[1]	Responsible Parties	When	Estimated Cost	Status[2]	Description	Upcoming Action
E4-1. Increase efforts to coordinate ongoing governmental and nongovernmental public outreach efforts as the plan becomes implemented and encourage private and nonprofit groups to continue to develop and implement Long Island Sound educational and outreach programs.	C	CTDEP NYSDEC EPA	Ongoing	Redirection of base program	Substantive Progress	LISS outreach staff in NY, CT and EPA LISO participate in LIS Educators Meetings organized by Save the Sound and held quarterly at various locations around the Sound.	LIS outreach staff in NY, CT and EPA will participate in planning organizing and conducting a LIS Educators Conference in March 2000.

:Y
Type: (C)ommitment, (R)ecommendation, (N)ew (A)ction

2) Status for ongoing programs and actions: Fully Met, Substantive Progress, Partial Progress, Discontinued
Status for dated actions: Complete, Ahead of Schedule, On Schedule, Behind Schedule, Partially Addressed, Not Initiated

4. INCREASE COMMUNICATION AND COOPERATION (CCMP TABLE 54, P.150)

CCMP Action	Type[1]	Responsible Parties	When	Estimated Cost	Status[2]	Description	Upcoming Action
E4-2. Establish a public outreach work group to guide the implementation of the public involvement and education commitments and recommendations. The work group will work closely with and serve to complement the ongoing public outreach and education efforts of the Citizens Advisory Committee. The group will also be charged with determining funding resources for implementation of public involvement and education recommendations, consulting with staff on tactics, working to provide coordination of public outreach efforts from both an internal and external basis, and assessing program effectiveness.	R	CAC CTDEP NYSDEC EPA	Upon signature of the plan by the state Governors and the EPA Administr a-tor	Redirection of base program	Complete	The first meeting of the Public Outreach Work Group (POWG) was held in October 1994. The POWG has reviewed outreach materials, provided ideas for new material, and reviewed the proposals received in response to the LISS Small Grants program. POWG was merged with the CAC communications subcommittee in 1998. CAC By Laws were amended in 1999 to reflect this change.	See E3-2.

5. ENHANCE EDUCATION AT ALL LEVELS (CCMP TABLE 55, P.151)

Ongoing Programs	Responsible Parties	Status[2]	Description	Upcoming Action
E5-1. Support ongoing actions that assist teachers in their efforts to integrate LIS issues into existing curricula.	CTDEP NYSDEC EPA Sea Grant	Substantive Progress	CTDEP continues to provide materials to teachers and schools upon request, see actions in this section. NY Sea Grant is a member of the Executive board for NYS Marine Educators and helps to distribute LIS materials and information to teachers. The NY Sea Grant hosted two grant writing workshops, one each in Connecticut and New York, for potential Small Grants applicants.	The Maritime Aquarium, NY/CT Sea Grants and EPA are cooperating on the LIS Educators Conference scheduled for March 2000 in Norwalk, CT.

Type: (C)ommitment, (R)ecommendation, (N)ew (A)ction

2) Status for ongoing programs and actions: Fully Met, Substantive Progress, Partial Progress, Discontinued
Status for dated actions: Complete, Ahead of Schedule, On Schedule, Behind Schedule, Partially Addressed, Not Initiated

5. ENHANCE EDUCATION AT ALL LEVELS (CCMP TABLE 55, P.151)

CCMP Action	Type[1]	Responsible Parties	When	Estimated Cost	Status[2]	Description	Upcoming Action
E5-2. Continue Connecticut's Long Island Sound High School Research Grant Program, initiated in 1990. This program provides funding for students to conduct research on the Sound and its watershed.	C	CTDEP	Ongoing	$30,000 per year	Discontinued		
E5-3. Encourage natural history museums and nature centers to promote Long Island Sound issues within their programs.	C	CTDEP NYSDEC EPA	Ongoing	Redirection of base program	Partial Progress	CTDEP works with museums and at public affairs such as local fairs and festivals to promote sound environmental management. CTDEP funded a Long Island Sound traveling display through the CT Museum of Natural History, completed in 1999. CTDEP developed a nonpoint source exhibit with the CT Museum of Natural History in 1999.	
E5-4. Work with school districts and, where appropriate, the Department of Education, in Connecticut and New York to develop Long Island Sound educational materials and outreach programs for primary and secondary schools. Help teachers integrate Long Island Sound information into their curricula and provide materials wherever possible. This should include hiring a Long Island Sound education coordinator.	R	CTDEP NYSDEC	When funding becomes available	$75,000 per year	Partial Progress	CTDEP's Project SEARCH and other Information and Education Section activities are aimed at educating educators and students about a broad range of environmental matters, including Long Island Sound.	
E5-5. Enhance ongoing actions to assist teachers in their efforts to integrate Long Island Sound issues into their existing curricula including the development and support of teacher workshops.	R	CTDEP NYSDEC EPA	When funding becomes available	$75,000 per year	Partial Progress	CTDEP's Project SEARCH and other Information and Education Section activities are aimed at educating educators and students about a broad range of environmental matters, including Long Island Sound.	

:Y
ype: (C)ommitment, (R)ecommendation, (N)ew (A)ction

2) Status for ongoing programs and actions: Fully Met, Substantive Progress, Partial Progress, Discontinued
Status for dated actions: Complete, Ahead of Schedule, On Schedule, Behind Schedule, Partially Addressed, Not Initiated

5. ENHANCE EDUCATION AT ALL LEVELS (CCMP TABLE 55, P.151)

CCMP Action	Type[1]	Responsible Parties	When	Estimated Cost	Status[2]	Description	Upcoming Action
E5-6. Consider a Long Island Sound High School Research Grant Program to provide resources to allow a variety of high schools to conduct research on the Sound and its watershed.	**R**	**NYSDEC**	**When funding becomes available**	**$30,000 per year**	Not Initiated		

6. SECURE FUNDING (CCMP TABLE 56, P.152)

Ongoing Program	Responsible Parties	Status[2]	Description	Upcoming Action
E6-1. The LISS will continue to encourage all organizations involved in the public involvement and education effort, both governmental and nongovernmental, to take advantage of the various grant programs, for which they are eligible, that provide funding for educational activities. These include CT's LIS Fund, LIS High School Research Grant Program, and EPA's Education Grants. Private sector funding should also be sought when and where possible and other private grant programs identified.	**CTDEP NYSDEC EPA Sea Grant Other Management Conference Participants**	Substantive Progress	Announcements for funding are widely circulated within the LIS community. Since its inception, the CTDEP LIS License Plate fund has allocated more than $2.6 million to fund over 160 projects. Since the inception of the LIS Small Grants Program, the New York Sea Grant office of the LISS has provided grant funds for 41 projects totaling $131,952. These projects assisted hundreds of teachers and thousands of school children, and produced over15,000 pieces of LIS literature. In 1999, the LISS provided grant funds totaling $50,000 for 10 local community environmental projects in Connecticut and New York	CTDEP will mail the RFP for the next round of License Plate projects in early 2000. The information will also be available on the CTDEP web site.

1) Type: (C)ommitment, (R)ecommendation, (N)ew (A)ction

2) Status for ongoing programs and actions: Fully Met, Substantive Progress, Partial Progress, Discontinued
Status for dated actions: Complete, Ahead of Schedule, On Schedule, Behind Schedule, Partially Addressed, Not Initiated

6. SECURE FUNDING (CCMP TABLE 56, P.152)

CCMP Action	Type[1]	Responsible Parties	When	Estimated Cost	Status[2]	Description	Upcoming Action
E6-2. Seek to create a public involvement and education (PIE) fund that could be supported by a variety of funding sources, including federal appropriations through the Long Island Sound Improvement Act. The PIE fund would be administered by the LISS Management Conference. A PIE fund and interest generated from its endowment would provide support for projects fulfilling plan involvement and education actions and recommendations as proposed by both nongovernmental and governmental organizations. **Current state and private Long Island Sound public education programs are under-funded. State and private funding sources must be directed toward meeting the needs of existing programs before being sought for a PIE fund.**	R	**CTDEP NYSDEC EPA**	**Upon signature of the plan by the state Governors and the EPA Administrator**	**Seed money should be made available for the establishment of a PIE Fund.**	Not Initiated	A PIE fund has not been established. However, funding for existing outreach and education programs, such as the CTDEP License Plate Fund and the LISS Small Grants Program have continued.	

6Y

Type: (C)ommitment, (R)ecommendation, (N)ew (A)ction

2) Status for ongoing programs and actions: Fully Met, Substantive Progress, Partial Progress, Discontinued

Status for dated actions: Complete, Ahead of Schedule, On Schedule, Behind Schedule, Partially Addressed, Not Initiated

Glossary of Acronyms

A	
ACOE	Army Corps of Engineers
B	
B	Billion
BAT	Best Available Technology
BMP(s)	Best Management Practice(s)
BNR	Biological Nutrient Reduction
BOD	Biological Oxygen Demand
C	
CAC	Citizens Advisory Committee
CCMP	Comprehensive Conservation and Management Plan
CD	Compact Disc
CD-ROM	Compact Disc - Read-Only Memory
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act (Superfund)
CES	Cooperative Extension Service
CSO(s)	Combined Sewer Overflow(s)
CT	Connecticut
CTDEP	Connecticut Department of Environmental Protection
CTDOA	Connecticut Department of Agriculture
CTDOA/BA	Connecticut Department of Agriculture Bureau of Aquaculture
CTDOHS	Connecticut Department of Health Services
CTDOT	Connecticut Department of Transportation
CVA	Clean Vessel Act
CWA	Clean Water Act
CZM	Coastal Zone Management
CZMA	Coastal Zone Management Act
D	
DO	Dissolved Oxygen (expressed in milligrams per liter mg/l)
E	
EIS	Environmental Impact Statement
EMPACT	Environmental Monitoring for Public Access and Community Tracking (EPA)
EPF	Environmental Protection Fund (New York State)
F	
FY	Fiscal Year
FFY	Federal Fiscal Year

G

GIS	Geographic Information System

H

HEP	Harbor Estuary Program (New York/New Jersey)
Hg	Mercury

I

ICM	Integrated Crop Management
IPM	Integrated Pest Management
ISC	Interstate Sanitation Commission
ISTEA	Intermodal Surface Transportation Efficiency Act

K

K	thousand
k	kilogram
km	Kilometer
Km^2	Square kilometer

L

l	liter
LA	Load Allocation
lbs	pounds
LIS	Long Island Sound
LISO	Long Island Sound Office (EPA)
LISS	Long Island Sound Study
LISWA	Long Island Sound Watershed Alliance

M

M	Million
MC	Management Committee
MEG	Model Evaluation Group
mg	milligrams
mgd	million gallons per day
mg/l	milligrams per liter
MPRSA	Marine Protection, Research and Sanctuaries Act
MSD(s)	Marine Sanitation Device(s)
MSRC	Marine Science Research Center (SUNY)

N

N	Nitrogen
NDD	National Diversity Database
NDZ	No Discharge Zone
NEIWPCC	New England Interstate Water Pollution Control Commission
NEMO	Nonpoint Education for Municipal Officials

N (Cont'd)

NJDEP	New Jersey Department of Environmental Protection
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration
NO_x	Nitrous Oxide
NPDES	National Pollutant Discharge Elimination System
NPS	Nonpoint Source(s)
NRCS	Natural Resource Conservation Service
NRWI	Norwalk River Watershed Initiative
NY	New York
NYC	New York City
NYCDEP	New York City Department of Environmental Protection
NYDOT	New York Department of Transportation
NY/NJHEP	New York/New Jersey Harbor Estuary Program
NYS	New York State
NYSDEC	New York State Department of Environmental Conservation
NYSDOH	New York State Department of Health
NYSDOS	New York State Department of State
NYSOPRHP	New York State Office of Parks, Recreation and Historic Preservation

O

ODA	Ocean Dumping Act
O&M	Operations and Maintenance
OLISP	Office of Long Island Sound Programs (State of Connecticut)

P

P.A.	Public Act
PCB(s)	Polychlorinated Biphenyl(s)
PIE	Public Information and Education
PS	Point Source

R

RFP(s)	Request for Proposal(s)
RNHT	Recreation and Natural Heritage Trust (State of Connecticut)

S

SAV	Submerged Aquatic Vegetation
SEP	State Environmental Protection (fund, CT)
SFY	State Fiscal Year
SIP	State Implementation Plan
sq. mi.	Square Miles
SUNY	State University of New York
SPDES	State Pollution Discharge Elimination System
SRF	State Revolving Fund

S (Cont'd)

STORET	STORage and RETrieval System (EPA Data System)
STP(s)	Sewage Treatment Plant(s)
SWEM	System-Wide Eutrophication Model

T

TAC	Technical Advisory Committee
TMDL	Total Maximum Daily Load

U

UCONN	University of Connecticut
USACOE	Unites States Army Corps of Engineers
USCG	United States Coast Guard
USDA	United States Department of Agriculture
USDOI	United States Department of the Interior
USEPA	United States Environmental Protection Agency
USFWS	United States Fish and Wildlife Service
USGS	United States Geological Survey

W

WAC(s)	Watershed Advisory Committee(s)
WLA(s)	Waste Load Allocation(s)
WMA	Wildlife Management Area
WWW	World Wide Web

To obtain copies of this report, contact:

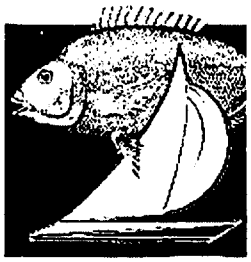
EPA Long Island Sound Office
Stamford Government Center
888 Washington Boulevard
Stamford, CT 06904
203 977-1541
203 977-1546 fax

or go to the LISS website at:

http://www.epa.gov/region01/eco/lis

for an electronic version of the report.

LONG ISLAND SOUND STUDY



LONG ISLAND SOUND STUDY

A Partnership to Restore and Protect the Sound

2000 CCMP IMPLEMENTATION TRACKING REPORT

January-December 2000

The Comprehensive Conservation and Management Plan

August 2001

THE LONG ISLAND SOUND STUDY

ACKNOWLEDGMENTS

This Report is the product of the Long Island Sound Study partnership of Federal, state, local and private agencies and organizations. The diversity of the Comprehensive Conservation and Management Plan for Long Island Sound increases the difficulty and complexity in obtaining the information and data for this report. We wish to thank the states of Connecticut and New York for their invaluable assistance in compiling the data for the report and in coordinating their efforts with the many other state and local agencies and organizations participating in the Study.

Index

About the 2000 Report

Understanding this Report

As in 1999, this *2000 CCMP Implementation Tracking Report* is organized into seven sections, each corresponding to the seven priority management areas identified in the CCMP:

1) Continuing the Management Conference;
2) Hypoxia;
3) Pathogen Contamination;
4) Toxic Substances;
5) Floatable Debris;
6) Management and Conservation of Living Resources and Their Habitats; and
7) Public Involvement and Education.

Each of these sections contains a brief narrative that highlights accomplishments of the Management Conference in that area in 2000.

Unlike the previous CCMP Implementation Tracking Reports, this report does not provide details on each of the 232 individual action items in the CCMP. The report instead provides information in the 36 CCMP subcategories outlined in the Index to the report.

As in prior year reports, the charts following each narrative section correspond to the appropriate table in the CCMP for each priority area.

The charts contain self-explanatory information under the 36 action areas identified in the CCMP, such as:

- *Description*; and
- *Planned Action*

The Appendix contains the entire set of 232 CCMP actions indexed to the detailed charts in the report.

An Annual Snapshot of Progress

Because of the inherent long-term nature of initiating and assessing the results of environmental restoration and improvement efforts, this report should be viewed as a one-year snapshot of accomplishments against the 36 action areas identified in the CCMP. This report is not an expression of environmental results.

Environmental Indicators

The LISS has developed a basic set of environmental indicators for Long Island Sound, with an ultimate goal of linking progress on the CCMP to actual environmental improvements in the Long Island Sound ecosystem.

In this way, environmental results may be used in the future to assess the effectiveness of CCMP actions, and the Management Conference will be in a better position to consider and adjust CCMP plans, actions, and resources according to the environmental results desired or achieved.

The LISS environmental indicators are accessible on the LISS website at: http://www.epa.gov/region01/eco/lis.

Foreword

This 2000 report documents the sixth year of implementation of the *Long Island Sound Study (LISS) Comprehensive Conservation and Management Plan (CCMP)* for Long Island Sound (LIS). This Report summarizes the continuing work of the LISS *Management Conference* partners in carrying out the CCMP.

The LISS Management Conference is sponsored by the U.S. Environmental Protection Agency (EPA), the New York State Department of Environmental Conservation (NYSDEC), and the state of Connecticut Department of Environmental Protection (CTDEP). Additional partners include:

- Interstate Environmental Commission (IEC);
- U.S. Department of the Interior's Fish and Wildlife Service (USFWS);
- U.S. National Oceanic and Atmospheric Administration (NOAA) National Marine Fisheries Service (NMFS);
- New York City Department of Environmental Protection (NYCDEP);
- U.S. Department of Agriculture Natural Resource Conservation Service (NRCS);
- New York State Department of State;
- New York and Connecticut Sea Grant College programs
- LISS Technical Advisory Committee (TAC); and
- LISS Citizens Advisory Committee (CAC).

Many other federal, state, municipal academic, and local public and private organizations contribute to implementation of the CCMP. Among these are the:

U.S. Army Corps of Engineers (ACOE);

U.S Geological Survey (USGS);

U.S. Department of Agriculture's Cooperative Extension Service;

Connecticut Department of Agriculture Bureau of Aquaculture (CTDOA/BA);

New York and Connecticut state Departments of Health;

New England Interstate Water Pollution Control Commission;

University of Connecticut (UConn); and

State University of New York (SUNY).

Together, these Federal, state, local, academic, and citizen partners combine their efforts to achieve the common CCMP vision for the long-term health, restoration, and economic well-being of Long Island Sound, its watersheds and tributaries, and living marine and marine-dependent resources.

Executive Summary

The Long Island Sound Study released its first comprehensive public report on the health of Long Island Sound in April 2001. *Sound Health 2001* provides an in-depth review of 15 principal environmental indicators of the health of the Sound over the last 10-15 years. The report presents data and trends in such areas as water quality, habitat restoration, toxics and pathogen contamination, as well as the status of important living resources native to the Sound or dependent on its health. An expanded suite of 45 indicators of the health of the Sound is posted on the LISS website.

This *2000 CCMP Implementation Tracking Report* should be viewed in concert with *Sound Health 2001* indicators. These reports, when considered as a whole, can provide an overview of the impact of management actions on the health of the Sound, and can help managers to refocus priorities if a desired environmental outcome is not being achieved. These reports are available on the LISS homepage at: http://www.epa.gov/region01/eco/lis.

Summary of 2000 Accomplishments

Nitrogen TMDL Approved

The most significant accomplishment in 2000 was the development of the final Total Maximum Daily Load (TMDL) for nitrogen in Long Island Sound, with EPA approval following in 2001. The states of Connecticut and New York submitted the TMDL in January 2001and EPA approved it in April 2001. The TMDL allocates responsibility for reducing nitrogen loads among all nitrogen sources.

Nitrogen Loading Continues Downward Trend

In 2000 the total point source nitrogen load to the Sound was estimated at 157,631 lbs/day, a decrease of over 29,000 lbs/day from 1990 levels. New York loadings totalled 109,518 lbs/day; Connecticut loads totalled 48,113 lbs/day. The total nonpoint source (NPS) load nitrogen to LIS was estimated to be about 28,000 tons/yr, about 9,000 tons below the highest load over the last decade in 1991 of 37,000 tons/yr. The LISS plans to revise these estimates using a US Geological Survey report to be released in 2001.

Hypoxia Indicators Lessen

The areal extent and duration of low (<3mg/l) dissolved oxygen (DO) was less in 2000 than the 14 year average. In 2000 the maximum area of low DO in LIS was estimated at 173 square miles (mi^2), with an overall duration of 35 days compared to the 14 year averages of 203 mi^2 and 56 days.

Continued Progress on Habitat Goals

The states of Connecticut and New York made good overall progress toward the LISS goal of restoring 2000 acres of tidal wetlands and 100 miles of river corridors for anadromous fish access by 2008. Since 1998, Connecticut has restored over 308 acres of tidal wetland habitat, treated or retreated many acres of phragmites-infested habitat, and restored 34.9 miles of river corridor to anadromous fish passage. Since 1998, New York has restored over 65 acres of tidal wetlands in the LIS watershed.

Addressing Toxic Contamination, Pathogens and Floatables

Communities on and around the Sound are continuing watershed management-based approaches to controlling sources of pollution to the Sound, including point and nonpoint sources, CSOs, and land use practices. Many communities have formed watershed management committees or groups that cross local, municipal, or even state jurisdictions, to work together in addressing environmental management problems that have no boundaries.

LIS Research Ongoing

The Management Committee continued to make funding available for the LIS research fund in

2000. The New York and Connecticut Sea Grant programs contributed $25,000 each for a total 2000 fund of $240,000. The LISS selected 3 research projects for funding in 2000, which will study historical environmental trends in the Sound over the past 400 years; investigate the causes of the 1999 lobster mortalities in the Sound; and study various factors that may affect phytoplankton growth in the Sound.

Citizen Action

The Citizens Advisory Committee (CAC) met in March, June, September, and December in 2000, and developed key recommendations to the Policy Committee, especially endorsing the creation of a Long Island Sound Reserve system, as called for in the CCMP. The CAC supported increased Federal funding to match the significant state financial commitments to the Sound -- as noted elsewhere in this report, the *Long Island Sound Restoration Act of 2000* was passed, increasing the appropriations authorization to $40 million through 2005.

Reaching and Educating the Public

The LISS outreach and education programs continued to conduct many meetings, conferences and workshops attended by hundreds of public officials and concerned citizens.

The LISS produced and distributed many thousands of copies of its LIS newsletter, *UPDATE*, as well as fact sheets, publications, and brochures covering timely and critical LIS topics. Many of these documents were posted on the LISS web page: http://www.epa.gov/region01/eco/lis. The LISS webpage continued to be one of the most visited pages on the EPA New England Region website, with nearly 60,000 recorded site visits in 2000.

LISS staff continued to: provide LIS displays at annual public events, such as Earth Day and LIS Days in Connecticut and New York; address scores of teachers, educators, school children, groups and classes; issue LIS press releases, make public service announcements, and give radio and press interviews on LIS issues.

Continuing the Management Conference

Carrying out the CCMP is the combined responsibility of the Management Conference partners. Through their ongoing programs and day-to-day program operations, and through Federal, state, local, and private LIS funding initiatives and activities, CCMP priorities are assessed, implemented, and reported.

CCMP Strategy:

An essential element of the Long Island Sound Study strategy to implement the CCMP was to continue the Management Conference partnership in carrying out the plan to restore and protect the Sound. The states and EPA first signed a LIS Agreement in 1994 and again in 1996, which formally committed EPA and the states to the Management Conference partnership as the primary means of implementing the CCMP. Most of the 13 CCMP actions to address this strategy have been achieved, and continue to be key to the viability of the LISS partnership. Federal legislation in 1990 created the EPA Long Island Sound Office to bridge the bi-state, multi-agency, public/private efforts to restore and protect the Sound.

✦✦✦ ✦✦✦

2000 Highlights:

- The *Long Island Sound Restoration Act* of 2000 [P.L. 106-457] reauthorized the LISS through 2005 and increased the appropriations ceiling to $40 million annually. Congress appropriated $5 million for the LISS in 2001.

- The LISS Policy Committee directed the Management Conference partners to update the 1996 LIS Agreement to identify measurable environmental goals for implementation of CCMP priorities over the next 5-10 years. The 2001 LIS Agreement is to be signed by the New York and Connecticut Governors and the EPA Administrator by September 2001.

- In September 2000 the Policy Committee signed the LIS Habitat Restoration Memorandum of Understanding (MOU) along with several Federal, state, and local agency partners. The MOU establishes roles and responsibilities of the partners in implementing the LISS 1998 Habitat Restoration Strategy goals of restoring 2,000 acres of habitat and reopening 100 river miles to anadromous fish passage by 2008.

- The Management Committee met in January, April, July, and October 2000. The Committee set aside a special period in its meetings for public comments, enabling citizens to directly convey their concerns about Long Island Sound to the Committee. In 2000 the US Fish & Wildlife Service accepted the Committee's invitation to participate as a full Committee member, formalizing its longstanding role as a key CCMP implementation partner.

- The Management Committee continued its commitment to understanding the science of the Sound, providing $190,000 to the LISS research fund in 2000. The Connecticut and New York Sea Grant College Program partners each also contributed $25,000 to this fund in 2000 for a total LISS research fund of $240,000.

- The LISS sponsored the second biannual municipal conference, co-hosted by the Mayors of Stamford and Glen Cove. Over 100 Federal, state, municipal and local officials attended the conference, with several reaffirming their commitment to preserve, restore and improve the Sound by signing the Bi-Coastal Municipal Partnership pledge.

- The LISS Citizens Advisory Committee (CAC) met quarterly in March, June, September and December 2000, recommending a number of actions on CCMP implementation to the Policy Committee. The CAC formed a new living marine resources (LMR) subcommittee to better assess and address this vital area.

SUMMARY OF CCMP MANAGEMENT ACTIONS: CONTINUING THE MANAGEMENT CONFERENCE

M-1. SUPPORTING IMPLEMENTATION (CCMP TABLE 50, P. 141)

Key Elements: The CCMP committed the LISS to formally extend the Management Conference to guide CCMP implementation, and to continue its Citizens Advisory Committee as an integral part of the conference. The plan also called for the EPA LISO to continue and expand its efforts to coordinate among Management Conference participants in support of CCMP implementation by providing funding and staffing, conducting education, outreach, monitoring, and data management, and ensuring consistency with other Federal and state goals and policies.

Description	2001 Planned Action
The *Long Island Sound Restoration Act of 2000* [P.L. 106-457] was enacted, reauthorizing the LISS through 2005 and increasing the appropriations authorization to $40 million annually.	
EPA and Congress continued to provide support for the LISS in FY2000 under Section 119 and 320 of the CWA.	EPA's FY2001 President's Budget included a line item of $500,000 for the LISO, with Congress earmarking an additional $4.5 million. The LISS also received $330,000 under EPA's National Estuary Program for LIS in FY2001.
In September 2000 the policy committee charged the management conference partners with revising the 1996 Long Island Sound Agreement for 2001to include quantifiable goals in CCMP priority areas over the next 5-10 years.	Development and implementation of the LIS 2001 Agreement.
The LISS continued to provide support for state program coordination and involvement and for the LISS public outreach and education and habitat restoration programs.	
The CAC supported increased Federal appropriations for the LISS in 2000 through briefings conducted for members of the LIS caucus in October 2000.	The CAC will continue to advocate for the full $40 million appropriation for the LISS.
The management committee supported earmarking LISS funding for CCMP implementation projects in the FY01 LISS budget request.	Continued support for CCMP implementation projects.
The policy committee signed the LIS Habitat Restoration MOU that establishes the roles and responsibilities of the signatories in implementing the 1998 habitat restoration strategy goals of restoring 2,000 acres of habitat and 100 river miles to anadromous fish passage.	Continue habitat restoration projects.
The USFWS accepted the management committee's invitation to participate on the committee as a full member, and participated in the quarterly meetings in 2000.	The USFWS will continue as an active participant in the management conference.

Eliminating Adverse Impacts of Low Dissolved Oxygen in the Sound

The Long Island Sound Study identified low dissolved oxygen (hypoxia) as the most significant water quality problem in LIS. Long Island Sound's waters comprise the largest single habitat for living marine resources in the watershed. Since 1990, EPA and the states of Connecticut and New York have implemented a phased program that first capped, and subsequently reduces human-caused nitrogen loads to LIS over a 15-year period.

CCMP Strategy:

The CCMP identified a five part strategy to address the elimination of adverse impacts of low dissolved oxygen in the aquatic habitat of the Sound: 1) reduce nitrogen from sewage treatment plants (STPs) and other point sources; 2) reduce nitrogen loads from nonpoint sources; 3) continue management of hypoxia; 4) fund implementation of hypoxia management plans; and 5) monitor and assess hypoxic conditions in the Sound.

✦✦✦ ✦✦✦

2000 Highlights:

- The states of New York and Connecticut held a series of public meetings in 2000 to gather public comments on the proposed waste load allocations to be included in the TMDL. Both states provided written responses to the public comments that were included with the TMDL submission.

- The states of New York and Connecticut completed the Total Maximum Daily Load (TMDL) for nitrogen and submitted the TMDL for EPA approval in January 2001. The TMDL is consistent with the July 1998 *Phase III Actions for Hypoxia Management,* the LISS bi-state agreement calling for a 58.5 percent reduction in human-caused (anthropogenic) nitrogen loads to the Sound over a 15 year period beginning in 1999. EPA approved the TMDL in April 2001.

- The estimated nitrogen load from STPs in the LIS drainage basin that entered the LIS in 2000 is approximately 158,676 lbs/day, a decrease of over 28,000 lbs/day from 1990 levels. This is a slight increase from the 1999 levels due to more accurate reporting by the states.

- New York's 2000 point source nitrogen loading was 110,563 lbs/day, compared with 105,759 lbs/day in 1999. Connecticut's point source nitrogen loading was 48,113 lbs/day in 2000 compared with 49,138 lbs/day in 1999. Figure 1 shows the total point source nitrogen load and the trends in New York and Connecticut since 1990. The total estimated nonpoint source load to LIS is estimated to be 27,937 tons (1999 figures), a reduction of 9,110 tons from the peak year of 1991 at 37,047 tons.

- In 2000, the maximum area and duration of dissolved oxygen (DO) levels less then 3 mg/l in LIS was173 mi^2 and 36 days. This was a somewhat larger area than the 1999 hypoxic area of 121 mi^2, but the duration of hypoxic conditions was somewhat less than the 50 days recorded in 1999. Figure 2 shows the timing and duration of hypoxia in LIS since 1987.

- The City of Waterbury's new STP came on line in 2000, increasing its nitrogen removal capacity by 75 percent, to 4mg/l. The new plant has capacity for processing 52 MGD and up to 82 MGD of primary effluent for storm water overflows.

- As of 2000, 19 municipal STPs in Connecticut have completed nitrogen removal projects totalling over $250 million; 5 STPs currently have nitrogen removal upgrades in progress totalling $80 million; and 6 STPs currently are under design for nutrient removal with design grant costs totalling over $116 million. (See Figure 3)

Figure 1

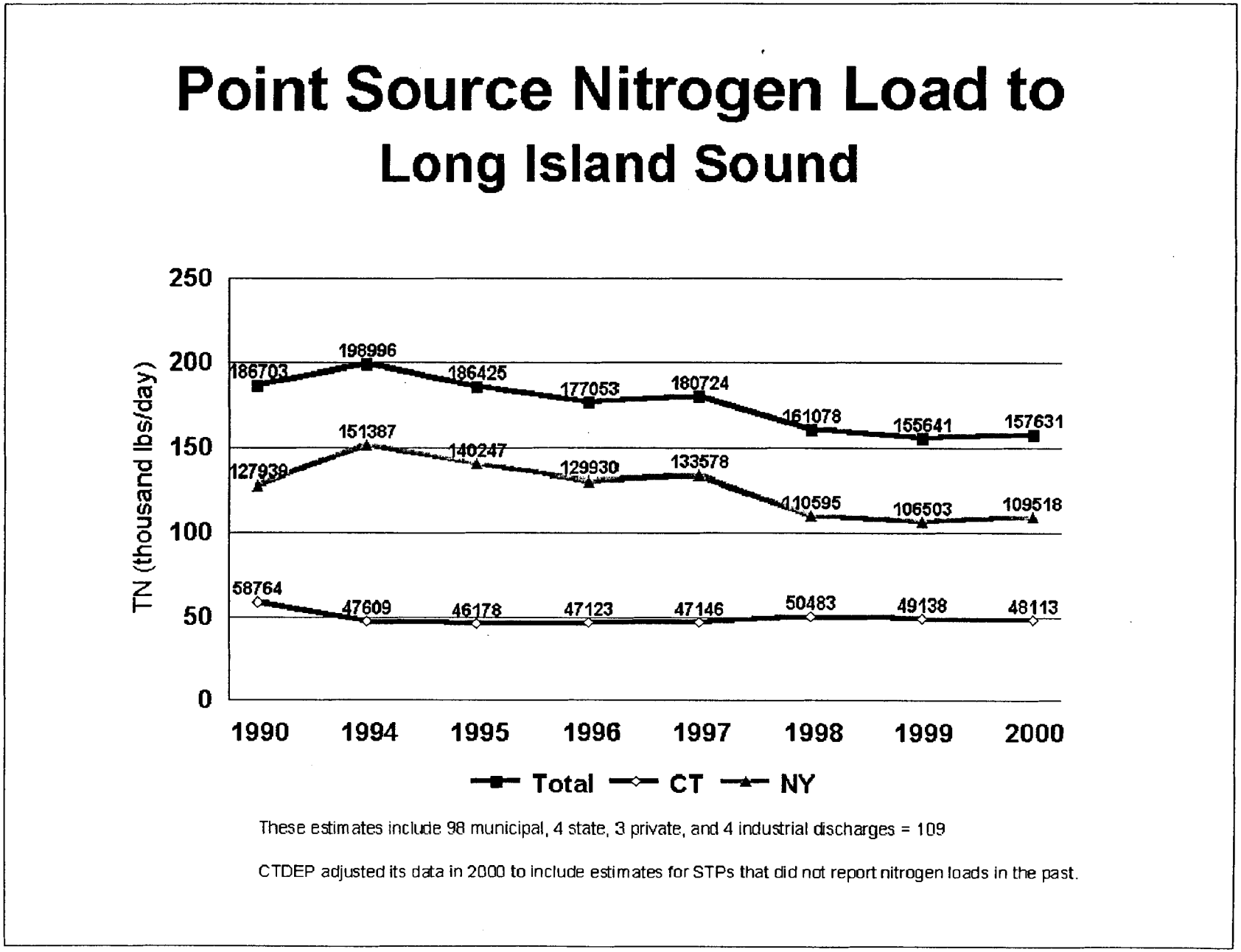
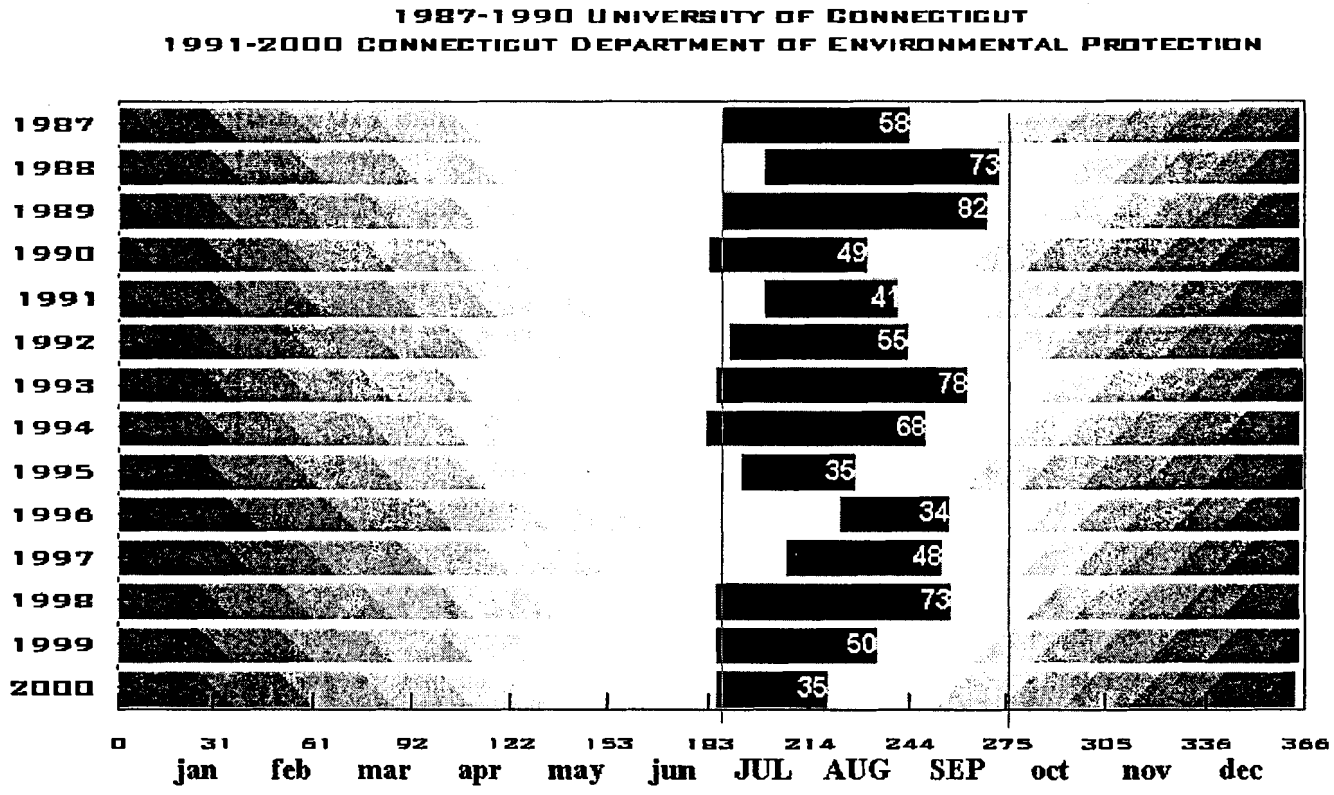

Point Source Nitrogen Load to
Long Island Sound
TN (thousand lbs/day)
250
200
150
100
50
0
186703
198996
186425
177053
180724
161078
155641
157631
127939
151387
140247
129930
133578
110595
106503
109518
58764
47609
46178
47123
47146
50483
49138
48113
1990
1994
1995
1996
1997
1998
1999
2000
Total
CT
NY
These estimates include 98 municipal, 4 state, 3 private, and 4 industrial discharges = 109
CTDEP adjusted its data in 2000 to include estimates for STPs that did not report nitrogen loads in the past.

Figure 2

Timing and Duration of Hypoxia in Long Island Sound



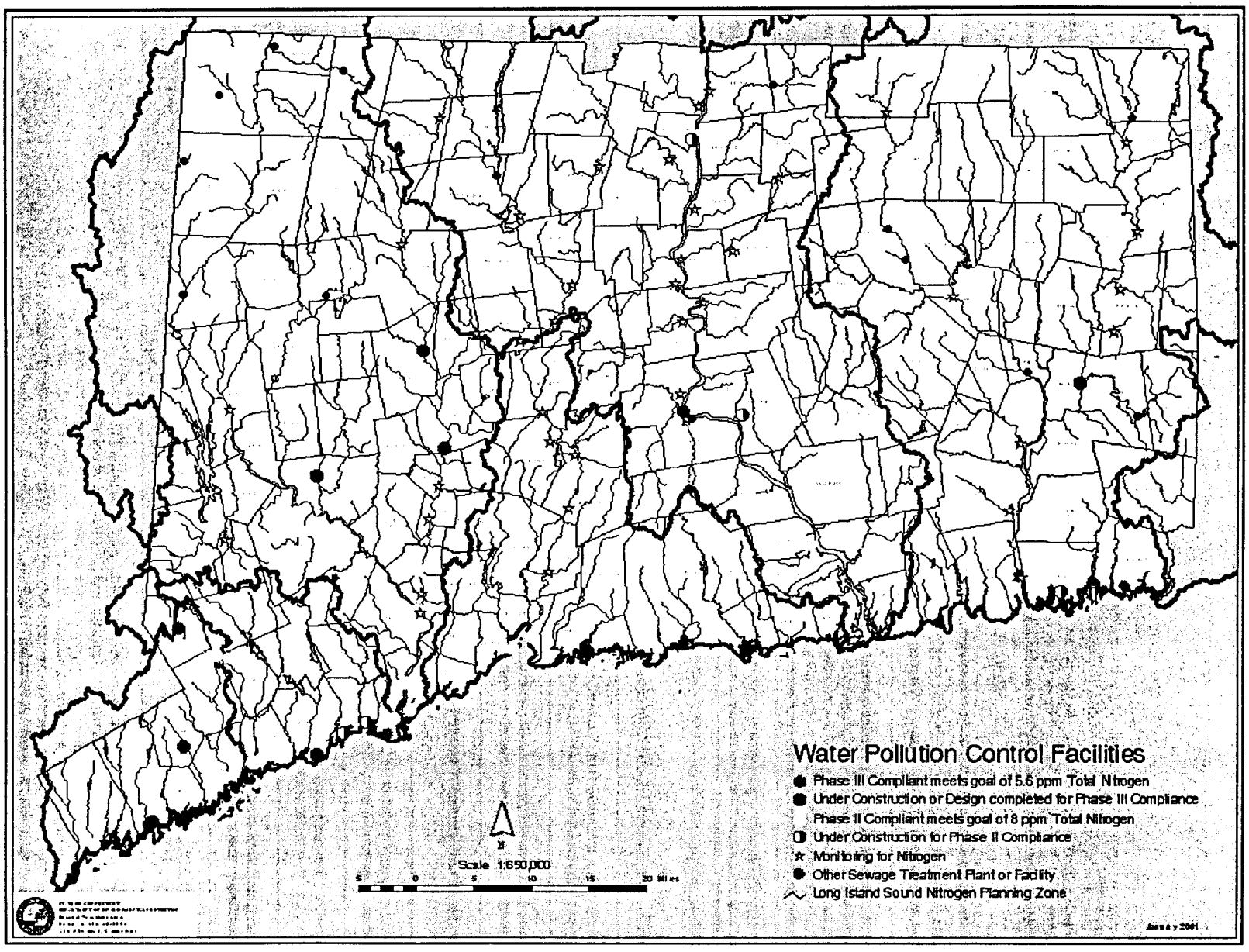

Water Pollution Control Facilities
Phase III Compliant meets goal of 5.6 ppm Total Nitrogen
Under Construction or Design completed for Phase III Compliance
Phase II Compliant meets goal of 8 ppm Total Nitrogen
Under Construction for Phase II Compliance
Monitoring for Nitrogen
Other Sewage Treatment Plant or Facility
Long Island Sound Nitrogen Planning Zone
Scale 1:650,000
5 0 5 10 15 20 Miles

Figure 3

SUMMARY OF CCMP MANAGEMENT ACTIONS: HYPOXIA

H-1. REDUCING NITROGEN FROM SEWAGE TREATMENT PLANTS AND OTHER POINT SOURCES (CCMP TABLE 4, P. 32)

Key Elements: The states of Connecticut and New York committed to reducing nitrogen loads throughout the Long Island Sound basin using a mixed approach of retrofits, pilot studies and upgrades under existing permitting authorities. With adoption of the TMDL, state requirements to remove nitrogen loads will be formalized and expanded well beyond the commitments specified in the CCMP. In anticipation of TMDL adoption, the states have been using a variety of legal, voluntary, and funding mechanisms to promote nitrogen removal from point sources, with considerable success.

Description	2001 Planned Action
The total estimated point source load to LIS in 2000 is 157,631 lbs./day, a decrease of over 29,000 lbs/day from 1990 levels. New York loadings totalled 109,518 lbs/day; Connecticut loads totalled 48,113 lbs/day.	Continued emphasis on TMDL targets.
In Connecticut as of December 2000, 19 municipal sewage treatment plants have completed nitrogen removal projects totalling nearly $251 million, e.g., Derby, CT – an aeration modification and upgrade for nitrogen removal (to less than 8 mg/l) was completed July 2000; Waterbury, CT – the new Waterbury municipal sewage treatment plant was completed on April 30, 2000. The nitrogen concentration of the new plant's effluent, to the Naugatuck River, is anticipated to be 4 mg/l, about a 75% reduction from previous nitrogen concentrations 5 municipal STPs currently have nitrogen removal upgrades in progress totalling nearly $80 million, e.g., Branford, CT -- facility planning and design have been completed and construction of the facility upgrade was begun in February 2000; Fairfield, CT -- began construction of nitrogen removal upgrades and was awarded an additional $8,118,067 grant and loan from the CT Bond Commission bringing the total bond funding for this project to over $41.2 M. 6 municipal STPs are currently under design for nutrient removal with design grant costs totalling over $116 million.	Continue to assist municipalities with upgrades to STPs. The Portland and New London STPs are scheduled for completion of nutrient removal upgrades in 2001. Groton is expected to begin construction of nitrogen removal upgrades in 2001 utilizing $17 M in state funding. Anticipated completion of the Fairfield STP by the end of 2001.
New York City is completing a comprehensive watershed management plan for the East River to address continuous sewer overflow impacts on the East River and Western Long Island Sound.	
The Village of Great Neck Sewer District and Great Neck Water Pollution Control District are conducting an engineering feasibility study to evaluate diversion of current flows outside the Long Island Sound Basin.	
NYCDEP has completed an evaluation of nitrogen control feasibility alternatives for all East River water pollution control plants.	
Westchester County, using $3.8 million in Clean Water/Clean Air Bond Act Funds, will begin construction of a full scale nitrogen control demonstration project at the Mamaroneck Sewer District employing high biomass technology.	
Belgrave Sewer District, with assistance of $110,000 in Clean Water/Clean Air Bond Act Funds will install upflow fluidized bed technology to evaluate treatment of effluent from a trickling filter facility.	
New York and Connecticut have conducted training programs for sewage treatment plant operators to optimize existing treatment facilities nitrogen removal capabilities.	
NYSDEC has modified NPDES permits for New York City, Westchester, Nassau, and Suffolk county dischargers to limit discharges of nitrogen to 1990 load levels.	
NYCDEP has implemented control at Upper East River facilities to reduce loads to below 1990 levels. 1) Separate centrate treatment at Wards Island, Hunts Point, and Bowery Bay. 2) Basic Step Feed BNR at Bowery Bay, Tallman Island, Hunts Point, and Wards Island. 3) Increased sludge age at Wards Island. (Total cost of these improvements exceeds $11,000,000. Grants from the Clean Water/Clean Air Bond Act totaling $3.8 million will assist NYCDEP)	

Description	2001 Planned Action
Clean Water/Clean Air Bond Act grants in the following amounts have been provided to the following to construct new nitrogen removal facilities:	
Glen Cove, $3.3 million; emergency construction started in 2000. Huntington Sewer District, $3.24 million Oyster Bay Sewer District, $3.7 million Kings Park Sewer District, $3.152 million Village of Northport, $977,50 Town of Huntington, Huntington Sewer District, $5.682 million	Major construction to start in 2001. Construction should commence in calendar year 2001.
Suffolk County DPW, Port Jefferson facility, $3.048 million NYC $30.828 million for phase I upgrade of the Hunts Point STP. Port Washington Water Pollution Server District, $222,000 to convert existing tankage to create nitrification/denitrification zones to demonstrate nitrogen removal at this trickling filter facility	Construction should commence in calendar year 2001
NYC is required to rebuild and upgrade its Newtown Creek Facility in the Lower East River to denitrify the effluent and provide at least 50% reduction of influent nitrogen.	The project will cost over $1.0 billion

H-2. REDUCING NITROGEN LOADS FROM NON-POINT SOURCES (CCMP TABLE 5, P.34)

Key Elements: The states of Connecticut and New York have broad authorities to manage nonpoint sources of pollution and have agreed in the CCMP to emphasize control of nitrogen in ongoing state and federal programs. These include state nonpoint source programs (CWA Sec. 319), the coastal nonpoint source control program (CZARA Sec. 6217), and stormwater permitting programs. Most of the site specific studies and activities identified in the CCMP have been completed. The states have committed to using nonpoint source control programs to begin the difficult task of reducing nonpoint sources of nitrogen and anticipate continuing those efforts as the primary means to meet the reduction goal specified in the TMDL upon adoption. In addition to the regulatory and funding programs, the states have made commitments to promote essential technical assistance and training programs through NRCS and NEMO as well as agency watershed and nonpoint programs that have become widespread since development of the CCMP.

Description	2001 Planned Action
Nonpoint sources of nitrogen cannot be easily monitored and are subject to wide variations depending on weather conditions, especially rainfall. Rough approximations of nonpoint source nitrogen loads have been constructed using a mix of stream monitoring data and export estimates based on land cover. These data show the 1999 nonpoint nitrogen load to be about 28,000 tons/yr, about 9,000 tons below the highest load over the last decade in 1991 of 37,000 tons/yr.	The LISS plans to revise these estimates using a USGS report to be released in 2001.
The LISS provided a fourth year of funding in FY00 to the University of Connecticut/Cooperative Extension System (UConn/CES) to continue its Nonpoint Education for Municipal Officials (NEMO) program in Long Island Sound coastal tributary watersheds. The scope of the program, which originally was targeted at the seven towns in the Norwalk River watershed, then expanded to include towns and watersheds in other parts of Fairfield County and in Westchester County, NY, focused primarily on assisting the NY Sea Grant Program establish a counterpart NEMO program on Long Island. project. In 2000, the NEMO program was expanded to include a new coordinator and office in SUNY Stony Brook, New York. The New York NEMO program is working with the Hempstead Harbor and Manhasset Bay Protection Committees in briefing local boards and commissions and in conducting two basic NEMO workshops for municipal officials in those communities. In three and a half years, the LIS NEMO program has conducted 110 workshops reaching more than 2400 participants in approximately 30 communities. The LISS provided a total of $194,000 in FY96 and FY98-00 to support the Long Island Sound NEMO	Continued LISS support for NY NEMO in FY2001 was approved by the Management Committee.
The LISS continued to provide staff support to the Norwalk River Watershed Initiative. Implementation of the Norwalk River Watershed Action Plan is being guided by the Norwalk River Watershed Advisory Committee, with representatives from EPA, the USDA Natural Resources Conservation Service (NRCS), CT DEP, the seven watershed communities, several citizen groups, and area residents. From FY98-01, EPA awarded $340,000 in Clean Water Act section 319 funds to support several high priority implementation activities, including hiring a "watershed coordinator" (in February 2000), riparian buffer restoration, stormwater management, road sand/salt reduction, and septic system outreach and education.	Continued LISS support for the NRWI in FY2001.

Description	2001 Planned Action
CTDEP expanded its Watershed management program in 2000 by filling 5 watershed coordinator positions within the Bureau of Water Management Planning and Standards Division.	Work with other watershed stakeholders to plan and implement watershed management activities.
Currently CTDEP is implementing 104 active §319 projects from FY94-2001 grants. Twenty four (24) new projects were funded under §319 for the year 2000 and 12 projects were closed out.	
CTDEP completed a §104(b)(3) watershed modeling project in December 2000. Section 104(b)(3) funds were utilized to develop a Long Island Sound watershed model, similar to that used by the Chesapeake Bay Program, to guide nonpoint nitrogen and watershed management in general. CT DEP contracted to develop a watershed model that will serve to (1) assess nonpoint source contributions of nitrogen, phosphorus, and carbon to Long Island Sound, and (2) assist CT DEP in managing these nutrients to reduce hypoxia. Last year, CT DEP contractors completed the LIS Watershed Model and presented their preliminary findings at the 2000 National Monitoring Projects Symposium in Connecticut.	A final report is due in 2001. CTDEP will make the modeling report available to environmental managers and professionals.
NYSDEC is providing funding support to Westchester County to conduct a special monitoring project to measure nonpoint source and tributary loads from Westchester County.	
NYSDEC completed a report which evaluated nonpoint source nitrogen loads to LIS from Nassau and Suffolk Counties.	
Westchester County Department of Planning, with funding support from NYSDEC, is continuing to develop watershed management plans for Westchester County (Zone 7). Watershed Advisory Committee 4 completed a draft management plan for the Sheldrake and Mamaroneck rivers and Mamaroneck Harbor.	Finalize WAC 4 management plans.
In 2000, the Suffolk County Department of Health, with funding support from NYS DEC began preparation of a Suffolk County Watershed Management Plan for Suffolk County (Zone 11).	
NYSDEC is working with the coalition of Nassau County dischargers to develop a work program for the development of a watershed management plan for Nassau County Zone (10).	
Local watershed planning efforts for Hempstead Harbor and Manhasset Bay, led by local municipalities, continued in 2000.	

H-3. CONTINUING MANAGEMENT OF HYPOXIA (CCMP TABLE 6, P. 39)

Key Elements: The actions specified in the CCMP primarily reference research, monitoring and modeling activities and the use of that information and those tools to improve understanding and management of hypoxia in the Sound. Much progress has been made in this area to provide the scientific basis for the TMDL and the TMDL specifies the implementation steps recommended in the CCMP to control hypoxia. Finally, the action to continue appropriate modeling and research and periodically review management plans is central to the adaptive management approach promoted in the TMDL.

Description	2001 Planned Action
A series of Public Informational Meetings for the WLA were held in Connecticut and in New York in 2000. The final TMDL with WLA was completed by the states and submitted to EPA in early 2001.	Begin implementation of TMDL.
EPA, CTDEP, NYSDEC and NYCDEP continued to address the System-Wide Eutrophication Model (SWEM) as a successor to the LIS 3 model. The agencies met in 2000 several times to review information and data collected as part of the refinement process.	A final agreement on the use of the SWEM is expected in 2001. The management conference provided funds in the FY2001 LISS budget for additional SWEM work.

H-4. FUNDING TO IMPLEMENT HYPOXIA MANAGEMENT PLANS (CCMP TABLE 7, P. 41)

Key Elements: The intentions of the CCMP actions were to fully fund existing nonpoint source (CWA Sec. 319 and CZARA 6217) programs, have states supplement state revolving fund programs, and to appropriate additional federal funds for management, emphasizing the Phase III management efforts incorporated in the TMDL.

Description	2001 Planned Action
In 1996-2000, CT committed $390 million for sewage treatment plant reconstruction projects that will benefit LIS and estimates that Clean Water Funding will be adequate to finance Phase III upgrade requirements. In CT the 2000 funding was $37.9 million. Total CT funding through 2000 including all completed projects, projects still under construction, and projects still in the design phase totals over $447 million.	For 2001 the CT Bond Commission approved over $11.6 M in grant & loan for design and upgrades to STPs for advanced nitrogen removal.

H-5. MONITORING AND ASSESSMENT OF HYPOXIA (CCMP TABLE 8, P. 4

Key Elements: The CCMP recognized the importance of continuing and expanding monitoring efforts to answer fundamental questions on the health of LIS and to identify trends and changes that may be related to management activities. Most of the recommended monitoring was to be directed towards oxygen and nutrients because of the hypoxia problem in LIS. In addition, several specific monitoring/research projects were listed, most of which were completed shortly after the CCMP was released. Lobsters were identified for special attention because of disease problems that pre-date the recent lobster die-off in western LIS. The CCMP also recommended EPA complete their dissolved oxygen criteria report to be used by the states to develop new criteria, if appropriate.

Description	2001 Planned Action
The LISS partners continued ambient monitoring of LIS in 2000. NYCDEP performed ambient monitoring of NY waters in western LIS. IEC continued its summer hypoxia monitoring in LIS by collection and weekly measurements of DO, temperature, salinity, chlorophyl a at 21 stations; at a subset of stations, samples were collected for phytoplankton and pfiesteria During the summer of 2000 CTDEP's LIS ambient water quality monitoring program took part in the EPA's National Coastal Assessment (or Coastal 2000) program. Along with the usual water quality parameters taken by the program, sediment samples were collected once from half of the fixed (sampling point) stations in LIS. In September 2000, the CT DEP produced its *Summer Hypoxia Monitoring Survey 1991-1998 Data Review*, an 84 page summary of 8 years of LIS water quality monitoring by CTDEP.	In the summer of 2001 the CT DEP will continue to participate in the National Coastal Assessment by recording usual water quality parameters and collect sediment samples from the other half of the fixed (sampling point) stations in LIS.
Hypoxic conditions in LIS were estimated to have extended for a period of 35 days and to cover a maximum area of 171 square miles. This compares favorably with the 14 year averages of 56 days and 206 square miles.	Continued ambient monitoring of LIS.
EPA published the *Ambient Aquatic Life Water Quality Criteria for DO (Saltwater): Cape Cod to Cape Hateras*, EPA-822-R-00-012, November 2000. CTDEP proposed a revision to its water quality criteria for DO based on the EPA criteria document.	EPA approved and DEP adopted new DO criteria for saltwater in 2001.
The University of Connecticut Department of Marine Sciences at Avery Point, Connecticut, continued to operate and maintain its real-time water quality monitoring network, MYSOUND through the third year of a three-year EPA grant under the EMPACT (Environmental Monitoring for Public Access and Community Tracking) program. The MYSOUND project added monitoring stations in the Western Sound, maintained by the Indian Harbor Yacht Club and Hempstead Harbor, maintained by the Coalition to Save Hempstead Harbor. The MYSOUND stations monitor surface and bottom waters for dissolved oxygen, temperature, salinity and selected other parameters at specific sites. The MYSOUND website address is: http://www.mysound.uconn.edu.	The LISS will fund an additional year of MYSOUND monitoring in FY2001.

Controlling Major Sources of Pathogens

Pathogens can cause illness in people exposed through bathing in, or consuming fish or shellfish from, contaminated waters. Pathogen contamination results in closed beaches, fisheries, or shellfish areas, hurting local economies and damaging public perception of the ecological health of the Sound.

CCMP Strategy:

The CCMP identifies a seven part strategy to control pathogen contamination to LIS from: 1) combined sewer overflows (CSOs); 2) non-point sources (NPS); 3) sewage treatment plants (STPs); 4) vessel discharges; and 5) individual on-site systems/discharges. The final two elements of the strategy are to control pathogen contamination through: 6) public education; and 7) monitoring and assessment of pathogens.

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2000 Highlights:

- Phased combined sewer overflow (CSO) abatement projects to alleviate pathogen problems continued in both states in 2000. Connecticut anticipates spending$560 million over the next 15 years to complete these CSO projects.
- New York City continues its $1.5 billion program to abate CSOs; NYC's comprehensive sewer abatement program is scheduled for completion between 2001and 2006.
- New York has increased capture of CSOs from 18 percent to 40 percent, and is in almost complete compliance with EPA's minimum standards for CSO controls.
- The City of Waterbury Connecticut's new STP can process up to 82 MGD of primary sewage for storm water events. The upgrade included a new state of the art ultraviolet disinfection unite to eliminate pathogens and reduce the chlorine toxicity resulting from traditional chlorine disinfection systems.
- As of 2000, Connecticut has 63 land-based pumpout facilities and 8 pumpout boat; of the 71 pumpouts, 70 are accessible to the general public; there are 15 total dump stations, 14 of which are accessible to the public. In the NYS coastal area, 2 additional pumpout stations were completed during 2000. This brings the total number of pumpouts along LIS in NYS to 41.
- Broader efforts are underway in both states to address nonpoint sources of pollution, and storm water management will also contribute to the control of pathogens to the Sound.
- In 2000, EPA approved CTDEP's TMDL for the Sasco Brook. The TMDL was approved using pathogen (fecal coliform indicator bacteria) from nonpoint sources under the *Human Contact Use* water quality parameter.

SUMMARY OF CCMP MANAGEMENT ACTIONS: PATHOGEN CONTAMINATION

P-1. CONTROLLING PATHOGEN CONTAMINATION FROM COMBINED SEWER OVERFLOWS (CCMP TABLE 31, P. 83)

Key Elements: Many municipalities with older sewerage facilities have combined stormwater and sanitary systems. These systems overflow during rainfalls, causing untreated sewage to reach the Sound. Abatement of combined sewer overflows (CSOs) will reduce a major source of pathogens to the Sound. CSO abatement programs are underway in New York and Connecticut.

Description	2001 Planned Action
CTDEP awarded $24 million in Clean Water Fund financing to New Haven for sewer separation contracts. New Haven has also finalized their Long Term Control Plan (LTCP) for CSO control. Bridgeport has continued work on their LTCP. (Total expected state grant & loan funding is over $5 M) The CT State Bond Commission awarded over $36.7 M toward CSO projects statewide in 2000. (Including the New Haven project)	The New Haven LTCP will be formally submitted in 2001. Bridgeport will formally submit their LTCP in 2001. Allocate funding for additional projects in 2001.
Bronx River CSO Storage Conduit Project will provide storage capacity. Meetings and field investigations have taken place	
Flushing Bay CSO Retention Facility is an underground storage tank which has a storage capacity of 43 million gallons, 48 MG in the tank and 15 MG in upstream sewers. The design has been completed with phase I construction of tank 75% complete.	
Hutchinson River CSO Storage Conduit Project will provide storage capacity. Meetings and field investigations have taken place.	
Alley Creek drainage area improvements/CSO abatement Facilities project has three components. The Alley Creek drainage area improvements, Alley Creek CSO abatement facility, and the Oakland Ravine Stormwater Treatment System. Meetings and field investigations have taken place.	
Westchester Creek CSO Storage Tank Project will include construction of a 12 MG underground storage tanks. Meetings and planning on take place.	

P-2. CONTROLLING PATHOGEN CONTAMINATION FROM NONPOINT SOURCES (CCMP TABLE 32, P. 84R

Key Elements: LISS has determined that nonpoint sources, including urban stormwater runoff, is one of the two most significant sources of pathogen contamination in Long Island Sound. Urban stormwater runoff containing pathogens can originate from many sources. Therefore, it presents a challenge to manage pathogens from nonpoint sources. Methods of controlling pathogens from nonpoint sources include (although are not limited to): best management practices; permitting activities; changes in building codes; consent agreements; and education.

Description	2001 Planned Action
In 2000 the USEPA approved CTDEP's TMDL for the Sasco Brook. This TMDL was approved using pathogen (fecal coliform indicator bacteria) from nonpoint sources under the"Human Contact Use" water quality parameter.	Implement the plan and monitor.
CT Dept. Of Agriculture's Division of Aquaculture continued its annual monitoring of shellfish beds for pathogens, providing invaluable information to the shellfish industry and the public on the classification and condition of shellfish beds.	Continue to monitor shellfish beds for health and viability.

Description	2001 Planned Action
The NYSDEC Phase II storm water implementation plan will involve the permitting of many storm sewer systems which discharge to the Long Island Sound. NYSDEC is also looking into a phase-in approach (statewide) and have discussed the possibility of LIS being one of the first areas to begin this effort with.	NYSDEC has made some progress, but will need to have SPDES permits in place for these discharges by 3/10/2003.
The LISS provided a fourth year of funding in FY00 to the University of Connecticut/Cooperative Extension System (UConn/CES) to continue its Nonpoint Education for Municipal Officials (NEMO) program in Long Island Sound coastal tributary watersheds. The scope of the program, which originally was targeted at the seven towns in the Norwalk River watershed, then expanded to include towns and watersheds in other parts of Fairfield County and in Westchester County, NY, focused primarily on assisting the NY Sea Grant Program establish a counterpart NEMO program on Long Island. project. In 2000, the NEMO program was expanded to include a new coordinator and office in SUNY Stony Brook, New York. The New York NEMO program is working with the Hempstead Harbor and Manhasset Bay Protection Committees in briefing local boards and commissions and in conducting two basic NEMO workshops for municipal officials in those communities. In three and a half years, the LIS NEMO program has conducted 110 workshops reaching more than 2400 participants in approximately 30 communities. The LISS provided a total of $194,000 in FY96 and FY98-00 to support the Long Island Sound NEMO	
The LISS continued to provide staff support to the Norwalk River Watershed Initiative. Implementation of the Norwalk River Watershed Action Plan is being guided by the Norwalk River Watershed Advisory Committee, with representatives from EPA, the USDA Natural Resources Conservation Service (NRCS), CT DEP, the seven watershed communities, several citizen groups, and area residents. From FY98-01, EPA awarded $340,000 in Clean Water Act section 319 funds to support several high priority implementation activities, including hiring a "watershed coordinator" (in February 2000), riparian buffer restoration, stormwater management, road sand/salt reduction, and septic system outreach and education.	
The LISS funded a project under the Small Grants program for Friends of the Bay in partnership with the incorporated Villages of Bayville and Lattingtown and the Davis Park Civic Association, to conduct an education and action program for residential waste water systems. The project produced 2500 copies of a septic system record keeping file and owners guide, which were used for residents in the project area and were distributed to other interested organizations.	Organizations in Westchester, Port Washington, Port Jefferson, and Hempstead Harbor have expressed an interest in using these in their communities.

P-3. CONTROLLING PATHOGEN CONTAMINATION FROM SEWAGE TREATMENT PLANTS (CCMP TABLE 33, P. 85)

Key Elements: If they are operating properly, most sewage treatment plants (STPs) contribute a relatively small percentage of pathogens to the Sound. However, malfunctions, illegal sewer hookups, and wet weather overflows can cause problems at STPs.

Description	2001 Planned Action
Branford and Fairfield Connecticut continue major plant upgrades including improved disinfection systems which will reduce pathogen contamination.	Construction will continue in 2001.
The Waterbury Connecticut STP upgrade was completed in April 2000 and included a new state of the art Ultraviolet (UV) disinfection unit to eliminate pathogens and reduce the chlorine toxicity resulting from traditional chlorine disinfection systems.	Continue to operate the new facilities and closely monitor for efficiency.
South Windsor Connecticut was awarded a grant and loan of $1.02 M for the construction of an ultraviolet disinfection system to destroy pathogens in its discharge to the CT River.	

P-4. CONTROLLING PATHOGEN CONTAMINATION FROM VESSEL DISCHARGES (CCMP TABLE 34, P. 86)

Key Elements: Although they are not a primary source of pathogens in the Sound, vessel discharges can be a cause of local water quality problems in poorly-flushed embayments. Creation of vessel No-Discharge Zones, use of best management practices, and increasing the number of vessel pumpout stations are major actions to manage pathogen contamination from vessel discharges.

Description	2001 Planned Action
A decision on Federal FY 2000 funding for CT was received in April 2000. $627,000.00 was received from F&WS for FFY 2000. Two additional boats were operational for the 2000 boating season. In CT by the end of the 2000 boating season there were 71 total pumpouts (8 of which are boats) 70 of which are available to the general public and 15 dump stations (including one floating rest room) 14 of which are available to the general public.	A decision on Federal FY 2001 funding for CT is anticipated in April 2001. CT has proposed to construct 3 additional stationary pumpouts and develop two boat programs in 2001/2002 in addition to the 9 stationary facilities and 1 boat currently in process.
CTDEP pumpout boat "Sound Choice" was donated to the town of Groton for operation in the Mystic Harbor area. In 2000 CTDEP purchased an additional pumpout boat for education and outreach purposes and the servicing of boats in the Lower Connecticut River, the Niantic River and the Thames River	The Mystic boat will be operated and maintained by the Towns of Groton and Stonington with a CVA grant. The DEP boat will continue its education and outreach mission exclusively in the Connecticut River for the 2001 boating season.
Publication in the "Embassy Guide" of the locations of pumpouts in all of Long Island Sound was coordinated between staff of the CT and NY CVA programs.	This biennial publication will again be prepared prior to the 2003 boating season
Education of boaters continued to be a focus of the CT CVA program. Boat shows were attended with displays and individual boater contacts were made. Annual meetings of the Connecticut Marine Trades Association and the Connecticut Harbor Management Association were attended with outreach materials displayed.	The same basic work plan will be implemented in 2001.
Preliminary internal discussions were conducted on the possibility of the establishment of EPA designated no discharge areas in two harbors in eastern CT.	It is anticipated that work will proceed on the establishment of no discharge areas for the CT side of the Pawcatuck River (the RI side is already so designated) and for the Mystic Harbor area.
CTDEPs *Best Management Practices Manual for Coastal Marinas*, completed in 1992, encourages marina operators to accept responsibility for providing proper boat sewage disposal facilities to boaters. A new 'Clean Marina Program' is being implemented including the use of the BMP Manual and other education outreach tools.	DEP-OLISP and Boating Division are developing a Clean Marina Program. As part of this new initiative, CT-DEP will update *Best Management Practices for Coastal Marinas*. This document will include practices for marinas owners and operators to reduce their pollution potential, and will include sections on minimizing impacts to living marine resources and habitats, and preventing the spread of pathogens. The program will include a boater outreach and education component, part of which will address proper disposal of boat sewage to prevent the spread of pathogens.

P-5. CONTROLLING PATHOGEN CONTAMINATION FROM INDIVIDUAL ON-SITE SYSTEMS/DISCHARGES (CCMP TABLE 35, P. 87)

Key Elements: When they are appropriately sited, functioning properly, and well-maintained, septic systems should not be a source of pathogens to the Sound. When not properly sited or maintained, they become a source of pathogens to the Sound. Both states' and local governments must play a role in managing pathogen contamination from individual on-site systems to the Sound.

Description	2001 Planned Action
NYSDEC is using CWA Section 319 funds to support development of an on-site training center. A demonstration facility is located at the campus of the SUNY College at Morrisville, New York. Part of DEC's funds subsidize tuition for public officials that take the training. The schedule for training courses through September 30, 2001 was recently distributed to DEC Regional Offices and to County Water Quality Coordinating Committees.	
The Nonpoint Source Coordinating Committee, coordinated by the NYSDEC Division of Water, NPS Management Section, convenes a On site Wastewater Treatment System Work Group. The work group is comprised of stakeholders interested in the proper siting, design, installation, and operation and maintenance of septic systems.	
The NYSDEC and NYSDOS are drafting a management strategy for Onsite Wastewater Treatment Systems (OWTS), in conformance with the provisions of the Coastal NPS Management Program under Section 6217 of the CZMA. Specific issues being addressed are the periodic inspection of operating systems, and the possible impact on nitrogen limited waters.	

P-6. CONTROLLING PATHOGEN CONTAMINATION THROUGH PUBLIC EDUCATION (CCMP TABLE 36, P. 88)

Key Elements: In many cases, a simple lifestyle change can reduce or eliminate a source of pathogen contamination in the Sound. The CCMP calls for development and implementation of public education plan, targeting specific audiences, in cooperation with federal, state and local public outreach experts and environmental educators.

Description	2001 Planned Action
The LISS developed and distributed thousands of copies of a four-part poster series highlighting nonpoint source pollution problems. The posters humorously illustrate four common nonpoint pollution problems for the Sound, including runoff from car washing, fertilizer, leaking automotive oil, and pet waste. The posters were adapted for LIS from the Washington State Department of Ecology's posters for Puget Sound.	

P-7. MONITORING AND ASSESSMENT OF PATHOGENS (CCMP TABLE 37, P. 89)

Key Elements: Monitoring of pathogens is a tool that will allow assessment of the success of the pathogen reduction activities called for in the CCMP. Monitoring and assessment are essential to improved understanding of pathogen contamination in the Sound. A well-designed monitoring program is an essential element for effective management of Long Island Sound and its watershed.

Description	2001 Planned Action
The *Beaches Environmental Assessment and Coastal Health Act* (BEACH), P.L. 106-284 was enacted on October 10, 2000. The Act will ensure standards for pathogens that protect human health; establish monitoring and notification measures and provide initial development and implementation grants to states.	The states of Connecticut and New York will determine appropriate actions to implement Beach Act requirements.

Protecting the Sound from the Adverse Effects of Toxic Substances

Toxic substances can cause adverse human and ecosystem health effects, and can result in significant negative economic impacts on the value of the natural resources of the Sound.

CCMP Strategy:

The CCMP strategy to address toxic contamination in LIS has five principal elements: 1) toxic contaminant source controls and prevention; 2) addressing sediment contamination; 3) improving human health risk management; 4) monitoring and assessment of toxic contaminants; and 5) research to investigate toxic contamination.

2000 Highlights:

- EPA and ACOE continued to work together on the Environmental Impact Statement (EIS) for designation of open water disposal sites in LIS. The agencies jointly held public meetings in Connecticut and New York in 2000 to gather public comment and input on the site designation process, proposed workplan, and site selection evaluation criteria and methodology. The designation process is expected to be completed by March 2002.

- CTDEP continued development of a Long Island Sound Sediment Quality Information Database (SQUID) using GIS and associated databases, which include such spatial and attribute data as: sewage treatment plant outfalls; combined sewer outfalls; industrial discharges; oil & chemical spills; landfills; stormwater outfalls; and locations in the Sound and harbors where sediment testing has been conducted.

- As a part of New York's State Pollution Discharge Elimination System (SPDES) permit/toxic reduction program NYSDEC developed total residual chlorine limits for the following 15 STPs in the Long Island Sound basin. The facilities are: Port Washington; Greenport (V); Great Neck (V); Great Neck – PCD; Glen Cove; Belgrave; Huntington (T); Oyster Bay; New Rochelle; Blind Brook; Port Chester; Northport (V); SUNY- SCSD #21; Port Jefferson-SCSD #1; and Kings Park - SCSD #6.

- In 2000, over 95% of the 84 Connecticut STPs discharging into the Sound or its tributaries passed toxicity testing. This is a 26% increase from 1999 in the number of facilities that discharge treated water that is safe for most aquatic life.

- EPA approved CTDEP TMDLs for copper, lead, and zinc for Factory Brook and for chlorine for Belden Hill Brook. This latter plan essentially required that a discharge to a *Class A* stream be removed. A single treatment facility installed an ultraviolet disinfection unit to replace an old chlorination unit and moved its discharge from the brook to a ground discharge.

SUMMARY OF MANAGEMENT ACTIONS: TOXIC SUBSTANCES

T-1. TOXIC CONTAMINANT SOURCE CONTROLS AND POLLUTION PREVENTION (CCMP TABLE 21, P. 65)

Key Elements: Permit programs and enforcement activity for both direct and indirect discharges, including toxicity testing of those discharges, are responsible for greatly reducing toxic substance loads over the past 25 years. LISS' priority management recommendation for toxic substances is to continue these successful activities, all of which are funded under current programs. Other programs that are designed to prevent pollution and reduce pollutant loads must also be supported as part of a comprehensive program to manage toxic contamination in the Sound.

Description	2001 Planned Action
A base Geographic Information System (GIS) project for the Sediment Quality Information Data (SQUID) system has been created for New Haven Harbor; A User Manual has been created.	User training of EPA, ACOE, NYSDEC, and NMFS staff is planned for February-March. A Technical Manual is under development.
The CT Bond Commission awarded South Windsor a grant & loan of $1.02 million to install an ultra-violet disinfection system to replace an old chlorination system that was causing a condition of chlorine toxicity in the Connecticut River, effectively eliminating the toxicity.	Encourage other municipal STP upgrades to include UV technology in their disinfection processes.
CT DEP submitted to EPA a TMDL for chlorine for Belden Hill Brook. EPA approved the Belden Hill Brook TMDL on June 9,2000. This plan essentially required that a discharge to a Class A stream be removed. A single treatment facility (small) installed an ultra-violet disinfection unit to replace an old chlorination unit and moved its discharge from the brook to a ground discharge.	Follow up monitoring will be conducted under the rotating watershed basin sampling plan.
CT DEP submitted to EPA a TMDL for copper, lead, and zinc for Factory Brook. EPA approved the Factory Brook TMDL on February 3, 2000.	Follow up monitoring will be conducted under the rotating watershed basin sampling plan.
Over 95% of the CT STPs passed toxicity testing in 2000; this is a 26% increase in the number of facilities that discharge treated water safe for most aquatic life.	As more STPs upgrade their facilities, the expected goal of 100% discharge passing the toxicity test will be reached.
As a part the SPDES permit program/toxic reduction program, NYSDEC developed total residual chlorine limits for the following fifteen (15) sewage treatment facilities in the Long Island Sound Basin. These limits were developed using the CORMIX model and acute and chronic standards of 13.0 ug/l and 7.5 ug/l, respectively. The facilities are: Port Washington, Greenport (V), Great Neck (V), Great Neck – PCD, Glen Cove STP, Belgrave, Huntington (T), Oyster Bay, New Rochelle, Blind Brook, Port Chester, Northport (V), SUNY- SCSD #21, Port Jefferson-SCSD #1, and Kings Park - SCSD #6.	

T-2. ADDRESSING SEDIMENT CONTAMINATION (CCMP TABLE 22, P. 67)

Key Elements: To begin the process of remediating sediments, LISS will conduct further assessments of toxic contaminant distribution in sediments of western Long Island Sound and embayments identified as having elevated toxic contaminant burdens. Based on these assessments, it will be possible to determine the feasibility, value, and cost of remediating contaminated sediments, where remediation may be necessary.

Description	2001 Planned Action
EPA and the ACOE continued work on the EIS for dredged material disposal site designation in LIS. A number of public meetings were held to present and discuss elements of the EIS.	The EIS process is ongoing.

T-3. IMPROVING HUMAN HEALTH RISK MANAGEMENT (CCMP TABLE 23, P. 68)

Key Elements: The objective of human health risk management is to determine the likelihood that exposure to a toxic substance will have adverse impacts on human health and to estimate the degree of the effects. In the case of Long Island Sound, the states of Connecticut and New York have issued advisories on consumption of selected seafood taken from the Sound. By improving communication of consumer advisories, it is anticipated that public health risk will be improved.

Description	2001 Planned Action
CTDEP continued to support UCONN researchers conducting research and monitoring for air deposition of mercury in LIS.	

T-4. MONITORING AND ASSESSMENT OF TOXIC CONTAMINANTS (CCMP TABLE 24, P. 71)

Key Elements: The LISS toxic contaminant monitoring program will focus on water, sediment and tissue media. The data collected from the monitoring program will be used to answer questions about resource and human health risks and sources of toxic contaminants.

Description	2001 Planned Action
CTDEP participated in the EPA-sponsored Coastal 2000 monitoring program.	
Under the EIS process for designation of dredged material disposal sites in LIS under MPRASA, the ACOE and EPA conducted sampling and characterization of sediments at disposal sites in LIS. Sediments were analyzed for texture, chemistry and toxicity. Results are pending additional and complementary work under the EIS.	

T-5. RESEARCH TO INVESTIGATE TOXIC CONTAMINATION (CCMP TABLE 25, P. 73)

Key Elements: Toxic contaminants identified in Long Island Sound are numerous; their pathways to the Sound are varied, and their effects on the environment, marine life and human health are not fully understood. These factors must be understood if effective management is to be accomplished. These needs are identified as recommendations at this time, though continuation of work begun by LISS through the EPA Long Island Sound Office should recognize these recommendations as priority research topics.

Description	2001 Planned Action
The Hudson River Foundation is overseeing the development of the CARP (Contaminant Assessment Reduction Project) project, a model to assess in-place loadings and levels of toxics in New York Harbor. This project is funded through Port Authority of NY and NJ funds. Once competed in 2004, the model will enable managers to more accurately evaluate what toxic source controls are necessary in order to render newly deposited sediments cleaner. The model will also be the tool used to develop TMDLs for the Harbor, which could in turn, influence levels of toxics in LIS.	After extensive review, the contractor for the CARP was selected and will begin work November 1, 2001.
The LISS funded the Marine Science Research Center, SUNY Stony Brook to investigate the effects of trace metals, organic carbon and inorganic nutrients in surface waters of LIS on phytoplankton growth. (DR. Wilhelmy, P.I.) The LISS also supported research that will investigate metal contaminant concentrations in LIS sediments over time (Dr. Varekamp, P.I.) These two-year research projects are ongoing.	

Reducing Floatable Debris in the Sound

Litter, debris, and trash floating in LIS coastal waters and washing up on LIS shorelines can be a nuisance to, or hazard for boaters, beach-goers, bathers, fishermen, and other recreational or commercial LIS users. Floatable debris can harm wildlife and living marine resources, and it diminishes the aesthetic enjoyment of the Sound as well as the surrounding environment.

CCMP Strategy

This CCMP priority area has two principal management actions: 1) controlling floatable debris from combined sewer overflows (CSOs) and storm sewers; and 2) increasing floatable debris cleanup efforts.

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2000 Highlights:

- Efforts to control combined sewer overflows (CSOs) and improve stormwater management, described under *Pathogens*, are also helping to reduce the amount of litter reaching the Sound. Communities around the Sound are adopting watershed management approaches to control sources of pollution entering the Sound, including point and nonpoint sources, CSOs, and land use practices. Many communities have formed watershed management committees or groups to work together in addressing environmental management problems that have no jurisdictional boundaries.

- As a result of National Beach Clean Up Day in September 2000, 1,674 volunteers from New York removed 34,300 pounds of debris from the shoreline along the Sound at 73 sites. In Connecticut, over 475 volunteers removed over 5,650 pounds of trash from 24 miles of shoreline.

- CTDEP's *Best Management Practices for Coastal Marinas* guide encourages marina operators to accept responsibility for litter control and recycling. The guide is being updated as part of CTDEP's Clean Marina Program.

SUMMARY OF CCMP MANAGEMENT ACTIONS: FLOATABLE DEBRIS

F-1. CONTROLLING FLOATABLE DEBRIS FROM CSOs AND STORMWATER SEWERS (CCMP TABLE 38, P. 96)

Key Elements: Ongoing programs conducted by state and municipal governments to reduce floatable debris; and long-term CSO abatement and NPDES stormwater permitting programs.

Description	2001 Planned Action
DEP-OLISP and Boating Division are developing a Clean Marina Program. As part of this new initiative, CT-DEP will update *Best Management Practices for Coastal Marinas* . This document will include practices for marinas owners and operators to reduce their pollution potential, and will include a section on reducing floatable debris. The program will include a recreational boater outreach and education component, part of which will address control of solid waste on boats. Part of the outreach will utilize producing and distributing laminated "Clean Boating Tips" cards detailing methods to minimize the environmental impacts of common boating practices.	CTDEPs *Best Management Practices for Coastal Marinas* encourages marina operators to accept responsibility for litter control and recycling.

F-2. INCREASING FLOATABLE DEBRIS CLEANUP EFFORTS (CCMP TABLE 39, P. 99)

Key Elements: Anti-litter educational campaigns, annual beach clean-ups, litter control demonstration projects and storm drain stenciling programs.

Description	2001 Planned Action
National Beach Clean Up Day in September 2000 resulted in 1,674 volunteers from New York picking up over 34,000 pounds of debris at 73 sites on LIS. In Connecticut, over 475 volunteers removed over 5,650 pounds of debris from 24 miles of shoreline.	Save the Sound, Inc., in cooperation with the CT Sea Grant program and the American Littoral Society in New York will promote National Clean Up Day in 2001.

Managing and Conserving Living Resources and Their Habitats

The overall abundance and diversity of habitats and living marine resources in the Sound is a strong indicator of the health of the ecosystem. Years of neglect, mismanagement, and damaging actions have diminished the abundance and diversity of the habitats and living marine resources of the Sound. These actions have caused water quality problems, adversely affected critical habitats, and contributed to damaging economic impacts from flooding, erosion, and runoff pollution.

CCMP Strategy:

The CCMP identified the following elements to preserve, protect and enhance LIS living marine resources and their habitats: 1) restoration and enhancement of aquatic and terrestrial habitats; 2) habitat protection and acquisition; 3) inventories and management strategies for aquatic and terrestrial habitats; 4) managing endangered and threatened species; 5) managing harvested species; 6) managing exotic and nuisance species; 7) educating the public; 8) developing databases; 9) Sound-wide and site-specific research and monitoring; and 10) living resource s and habitat research.

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2000 Highlights:

- The states of Connecticut and New York made excellent overall progress toward the goals of the 1998 Habitat Restoration Strategy. As of 2000, over 300 acres of tidal wetland have been restored and 36 miles of river corridor has been reopened to anadromous fish passage against the goals of 2000 acres and 100 miles by 2008. A fishway was completed at Ed Bills Dam on the east branch of Eightmile River, which opened up 6 miles of river; a fishway was reconstructed at Whitford Brook in Mystic that opened up 3 miles of river.

- During 2000, Connecticut acquired 1391acres of land, purchased the development rights for 427 acres, and awarded Open Space grants to municipalities and land trusts to purchase an additional 2, 881 acres at a cost of $10.5 million.

- Save the Sound, Inc., the National Audubon Society of New York State, and the Regional Plan Association sponsored a series of 10 public hearings from May-June 2000, *Listen to the Sound 2000*, to gather public input for the creation of a Long Island Sound Reserve system. Over 200 people testified at the hearings with over 500 attending the series of meetings held around the Sound.

- The CAC strongly endorsed the creation of a LIS reserve that would identify and protect key LIS recreation, public access, open space, and underwater habitats in the Sound. A coalition of interest groups is working to implement this CCMP action.

- Connecticut DEP, the City of Waterbury, the Naugatuck Chapter of Trout Unlimited, the Naugatuck Watershed Association and the Fish and Wildlife Foundation worked together to open up over 18 miles of the Naugatuck River to fish passage. Four dams have been removed and a fish ladder installed on a fourth dam. In 2001 three more dams will be removed and a fish bypass channel on a fourth will open up a total of 30 miles of the river once again to anadromous fish. These actions, combined with the water quality improvements from the new Waterbury STP, will restore the Naugatuck River system to a condition not seen since before the Industrial Revolution.

- CTDEP completed brackish marsh restorations at Nott Island (Connecticut River) 40 acres; Hammonasset Beach State Park, 5 acres; Davis Pond Marsh, 10 acres; and Lord Cove, 200 acres.

SUMMARY OF CCMP MANAGEMENT ACTIONS: MANAGEMENT AND CONSERVATION OF LIVING RESOURCES AND THEIR HABITATS

L-1. RESTORATION AND ENHANCEMENT OF AQUATIC AND TERRESTRIAL HABITATS (CCMP TABLE 40, P.107)

Key Elements: Continue and enhance programs to restore tidal wetlands and other habitats. Develop a coordinated strategy to inventory and prioritize habitat restoration and enhancement needs.

Description	2001 Planned Action
Connecticut continues to restore degraded tidal wetlands through its existing programs and in collaboration with the Long Island Sound Study Habitat Restoration plan which funds a restoration coordinator. DEP has established a Tidal Wetland Restoration Team (i.e., USFWS, NMFS, NRCS, Save the Sound) which identifies annual work priorities. In 2000 construction was completed at Hammonassett State Park, DOT approved the design contract for Old Field Creek, permitting and procurement of 319 funds for Wilson Covein Norwalk. Connecticut continues to use the Coves and Embayments Program to fund preliminary engineering, design and construction for the restoration of degraded coves especially those dominated by tidal wetlands.	The preliminary work plan for 2001 has nearly 20 wetland restoration projects identified - this includes preliminary engineering, design and construction activities.
Connecticut has established a coastal barrier habitat restoration team. Connecticut DEP Office of Long Island Sound Program and specifically the LISS Habitat Restoration coordinator has been the lead for removal of the invasive aquatic plant water chestnut from Connecticut River waters. Funds for this project were received from USFWS, National Fish & Wildlife Foundation, NMFS, and The Nature Conservancy.	Invasive species control is planned for Black Point Beach in E. Lyme and the Team will be identifying a work plan for 2001. Continue to harvest water chestnut for Connecticut River sites.
DEP has been assisting corporations and Coastal America to develop a Corporate Wetland Restoration Program in Connecticut. Several corporations have become partners and provided funding support for restoration activities. They include Northeast Utilities and Boehringer-Ingelheim. The goal of the program is have 18 partners and 1 million dollars of funds by June 2001.	Continue to work with Coastal America and the corporate partners to create the CWRP.
In 2000 Connecticut used the following sources of non-state funds to support habitat restoration: National Fish & Wildlife Foundation, USFWS, EPA 319, The Nature Conservancy, Intermodal Surface Transportation Efficiency Act, Corporate Wetlands Restoration Partnership funds, Ducks Unlimited, Connecticut Waterfowl Association, CT Conservation Stamp Program, Connecticut Valley Waterfowlers Association, Connecticut Audubon, and NRCS.	On-going
The following brackish marsh restorations were completed: Nott Island (CT River) - 40 acres, Hammonasset State Park - 5 acres, Davis Pond Marsh - 10 acres, and Lord Cove - 200 acres.	Phragmites control work will continue in 2001 at Lord Cove, Great Island and Upper Island.
NYSDOS awarded the Town of Oyster Bay a grant of $25,000 to prepare a Glenwood Landing Waterfront Redevelopment and Revitalization Plan.	The Hempstead Harbor Protection Committee will prepare a Waterfront Redevelopment and Revitalization Plan.
The Hempstead Harbor Protection Committee completed an aquatic habitat restoration study of the lower portion of Hempstead Harbor with the Army Corps of Engineers.	The Town of North Hempstead will assume the role of project sponsor on behalf of the Committee and will sign a letter of intent with the Corps to prepare a detailed feasibility, cost, and environmental assessment study for two areas proposed for restoration in the lower harbor.
The Village of Great Neck Estates received a NYS Clean Water/Clean Air Bond Act Grant of $28,297 to remove road sand washed into the Pond Park pond to restore habitat for fish and wildlife and install sediment containment rings in the existing storm drain lines to prevent future sediment loads and improve water quality in the pond which is adjacent to Little Neck Bay.	

Description	2001 Planned Action
Nassau County received a NYS Clean Water/Clean Air Bond Act Grant of $644,125 to repair severely eroded stream and pond banks in the Manhasset Valley Park, in the Manhasset Bay watershed. The project includes dredging portion of the pond and stream areas to remove sediment and improve habitat. Wetland plantings will be established to increase cover for migratory waterfowl.	
Nassau County received a NYS Clean Water/Clean Air Bond Act Grant of $500,000 to repair severely eroding streambanks to reduce the amount of sediment entering Whitney Lake, in the Manhasset Bay watershed. Nassau County will install sediment traps at the lake inlet to capture sediment before it enters Whitney Lake. Dredging and planting wetland vegetation will increase habitat and help restore the warm water fishery.	
The Town of Smithtown received a NYS Clean Water/Clean Air Bond Act Grant of $125,000 to install drainage structures along St. Johnland Road and replace a failing culvert under the road to reduce stormwater runoff and sediment entering the Nissequogue River, which is expected to improve water quality for a variety of aquatic life.	
The USFWS, in partnership with CT DEP, NRCS, New Haven Land Trust, and Northeast Utilities, installed a fish ladder at the Pond Lily dam on the West River in New Haven. This passage restores river herring to 164 acres of habitat from which they had been excluded since 1794.	

L-2. HABITAT PROTECTION AND ACQUISITION (CCMP TABLE 41, P.110)

Key Elements: Maintain the effectiveness of permit programs (e.g. for wetlands, stormwater, dredging) to regulate use and development affecting aquatic resources and critical habitats. Expand acquisition programs and efforts to protect habitats from development and establish a reserve system of areas of land and water of outstanding or exemplary scientific, educational, or biological value.

Description	2001 Planned Action
Land acquisition of open space in CT continues under the Recreation and Natural Heritage Trust Program (RNHT) using state bond funds. The RNHT plans to provide $166 million in state bond funds for open space acquisitions by the year 2023. During 2000 the State of CT purchased 1391 acres of land, purchased the development rights for 427 acres, and awarded Open Space grants to municipalities and land trusts to purchase an additional 2,881 acres at a cost of $10.5 M. Since the establishment of the Governor's Open Space Program more than 14,000 acres has been protected at a cost of approximately $40 million. In addition to the $20 million spent in partnership with towns, conservation groups and water companies, the state has spent an additional $20 million on direct purchases of open space that is now part of the state's inventory of public land.	CT anticipates acquiring over 15,000 acres of open watershed land from a water utility company assuring preservation for generations to come.
In December 2000 Connecticut Governor Rowland designated 8 parcels of state-owned land as Natural Area Preserves, a special designation to protect the unique ecological characteristics and species of an area. To become part of Connecticut's Natural Area Preserve System, an area must be an area of land or water containing or potentially containing, plant or animal life or features of biological, scientific, educational, geological, paleontological or scenic value worthy of preservation in their natural condition The new designations, totaling 1,192 acres, raise the amount of Natural Area Preserves in Connecticut to over 6,700 acres. The 8 state-owned areas, are Bluff Point in Groton, Duck Island in Westbrook, Gold's Pines in Cornwall, Roger Tory Peterson Wildlife Area in Old Lyme, Lord Cove in Lyme/Old Lyme, Matianuck Sand Dunes in Windsor, Merrick Brook in Scotland, and Sandy Brook in Colebrook.	
Under the LISS, the USFWS proposed a 2 year project to identify ecological components for a potential LIS reserve program.	The management committee approved 2001funding for identification of ecological components of a LIS reserve.

Description	2001 Planned Action
In the Town of North Hempstead a new dedicated fund in the amount of $15 million to establish an Environmental Legacy Fund was approved by voters on 7 November 2000. Purposes and allocation of funds are to be specified in a local law, along with the establishment of an Advisory Review Committee to assist and make recommendations to the Town Board on the uses of the funds.	Funds will be used over several years for three general purposes: Open Space Acquisition, Restoration and Protection of Environmentally Sensitive Areas, and Improvement and Enhancement of Coastal Areas and Waterways.
Voters in the Town of Oyster Bay voted to approve a $30 million Bond Proposition, which allocates funds for the acquisition, preservation and protection of environmentally sensitive land, and enhancement of park and recreational facilities. It provides $20 million for land conservation/acquisition and $10 million to fund improvements to existing parks and recreational facilities.	An Advisory Committee will conduct research on environmentally sensitive lands for possible acquisition and/or enhancement of park facilities and make project recommendations to the Town Board for approval.
New York state has converted 153 acres of the former Kings Park Psychiatric Center into the Nissequogue River State Park, which includes 4 miles of river front.	Although portions of the remaining property may be sold, there is a stipulation that for every acre developed, 3 are to be set aside for open space.
Shortly after the *Listen to the Sound 2000* series of public meetings on LIS, Suffolk County acquired the Chandler Estate for preservation, a 40 acre property on the east shore of Mount Sinai Harbor.	
New York State passed legislation permitting a municipality to regulate and prohibit the use of personal watercraft within its waterways.	

L-3. INVENTORIES AND MANAGEMENT STRATEGIES FOR AQUATIC AND TERRESTRIAL HABITATS (CCMP TABLE 42, P.112)

Key Elements: Develop habitat management strategies for specific complexes or regions using a watershed perspective.

Description	2001 Planned Action
CT DEP requested that NOAA consider revising the 15+ year old Environmental Sensitivity Maps for Connecticut. NOAA secured some funding for this project but the region was expanded to include New York and New Jersey. NOAA's contractor compiled data from DEP staff and have prepared a preliminary set of maps. These data will be used to develop protection strategies to protect sensitive coastal habitats and living resources.	The contractor will finalize the maps and NOAA will ultimately distribute hard copy and electronic copy. The electronic data will be incorporated into DEP's Oil Spill GIS.
The Hempstead Harbor Protection Committee was awarded $20,000 out of the State Quality Communities Demonstration Program. The Committee applied for this grant in April to prepare an assets and opportunities inventory of major waterfront parcels on Hempstead Harbor.	
The USFWS hosted a workshop to improve integrated surveys of colonial water birds in and around the Sound. CTDEP and NYSDEC specialists participated with researchers to explore avenues to more reliably measure nesting populations. Trials of techniques to verify survey accuracy were completed.	

L-4. MANAGING ENDANGERED AND THREATENED SPECIES (CCMP TABLE 43, P.116)

Key Elements: Continue endangered species programs and develop lists of Long Island Sound endangered species to aid management programs

Description	2001 Planned Action
The Corps of Engineers is proposing to dredge Southport Harbor. Since the time of last dredging (circa 1960), sandy beach and dunes have formed between the east breakwater and channel. Not only does this support rare dune habitat, but portions of the site supported a coastal grassland species, which is listed as state threatened. The Environmental and Geographic Information Center and the Office of Long Island Sound Programs has assisted the Corps in identifying the federal consistency (with Connecticut's Coastal Management Act) and endangered species issues including mapping the specific location of the threatened species. The Corps is developing an environmental assessment and will be investigating alternative actions to avoid or minimize impacts to dunes and especially the threatened grass.	Receipt of an environmental assessment from the Corps of Engineers and the issuance of a federal consistency determination.
The NYSDEC Natural Heritage Program is updating its Rare Plant List, which will include the status of each species.	Updated list planned for 2001.
The USFWS managed the stabilization of Faulkner Island, a key nesting site for the endangered roseate tern. The monitoring of the stabilization effects and black-crowned night heron predation on tern nesting continues.	

L-5. MANAGING HARVESTED SPECIES (CCMP TABLE 44, P.117)

Key Elements: Ensure safe consumption and enhanced production of harvested species through fishery management plans, improved fish passage and habitat improvements. Support related programs such as oyster cultch placement, artificial reef development, dredging windows, and incidental take of nontarget species or entrainment/impingement at industrial facilities

Description	2001 Planned Action
CT DEP continues to award grants and participate in restoration of riverine migratory corridors for anadromous fish in the streams and rivers of the state. In 2000 a fishway was completed at Ed Bills Dam on the east branch of Eightmile River that opened up 6 miles of the river. A fishway was reconstructed at Whitford Brook in Mystic that opened up three miles of migratory corridor. A total of 36 miles of RMC have been restored since 1998. The goal is to restore 100 miles by 2008.	Continue to work with partners to open up additional fish passages and provide funding for design and construction of fish bypasses and ladders.

L-6. MANAGING EXOTIC AND NUISANCE SPECIES (CCMP TABLE 45, P.120)

Key Elements: Develop measures to prevent the introduction of undesirable species and implement a program to reduce the abundance of mute swans.

Description	2001 Planned Action
On June 30, 2000, Connecticut DEP Office of Long Island Sound Programs spearheaded a group of volunteers from the Nature Conservancy, the Town of East Hartford, The Connecticut River Watershed Council, the U.S. Fish and Wildlife Service (USFWS), the Hockanum River Watershed Association, and volunteers from the United Technologies Corporation in the removal of the invasive aquatic plant water chestnut from a 7 acre site in the Hockanum River. NYSDEC has awarded Bond Act funds for projects as the Edith Read Sanctuary and the Nature Study Woods, both in Westchester County, to remove invasive species from 50 acres of forested area.	Monitoring of this site and the entire river will be ongoing for as long as 7-10 years. Invasive species control is planned for Black Point Beach in E. Lyme and the Team will be identifying a work plan for 2001. Continue to harvest water chestnut for Connecticut River sites.

L-7. EDUCATING THE PUBLIC ABOUT THE PLANTS AND ANIMALS OF LONG ISLAND SOUND (CCMP TABLE 46, P.120)

Key Elements: Educate the public about the plants and animals of Long Island Sound and elicit volunteers assist plants and animals monitoring programs.

Description	2001 Planned Action
CT DEP continues to provide support to a volunteer Secchi Disk network which is attempting to evaluate trends in light availability to help identify appropriate times or locations for restoring eelgrass.	Continue data collection efforts.

L-8. DEVELOPING AN INFORMATIONAL DATABASE ABOUT LIVING RESOURCES AND THEIR HABITATS (CCMP TABLE 47, P.122)

Key Elements: Develop and expand informational databases on living resources and their habitats with an emphasis on GIS data for resource management

Description	2001 Planned Action
The Office of Long Island Sound Programs continues to create coverages of coastal resource information to support oil spill response. OLISP recommended to NOAA to revise and update the over 15 year old Environmental Sensitivity Maps (see Table L-3). Funding was secured for this project and NOAA's consultant has produced draft ESRI maps based upon data provided by DEP staff. Other draft coverages that have been developed are breakwaters and navigation channels. Through the NOAA Coastal Services Center's Coastal Fellow program, OLISP has a coastal fellow completing the second year of the Sediment Quality Information Database (SQUID) to manage data related to sediment dredging and quality.	Develop an anadromous finfish GIS project. Continue to finalize the SQUID project.

Description	2001 Planned Action
Connecticut DEP continues to compile information regarding trends in eelgrass populations. Anecdotal information would suggest that most, if not all, southeast coves are continuing to see declines in eelgrass abundance. Several likely causes have been identified including nonpoint source nitrogen enrichment, STP's in the case of Little Narragansett Bay/Pawcatuck River and possibly warmer than normal temperatures associated with El Nino and La Nina. The University of Connecticut Marine Sciences Center is conducting some preliminary studies of southeastern coves to evaluate and model the impacts of nitrogen upon biological communities.	DEP has submitted a request to the LISS study to fund a remapping of eastern Long Island Sound and Fisher's Island Sound beds to determine long term trends.
CT DEP received $1 million for the LIS Research Fund to help to identify the causes of recent lobster mortality in western Long Island Sound and shell disease in eastern Long Island Sound. Congress appropriated funds for this purpose also and DEP has collaborated with NMFS and Sea Grant in the release of a joint RFP for lobster research. An RFP was released in late summer and full proposals were received in December. The Long Island Sound License Plate program continues to provide small grants for research. This program annually publishes research priorities - for the 2001 grants, this information was posted on the web. In 2000, three projects were funded for research totalling $47,883.70	Complete the selection of research proposals for lobster research and issue awards. Continue to fund priority research through the LIS License Plate program.

L-9. SOUND WIDE AND SITE-SPECIFIC RESEARCH AND MONITORING (CCMP TABLE 48, P.123)

Key Elements: Continue and enhance monitoring of living resource populations with an emphasis on fishery surveys, colonial water birds, submerged aquatic vegetation, and lobsters.

Description	2001 Planned Action
See description under L-10 below.	

L-10. LIVING RESOURCES AND HABITAT RESEARCH (CCMP TABLE 49, P.124)

Key Elements: Identify priorities for research to fill gaps in our understanding of the Long Island Sound ecosystem and to assist management of living resources.

Description	2001 Planned Action
The LISS funded 3 research grants in 2000 to examine the cause(s) of the lobster mortalities in LIS; investigate the historical environmental trends in LIS over the past 400 years; and study various factors that may affect phytoplankton growth in the Sound.	Work planned under the research grants is continuing in 2001.
The management committee approved a LIS research fund of $190,000 in 2000 supplemented by the New York and Connecticut Sea Grant College programs of $25,000 each for a total LISS research fund of $240,000.	The management committee approved a LIS research fund of $350,000 in 2001.

Raising Public Awareness and Participation Through Education and Outreach

A significant factor toward long-term CCMP effectiveness is the ability to increase public awareness of and participation in day-to-day activities designed to protect LIS. Educating LIS watershed residents and increasing the number of people that take an active interest in protecting and restoring the Sound helps to nurture long-term stewardship ideals in local communities. As the Sound is restored to a healthier state, public support based on these ideals will help ensure continued progress.

CCMP Strategy:

The CCMP public awareness and outreach strategy has six major elements: 1) increasing community awareness and stewardship; 2) promoting understanding; 3) facilitating public participation; 4) increasing communication and cooperation; 5) enhancing education at all levels; and 6) securing funding.

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2000 Highlights:

- In 2000, the LISS outreach program responded to 553 information requests, developed and staffed displays at 14 public events that reached over 2,000 people; and provided 9 presentations to combined audiences of 675.
- The LISS public education and outreach program developed and distributed quarterly LISS Newsletters covering timely LIS topics to over 4,000 addressees in 2000: 1) *LIS Environmental Indicators;* 2) *LIS Habitat Restoration*, and 3) *LISS Summit.*
- The LIS Educators Conference was held in March 2000 in cooperation with the Maritime Aquarium in Norwalk, Connecticut. Over 220 educators attended the conference that featured 40 exhibitors and 25 workshops on a variety of critical LIS areas of concern.
- The CTDEP Long Island Sound Fund awarded $80,000 in grants for education projects, including development of a teacher resource guide to environmental education programs, public education for septic system maintenance, groundwater contamination and nonpoint source protection and community-based programs at Cove Island Park in Stamford, creating 100 year-round environmental education activities about the Sound for a wide range of age groups.
- In 2000, the LISS World Wide Web page continued to be one of the most popular sites on the EPA Region I host server, with nearly 60,000 "hits." The LISS site includes LIS fact sheets, slide shows, newsletters, LIS links, and key Federal and state LIS personnel contact information. The LISS web page address is: http://www.epa.gov/region01/eco/lis.
- NYSDEC, CTDEP, and EPA conducted workshops, seminars, symposia, and conferences on LIS issues in various locations throughout the LIS area during 2000 Included are the Municipal Conference in June 2000; four NRCS Watershed Community Collaboration Workshops held in Connecticut in November 2000; and a series of public comment meetings on the LIS TMDL held in New York and Connecticut during Summer 2000.
- Through 2000, the LISS public information and education Small Grants Program has provided funds for 58educational, informational and construction projects totaling over $211,000. These projects assisted hundreds of teachers and thousands of school children, and produced over 20,000 pieces of LIS literature. In 2000, the LISS provided funds totaling $74,000 for 17 local community environmental education projects in New York and Connecticut.

- The Nonpoint Education for Municipal Officials (NEMO) project continued to present its four-part series on nonpoint source pollution prevention and the link between land use and water quality. NEMO conducted 17 workshops in Connecticut and 19 in New York for over 760 persons in attendance. Municipal representatives included town selectmen/women, planning and zoning boards, health departments, conservation and environment commissions, highways and parks and recreation departments.

- In 2000 the NEMO program was expanded to include a new coordinator and office in SUNY Stony Brook, New York. The New York NEMO program is working with the Hempstead Harbor and Manhasset Bay Protection Committees in briefing local boards and commissions and in conducting two basic NEMO workshops for municipal officials in those communities.

SUMMARY OF MANAGEMENT ACTIONS: PUBLIC INVOLVEMENT AND EDUCATION

E-1. COMMUNITY AWARENESS AND STEWARDSHIP (CCMP TABLE 51, P.146)

Key Elements: The CCMP emphasized existing, and enhanced public involvement and education programs at local, regional and national levels to promote understanding and management of LIS. The development of informational materials for specific audiences including printed materials, public exhibits, educational curricula, and research programs were identified as primary outreach and education mechanisms.

Description	2001 Planned Action
CTDEP held six regional workshops geared toward municipal land use decision makers in coastal communities. A Connecticut Coastal Management Manual produced by CTDEP was made available to participants. A data-based presentation was given that focused on CT's coastal resources and guidance in utilizing existing tools to assist in improved land use decisions. Over 129 individuals attended representing 27 coastal communities.	Additional sessions are planned for 2001 and copies of the CT Coastal Management Manual will be distributed upon request.
LISS communications staff led the development of the first LISS environmental indicators report on the health of Long Island Sound -- SoundHealth 2001. The report summarizes data gathered for 15 environmental, human health, ecological and natural resource indicators of the health of the Sound over a 15 year period.	Produce a number of updated fact sheets based on information produced in the Sound Health 2001 Report; develop a web-based expanded version of the report.
The LISS modified a series of 4 nonpoint source public educational posters originally developed by the State of Washington, and adapted them for LIS. The posters were produced in 3 sizes and distributed to a broad audience.	Continue to distribute posters and explore other venues for the nonpoint source messages.
CTDEP and NYSDEC staff organized and held a series of public informational meetings in NY and CT on the LIS Waste Load Allocation for the proposed TMDL.	Produce a series of fact sheets and a FAQ (Frequently Asked Questions) on the TMDL and proposed Credit Exchange Program.
The LISS Outreach Program: -responded to 553 information requests, developed and staffed displays at 8 events that reached 1,950 people; and provided 3 presentations to a combined audience of 525. -gave LIS presentations to one elementary, three high school, and two college classes informing over 150 students about LIS issues, concerns, and ecosystem value. -direct mailed to all coastal NY Public Libraries and municipalities a free set of the nonpoint source pollution posters. -published *UPDATE* newsletters focusing on: Habitat Restoration; Environmental Indicators; and LISWA Citizens Summit. -produced and distributed three issues of the LIS newsletter *Sound Outlook* to a circulation of over 2,500.	Staff will continue to respond to requests for information, provide presentations, staff displays at events, and publish the newsletter and other pertinent materials.
The LIS Educators Conference was held in March 2000 in cooperation with The Maritime Aquarium, Norwalk, CT, and other LISS partners. The conference was attended by 220 educators from Connecticut, New York, New Jersey, and Massachusetts. There were 40 exhibitors and 25 workshops.	
The LIS Research Conference was held in November 2000 in cooperation with the Connecticut Sea Grant College Program, the LIS Foundation, the LIS Councils and Assembly and the New York Sea Grant Institute. The conference addressed historical trends in LIS; non-point source pollution; marine ecosystems; diseases and pathobiology; sediment forms and monitoring; water quality and nutrients and algae. Over 150 people attended the 2 day session at UCONN Stamford.	Planning for the 2002 research conference is underway.
NY Sea Grant hired a student intern from SUNY Stony Brook to assist with the LISS Small Grants program through funding provided by NYSDEC.	NY Sea Grant plans to hire a federal work study student to continue assisting with the small grants.

E-2. PROMOTING UNDERSTANDING (CCMP TABLE 52, P.147)

Key Elements: An important component of the Public Involvement and Education priority of the CCMP is keeping the partner agencies and municipalities informed and abreast of LIS issues. It was the intent of the CCMP to have the states of Connecticut and New York incorporate LIS information into all related programs wherever possible. All coastal municipalities are to be provided with information on CCMP implementation and how it would affect their cities and towns. Additionally, the partners are to provide briefings to user groups and assess and support opportunities for training and educating the environmental decision making community and regulated community on LISS CCMP actions.

Description	2001 Planned Action
In September 2000, the CTDEP produced its *Summer Hypoxia Monitoring Survey 1991-1998 Data Review*, an 84 page summary of 8 years of LIS water quality monitoring conducted by CTDEP.	Participate in producing and updating the LIS indicator report, *Sound Health 2001*.
CTDEP LISS Outreach staff continued as contributing editor for the CTDEP newsletter *Sound Outlook*, the a Long Island Sound newsletter. This newsletter is a cooperative effort between the Coastal Zone Management and National Estuary Programs at the state level. *Sound Outlook* has a circulation of 2,300 and in the year 2000 was made available on the DEP web site.	Continue to publish *Sound Outlook* and cooperate with the LISS newsletter *UPDATE*.
NYSDEC and the LISS provided support for the creation of a LI NEMO (Nonpoint Education for Municipal Officials) coordinator housed at the NY Sea Grant offices in Stony Brook. The coordinator was hired in May 2000 to work with the Hempstead Harbor and Manhasset Bay Protection Committees. Staff has introduced NEMO at over a dozen watershed protection committee and municipal board meetings. Two NY NEMO basic workshops were provided for municipal officials and staff in the Hempstead Harbor and Manhasset Bay watersheds.	Continue the LI NEMO with expansion to other coastal communities and expand into Westchester County. Develop "follow up" workshops and continue to provide "basic" workshops in Hempstead Harbor and Manhasset Bay watersheds
The LISS website at http://www.epa.gov/region01/eco/lis was one of the most visited sites on the EPA Region I server, with nearly 60,000 hits in 2000.	Formation of a LISS web development team to recommend site improvements.

E-3. FACILITATING PUBLIC PARTICIPATION (CCMP TABLE 53, P.148)

Key Elements: The intent of the CCMP in terms of public participation is that "the public must be involved in setting policy for the Sound . . . as well as participating in the cleanup of the Sound through hands-on activities". The LISS partners are to provide financial and technical support for such activities as beach cleanups, habitat restoration projects, and storm drain stenciling. The EPA and states of Connecticut and New York are to promote citizen involvement in educational and volunteer monitoring activities in and around the Sound and providing technical assistance as needed.

Description	2001 Planned Action
The LIS CAC met quarterly in 2000 to identify and address issues concerning LIS and the CCMP.	Quarterly meetings are planned for 2001.
The LISS funded 17 small grants projects in 2000. For example, the Friends of the Bay project produced septic system maintenance folders; and the Riverhead Foundation produced laminated cards to aid the public in the identification of stranded animals. The LISS produced a flyer explaining the grant program and how to obtain a grant. NY Sea Grant and Cornell Cooperative Extension produced a flyer for Senator Carl Marcellino's district about *Home Underground Storage Tanks*.	LISS Small Grants funded 15 projects for FY 2001.
NY Sea Grant revised and updated the storm drain stenciling brochure detailing how to organize a storm drain stenciling project.	New York Sea Grant will continue to distribute the new brochures and stencils to interested groups.

E-4. INCREASE COMMUNICATION AND COOPERATION (CCMP TABLE 54, P.150)

Key Elements: The CCMP commissioned the EPA and the states of Connecticut and New York, in combination with a Management Conference public outreach workgroup, to help coordinate ongoing governmental and non-governmental public outreach efforts. During the CCMP implementation phase, and thereafter, the partners are to encourage private and non-profit groups to continue to develop and implement LIS educational and outreach programs.

Description	2001 Planned Action
CTDEP LISS Outreach staff continued to provide technical information and resources (about LIS and LISS CCMP actions) to their own agency staff and to other state and federal agency partners to facilitate cooperation and outreach with each other and the public at large.	Continue to provide information and resources to state and federal agency staff.
CTDEP LIS monitoring and outreach staff participated in the biennial Long Island Sound Research Conference (held in November 2000), providing a report and technical data based on the monitoring efforts over the last ten years.	
LISS staff participated in the LIS Total Education Network (LISTEN) meetings organized by Save the Sound.	LISS outreach staff in NY, CT, and EPA-LISO will continue to participate in LIS Educators meetings organized by Save the Sound and held quarterly at various locations around the Sound.
LISS staff participated in the EMPACT meetings to discuss opportunities for outreach activities.	Staff will continue to attend EMPACT meetings.

E-5. ENHANCE EDUCATION AT ALL LEVELS (CCMP TABLE 55, P.151)

Key Elements: A key objective for the LISS involvement and education program is to develop, among the citizens of CT and NY, a long-term sense of environmental appreciation for and understanding of the Sound by enhancing educational opportunities at all age levels. The States of Connecticut and New York are to work with appropriate school districts in their respective states to develop Long Island Sound educational materials to integrate into existing primary and secondary school curricula. The partners are to encourage natural history museums and nature centers to promote LIS issues within their programs and provide support for teacher training and workshops integrating LIS issues.

Description	2001 Planned Action
The CTDEP LISS Outreach Coordinator gave LIS presentations to one elementary, three high school, and two college classes informing over 150 students and participated in an LIS day reaching 4th thru 8th grade students in Westbrook, CT.	Continue to bring presentations and resources to area schools.
The CTDEP Long Island Sound License Plate Fund awarded nearly $80,000 in grants for education projects. Projects included a *Teacher Resource Guide to Environmental Education Programs*, Public Education pertaining to Septic System Maintenance, Groundwater Contamination and NPSP, *Sound Connections* (An education and outreach program for urban students to promote the prevention of litter in LIS and a non-point source pollution program for 4th graders), and *Community-Based Public Programs at Cove Island Park* (creating 100 year-round environmental education activities about LIS that will reach a wide age range of people).	Continue to promote the LIS Fund grant program and facilitate education and outreach projects.

E-5. ENHANCE EDUCATION AT ALL LEVELS (CCMP TABLE 55, P.151)

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Description	2001 Planned Action
NY Sea Grant is a member of the Executive board for NYS Marine Education Association. Staff distributes new LISS materials to members and keeps them informed of LISS activities.	Staff will continue as a board member and distribute information. Staff will also assist with the organization of the yearly conference held at Southampton College June 8-10, 2001.
NY Sea Grant conducted two grant small grants writing workshops to help prepare potential applicants for the LISS Small Grants program; one each in CT and NY.	Staff will hold two grant writing workshops once the 2002 small grants call is announced.

E-6. SECURE FUNDING (CCMP TABLE 56, P.152)

Key Elements: Connecticut, New York and the EPA are to publicize grant opportunities whenever possible and to encourage all organizations associated with the public involvement and education effort, both governmental and non-governmental, to take advantage of the various grant programs available that provide funding for educational activities and products. Private sector funding should also be sought when and wherever possible and identify other grant programs for which LIS projects would be eligible.

Description	2001 Planned Action
The *Long Island Sound Restoration Act* of 2000, P.L. 106-457 was enacted, which extended the LISS through 2005 and increased the appropriations ceiling to $40 million annually.	Congress earmarked $4.5 million for LIS; EPA allocated $500K for LIS in the 2001 budget.
The CT State Bond Commission approved a grant in aid to SoundWaters, Inc. for $350,000 for funding environmental exhibits relating to Long Island Sound.	
The CT DEP Long Island Sound Research Fund gave out over $181,000 for projects that enhanced education and outreach and facilitated public involvement in research and habitat restoration.	
Since the inception of the LIS Small Grants Program, the LISS has provided funds for 58 projects totaling over $211,000. These projects assisted hundreds of teachers and thousands of school children, and produced over 20,000 pieces of literature. In 2000, the LISS provided grant funds totaling $70,000, with an additional $4,000 from NYSDEC for 17 local community environmental projects in CT and NY.	15 projects will be underway in 2001. The call for proposals for 2002 will go out in the summer 2001.

Long Island Sound Study
Comprehensive Conservation and Management Plan
Actions

CONTINUING THE MANAGEMENT CONFERENCE

M1-1. Formally extend the Management Conference for a minimum of five years to continue coordination and oversee implementation of the management plan. The Citizens Advisory Committee will remain part of the Management Conference structure.

M1-2. Continue and expand the role of the EPA Long Island Sound Office, consistent with the requirements of the LIS Improvement Act of 1990. Funding is available in FY 1994, but will be required in future years.

M1-3. Continue state program coordination and involvement in the Management Conference. Funding is available in FY 1994, but will be required in future years.

M1-4. Maintain public involvement and education efforts with an added focus on local government involvement. Funding is available in FY 1994, but will be required in future years.

M1-5. Establish delegation of authority to allow the EPA Long Island Sound Office to support projects of studies as authorized by the Long Island Sound Improvement Act.

M1-6. Advocate modification to Clean Water Act § 320(g)(2) to allow the EPA to provide base funding through cooperative agreements to National Estuary Programs that complete their management plans.

M1-7. Develop a coordinated monitoring plan to assess the effectiveness of implementation, considering innovative approaches and building upon existing programs.

M1-8. Coordinate data management efforts between Long Island Sound and New York-New Jersey Harbor Estuary Program (HEP), including support for a system wide data manager.

M1-9. Modify the current structure of the LISS as needed to oversee implementation of the plan.

M1-10. Ensure that the LISS is consistent with existing state coastal zone management (CZM) policies.

M1-11. Incorporate relevant elements of the plan into the state CZM program for federal consistency review.

M1-12. Continue to support and enhance data management, analysis and reporting.

M1-13. Prepare an annual progress report on implementation including recommendations to redirect efforts.

HYPOXIA

H1-1. The states of New York and Connecticut will continue their point and non-point source permitting and enforcement programs as a primary mechanism of pollutant load reduction. Fundamental to the direction of these programs are the states' water quality standards and classifications that provide the basis for management policies and decisions.

H1-2. The state of New York will ensure compliance with the consent order to upgrade the Newtown Creek plant to provide secondary treatment with biological nutrient removal retrofit modifications.

H1-3. The state of Connecticut will freeze nitrogen discharges and, if appropriate, explore opportunities to reduce nitrogen discharges at three industrial facilities with significant nitrogen discharges.

H1-4. The municipalities in the states of Connecticut and New York will implement biological nutrient removal retrofits to reduce the load of nitrogen to the Sound on an interim basis.

H1-5. Conduct feasibility studies and pilot demonstrations for nitrogen removal at 13 of its [NYC] 14 sewage treatment plants, with actual design for Newtown Creek.

H1-6. Westchester County will investigate sludge re-handling at their four facilities to determine if opportunities exist for nitrogen load reduction.

H1-7. The state of New York will continue to seek to reach agreement with Belgrave, Great Neck East Shore, Huntington, Oyster Bay, Port Washington, and Kings Park on permit modifications for implementing the no net increase in nitrogen policy.

H2-1. The states of Connecticut and New York will continue to use their existing authority to manage non-point source pollution and appropriate federal grants such as CWA§ 319, 604(b), and 104(b) to carry out projects that will help prevent increases and, to the extent practicable, achieve reductions in the non-point source loads from high priority drainage identified in the CT and NY portions of the watershed.

H2-2. The states of CT and NY are developing their coastal non-point source control programs, as required by §6217 of the Coastal Zone Management Act.

H2-3. The states of CT and NY will continue to implement general storm water permit programs to control the discharge of storm water from industrial, construction, and municipal activities, in accordance with EPA's national program regulations. These permits will regulate discharges from construction activity greater than five acres and from eleven industrial categories.

H2-4. The states of CT and NY will continue to implement their existing permitting programs, such as the inland and tidal wetland programs, to address non-point nutrient control with respect to LIS management needs, as appropriate.

H2-5. The states of CT and NY will implement the requirements of the reauthorized Clean Air Act to achieve additional nitrogen emission controls. Major actions include reduction of nitrous oxide emissions through adoption of statewide enhanced vehicle inspection and maintenance programs and stricter emission controls for stationary sources such as power plants.

H2-6. The EPA will make non-point source management of nitrogen and other pollutants identified by the LISS, through wetlands and riparian zone protection as well as best management practices implementation, high priorities for funding under §319, 104(b), and 604(b) of the Clean Water Act.

H2-7. Investigate expansion of storm water permitting programs to regulate communities with populations fewer than 100,000 that border Long Island Sound within high priority management zones.

H2-8. In cooperation with the state of New York, Westchester County is developing a non-point source management plan that will include implementing best management practices for non-point source nitrogen control, monitoring their effectiveness and establishing a Westchester County management zone (or bubble) for assessing compliance with the nitrogen load freeze.

The LISS will explore extending the bubble concept to other management zones throughout Connecticut and New York state portions of the Long Island Sound drainage.

H2-9. Westchester County will implement the recommendations of the County Executive's Citizens Committee on Non-point Source Pollution in Long Island Sound.

H2-10. Point and non-point nitrogen load estimates will be made in the City of Stamford to assess feasibility of a point/non-point source *trading* program. A cost-effective mix of management options will be proposed that may be used to help decide how nitrogen reduction targets can be met once they are established.

H2-11. New York state will pursue the expansion of the State Building Code to include provisions for erosion and sediment control and storm water practices for all construction activities in order to prevent increases in non-point nitrogen runoff.

H2-12. Provide technical assistance to coastal municipalities to address impacts of hypoxia in their municipal regulations and plans of development, as required by law.

H2-13. Advocate the use of the June nitrate test on agricultural lands to ensure that fertilizer applications to crops do not exceed crop needs.

H2-14. In addition to continuing general storm water permitting programs, the state of New York should determine if the general permit adequately regulates nitrogen from activities subject to national storm water regulations.

H2-15. Explore the expansion of current requirements for federally licensed or permitted projects to obtain a water quality certification in New York to protect water quality from sources of pollution to include all projects adjacent to wetlands and other sensitive areas (e.g., adjacent to wetlands) or those that exceed a minimum size (e.g., greater than one acre).

H2-16. The states of Connecticut and New York should develop a habitat restoration plan that includes a list of potential project sites and priorities. Wetland projects that are in close proximity to priority nitrogen management areas should be highlighted.

H2-17. Evaluate Maryland's *Critical Areas* regulations and the reported nutrient reduction benefits and make recommendations of the potential value of a similar program for Long Island Sound.

H3-1. The LISS will complete work on the LIS 3.0 model and the necessary management scenario projection runs.

H3-2. Develop LIS 3.0-based dissolved oxygen targets and nitrogen load reduction targets for each management zone.

H3-3. Establish a firm timetable for achieving, within 15 years, the load reduction targets by zone, with progress measured in five year increments.

H3-4. Develop zone-by-zone plans to achieve the nitrogen load reduction targets.

H3-5. Encourage and support development of innovative, cost-effective technologies to reduce point and non-point sources of nitrogen.

H3-6. Periodically recalibrate LIS 3.0 to reflect the changing conditions of the Sound and use it to explain these changing conditions and to evaluate proposals to modify the management plan, as necessary.

H4-1. Increase funding of the Connecticut and New York State Revolving Fund Programs to meet statewide wastewater control needs, including Long Island Sound nitrogen control needs.

H4-2. Appropriate $50 M to fund a *Long Island Sound Challenge Grant Program,* a significant portion of which would be used to ensure that the Phase III nitrogen control efforts get off to a fast start with full local government cooperation.

H4-3. Fully fund the non-point source control programs under §319 of the Clean Water Act and §6217 of the Coastal Zone Act Reauthorization Amendments to support additional non-point source management activities.

H5-1. The states of Connecticut and New York, New York City, and the Interstate Sanitation Commission will monitor dissolved oxygen and nutrients in Long Island Sound, its major tributaries, and key sewage treatment plants.

H5-2. Develop a coordinated monitoring plan to assess the effectiveness of implementation, considering innovative approaches and building upon existing programs.

H5-3. As part of a combined National Estuary Program Action Plan Demonstration Project and a CTDEP Long Island Sound Research Fund project, the EPA and the state of Connecticut will complete a demonstration project designed to evaluate and quantify the benefits of a riparian zone in the denitrification process.

H5-4. The state of Connecticut, through its Long Island Sound Research Program, has solicited proposals to identify the role of riverine transport in attenuating the load of nitrogen delivered to the Sound in the Housatonic or Naugatuck Rivers. If an acceptable proposal is identified, it will be a priority for funding in 1994.

H5-5. The state of Connecticut, through its Long Island Sound Research Program, will continue to fund atmospheric deposition monitoring of nitrogen a two coastal locations through May, 1994.

H5-6. The EPA Office of Research and Development will continue to develop regional dissolved oxygen criteria for marine and estuarine waters.

H5-7. The NYSDEC will complete its initial study on the effects of hypoxia and disease on Long Island Sound lobsters.

H5-8. Continue long-term dissolved oxygen and nutrient monitoring of the Sound, its major tributaries, and key sewage treatment plants.

H5-9. Continue to monitor finfish and crustaceans of the Sound with emphasis on determining population response to low dissolved oxygen.

H5-10. Continue to monitor the effects of hypoxia on disease of lobsters.

PATHOGEN CONTAMINATION

P1-1. Continue CSO implementation and update overall management plans to assure implementation addresses bathing beach and shellfish closures and is consistent with water quality standards.

P2-1. Implement the state nonpoint source management initiatives supported from Section 319 funding

P2-2. Develop state coastal nonpoint source control programs, as per Section 6217 of the Coastal Zone Management Act to address the nonpoint source pathogen load from the LIS coastal zone.

P2-3. Implement general storm water permit programs to control the discharge of storm water from industrial, construction, and municipal activities, as per EPA regulations.

P2-4. Provide technical assistance to coastal municipalities to address impacts of pathogens in their municipal regulations and plans of development, as required by state law.

P2-5. Pursue changes of the State Building Code to include provisions for storm water management.

P2-6. Initiate a pilot program to control storm water discharges using enforceable instruments (i.e., permits or consent agreements). Connecticut and New York will evaluate the effectiveness of the pilot program for more widespread implementation.

P2-7. Expand current requirements for federally licensed or permitted projects to obtain a water quality certification to include all projects in sensitive areas or where a contaminant or parameter is found to exist at or exceeding a threshold value.

P3-1. Minimize malfunctions of treatment systems and eliminate dry weather overflows and illegal hookups to storm sewers through aggressive management programs. Ensure prompt notification and response and take quick enforcement action.

P3-2. Identify and take priority enforcement actions to control wet weather overflows from sewers caused by excessive infiltration and inflow.

P3-3. Implement a beach and shellfish closure action plan to take immediate corrective and priority enforcement actions addressing improperly treated municipal discharges. Preventable incidents involving beaches and shellfish areas will be emphasized.

P4-1. During the permitting process, minimize the impacts of boat dockage facilities and temporary live-aboard anchorages by considering their proximity to productive and certified shellfish waters, existing boat channels, wetlands, and critical habitat areas, and tidal flushing.

P4-2. Consider the impacts of vessel discharges through appropriate resource management and recovery programs and limit or condition the siting or operation of boating facilities as necessary to minimize such impacts.

P4-3. New York and Connecticut will apply to the EPA to create vessel *No Discharge* areas in specific embayments and harbors after ensuring the sufficient availability of pump-out stations and treatment facilities.

P4-4. New York state has identified Huntington and Lloyd Harbors as areas requiring additional protection and the EPA has Public Noticed its tentative determination that there are adequate pump-out facilities in these areas.

P4-5. Connecticut, through a 319 grant, will ensure completion of a marina and mooring area water quality assessment guidance document. Connecticut has also completed a marinas *best management practices* project report for nonpoint sources of pollution, which may be used to develop requirements for use of certain best management practices at marinas. New York state will review these documents for potential incorporation into state management programs.

P4-6. Complete regulations to require pump-out facilities as required by, and in accordance with, state law.

P4-7. The states of Connecticut and New York have received funding from the Federal Clean Vessel Act to conduct a pump-out needs survey, determine the effectiveness of existing facilities, develop and implement plans for construction of additional pump-out stations by marinas and prepare education/information plans.

P4-8. Collect information on sewage discharge controls in Long Island Sound, disinfection chemicals used, boater education and sewage treatment plant acceptance of pump-out wastes. Evaluate availability of treatment capacity for pump-out wastes and secure commitments from municipalities to accept these wastes.

P5-1. Connecticut and New York are coordinating management actions with local governments when on-site septic systems are found to be failing and impacting shellfish growing areas and bathing beaches.

P5-2. Continue and enhance management actions with local governments when on-site septic systems are found to be failing and impacting shellfish growing areas and bathing beaches.

P5-3. Evaluate existing septic system controls (including system monitoring, required maintenance and repair and replacement of failing systems) to determine if they are sufficient to protect coastal ecosystems and recommend changes to local governments.

P6-1. Develop and implement a public education plan, targeting specific audiences, in cooperation with federal, state and local public outreach experts and environmental education.

P7-1. Review existing data and reports and the recommendations of the Monitoring Workshop to identify shell fishing or bathing area in need of further assessment.

P7-2. Perform bacterial surveys of harbors and embayments to identify contaminated shellfish areas and potential sources of pathogens as required by the National Shellfish Sanitation Program.

P7-3. Use seasonal or conditional certification of shellfish harvest areas, as may be warranted by water quality variations, under guidelines provided by the National Shellfish Sanitation Program.

P7-4. Meet annually with health directors of coastal municipalities to refine monitoring and bathing beach closure protocols and share information

P7-5. Evaluate existing monitoring programs and, as necessary, make recommendations for enhancements.

P7-6. Conduct a workshop to determine appropriate and consistent methods for bathing beach monitoring and laboratory analysis and work to adopt, if feasible, common methods.

P7-7. Implement the recommendations of the LISS Monitoring Plan to enhance pathogen monitoring.

P7-8. Develop and conduct a dry and wet weather sampling program for specific drainage basins. Both states will evaluate this pilot program for possible expansion.

P7-9. Assess the impacts of identified point and nonpoint sources and assign priorities to areas where management actions are most likely to be beneficial. Priority criteria will include viability of the resource, feasibility and cost-effectiveness of management. Enhance state bacterial surveys of harbors and embayments to identify contaminated shellfish areas and potential sources of pathogens.

P7-10. Support the efforts to develop a better understanding of the relationship between pathogen indicators and the risk to public health such as the National Indicator Study.

P7-11. Along with supporting the National Indicator Study, investigate funding for a regional epidemiological survey to determine the relationship between waters of varying indicator quality and public health.

TOXICS CONTAMINATION

T1-1. The states of Connecticut and New York and the Army Corps of Engineers will continue to regulate dredging and the disposal of dredged sediments through the existing permit programs.

T1-2. The states of Connecticut and New York and the EPA will continue their pretreatment programs to ensure that toxic discharges to sewage treatment plants are controlled. The states of Connecticut and New York, through their Pollution Discharge Elimination System Programs, will continue to ensure that facilities comply with their permit limits.

T1-3. The states of Connecticut and New York and the EPA will apply pollution-prevention techniques, as appropriate, to both direct and indirect discharges of toxic substances by emphasizing wastewater minimization, recycling of wastewater, and alternative processes and chemicals to reduce toxicity and toxics loads and to minimize effects on all environmental media.

T1-4. The states of Connecticut and New York will review municipal and industrial discharge permits to surface waters to reduce the allowable concentrations of toxic pollutants from the previous permitted values.

T1-5. The LISS will encourage adequate funding to continue and expand pollution prevention site visit programs targeting industrial dischargers to the Sound and its tributaries.

T1-6. As part of the NY-NJ Harbor Estuary Program, total maximum daily loads, wasteload allocations for point sources, and load allocations for nonpoint sources will be developed to ensure that water quality standards for mercury are met in the Harbor, the East River, and Long Island Sound.

T1-7. As part of the New York - New Jersey Harbor Estuary Program, the states of New York and New Jersey will establish water quality-based effluent limits for copper, mercury, and six other toxic metals, as necessary. Permits will be subsequently modified.

T1-8. Support education on the environmental impact of using home, garden, and commercial hazardous chemicals and pesticides and continue to provide guidance on how to minimize use of these chemicals and properly dispose of them through household hazardous waste collection.

T1-9. Evaluate mass loadings of toxic contaminants and determine their relationship to ambient water and sediment quality.

T1-10. Identify and assign priorities to toxic substances which should be banned from use and for which *virtual elimination of discharge* should be the goal.

T2-1. The LISS will review the National Oceanic and Atmospheric Administration (NOAA) 1991 sediment chemistry and toxicity survey results of harbors and embayments, when available in the Spring 1994.

T2-2. The LISS will provide a preliminary review of the data on sediment contamination on a site-by-site basis. State and federal experts will evaluate the problem at each site and recommend additional assessments needed to fully characterize the problem, ascertain the need for and feasibility of remediation and prepare a remediation plan.

T2-3. The City of Glen Cove plus their Review Committee will evaluate the contamination of Glen Cove Creek.

T2-4. The LISS will review and evaluate sediment remediation approaches developed in the Great Lakes ARCS Program and HEP.

T2-5. Conduct further assessments and develop site plans addressing the feasibility, technical approach, cost and value of conducting remediation activities for Black Rock Harbor and Glen Cove Creek, where data may be sufficient to conduct case study analyses. Recommend other harbors for characterization and feasibility studies to be conducted at a rate of two harbors per year.

T3-1. The LISS will advocate the coordination between the states of Connecticut and New York to review health risk and advisory recommendations and formulate plans to ensure consistency.

T3-2. Develop strategies for controlling loadings of contaminants for which seafood consumption advisories have been issued.

T3-3. Develop a strategy for identifying toxic substances of human health risk concern in Long Island Sound seafood species and tolerance levels for those substances.

T4-1. The mussel watch and benthic surveillance components of NOAA's Status and Trends Program and the EPA's Environmental Monitoring and Assessment Program provide regular and systematic sampling of contaminant levels in the Sound.

T4-2. A monitoring workshop was held to integrate findings of the LISS and develop a comprehensive, Soundwide monitoring plan for toxic substances.

T4-3. Under the auspices of the New York- New Jersey Harbor Estuary Program (HEP), the U.S. Army Corps of Engineers has agreed to develop a work plan and budget to develop system wide models for PCBs, mercury, and other toxic pollutants that will provide the technical foundation for comprehensive efforts to eliminate these contamination problems in the Sound-Harbor-Bight system. The Corps of Engineers and other participants have agreed to seek the funding necessary to complete these models. Special attention will be directed to fully account for nonpoint sources of mercury.

T4-4. Monitoring initiatives will be coordinated with the EPA Regional - Environmental Monitoring and Assessment Program (EMAP) to further the understanding of sediment toxicity and benthic community structure gradients in western Long Island Sound.

T4-5. Conduct site-specific characterization surveys of water, sediment and biota in harbors where active sources of toxic substances are believed to persist at a rate of two harbors per year.

T4-6. Identify sources and sites of PCB loadings to the Sound ecosystem from in-Sound and NY-NJ Harbor Estuary sources. Focus on reducing and eliminating PCB loadings on a priority basis, concentrating on areas of known contamination such as Black Rock Harbor.

T4-7. Monitor contaminant levels in selected estuarine organisms to ascertain their effects on the biology of the species and their effects on the edibility of the species.

T4-8. Implement the recommendations from the LISS Monitoring Plan to improve contaminant monitoring.

T5-1. The relationship between organism body burdens and their toxic response needs to be investigated as an important mechanism of toxic impact.

T5-2. Trophic level transfer and bioaccumulation effects of contaminants up the food chain need to be quantified to better manage both the aquatic community and human health risk.

T5-3. While toxicity testing of sediments and waters is an efficient means of identifying toxicity problems, the relationship between toxicity and specific causative agents needs to be determined.

T5-4. Evaluate the use of an ecological risk assessment approach, demonstrated in the LISS Black Rock Harbor Action Plan Demonstration Project, for more widespread application to identify toxicity and its sources in embayments and harbors of the Sound.

T5-5. Continue to monitor finfish and crustaceans of the Sound with emphasis on determining population response to low dissolved oxygen.

FLOATABLE DEBRIS

F1-1. Continue implementation of long-term CSO abatement programs to manage or eliminate all CSO areas remaining in the Long Island Sound region.

F1-2. Control discharge of stormwater from industrial, construction, and municipal activities in accordance with EPA's national program regulations.

F2-1. Continue to implement the *Pack It In/Pack It Out* anti-litter campaign.

F2-2. The New York-New Jersey Harbor Estuary Program has developed detailed short- and long-term floatable debris action plans for the New York-New Jersey Harbor.

F2-3. National Beach Cleanup Program. As part of this program, annual cleanups of Long Island Sound shorelines have taken place since 1988. This program costs $10,000 per year per state to coordinate and support volunteer efforts.

F2-4. Continue to implement *Clean Streets/Clean Beaches* anti-litter campaign.

F2-5. Conduct a demonstration project to encourage proper solid waste handling and recycling at five marinas.

F2-6. Expand involvement in *Coastweeks* program to include a second beach cleanup in the spring, prior to the beach season.

F2-7. Continue to coordinate volunteers to paint stenciled messages on storm drains, such as *Don't Dump - Drains to Long Island Sound.*

F2-8. Maintain clean beaches and minimize resuspension of debris back into Long Island Sound waters by: -Cleaning beaches in the evening to prevent resuspension overnight; -Using solid waste receptacles with lids instead of the open mesh type; -Providing recycling containers in convenient locations; -Using environmentally responsible containers for food and beverages at concession stands.

F2-9. Distribute a directory of volunteer groups in the Long Island Sound watershed that work on projects and activities to reduce marine debris.

F2-10. Encourage the public and manufacturers to promote recycling, use less packaging, and substitute products made from degradable material whenever possible.

F2-11. Encourage marina operators to accept responsibility for litter control and recycling.

F2-12. Require floatation materials that are resistant to decomposition and fragmentation.

LIVING RESOURCES AND THEIR HABITATS

L1-1. Connecticut, New York, and federal agencies will continue to pursue restoration of degraded habitat.

L1-2. Through Connecticut's coastal permit programs and consistency with the CT Coastal Management Act, applicants may be required to protect, restore or enhance aquatic resources.

L1-3. Connecticut preparing a tidal wetland management plan that includes an identification of potential wetland restoration sites.

L1-4. Connecticut will continue the Coves and Embayments Restoration program to restore degraded tidal and coastal embayments and coves.

L1-5. Connecticut, New York, and federal agencies currently administer programs for the restoration of habitats other than tidal wetlands such as dunes, submerged aquatic vegetation, and coastal woodlands.

L1-6. New York is phasing out, and Connecticut prohibits, maintenance ditching of mosquito ditches in favor of selective use of open marsh water management techniques to control mosquitos and restore pools and ponds on tidal wetlands.

L1-7. Coastal America, a cooperative effort of several federal agencies, is conducting a study in Connecticut to evaluate the impacts of transportation facilities upon ten tidal wetland sites. This study is sponsored by the CTDEP and undertaken by the USACE. When the study is completed, restoration plans will be developed for those sites where a transportation facility is shown to be the cause of degradation. Restoration is expected to be implemented through a combination of ISTEA, Water Resources Development Act, Long Island Sound Cleanup Account funds, New York's Environmental Protection Fund, and, where appropriate, natural resources damages recovered under CERCLA or OPA90.

L1-8. Connecticut's Coves & Embayments Program will complete nine restoration projects in progress and commitments to begin three new projects.

L1-9. Connecticut and New York should continue to pursue the use of funds from the following programs, and explore additional funding sources, to support restoration and enhancement activities described in the previous recommendation: The Land and Water Conservation Fund, the Intermodal Surface Transportation Efficiency Act (ISTEA) Enhancement Program, the Partners in Wildlife Program,§ 319 of the Clean Water Act, Army Corps of Engineers Section 22 Planning Funds, the Water Resources Development Act, National Coastal Wetlands Conservation Grants, the North American Waterfowl Management Plan, Connecticut's Long Island Sound Cleanup Funds, and the Coastal Zone Management Act.

L1-10. The rapid displacement of native brackish and fresh tidal plant communities on the Connecticut River has been identified as the single most significant habitat problem in this estuary. A specific restoration program for the control of common reed in these tidal wetlands needs to be implemented to check and reverse the spread of common reed and develop the most efficient means of effecting this restoration. Control techniques need to be evaluated for the full range of wetland habitat types on the river. Baseline surveys will be established and post-control monitoring over multiple years will be conducted.

L1-11. New York should continue to phase out maintenance ditching for mosquito control. These programs should receive additional support for selective use of open marsh water management techniques to control mosquitos and restore pools and ponds on tidal wetlands.

L1-12. Obtain long-term funding for Connecticut wetland restoration staff.

L1-13. Connecticut and New York should develop a restoration plan for the full range of coastal terrestrial and estuarine aquatic habitats adjacent to and in Long Island Sound. The restoration plan will include a list of potential restoration projects and a priority listing of projects to be implemented. Preliminary sites identified for future restoration in New York include: City Island ($300,000); Pelham Bay Park ($400,000); Wading River ($50,000); Sunken Meadow Creek ($50,000); Crab Meadow ($50,000); and Mattituck Creek ($100,000). Other sites in New York where costs have not been estimated include Pugsley Creek, Udall's Cove, Oak Neck Creek, Frost Creek, and East Creek. Connecticut has estimated that ten priority sites could be restored for $750,000, or approximately $75,000 per site.

L1-14. New York should strengthen their capabilities for implementing programs that restore degraded habitats. This should be undertaken in cooperation with the implementation of the Long Island Sound Regional Coastal Management Plan.

L2-1. The states of Connecticut and New York and the USACE will continue to implement their permit programs and coastal consistency provisions of states' Coastal Management Programs to regulate use and development of aquatic resources and critical habitats such as tidal and freshwater wetlands, intertidal flats, submerged aquatic vegetation beds, beaches, and dunes.

These programs also regulate dredging and the disposal of dredged sediments at designated sites in Long Island Sound. Open water disposal is only permitted at the designated open water sites and may only occur if the disposal will not cause adverse impacts to estuarine organisms.

L2-2. Connecticut will continue to reduce habitat degradation caused by storm water runoff projects (e.g. chronic dilution effects and sedimentation) through the goal of retaining the first one-inch of runoff.

L2-3. Connecticut and New York have programs to acquire by easement, fee simple acquisition, or other means habitats important for populations of plants and animals. These programs include the development of priority listings for acquisition and protection.

Connecticut and New York have land acquisition and management programs that use state funds and federal fund programs such as the Land and Water Conservation Fund, the National Coastal Wetland Conservation Program, and the North American Waterfowl Management Plan to protect and acquire coastal lands and wetlands.

L2-4. The USFWS maintains a national system of refuges, which includes the Stewart B, McKinney National Wildlife Refuge in Connecticut (i.e., Salt Meadow, Chimon Island, Sheffield Island, Goose Island, Milford Point and Falkner Island Units) and Long Island National wildlife Refuge Complex in New York (i.e., Oyster Bay and Target Rock units).

L2-5. Congress has authorized the creation of the Silvio Conte Connecticut River National Fish and Wildlife Refuge within the Connecticut River Watershed for the purpose of conserving, protecting and enhancing the Connecticut River Valley populations of plants, fish, and wildlife; preserving natural diversity and water quality; fulfilling international treaty obligations relating to fish and wildlife; and providing opportunities for scientific research and education.

L2-6. Connecticut has established a Migratory Bird Conservation Stamp Program, the proceeds of which can be used for acquisition and management. The newly created state income tax form check off for endangered species, natural areas preserves, and watchable wildlife creates a fund that can be used for the identification, protection, conservation, management, and education activities related to the above listed wildlife and habitats.

L2-7. Create a Long Island Sound Reserve System consisting of areas of land and water of outstanding or exemplary scientific, educational, or biological value to reflect regional differentiation and variety of ecosystems and to include representatives of all of the significant natural habitats found in the Sound. Where appropriate, sites will be selected from existing lands and wetlands held for conservation purposes so that acquisition funds will be directed towards those lands in private ownership that are needed to complete the reserve system.

The primary activities in the recommendation include site identification (2 years) and site protection through the development of management plans, acquisition where necessary, and site management.

L2-8. Connecticut and New York should continue to acquire or protect through less than fee simple means, significant coastal habitats through funding sources such as the Land and Water Conservation Fund, the National Coastal Wetland Conservation Program, the North American Waterfowl Management Plan, Connecticut's Recreation and Natural Heritage Trust Program, Connecticut's Migratory Bird Conservation Stamp Program, New York's Environmental Protection Fund, and, where appropriate, natural resource damages recovered under CERCLA or OPA90.

L2-9. Acquire and protect those sites that are considered for acquisition in the New York State Open Space Conservation Plan. Sites include Oyster Bay Harbor ($5 million); Porpoise Channel ($2 million); Plum Point ($1 million); Udall's Cove ($8 million). Other sites on Long Island Sound that are among the state's highest priority acquisition sites include: Bronx River Trailway, Udall's Ravine, Alley Creek ($750,000); Long Creek and Mattituck Creek ($340,000); Premium River ($750,000); and Cedar Beach Creek ($186,000).

L2-10. Acquire and protect those sites that are considered priorities for acquisition in Connecticut. The Great Meadows site is the highest priority. (See also Ongoing Programs portion of this table in the CCMP.)

L2-11. Encourage activities of existing Long Island Sound-specific land trusts and encourage formation of new trusts, to seek donations and easements of localized habitat areas for the plants and animals of Long Island Sound.

L3-1. Connecticut, New York and The Nature Conservancy will continue the Natural Diversity Database in Connecticut and the Natural Heritage Program in New York. These programs collect, maintain, and update information pertaining to significant terrestrial and aquatic habitats.

L3-2. The USFWS will continue the Southern New England-New York Bight Coastal and Estuary Project. The project focuses on assessing and monitoring the regional geographic distribution and population status of a large number of key species called *Species of Special Emphasis* and their habitats including evaluating the threats to physical integrity of these habitats and the viability of species populations. Primary objectives are to determine and delineate those regionally important habitats and species populations requiring both immediate and long term protection, conservation, enhancement, and restoration.

L3-3. The NYSDEC will, on a pilot basis, develop a site-specific habitat management strategy for the Oyster Bay/Cold Spring Harbor complex. Phase II will entail implementation of the identified strategy.

L3-4. Connecticut is identifying wetland complexes of statewide significance and general wetland protection strategies for areas located in Long Island Sound and the Connecticut River. This project has been funded by the EPA under §104(b) of the Clean Water Act.

L3-5. Develop a nomination document to recommend the designation of the Connecticut River estuary as a *Wetland of International Importance* for the purpose of establishing a formal designation of this area to recognize the ecological significance of this ecosystem and to foster increased protection of its significant habitat complex and living resources.

L3-6. Develop a strategic plan for the estuarine portion of the Connecticut River that will identify habitat and species issues/problems, monitoring, and research needs and recommendations to foster increased protection of this nationally significant ecosystem.

L3-7. Develop and periodically update a list of significant habitats, habitat complexes, and sensitive areas for protection and management. When completed, habitat management plans will be developed for these areas. In New York this should be undertaken in cooperation with the implementation of the NYSDOS Long Island Sound Regional Coastal Management Plan.

L3-8. Expand the Southern New England-New York Bight Coastal and Estuary Project to: 1) include the watersheds of Long Island Sound; and 2) reexamine the habitat complexes previously identified in Long Island Sound based upon the most current listing of Species of Special Emphasis. Examine the complexes more carefully to fine tune the management recommendations and implement these recommendations through state, county and municipal agencies.

L3-9. Federal habitat programs should develop a watershed approach to protection of living resources of Long Island Sound and their habitats, such as development of a Connecticut River/Long Island Sound Management Unit by the USFWS.

L3-10. Designate portions of the Connecticut River estuary as a National Estuarine Research Reserve. A reserve designation will result in promoting research that is directed towards resource management issues and provide facilities and programs for public education and interpretation.

L4-1. Connecticut, New York, and federal agencies will continue to implement their Endangered Species Programs in order to protect endangered and threatened species that live in and adjacent to Long Island Sound.

L4-2. Develop a list of endangered and threatened invertebrates. Maintain and update the diversity database. Periodically revise the list of threatened and endangered species. Expand the monitoring program, identify essential habitats, and develop recovery plans.

L4-3. Develop legislation or regulations in New York state that will minimize disturbance to the essential habitats of rare plants and animals.

L4-4. Revise and publish a list of rare and sensitive species associated with the coastal lands and waters of Long Island Sound.

L5-1. Development and implementation of fishery management plans, including research, monitoring, and conservation law enforcement activities.

L5-2. Management of shellfish aquiculture activities including resource monitoring.

L5-3. Improvement of anadromous fish passage opportunities including associated research and monitoring activities.

L5-4. Wildlife management, including research and monitoring activities in support of management programs.

L5-5. Activities that minimize mortality due to entrainment and impingement of eggs, larvae, and juvenile and adult aquatic organisms at industrial facilities.

L5-6. Define, revise, and coordinate the establishment of seasonal restrictions for dredging that minimize adverse effects on aquatic organisms, especially finfish and shellfish and their habitats.

L5-7. Enhance implementation of interstate fishery management plans for Long Island Sound fishery resources.

L5-8. Expand efforts to bypass obstructions to anadromous finfish migrations on Connecticut tributaries to Long Island Sound and the Connecticut River by constructing or installing fishways or fishlifts.

L5-9. Enhance municipal shellfish restoration programs.

L5-10. Enhance the Connecticut Oyster Restoration Program on public beds in state waters by stocking settling habitat (cultch) and conducting related activities (e.g., resource sampling).

L5-11. Develop a marine biotoxin assessment program for shellfish.

L5-12. Develop artificial reefs in appropriate areas of New York waters to increase fishing opportunities, consistent with the New York State Artificial Reef Development Plan. Plans have been developed to construct reefs in New York waters of Long Island Sound off Matinecock Point, Eatons Neck, Miller Place/ Mt. Sinai, and Mattituck Inlet.

L5-13. Develop methods to reduce the incidental take of nontarget species and undersized individuals in fishing activities.

L6-1. Develop measures to prohibit or prevent the induction or release to Long Island Sound and its watershed of known or potentially undesirable species.

L6-2. Implement a management program to reduce abundance of mute swans that are causing losses of certain aquatic habitat types such as submerged aquatic vegetation and certain types of emergent tidal wetland vegetation.

L7-1. Develop an outreach program to inform and educate the public about the plants and animals in Long Island Sound.

L7-2. Develop a citizens monitoring program specific to the plants and animals of Long Island Sound sufficient to aid managers in identifying problems and assessing the effects of management efforts.

L8-1. Connecticut will continue its statewide Geographic Information System (GIS) Program to digitize spatial information and data for resource management purposes.

L8-2. Connecticut has created a Long Island Sound Resources Center for the purpose of : 1) developing the full potential of estuarine related GIS applications; 2) computerizing pertinent literature and data for rapid access through standard word search and spatial basis; and 3) completion of the estuarine geology of Long Island Sound. Additionally, this Center is taking a leadership role in the development of side scan sonar mapping of Long Island Sound that is now being overlaid with benthic community information. This will become the foundation of future living species and habitat management programs.

L8-3. Identify spatial data for living resources and habitat on a Sound wide basis and digitize priority data sets for incorporating into a Sound wide Geographical Information System.

L8-4. Expand the data layers for living resources and their habitats on a Sound wide basis.

L8-5. Develop and maintain state databases and an integrated Long Island Sound database describing the living resources of Long Island Sound and their habitats.

L8-6. Expand the side scan sonar/benthic habitat mapping program in order to create baseline information for management and conservation purposes.

L8-7. Maintain and enhance the Long Island Sound literature, indexing and GIS capabilities of the Marine Sciences Research Center at SUNY, Stony Brook.

L9-1. Connecticut conducts a Sound wide open water fishery survey that has become an integral component of the LISS monitoring and Management programs. In addition, Connecticut conducts a nearshore finfish survey, and surveys of lobster, shad, anadromous herrings, Atlantic sturgeon, and shortnose sturgeon (the latter is listed by the federal government as an endangered species). Other marine surveys include a survey of oyster recruitment (Connecticut Department of Agriculture, Aquiculture Division) and recreational and commercial fishery statistics activities.

L9-2. Connecticut conducts nesting surveys of colonial water birds, Least Tern and Piping Plover, Osprey, waterfowl, a mid-winter eagle survey, and surveys of diamond-backed terrapin, threatened and endangered terrestrial species, and other species of special concern.

L9-3. New York conducts an American lobster mortality project funded by the LISS. In addition, New York conducts the NMFS's Recreational Fishery Statistics Survey, surveys of commercial fishery landings, seabird surveys, (e.g., ospreys, piping plovers, least terns), surveys of threatened and endangered species and species of special concern, and other surveys as needed.

L9-4. Connecticut should pursue the construction and staffing of a marine science technology center at Avery Point with a research focus on Long Island Sound.

L9-5. Enhance wildlife monitoring activities (e.g., seabirds, waterfowl, and marine turtles).

L9-6. Monitor the status and trends of eelgrass in the Sound and all species of submerged aquatic vegetation in the Connecticut River using remote sensing and ground surveys.

L9-7. New York should initiate a nearshore fishery independent survey of Long Island Sound.

L9-8. Continue the lobster mortality and disease monitoring project in Long Island Sound.

L10-1. Connecticut will continue the Long Island Sound Research fund. This fund is used to foster research that addresses priority management issues in Long Island Sound including living species and their habitats.

L10-2. Connecticut has funded the following living resources and habitat research: evaluation of the causes of declines of eelgrass; assessment of contaminant levels in the greater scaup; changes in the phytoplankton community resulting from nitrogen enrichment; effects of hypoxia on bottom feeding fish; vegetation changes in a restoring tidal wetland; and mapping of benthic communities.

L10-3. Identify priorities for management-oriented research about the living resources of Long Island Sound and their habitats.

PUBLIC INFORMATION & EDUCATION

E1-1. The LISS and state public involvement and education programs are: developing printed and other educational materials for specific audiences; exhibiting LIS materials at regional and local fairs and events; encouraging education and information on the Sound for urban populations; promoting the importance of the Sound's resources to children in the region; and, using public educational material of non-profit organizations.

E1-2. Support research conferences such as: the CTDEP conference to highlight its LIS Research Grant Program; the LIS Watershed Alliance *Citizens' Summit* annual conference on the Sound; and the bi-state LIS research conference sponsored by local universities, Sea Grant programs, and the states.

E1-3. *Coastweeks*, an annual three week celebration of marine and coastal environments is supported by both states.

E1-4. Enhance the LISS and state public involvement and education programs to provide additional funding to build upon the current outreach and education activities with a new focus on interpretation and implementation of the management plan.

E2-1. Incorporate LIS information into all related programs conducted by state staff wherever possible.

E2-2. Provide information to all municipalities on the LISS and the importance of protecting and restoring the Sound. Special attention will be given to coastal municipalities in the form of briefings by state officials to explain exactly how implementation of the plan will affect that particular city or town and how to work cooperatively together to implement the management plan. Briefings will also be held for specific user groups, local officials, and elected representatives.

E2-3. Assess opportunities for training and educating the environmental decision-making community and provide technical information and assistance on implementation of the plan to the regulated community.

E2-4. Utilize the Bi-state Marine Resources Committee to ensure Long Island Sound related legislation moves on a parallel track in both Connecticut and New York and to help educate local governments and the public about the importance of the Sound and the successful implementation of the LISS recommendations.

E2-5. Pursue reestablishment of funding for the Long Island Sound Resource Center at Avery Point and further development of a similar resource center in New York to serve as clearinghouses and depositories for information about the Sound and investigate ways to improve funding for these centers.

E3-1. Encourage public participation in activities relating to the cleanup and protection of the Sound and provide support for activities including storm drain stenciling, beach grass planting, and beach cleanups.

E3-2. The LISS Citizens Advisory Committee will continue to provide guidance to the Management and Policy Committee and serve as a link between the public and LISS management agencies. The CAC has been instrumental in providing guidance to the Study and serving as a conduit between the Management Conference and the public.

E3-3. Enhance funding for hands-on activities such as storm drain stenciling, beach grass planting and beach cleanups to allow the public to actively participate in the cleanup and restoration of the Sound and learn more about its ecosystem.

E3-4. Promote citizen involvement in educational and monitoring activities in and around the Sound and consider:
-Providing technical assistance to citizen monitoring groups;
-Developing a reward system for citizens participating in Long Island Sound protection and restoration programs;
-Developing environmental habitat kits and guide maps;
-Production and distribution of videos of Long Island Sound research cruises.

E4-1. Increase efforts to coordinate ongoing governmental and non-governmental public outreach efforts as the plan becomes implemented and encourage private and nonprofit groups to continue to develop and implement Long Island Sound educational and outreach programs.

E4-2. Establish a public outreach work group to guide the implementation of the public involvement and education commitments and recommendations. The work group will work closely with and serve to complement the ongoing public outreach and education efforts of the Citizens Advisory Committee. The group will also be charged with determining funding resources for implementation of public involvement and education recommendations, consulting with staff on tactics, working to provide coordination of public outreach efforts from both an internal and external basis, and assessing program effectiveness.

E5-1. Support ongoing actions that assist teachers in their efforts to integrate LIS issues into existing curricula.

E5-2. Continue Connecticut's Long Island Sound High School Research Grant Program, initiated in 1990. This program provides funding for students to conduct research on the Sound and its watershed.

E5-3. Encourage natural history museums and nature centers to promote Long Island Sound issues within their programs.

E5-4. Work with school districts and, where appropriate, the Department of Education, in Connecticut and New York to develop Long Island Sound educational materials and outreach programs for primary and secondary schools. Help teachers integrate Long Island Sound information into their curricula and provide materials wherever possible. This should include hiring a Long Island Sound education coordinator.

E5-5. Enhance ongoing actions to assist teachers in their efforts to integrate Long Island Sound issues into their existing curricula including the development and support of teacher workshops.

E5-6. Consider a Long Island Sound High School Research Grant Program to provide resources to allow a variety of high schools to conduct research on the Sound and its watershed.

Glossary of Acronyms

A	
ACOE	Army Corps of Engineers
B	
B	Billion
BAT	Best Available Technology
BMP(s)	Best Management Practice(s)
BNR	Biological Nutrient Reduction (Removal)
BOD	Biological Oxygen Demand
C	
CAC	Citizens Advisory Committee
CCMP	Comprehensive Conservation and Management Plan
CD	Compact Disc
CD-ROM	Compact Disc - Read-Only Memory
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act (Superfund)
CES	Cooperative Extension Service
CSO(s)	Combined Sewer Overflow(s)
CT	Connecticut
CTDEP	Connecticut Department of Environmental Protection
CTDOA	Connecticut Department of Agriculture
CTDOA/BA	Connecticut Department of Agriculture Bureau of Aquaculture
CTDOHS	Connecticut Department of Health Services
CTDOT	Connecticut Department of Transportation
CVA	Clean Vessel Act
CWA	Clean Water Act
CZM	Coastal Zone Management
CZMA	Coastal Zone Management Act
D	
DO	Dissolved Oxygen (expressed in milligrams per liter [mg/l])
E	
EIS	Environmental Impact Statement
EMPACT	Environmental Monitoring for Public Access and Community Tracking (EPA)
EPF	Environmental Protection Fund (New York State)
F	
FY	Fiscal Year
FFY	Federal Fiscal Year
G	
GIS	Geographic Information System
H	
HEP	Harbor Estuary Program (New York/New Jersey)
Hg	Mercury
I	
ICM	Integrated Crop Management
IEC	Interstate Environmental Commission

I Cont'd

IPM	Integrated Pest Management
ISTEA	Intermodal Surface Transportation Efficiency Act

K

K	thousand
k	kilogram
km	Kilometer
Km^2	Square kilometer

L

l	liter
LA	Load Allocation
lbs	pounds
LIS	Long Island Sound
LISO	Long Island Sound Office (EPA)
LISS	Long Island Sound Study
LISWA	Long Island Sound Watershed Alliance

M

M	Million
MC	Management Committee
MEG	Model Evaluation Group
mg	milligrams
mgd	million gallons per day
mg/l	milligrams per liter
MPRSA	Marine Protection, Research and Sanctuaries Act
MSD(s)	Marine Sanitation Device(s)
MSRC	Marine Science Research Center (SUNY)

N

N	Nitrogen
NDD	National Diversity Database
NDZ	No Discharge Zone
NEIWPCC	New England Interstate Water Pollution Control Commission
NEMO	Nonpoint Education for Municipal Officials
NJDEP	New Jersey Department of Environmental Protection
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration
NO_x	Nitrous Oxide
NPDES	National Pollutant Discharge Elimination System
NPS	Nonpoint Source(s)
NRCS	Natural Resource Conservation Service
NRWI	Norwalk River Watershed Initiative
NY	New York
NYC	New York City
NYCDEP	New York City Department of Environmental Protection
NYDOT	New York Department of Transportation
NY/NJHEP	New York/New Jersey Harbor Estuary Program
NYS	New York State
NYSDEC	New York State Department of Environmental Conservation
NYSDOH	New York State Department of Health
NYSDOS	New York State Department of State
NYSOPRHP	New York State Office of Parks, Recreation and Historic Preservation

O

ODA	Ocean Dumping Act
O&M	Operations and Maintenance
OLISP	Office of Long Island Sound Programs (State of Connecticut)

P

P.A.	Public Act
PCB(s)	Polychlorinated Biphenyl(s)
PIE	Public Information and Education
PS	Point Source

R

RFP(s)	Request for Proposal(s)
RNHT	Recreation and Natural Heritage Trust (State of Connecticut)

S

SAV	Submerged Aquatic Vegetation
SEP	State Environmental Protection (fund, CT)
SFY	State Fiscal Year
SIP	State Implementation Plan
sq. mi.	Square Miles
SUNY	State University of New York
SPDES	State Pollution Discharge Elimination System
SRF	State Revolving Fund
STORET	STORage and RETrieval System (EPA Data System)
STP(s)	Sewage Treatment Plant(s)
SWEM	System-Wide Eutrophication Model

T

TAC	Technical Advisory Committee
TMDL	Total Maximum Daily Load

U

UCONN	University of Connecticut
USACOE	Unites States Army Corps of Engineers
USCG	United States Coast Guard
USDA	United States Department of Agriculture
USDOI	United States Department of the Interior
USEPA	United States Environmental Protection Agency
USFWS	United States Fish and Wildlife Service
USGS	United States Geological Survey

W

WAC(s)	Watershed Advisory Committee(s)
WLA(s)	Waste Load Allocation(s)
WMA	Wildlife Management Area
WWW	World Wide Web

To obtain copies of this report, contact:

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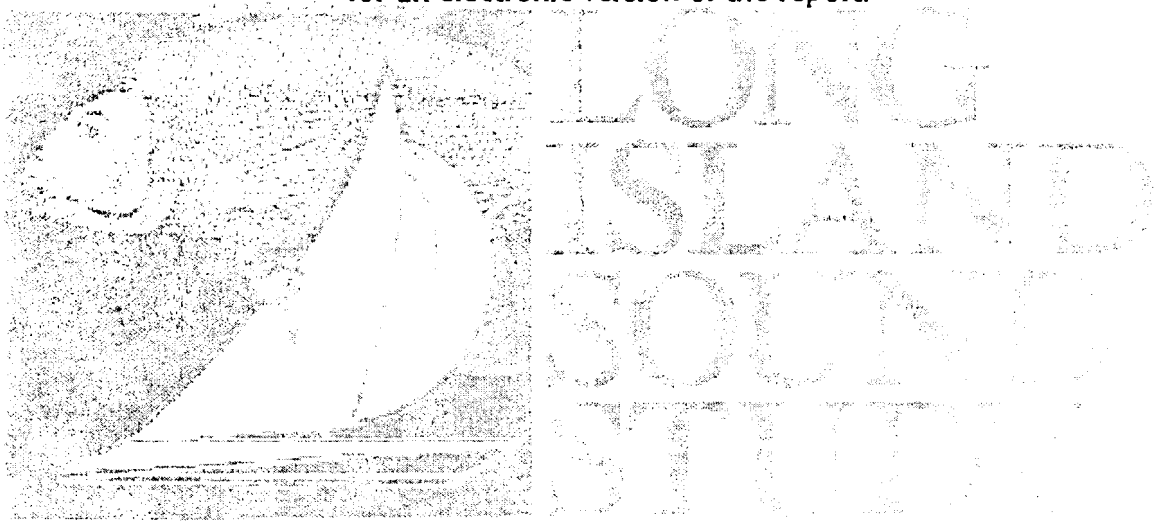
or go to the LISS website at:

http://www.epa.gov/region01/eco/lis

for an electronic version of the report.



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The Policy Committee provides oversight and direction to the Management Conference in implementing the Long Island Sound Study Comprehensive Conservation and Management Plan

LONG ISLAND SOUND STUDY

Partnership to Restore and Protect the Sound

Long Island Sound Study Policy Committee

Charge to the Management Conference

September 27, 2000

Charge to Develop a Long Island Sound 2001 Agreement

Background

The Long Island Sound Study (LISS) has made considerable progress in implementing the 1994 Comprehensive Conservation and Management Plan (CCMP) for Long Island Sound through its continued, cooperative regional approach. We affirmed our bi-state support for this effort in our *1996 Long Island Sound Agreement* signed by Governor Rowland and Governor Pataki. Using the CCMP as a blueprint for protection and restoration of the Sound, the LISS has continued to refine and add detail to commitments and priorities, most recently by our adoption in 1998 of specific targets and time frames for nitrogen reduction and habitat restoration. To continue this dynamic process, we propose that the LISS update its implementation agreement.

Vision

The LISS will update the *LIS 1996 Agreement* on implementing the CCMP to reaffirm executive-level support and further describe and prioritize targets and time frames for implementation. The *LIS 2001 Agreement* will better define desired outcomes of CCMP actions in measurable, trackable terms, better link monitoring/research and environmental indicators to environmental goals and results, maintain momentum for CCMP implementation, reaffirm implementation priorities, and address emerging issues.

Scope

The *LIS 2001 Agreement* will be a concise (5-10 page) document identifying quantifiable targets and time frames to implement the CCMP. It will affirm our targets for nitrogen reduction and habitat restoration that we developed pursuant to the 1994 CCMP and the 1996 Agreement. In developing the *2001 Agreement*, the LISS will consider developing additional targets and timetables for implementation of other CCMP actions, such as, but not limited to, a reserve system, watershed protection, living resources, research, and monitoring.

Process

The *LIS 2001 Agreement* will be developed using a consensus-based process coordinated through the LISS Management Conference and will be subject to public review and comment. Upon its completion it will be presented to the Policy Committee for concurrence and then forwarded to the Governors of Connecticut and New York and EPA Administrator for signature.

Time Frame

The *LIS 2001 Agreement* will be presented to Policy Committee for adoption by September 30, 2001.

Approved by the Long Island Sound Study Policy Committee, Stamford, Connecticut, September 27, 2000:

John P. Cahill, Commissioner
NYSDEC

Arthur J. Rocque, Jr., Commissioner
CTDEP

for Jeanne M. Fox, Regional Administrator
EPA Region 2

Mindy S. Lubber, Regional Administrator
EPA New England Region

LONG ISLAND SOUND STUDY

A Partnership to Restore and Protect the Sound

Long Island Sound 2001 Agreement

Our Vision - *To Restore the Ecological Health of Long Island Sound by 2014, the 400th Anniversary of Adrian Block's Exploration of Long Island Sound*

Whereas, in 1994 the states of Connecticut and New York and the U.S. Environmental Protection Agency, approved a *Comprehensive Conservation and Management Plan* (CCMP) for Long Island Sound, and

Whereas, support for implementing the CCMP was affirmed in the *1996 Long Island Sound Agreement* and much progress has been made in protecting and restoring Long Island Sound through a bi-state, cooperative Management Conference, and

Whereas, using the CCMP as a blueprint for protection and restoration, the Long Island Sound Study (LISS) has continued to refine and add specificity to commitments and priorities, and

Whereas, the LISS has continued this dynamic process by developing this *Long Island Sound 2001 Agreement* to reaffirm our commitment and further identify and prioritize targets and time frames for implementation, and

Whereas, our vision is a Long Island Sound restored to ecological health by 2014, the 400th Anniversary of Adrian Block's Exploration of Long Island Sound, and

Whereas, to make progress toward that vision, this *Long Island Sound 2001 Agreement* sets clear goals and targets, the achievement of which will be a challenge requiring the engagement of everyone -- federal, state, interstate, and local governments, businesses, schools and universities, and citizens -- around the Sound.

Therefore, by this Agreement, we recommit ourselves and challenge others to work to attain the goals of the CCMP and to make Long Island Sound's waters cleaner and healthier, its living resources more abundant and diverse, and its economic and recreational worth to the region even more valuable.

Wherefore now we hereby affix our signatures to the Agreement on this ___ day of _____ 2001.

George M. Pataki Governor State of New York	John G. Rowland Governor State of Connecticut	Christine Todd-Whitman Administrator Environmental Protection Agency

HYPOXIA - *Eliminate the adverse impacts of hypoxia resulting from human activities.*

1. By 2014, achieve a 58.5 percent reduction in the total enriched load of nitrogen to Long Island Sound from point and nonpoint sources within the New York and Connecticut portions of the watershed, as defined by the December 2000 document - *A Total Maximum Daily Load Analysis to Achieve Water Quality Standards for Dissolved Oxygen in Long Island Sound.*

2. By 2003, establish Phase IV nitrogen reduction agreements to address atmospheric deposition and watershed management for areas outside of the New York and Connecticut portion of the watershed.

PATHOGENS - *Increase the area for shellfish harvesting and eliminate bathing beach closures while maintaining protection of human health.*

1. By 2003, nominate vessel no-discharge areas for the Pawcatuck and Mystic Rivers in Connecticut and for all the embayments in New York. By 2005, nominate vessel no-discharge areas in three additional areas in Connecticut.

2. By 2010, decrease the acreage closed year-round to shellfishing by 10 percent compared to 2000 levels.

3. By 2010, minimize chronic bathing beach closures in Long Island Sound due to pathogen indicators, with a goal of eliminating all chronic closures (closed for at least three days per year for at least three of the last five years).

TOXIC SUBSTANCES - *Eliminate toxicity or bioaccumulation impacts on living resources by reducing contaminant inputs and cleaning up contaminated sites, and manage risk to humans from seafood consumption.*

1. By 2005, EPA, in conjunction with the Army Corps of Engineers, will complete the Environmental Impact Statement for the designation of dredged material disposal sites in Long Island Sound.

2. By 2003, update the Long Island Sound *Contaminants of Concern* list and by 2006 develop a strategy to address priority issues.

LIVING RESOURCES AND THEIR HABITATS - *Assure a healthy ecosystem with balanced and diverse populations of indigenous plants and animals, increase the abundance and distribution of harvestable species, and restore the ecological functions of degraded and lost habitats.*

1. By 2003, complete the mapping of eelgrass in the Long Island Sound area to determine trends. Continue to promote investigations and research into determining the impacts of nitrogen upon the degradation of aquatic habitats (i.e., loss of eelgrass, increases in macroalgae and benthic algae) in shallow embayments and bays in eastern Long Island Sound.

2. By 2005, document tidal wetland losses in the Sound and promote research that will determine whether accelerated sea level rise is responsible for the loss of habitat that is critical to the Sound's birds, finfish, and overall productivity.

3. By 2004, complete research and monitoring studies into the causes of lobster mortality and identify any management measures that could be implemented to prevent future mortality.

4. By 2003, develop a list of other high priority issues related to the management and conservation of living resources and habitats in the Sound's ecosystem.

5. By 2003, identify the invasive species of concern in Long Island Sound.

6. Restore at least 2000 acres of habitat and 100 river miles for fish passage during the ten-year period from 1998 to 2008 and monitor these sites to confirm restoration progress over time.

7. By 2004, identify sites of outstanding and exemplary scientific, educational, or biological value and identify a process for creating an ecological reserve for the purpose of assuring conservation of a strategic network of these sites.

OPEN SPACE AND PUBLIC ACCESS - *Assure continued public access to Long Island Sound for aesthetic, recreational, cultural, and historical purposes and continue to identify and acquire open spaces that are essential for the ecological health and balance of the Sound.*

1. Continue state land protection initiatives to acquire ecologically and recreationally significant properties along the coast and increase public access opportunities to shoreline locations.

2. By 2003, identify a coordinated strategy for developing a Long Island Sound Reserve System that:
   a. promotes conservation of open space, landscapes, and ecosystems;
   b. improves access to the Sound; and
   c. establishes a listing of existing open space properties and prioritizes property types for natural resource conservation and natural resource-based outdoor recreation.

3. Work together to attract federal, state, local, and private funding for open space projects.

WATERSHED MANAGEMENT - *Assure a viable Long Island Sound watershed that supports vibrant and healthy aquatic life, and minimizes the negative effects of erosion, sedimentation, and flooding on the Sound and its tributaries and embayments.*

1. By 2010, Connecticut and New York will work toward a goal of having 50 percent of their respective areas in the watershed developing or implementing watershed restoration strategies.

2. By 2003, Connecticut and New York will identify the amount of impervious surface in their respective portions of the watershed, based on available land use/land cover data. Through watershed planning efforts the states will encourage municipalities to adopt limitations on impervious surfaces, with an overall goal of minimizing increases in

impervious cover to a rate consistent with population change.

3. By 2004, Connecticut and New York will assess the amount of riparian forest buffer in their portions of the watershed using available land use/land cover data. Through watershed planning efforts, the states will encourage the establishment of targets to expand the percentage of riverine miles with forested buffers.

PUBLIC EDUCATION AND COMMUNITY INVOLVEMENT - *Promote an informed and educated constituency involved in community decisions affecting the ecological health of Long Island Sound and its living resources.*

1. Continue to report every two years on the health of Long Island Sound through ecological indicators, including measures of living resources, water quality, landscape changes, and community involvement.

2. Continue to support efforts to develop and establish Long Island Sound curricula for primary and secondary schools through granting programs such as the LISS Small Grants Program.

3. Through the use of initiatives such as Project WET, Project SEARCH, the Long Island Sound License Plate Program, and the LISS Small Grants Program, offer Long Island Sound field and learning experiences to as many school children as possible, with a goal of reaching 50 percent of the school children within the Connecticut and New York portions of the watershed by 2010.

4. By 2004, develop a public awareness campaign to help control the introduction, spread, and impact of invasive species.

PARTNERSHIPS - *Support the LISS Management Conference partnership in communicating and coordinating action to restore and protect the Sound among federal, state, interstate, and local governments, educational institutions, private non-profit organizations, the regulated community, and the public.*

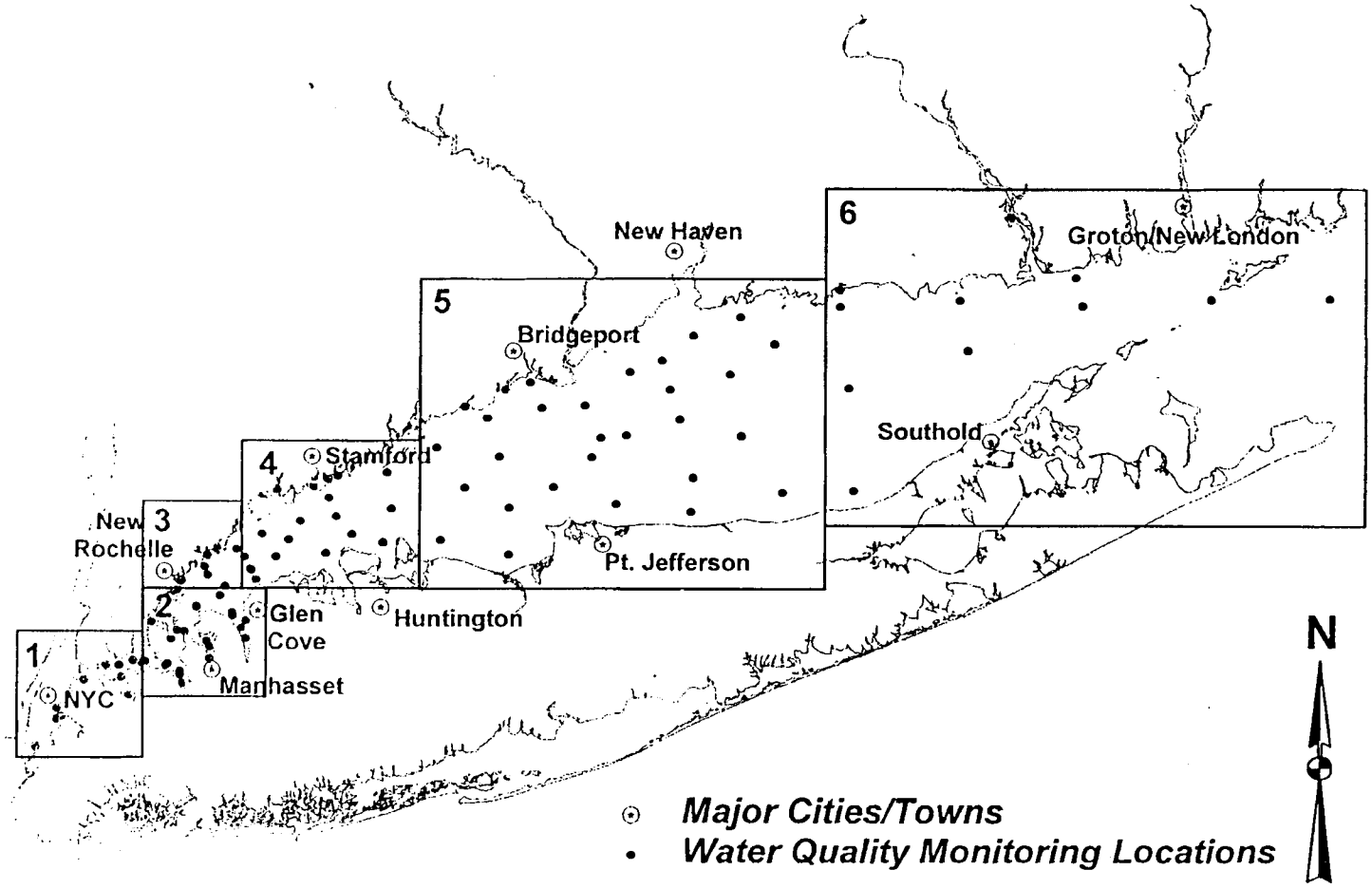
1. Continue federal and state support and continue to build partnerships at all levels to implement the CCMP for Long Island Sound and to effect the specific elements in this Agreement.

2. Continue support for the EPA Long Island Sound Office at a level necessary to coordinate and achieve the goals in this Agreement.

3. By 2005, reconvene to assess progress toward meeting the CCMP goals and the targets in this Agreement and consider any additional actions necessary.

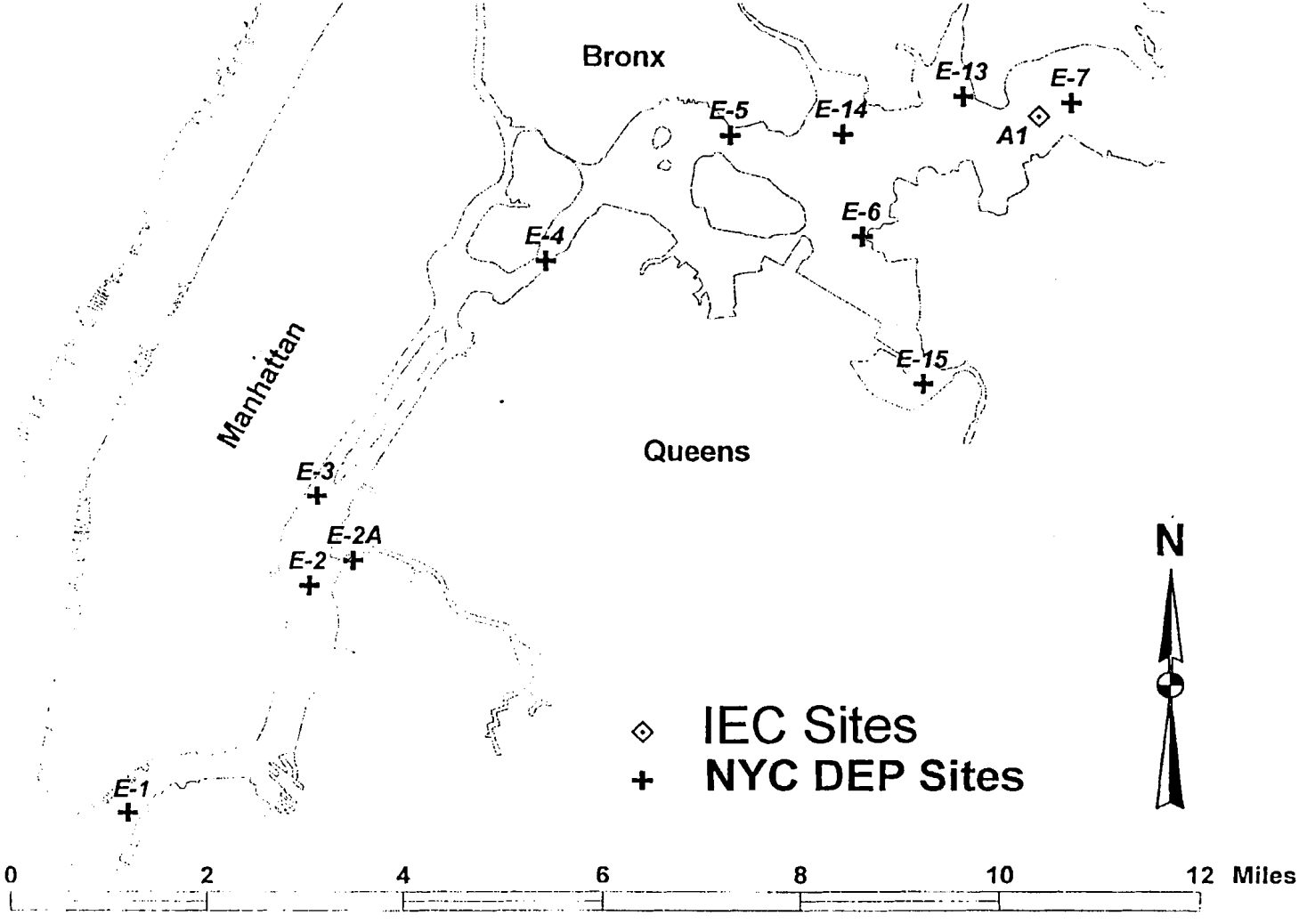
Long Island Sound Water Quality Monitoring Station Locator Map

See numbered region maps for specific station locations

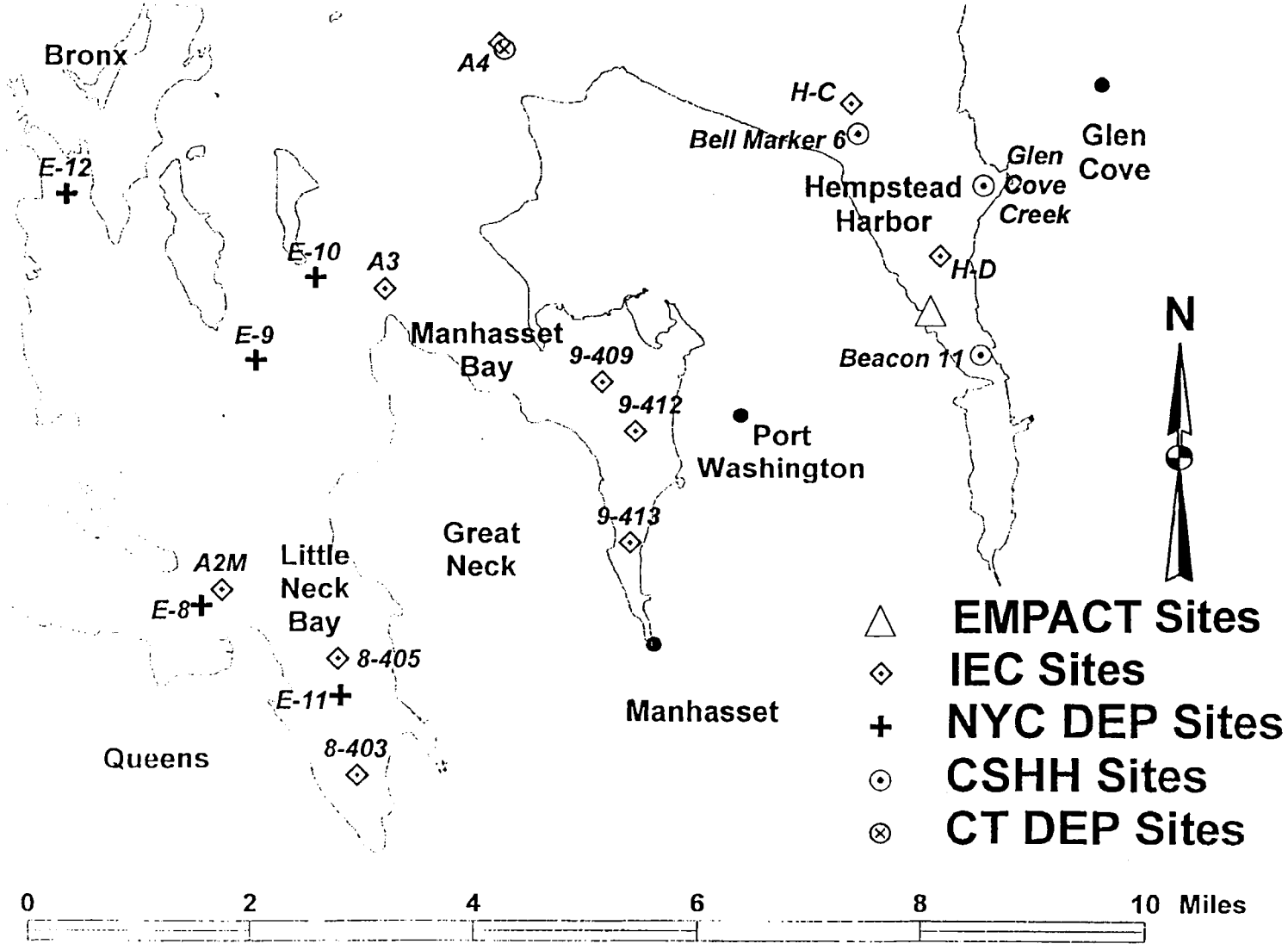


ATTACHMENT 13

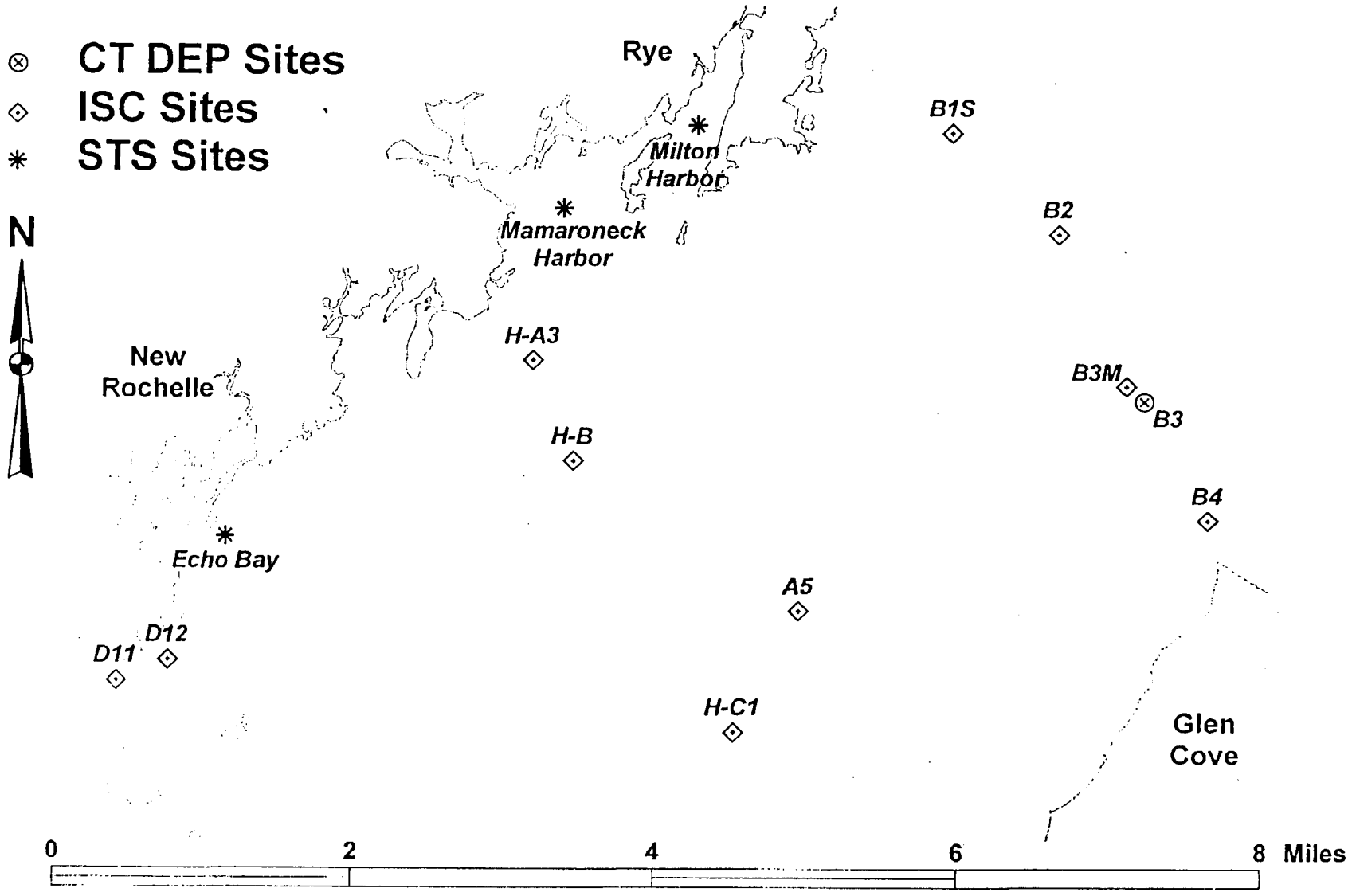
MAP 1: New York City Water Quality Monitoring Stations



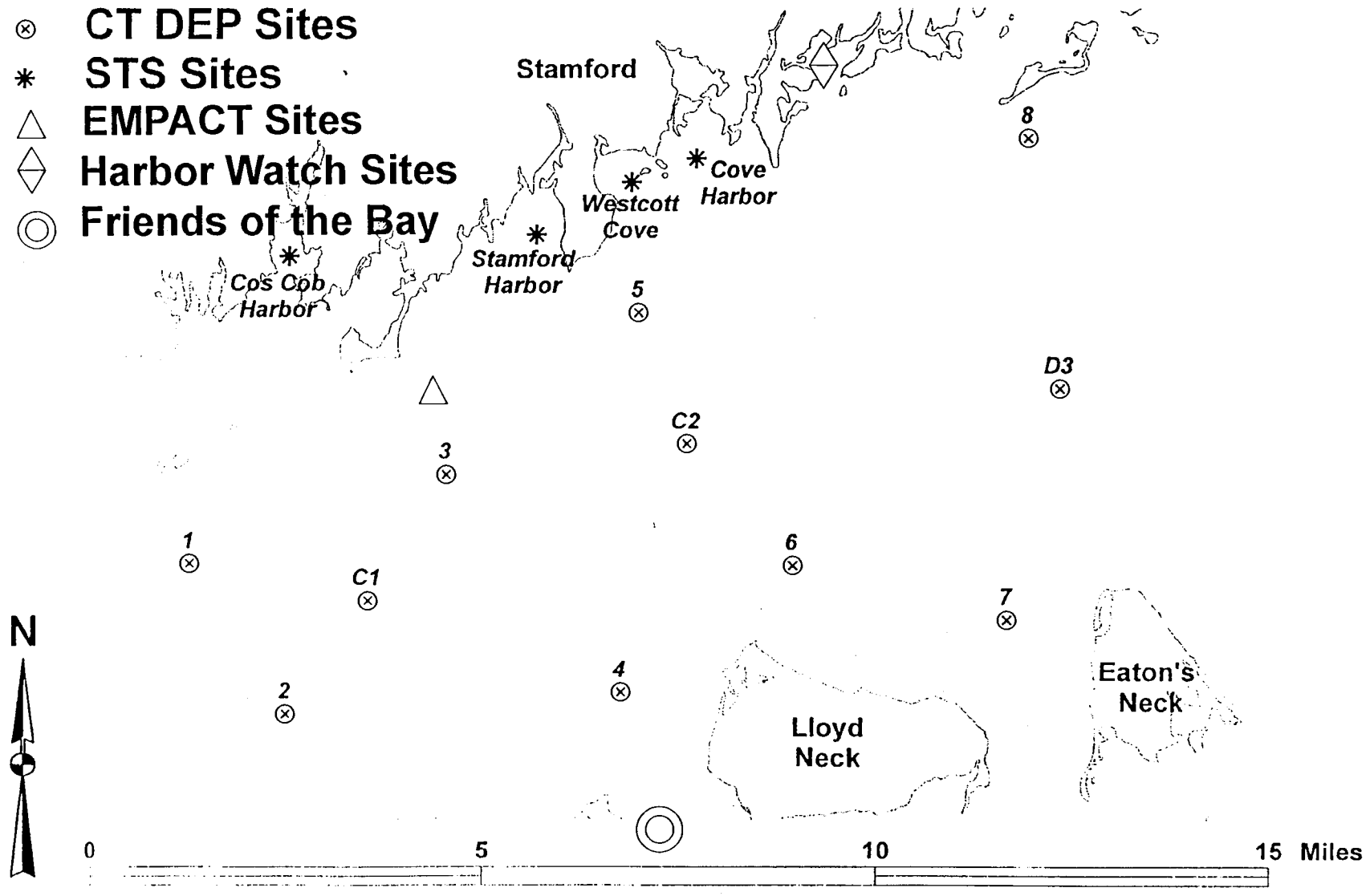
MAP 2: North Shore Bays Water Quality Monitoring Stations



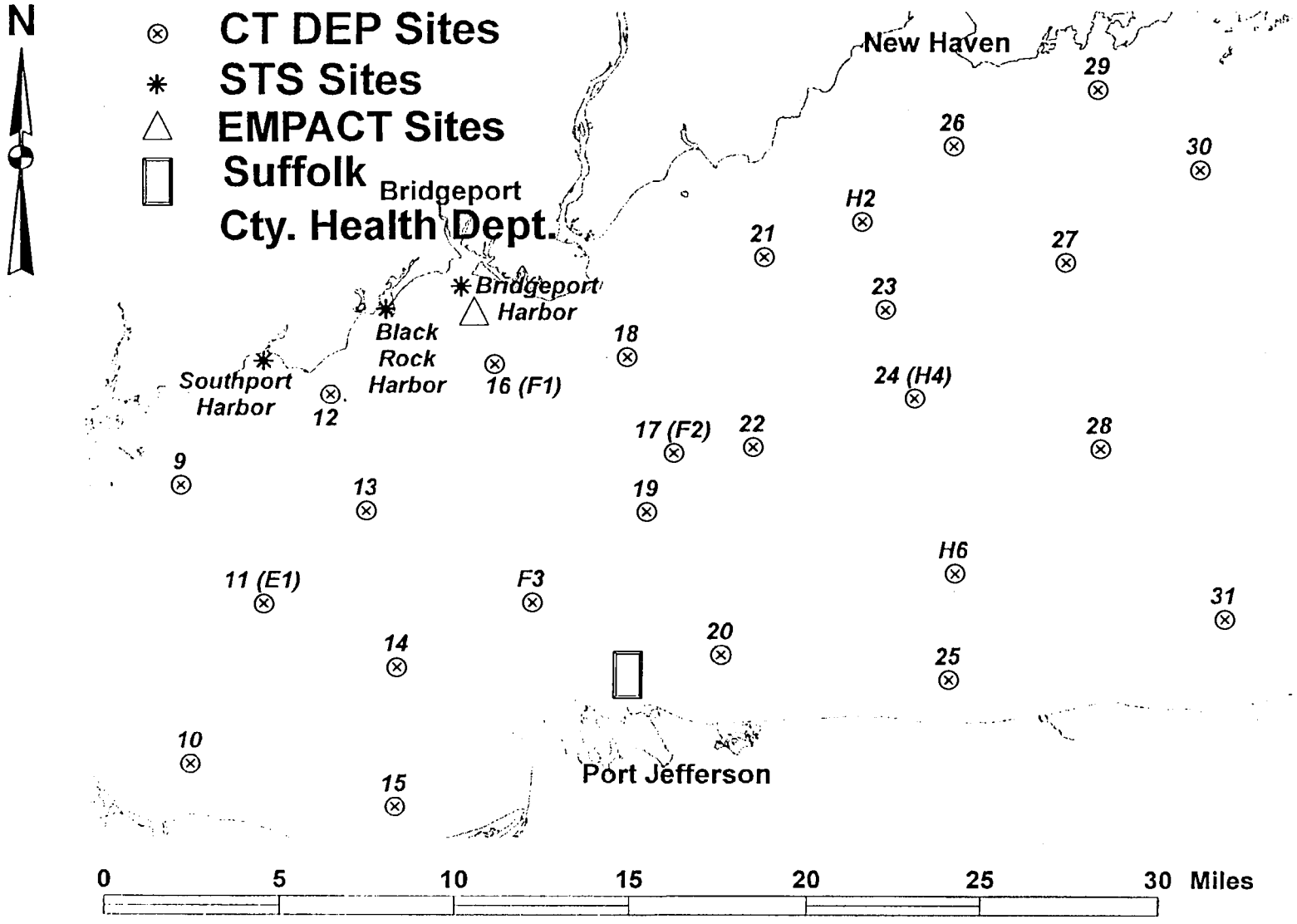
MAP 3: Western LIS Water Quality Monitoring Stations



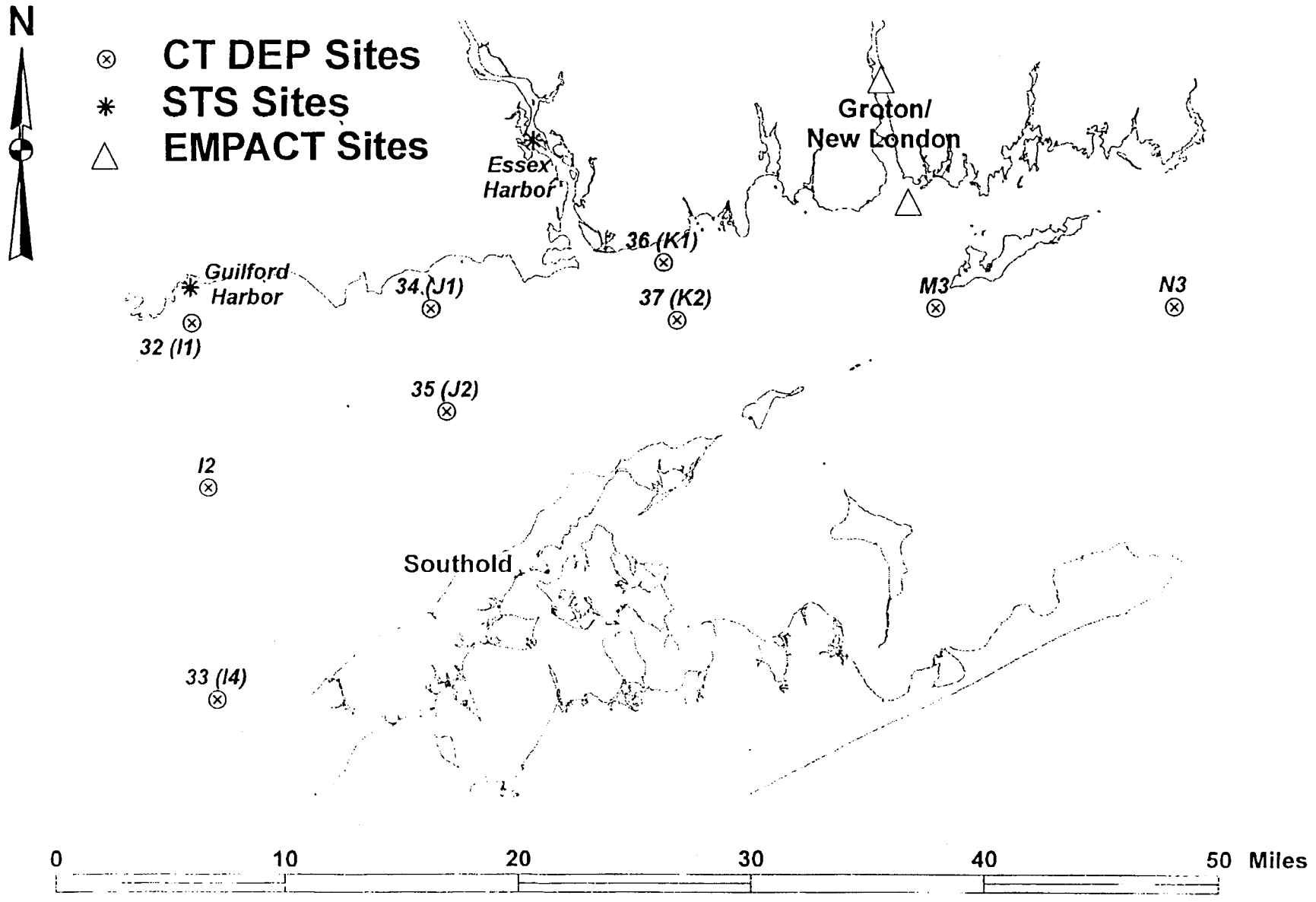
MAP 4: W. Central LIS Water Quality Monitoring Stations



MAP 5: Central LIS Water Quality Monitoring Stations

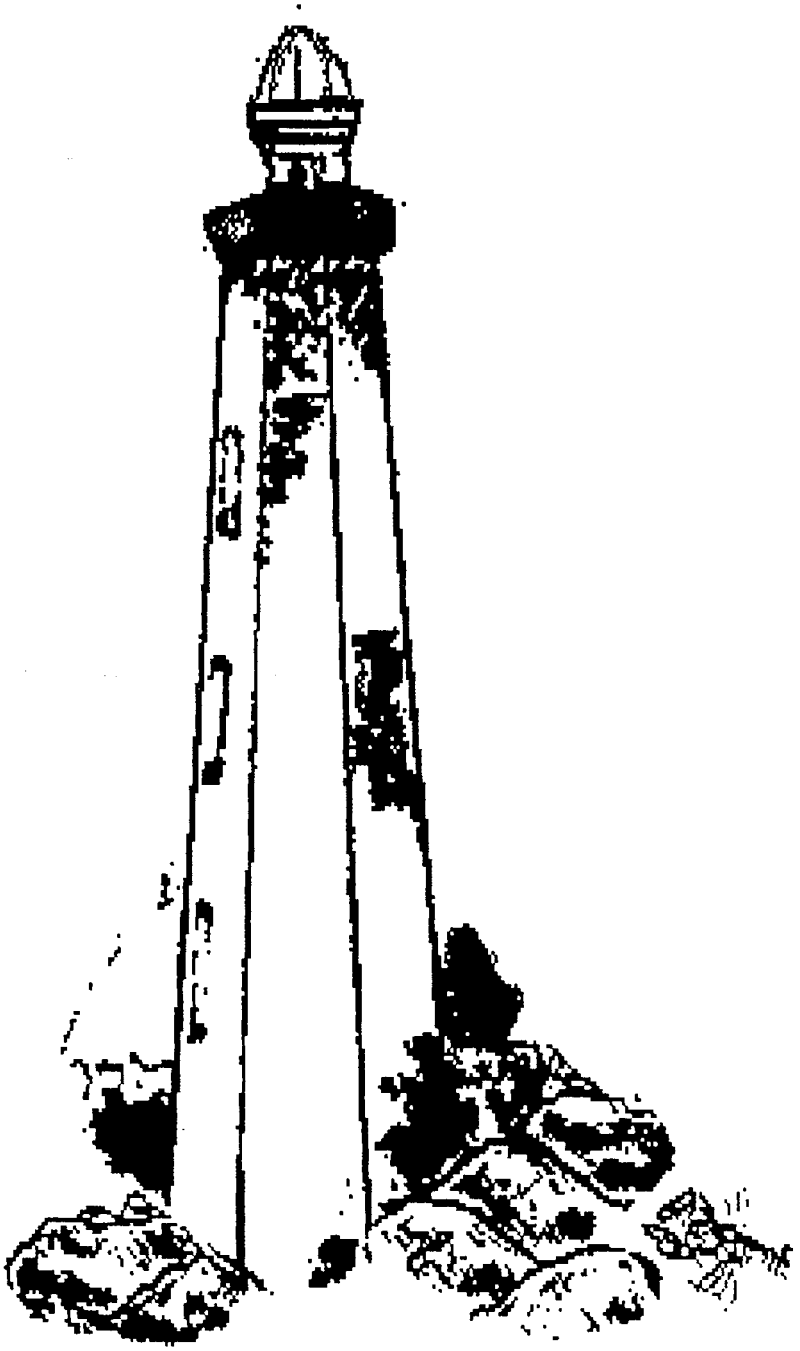


MAP 6: Eastern LIS Water Quality Monitoring Stations



State of The Sound '99

Water Quality Monitoring Work Group Annual Dissolved Oxygen Summary



In This Year's Report:

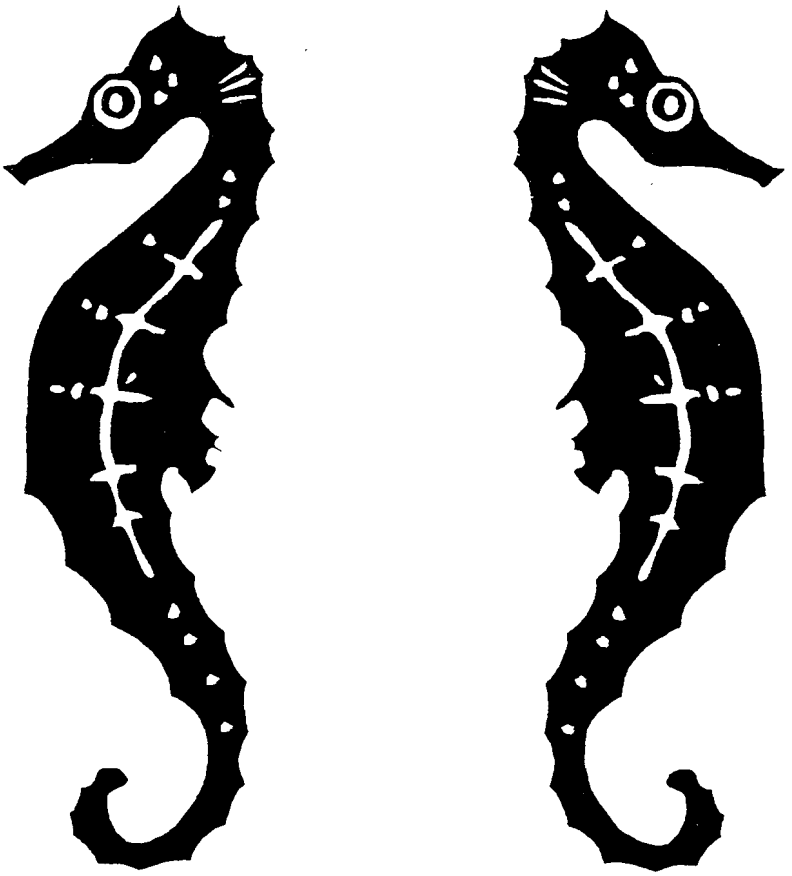
- *Water Quality Where You Live*
- *The Disappearance of the LOBSTERS!*
- *The Reappearance of HARBOR SEALS!*

Members of the Water Monitoring Work Group

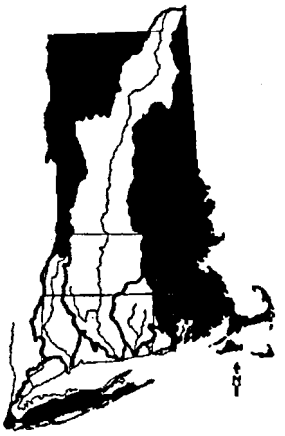
For more information regarding the *State of the Sound '99* report, water quality data in your area, and what you can do to become involved with one of these groups, please contact the group nearest you!

Organization	Address	Phone
Coalition to Save Hempstead Harbor	247 Sea Cliff Ave. PO Box 159 Sea Cliff, NY 11579	1.516.759.3832
Connecticut Department of Environmental Protection	Bureau of Water Management 79 Elm Street Hartford, CT 06106	1.860.424.3727
Friends of the Bay	PO Box 564 Oyster Bay, NY 11771	1.631.922.6666
Habor Watch/River Watch	.Westport Nature Center 10 Woodside Lane Westport, CT 06880	1.203.227.7253
Interstate Sanitation Commission	311 West 43rd Street Room 201 NY, NY 10035	1.212.582.0380
Nassau County Health Department	240 Old Country Road Mineola, NY 10036	1.212.571.2353
NY City Department of Environmental Protection	Marine Science Section Room 213 Wards Island NY, NY 10035	1.212.860.9388
NY State Department of Environmental Conservation	Bureau of Marine Habitat Protection 205 North Bell Meade Road East Setauket, NY 11733	1.631.444.0461
Project to Research Our Bay Environment	325 Beverly Road Douglaston, NY 11363	1.718.225.7050
Save the Sound, Inc.	185 Magee Avenue Stamford, CT 06902	1.888.SAVE.LIS 1.203.327.9786

Organization	Address	Phone
Sea Grant/Long Island Sound Study	Marine Sciences Research Center SUNY Stonybrook Stonybrook, NY 11794	1.631.632.9216
South Shore Estuary Watch	Massapequa High School 4925 Merrick Road Massapequa, NY 11758	1.516.797.6236
Suffolk County Health Department	County Center Riverhead, NY 11901	1.516.852.2077
United States Environmental Protection Agency; Long Island Sound Office	888 Washington Blvd Stamford, CT 06902	1.203.977.1541



INTRODUCTION



Long Island Sound and its watershed

It is estimated that nearly 10 percent of the United States population lives within 50 miles of Long Island Sound, making it one of the nation's most environmentally impacted estuaries. Because of Long Island Sound's economic and ecologic importance, it was one of the first estuaries to be identified by the National Estuary Program as a nationally significant estuary *(a semi-enclosed coastal body of water that has a free connection with the open sea and the freshwater from the land)* in need of protection and improvement. As a result, Long Island Sound became the focus of governmental, inter-state and federal, and university related studies. Through the Environmental Protection Agency's *(EPA)* Long Island Sound Study, hypoxia *(a condition in which dissolved oxygen is low or deficient)* was identified as the highest priority upon which New York, Connecticut, and the US EPA should focus their efforts and resources.

The waters of Long Island Sound are monitored by governmental agencies as well as volunteer water quality monitoring groups. In an effort to increase coordination between these monitoring groups, the Water Monitoring Work Group was established in 1996, and to this date has created a unified data sheet combining the parameters tested by its member organizations, a computerized map of Long Island Sound depicting the sampling sites of the member groups, and finally, an annual dissolved oxygen summary published to make dissolved oxygen data available to the public.

WHY DISSOLVED OXYGEN?

Dissolved oxygen levels are often used to gauge the overall health of the aquatic environment that is being tested. Oxygen, which is necessary for all marine organisms as well as terrestrial organisms, enters the water from the atmosphere through the churning action of the waves and the production of oxygen through the photosynthesis of marine plants such as seaweeds (macroalgae) and phytoplankton (microalgae). In a saltwater environment, nitrogen generally acts as a nutrient for plant growth. Unfortunately, there is an overabundance of nutrients entering Long Island Sound.

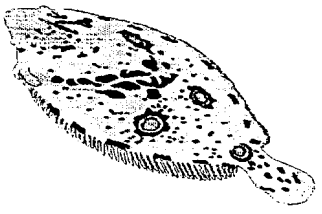
Nutrients enter the Sound many ways; sewage treatment plants, septic systems, stormwater and street run off, fertilizer run off from lawns and gardens, and contaminants brought down by precipitation. These nutrients act as a fertilizer causing marine plants, particularly algae, to undergo a rapid growth, also known as an algal bloom. When the plants die and sink to the bottom, they are decomposed by oxygen consuming bacteria. An increase in the amount of decomposition leads to a decrease in the amount of dissolved oxygen, which can become harmful, if not fatal, to the organisms within that particular region. Areas that experience dissolved oxygen levels that fall below 3.0mg/L are generally dubbed hypoxic.

DISSOLVED OXYGEN AFFECTS EVERYTHING!

Dissolved oxygen in Long Island Sound is important to marine life as gaseous oxygen in

the atmosphere is important to humans. As required by the federal Clean Water Act (Section 303), the states of Connecticut and New York have adopted dissolved oxygen water quality standards for coastal and marine surface waters. The states have set dissolved oxygen criteria for water resources depending upon the use of that specific water body. Connecticut and New York have set standards for dissolved oxygen levels set at 5.0mg/L of dissolved oxygen as a minimum requirement to protect marine fish, shellfish, and wildlife habitat as well as for harvesting shellfish for transfer to approved areas for purification prior to being sold for human consumption. Dissolved oxygen should not be less than 6.0mg/L (Connecticut standard) or 5.0mg/L (New York standard) at any time for the harvesting of shellfish for direct human consumption. The Interstate Sanitation Commission (ISC) has designated the waters of Long Island Sound to remain above 5.0mg/L at all times so that they are suitable for marine life and subsequently promote recreational and commercial activities.

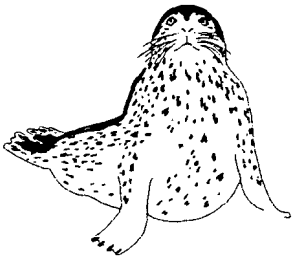
These state standards were developed not only to ensure continued protection of economic and recreational uses but also to ensure the diversity and health of organisms that live within Long Island Sound.



MARINE LIFE IN THE BALANCE

The creatures of Long Island Sound received much attention this year. The good news is that many species that had not been seen in large numbers in the past are returning to the Sound. Since the late 1980s, the number of harbor seals (*Phoca vitulina*) "wintering" in Long Island Sound has increased quite noticeably. In Long Island Sound, hundreds of seals group off the coast of Fishers Island, NY. As many as 50 individuals have been counted at one time on the Connecticut coast.

There have been several suggestions as to why the number of wintering seals has been increasing. One reason is that the health of the Sound has been improving and as a result, can sustain larger fish stocks, providing more food for the seals. Other reasons for the increased number of seals in Long Island Sound are conservation efforts, specifically the Marine Mammal Protection Act of 1972. Also, the decline of fish stocks in New England and Canada may be forcing the seals to travel farther south to areas where there is a greater chance for them to find food. Similarly, healthier conditions in Long Island Sound have contributed to increasing populations of blue crabs and lobsters with catches of these peaking in the summer of 1999. However, in September of 1998, lobster men fishing in Long Island Sound notified the New York State Department of Environmental Conservation, the Connecticut Department of Environmental Protection, and the University of Connecticut, of traps containing dead lobsters. In October of 1999, these researchers collaborated and began to research potential causes of the lobster and crab mortalities. Water quality data was examined for areas of hypoxia, water samples were tested for heavy metals, lobster tissue and hemolymph samples were tested for possible bacteria and viruses, and as a result, scientists have discovered a parasite (paramoeba) that may be indirectly responsible for this summer's lobster deaths.



CRITICAL DATA

Water monitoring groups collect years of data that can be used to identify ecological trends; areas of the Sound have experienced low dissolved oxygen seasonally and regions that are improving or declining. By pin pointing areas of concern, efforts become actions and areas can slowly be taken off the "list of concerns" and the improvements in water quality can be seen indirectly through, for example, the harbor seals that make their way to the Sound in greater numbers each year.

Data collected by groups within the Water Monitoring Work Group is used to assess the water quality of the Sound, and to provide important data to research teams such as those that are looking to find a cause for this year's lobster die-off.

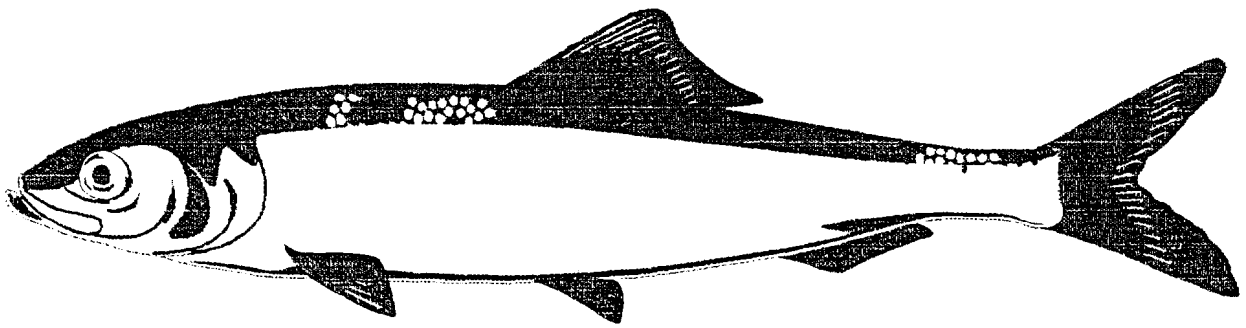
WATER QUALITY WHERE YOU LIVE

In addition to the important data that is provided to research teams, and state and local governments, data is made available to the public through this State of the Sound report.

HOW TO USE THE STATE OF THE SOUND WATER QUALITY STATION MAP:

Locate on the following maps the town in which you live, or the area you are most interested in researching.

Using the key below the map, find the organization that monitors the water quality nearest you and read that group's results in our results section following the map. To get more detailed information on water quality, please contact that group using the contact list at the front of the report.



RESULTS

COALITION TO SAVE HEMPSTEAD HARBOR

As part of its citizen's water monitoring program, the Coalition monitors DO levels, water temperature, salinity, pH, nitrites, nitrates, and ammonia, as well as records observations regarding weather and water conditions, wildlife, and human activities at eight sites within Hempstead Harbor. Testing is conducted weekly from May to November and includes collection of water samples that are tested for coliform by the Nassau Cont Department of Health. Also, the Coalition, in conjunction with the Town of Oyster Bay, maintains a stationary probe that was deployed in the middle of Hempstead Harbor in July of 1999. The stationary probe records DO, water temperature, salinity, and pH at hourly intervals, 24 hours a day.

Overall, the average water temperature recorded by the Coalition for June-October nearly matched the average recorded for 1998, but the water warmed up earlier with temperature readings for June 1999 averaging 1.5°C higher than those recorded for June 1998. And despite drought conditions in June and July 1999, heavy rains in late August and September brought the total rainfall for June through October to about an inch more than it was for those months in 1998. In general, 1999 average dissolved oxygen levels improved slightly over 1998 levels and were near 6 mg/L. DO levels were above the New York State standard of 5 mg/L about 64% of the time at Beacon 11 (middle of the Harbor), 73% of the time at the entrance of Glen Cove Creek, and 76% by the Glen Cove sewage treatment plant. But at the station located near the mouth of the harbor, DO levels were above 5 mg/L only 47% of the time. The stationary probe in the middle of the harbor suggested interesting correlations between tidal cycles and DO levels and water temperature, i.e., DO and water temperatures were highest at low tide and lowest at the high tide-next summer's data will show whether this effect is repeated.

Observations recorded throughout 1999 testing season indicated that large schools of bait fish- silversides, killifish, and bunker (Atlantic menhaden) were present throughout the harbor and provided a good food supply for larger fish as well as a diversity of water birds, including ospreys. In contrast to the summer of 1998, there were no significant fish kills during the summer of 1999 (only a few dead bunker-up to 6-were noted on about four occasions and some of the fatalities seemed to bu the result of predation).

The Coalition to Save Hempstead Harbor is a volunteer, nonprofit organization dedicated to identifying and elimination environmental threats to Hempstead Harbor and its surrounding communities and to advancing the public interest, education, and participation in the restoration and protection of the local environment.

CONNECTICUT DEPARTMENT OF ENVIRONMENTAL PROTECTION

The Connecticut Department of Environmental Protection conducts a Summer Hypoxia Survey which is part of the broader Long Island Sound Ambient Water Quality Monitoring Program and has provided a description of the extent and duration of low dissolved oxygen concentrations for the summer of 1999.

Bi-weekly cruises started in mid June and

ended by early September with an average of 43 different stations sampled on 6 cruises for a total of 260 samples. Dissolved oxygen (DO) levels in the long Island Sound followed seasonal patterns with a decrease in bottom water DO over time and an increase in the area impacted by hypoxia (DO less than 3 mg/L). The onset of hypoxia was estimated to occur on July 2, 1999 and lasted approximately 50 days until August 21, 1999. In all, 11 different stations were found to have had hypoxic conditions during the summer of 1999. Stations H2 and 18, located in the Central Basin offshore from Milford, CT were the only two stations outside the Narrows and Western basin to develop hypoxic conditions over the 1999 season. The Narrows and Western basin make up the section of Long Island Sound west of a line from Stratford, CT to Port Jefferson, NY. The maximum extent of the hypoxic condition occurred in early August and affected 10 stations, which accounted for an area of 312 km^2 (120mi^2), an area approximately five times the size of Manhattan. The maximum area below the state water quality standard (5.0 mg/L) was 1654 km^2 (640mi^2), and extended out to a line between Guilford, CT and Mattituck, NY. Both the duration and maximum hypoxic area were below the nine-year averages of 54 days and 472 km^2 (182mi^2) respectively.

There was an overall improvement in Dissolved Oxygen levels between the summers of 1998 and 1999. The maximum area affected went from 435 km^2 (168mi^2) in 1998 to 312km^2 (120mi^2) in 1999, the duration decreased from 73 days in 1998 to 50 days in 1999. In 1998, 36.7% of the stations had hypoxic events compared to only 22.4% of the stations in 1999.

Factors contributing to the below average hypoxic event include a mild winter, a dry summer and successive wind events at the end of the summer. The mild winter helped to increase the temperature of both the bottom and surface waters in Long Island Sound and subsequently decrease the strength of the thermocline that developed early in the season. The very dry summer decreased the inflow of nutrients that can fuel phytoplankton growth and lead to a decrease in dissolved oxygen. Two strong wind events, tropical storm Dennis and hurrican Floyd helped to break up the thermocline and allowed for the re-oxygentation of the bottom waters of Long Island Sound.

In response to concerns about increased lobster mortality in Long Island Sound, the Connecticut Department of Environmental Protections' Long Island Sound Water Quality Monitoring Program conducted a survey in late September 1999 in an attempt to determine a cause. Whole water samples from the western portion of Long Island Sound were collected and analyzed for metals, PCB's, VOC's, SOC's and arsenic. The analysis of these samples did not identify any conditions or toxins that could explain the die-off.

The Connecticut Department of Environmental Protection's water monitoring program was initiated to provide long-term monitoring that will assist in evaluating the success of management actions.

FRIENDS OF THE BAY

Friends of the Bay monitors dissolved oxygen in six sites throughout Oyster Bay and Cold Spring Harbor. Each of the sites is monitored on one day each week (once just after sunrise and once just before sunset). The sites tested are: Mill Neck Creek; West Harbor, Roosevelt Beach; Plum Point; and two sites in Cold

Spring Harbor.

The average bottom dissolved oxygen for the morning samples was 5.80 mg/L. Every site failed to meet the New York State Standard of 5 mg/L at least once during the morning sampling, while in the afternoon samples, Plum Point and Cold Spring Harbor North and South failed to meet the standard at least once. Mill Neck Creek had the highest dissolved oxygen averaging at 7.17 mg/L. Cold Spring Harbor South had the lowest dissolved oxygen reading averaging only 5.05mg/L with two samples as low as 1.76 mg/L.

Friends of the Bay also reports unusual conditions and collects floatable debris in addition to monitoring for dissolved oxygen of their sampling sites. This year, Friends of the Bay observed and reported to Department of Environmental Conservation a fish kill of approximately twenty adult menhaden *(Brevoortia tyrannus)* just east of the Bayville Bridge on the morning of July 30th.

Friends of the Bay's mission is to promote community awareness of the need to preserve water quality and marine life in the Bay, to assure the aesthetic, economic, and recreational value o f Oyster Bay and Cold Spring Harbor and to ensure that development in the watershed is compatible with the needs of a healthy ecosystem.

INTERSTATE SANITATION COMMISSION

This year marks the Interstate Sanitation Commission's ninth year of monitoring water quality in western Long Island Sound and the upper East River. Water sampling is conducted from June through mid-September collecting weekly surface,mid depth, and bottom water samples at twenty one stations.

Samples of surface waters in 1999 essentially showed no change in dissolved oxygen from the 1998 testing season. The 1999 surface water results for the categories of *Greater Than 5 mg/L, Between 3 and 5 mg/L, and Less Than 3 mg/L* are 73.3%, 26.7%, and 0.0% respectively. In the same category order, the results of the 1998 survey were 76.7%, 23.3% and 0.0% respectively. In addition the weather patterns for both years were similar: mild winters with very dry near drought-like spring seasons followed by very hot summers with late season torrential rainstorms.

Bottom waters of the Sound indicated a change in average dissolved oxygen levels this year from last year. The 1999 bottom water results for categories of *Greater Than 5mg/L, Between 3 and 5 mg/L* and *Less Than 3 mg/L* are 22.5%, 52.1%, and 25.4 % respectively. In the same category, bottom water results from 1998 were 29.2%, 53.3% and 17.5% respectively.

Many different natural and anthropogenic factors (water pollution, municipal water pollution control programs, weather, circulation pattern changes proliferation or lack of algal blooms, etc.) contribute to hypoxia and year to year variability. In general, for 1999, 22.5% of the values measured in the bottom waters throughout the study area (including turbulent East River and the open waters of the Sound and its embayments) met the ISC requirement of 5mg/L at all times for a "Class A" waterbody. A unique event this past summer was a fish kill observed in Manhasset Bay, one week after minimum and maximum surface water dissolved oxygen reached its lowest on August 9th, all observations were immediately reported to NYS DEC.

The Interstate Sanitation Commission is a tri-state agency (New York-New

Jersey-Connecticut) with programs in air pollution, resource recovery facilities, and toxics, but with continued emphasis on water quality monitoring, regulation and enforcement.

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION

Most monitoring of water quality in Long Island Sound is done by other agencies, although a limited amount of sampling is done by the NYSDEC Bureau of Marine Resources' Shellfish Management and Anadromous Fisheries Units. In the space of the Shellfish Management Unit, the intent of the monitoring is to determine the suitability of shellfish areas. The Anadromous Fisheries Unit monitors water quality as a parameter of their fisheries surveys.

PROBE (Project to Research to Restore Our Bay Environment)

With the help of citizens from the Little Neck Bay area, water quality in the Little Neck Bay is monitored for surface and bottom water temperatures, salinity and dissolved oxygen. Dissolved oxygen levels for the Douglas Manor Dock remained high until July 15th when surface waters fell to 5.1 mg/L. Surface and bottom DO levels remained above 5.1mg/L and rose to 12.1mg/L on September 27th. The seasonal mean for the Douglas Manor Dock was 9.1mg/l at the surface waters and 7.1 mg/L in bottom waters. Dissolved oxygen levels at the Bayside Marina, along the CIE, mimicked those of the Douglas Manor Dock. Alley Creek dissolved oxygen levels were lower than the other two sites and fell to 2.4mg/L on July 21st.

Seasonal means for all three sites are as follow: Douglas Manor Dock 9.1 mg/L (surface) and 7.1mg/L (bottom); Bayside Marina 9.2 mg/L (surface) and 6.7 mg/L (bottom); and Alley Creek 7.6mg/L (surface) and 6.1 mg/L (bottom). Although all three stations experienced a few periods of low dissolved oxygen, the overall dissolved oxygen levels for these three stations were good.

PROBE's mission is to monitor, protect, and improve the environmental quality of the overall Little Neck Bay ecosystem.

SAVE THE SOUND, INC.

One hundred and thirty nine volunteers from Save The Sound donated over two thousand hours of their time to this year's water quality monitoring program. Twelve harbors and coves within Long Island Sound were monitored this year ranging from Essex Harbor, in Essex Connecticut to Echo Bay in New Rochelle New York. Through their annual Water Quality Report, Save The Sound publishes data on dissolved oxygen, pH, temperature, and salinity as well as information on fish kills and areas of concern within each harbor.

In general, water quality improved between 1998 and 1999, mainly due to differences in the weather. Twenty eight percent of the stations experienced hypoxia in 1999 compared to thirty six percent in 1998. The percentage of stations in New York and Connecticut that were above the state water quality standards for dissolve oxygen increased by six percent in 1999 to 19%. However, violations of the states water quality standards increased in 1999 from 51% to 53%. In 1999, an anoxic event (dissolved oxygen was recorded below .5mg/L) occurred in Southport Harbor, Connecticut.

Areas of concern, stations with extended

periods of hypoxia or DO levels below the state standard, were identified in each harbor with the exceptions of Westcott Cove, Cove Harbor, and Essex Harbor. In general, those stations closest to tributaries of the harbors had the poorest water quality, possibly indicating that runoff pollution is a large factor in the degradation of water quality.

One fish kill was reported in Stamford Harbor by Save The Sound's volunteers, possibly the results of predation by bluefish, no hypoxic event was recorded at the time of the sighting.

Save the Sound, Inc. is a non-profit membership organization dedicated to the restoration, protection and appreciation of Long Island Sound and its watershed through education, research, and advocacy.

CONCLUSIONS

The water quality monitoring in Long Island Sound for 1999, indicates that conditions in Long Island Sound appear to be stable. The dissolved oxygen measurements obtained show that DO levels were slightly higher at most locations in 1999 than in 1998. The difference is most likely attributed to lower precipitation levels during the summer of 1999, and two storm events in the fall which caused vertical mixing in the water column, redistributing oxygen from the surface to the bottom layers of the Sound. Although lobster mortality in the Sound during 1999 caused considerable concerns and received much attention in the press, there was no direct linkage between DO levels and lobsters.

Overall, the Water Quality Monitoring Work Group views the 1999 results with guarded optimism. Water quality in most areas of the Sound appears to be stable or slightly improved over the past decade. It appears that degradation of the Sound's water quality has been arrested due to improvements in sewage treatment systems and programs to prevent non-point source pollution. The return of species such as the harbor seal to the Sound is encouraging. However, development in the coastal areas surrounding Long Island Sound continues and periodic fish and lobster kills remind us that the Sound is a complex ecosystem subject to stress imposed by both natural phenomenon as well as human sources of pollution. Continued vigilance in the form of ongoing water quality and biological monitoring must continue to ensure that any new stresses are detected and analyzed so that measures can be taken to mitigate or reverse any further decline of the Sound's environmental health.

A CALL TO ACTION!
WHAT CAN *YOU* DO?

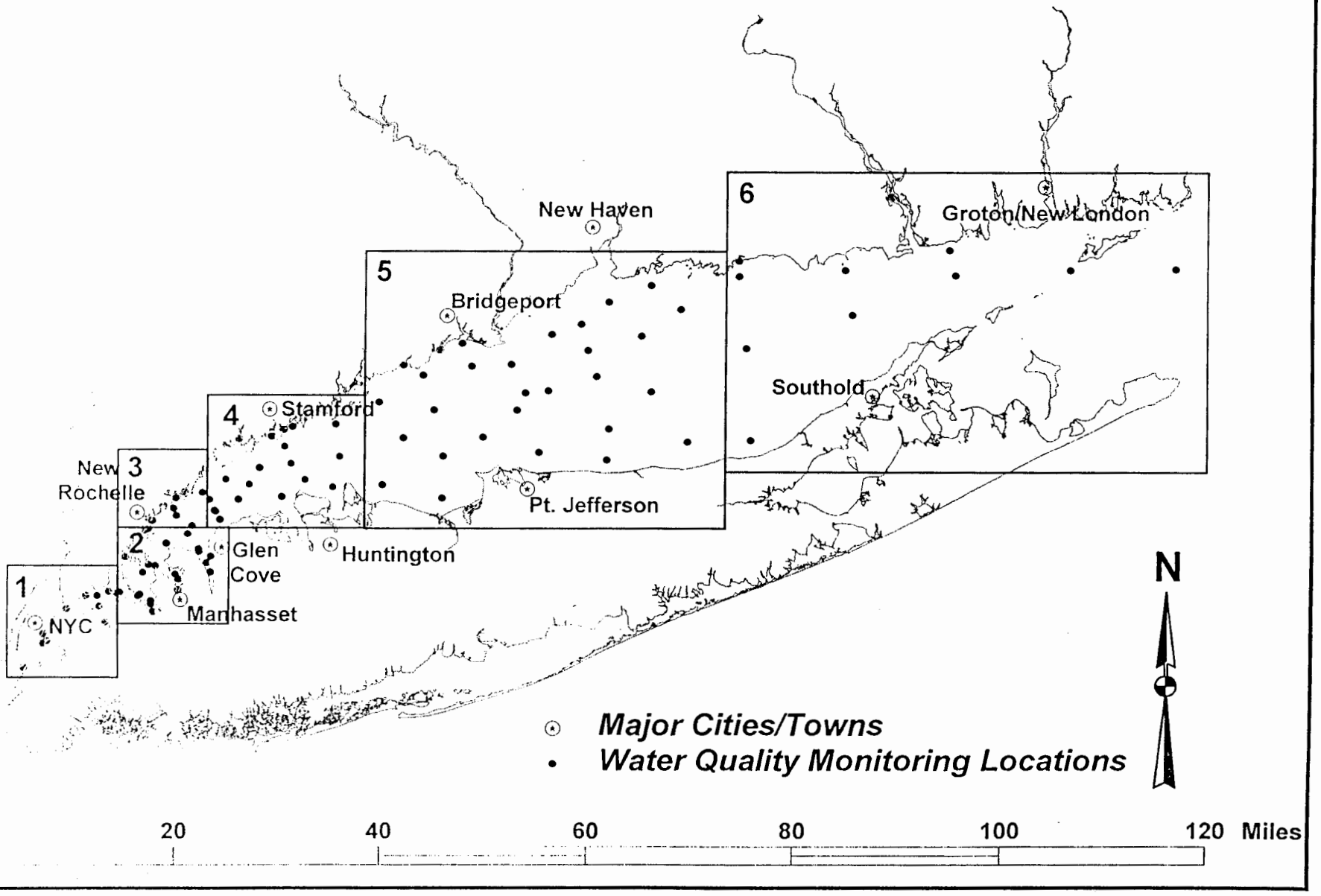
The groups that are part of the Water Monitoring Work Group were established with the common goal of monitoring and improving the waters of Long Island Sound. Many began with a few concerned citizens, others were created through governmental agencies as part of a nation wide fight against the degradation of our water bodies. Still others were created as a result of a cut in local and state monitoring budgets. These monitoring groups are responsible for the monitoring of many areas that would otherwise be ignored.

Without continued financial support many of these groups would be unable to continue monitoring efforts. Without the support of volunteers, there would not be enough time or people to continue testing the waters. If you would like to contribute to these groups your

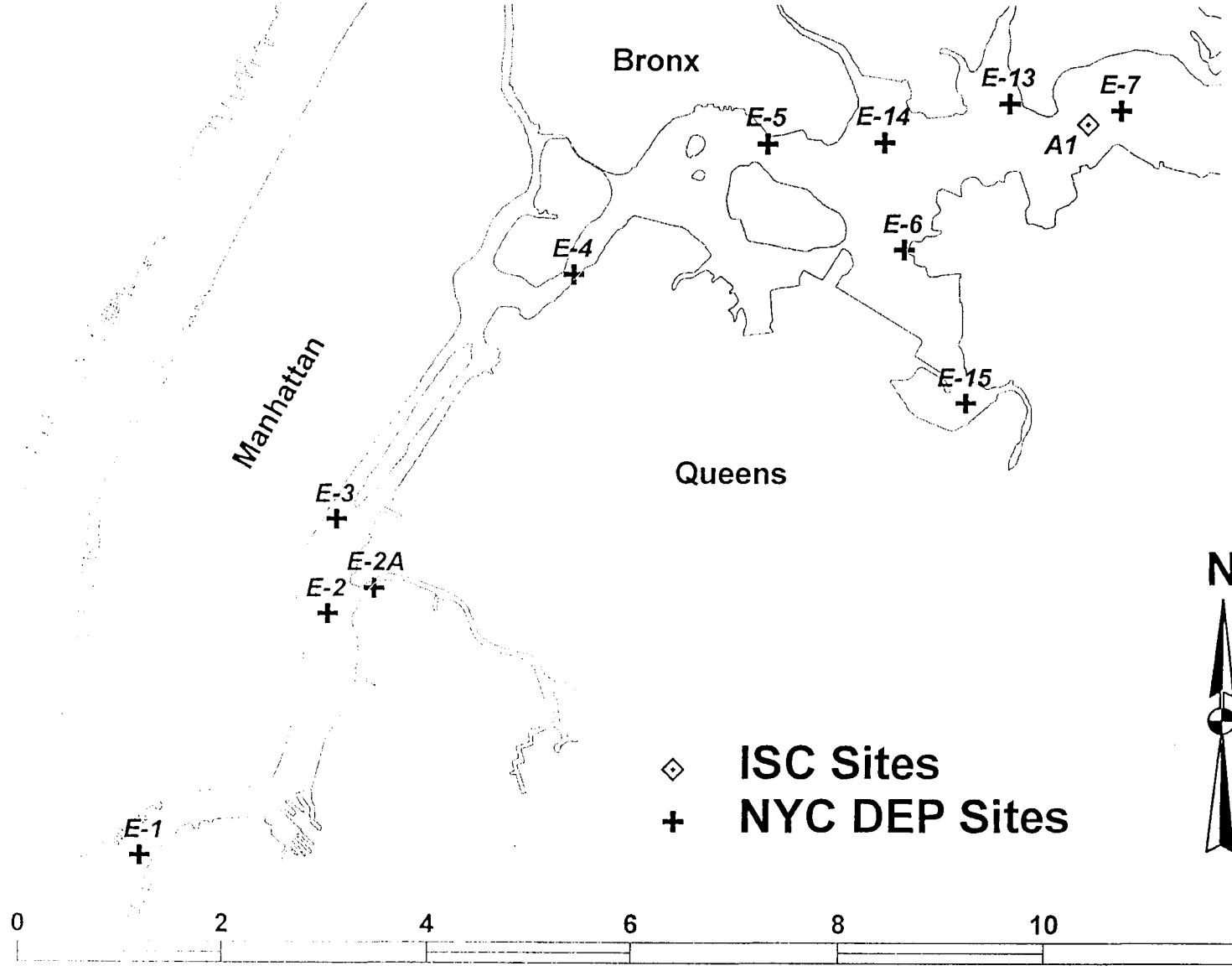
time, donations, or just words of encouragement, please contact the group nearest you!

Long Island Sound Water Quality Monitoring Station Locator Map

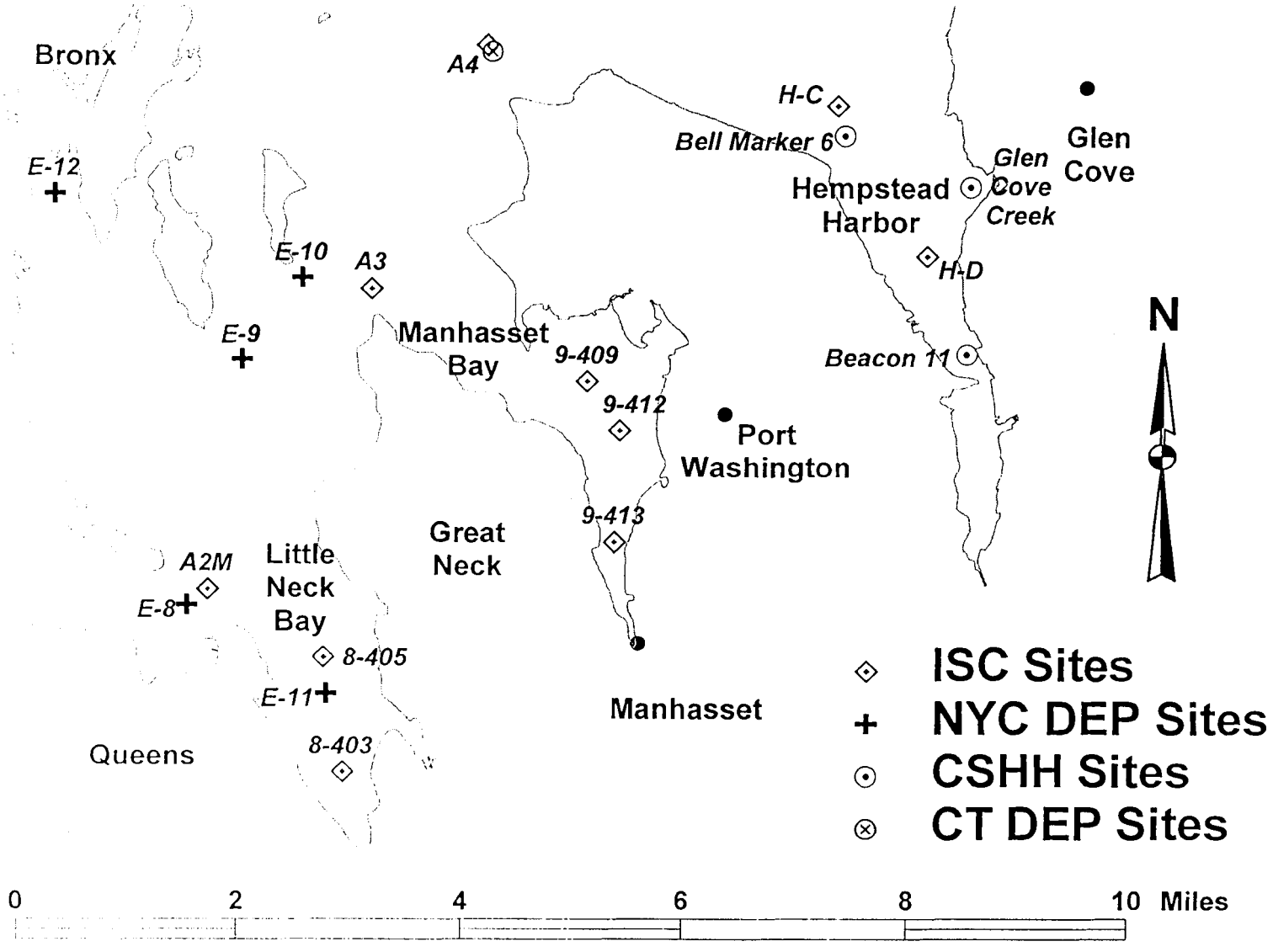
See numbered region maps for specific station locations



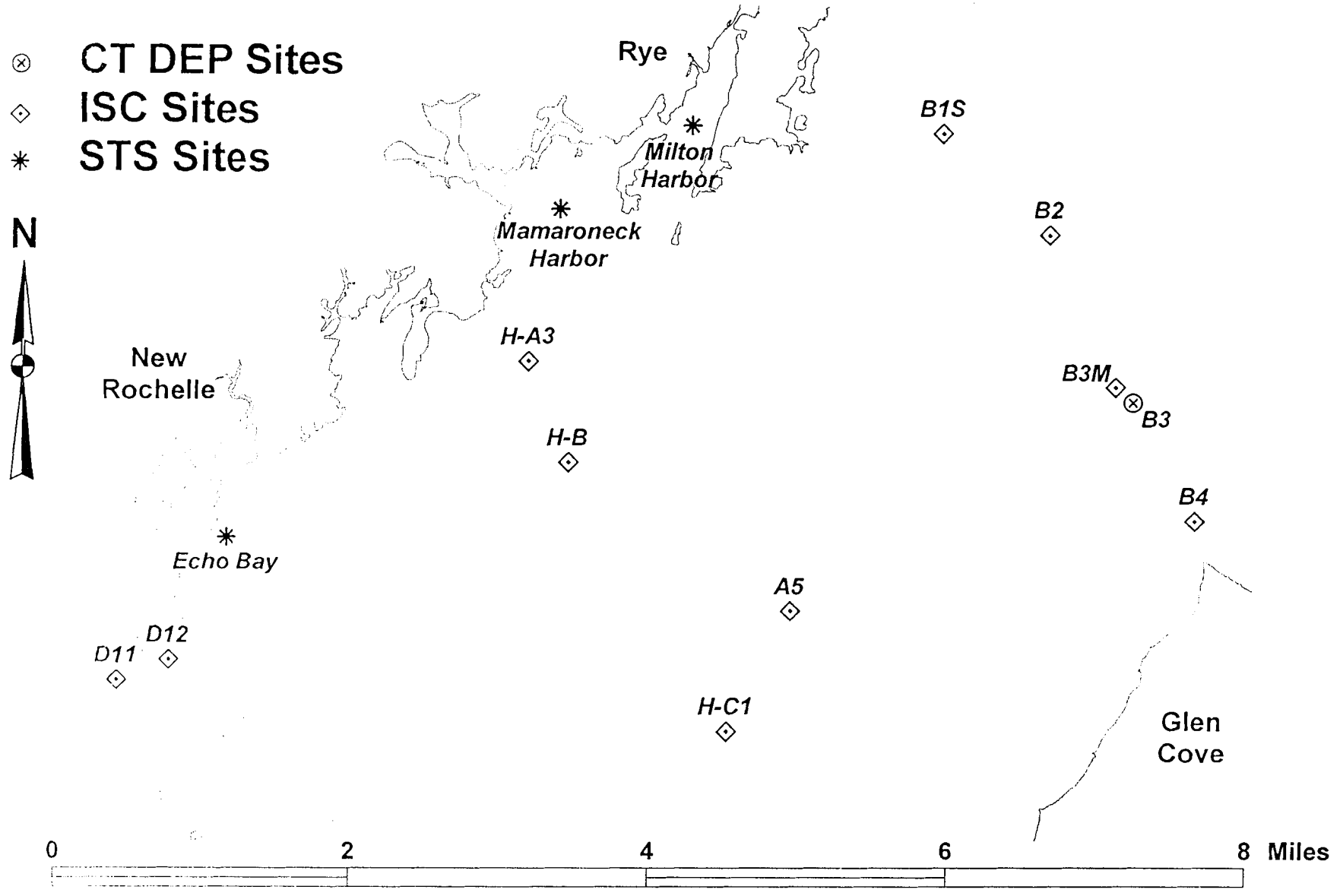
MAP 1: New York City Water Quality Monitoring Stations



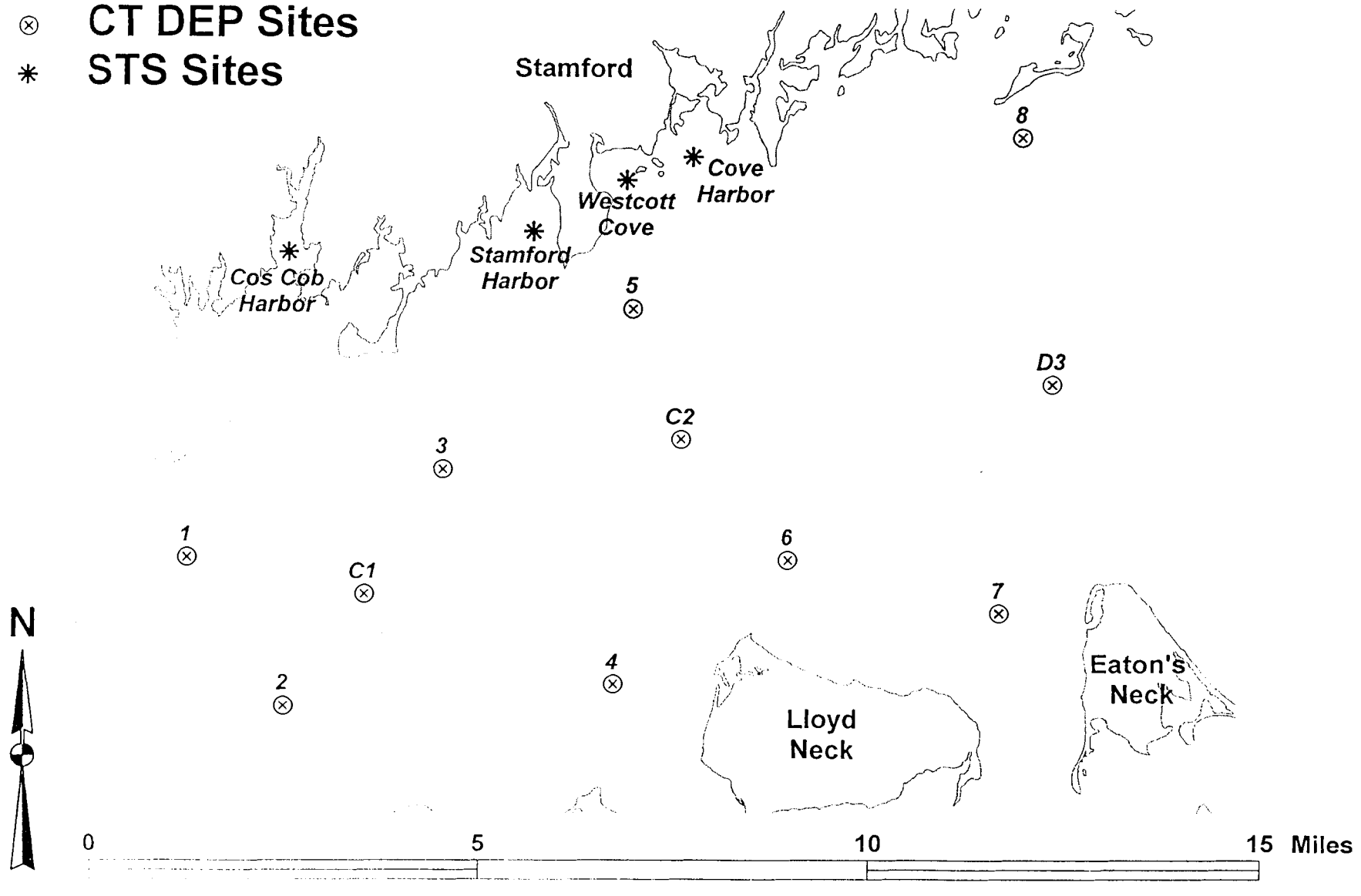
MAP 2: North Shore Bays Water Quality Monitoring Stations



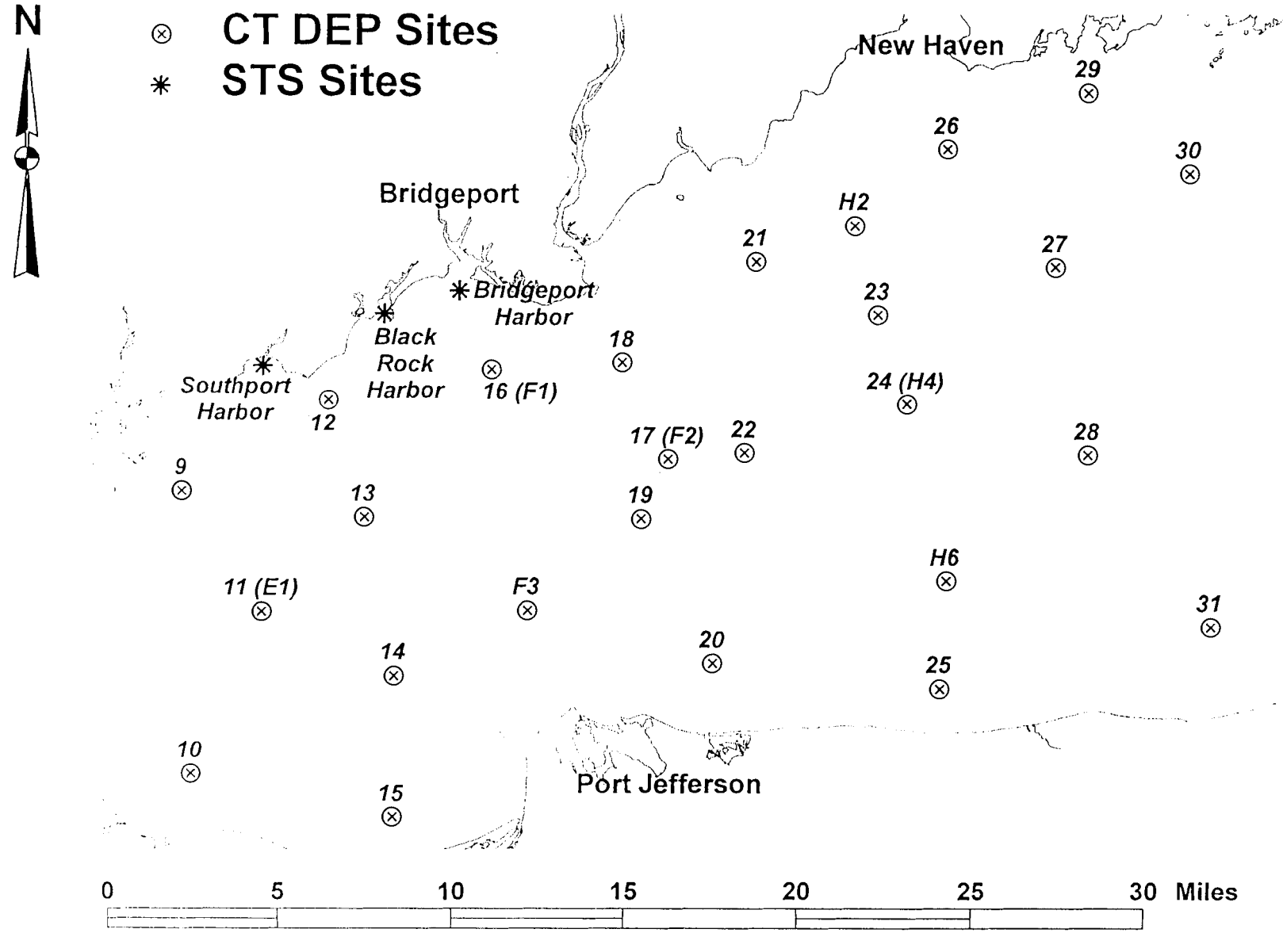
MAP 3: Western LIS Water Quality Monitoring Stations



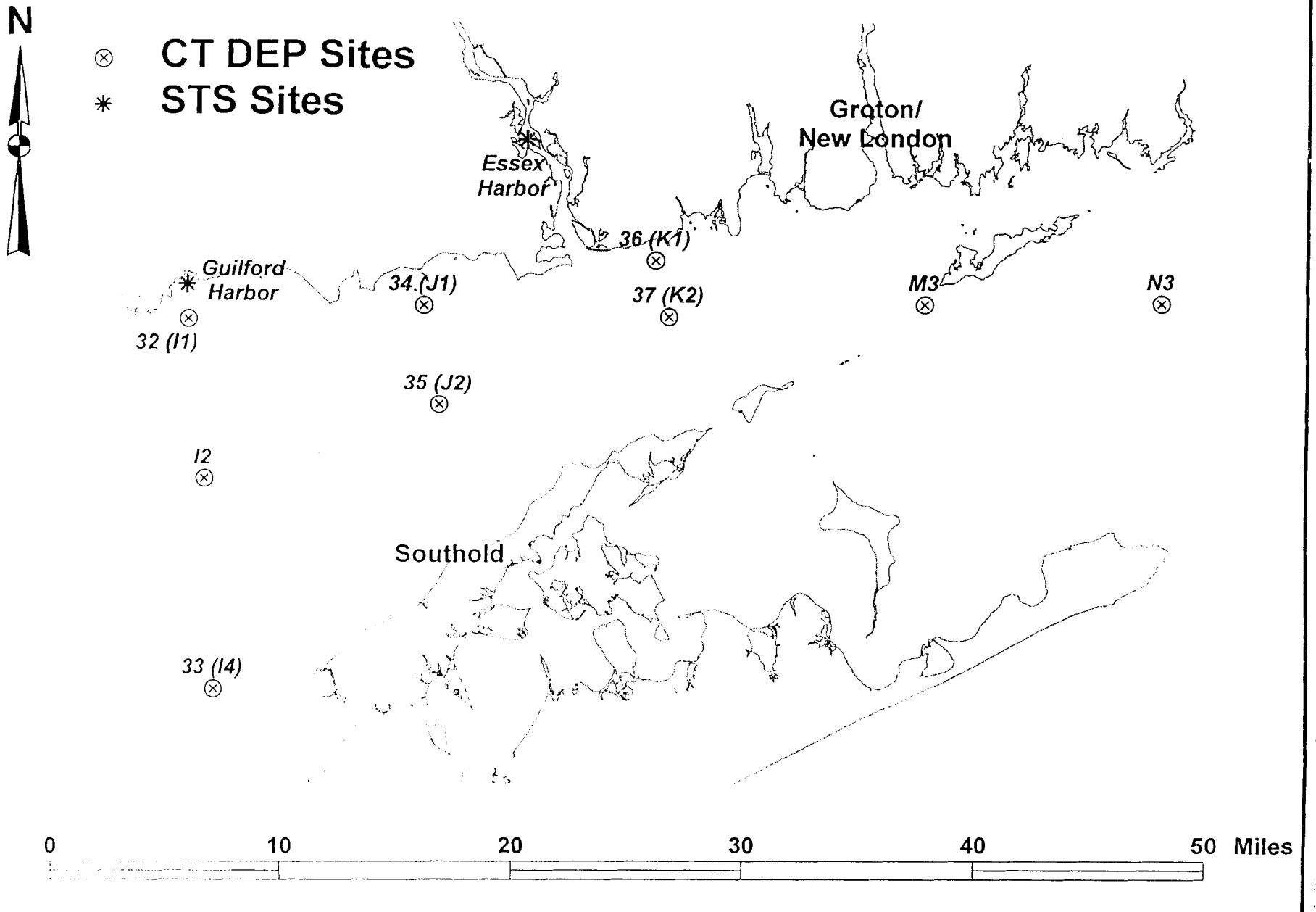
MAP 4: W. Central LIS Water Quality Monitoring Stations



MAP 5: Central LIS Water Quality Monitoring Stations



MAP 6: Eastern LIS Water Quality Monitoring Stations



ATTACHMENT 15

Save the Sound, Inc.

MISSION

Save the Sound, Inc., is a non-profit membership organization dedicated to the restoration, protection, and appreciation of Long Island Sound and its watershed through advocacy, education, and research.

BOARD OF TRUSTEES

STAFF

Save the Sound, Inc.

Save the Sound, Inc. is a non-profit membership organization dedicated to the protection, restoration, and appreciation of Long Island Sound and its watershed through advocacy, education, and research. The organization was established in 1972. Formerly called the Long Island Sound Taskforce, Save the Sound changed its name in 1995 to better express its mission and as a call to action.

Water Quality Monitoring Program

Established in 1991 as the Adopt A Harbor program, the Water Quality Monitoring Program is a research program. Based on solid science, it monitors the harbors and coves of Long Island Sound using U.S. Environmental Protection Agency approved methods.

Jenifer Thalhauser, Save the Sound's Research Coordinator, manages all phases of the water quality monitoring program. She is also responsible for overall supervision of the water quality laboratory and Save the Sound's Adopt A Watershed programs. Jenifer holds a B.S. in Environmental Science from the University of New England.

Suggested citation:
Thalhauser, J. 2001. *2000 Long Island Sound Water Quality Report.* Save the Sound, Inc. Stamford, CT.

Please contact Save the Sound, Inc. for more copies of this report and for information about other programs in research, education, and advocacy, or about becoming a Save the Sound member.

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Save the Sound would like to thank everyone, especially Save the Sound members and contributors, whose generosity made the 2000 testing season a great success. Save the Sound would like to thank the following donors:

- **Connecticut Department of Environmental Protection's License Plate Fund**
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- **Carl Harvey and The New Haven Sound School**
- **Dave Taylor at the American Yacht Club**
- **John Curtis and the Bridgeport Regional Vocational Aquaculture School**
- **The Connecticut River Museum**
- **Richard Yarri and the Harbor House Marina**
- **John Brown and Hitchcock Marine Services**
- **New Rochelle Parks and Recreation Department**
- **Dennis McCarthy and Nichols Yacht Yard**
- **Robert Larsen and the Pequot Yacht Club**
- **University of Connecticut, Avery Point Campus**
- **Town of Greenwich Marine Facility**
- **Jim Mancusi and the Village of Mamaroneck marina**
- **A special thanks to Pete Tuite for the time he spent in Save the Sound's laboratory analyzing chlorophyll and algae samples. Thanks Pete!**

Volunteers

This program was possible thanks to the following people.
Save the Sound extends a special thanks to our volunteers:

Harbor Coordinators:
Carl Harvey
Cindy Konney
Kirk Shadle
Bill Sheppard
Eddy Weygandt

Volunteers
Ali Aceto
Elizabeth Aceto
Greg Adkins
Larry Askew
James Athey
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Tony Belcher
Liz Blackett
Tish Blackett
Marianne Boccuzzi
Kenneth Borst
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Alan Boyd
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Richard Sabbia
Barbara Sager
Walter Sanstrom
Wendy Satin
Pam Schaul
Scott Schields
John Schnefke
Frank Scholan
Susan Sheldon
Adam Shredder
Addison Smith
Garrett Smith
Ginny Tennison
Peter Tuite
Roger Van Tassell
Peter Whitaker
Domenick Yezzi
Lisa Zint
Michelle Zychowski
Bill Whittemore

Bridgeport Aquaculture School students:
Nineteen students from The Bridgeport Regional Vocational Aquaculture School were trained by teachers participating in Bridgeport, CT and performed the monitoring for Blackrock Harbor.

TABLE OF CONTENTS

ABSTRACT

Water quality was monitored in nine out of thirteen Westchester County (NY), Fairfield County (CT), New Haven County (CT), and Middlesex County (CT) harbors. Forty six sites were tested to determine the status and trends of water quality. Surface and bottom dissolved oxygen (DO), salinity and temperature were measured weekly in the morning during the testing season (May-October, 2000). Chlorophyll *a* was also measured weekly in Milton Harbor, Stamford Harbor, Guilford Harbor, and Bridgeport Harbor. In the harbors studied in 2000, the incidence of hypoxia ($\leq$3.0 mg/l DO) decreased in comparison to the year before. Violations of water quality standards (DO $\leq$ 5.0 mg/l and $\geq$ 3.0 mg/l) decreased between the two years.

The water quality was better overall in 2000 when compared to 1999, mainly due to differences in weather between the years. In 1999 a warm summer and a greater amount of precipitation contributed to lower levels of dissolved oxygen in the harbors compared to a very cool summer in 2000. Heavy rain events in July 2000 contributed to a period of low dissolved oxygen in the harbors.

Areas of concern, stations with extended periods of hypoxia and/or DO levels below the state water quality standard, were identified mainly in Stamford Harbor, Milton Harbor, Mamaroneck Harbor, and Manhasset Bay.

INTRODUCTION

Long Island Sound is a vital part of the economic and environmental worth of the region. It is one of the most productive ecosystems in the nation and supports a diverse assemblage of marine life. It is estimated that the Sound contributes approximately $6 billion annually to the regional economy, with recreational and commercial fishing contributing over $ 1 billion per year (Altobello, 1992). Currently, nearly ten percent of the United States' population lives within 50 miles of Long Island Sound (Long Island Sound Study, 1994). The population of people living in the region continues to grow and put pressure on Long Island Sound.

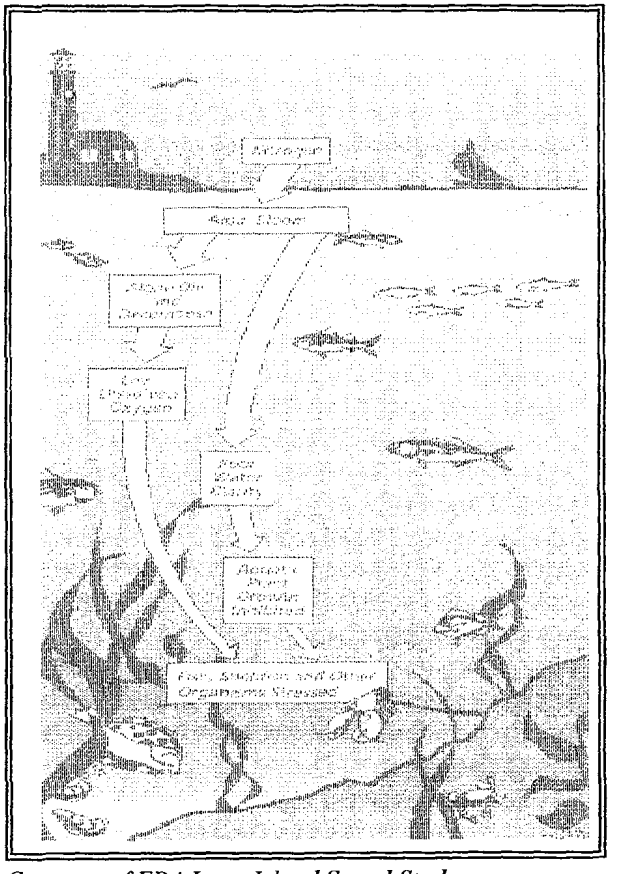
In the late 1980's, a large number of fish kills was reported throughout the Sound and caught the attention of the federal government. In response to the degrading health of Long Island Sound, the Environmental Protection Agency began the Long Island Sound Study (LISS), an EPA office based in Stamford, CT, was created to improve the health of Long Island Sound. In cooperation with the states of New York and Connecticut, the EPA LISS created a Comprehensive Conservation and Management Plan (CCMP) as a blueprint for the work to be done around the Sound.

The CCMP identifies several threats to the health of Long Island Sound. One of those threats is hypoxia. Hypoxia is an incidence of low dissolved oxygen. If an area in the water becomes hypoxic, life in that area is threatened. Low dissolved oxygen can mean slowing the growth of the organism, forcing it to move to another area with higher amounts of oxygen and if low enough, it could mean the death of the organism.

Hypoxia often occurs when too many nutrients (nitrogen and phosphorous) enter the water. In the marine environment, nitrogen generally acts as the limiting nutrient for algal growth (i.e., if this key nutrient is absent, growth of the plant is halted). Unfortunately, there is an overabundance of nitrogen in the Sound. Nitrogen enters Long Island Sound through many sources such as sewage treatment plants, leaking septic systems, storm-water runoff, and acid rain. Nitrogen acts as a fertilizer causing marine plants to undergo rapid population growth called an 'algal bloom.' When the algae die and sink to the bottom, oxygen is consumed during their decomposition by naturally

occurring bacteria (figure 1). The result may be a hypoxic area.

The open waters of Long Island Sound are monitored by government agencies (Connecticut Department of Environmental Protection, Interstate Environmental Commission, New York City Department of Environmental Protection, and New York State Department of Environmental Conservation). The coastal bays, coves, and harbors, however, are for the most part monitored by volunteer water quality monitoring groups, such as Save the Sound. The purpose of the Water Quality Monitoring Program is to collect baseline data to be used in determining water quality status and trends in areas not included in other research programs and to provide information on remediation of those areas. The results are used to supplement regional monitoring efforts, to provide data for further scientific research, to educate citizens about Long Island Sound pollution, and to advocate for better land and water use practices and improved pollution control.



Courtesy of EPA Long Island Sound Study

Figure 1: Nitrogen pollution has been identified as one of the major threats to the health of Long Island Sound. Excess nitrogen enters the Sound and acts as a fertilizer, fueling the growth of marine plants. This sudden growth of marine plants is called an algal bloom. Algae in large amounts is both dangerous to a marine system alive or dead. Alive, it floats at the top of the water blocking sunlight from the plants and animals at the bottom of the water. When it begins to die, the algae sinks to the bottom and is decomposed by bacteria. This bacteria must consume oxygen in order to break down the dead algae. As the amount of decomposition increases, the amount of oxygen used by the bacteria also increases. The result is an area with low amounts of dissolved oxygen that can be very harmful to the organisms living in the area.

By reducing the nitrogen that is released into Sound, algal blooms will occur less frequently and dissolved oxygen will not be used up as rapidly.

DO (mg/L)	Ecological Effects
0-2.0	More than 90% of benthic fishes and lobsters are absent.
1.5-3.0	Many early life stages of fish and shellfish die in 1-4 days.
3.0-4.3	• Reduced lobster and fish catches • Death of some organisms • Atlantic silverside threshold
5.0, and above	Believed to be protective of most marine life.

Figure 2: Dissolved oxygen levels and their effects on marine organisms.

This report presents the findings from Save the Sound's 2000 water quality monitoring season.

METHODS

Nine harbors and coves were tested weekly May through October, 2000. Surface and bottom measurements included dissolved oxygen (DO), salinity, temperature, and Secchi depth in all harbors. In Milton Harbor, Stamford Harbor, Guilford Harbor, and Bridgeport Harbor, photosynthetic pigment chlorophyll *a* was also sampled at the surface and analyzed as a measure of algal biomass. Measurements were taken from 7:00am to 9:00am every Saturday.

In Milton Harbor, Cos Cob Harbor, Stamford Harbor, New Haven Harbor, Bridgeport Harbor and Guilford Harbor, a Hydrolab H20 Multiprobe was used to measure DO, salinity, temperature, and pH. The instrument automatically adjusted DO readings for salinity and temperature, and adjusted salinity readings for temperature. No additional calculations were used to correct these values.

The volunteers air calibrated the multiprobe before they began each testing session. Each day the DO probe was also checked for air bubbles and the membrane was changed, if necessary.

In Milton Harbor, Southport Harbor, and Essex Harbor, a hand-held YSI Model 85 Oxygen, Conductivity, Salinity and Temperature System was used to measure DO, salinity, and temperature. The instrument automatically adjusted DO readings for salinity and temperature, and adjusted salinity readings for temperature. No additional calculations were used to correct these values.

The volunteers air calibrated the hand-held system before they began each testing session. Each day the DO probe was also checked for air bubbles and the membrane was changed, if necessary.

DO readings from the Hydrolab and YSI meters were checked against DO titrations with a burette in Save the Sound's Stamford laboratory at the beginning, middle, and end of the testing season. Salinity readings from the Hydrolab and YSI meters were checked against a hydrometer. Temperature readings from both meters were checked against a LaMotte thermometer. The meters and probes were cleaned and/or sent to the manufacturer for repairs if the calibration readings were greater than the factory accuracy of the meters.

In Milton Harbor, Guilford Harbor, Stamford Harbor, and Bridgeport Harbor, water samples for chlorophyll *a* analysis were collected using a Van Dorn sampler. Water samples were taken 1.0 m below the surface of the water. The mixed water sample was filtered on the boat through a Whatman GF/F (0.45 micrometer (um)) glass fiber filter using a Nalgene filter manifold and hand pump. The volume of water filtered was determined by comparing the color on the filter to a color chart after a dark green or dark brown color was reached on the filter paper. The filter apparatus was rinsed three times with distilled water after each use. The filter was placed in a foil packet, labeled, and stored on ice until it was transferred to the laboratory freezer. Any samples held longer than three weeks in the laboratory were noted in the sample log book as such, since there may be possible degradation of the chlorophyll in those samples (Greenberg *et al.*, 1992).

Chlorophyll *a* extraction and analysis was performed at Save the Sound's water quality laboratory by a member of the research staff or by trained volunteers following *Standard Methods* protocols (Greenberg *et al.*, 1992). Pigments were extracted after grinding the filter with a Teflon pestle in a 55.0 milliliter (ml) grinding tube with a 90% aqueous acetone solution. The samples were clarified in a centrifuge for 20 minutes, then analyzed using a Perkin Elmer Lambda 11 UV/VIS Spectrometer with a 2.0 nanometer (nm) band width. A band width of 2.0 nm is necessary since chlorophyll has a narrow absorption peak and a larger-sized band width would underestimate the chlorophyll *a* concentration (Greenberg *et al.*, 1992). The following exception to *Standard Methods* was performed: after being clarified, the samples

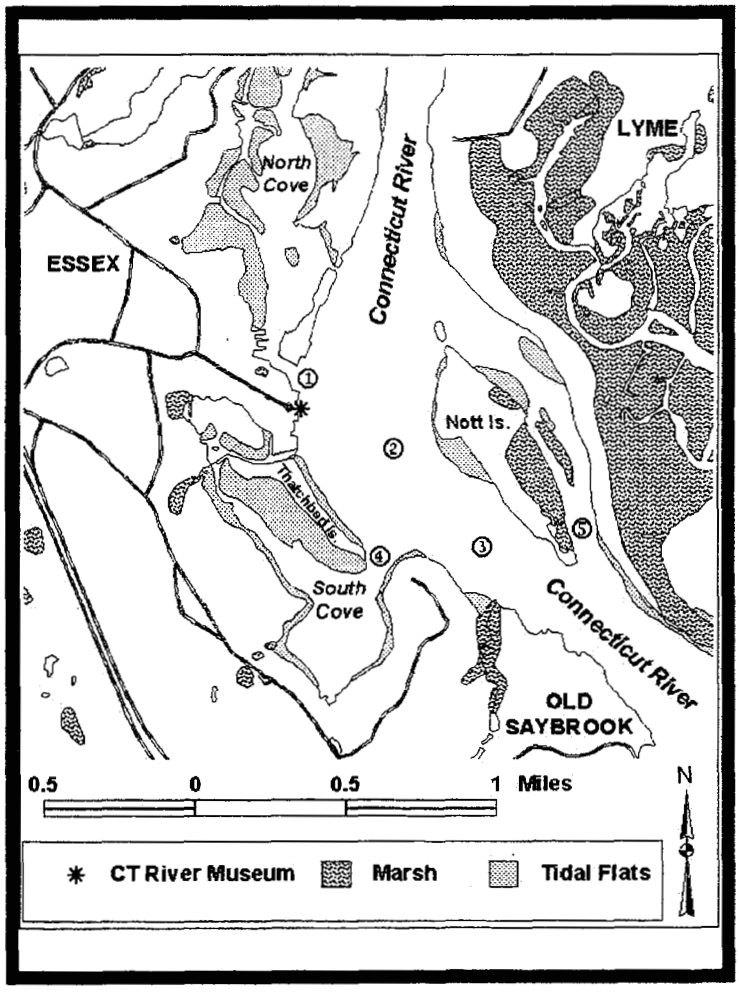
were resuspended and centrifuged two more times to insure 99.1% retrieval of chlorophyll *a* as outlined in Save the Sound's laboratory operational parameters report (Kuntz, 1995a).

Chlorophyll concentrations were corrected for pheophytin *a* (inactive or "dead" chlorophyll with no magnesium atom in its molecular structure) so that chlorophyll *a* values were not overestimated (Greenberg *et al*, 1992). The correlation between dissolved oxygen and chlorophyll *a* was calculated using Lotus 1-2-3 version 5 and the correlation coefficient (r) was compared to critical values to determine statistical significance at the 1% level (Rohlf and Sokal, 1981).

All of the laboratory equipment was calibrated at the beginning of the testing season and at regular intervals to maintain the accuracy of all readings as outlined in Save the Sound's laboratory quality assurance manual (Kuntz, 1995c).

Weather data were taken from climatological data gathered by the National Weather Service's Northeast Regional Climate Center. Precipitation (converted from inches to centimeters (cm)) was recorded daily and summarized monthly.

All volunteers (scientists and pilots) are trained thoroughly by Save the Sound's research staff, with particular attention given to consistency of data collection. Save the Sound trains volunteers under an EPA-Approved Quality Assurance Plan which requires a six hour training course (classroom and field work) before volunteers can participate in the program.



Essex Harbor
Essex, Connecticut

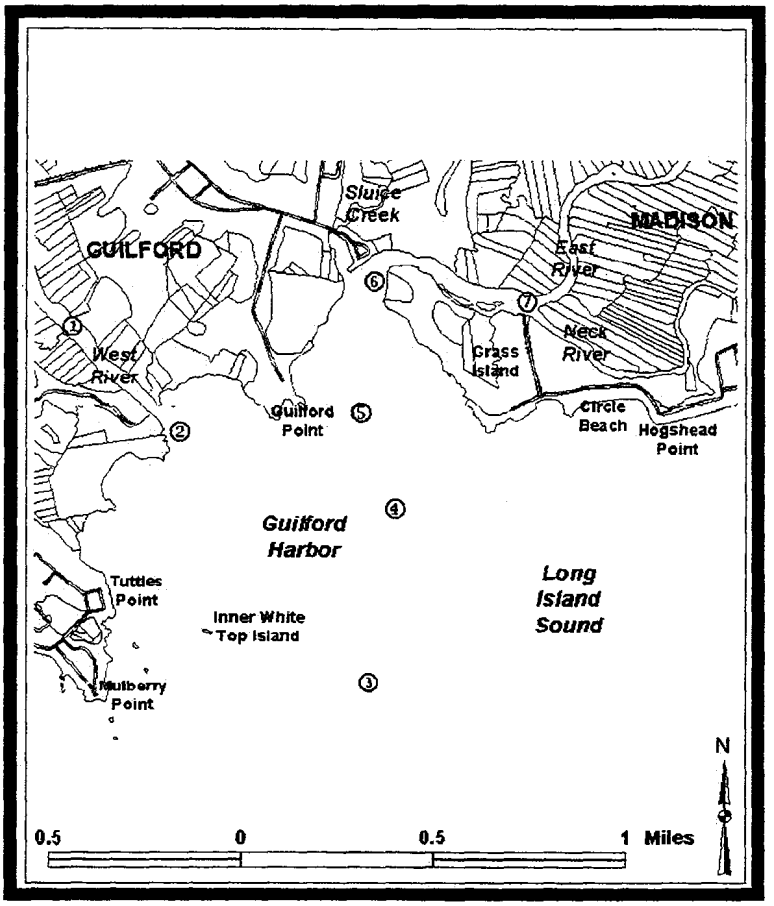
Harbor Description

Like Guilford Harbor, much of the development along Essex Harbor is made up of residential and marina complexes. Unlike the other harbors, Essex Harbor is simply a section of the Connecticut River.

The river forks in Essex Harbor due to Nott Island. Nott Island is a large undeveloped area with extensive marsh and tidal mudflat areas. Many migratory birds use Nott Island as a stop-over on their north-south migrations.

Extensive marshes and mudflats run along the banks of this portion of the river which allow for recreational and commercial fishing, as well as birdwatching. The Connecticut River Museum is located on the eastern bank across from Nott Island.

Essex Harbor
Stations monitored by Save the Sound:
Station 1: (Essex Island Marina) Norther-most station off of Essex Island Marine where North Cove drains into the Connecticut River.
Station 2: (Red Nun 26) This buoy is located in the river's main channel between Nott Island and Thatchbed Island.
Station 3: (Red Nun 24) This buoy is located between the southern portion of Nott Island and Haydens Point in the river's main channel.
Station 4: (South Cove Entrance) This station is located at the entrance of South Cove between Thatchbed Island and Haydens Point.
Station 5: (Nott Island) This site is located off the eastern side of the southern tip of Nott Island.



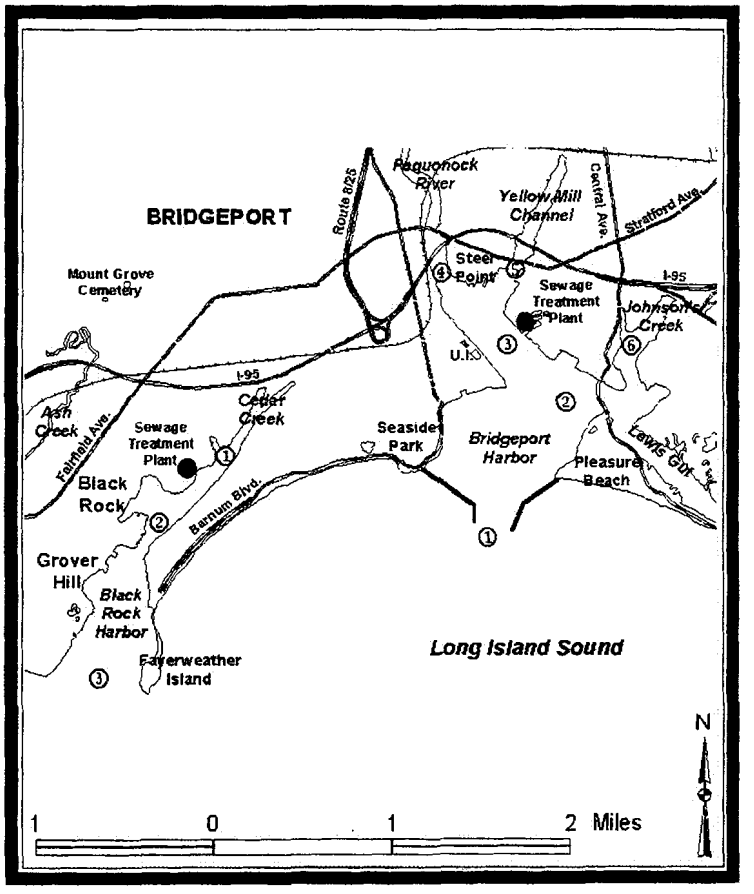
Guilford Harbor
Guilford, Connecticut

Harbor Description

Most of the development along Guilford Harbor is made up of residential and marina complexes. There is no sewage treatment plan for Guilford Harbor so residents rely on septic systems. Disposal pits, where septic system cleaning companies dump waste, are located in the East River Watershed. Guilford Harbor has two rivers that drain into it; the East and West Rivers. The East River is bordered on the east by Grass Island at its mouth and the West River is bordered on the west by Chaffinch Island at its mouth with Guilford Point separating the two tributaries. Extensive mudflats run along the banks of both rivers which allow for Guilford's recreational and commercial shellfisheries. The largest oyster bed in Guilford is located on the East River. Many of the recreational shellfishing beds are restricted to use because of high levels of bacterial contamination.

Guilford Harbor
Stations monitored by Save the Sound:

Station 1: (Guilford Yacht Club) This station is located in the West River at the yacht club.
Station 2: (Red Nun 8) Located south of Chaffinch Island where West River meets Guilford Harbor.
Station 3: (Green Can 3) The station furthest out in the harbor, found south of Guilford Point and station 4.
Station 4: (Green Can 7) Located north of Station 3 and south of Grass Island.
Station 5: (Red Nun 12) Located at the entrance to East River between Grass Island and Guilford Point.
Station 6: (Red Nun 14) Found where East River and Sluice Creek meet and south of Guilford Marina.
Station 7: (Boat Ramp) Located where East River and Neck River meet.



Bridgeport Harbor
Bridgeport, Connecticut

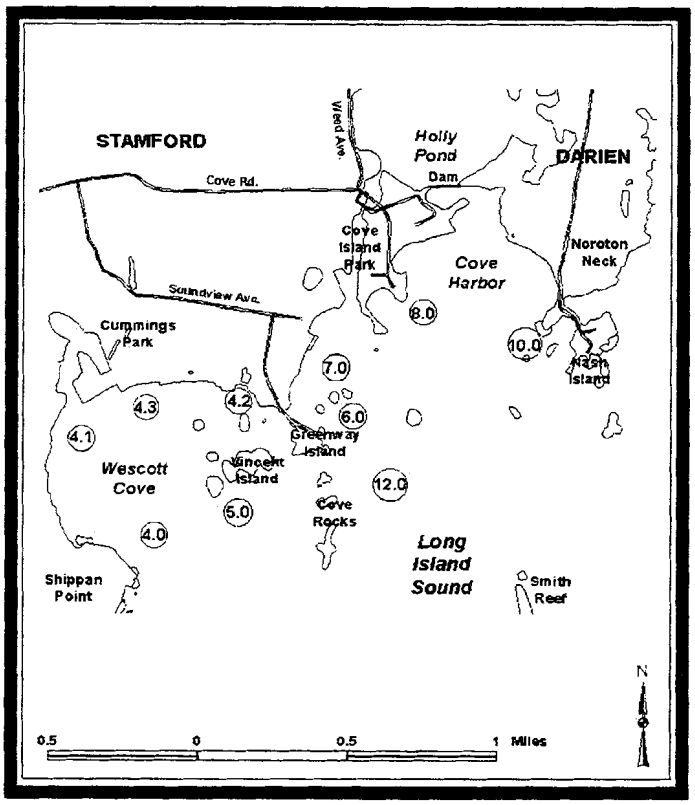
Harbor Description

Bridgeport Harbor is one of three deep water harbors in Connecticut and is the deepest harbor monitored by Save the Sound. Bridgeport Harbor has three tributaries; the Pequonock River, Yellow Mill Channel, and Johnsons Creek/Lewis Gut.

Bridgeport is a highly developed harbor. There are two main docks where the Bridgeport to Port Jefferson Ferry lands. The operational UI Plant is located next to Union Square dock and requires an estimated 500 million gallons of water a day. The Shoreline Dog Track is located on the Pequonock River and has a kennel that can house up to 1,100 dogs.

Bridgeport Harbor
Stations monitored by Save the Sound:

Station 1: (Red Nun 12) This station is outside the breakwater at the mouth of the harbor.
Station 2: (Red Nun 2) This buoy is within the main stem of the harbor across from the United Illuminating Steel Point Plant site.
Station 3: (United Illuminating./Green Can 21) Withing the main stem of the harbor across from the UI Plant, just south of I-95 and the railroad tracks.
Station 4: (Steel Point Telephone Pole) This station is near the confluence of the Pequonock River and the harbor at the site of the old UI Plant.
Station 5: (Yellow Mill/Stratford Avenue Bridge) This station is south of the Stratford Avenue Bridge in the Yellow Mill Channel.
Station 6: (Johnson Creek/Red Nun 8) This station is located in Johnson Creek near several oil tanks and a marina.



Westcott Cove & Cove Harbor
Stamford, Connecticut

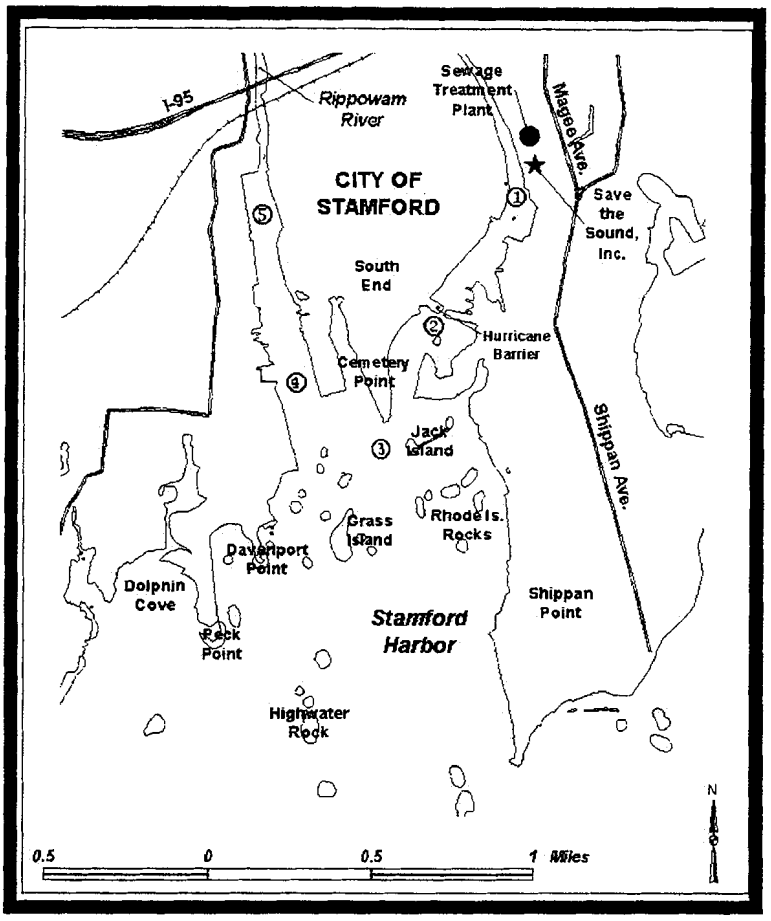
Harbor Description

Westcott Cove is located one mile east of Stamford Harbor and south of Cummings Beach. The land surrounding the cove is residential and has a marina at Cummings Park. Westcott Cove contains recreational shellfishing beds which are regulated by the Stamford Shellfish Commission.

Cove Harbor is located just east of Westcott Cove and west of Nash Island in Noroton, CT. The area is residential and very similar and very similar to Westcott Cove. .Cove Beach is a popular recreational spot in Stamford with year-round activity. Holly Pond is separated from Cove by a dam.

Westcott Cove Stations:
Station 4.0: (Flashing Red Nun 4) Entrance of the navigable channel for Cummings Park, near east bank of Shippan Point.
Station 4.1: (Red Nun 10) This station is just outside Cummings Park marina and is across from West Beach.
Station 4.2: (South of Lagoon) Near the north shore, and is located near a storm drain that empties in the area.
Station 4.3: (Breakwater off Cummings Beach) This station is near the north shore across from the Cummings Beach breakwater.
Station 5.0: (Vincent Island) This station is south of a small, rocky island and is furthest from the shore.

Cove Harbor Stations
Station 12.0: (Cove Rocks/Three Sisters) This is the deepest station east of Cove Rocks.
Station 10.0: (Nash Island Rocks) This station is at the rocks west of Nash Island or Pratt Island Two. There are oyster bed markings this area.
Station 8.0: (Horseshoe Beach) This station is off of the rocks on the eastern side of Horseshoe Beach.
Station 7.0: (Green Can 1) A privately maintained buoy.
Station 6.0: (Private Island) East of a privately maintained island and west of a cluster of white rocks.



Stamford Harbor
Stamford, Connecticut

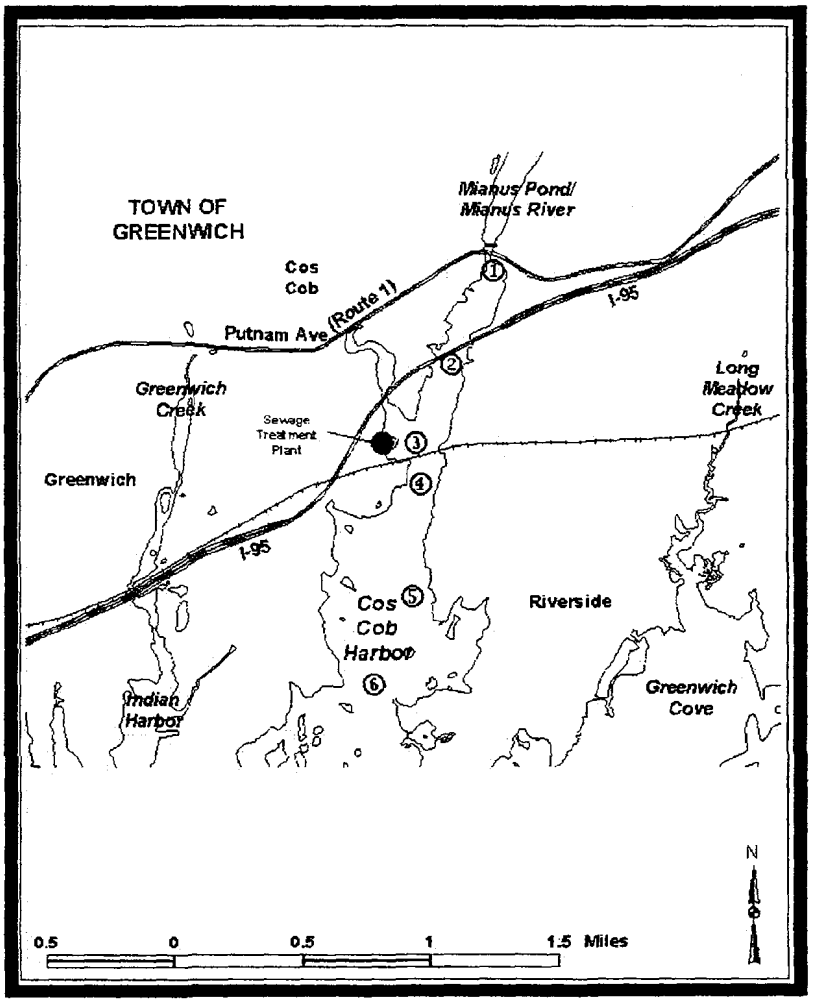
Harbor Description

Stamford Harbor is primarily industrial in its surrounding land use, however there are also residential and mooring areas on the shores. The harbor is divided into east and west branches. The Woodland Cemetery and Kosciusko Park peninsula divides the harbor. Both east and west branches have small tidal flat areas along the shores of the peninsula.

On the western bank of the west branch is Southfield Park, a public beach that is generally closed for swimming due to high bacteria levels (Kuntz, 1996).

The east branch of the harbor is separated and protected from the mouth of Long Island Sound by a hurricane barrier. Along the entire western bank of the east branch are tidal mudflats. These mudflats are often frequented by waterfowl searching for food. To the north is a seawall where Save the Sound's facilities are located.

Stamford Harbor
Stations monitored by Save the Sound:
Station 1: (East Branch/Save the Sound) In the east branch, just south of the Sewage Treatment Plant.
Station 2: (East Branch/Green Can 1) Just outside the hurricane barrier in the east branch.
Station 3: (Main Channel/Green Can 1) Most seaward station, just beyond Jack Island.
Station 4: (West Branch) Located between Yacht Haven West gas station and Southfield Park.
Station 5: (West Branch) Downstream of the Rippowam River, near Herberts Landing fuel dock and Genovese Cement Company.

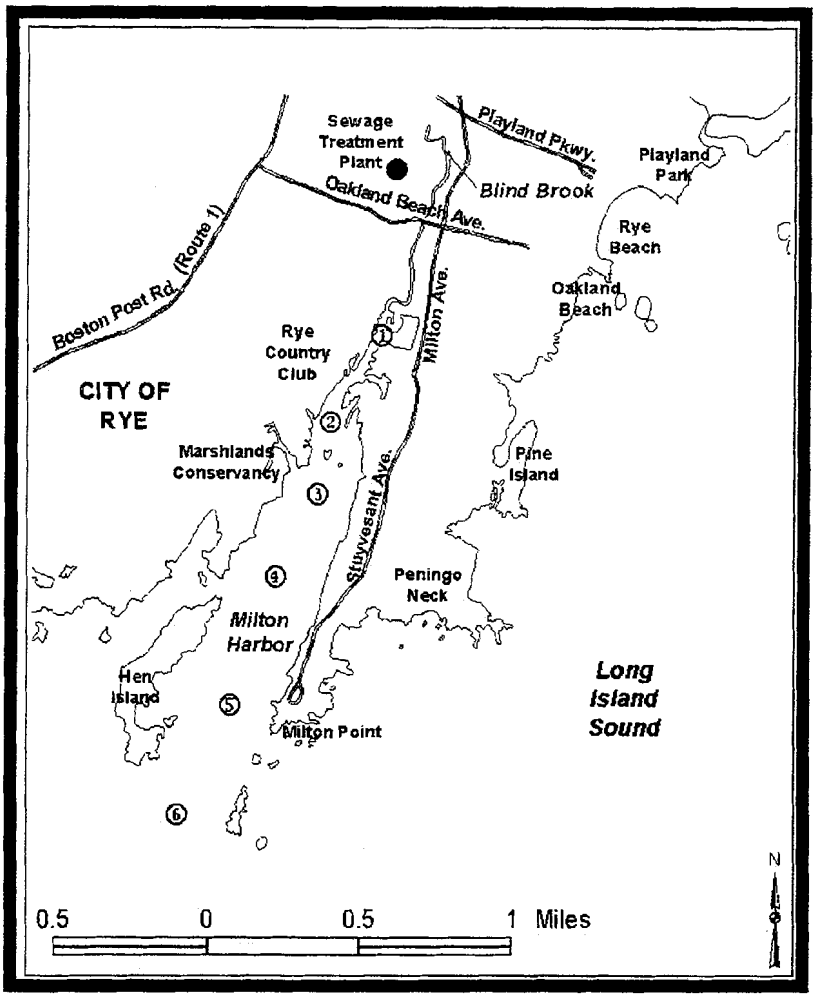


Cos Cob Harbor
Greenwich, Connecticut

Harbor Description

Cos Cob Harbor is an extension of the Mianus River. The harbor is divided into the inner and outer areas by the Metro North Railroad Bridge. The inner harbor has mudlfats on the east bank which occupy more than half the width of the harbor. On the west side, there are several marinas running the entire length of the harbor jus to the south of Route One and the Mianus River Dam. In the outer portion, there are large homes and the Riverside Yacht Club on the east side of the harbor. The west side consists mostly of undeveloped land and the remains of the Cos Cob Power Plant. This was the first power plant built specifically for the railroad and was in operation from 1907 to 1970.

Cos Cob Harbor
Stations monitored by Save the Sound:
Station 1: (Storm Drain Pipe/Dam) Northernmost station which is just south of the Mianus River.
Station 2: (Lobster Float) Owned by a local lobsterman, located just south of the Interstate 95.
Station 3: (Town Docks) This station is off of the main channel where the Mill River enters the harbor.
Station 4: (Green Can 13) This buoy is across from the remains of the Power Plant.
Station 5: (Green Can 11) This buoy lies off of the Riverside Yacht Club and is in the widest part of the harbor.
Station 6: (Green Can 7) The deepest site in Cob Harbor, it is located at the mouth of the harbor.



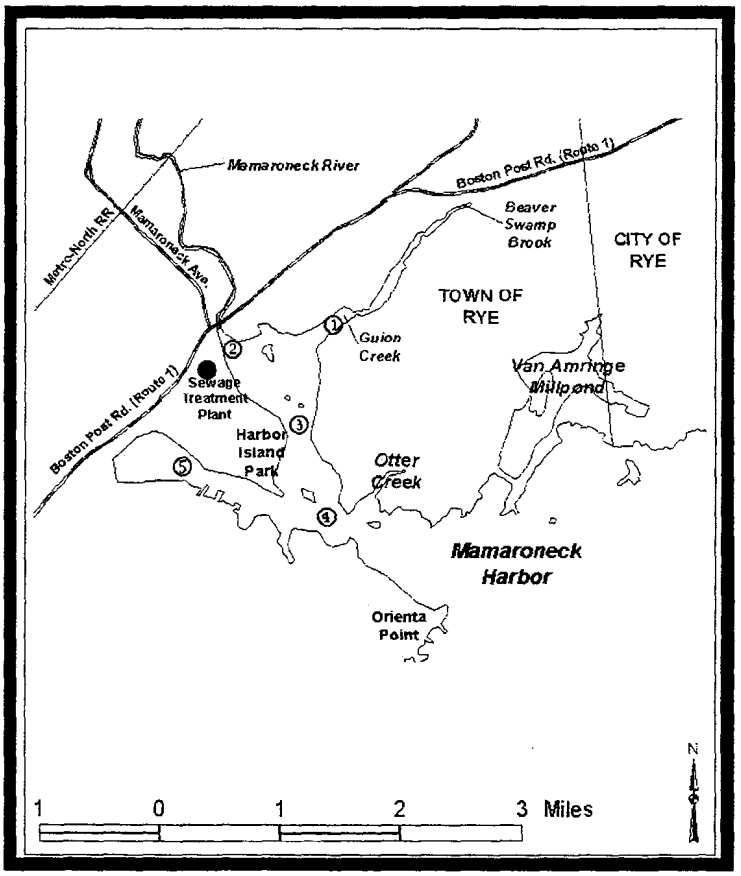
Milton Harbor
Rye, New York

Harbor Description

Milton Harbor is a narrow harbor with primarily residential, marina, and mooring areas. The dredged channel has approximately meters of water between the head of navigation and Milton Point and gets deeper beyond the Point. There us a large tidal flat areas on the northeastern quadrant. The harbor is fed by Blind Brook which originates at the Westchester County Airport. The Marshlands Conservancy and a golf course are on the western bank of the harbor, Hen Island, near the mouth of the harbor, is a residential island accessible by boat only.

Milton Harbor
Stations monitored by Save the Sound:

Station 1: (Red Nun 14) Northern-most station south of the Blind Brook outlet and two marinas; Shongut Marina and Rye Municipal Boat Basin.
Station 2: (Red Nun 12) Located south of Station 1, located on large tidal flat.
Station 3: (Red Nun 10) Located south of Station 2, within southern portion of the tidal flat.
Station 4: (Red Nun 8) Located south of Station 3, east of Maries Neck.
Station 5: (Red Nun 6) Located south of Station 4, west of Milton Point and east of Hen Island.
Station 6: (Green Can 3) Most seaward station, located south of Station 5, west of Scotch Caps.



Mamaroneck Harbor
Mamaroneck, New York

Harbor Description

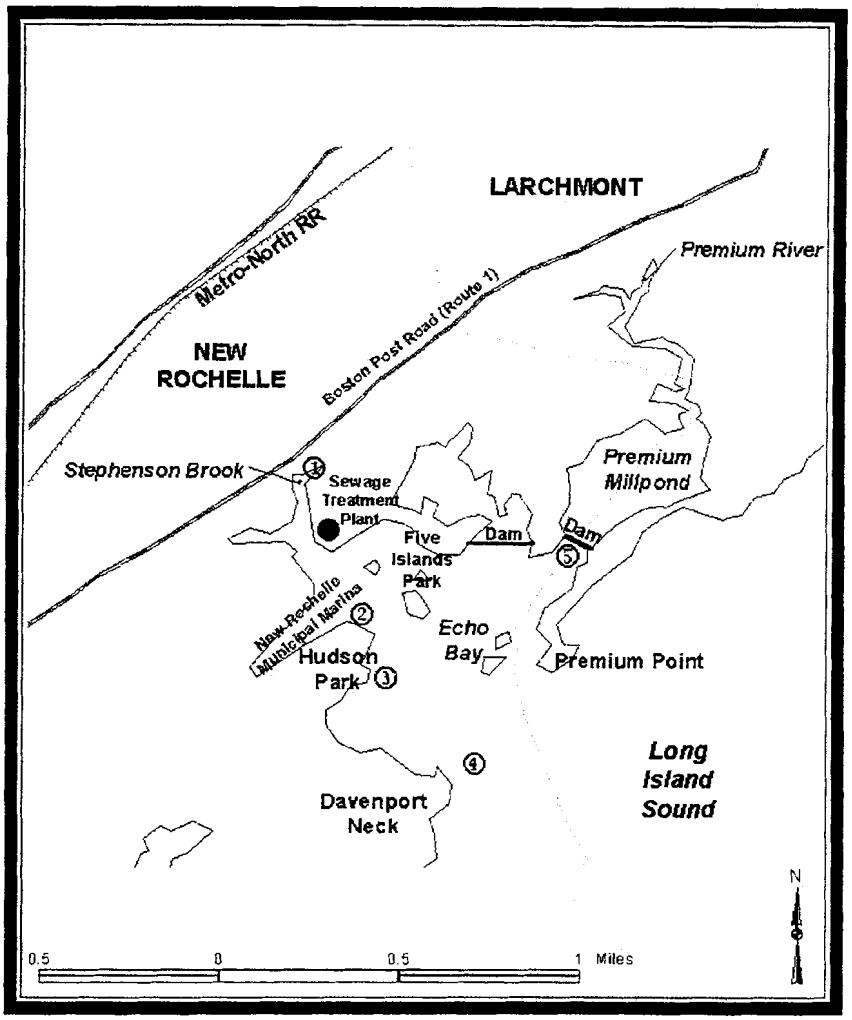
Mamaroneck Harbor has a combination of residential and commercial uses. The harbor id divided into a "Y" forming an east and west section. The two basins are separated by a peninsula that is occupied by Harbor Island Park and the Mamaroneck Sewage Treatment Plant. The sewage outfall is located near flashing Red Nun 42, which also marks the entrance to Milton Harbor.

The east basin channel is approximately 3 meters deep at low tide and is fed by Guion Creek (a.k.a., Beaver Swamp Brook) in the eastern corner, and by the Mamaroneck River in the western corner. The western basin channel is approximately 2 meters deep at low tide. Both channels are framed by small tidal flats.

Station Descriptions

Stations monitored by Save the Sound:

Station 1: (East Basin/Blue House) Located in a shallow tidal area in the northeast corner of the east basin.
Station 2: (East Basin/Launch Ramp) South of the Mamaroneck River outlet, near a permanent floating dock frequented by birds, fishermen, and heavy boat traffic.
Station 3: (East Basin/Red Nun 14) South of Station 2, near Harbor Island Park swimming area.
Station 4: (Green Can A) Most seaward station, located south of Station 3 at the East and West Basin juncture.
Station 5: (West Basin/Harbor Island Municipal Marina) North end of the east dock in the marina.



Echo Bay
New Rochelle, New York

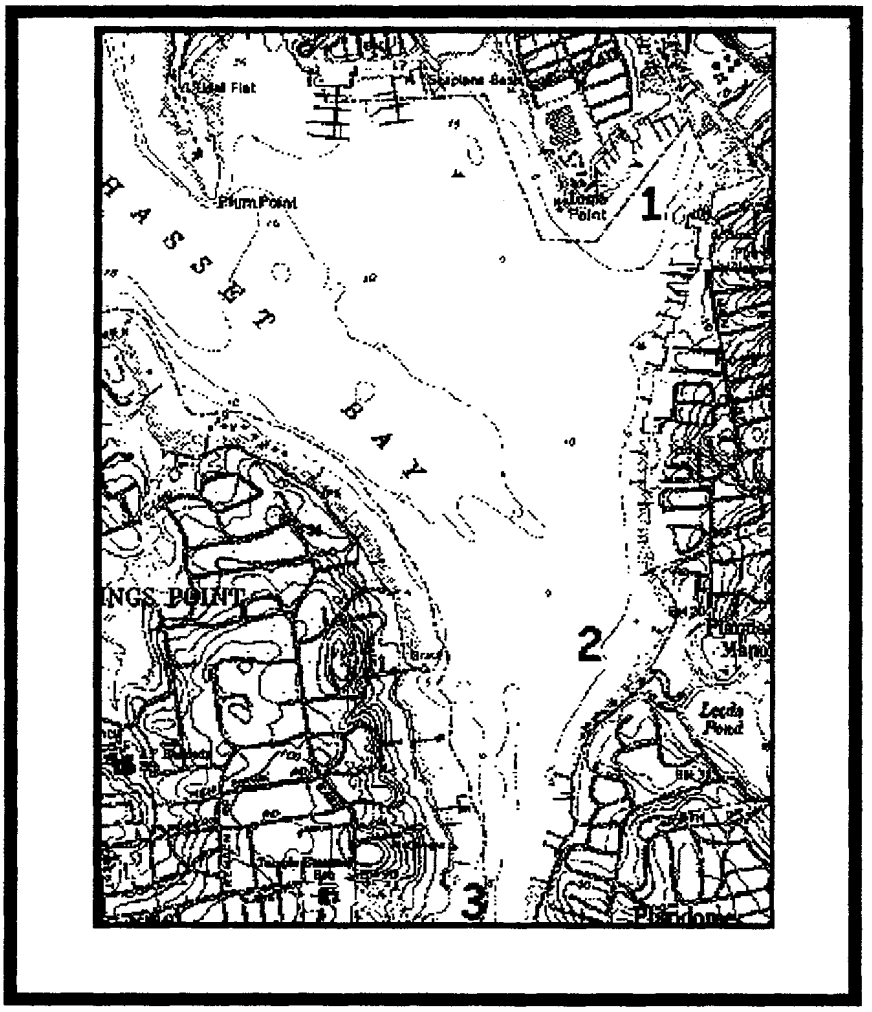
Harbor Description

Echo Bay is primarily an industrial harbor with manufacturing plants and commercial facilities along its shoreline. On the western bank are residential areas and a multiple outdoor facility. A sewage treatment plant, servicing several towns withing Westchester County, is located on the western bank. Five Islands Park is located in the center of the Bay and is a heavily used recreational area.

In the northeast section of the bay is the Mill Pond. This area if filled with tidal flats and marshes. In the northwest section, the bay is fed by Stephenson Brook which runs through the City of New Rochelle.

Station Descriptions
Stations monitored by Save the Sound:

Station 1: (Stephenson Brook Outfall) Located at the culvert where Stephenson Brook enters Echo Bay. This station is accessible only at high tide.
Station 2: (Red Nun 10) Located off the northern end of Hudson Park, east of the New Rochelle Municipal Marina.
Station 3: (Red Nun 6) Located off of the southern end of Hudson Park and Echo Island.
Station 4: (Mill Pond Dam) Located at the waterfall created by the Mill Pond Dam.



Manhasset Bay Manhasset New York

Harbor Description

Manhasset Bay has a surface area of approximately 2,725 acres with a volume of nearly 9 billion gallons of water.

The bay has a watershed of approximately 10,000 acres with approximately 77% of the land used for residential purposes. Other land use includes industrial, commercial, and recreational purposes.

Manhasset Bay
Stations monitored by Save the Sound:

Station One (Sheets Creek): Station one is located just outside the mouth of Sheets creek.

Station Two (Leed's Pond): Station two is located offshore of Leed's Pond

Station Three (Shelter Harbor Marina):
Station three is located near the Shelter Harbor Marina

Station Four (Barker's Point):
Station four (not shown on map above) is located halfway between Barker's Point and Plum Point.

Results

Please refer to graphs following this section.

Guilford Harbor

Guilford Harbor maintained good water quality from the end of July through October. Dissolved oxygen fell below the State Standard (5.0 mg/L) on one occasion, on 7/29/00, surface and bottom dissolved oxygen fell to approximately 4.8 mg/L. Water temperatures were cool as we experienced a fairly cool summer. Testing was not performed in Guilford Harbor last year, therefore no comparisons can be made to last year's results.

Bridgeport Harbor

Bridgeport Harbor maintained fair to good water quality throughout Save the Sound's testing season. Dissolved oxygen fell below the State standard several times especially through the end of July and into August. Conditions became hypoxic in bottom waters only once, July 29th at station five. Temperature was average and followed the typical summer to fall seasonal changes. Salinity remained relatively stable, fluctuating between 23 and 25 ppt. Bridgeport Harbor was monitored for only three weeks last year. Results from this year can not be compared to last because of the lack of testing in the 1999 season.

Black Rock Harbor

Black Rock Harbor was monitored August to May, during the Bridgeport Regional Vocational Aquaculture school year. Results from this harbor can not be compared to other harbors as other harbors were monitored during the summer. Surface and bottom dissolved oxygen remained well above the State standard throughout the winter. Water temperatures were cold as expected during the winter. Salinity fluctuated towards the end of the monitoring season, March into April. Black Rock Harbor experienced good water quality throughout the fall and winter season and a few periods of low dissolved oxygen towards the end of the summer.

Stamford Harbor

Stamford Harbor water quality was fair to good this past summer as dissolved oxygen stayed just above the State standard in the earlier part of the summer. July 29th and August 19th showed a drop in dissolved oxygen in both surface and bottom waters. Water temperature ranged from approximately 16 to 22 degrees Celsius.

Station one experienced the most occurrences of low dissolved oxygen out of the five stations. Station one is located farthest from the mouth of the harbor near Stamford's sewage treatment plant.

Mamaroneck Harbor

Mamaroneck Harbor experience poor water quality conditions throughout the summer season. Dissolved oxygen frequently fell below the State standard. Station one, two and three experienced several days of hypoxic conditions in surface and in bottom waters. Dissolved oxygen was not measured August 30th and October 14th due to equipment problems. Salinity was exceptionally low on July 29th. Temperature remained relatively constant at 20 to 25 degrees Celsius.

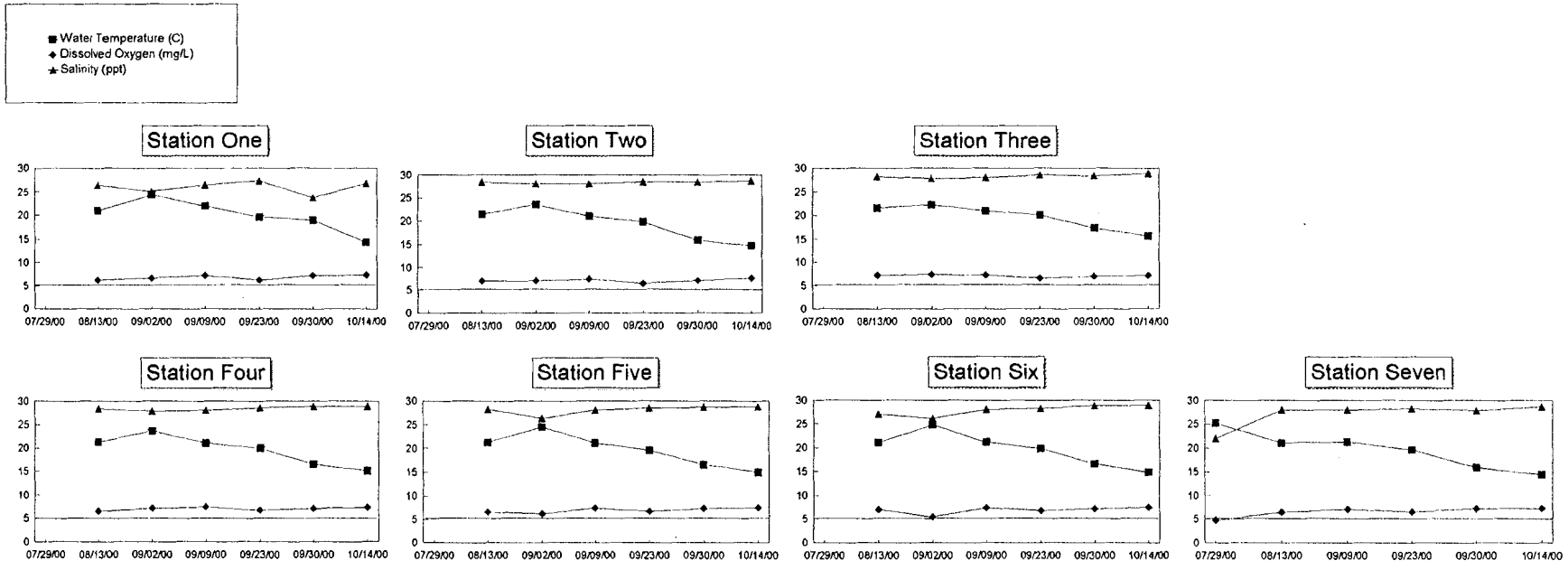
Milton Harbor

Milton Harbor experience poor water quality throughout most of the testing season. Dissolved oxygen fell as low as 2mg/L, almost anoxic on August 16th in Statio one surface waters. Station three violated water quality standards throughout at least half of the testing season. Bottom waters were exceptionally low throughout most of the season and were anoxic on a few occasions (June 24th, August 16th). Salinity was very stable, ranging from 24 to 26.5 ppt. Temperature was relative to the summer temperatures experienced throughout much of the Sound.

Manhasset Bay

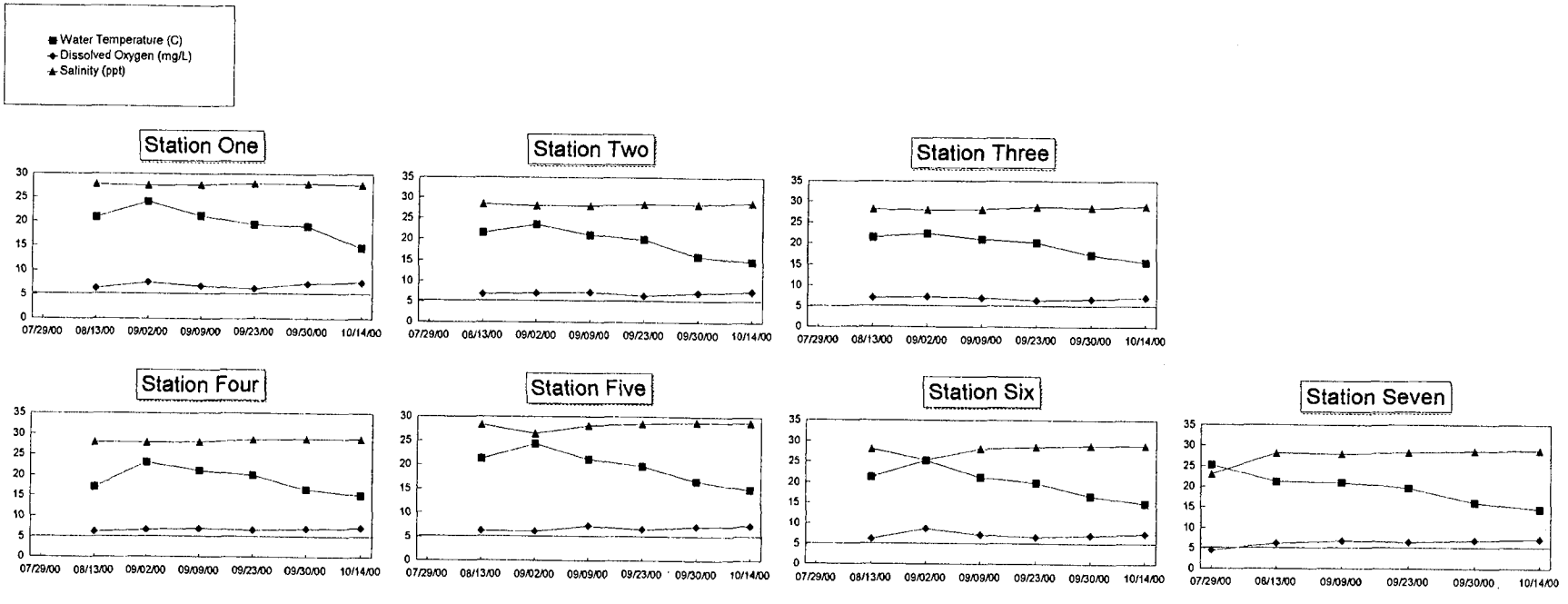
Throughout the month of August, dissolved oxygen levels fell below the State standard especially in stations one and three. Station four stayed above the state standard on all but one of the sampling days. Salinity and temperatures readings remained fairly constant. Salinity ranged from 23 to 25.5 ppt and temperature from 22 to 15 degrees Celsius.

Guilford Harbor



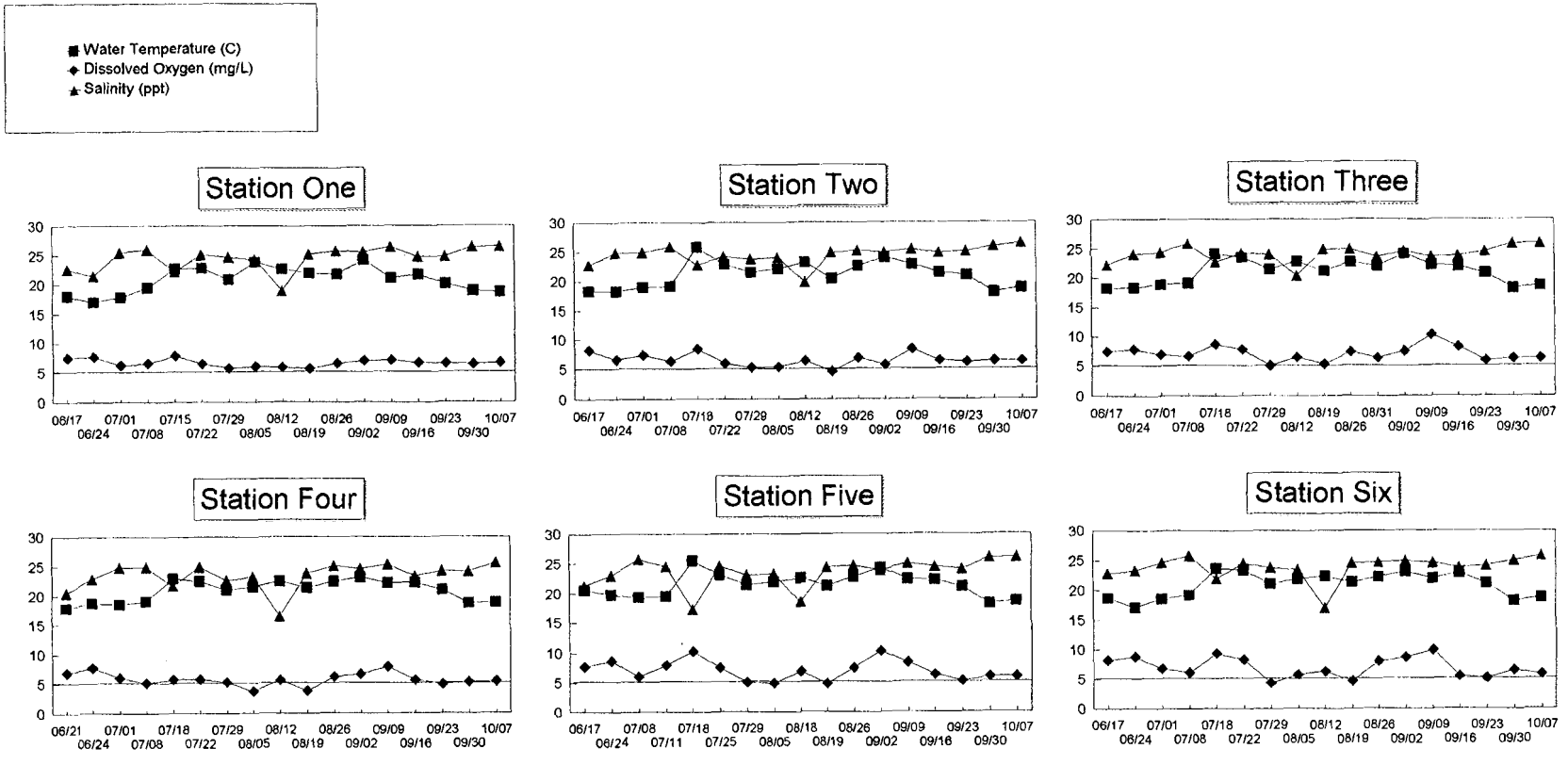
Graphs represent surface water dissolved oxygen, temperature, and salinity readings. Measurements were taken weekly from July through October.

Guilford Harbor



Graphs represent bottom water dissolved oxygen, temperature, and salinity readings. Measurements were taken weekly from July through October.

Bridgeport Harbor



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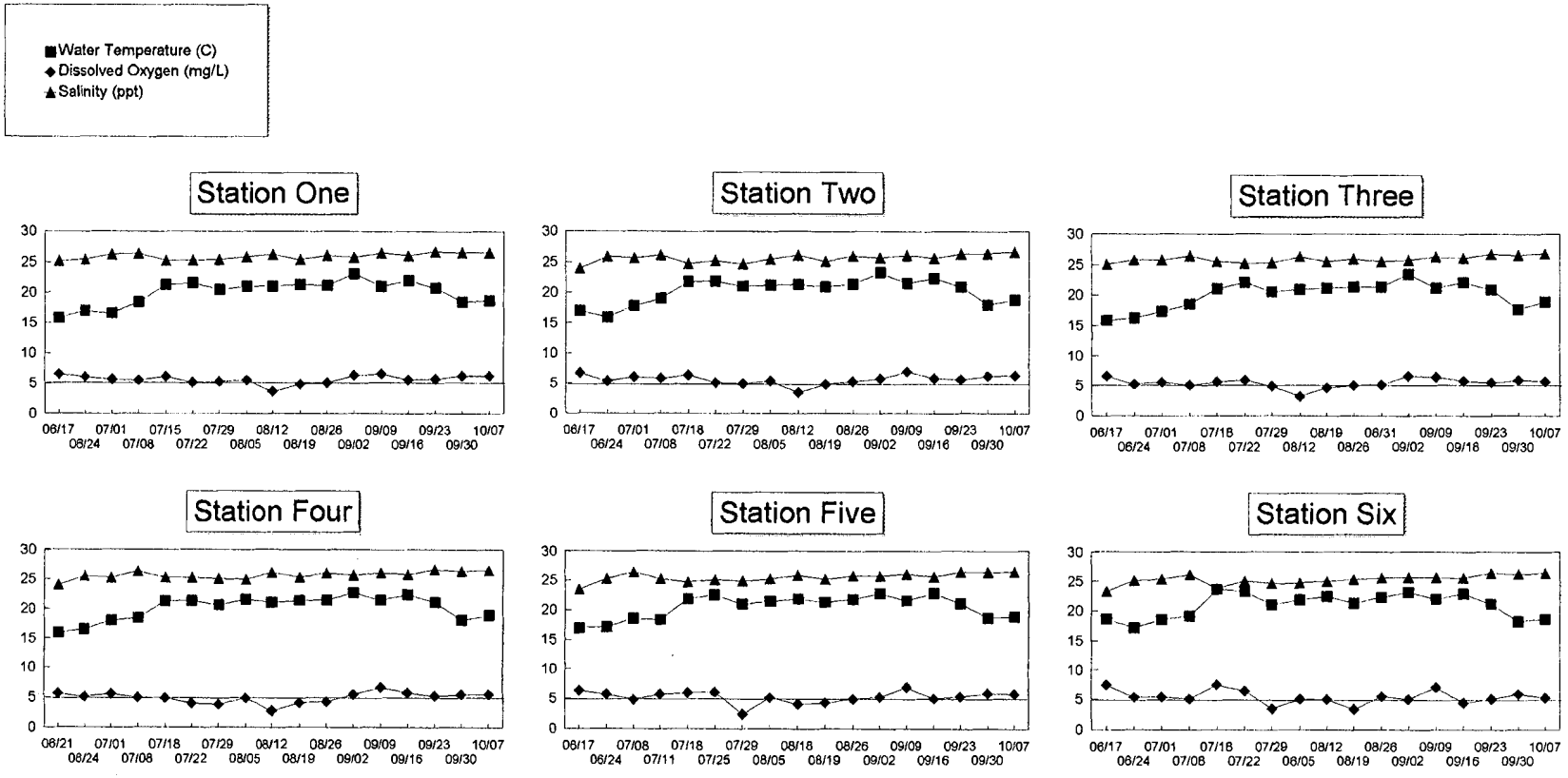
Bridgeport Harbor



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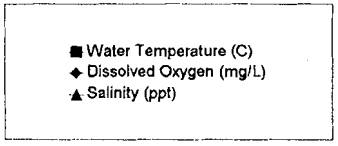
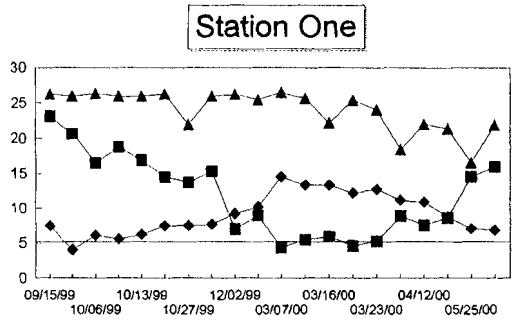
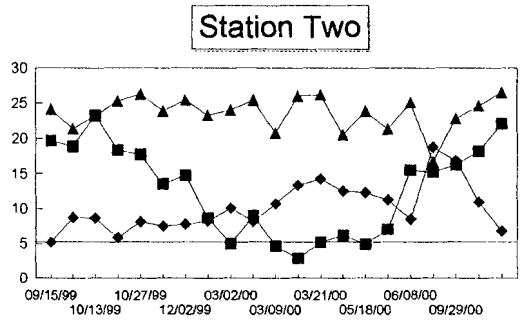
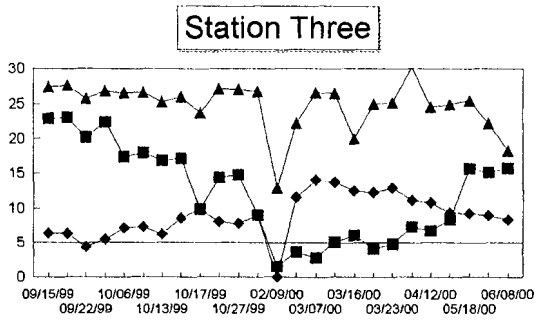
Black Rock Harbor









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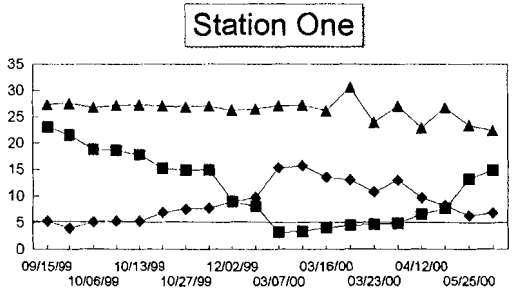
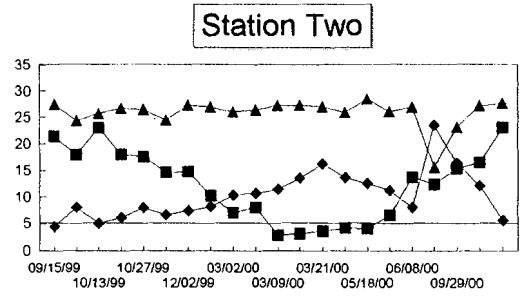
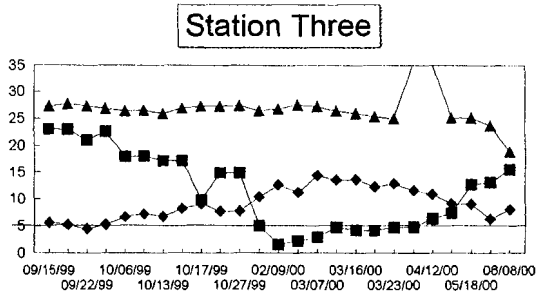
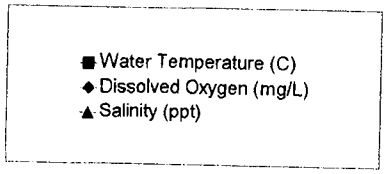


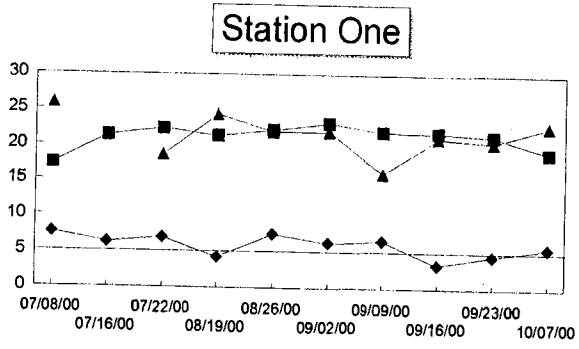


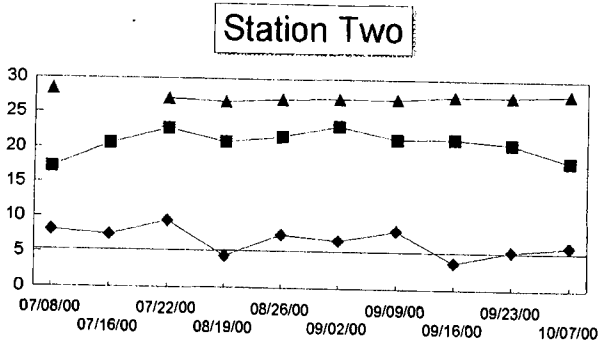


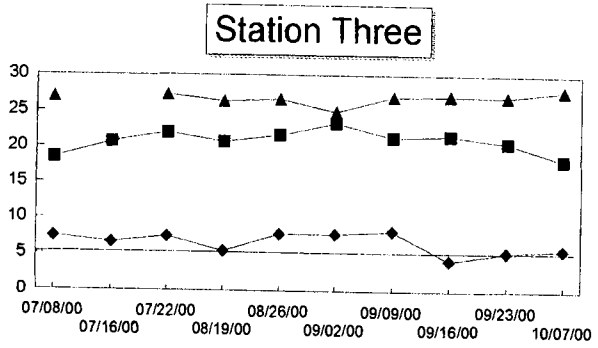
Graphs represent bottom water dissolved oxygen, temperature, and salinity readings. Measurements were taken weekly from September through June, 2000.

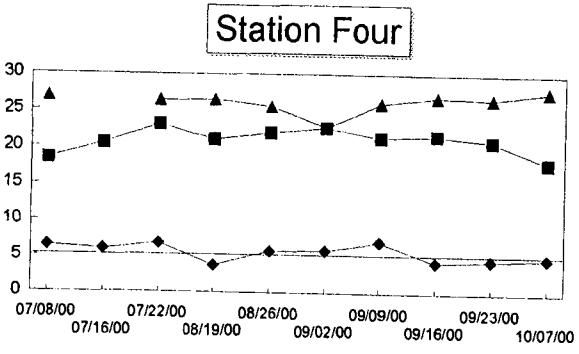
Stamford Harbor

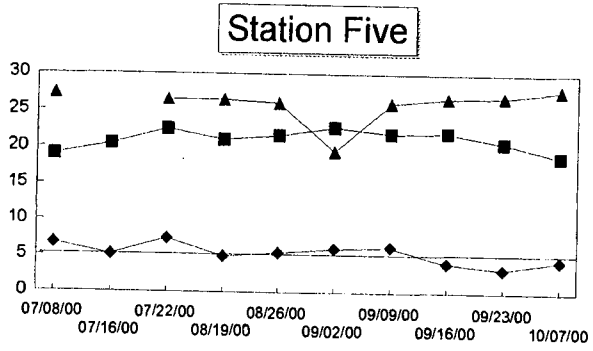






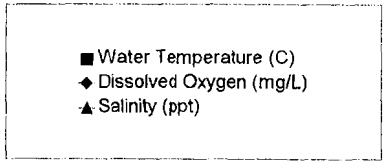


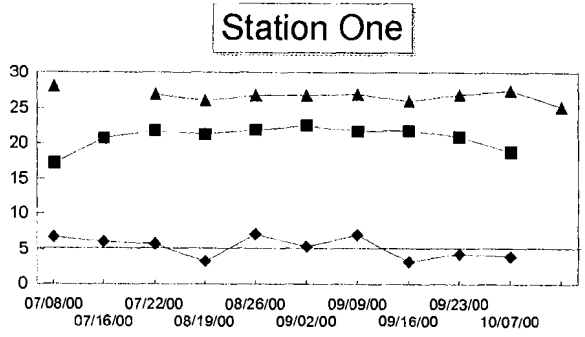


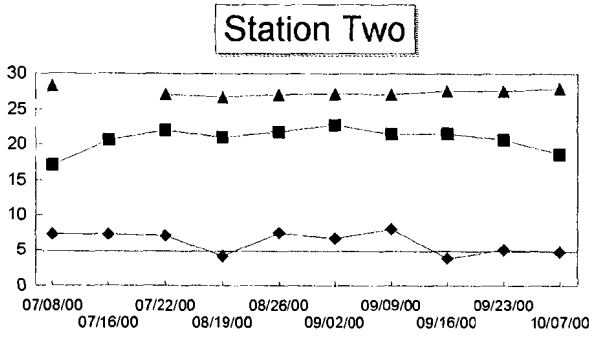


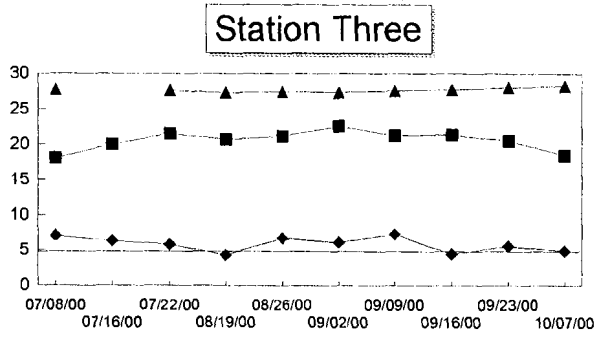
Graphs represent surface water dissolved oxygen, temperature, and salinity readings. Measurements were taken weekly from early July thorugh October.

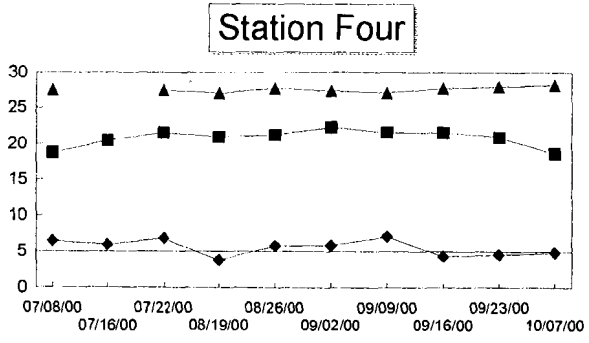
Stamford Harbor

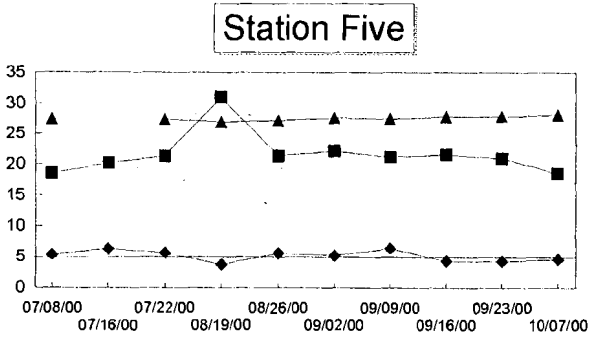






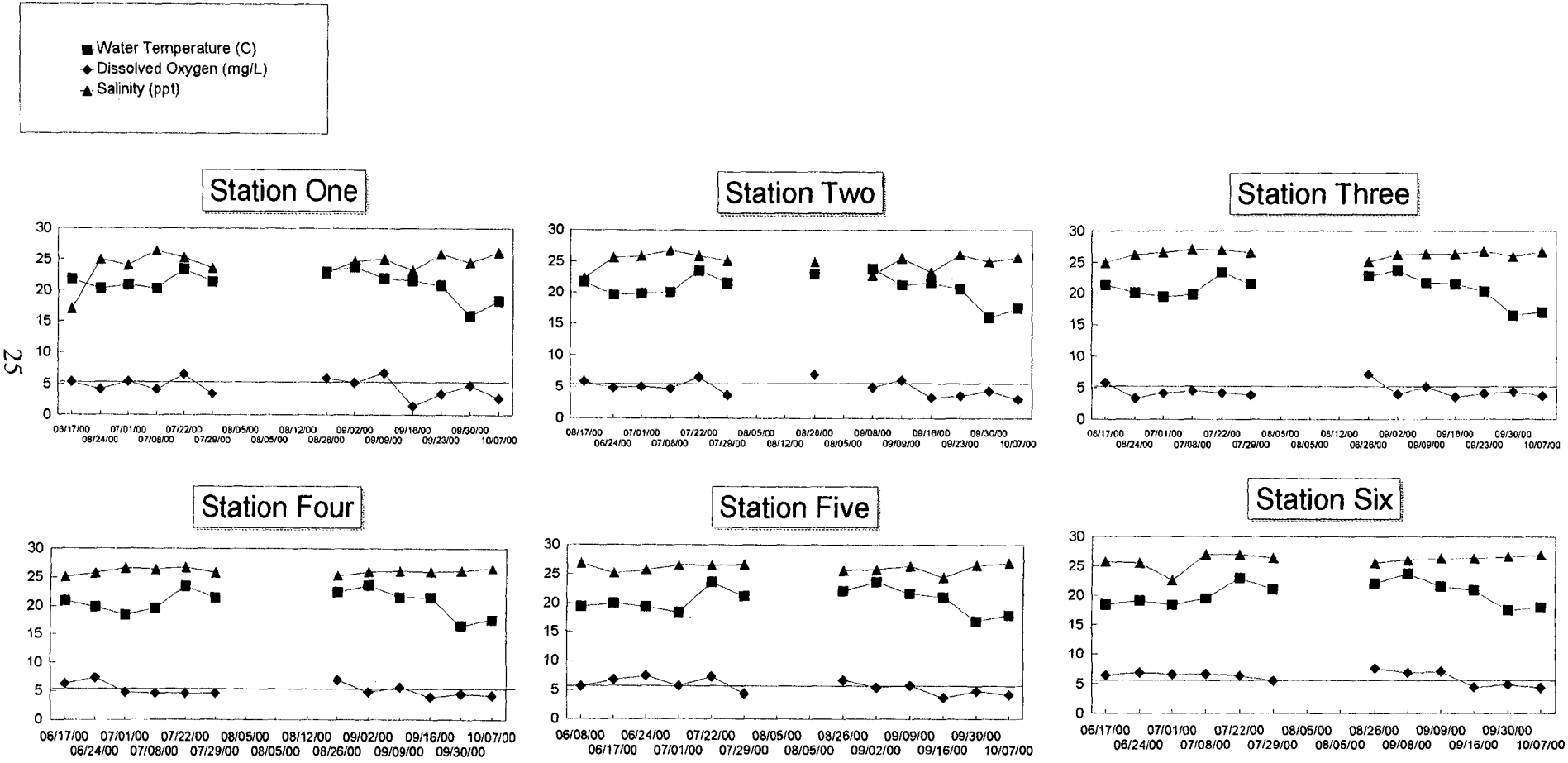






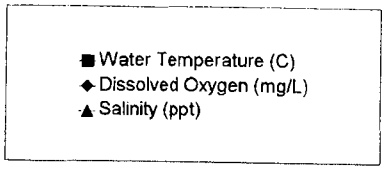
Graphs represent bottom water dissolved oxygen, temperature, and salinity readings. Measurements were taken weekly from early July thorugh October.

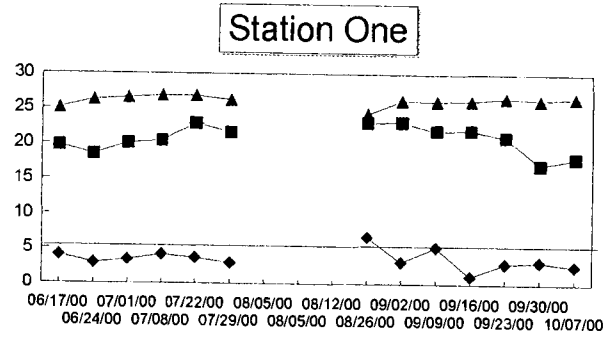
Milton Harbor

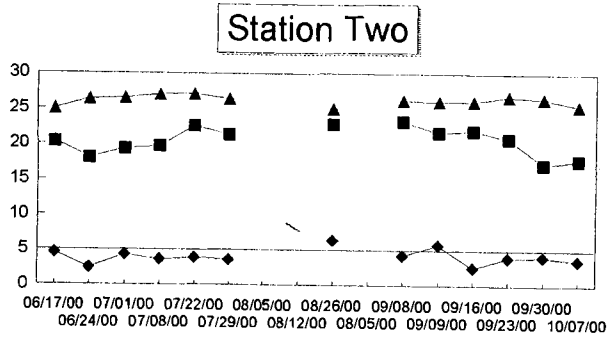


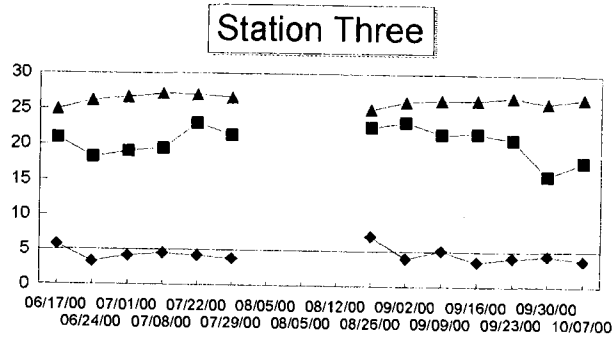
Graphs represent surface water dissolved oxygen, temperature, and salinity readings. Measurements were taken weekly from June through October

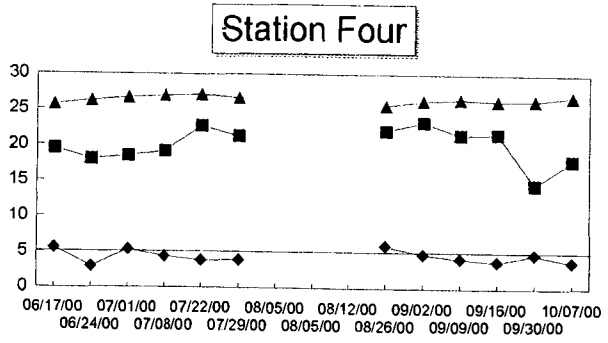
Milton Harbor

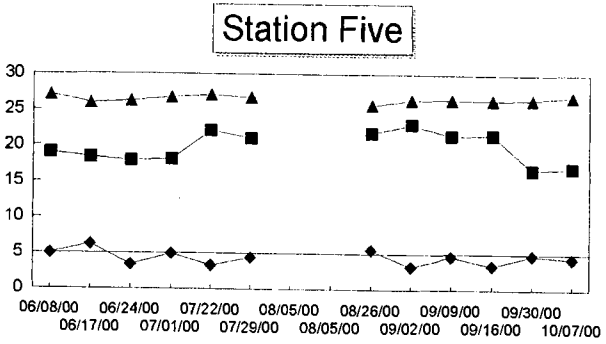


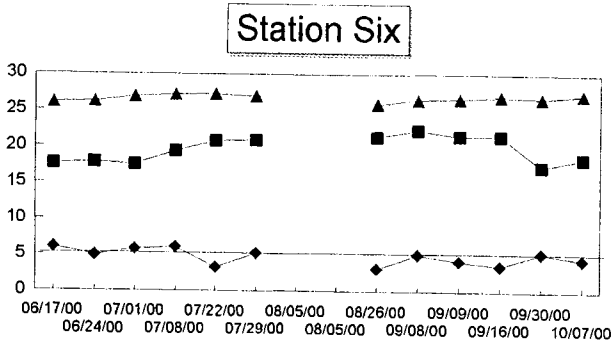






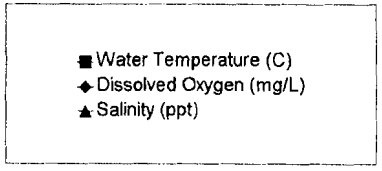


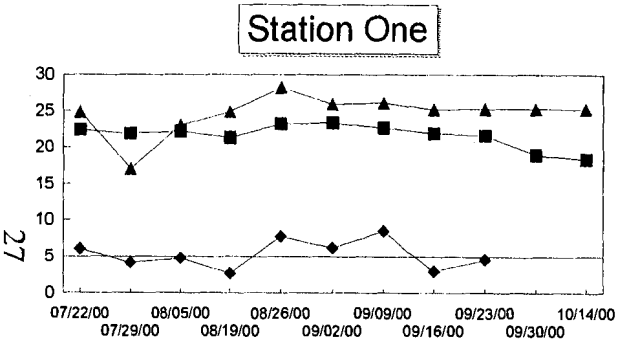


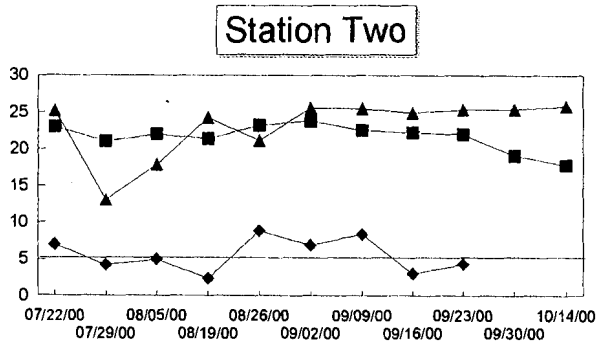


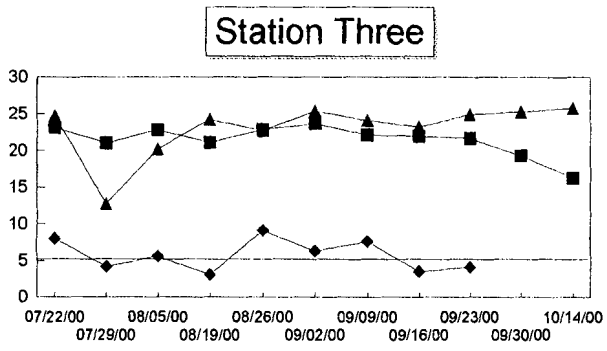
Graphs represent bottom water dissolved oxygen, temperature, and salinity readings. Measurements were taken weekly from June through October

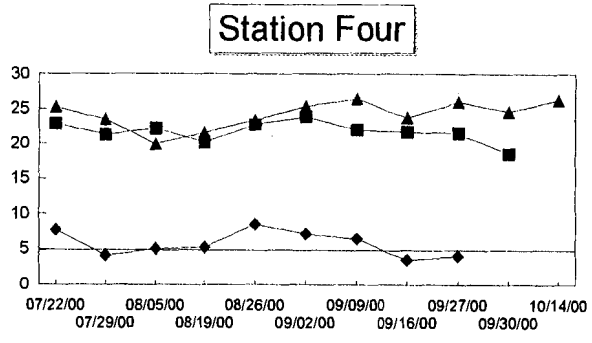
Mamaroneck Harbor

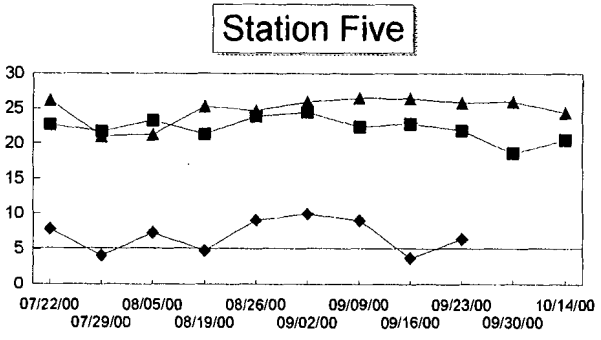






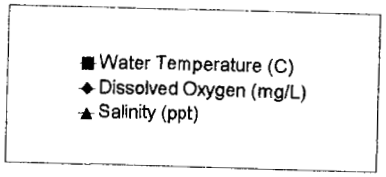


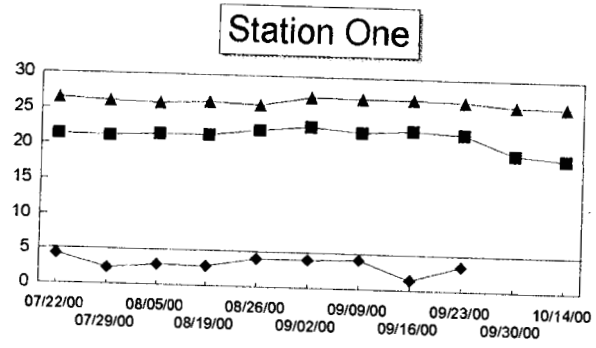


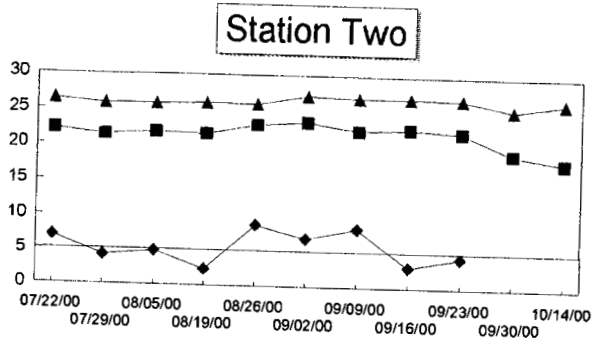


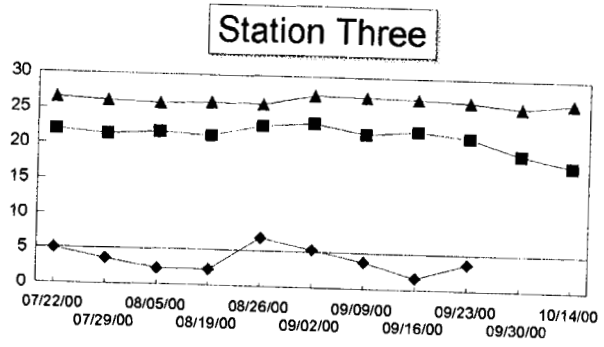
Graphs represent surface water dissolved oxygen, temperature, and salinity reasings. Measurements were taken weekly from July through October, 2000.

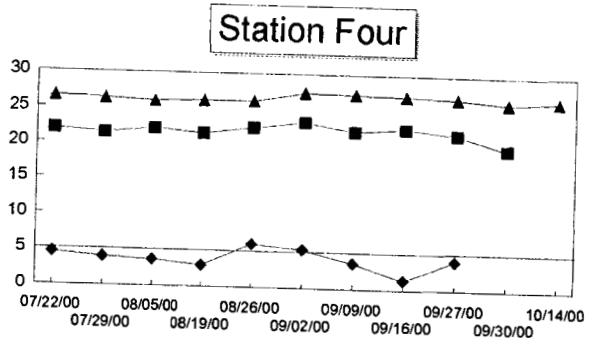
Mamaroneck Harbor

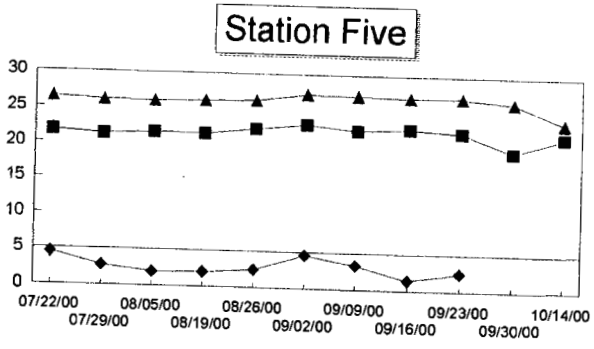






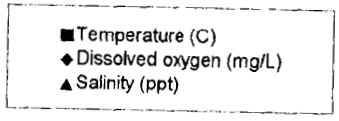


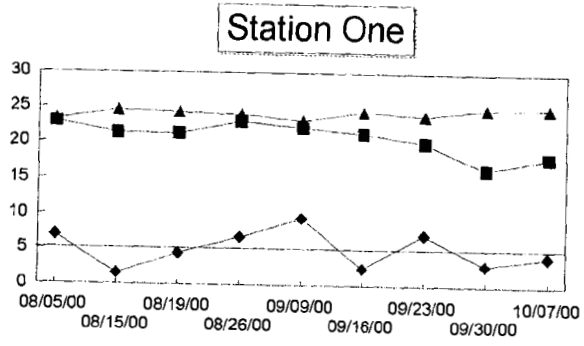


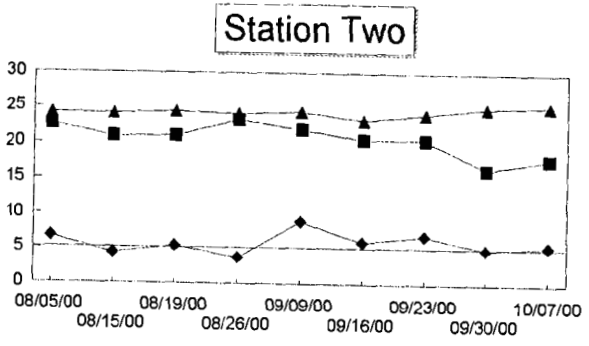


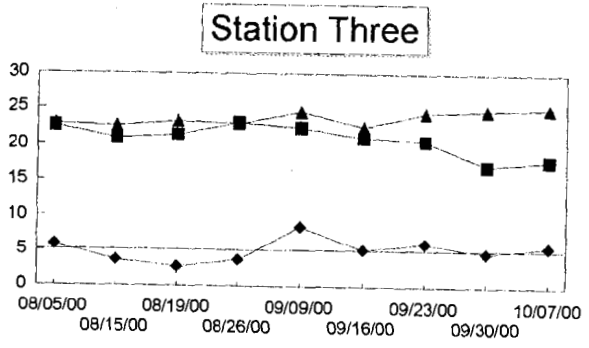
Graphs represent bottom water dissolved oxygen, temperature, and salinity reasings. Measurements were taken weekly from July through October, 2000.

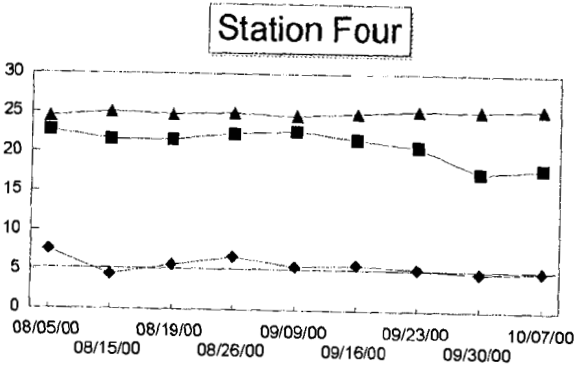
Manhasset Bay





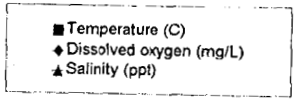


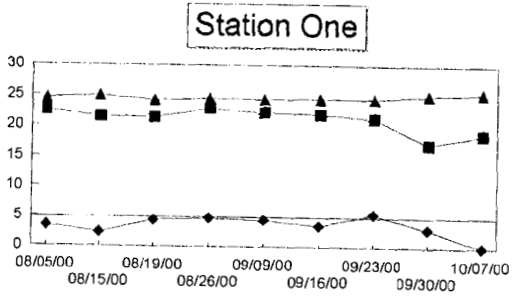


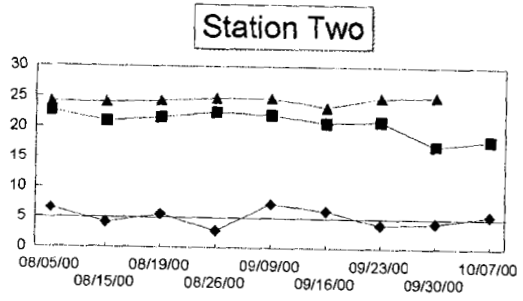


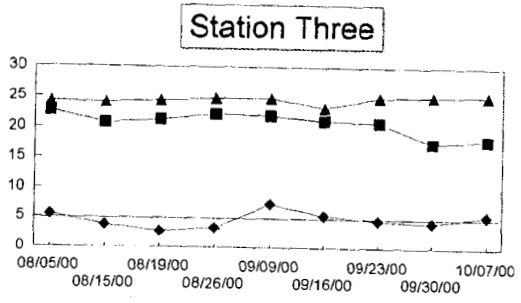
Graphs represent surface water dissolved oxygen, temperature, and salinity.

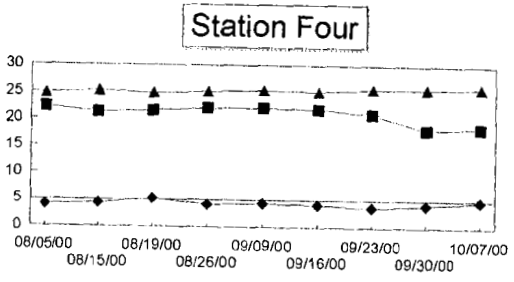
Manhasset Bay











Graphs represent bottom water dissolved oxygen, temperature, and salinity.

Nutrient and Chlorophyll Analysis for Guilford Harbor

For the 2000 testing season, chlorophyll analysis and nutrient samples were taken in addition to the normally performed water quality tests.

Methods

Guilford Harbor was tested weekly May through October, 2000. Surface and bottom measurements included dissolved oxygen (DO), salinity, temperature, and Secchi depth in all harbors. Photo-synthetic pigment chlorophyll *a* was also sampled at the surface and analyzed as a measure of algal biomass.

A Hydrolab H20 Multiprobe was used to measure DO, salinity, temperature, and pH. The instrument automatically adjusted DO readings for salinity and temperature, and adjusted salinity readings for temperature. No additional calculations were used to correct these values. The volunteers air calibrated the multiprobe before they began each testing session. Each day the DO probe was also checked for air bubbles and the membrane was changed, if necessary.

Temperature readings the meter was checked against a LaMotte thermometer. The meters and probes were cleaned and/or sent to the manufacturer for repairs if the calibration readings were greater than the factory accuracy of the meters.

Water samples for chlorophyll *a* analysis were collected using a Van Dorn sampler. Water samples were taken 1.0 m below the surface of the water. The mixed water sample was filtered on the boat through a Whatman GF/F (0.45 micrometer (um)) glass fiber filter using a Nalgene filter manifold and hand pump. The volume of water filtered was determined by comparing the color on the filter to a color chart after a dark green or dark brown color was reached on the filter paper. The filter apparatus was rinsed three times with distilled water after each use. The filter was placed in a foil packet, labeled, and stored on ice until it was transferred to the laboratory freezer. Any samples held longer than three weeks in the laboratory were noted in the sample log book as such, since there may be possible degradation of the chlorophyll in those samples (Greenberg *et al.*, 1992).
Chlorophyll *a* extraction and analysis was performed at Save the Sound's water quality laboratory by a member of the research staff or by trained volunteers following *Standard Methods* protocols (Greenberg *et al.*, 1992). Pigments were extracted after grinding the filter with a Teflon pestle in a 55.0 milliliter (ml) grinding tube with a 90% aqueous acetone solution. The samples were clarified in a centrifuge for 20 minutes, then analyzed using a Perkin Elmer Lambda 11 UV/VIS Spectrometer with a 2.0 nanometer (nm) band width. A band width of 2.0 nm is necessary since chlorophyll has a narrow absorption peak and a larger-sized band width would underestimate the chlorophyll *a* concentration (Greenberg *et al.*, 1992). The following exception to *Standard Methods* was performed: after being clarified, the samples were resuspended and centrifuged two more times to insure 99.1% retrieval of chlorophyll *a* as outlined in Save the Sound's laboratory operational parameters report (Kuntz, 1995a). Chlorophyll concentrations were corrected for pheophytin *a* (inactive or "dead" chlorophyll with no magnesium atom in its molecular structure) so that chlorophyll *a* values were not overestimated (Greenberg *et al*, 1992). The correlation between dissolved oxygen and

chlorophyll *a* was calculated using Lotus 1-2-3 version 5 and the correlation coefficient (r) was compared to critical values to determine statistical significance at the 1% level (Rohlf and Sokal, 1981).

Water samples were also taken for nutrient analysis. Volunteers followed the same procedures nutrient samples as chlorophyll *a* samples. Samples were stored in opaque sterilized sampling bottles and stored on ice until they were taken to the Coastal Environmental Research Facility at the University of Connecticut-Avery Point. Samples were then analyzed for DIP, NOX, and NH3.

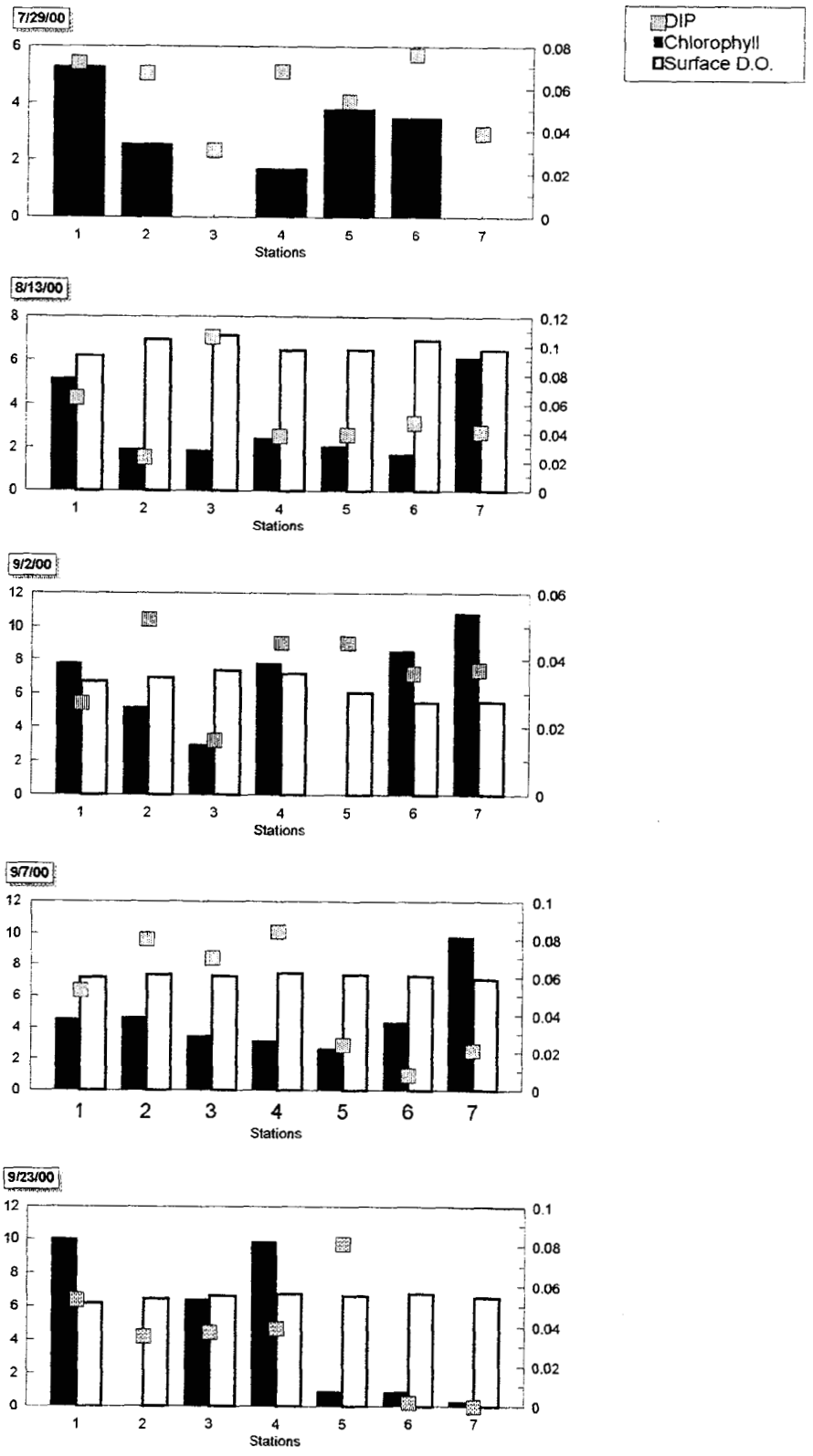
All of Save the Sound's laboratory equipment was calibrated at the beginning of the testing season and at regular intervals to maintain the accuracy of all readings as outlined in Save the Sound's laboratory quality assurance manual (Kuntz, 1995c). For procedures followed by staff at the Coastal Environmental Research Facility, please contact Jan Heitert at the University of Connecticut- 860-405-9229.

Project Results

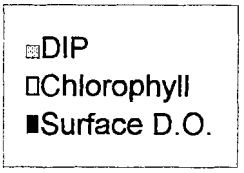
Results of this project are graphed as:

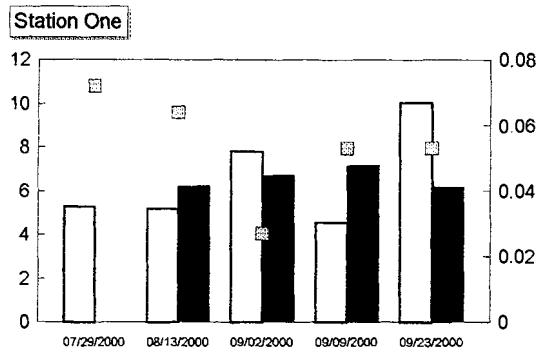
I. Chlorophyll *a* , Dissolved Inorganic Phosphorous (DIP), and Surface Dissolved Oxygen Surface D.O.) by date
II. Chlorophyll *a* , DIP, and Surface D.O. by stations
III. Nitrogen Oxide (NOX) and DIP by date
IV. NOX by date
V. DIP by date
VI. NOX by stations
VII. DIP by stations

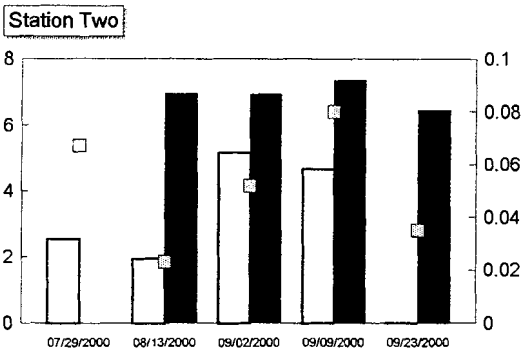
Guilford Harbor: Chlorophyll a, DIP, & Surface D.O. by Date

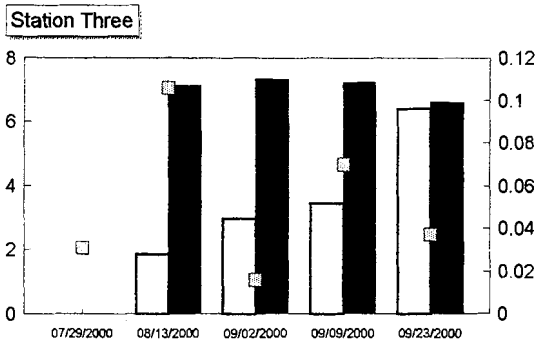


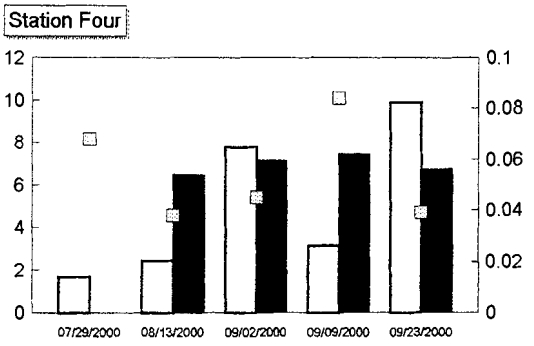
Guilford Harbor: Chlorophyll a, DIP, & Surface D.O. by Stations

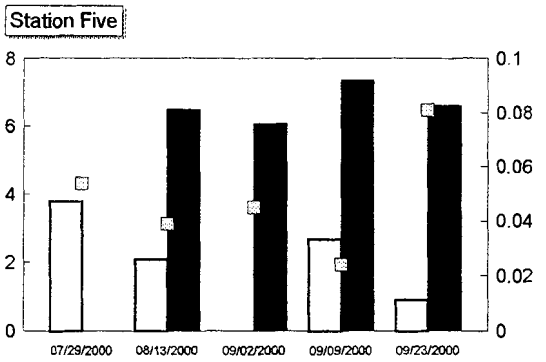


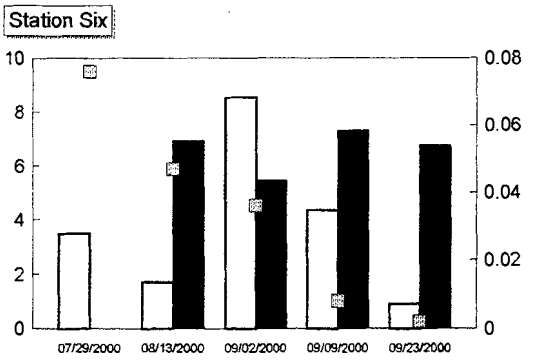


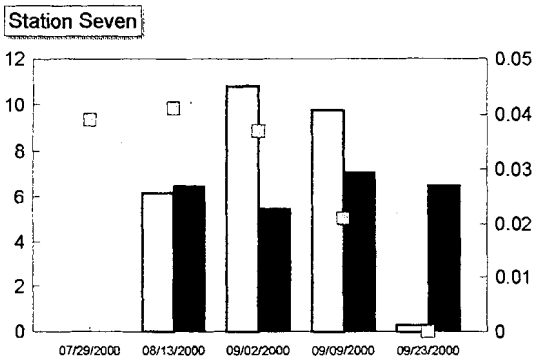






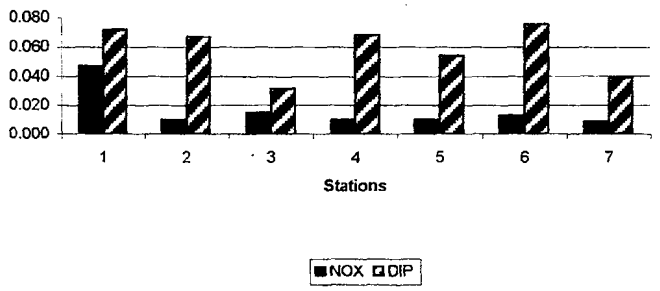






Guilford Harbor: NOX & DIP by Date

7/29/00



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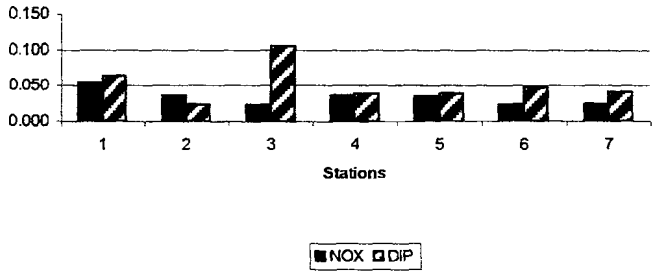

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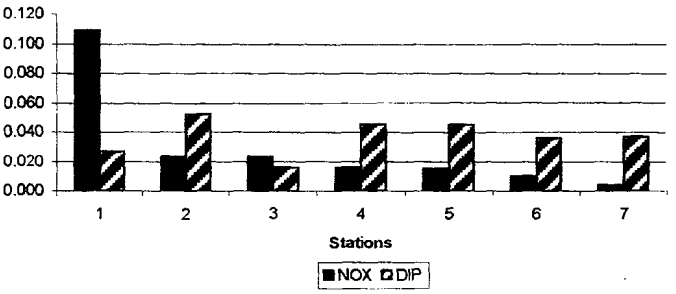

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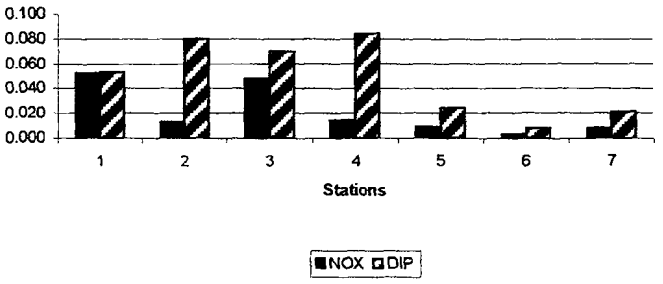

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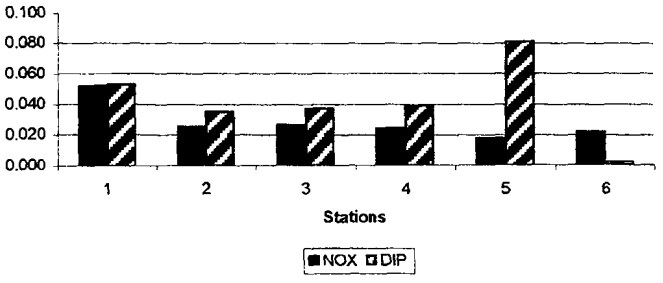
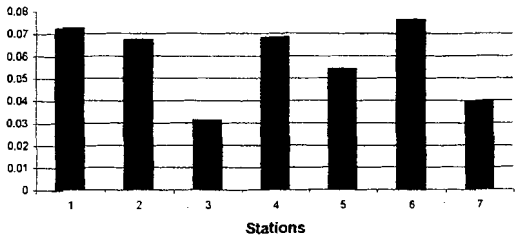


Guilford Harbor: DIP by date

7/29/00



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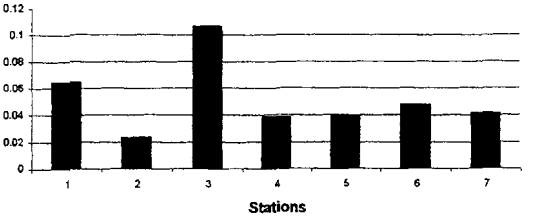

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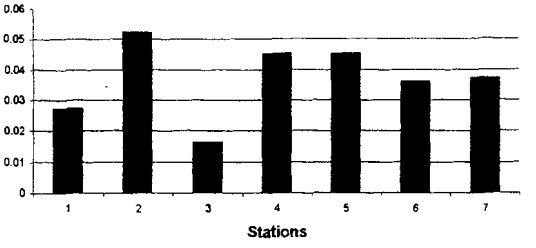

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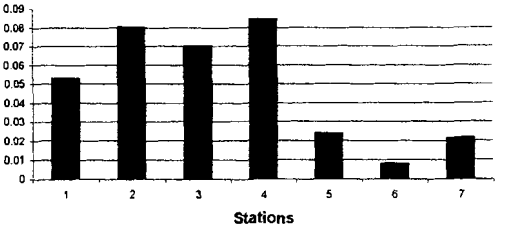

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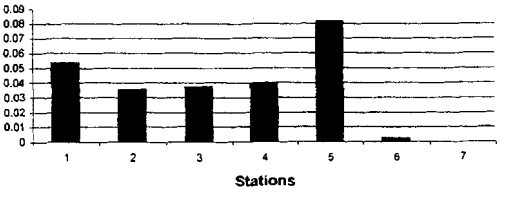
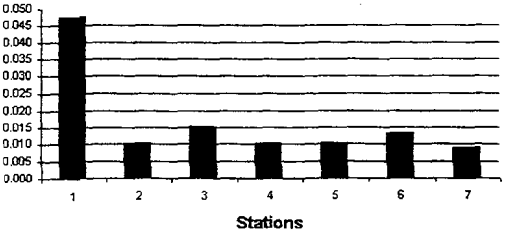
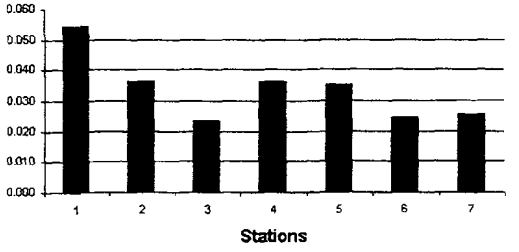


Guilford Harbor: NOX by Date

7/29/00



8/13/00



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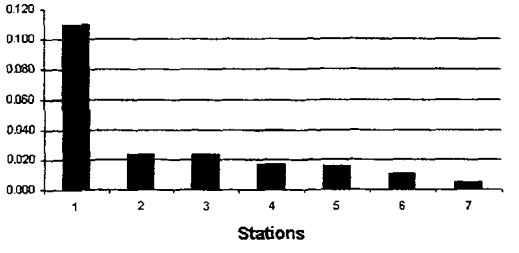

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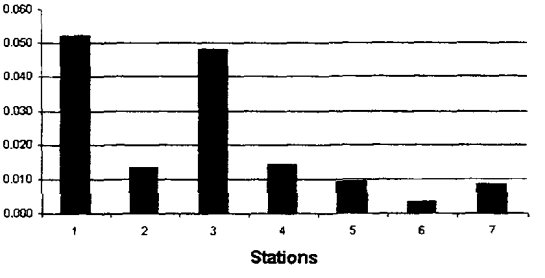

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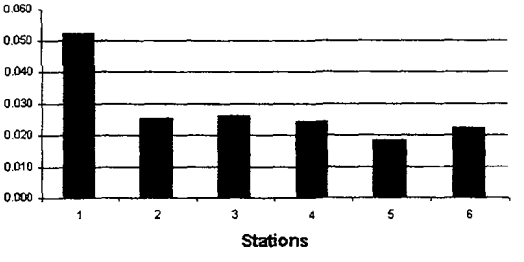
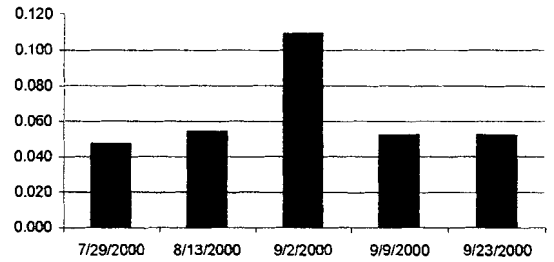
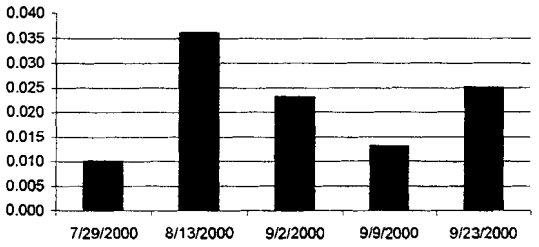


Guilford Harbor: NOX by Stations

Station One



Station Two



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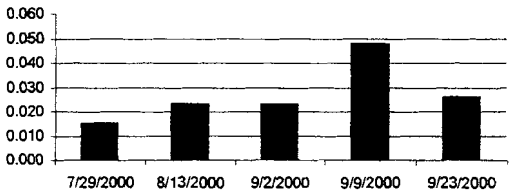

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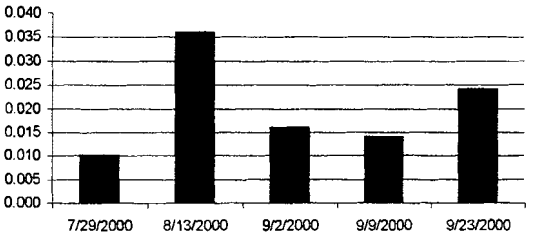

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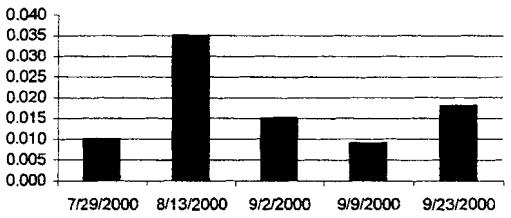

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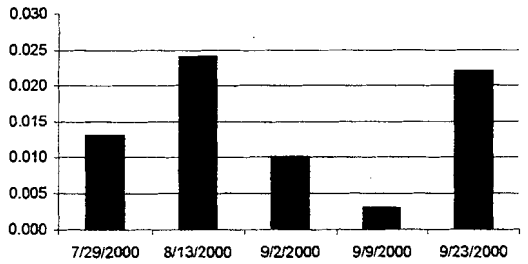

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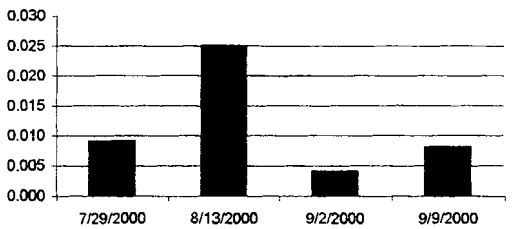

Guilford Harbor: DIP by Station

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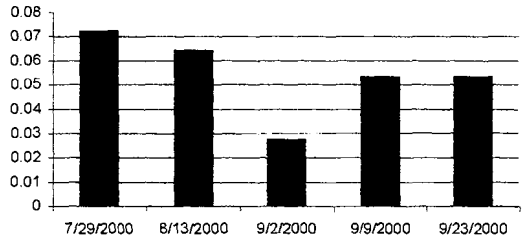

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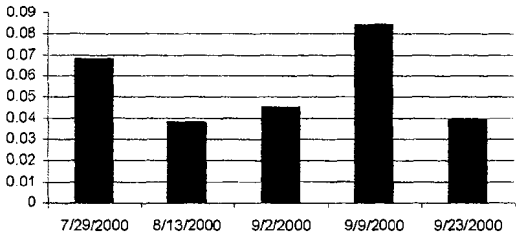

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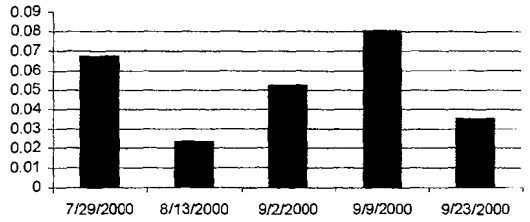

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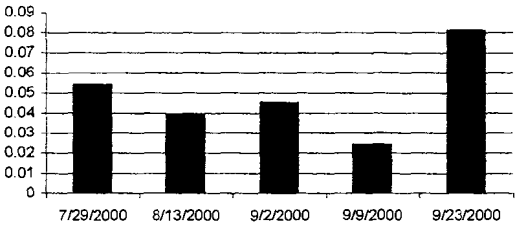

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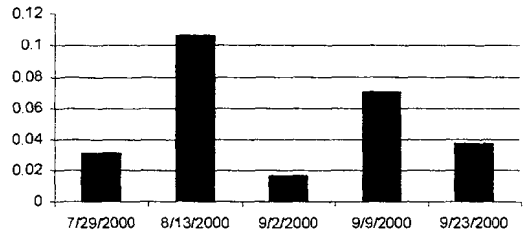

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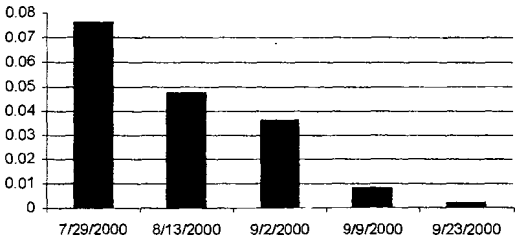

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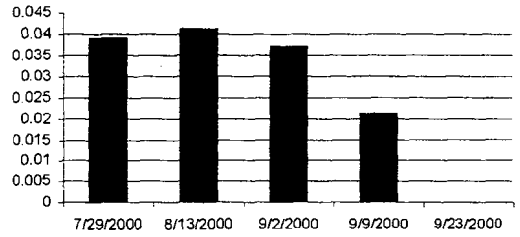

Discussion

Of the eight harbors that were tested during the 2000 season, those harbors that experienced the poorest water quality were harbors in the western end of Long Island Sound, Milton Harbor, Mamaroneck Harbor, and Manhasset Bay. Over the ten years that Save the Sound has been testing water, this trend has remained fairly constant. There are several possible reasons for this repeating trend.

Long Island Sound is an estuary. Salt water from the ocean mixes with freshwater from the rivers, the result is a semi-enclosed body of brackish water. The eastern end of Long Island Sound is flushed with each incoming and outgoing tide. New water is brought in, replenishing oxygen and flushing out pollutants. Concurrently, water from eastern LIS, containing nutrients and other pollutants, is pushed to the western end of the Sound contributing to their already existing water quality problems. In addition to this influence of the tides, a larger population and increased point and nonpoint source pollution contribute great amounts of nutrients that ultimately increase the incidences of hypoxia.

As a result, bottom waters in Long Island Sound's western harbors experienced poor water quality throughout much of the summer. Mamaroneck Harbor violated NY State Water Quality standards at least 8 times from mid-July to late September. Milton Harbor bottom waters experienced extremely poor water quality throughout the month of July and into August. And Manhasset Bay bottom waters violated State WQ Standards for most of the month of August.

Stamford Harbor and those harbors east experienced overall fair to good water quality throughout the testing season. Heavy rains during the month of July contributed to a short period of hypoxia in Stamford and Bridgeport harbors. Water quality was fair to good throughout the remainder of the season.

Overall water quality was better in summer 2000 when compared to summer 1999, mainly due to cooler weather temperatures. It is important to note that year to year comparisons can be made only by attributing improvements and degradations in water quality to changes in the weather. In order to identify trends in improving or degrading water quality, it is necessary to collect many years of base-line data so that a more accurate conclusion can be made on the status of the health of Long Island Sound.

Solutions to Long Island Sound water quality problems exist in sewage treatment plant upgrades, well-maintained septic systems, a reduction in run-off from over-fertilized lawns and impervious surfaces, and an increase in education throughout the Long Island Sound coastal and watershed communities.

For more information on Save the Sound's Water Quality Monitoring Program and results for the past ten years, please contact the Research Department at 888 SAVE- LIS.

Literature Cited

Altobello, M.A. 1992. *The Economic Importance of Long Island Sound's Water Quality Dependant Activities.* Report to EPA Region I. pp. 1-41.

Brosnan, T.M. and A.I. Stubin. 1992. Spatial and Temporal Trends of Dissolved Oxygen in the East Creek and Western Long Island Sound. In: *Proceedings from Long Island Sound Research Conference.* Southern Connecticut State University, New Haven, CT. pp.169-175.

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The Ocean Conservancy
Advocates for Wild, Healthy Oceans

LONG ISLAND SOUND STUDY
A Partnership to Restore and Protect the Sound

AGENDA

Volunteer Estuary Monitoring Workshop
October 25-26, 2001
Groton, Connecticut

(times and speakers subject to change)

October 25

Project Oceanology
Avery Point
1084 Shennecossett Rd.
Groton, CT 06340
Phone: 860-445-9007 or 800-364-8472
Fax: 860-449-8008

What to bring:

- *Information, documents, etc. about your program that you would like to share*
- *Travel reimbursement form*
- *Attire for field trip (e.g., old clothes, rain gear, waders if available)–prepare to get dirty!*
- *Monitoring equipment to undergo quality assurance checks*
- *Quality Assurance Project Plans (QAPPs) and QAPP questions*

8:00-8:30 Registration and Continental Breakfast

8:30-9:00 **Welcome and Overview**
Ron Ohrel, The Ocean Conservancy
Joe Hall, U.S. Environmental Protection Agency
Mark Tedesco, Long Island Sound Study

9:00-9:30 **Introductions**
All participants will have an opportunity to speak briefly–1-2 minutes–about what they hope to gain from the workshop and any aspect of their volunteer monitoring program. Topics could include interesting projects, educational materials developed, etc.

9:30-12:00 **Session I: Data Collection, Methodology, and Analysis**

9:30-10:15 Defining Questions and Objectives
Jenifer Thalhauser, Manhasset Bay Protection Committee

10:15-10:30 Break

10:30-11:15 Quality Assurance Procedures
Stephen DiMattei, U.S. EPA New England–Quality Assurance Unit
Arthur Clark, U.S. EPA New England–Quality Assurance Unit

11:15-12:00 Making Sense of It All: Data Management and Analysis
Mike Beauchene, Connecticut DEP

12:00-1:00 Lunch

1:00-1:30 STORET and SWIMS
Joe Hall, U.S. Environmental Protection Agency

1:30-1:45 Travel to Field Site

1:45-5:30 **Session II: Field Trip and Quality Assurance Breakouts**

(Three round robin breakouts; each breakout will be conducted simultaneously and repeated every 75 minutes; participants can choose the breakouts they want to attend and when to attend them.)

Breakout 1: Field Exercises

(Review of monitoring techniques and instruments.)

Field Exercise Leader(s):

Micki Weiss, Project Oceanology
Presenter to be determined

Breakout 2: Quality Assurance Checks

(Participants will discuss ways to check that equipment is calibrated and better ensure that sampling and analytical methods generate data that meets project needs. Participants may bring to the session their equipment or methods about which they have questions.)

Quality Assurance Check Leader(s):

Diane Switzer, U.S. EPA New England Regional Laboratory
Presenter to be determined

Breakout 3: Quality Assurance Project Plan Reviews

(Participants can bring their QAPP questions for consultation with QAPP experts.)

QAPP Review Leader(s):

Stephen DiMattei, U.S. EPA New England–Quality Assurance Unit
Arthur Clark, U.S. EPA New England–Quality Assurance Unit

5:30 **Adjourn**

6:30 Dinner: Best Western Sovereign Hotel
9 Whitehall Avenue
Mystic, CT 06355
Phone: 860-536-4281

Dinner Speaker:
Presenter to be determined

The Ocean Conservancy
Advocates for Wild, Healthy Oceans

LONG ISLAND SOUND STUDY
A Partnership to Restore and Protect the Sound

October 26

Project Oceanology
Avery Point
1084 Shennecossett Rd.
Groton, CT 06340
Phone: 860-445-9007 or 800-364-8472
Fax: 860-449-8008

What to bring:

- *Travel reimbursement form*

8:00-8:30 Registration and Continental Breakfast

8:30-8:45 **Welcome and Review of Yesterday**
Ron Ohrel, The Ocean Conservancy

8:45-11:30 **Session III: Data Presentation**

8:45-9:30 Case Study: Presenting Data to Different Audiences
Tony Williams, The Coalition for Buzzards Bay

9:30-11:00 Group Exercise: How Healthy is Long Island Sound?
(Attendees will be separated into different groups. Each group will be given data from a different embayment and be asked to determine what that data tell them about the health of that area. Later, all groups will be asked to come together and report out to the plenary. The group exercise leader will then lead everyone in trying to determine what each group's information tells us about the overall health of the Sound and how that information would be best conveyed to the general public and decision-makers.)

Group Exercise Leader:
Jerry Pesch, U.S. EPA, ORD

11:00-12:15 **Session IV: Program Management**

11:00-12:00 Media, Outreach, Publicity
Elizabeth Herron, Univ. of Rhode Island Watershed Watch Program
Paul Choiniere, The Day

12:00-1:15 Lunch

1:15-3:30 **Session IV (continued)**

1:15-2:00 Volunteer Recruitment, Training, Motivation, Incentives
Bill Shadel, Save the Sound

2:00-3:00 Fundraising
Michelle Payne, The Ocean Conservancy

3:00-3:15 **Workshop Wrap-Up**
Wrap-Up Discussion
Workshop Evaluations
Ron Ohrel, The Ocean Conservancy

3:15 **Adjourn**

Transition from a Hypoxia-Based Monitoring Plan
to an Ecosystem-Based Monitoring Plan
Draft Workshop Agenda
March 6-7, 2002

Wednesday, March 6

8:30-9:00 Coffee and Sign-In

9:00-9:15 Introduction, Welcome, and Purpose of Workshop, *Mark Tedesco, EPA*
Purpose: Discuss transition from a hypoxia-based monitoring focus to an ecosystem-based focus. Describe meeting structure and objectives.

9:15-9:45 Conceptual Framework for Ecosystem Monitoring, *Carlton Hunt, Battelle*
Purpose: Present conceptual framework of LIS ecosystem functions and interactions and lessons learned from Massachusetts Bay Monitoring Program.

9:45-10:15 Monitoring Long Island Sound: Current Programs and Products, *Lynn McLeod, Battelle*
Purpose: Summarize existing monitoring. Identify elements of ecosystem that are monitored and those that are not.

10:15-10:30 Break

10:30 –11:15 Monitoring Coastal Ecosystems on the National Level, *John Paul or Gerry Pesch, EPA/ORD*
Purpose: Present the EMAP approach to monitoring coastal ecosystems, results, and lessons learned.

11:15-11:45 Panel Discussions: Purpose and Expected Outcomes, *Carlton Hunt, Battelle*
Purpose: Review elements of ecosystem that are monitored and modeled and those that are not. Of those that are, are the spatial and temporal scales appropriate? Of those that aren't, what parameters would provide the most managerially useful information? Over what scales should they be measured? What new technologies should be considered?

11:45-1:00 Lunch (Possible lunch time talk on the MYSound program or the LISS Environmental Indicators)

1:00-2:00 Panel on Water Column Trophic Interactions: *Evan Ward, UCONN, Gary Wikfors, NMFS, Hans Dam, UCONN, Gordon Taylor, SUNY, Gerry Capriulo,*
Purpose: What measures of the rate and status of trophic interactions should be monitored? Over what time and space scales? What information on ecological condition will they provide and how can this information be used?

2:00-3:15 Panel on Near-shore Benthic Communities: *Milan Keser, Millstone, Roman Zajac, University of New Haven, Bob Cerrato, MSRC, Bob Whitlach, UCONN,*

3:15-3:30 Break

3:30-4:45 Panel on Living Resources: *Dave Simpson, CTDEP, Scott Warren, CT College, Dave Conover, MSRC, shellfish community (John Volk for contact) SAV + GIS mapping (Ron Rozsa contact),*
Purpose: Is monitoring of higher trophic levels adequate to manage recreationally or commercially important living resources? Is monitoring of habitats (e.g. SAV, tidal wetlands) adequate to support management?

Possible group dinner.

Transition from a Hypoxia-Based Monitoring Plan
to an Ecosystem-Based Monitoring Plan
Draft Workshop Agenda
March 6-7, 2002

Thursday, March 7

8:45-9:00	Coffee
9:00-9:45	Modeling Long Island Sound, *John St John or Jim Fitzpatrick, HydroQual* Purpose: Summarize Systemwide Eutrophication Model. Identify elements of ecosystem that are modeled and those that are not.
9:45-11:00	Panel on Modeling: *James Kremer, UCONN, Dominic DiToro, HydroQual, Bob Wilson, SUNY, someone familiar with contaminant modeling (e.g. NY/NJ Harbor), others?* Purpose: What enhancements to SWEM or new modeling initiatives are feasible and should be pursued? How will these enhancements aid management?
11:00-12:15	Panel on Contaminants: *Anne McElroy, SUNY, Johan Varekamp, Wesleyan, Ellen Mecray, USGS, Bruce Brownawell, MSRC, Nick Fisher, MSRC* Purpose: Are current contaminant assessments adequate? Are additional or new indicators advisable to identify risks and management responses?
12:15-1:15	Lunch
1:15-2:30	Panel on Synthesis/Next Steps: *Frank Bohlen, UCONN, Tom Morrissey, CTDEP, advocate for coastal observing systems, (e.g. Tom Malone, UMD), citizen advocate,(e.g. John Atkin), NOAA Marine Sanctuaries/Reserves contact* Purpose: What are the practical next steps for scientists, managers, and advocates to enhancing the monitoring of the ecological system of Long Island Sound? What enhancements should be priorities? How can Long Island Sound network and collaborate with other coastal monitoring and observing initiatives?
2:30–3:00	Workshop Summary, *Carlton Hunt, Battelle*

LONG ISLAND SOUND STUDY

Sound Health

STATUS AND TRENDS IN THE HEALTH OF LONG ISLAND SOUND

Sound Health: Status and Trends in the Health of Long Island Sound

Introduction to Long Island Sound and the Long Island Sound Study

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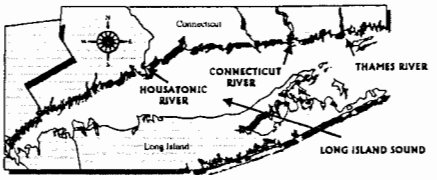
Photo by CT DEP

What is Long Island Sound?

Long Island Sound is an estuary, a place where salt water from the ocean mixes with fresh water from rivers draining from the land. Long Island Sound abounds in fish, shellfish, and waterfowl, providing feeding, breeding, nesting, and nursery areas for diverse animal and plant life.



Long Island Sound supports many recreational and commercial uses. More than 8 million people live in the Long Island Sound watershed and millions more flock yearly to the Sound for recreation. More than $5 billion is generated annually in the regional economy from boating, commercial and sport fishing, swimming, and beachgoing.

Long Island Sound
An Estuary of National Significance

1985 - The federal government and the states of Connecticut and New York initiated the Long Island Sound Study, a cooperative endeavor to analyze and correct the Sound's most pressing environmental problems.

1987 - Congress recognized the significance of preserving and enhancing coastal environments and established the National Estuary Program (NEP). Under this program, the Long Island Sound was designated an "Estuary of National Significance." Since its establishment, the NEP has expanded to include 28 estuaries throughout the United States, including the Long Island Sound.

1994 - The LISS Management Conference issued and began implementation of a Comprehensive Conservation and Management Plan to protect and preserve Long Island Sound.

What is the Long Island Sound Watershed?

The Sound's watershed, which is all the land from which water drains into the Sound, extends into Canada, and covers an area of about 16,000 square miles. About 11,000 square miles (71 percent) of the watershed is in the drainage basin of the Connecticut River.

The Long Island Sound watershed is inhabited by more than 8 million people. Any pollutants entering the water as a result of human activities in the watershed can ultimately enter Long Island Sound.

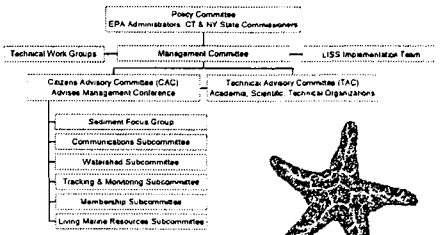
EPA, Office of Wetlands, Oceans, and Watersheds

What is the Long Island Sound Study?

The Long Island Sound Study (LISS) is a cooperative effort involving a variety of stakeholders representing citizen and environmental groups, business and industry, academic institutions, and local, state, and federal governments.

These stakeholders, collectively known as the LISS Management Conference, are working together to implement the Comprehensive Conservation and Management Plan.

LISS Management Conference



Comprehensive Conservation and Management Plan - 1994

- Water quality
  - Hypoxia – low dissolved oxygen
  - Toxic contaminants
  - Pathogens
  - Floatable debris
- Living resources
- Habitat restoration
- Land use and development
- Public involvement and education

CCMP Implementation Priorities

- Nitrogen reduction: 58.5% by 2014
- Habitat restoration: 2000 acres restored and 100 river miles opened for fish passage by 2008
- Watershed protection
  - Land use planning
  - Nonpoint source pollution
- Monitoring and research
- Public involvement and education

Long Island Sound Environmental Indicators Address These Questions:

Are the waters and sediments getting cleaner?

How is the landscape changing due to human activities?

How is the public involved in cleanup efforts?

Are fish and wildlife populations more abundant?

Are fish and wildlife habitats being protected and restored?

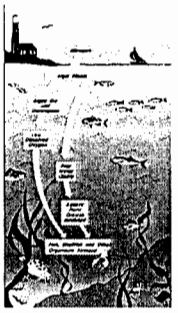
Are the Waters and Sediments Getting Cleaner?

Table of Contents

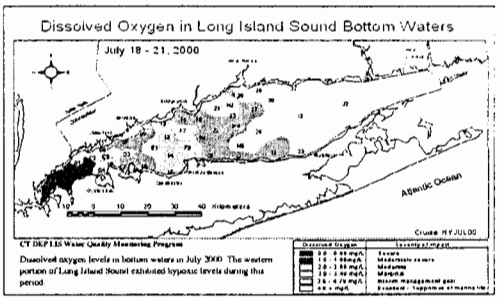
Photo by CT DEP

Hypoxia

- Dissolved oxygen (DO) levels gauge the overall health of the aquatic environment.
- When DO levels in the bottom waters of the Sound are low (a condition called hypoxia) to non-existent (anoxia), then the survival, reproduction, or use of an area by marine life is impaired.
- Food sources for commercially-valuable marine species are depleted.
- Marine species life cycle development may be impaired due to stress caused by hypoxia.
- The larger problem is over-fertilization of the Sound with nutrients, primarily nitrogen.
- Nitrogen fuels excessive algae growth. When the algae die and settle to the bottom of the Sound, the decay process uses up the available oxygen.
- In 1998, LISS adopted a 58.5 percent reduction target for nitrogen loads from human sources to the Sound over 15 years, with five and ten-year interim targets to assure steady progress.
- In 2001, the EPA approved Connecticut's and New York's strategy, called a Total Maximum Daily Load (TMDL), for achieving the reductions and allocating responsibility among nitrogen sources.



Dissolved Oxygen in Long Island Sound Bottom Waters

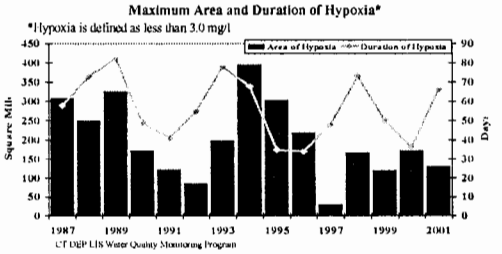


From mid-July through September, portions of Long Island Sound, particularly the bottom waters at the western end, experience low dissolved oxygen conditions known as hypoxia. The low levels of oxygen impair the feeding, growth, and reproduction of aquatic life. In extreme conditions, some organisms may suffocate and die, while others flee the hypoxic zones.

Dissolved Oxygen Levels

Maximum Area and Duration of Hypoxia*

*Hypoxia is defined as less than 3.0 mg/l

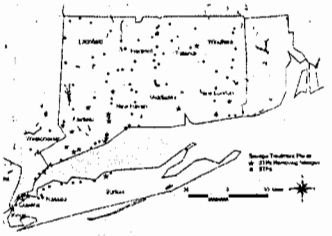


The severity of hypoxia depends on the size of the area affected, how long the condition persists, and how low the oxygen levels dip. The maximum area of hypoxia has averaged 201 square miles from 1987 through 2000, with a low of 30 square miles in 1997 and a high of 395 square miles in 1994. The duration of hypoxia has averaged 56 days during that same period, with a low of 34 days in 1996 and a high of 82 days in 1989.

Biological Nutrient Removal (BNR)

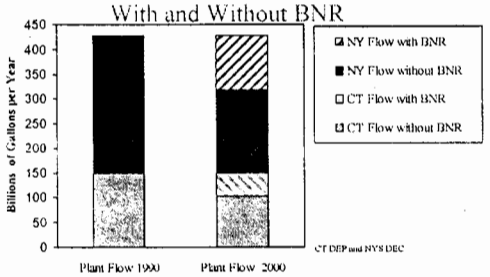
There are 105 sewage treatment plants (STPs) in CT and NY that discharge into the Sound or its tributaries. BNR systems to remove nitrogen are being phased in at selected STPs.

Both states have actively implemented actions and incentives to upgrade plants. Since 1990, 25 percent of the STPs have been upgraded to include BNR.



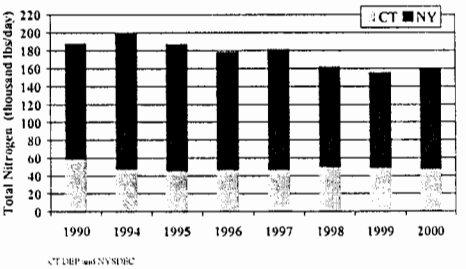
EPA New England

Sewage Treatment Plant Effluent With and Without BNR



In 1990, there were no STPs in Connecticut or New York using BNR to remove nitrogen from wastewater. In 2000, STPs in the two states treated more than 157 billion gallons of effluent with BNR to remove nitrogen from the waste stream.

Point Source Nitrogen Load



As a result of BNR upgrades to STPs, there has been a reduction of 19.2 percent in nitrogen loading to Long Island Sound from STPs over the past ten years.

Tributary Trends

(1981-88)

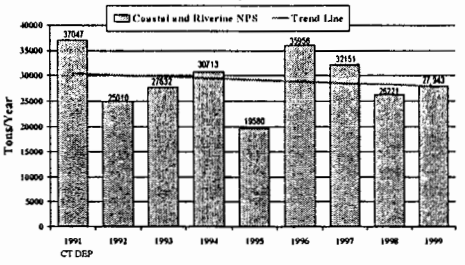
Constituent	Direction of Trend	Possible Environmental Causes of Detected Trends
Total Phosphorus	Downward	Wastewater treatment improvements, decline in agricultural land use, decline in use of detergents containing phosphorus
Total Nitrogen	Few Trends	Point discharges, nonpoint runoff, atmospheric deposition
Total Ammonia Nitrogen	Downward	Wastewater treatment improvements
Total Nitrite-plus-Nitrate	Few Trends	Point discharges, nonpoint runoff, atmospheric deposition, conversion of ammonia to nitrate in wastewater treatment facilities
Chloride	Upward	Point discharges, road salt in nonpoint runoff
Fecal Coliform Bacteria	Downward	Wastewater treatment improvements, improved agricultural management practices

Trench, E.C.T., and Kontzendorfer, D.A., 1997, Trends in Surface-Water Quality in Connecticut, U.S. Geological Survey Fact Sheet FS-133-97, 4p

Several trends - total phosphorus, total ammonia nitrogen, and fecal coliform bacteria - indicate improvements in stream water quality related to improved wastewater treatment. Other trends, such as chloride, indicate subtle but widespread deterioration in water quality related to statewide increases in human use of land and water resources.

LISS: Sound Health

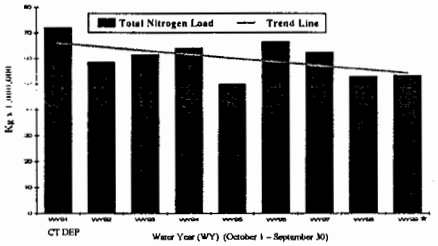
River and Coastal Nonpoint Source Pollution



Nitrogen loading from nonpoint sources in the watershed fluctuate on an annual basis mainly due to variations in precipitation. But, overall, there has been a reduction of nitrogen from nonpoint sources. River data are estimates based on the sampling data from river gauging stations and include nitrogen from point and nonpoint sources upriver and outside Connecticut's border.

LISS: Sound Health

Estimated Total Nitrogen Load from all Sources

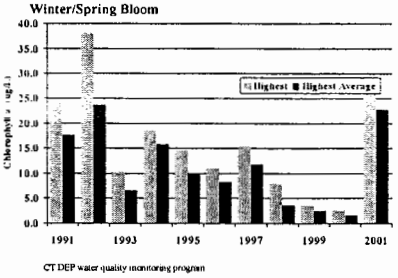


Nitrogen enters Long Island Sound from a variety of point and nonpoint sources - sewage treatment plants, septic systems, stormwater runoff – all a result of human activity. Nitrogen is also found as a natural component of the Sound's physical environment. The overall trend in the past decade has been decreasing nitrogen discharges from point and nonpoint sources.

LISS: Sound Health

Chlorophyll-a in Western Long Island Sound

Winter/Spring Bloom



The concentration of chlorophyll-a, the green pigment in phytoplankton, is used to represent the levels of phytoplankton in surface water. Phytoplankton levels are affected by a number of factors such as temperature, light, nitrogen levels, and zooplankton grazing.

Reducing the amount of nitrogen entering the Sound is expected to reduce chlorophyll-a levels and result in improved water clarity and higher oxygen levels. For western Long Island Sound, the most sensitive region of the Sound, chlorophyll-a levels during the winter/spring bloom declined from 1992 to 2000, but increased in 2001.

LISS: Sound Health

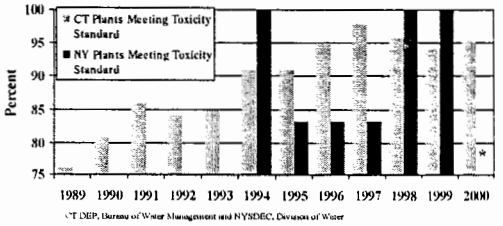
Toxic Contaminants

- Long Island Sound: resource and disposal site since industrialization began.
- Measurable quantities of contaminants exist in sediments dating back to the mid-1800s.
- Quantities for some contaminants have increased over time, new contaminants have been added, and amounts of some have decreased in response to regulatory action.

Today, the major sources of toxic chemicals to Long Island Sound are STPs, industrial discharges, urban stormwater, and atmospheric deposition. Federal and state programs strive to reduce toxic chemical discharges to the Sound and to minimize the toxicity of effluents from STPs and industries.

LISS: Sound Health

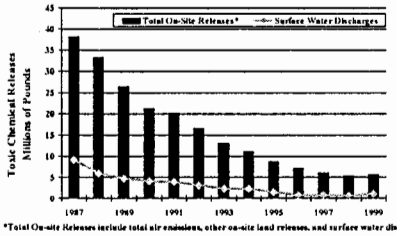
Percent of Municipal Treatment Plants Tested to be Non-Toxic



In 1989, the effluent from 76 percent of Connecticut STPs tested was non-toxic. In 2000, 95 percent were non-toxic, a 76 percent reduction in the number of facilities discharging a potentially toxic effluent. In 1998 and 1999, no New York municipal treatment facilities discharging to the Sound exhibited toxicity. In 2000, one New York municipal facility failed one out of four of each quarterly acute and chronic tests respectively, thereby resulting in its overall toxic classification.

LISS: Sound Health

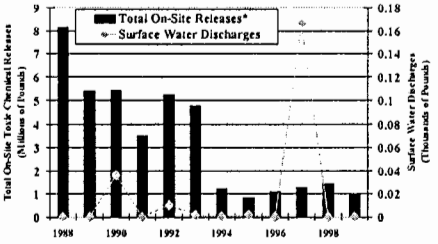
Connecticut Industrial Chemical Discharges



*Total On-site Releases include total air emissions, other on-site land releases, and surface water discharges.
EPA 1999 Toxics Release Inventory

The Emergency Planning and Community Right to Know Act of 1986 requires facilities in the United States to report releases to the environment of more than 600 designated toxic chemicals. The EPA maintains the Toxics Release Inventory, a national database that identifies the chemicals manufactured and used at industrial facilities and the annual amounts of these chemicals released in waste. Overall, toxic releases in the Sound's watershed have declined relative to the late 1980s. This is consistent with toxic releases throughout the country.

New York Industrial Chemical Discharges



*Total On-Site Releases include total air emissions, other on-site land releases, and surface water discharges.
EPA 1999 Toxics Release Inventory

The noticeably high figure for water discharges in 1997 was primarily due to one facility which released 165,000 lbs. Overall, toxic releases in the New York portion of the Long Island Sound have declined with respect to the late 1980s. This is consistent with toxic releases throughout the state.

Contaminant Trends in Mussels

(Since 1986)

NOAA National Status and Trends Program

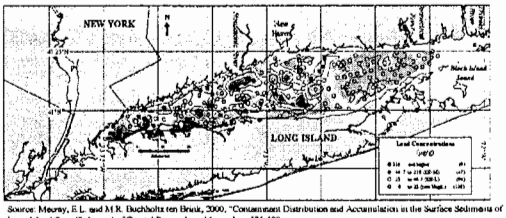
Contaminant Trends in Mussels

Site	As	Cd	Cu	Hg	Ni	Pb	Se	Zn	Chlor	DDT	Dield	PCB	PAH	BT
Connecticut River	⟷	⟷	⟷	⟷	⟷	⟷	⟷	⟷	⟷	⟷	⟷	⟷	⟷	⟷
New Haven	⟷	⟷	⟷	⟷	⟷	⟷	⟷	⟷	⟷	⟷	⟷	↓	⟷	⟷
Housatonic River	⟷	↓	⟷	⟷	↓	⟷	⟷	⟷	↓	⟷	⟷	⟷	↓	⟷
Sheffield Island	⟷	↓	⟷	⟷	⟷	⟷	⟷	⟷	↓	↓	⟷	⟷	⟷	⟷
Mamaroneck	⟷	↓	⟷	⟷	⟷	⟷	⟷	⟷	↓	↓	⟷	⟷	⟷	⟷
Throgs Neck	⟷	↓	↓	⟷	⟷	⟷	⟷	↑	⟷	↓	⟷	↓	⟷	⟷
Hempstead Harbor	⟷	↓	⟷	⟷	↓	↓	⟷	↓	↓	↓	⟷	↓	⟷	⟷
Huntington Harbor	⟷	⟷	⟷	⟷	⟷	⟷	⟷	⟷	⟷	⟷	⟷	↓	⟷	⟷
Port Jefferson Harbor	↓	⟷	↓	⟷	⟷	⟷	⟷	⟷	⟷	⟷	⟷	↓	⟷	⟷

As=Arsenic, Cd=Cadmium, Cu=Copper, Hg=Mercury, Ni=Nickel, Pb=Lead, Se=Selenium, Zn=Zinc, Chlor=Total Chlordane, DDT=Total DDT, Dield=Total Dieldrin, PCB=Total Polychlorinated Biphenyls, PAH=Total Polycyclic Aromatic Hydrocarbons, BT=Total Butyl Tin

⟷ No Trend | ↓ Decreasing Trend | ↑ Increasing Trend

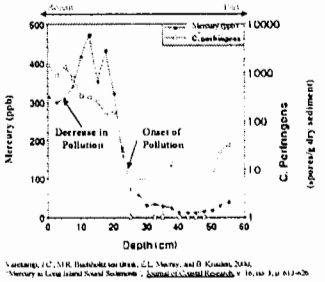
Lead in Surface Sediments



Source: Mecray, E.L. and M.R. Buchholtz ten Brink, 2000, "Contaminant Distribution and Accumulation in the Surface Sediments of Long Island Sound", Journal of Coastal Research, v. 16, no. 3, p. 575-590

The concentrations of lead and other metals in bottom sediments are generally higher in the western Sound and lower in the bottom-scoured regions of the eastern Sound. This is primarily due to both the locations of pollutant sources and the westward transport of contaminants associated with fine-grained particles.

Mercury Concentrations in Sediment



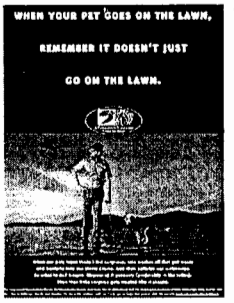
Varekamp, J.C., M.R. Buchholtz ten Brink, E.L. Mecray, and B. Kreulen, 2000, "Mercury in Long Island Sound Sediments", Journal of Coastal Research, v. 16, no. 3, p. 613-626.

Mercury concentrations in the upper 10-15 cm of sediment have decreased, reflecting reductions in mercury sources in recent decades. *Clostridium perfringens*, an indicator of sewage-derived pollution, mirrors the continued increases in population around the Sound.

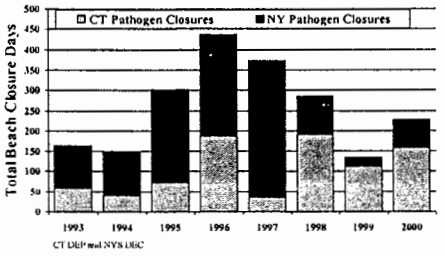
Pathogens

- Pathogens are disease-causing bacteria and viruses.
- Pathogens enter the Sound from inadequately treated human sewage and domestic and wild animal wastes.
- Primary sources of pathogens:
  - older sewer systems that have combined stormwater and sanitary systems that overflow during rainfalls (called combined sewer overflows).
  - failing septic systems.
  - illegal connections to storm sewers.
  - STP malfunctions, and
  - vessel sewage discharges.

To protect public health, beaches are periodically closed, and many of the Sound's prime shellfish beds are closed, due to indications of pathogen contamination.



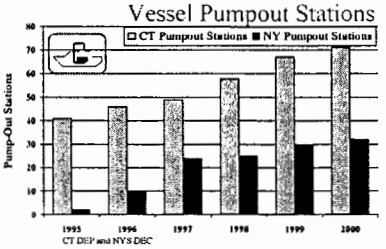
Beach Closure Days



There are 240 monitored beaches along Long Island Sound (131 in Connecticut and 109 in New York) that provide valued recreational opportunities. Yearly variations in closures are a product of rainfall patterns and incidents such as sewer-line ruptures. As an example, a relatively dry summer in 1999 led to significantly fewer closings than in 2000 or previous years.

LISS: Sound Health

Vessel Pumpout Stations



In 1995, there were 43 vessel pumpout stations in the Sound. Five years later, there were 103, more than a two-fold increase in locations.

The Federal Clean Water Act requires all boats with an installed head to have a Coast-Guard approved marine sanitation device (MSD) attached to the toilet. The MSD addresses the problem of nonpoint sources of pollution, specifically floatable debris, pathogen contamination, and nutrient loading to Long Island Sound. Both states have utilized Clean Vessel Act funding to provide grants to marinas for installation of boat waste pumpout facilities. Both states also have mobile pumpout vessels that provide service to boaters. In the Sound, the only legal means of disposing of untreated sewage is through a pumpout facility.

LISS: Sound Health

Floatable Debris

- Trash floating in coastal waters and bays or washed up on the beach
- Reduces the enjoyment of the Sound, can be a nuisance or hazard for boaters, and can harm wildlife
- The ultimate source of floatable debris is people who litter and improperly dispose of their waste
- Litter is carried to the Sound primarily from stormwater discharges and combined sewer overflows, New York Harbor and tributaries to the Sound, and shoreline visitors and boaters

Floatables Management:

- Reduce the flow of litter from its major sources
- Collect and pick it up once it is in the Sound
- Changing people's behavior and attitude towards litter is the most effective way to combat the problem

LISS: Sound Health

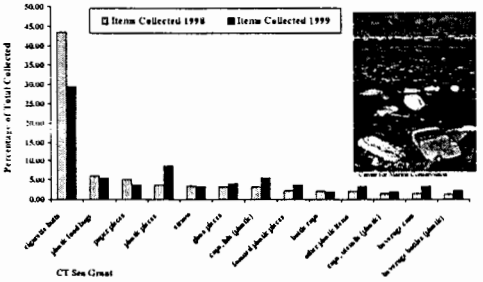
International Coastal Cleanup

- International Coastal Cleanup is a global project of the Center for Marine Conservation.
- Mission:
  - remove debris from the shorelines, waterways, and beaches of the world's lakes, rivers, and the ocean AND collect valuable information on the amount and types of debris
  - educate the public on marine debris issues
  - encourage positive changes to reduce debris in waterways and enhance aquatic environments

International Coastal Cleanup takes place annually during the third weekend of September. During that weekend, volunteers from Connecticut and New York remove and document the trash that they find on beaches and shorelines. Data compiled from beach cleanups are used to identify sources of marine debris. People are the problem, but people are also the solution.

LISS: Sound Health

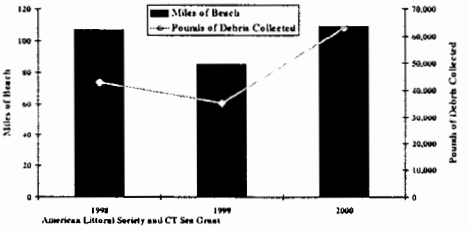
Composition of Debris Collected in Connecticut



Plastics, light-weight and durable, account for more that 50% of all marine debris. By examining the numbers of items collected alone, cigarette butts far outnumber any other kind of debris collected.

LISS: Sound Health

Pounds of Debris and Miles of Beach Cleaned Around Long Island Sound



An estimated 14 billion pounds of debris were once dumped into the ocean every year. The MARPOL treaty of 1988 made much of ocean dumping illegal. During Coastal Cleanup weekend in September 2000, volunteers in Connecticut and New York cleaned more than 100 miles of beach and collected nearly 63,000 pounds of debris. But laws alone are not enough to stop pollution before it begins. Compliance, enforcement, and education are crucial components of long-term trash education.

LISS: Sound Health

Are Fish and Wildlife Populations More Abundant?

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Shellfish
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- Hard Clam Harvest
- Lobster Landings

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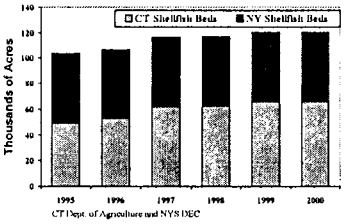
- Bluefish Abundance
- Winter Flounder Abundance
- Tautog Abundance
- Striped Bass Abundance

Coastal Bird Populations
- Osprey Nesting Adults
- Piping Plover Nesting Adults
- Least Tern Nesting Adults

LISS: Sound Health

Acreage/Classification of Shellfish Beds

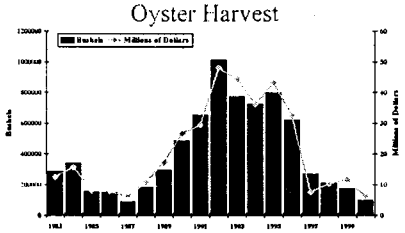


CT Dept. of Agriculture and NYS DEC

More than 65,000 acres of shellfish grounds are cultivated in Connecticut's coastal water by the aquaculture industry with additional acres cultivated in New York. This number includes beds under cultivation for harvesting or for growing stock. Of the beds that are used for harvesting, approximately 80% are approved or conditionally approved and the remaining 20% are restricted or conditionally restricted.

LISS: Sound Health

Oyster Harvest



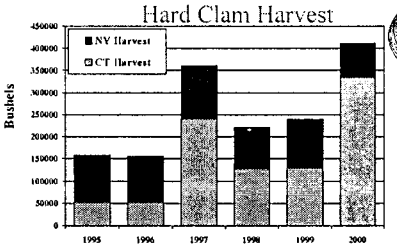
CT Dept. of Agriculture, Bureau of Aquaculture and NYS DEC Shellfish Division

The oyster is, by far, the most economically important shellfish harvested from Long Island Sound. The volume of oyster and other shellfish harvests is indicative, in part, of improved water quality and successful oyster culture practices.

The oyster harvest peaked in 1992 and has declined since mainly due to two parasitic diseases, MSX and Dermo, that have decimated the oyster. Nevertheless, oysters continue to endure changing conditions in the Sound. Officials, scientists, and citizens are working together to develop oyster habitats, such as constructed reefs, as well as disease-resistant oysters. During 2000, Oyster Bay, NY, lived up to its name by producing 82% of the NY State oyster harvest.

LISS: Sound Health

Hard Clam Harvest

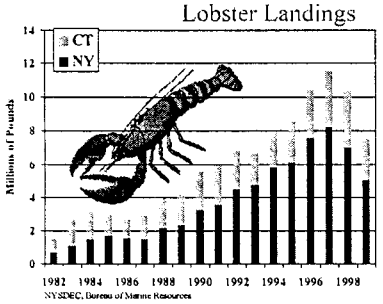


CT Dept. of Agriculture and NYS DEC

Hard-shell clams are another commercially-important shellfish harvested from Long Island Sound. When they are small, they are known as "little necks" or "cherrystones" and may be eaten raw if taken from unpolluted waters. Larger clams or "quahogs" are eaten cooked.

LISS: Sound Health

Lobster Landings



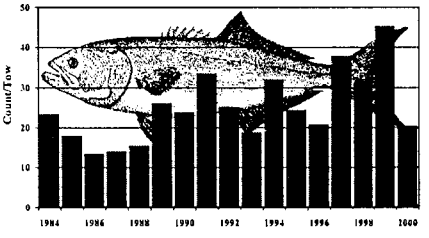
NYSDEC, Bureau of Marine Resources

Lobsters are by far the most commercially important species of crustacean in Long Island Sound. There are about 900 licensees from New York and another 400 in Connecticut who earn a living fishing for lobster.

Over the past two decades, there was a tremendous increase in lobster landings, with the peak occurring in 1997. However, over the last two years, a die-off of lobsters, most severely in the western Sound, has reduced the harvest. Research is underway to understand the causes of the die-off.

LISS: Sound Health

Bluefish Abundance

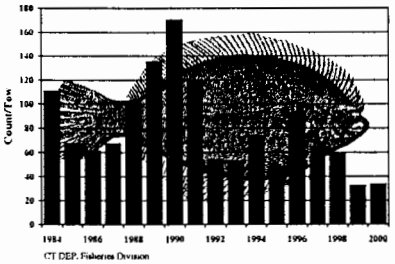


CT DEP, Fisheries Division

Bluefish are one of the more highly migratory of Long Island Sound's principal fishery resources. Availability of prey in the Sound, exploitation elsewhere, and oceanography all have a substantial effect on the abundance and distribution of bluefish and their availability in the Sound. Currently, the bluefish is considered overfished throughout its range and additional management options are being considered.

LISS: Sound Health

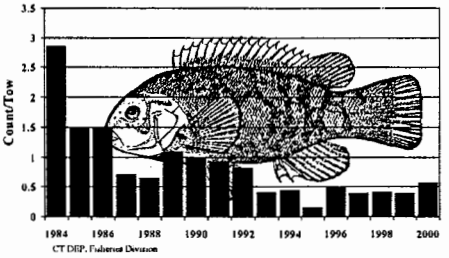
Winter Flounder Abundance



Winter flounder is a commercially and recreationally important species that resides in Long Island Sound waters. Winter flounder was severely overfished in the 1980s. The fishery has been recovering in response to restrictive management measures. While stocks have shown modest improvement in the last three years, they remain far below the long-term average.

LISS: Sound Health

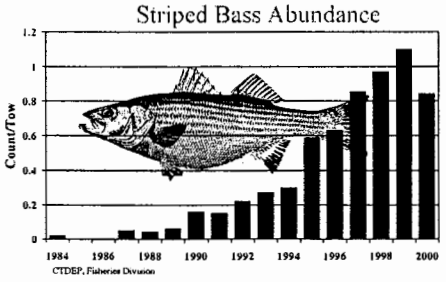
Tautog Abundance



Tautog, or blackfish, find the rocks and boulders left by glacial deposition in Long Island Sound an ideal "reef" habitat. Continuing low tautog counts indicate that the species has not yet responded to more stringent management measures that were implemented in 1997.

LISS: Sound Health

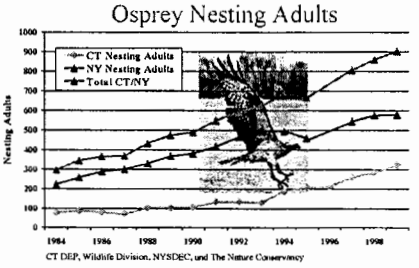
Striped Bass Abundance



Striped bass is another economically important species of finfish that was at lower abundance in the mid 1980s but has been increasing. Striped bass were the first species to be targeted for stock rebuilding, beginning in 1984. Restrictive harvest limits and larger minimum size restrictions over the last 15 years allowed the stock to grow to unprecedented levels. In 1995, the striped bass was declared "officially recovered" and no longer overfished.

LISS: Sound Health

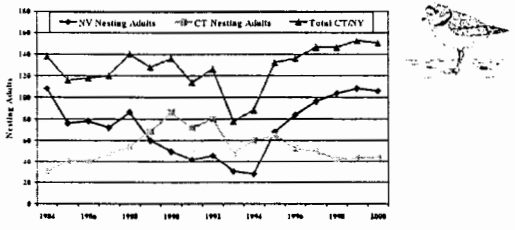
Osprey Nesting Adults



The osprey population around Long Island Sound fell sharply during the 1950s and 1960s due to the effects of pesticides, particularly DDT. Since the ban on DDT, which occurred during the 1970s, and the placement of nesting platforms in wetlands all along the Sound, the osprey population has been making a recovery.

LISS: Sound Health

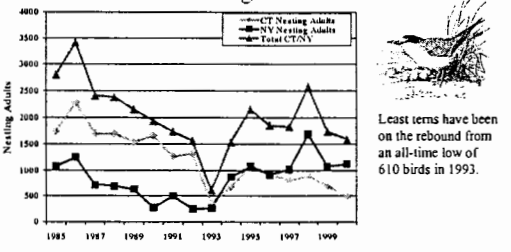
Piping Plover Nesting Adults



Piping plovers are small shorebirds that nest on beaches, often with least terns. Their nesting and reproduction are threatened by human intrusion, storm tides, and predators. Since protection and monitoring efforts began in 1984, nesting success has improved, resulting in more returning adults in subsequent years.The piping plover was given federal threatened species status in 1986.

LISS: Sound Health

Least Tern Nesting Adults



Least terns have been on the rebound from an all-time low of 610 birds in 1993.

Disturbances, loss of habitat, and habitat degradation are affecting the population of least terns in the Sound area. The least tern population fluctuated over the last fifteen years, with relatively lower numbers present during the late 1980s and the early 1990s. Overall, between 1985 and 1997, there has been no statistically significant trend.

LISS: Sound Health

Are Fish and Wildlife Habitats Being Protected and Restored?

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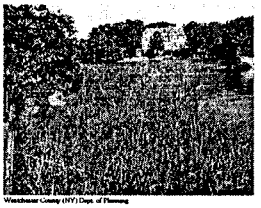
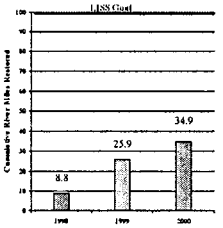


Westchester County (NY) Dept. of Planning

LISS: Sound Health

Miles of Streams Restored for Anadromous Fish Passage



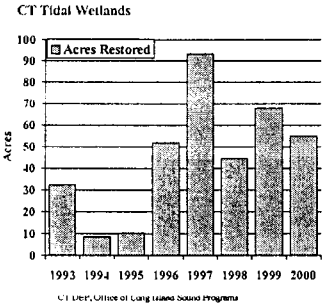
In 1998, LISS adopted a goal of restoring 100 miles of riverine migratory corridors for anadromous fish by the year 2005

As of 2000, 34.9 miles of river have been restored.

Anadromous fish live in the ocean but swim up rivers to reproduce in fresh water. The migration of anadromous fish such as alewives, smelt, blueback herring, American shad, and Atlantic salmon has been limited by physical barriers (including dams, culverts, tide gates, and sections of river with inadequate water volume) that block access to spawning areas. These travel routes are now being made accessible through fishways and bypasses, removal of obstacles, and altering dam releases.

LISS: Sound Health

Acres of Tidal Wetlands Restored

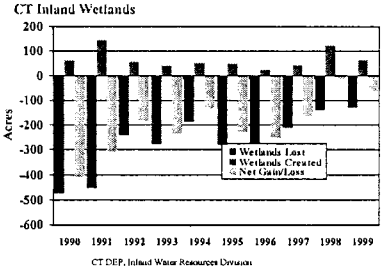


In 1998, the LISS adopted a goal of restoring 2000 acres of coastal habitat (e.g. dunes, inland wetlands, tidal wetlands, forests, submerged aquatic vegetation) by the year 2008.

Since 1993, more than 308 acres of tidal wetland habitat have been restored in Connecticut. Since 1996, New York has restored approximately 65 acres of tidal wetlands. Additional restoration projects are underway.

LISS: Sound Health

Acres of Inland Wetlands



Since 1990, wetland loss has outweighed the amount of wetlands created. But the trend shows that Connecticut wetland alterations and loss have consistently declined while wetland creation has been gaining in recent years. While freshwater wetlands are mapped in New York, no trend analysis has been done to date.

LISS: Sound Health

Acres of Submerged Aquatic Vegetation

Submerged aquatic vegetation beds are comprised of rooted plants like eelgrass and widgeon grass that grow on shallow muddy and sandy bay bottoms below the spring low tide mark. Eelgrass is ecologically important because it serves as vital nursery habitat for many desirable fish and shellfish species. Historical information indicates that eelgrass was once "common" along the entire coastline of the Sound and in sheltered bays, harbors, rivers, and creeks.

Beginning in 1931, there was a massive die-off of eelgrass all along the Atlantic Ocean in both Europe and North America. Both sides of the Atlantic were believed to have lost at least 90% of existing eelgrass populations. Eelgrass abundance in the Sound declined dramatically between 1931-32. Eelgrass beds in central and western Long Island Sound declined by two-thirds of their original extent. There are no known eelgrass populations along the north shore of Long Island.

Studies conducted in other estuaries have shown degradation of water quality to be the single most significant cause of eelgrass declines. Poor water quality not only degrades or destroys healthy beds, but also prevents the reestablishment of beds at historical locations. Light availability appears to be the most important parameter.

LISS: Sound Health

How is the Landscape Changing Due to Human Activities?

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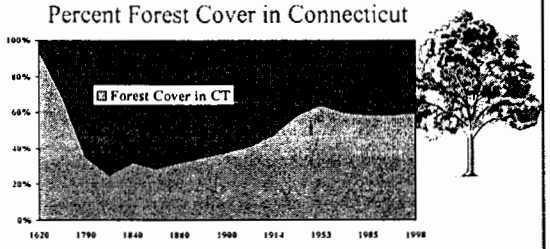
LISS: Sound Health

Percent Forest Cover in Connecticut

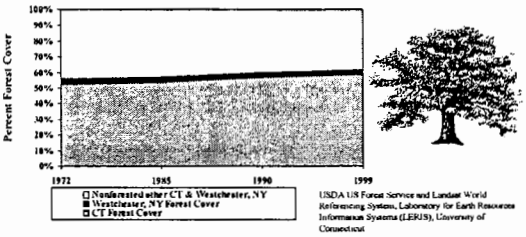


USDA US Forest Service and Landsat World Referencing System, Laboratory for Earth Resources Information Systems (LERIS), University of Connecticut

From the 1600s through the 1800s, forest area decreased as land was cleared for agriculture, housing, and industry. However, in the 1900s, many farms were abandoned and trees grew back. This has caused a huge increase in the amount of forest area during the last 100 years.

LISS: Sound Health

Watershed Forest Cover



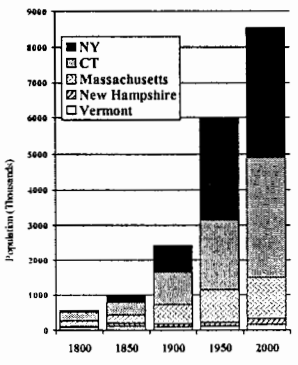
USDA US Forest Service and Landsat World Referencing System, Laboratory for Earth Resources Information Systems (LERIS), University of Connecticut

Forest cover in the Long Island Sound watershed, mostly in Connecticut, has shown a slight increase, although most coastal forests were lost to development many years ago. This is especially true in the Westchester County, NY portion of the watershed where only small parcels of forested land may still exist. Forest cover in Connecticut continues to grow as a result of Connecticut forest management practices.

LISS: Sound Health

Watershed Population Levels

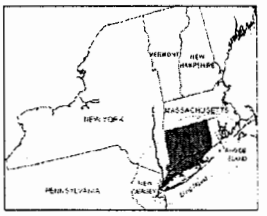
More than 8 million people live in the Long Island Sound watershed. While population levels in the Sound's watershed are expected to remain fairly stable in the future, there has been an increasing population shift toward the coast.

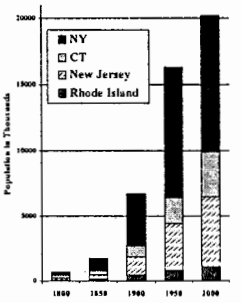


Compiled by M.A. Parker, CT DEP, from population data maintained by the U.S. Census Bureau (2000) at http://www.census.gov/main/www/cen2000.html, the University of Virginia Library with the cooperation and consent of the Inter-University Consortium for Political and Social Research at http://fisher.lib.virginia.edu/census, and New York census 2000 township data from the Empire State Development - DataCenter at http://www.empire.state.ny.us/nyvide/fpr/census2000pl94_local.html.

LISS: Sound Health

Population Within 50 miles of the Sound

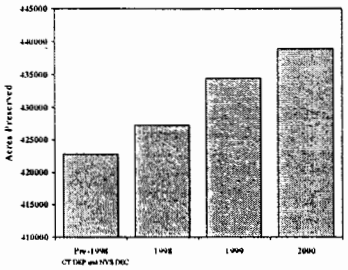




More than 21 million people live within a 50-mile radius of the Sound. With nearly 10% of the nation's population crowded around Long Island Sound, it is an estuary struggling to cope with many stressors.

LISS: Sound Health

Open Space Preserved in the LIS Watershed



In 1998, Connecticut passed legislation to preserve 21% of the state's land, or 673,210 acres, as open space by 2023. Currently, 438,900 acres have been preserved, which is more than 65% of its ultimate goal.

New York State's first Open Space Plan was adopted in 1992 and updated in 1995. It provides a comprehensive plan for conserving valuable open space in New York State into the 21st Century. Over the past six years, New York State has invested more than $300 million to preserve more than 300,000 acres of valuable land throughout the State. This makes New York one of the Nation's leaders in open space conservation.

LISS: Sound Health

How is the Public Involved in Restoring and Protecting Long Island Sound?

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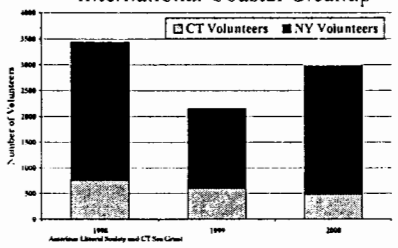
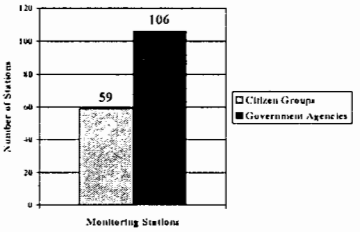
LISS: Sound Health

International Coastal Cleanup



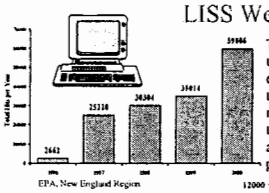
During Coastal Cleanup weekend in September 2000, nearly 3,000 volunteers in Connecticut and New York picked up debris along 100 miles of shoreline and one underwater site and collected nearly 63,000 pounds of debris.

Volunteer Water Quality Monitoring



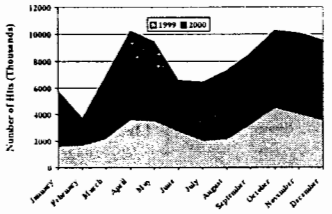
A number of agencies and citizen groups collect data that can be used to identify water quality trends. Areas in the Sound that seasonally experience low dissolved oxygen levels are characterized from year to year. This monitoring identifies how Long Island Sound responds to management initiatives such as nitrogen reduction.

LISS Web Site Visitors

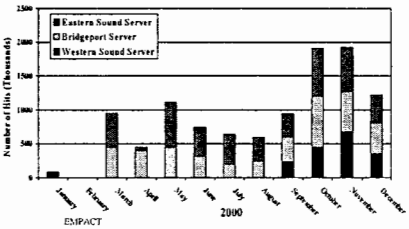


The web site went online in July of 1996, so the bar represents only six months. As of the end of 2000, over 153,000 visitors have been to the LISS web site. An overall increasing number of "hits" to the web site is attributed to the effectiveness of LISS public outreach activities and greater use of the internet by the public.

The greatest number of "hits" appear during the late Spring and late Fall months. This may be the influence of the academic year, with heaviest use during the time of year when class projects and term papers are due.



MYSound Web Site Visitors



Western Sound Server includes Hempstead Harbor and Western Sound Station off Greenwich. These stations went online in September 2000. Eastern Sound Server includes New London Dumpsite Station and Thames River Station. Zeroes indicate station inactivity.

MYSound (Monitoring Your Sound) provides comprehensive, real-time marine water quality monitoring data on Long Island Sound and its harbors and estuaries. The MYSound web site integrates data from monitoring buoys with data from the CT DEP Bureau of Water Management's marine water quality monitoring program and from Save the Sound's volunteer water quality database to provide a more comprehensive picture of the water quality in the Sound. An overall increasing number of "hits" to the web site are attributed to public awareness of the web site and the effectiveness of public outreach activities.

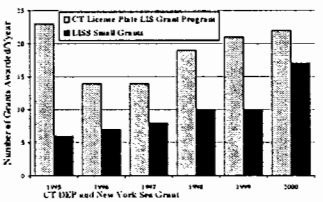
Long Island Sound Grant Programs

The two primary grant programs dedicated to enhancing public awareness of the Long Island Sound and its watershed are the Long Island Sound License Plate Program and the Long Island Sound Study Public Participation Information and Education Small Grants Program.

The LIS License Plate (Grant) Program is a program administered by the CT DEP Office of Long Island Sound Programs and is funded from the sales of specialty automobile vanity plates by the CT Department of Motor Vehicles. Through State Legislation, a Long Island Sound Fund was established in which the monies from the license plate sales could be deposited and from which award money for grants could be drawn. In general, the LIS Fund supports four categories of activities: Public Access, Public Education and Outreach, Habitat Restoration, and Research. Grants of up to $25,000 are awarded to applicants following a rigorous review process.

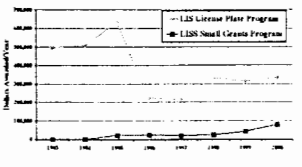
The Long Island Sound Study Public Participation Information and Education Small Grants Program is administered through the LISS National Estuary Program by the EPA Long Island Sound Office. Funding for the Small Grants is provided from EPA grant monies under Clean Water Act funding. The LISS Small Grant funds generally support three categories of projects: Public Education, Outreach, and Involvement, Habitat Restoration, and Research. The projects must have a component that increases public awareness and education emphasizing Long Island Sound as a living environmental and social resource and encouraging participation in restoration and preservation of LIS.

LIS Grant Awards



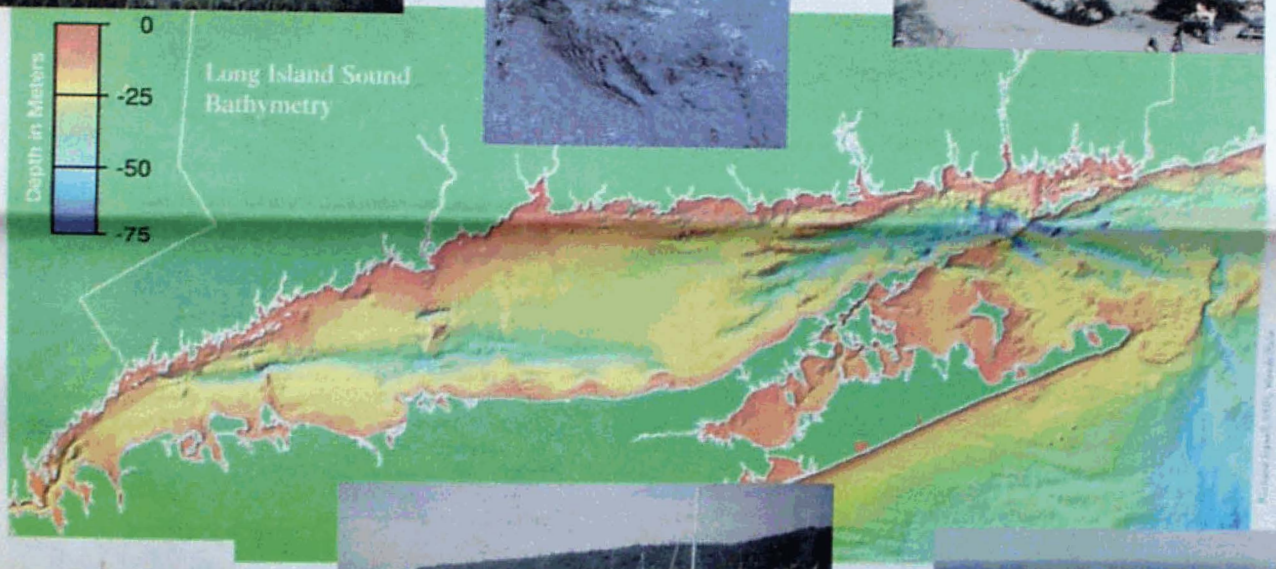
Total funds allocated between the two programs from 1993 to 2000 has totalled over $3 million.

Public interest in the grants programs has steadily grown since their inception. As the number of grants submitted is beginning to level off, the quality of the proposals continues to improve and more grants are being awarded. The funded projects focus on controlling nonpoint source pollution, teacher training, habitat restoration, community involvement and education, and water quality monitoring.



LONG ISLAND SOUND STUDY

SOUND HEALTH 2001



STATUS AND TRENDS IN THE HEALTH OF LONG ISLAND SOUND

ATTACHMENT 19

Long Island Sound's Health

Long Island Sound is an estuary, a place where salt water from the ocean mixes with fresh water from rivers draining from the land. Like other estuaries, Long Island Sound abounds in fish, shellfish, and waterfowl. It provides feeding, breeding, nesting, and nursery areas for diverse animal and plant life.

Long Island Sound also supports many recreational and commercial uses. More than 8 million people live in the Long Island Sound watershed and millions more flock yearly to the Sound for recreation. More than $5 billion is generated annually in the regional economy from boating, commercial and sport fishing, swimming, and beachgoing. The ability of the Sound to support these uses is dependent on the quality of its waters, living resources, and habitats.

An Estuary of National Significance

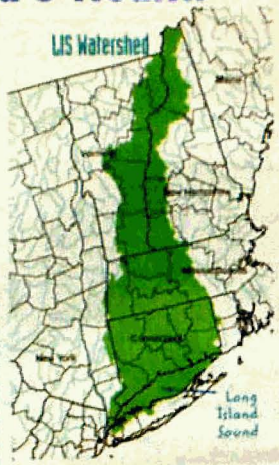
In 1985 the federal government and the states of Connecticut and New York initiated the Long Island Sound Study (LISS), a landmark cooperative endeavor designed to analyze and correct the Sound's most pressing environmental problems. In 1987, under the National Estuary Program (NEP) established by Congress, the Long Island Sound was designated an "Estuary of National Significance."

Collectively known as the LISS Management Conference, stakeholders representing citizen and environmental groups, businesses and industries, academic institutions, and local, state, and federal governments, are working together to implement the Comprehensive Conservation and Management Plan (CCMP) of 1994 to protect and preserve this vital estuary.

The Management Conference identified seven issues that merit special attention: (1) low dissolved oxygen (hypoxia), (2) toxic contamination, (3) pathogen contamination, (4) floatable debris, (5) living resources and habitat management, (6) land use and development, and (7) public involvement and education. The CCMP includes 232 action items that provide the framework for federal, state, local, academic, and citizen partners to combine their efforts to address these issues and achieve a common vision for the long-term health, restoration, and economic well-being of Long Island Sound, its watershed, and tributaries.

From colonial times until fairly recently, many uses of Long Island Sound and the surrounding watershed were made without considering the environmental impact on this great body of water. Since the federal Clean Water Act became law in 1972, investments in water pollution control programs have led to measurable improvements in water quality, in spite of increasing numbers of people and activities on the Sound and within its watershed. Obvious sources of pollution are now regulated and controlled through permit programs, tidal wetlands are protected, and major efforts to build and improve sewage treatment plants and control industrial discharges have helped to restore degraded waters.

It's important to assess, on an ongoing basis, just how effective these efforts have been. Is the water cleaner and safer to swim in? Are contaminant concentrations decreasing? Are habitats being protected and restored? Are the fish and shellfish more abundant (and safe to eat)? *But what is the state of the ecological resources* of Long Island Sound? And what new threats may be emerging from contaminants or impacts that we currently know little about? Under a new initiative, the Long Island Sound Study (LISS) is working to develop indicators of the health of the Sound to answer these kinds of questions.



Sound Health 2001 highlights water quality conditions, the status of living resources that call the Sound home, trends in land use and development, and other indicators of environmental health. By providing a *snapshot of current conditions* and trends, **Sound Health 2001** helps to assess the effectiveness of efforts to deal with issues such as nitrogen pollution, sediment contamination, habitat restoration, and the health and abundance of living resources.

Trying to briefly summarize the health of a body of water 110 miles in length is risky. Sheet sound bites (no pun intended) cannot capture the geographic variability of Long Island Sound. In addition, good news (reductions in nitrogen and toxic contaminant discharges) and bad news (a troubling die-off of lobsters) are part of the same, complex story. By putting the pieces side by side, we can better appreciate the complexity of the Sound and think about the links among issues.

We hope this report will pique your interest in further exploring Long Island Sound and its watershed and in making changes in your everyday life that will help the clean-up effort. Long Island Sound is a valuable resource - understanding how your activities can affect it will help us to restore and protect it.

If you are interested in obtaining more information, full citations for the data and findings contained in this summary are provided at **www.epa.gov/region01/eco/lis**.

ECOSYSTEM INDICATORS

Environmental indicators are specific, measurable markers that help assess the condition of the environment and how it changes over time. Both sharp changes and general trends in the values of these markers can indicate improved or worsening environmental health. The LISS has developed a series of indicators to answer the following questions:

1 Are the Waters and Sediments Getting Cleaner?

Hypoxia
- Dissolved Oxygen Levels
- Biological Nutrient Removal (BNR)
- Point Source Nitrogen Loads
- Chlorophyll-a Levels

Toxic Contaminants
- End-of-Pipe Toxicity
- Industrial Chemical Discharges
- Contaminant Trends in Mussels
- Contaminants in Sediments

Pathogens
- Beach Closure Days

2 Are Fish and Wildlife Populations More Abundant?

Shellfish
- Oyster Harvest
- Lobster Landings

Finfish
- Bluefish, Winter Flounder, and Tautog Abundance

Coastal Birds
- Osprey Nesting Adults
- Plover and Least Tern Populations

3 Are Fish and Wildlife Habitats Being Protected and Restored?

- Miles of Stream Accessible to Anadromous Fish
- Acres of Tidal Wetlands Restored
- Acres of Inland Wetlands

4 How is the Landscape Changing Due to Human Activities?

- Forest Cover
- Watershed Population Levels

SOME FACTS ABOUT LONG ISLAND SOUND

- Long Island Sound is an estuary, a place where salt water and fresh water mix. Unlike other estuaries, it's open at both ends – through The Race to the Atlantic Ocean at the eastern end and through the East River and New York Harbor at the western end.

- Salt water flows into the Sound from the Atlantic Ocean. Approximately 90 percent of its freshwater comes from three major rivers in Connecticut: the Thames, the Housatonic, and the Connecticut.

- Long Island Sound's east-west orientation makes it unusual among estuaries. Most large estuaries in the North Atlantic are oriented north-south.

- It is bounded by the state of Connecticut and Westchester County, New York, on the north and by Long Island on the south. Long Island Sound is 110 miles long (east to west) and about 21 miles across at its widest point, with mid-Sound depths between 60 and 120 feet.

- The average depth of the Sound is a shallow 65 feet. If dropped into the Sound at this depth, the Statue of Liberty would still have 86 feet exposed above the water, and that's without its 150-foot granite base.

- Long Island Sound has a water surface of 1,208 square miles and a volume of 2.19 trillion cubic feet, which is about 67 billion tons or 18 trillion gallons of water.

- The Sound's watershed, which is all the land from which water drains into the Sound, extends into Canada and covers an area of about 16,820 square miles. About 17,000 square miles (1% percent of the watershed is in the drainage basin of the Connecticut River.

- The Long Island Sound watershed is inhabited by more than 8 million people. Any pollutants entering the water as a result of human activities in the watershed can ultimately harm Long Island Sound.

- The 82 sewage treatment plants in Connecticut and 23 in New York that discharge into the Sound or its tributaries contribute more than a billion gallons of treated effluent each day.

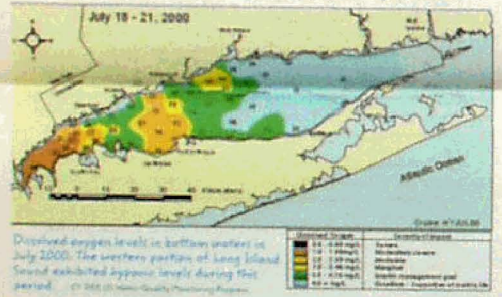
Are the Waters and Sediments Getting Cleaner?

HYPOXIA

Dissolved oxygen levels in water are often used to gauge the overall health of the aquatic environment. When dissolved oxygen levels in the bottom water layer of the Sound are low (a condition called hypoxia) to non-existent (anoxia), then the survival, reproduction, or use of an area by living marine resources is impaired. This can affect commercially-valuable marine species by depleting their food sources or impairing their development due to stress caused by inadequate oxygen concentrations.

From mid-July through September, Long Island Sound and many of its aquatic inhabitants suffer from hypoxia. During this period, oxygen levels in the bottom waters of Long Island Sound fall to levels inadequate to support healthy populations of aquatic life.

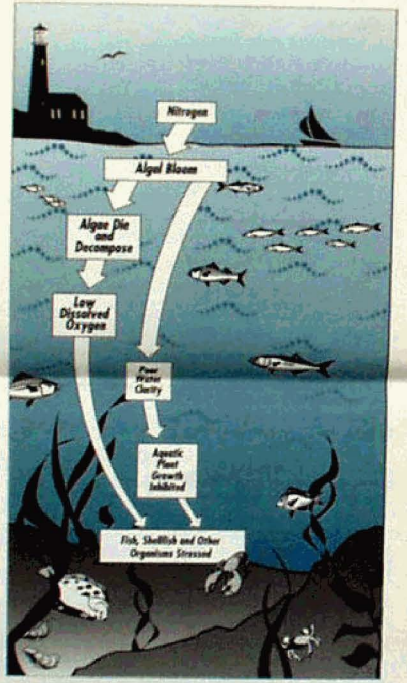
Dissolved Oxygen in Long Island Sound Bottom Waters



Dissolved oxygen levels in bottom waters in July 2000. The western portion of Long Island Sound exhibited hypoxic levels during this period.

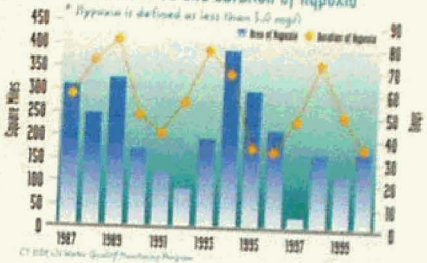
Hypoxia is a symptom of a larger problem, the over-fertilization of the Sound with nutrients, primarily nitrogen. While nitrogen is a necessary nutrient in a productive ecosystem – a building block for plant and animal tissue – too much nitrogen fuels the excessive growth of planktonic algae (floating plants). The dense algae blooms cloud the water and shade the bottom. When the algae die and settle to the bottom of the Sound, they are decayed by bacteria, a process that uses up available oxygen. Oxygen in short supply impairs the feeding, growth, and reproduction of the Sound's aquatic life. In extreme conditions, some organisms may suffocate and die, while others flee the hypoxic zones. The dense blooms also prevent enough light from reaching shallow water bottoms to support the growth of submerged aquatic vegetation, an important habitat for shellfish and juvenile fish. As a result, nitrogen – in excess – impairs the function and health of Long Island Sound.

Effects of Excess Nitrogen



Since 1990, the LISS has been implementing a phased plan to improve oxygen levels in the Sound by reducing nitrogen loads. In 1998, LISS adopted a 58.5 percent reduction target for nitrogen loads from human sources to the Sound over 15 years, with five and ten-year interim targets to assure steady progress. The states of Connecticut and New York are working to achieve the target through upgrades to sewage treatment plants, watershed restoration strategies to control nitrogen runoff, and reductions in nitrogen oxide emissions to the air. As a result, nitrogen discharges to Long Island Sound have decreased, reducing algae growth, and improving oxygen levels.

Maximum Area and Duration of Hypoxia*



Dissolved Oxygen Levels

The severity of hypoxia depends on the area affected, how long the condition persists, and how low the oxygen levels dip. Weather conditions influence the severity of hypoxia from year to year, but taken together, in terms of area, duration, and intensity, the severity of hypoxia has decreased since the late 1980s. Continued monitoring is necessary to observe how the Sound will respond to continued reductions in nitrogen.

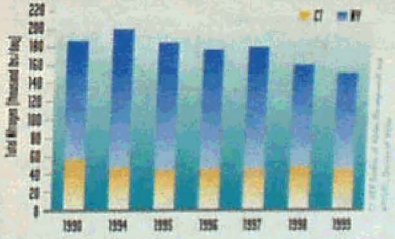
Biological Nutrient Removal (BNR)

The dominant source of human-caused nitrogen loadings is from sewage treatment plants (STPs). Historically, conventional STPs removed oxygen-demanding solids from the wastewater. Now, STPs are being upgraded using an advanced technology called biological nutrient removal (BNR) to also remove nitrogen from the wastewater.

Since 1990, 25 percent of the STPs have been upgraded to include BNR. In some cases, BNR can be added to existing STPs with minor modifications and at a low cost. However, to achieve the ambitious levels of nitrogen reduction needed to alleviate hypoxia, many STPs will need to be reconstructed at a cost of several hundred million dollars.

BNR Treatment

Point Source Nitrogen Load



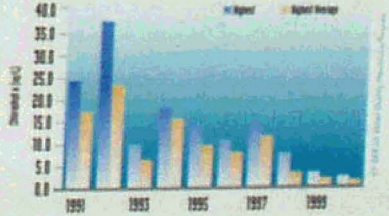
Point Source Nitrogen Loads

As a result of BNR upgrades to STPs, there has been a reduction of 19.2 percent in nitrogen loading to Long Island Sound from STPs over the past ten years.

Chlorophyll-a Levels

The concentration of chlorophyll-a, the green pigment in phytoplankton, is used to measure the levels of phytoplankton in surface water. Reducing the amount of nitrogen entering the Sound is expected to reduce chlorophyll-a levels, improve water clarity, and increase oxygen levels. For western Long Island Sound, the most sensitive region of the Sound, chlorophyll-a levels during the winter/spring bloom declined from 1991-2000.

Chlorophyll-a in Western LIS



TOXIC CONTAMINANTS

Humans have used Long Island Sound as a resource and a disposal site since industrialization began. Measurable quantities of contaminants exist in sediments dating back to the mid-1800s. Quantities of some have increased over time, new contaminants have been added, and amounts of some have decreased in response to regulatory action. Toxic chemicals enter Long Island Sound from sources such as manufacturing processes, household cleaning and pest control products, automobile exhausts, and emissions from fossil fuel power plants. Stormwater pipes carry contaminants washed from roads, parking lots, disturbed land, and construction sites. Rivers and streams transport contaminants from the watershed into Long Island Sound.

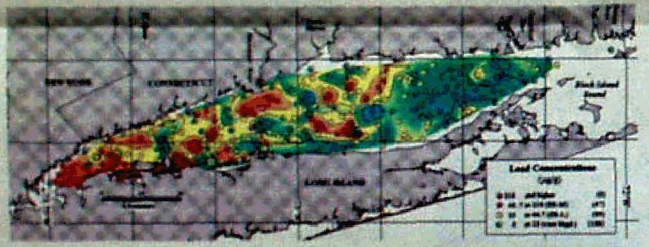
Potentially toxic substances, both naturally-occurring and human-generated, can cause adverse ecosystem or human health risks when exceeding certain concentrations. These substances include trace metals (chromium, copper, lead, mercury, silver, arsenic, zinc) and organic compounds such as PAHs (polycyclic aromatic hydrocarbons), PCBs, and pesticides (such as DDT, chlordane, and atrazine).

Many contaminants become associated with particles suspended in the water. These particles then settle to the bottom, accumulating the contaminants at higher concentrations in the sediments than in the overlying waters. However, contaminants are not uniformly distributed throughout the Sound. Contaminants accumulate in areas of weak currents, large sediment inputs, and little sediment reworking. Areas where strong bottom currents stir up the bottom tend to have less sediment accumulation and lower contaminant concentrations.

As particles settle to the bottom of the Sound, they create a reservoir of contaminants that can harm marine life living or feeding near sediments. Fish and shellfish can, in turn, accumulate toxic contaminants, posing a human health risk. Public health advisories are published to inform consumers about potential risks from eating large amounts of seafood that contain higher chemical levels.

Today, the major sources of toxic chemicals to Long Island Sound are STPs, industrial discharges, urban stormwater, and atmospheric deposition. Federal and state programs strive to reduce toxic chemical discharges to the Sound and to minimize the toxicity of effluents from sewage treatment plants and industries.

Lead in Surface Sediments



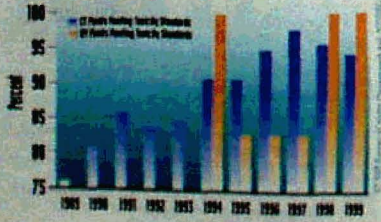
The concentrations of lead and other metals in bottom sediments are generally higher in the western Sound and lower in the better-flushed regions of the eastern Sound. This is primarily due to both the location of pollutant sources and the westward transport of contaminant-associated with finer-grained particles.

End-of-Pipe Toxicity

Tests are conducted to measure the effects of chemicals and identify facilities that are discharging potentially toxic effluents to waterways. Connecticut requires toxicity testing at STPs throughout the state. New York State requires toxicity testing when appropriate to adequately protect aquatic life.

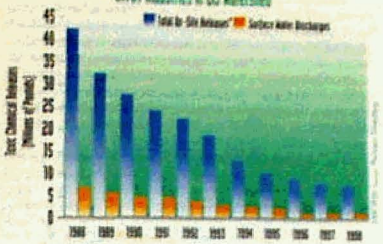
In 1989, the effluent from 76 percent of Connecticut STPs tested was non-toxic. In 1999, 94 percent were non-toxic, a 75 percent reduction in the number of facilities discharging a potentially toxic effluent. In 1998 and 1999, no New York municipal treatment facilities discharging to the Sound exhibited toxicity.

Percent of Municipal Treatment Plants Tested to be Non-Toxic



TRI Data

CT/NY Industries in LIS Watershed



* Total On-Site Releases include total air emissions, other on-site land releases, and surface water discharges.

Industrial Chemical Discharges

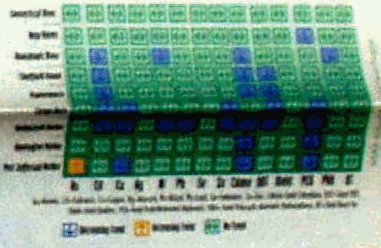
The Emergency Planning and Community Right to Know Act of 1986 requires facilities in the United States to report releases to the environment of more than 600 designated toxic chemicals. The U.S. Environmental Protection Agency (EPA) maintains the Toxics Release Inventory (TRI), a national database that identifies the chemicals manufactured and used at industrial facilities and the annual amounts of these chemicals released as waste. Seven new industrial sectors, in addition to the manufacturing industry, began reporting for the first time in 1998. The newly included sectors are electric utilities, coal mining, metal mining, chemical wholesalers, petroleum bulk plants and terminals, solvent recovery, and hazardous waste treatment, storage, and disposal. In addition, in 1999, EPA lowered the reporting thresholds for certain persistent toxic chemicals and certain other chemicals were added to the list of toxic chemicals. The major portion of the TRI consists of releases to air. Overall, toxic releases in the Sound's watershed have declined relative to the late 1980s. This is consistent with toxic releases throughout the country.

Contaminant Trends in Mussels

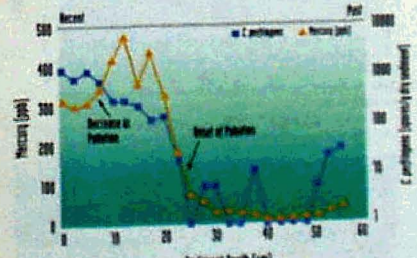
Since 1986, the National Status and Trends Mussel Watch Program has monitored chemical contaminants in bivalve mollusks. Concentrations of chemicals in mussels are related to the levels of chemicals in the water that they inhabit and in the food that they filter from the water. Decreased chemical concentrations in the water and in food sources will result in decreased concentrations in mussels.

On the whole, levels of metals (copper, nickel, lead, and silver) and organic compounds in mussels have declined. Contamination is decreasing at many sites for chemicals whose use has been banned (chlordane, DDT, PCBs) or severely curtailed (cadmium). With the exception of arsenic in Port Jefferson Harbor, no chemical has increased in concentration in the monitored harbors in Long Island Sound.

Contaminant Trends in Mussels



Mercury Concentrations in Sediment



Contaminants in Sediments

Human activities over the last 400 years have affected the water and sediment quality of Long Island Sound. Sediment cores provide a history of contaminant inputs resulting from changes in the watershed. Surface sediments reflect recent condition; deeper sediments reflect past conditions. Many contaminants increased in the sediment of the Sound with increasing population and industrialization of the watershed. More recently, however, pollution controls and changes in manufacturing trends have decreased the amount of contaminants discharged in Long Island Sound and have resulted in decreased concentrations of contaminants in the surface sediments.

Mercury concentrations in the upper 10-15 cm of sediment have decreased, reflecting reductions in mercury inputs in recent decades. C. pectinaria, an indicator of sewage chemical pollution, indicates the continued recovery in pollution around the Sound.

PATHOGENS

Pathogens, which are disease-causing bacteria and viruses, can enter Long Island Sound from inadequately treated human sewage and domestic and wild animal wastes. Some of the primary sources of pathogens to the Sound are older sewer systems that have combined stormwater and sanitary systems that overflow during rainfalls (called combined sewer overflows), failing septic systems, illegal connections to storm sewers, STP malfunctions, and vessel sewage discharges. To protect public health, beaches are periodically closed, and many of the Sound's prime shellfish beds are closed, due to indications of pathogen contamination. People can become sick by swimming in waters contaminated by pathogens or by eating raw or partially cooked shellfish that contain pathogens. As a result, pathogen contamination can seriously affect the region, economically and socially.

Yearly variations are a product of rainfall patterns and incidents such as sewer line ruptures. In 1999, the relatively dry summers led to significantly fewer closings than in previous years.

Beach Closure Days

There are 240 monitored beaches along Long Island Sound (131 in Connecticut and 109 in New York) that provide valued recreational opportunities. Combined sewer overflows and stormwater runoff associated with rainfall events are the major causes of beach closures. As a result, the number of days beaches are closed to swimming increases with increased rainfall. Over time, however, the number of beach closure days can be used to assess the effectiveness of pathogen control activities, such as:

- abatement of combined sewer overflows;
- control of stormwater runoff and other nonpoint pollution; and,
- minimizing mechanical breakdowns in sewer systems and STPs that result in releases of untreated sewage.

Are Fish and Wildlife Populations More Abundant?

The coastal environs of Long Island Sound represent a unique and highly productive ecosystem. A diverse array of living resources ranges from microscopic plants and animals that drift with the currents to seaweeds and economically important finfish, shellfish, and crustaceans. Many other types of wildlife, such as birds, sea turtles, and marine mammals, spend all or part of their lives in the Sound, on its shores, or in its watershed.

The abundance and diversity of living resources such as oysters, clams, lobsters, finfish, and birds are indicators of ecosystem health and human impact. These organisms respond to environmental conditions, habitat availability, and disease. These living resources contribute billions of dollars to the regional economy through commercial and recreational fishing. Moreover, the opportunity to observe and appreciate the Sound's plants and animals is in itself an enjoyment for millions of the region's residents and visitors.

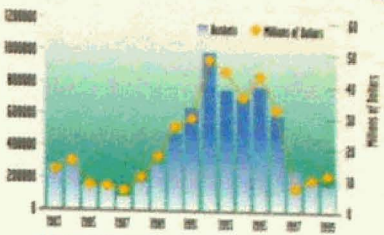
SHELLFISH

Long Island Sound produces some of the finest shellfish in the country. More than 60,000 acres of shellfish grounds are cultivated in Connecticut's coastal water by the aquaculture industry with additional acres cultivated in New York. Although oysters are the dominant commercial shellfish resource in the Sound, commercial and recreational shellfishers also harvest hard clams (or quahogs), soft-shell clams (or steamers), bay scallops, blue mussels, surf clams, and razor clams.

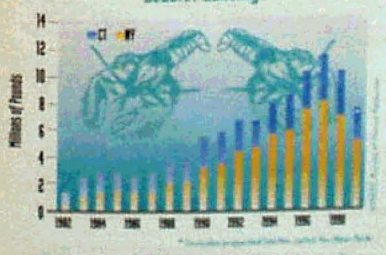
Oyster Harvest

Oyster farming developed into a major industry in the Sound by the late 19th century. Today, after a long period of decline, the Sound's oyster industry is once again one of the largest in the nation. The Sound's oysters are marketed throughout the country, and their high quality commands a premium price. The oyster is, by far, the most economically important shellfish harvested from Long Island Sound. The volume of oyster and other shellfish harvests is indicative, in part, of improved water quality and successful oyster culture practices.

Today, disease is the number one threat to oysters. Since 1997, two parasitic diseases, MSX and Dermo, have decimated the oyster. MSX kills juvenile oysters, while Dermo kills adult oysters before they are big enough to reproduce or be harvested. Nevertheless, oysters continue to endure changing conditions in the Sound. Officials, scientists, and citizens are working together to develop oyster habitats, such as constructed reefs, as well as disease-resistant oysters.



The oyster harvest peaked in 1997, and has declined since mainly due to disease outbreaks.



Over the past two decades, there has been a tremendous increase in lobster landings, with the peak occurring in 1997. However, over the last two years, a die-off of lobsters, most severely in the eastern Sound, has reduced the harvest.

Lobster Landings

The American lobster is one of the most important and valuable seafood products harvested in New York and Connecticut. Long Island Sound's lobster fishery was the third largest in the country behind Maine and Massachusetts, earning a dockside value in New York alone of over $29 million in 1998.

However, the health of the Long Island Sound lobster industry is now in question. Lobster fishermen and dealers began reporting dead and dying lobsters in their gear in the western third of Long Island Sound in mid-September of 1999. Continuing through 1999 and 2000, the die-off was unprecedented in scope and catastrophic to the lobster fishery. To make matters worse, over the past few years, the incidence of shell disease, in which bacteria forms a black stain that eats through the shell, has increased in lobsters from eastern Long Island Sound. In response, the federal government, Connecticut, and New York have provided funds for economic assistance and research.

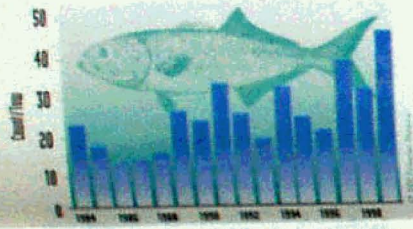
Scientists are unsure what is causing the lobsters to die in the western Sound, but University of Connecticut scientists found that all the dead lobsters had the same protozoan parasite called *Paramoeba*. Part of solving the lobster mystery will be to research whether changes in weather conditions (such as storms or average temperature fluctuations), pollutants in the water or sediments, hypoxia (lack of oxygen), dietary change, or management practices (such as dredging and pesticide applications) could have weakened the animals so that they became susceptible to disease and parasites. Research is underway to determine the long-term effect on the lobster fishery and on the Long Island Sound ecosystem as a whole.

FINFISH

In the late 1980s and early 1990s, marine fish stocks plummeted in Long Island Sound. All of the principal species supporting the recreational and commercial fisheries of the Sound were considered overfished. These included bluefish, striped bass, winter flounder, fluke, scup, tautog, and weakfish. These fish comprise 95 percent of the species sought by anglers and commercially-licensed seafood producers. All of the species listed are now managed by the Atlantic States Marine Fisheries Commission. A combination of environmental conditions leading to improved recruitment (the number of young produced per year) for some species and fishery management measures to limit exploitation and rebuild stock for others has helped "turn the corner" for Long Island Sound fishery productivity. However, there still remains a great deal of work to be done to improve fish stocks.

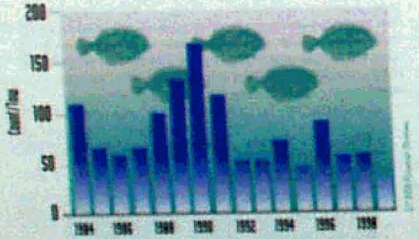
Bluefish, Winter Flounder, and Tautog Abundance

Bluefish



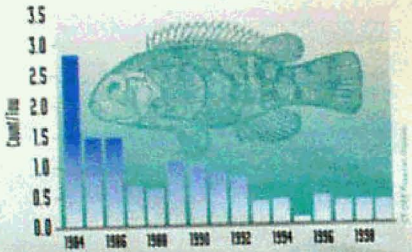
Bluefish are one of the more highly migratory of Long Island Sound's principal fishery resources. Availability of prey in the Sound, exploitation elsewhere, and oceanography all have a substantial effect on the abundance and distribution of bluefish and their availability in the Sound. Currently, the bluefish is considered overfished throughout its range and additional management options are being considered.

Winter Flounder



Winter flounder is a commercially and recreationally important species that resides in Long Island Sound waters. Winter flounder was severely overfished in the 1980s. The fishery has been recovering in response to restrictive management measures. While stocks have shown modest improvement in the last three years, they remain far below the long-term average.

Tautog



Tautog, or blackfish, find the rocks and boulders left by glacial deposition in Long Island Sound an ideal "reef" habitat. Continuing low tautog counts indicate that the species has not yet responded to more stringent management measures that were implemented in 1997.

FISH CONSUMPTION ADVISORY

This advisory refers to sport fish that people catch. It does not apply to fish bought in stores. Due to the possibility that ingested fish will have elevated concentrations of contaminants, the following marine organisms have consumption advisories issued by the NYS Department of Health and CT Department of Public Health:

Marine Bluefish and Eels—
NY: Eat no more than one meal per week of bluefish or eels. (PCB contamination) CT: Bluefish 13-25" - Eat no more than one meal per month. Bluefish over 25" - Eat no more than one meal per 2 months; high risk group (women of childbearing age, pregnant women, and children under 6) should not eat bluefish over 25". Eels: Do not eat eels.

Marine Striped Bass—
NY: Women of childbearing age and children under 15 should not eat striped bass taken from Long Island Sound west of Wading River. Others should eat no more than one meal per month from the above-mentioned area. Everyone should eat no more than one meal per week of striped bass taken from Long Island Sound east of Wading River. (PCB contamination) CT: High risk group should not eat striped bass. All others should eat one meal per 2 months.

Crabs and Lobsters—
CT/NY: Hepatopancreas (green meat or mustard) should not be eaten (PCB, cadmium, and dioxin contamination).
For more information, visit
www.health.state.ny.us/nysdoh/environ/fish
www.state.ct.us/dph/BCH/ench/webfish

COASTAL BIRDS

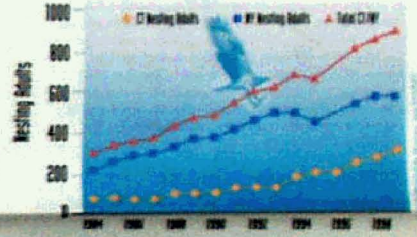
There are more than 125 species of birds, mainly waterfowl, water birds, and raptors that rely on the Long Island Sound estuary system for food and habitat. Bird populations in and near the Sound vary seasonally. In winter, birders delight at large concentrations of mergansers, scaups, scoters, mallards, black ducks, loons, cormorants, and Canada geese. Spring brings the annual migration of a wide variety of plovers, terns, sandpipers, waterfowl, herons, egrets, and songbirds. During the summer months, birds are busy tending their nests and young. Fall, once again, brings masses of birds migrating along the coast on their way to southern wintering grounds.

Osprey Nesting Adults

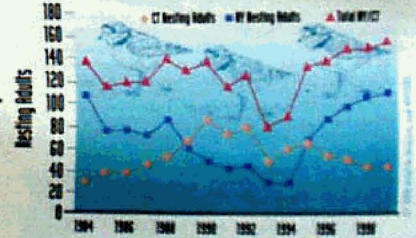
Ospreys are fish-eating birds of prey that live throughout the world. The availability of fish, water conditions, and health of the environment directly affects the health, reproduction, and nesting success of the Sound's osprey population. Ospreys are important indicators of the health and integrity of the Sound, since they are high in the marine and coastal food web.

The osprey population around Long Island Sound fell sharply during the 1950s and 1960s due to the effects of pesticides, particularly DDT. Since the ban on DDT, which occurred during the 1970s, and the placement of nesting platforms in wetlands all along the Sound, the osprey population has been making a recovery.

Osprey Nesting Adults



Piping Plover Nesting Adults



Piping Plover Populations

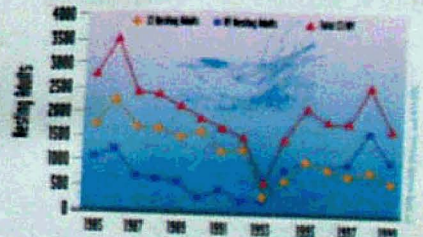
Piping plovers are small shorebirds that nest on beaches, often with least terns. Their nesting and reproduction are threatened by human intrusion, storm tides, and predators. Since protection and monitoring efforts began in 1984, nesting success has improved, resulting in more returning adults in subsequent years. The piping plover was given federal threatened species status in 1986.

Least Tern Populations

The least tern is likely to be seen around the Sound from May to early August. They were hunted to near-extinction for the hat trade in the 1800s. Numbers rebounded after hunting was banned. More recently, disturbances, loss of habitat, and habitat degradation are affecting the population of least terns in the Sound area. The least tern population fluctuated over the last fifteen years, with relatively lower numbers present during the late 1980s and the early 1990s. Overall, between 1985 and 1997, there has been no statistically significant trend.

Least Terns have been on the rebound from an all-time low of 446 birds in 1991.

Least Tern Nesting Adults



Are Fish and Wildlife Habitats Being Protected and Restored?

A habitat is a place where plants and animals live. While there is still much healthy habitat in and around Long Island Sound, the overall abundance and diversity of habitats have diminished. Incompatible human uses of the Sound and its resources since the 1700s have resulted in the loss of wetlands, eelgrass beds, and terrestrial habitats. The good news is that many habitats are now protected and restoration is occurring.

In 1998, the LISS Habitat Restoration Initiative adopted goals to restore 2000 acres of coastal habitat (e.g. dunes, inland wetlands, tidal wetlands, forests, submerged aquatic vegetation) by the year 2008. In addition, bi-state efforts are focusing on open space protection. For example, in 1999, Connecticut acquired 2,910 acres for open space at a cost of nearly $10.6 million, while assisting municipalities, land trusts, and water companies with the purchase of another 4,203 acres with $10 million through the state Department of Environmental Protection's Open Space and Watershed Land Acquisition Grant program. New York State has an Open Space Management Plan that lists the region around Long Island Sound as a priority for land acquisition.

Miles of Stream Accessible to Anadromous Fish

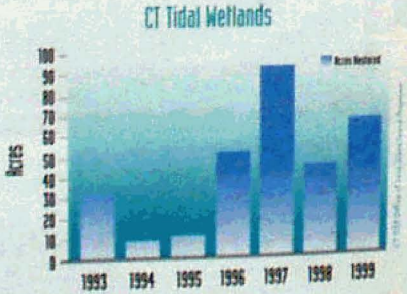
Anadromous fish live in the ocean but swim up rivers to reproduce in fresh water. The migration of anadromous fish such as alewives, smelt, blueback herring, American shad, and Atlantic salmon have been limited by physical barriers (including dams, culverts, tide gates, and sections of river with inadequate water volume) that block access to spawning areas. These travel routes are now being made accessible through fishways and bypasses, removal of obstacles, and altering dam releases.

In 1998, LISS adopted a goal of restoring 100 miles of riverine migratory corridors for anadromous fish within ten years. In the past two years, 33.4 river miles have been opened to anadromous fish, leaving 66.6 miles of riverine migratory corridors to be restored by the year 2008.

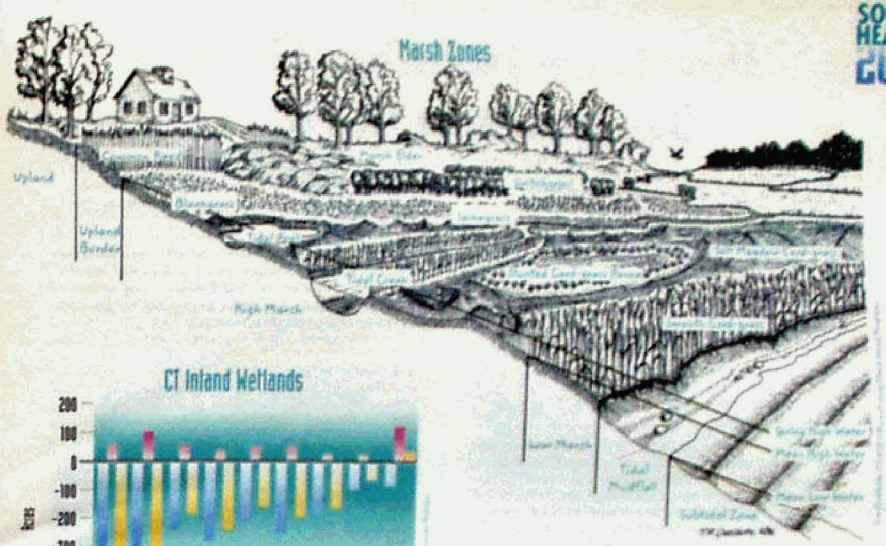
Acres of Tidal Wetlands Restored

Tidal wetlands, or marshes, are grasslands located between land and sea that form an important link to adjacent estuaries. Tidal wetlands are among the most productive ecosystems in the world. Decaying marsh grass fragments that wash into Long Island Sound are an important part of the food web, supporting many species of fish, invertebrates, and birds. Marshes provide food, shelter, and breeding or nursery grounds for many species of wildlife. Marshes also protect the land from flooding and erosion in stormy weather and filter pollutants from the water.

Approximately 25 percent to 35 percent of the Sound's tidal wetlands had been destroyed over the past 100 years by filling, dredging, and development. This trend was halted following passage of federal and state legislation in the early 1970s to protect tidal wetlands. The emphasis is now on restoration. Both Connecticut and New York have funds dedicated to wetland restoration. Connecticut has restored 1500 acres of tidal wetlands since the early 1970s. New York has restored about 65 acres of tidal wetlands since passage of the 1996 Clean Air/Clean Water Bond Act. Tidal wetland restoration is an integral part of the LISS goal to restore 2000 acres of coastal habitats by the year 2008.



Since 1995, more than 308 acres of tidal wetland habitat have been restored in Connecticut. Since 1996, New York has restored approximately 65 acres of tidal wetlands. Additional restoration projects are underway.



Since 1990, wetland alterations and losses have consistently declined and wetland creation has gained. As a result, in 1998, Connecticut had a net gain in inland wetlands. While freshwater wetlands are mapped in New York, no trend analysis has been done to date.

Acres of Inland Wetlands

Like tidal wetlands, inland wetlands serve many valuable functions, including fish and wildlife habitat, flood storage, groundwater recharge, and pollutant removal. Wetlands act as natural sinks for nutrients and other pollutants that otherwise would find their way into the numerous rivers and streams that eventually lead to Long Island Sound. Before their value was realized, wetlands were routinely filled in or drained to accommodate the construction of buildings, parking lots, and roads. Federal and state laws enacted in the early 1970s to protect wetlands began to halt this practice and are beginning to show positive results.

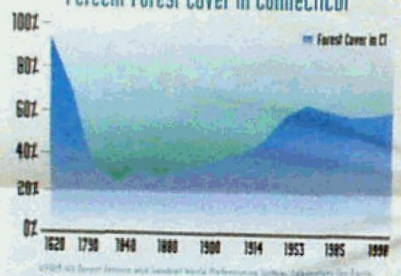
How is the Landscape Changing Due to Human Activities?

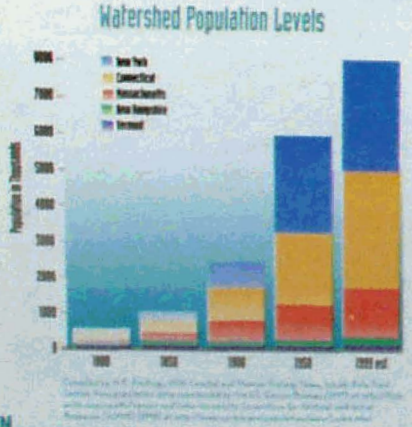
Many of the changes in the quality of Long Island Sound are driven by changes that have occurred in the surrounding landscape. Of particular concern are the loss of wetlands, forests, farms, and other open space to development. Following World War II, the area around Long Island Sound experienced rapid population growth. Residential, commercial, and recreational development increased pollution, altered land surfaces, reduced open spaces, and restricted access to the Sound. The use of the Sound as a place to dispose of human and other wastes increased dramatically. The "paving over" of the land increased runoff and reduced the filtration and processing functions of natural landscapes. Development destroyed or altered many vital habitats, harmed native wildlife populations, and reduced breeding grounds and nursery areas for many native species.

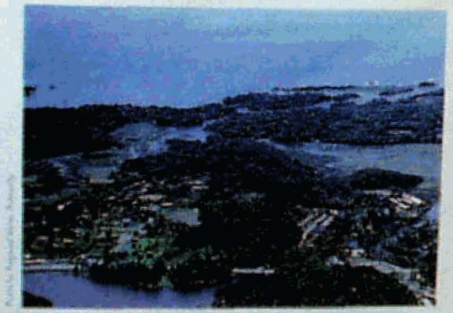
Back in the 1800s and early 1900s, compact towns and cities, surrounded by farms and forests, dotted the watershed. After World War II, the automobile made it easy to live out of town and suburbia was born. Suburban sprawl has now brought a new set of environmental problems to manage.

Forest Cover

From the 1600s through the 1800s, forest area decreased as land was cleared for agriculture, housing, and industry. However, in the 1900s, many farms were abandoned and trees grew back. This has caused a huge increase in the amount of forest area during the last 100 years. Healthy forests contribute to healthy rivers and, ultimately, a healthy Long Island Sound. Forests are important because they capture rainfall, reduce stormwater runoff, maintain stream flow, reduce erosion, trap nutrients, and stabilize soil. They provide places for recreation, and supply the raw materials for fuel, lumber, and paper. Forests also provide many kinds of habitat important to the survival of fish and wildlife. When streams and shorelines are buffered by forests, the amount of nutrients and soil washing into Long Island Sound is reduced.







Watershed Population Levels

More than 8 million people live in the Long Island Sound watershed. More than 21 million people live within a 50-mile radius of the Sound. While population levels in the Long Island Sound watershed are expected to remain fairly stable in the future, there has been an increasing population shift toward the coast.

What Can You Do?

As a resident of the Long Island Sound watershed, here are some simple things you can do to help restore and protect Long Island Sound.

In The Home

- Use environmentally friendly landscaping techniques that require less fertilizer, prevent erosion, and use native plants. This helps prevent sediments and nutrients, like nitrogen and phosphorus, from reaching Long Island Sound, and provides habitat for native species.
- Leave grass clippings on the lawn to recycle nutrients. Start a compost pile to reduce the amount of waste you put into the garbage disposal or garbage can.
- Use a soil test kit to determine the amount of fertilizer needed. More is NOT better for your plants or for reducing the effects of overloading the Sound with nutrient-rich runoff. Learn how to practice environmentally sound gardening.
- Preserve any wetlands on your property, even small areas.
- Conserve water at home and in the office to reduce the volume of wastewater that must be treated by a sewage treatment plant or septic system. This will increase the efficiency of treatment and save you money.
- Use safe, non-toxic alternatives for cleaning and for controlling pests.
- Take household chemicals to a recycling center instead of pouring them down drains or putting them in the trash. REMEMBER: substances poured down drains, storm sewers, or on the land are likely to be transported to Long Island Sound.
- Never pour motor oil or other auto fluids down a drain or sewer or discard them with the trash (in Connecticut and New York, it's against the law!)
- Maintain your septic system by having it pumped out every three to five years.
- Scoop up pet waste and dispose of it in the toilet. If local laws allow, pet waste can either be buried or sealed in a plastic bag and put in the garbage.
- Wash your car on a grassy area if possible, so the ground can filter the water naturally. Use soap sparingly and try to use non-phosphate detergents. Empty the bucket of soapy water down the sink, not in the street.

In and On the Sound

- Don't be a litterbug. Never throw litter, especially plastic, into the street, down storm drains, or onto the beach. Rainfall carries the trash into the sewers where it eventually travels into the Sound.
- Be a responsible boater. Remember, it is illegal to discharge wastes from a Type III (holding tank) marine sanitation device. Pumpout facilities must be used to prevent release of pathogens directly into coastal waters.
- Never feed water birds. This encourages them to stay through the winter and gather in flocks. Their droppings, which contain bacteria and nitrogen, can contaminate shellfish beds and may cause the closing of bathing areas.

How Do We Know We Still Need to Do More?

While progress is being made toward achieving the Comprehensive Conservation and Management Plan (CCMP) goals of clean water and sediments, abundant and diverse fisheries and wildlife, sustainable ecosystems, and multiple commercial and recreational use of Long Island Sound, much remains to be accomplished. Examination of the environmental indicators in this report allows us to identify our successes and recognize the needs for further study. It is apparent that continued research is necessary to answer the questions:

- What caused the 1999 lobster die-off in the Sound?
- What effects do temperature, hypoxia, and toxic contamination have on living resources in the Sound?
- How will the Long Island Sound ecosystem respond to continued nitrogen reductions?
- What effect does sediment disposal have in the Sound?
- How does atmospheric deposition of pollutants affect water quality in the Sound?
- What more can people do to help restore and protect Long Island Sound?
- What will global warming and sea level rise mean for the Sound?

As we continue our efforts to implement the goals and priorities of the CCMP, we leave the answers to these questions for the next State of the Sound report.

The LISS Citizens Advisory Committee

The Voice of the People

The LISS has a unique pipeline for citizens to provide advice to the Management Conference on issues of concern to the Long Island Sound community at large. Established in 1988, the Citizens Advisory Committee includes representatives of environmental groups, industry, marinas, marine trades and business associations, planning agencies, commercial fisheries organizations, education, and research. The citizens on the committee provide a two-way link between government and the public to increase understanding of the LISS, its goals and commitments, and the ongoing efforts to restore and protect Long Island Sound.

In Your Community

- Participate in policy decisions and attend public meetings, such as your local planning and zoning, conservation, or wetlands commission meetings. Speak out on local issues that can have ramifications for your town and Long Island Sound.
- Support local harbor management plans.
- Organize and/or volunteer for citizen water quality monitoring projects in your community.
- Organize a storm drain stenciling project in your neighborhood.
- Participate in beach grass plantings and beach clean-up activities.
- Get involved in local organizations that monitor land management and participate in efforts to manage growth.
- Encourage government officials to improve existing infrastructure and encourage them to engage citizens in smart growth decisions.
- Use public transportation.

SOUND HEALTH 2001

Who Do You Call?

The Long Island Sound Study is a partnership of federal, state, and local government agencies, private organizations, and educational institutions working together to restore and protect Long Island Sound. For additional information, contact these key agencies and organizations:

EPA Long Island Sound Office
CT (203) 977-1541
NY (631) 632-9216
www.epa.gov/region01/eco/lis

New York State Department of Environmental Conservation
(631) 444-0467
www.dec.state.ny.us

State of Connecticut Department of Environmental Protection
(860) 424-3000
dep.state.ct.us

CONNECTICUT

Department of Health
Septic Systems
(860)509-7296

Department of Health
Shellfish Quality
(860) 509-7750

DEP Hazardous Spills/Oil & Chemical
(24 hour)
(860) 424-3338

DEP Hazardous Waste/
Enforcement/Complaints
(860) 424-3023

DEP Hazardous Waste
Collection/Schedules
(860) 424-3242

Turn in Poachers/Report Violations
(860) 842-4357

Department of Agriculture
Bureau of Aquaculture
(203) 874-0696

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Connecticut Sea Grant
(860) 405-9105

NEW YORK

DEC Debris Line
(718) 482-4955

DEC Spill Hotline
(800) 457-7362

DEC Marine Resources
(631) 444-0430

Department of Health
(800) 458-1158

New York Sea Grant
(631) 632-6905

GENERAL CONTACTS

National Response Center
(dumping/spills)
(800) 424-8802

Long Island Sound Watershed Alliance
(203) 327-9786

U.S. Geological Survey
Woods Hole Field Center
(508) 548-8700
www.marine.usgs.gov

Are You on Our Mailing List?

UPDATE is a quarterly publication featuring news from around the Sound. To sign up to receive your free copy, visit our website at **www.epa.gov/region01/eco/lis/feedback** and we'll place your name on our mailing list. The LISS also publishes fact sheets, educational pamphlets, and brochures on a variety of topics. Many of these publications can be obtained on the LISS website.

Acknowledgments

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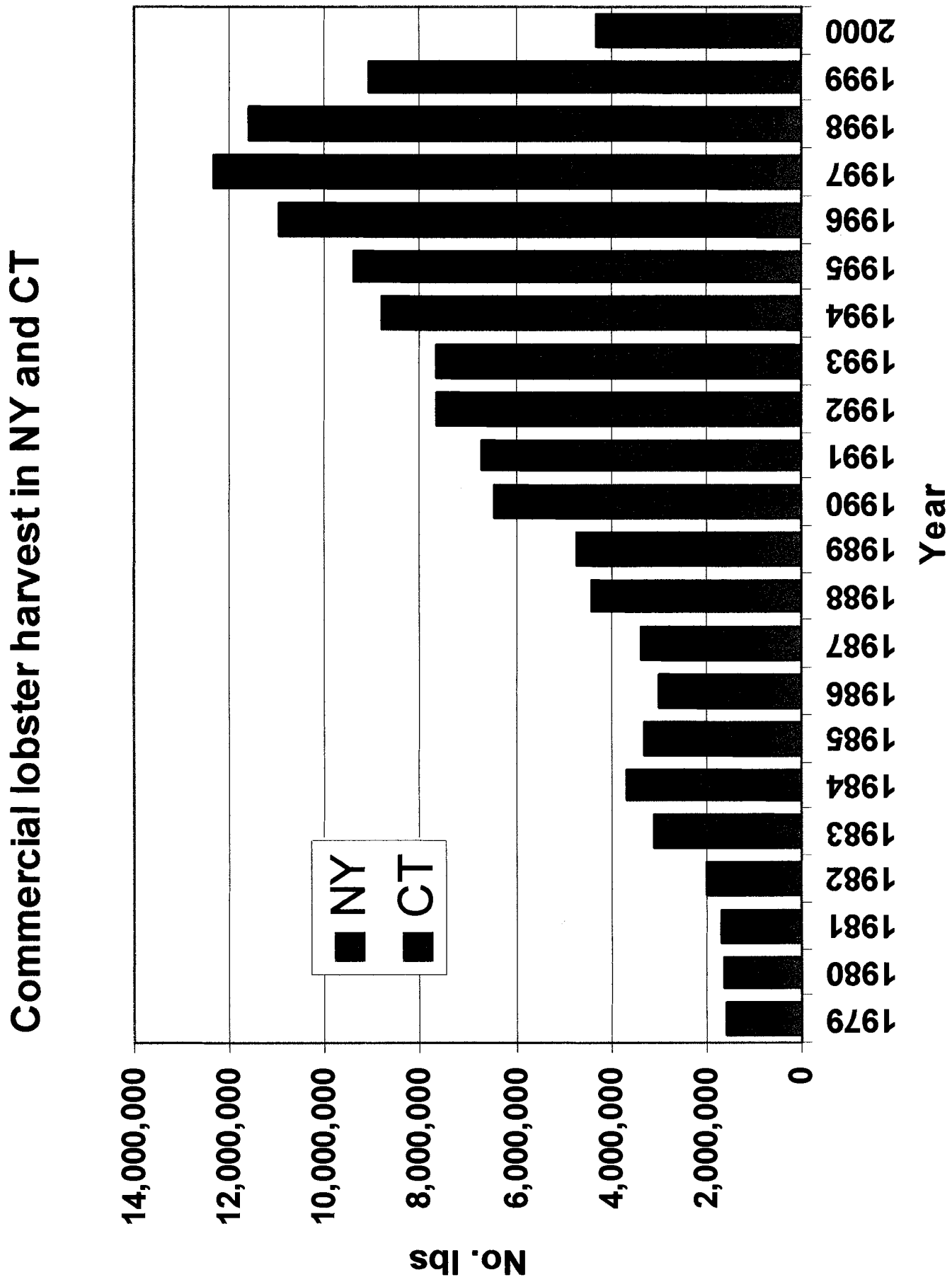
United States Environmental Protection Agency
Long Island Sound Office
Stamford Government Center
888 Washington Boulevard
Stamford, CT 06904-2152


Commercial lobster harvest in NY and CT
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10,000,000
8,000,000
6,000,000
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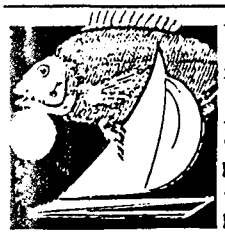

LONG ISLAND SOUND STUDY

A Partnership to Restore and Protect the Sound

Citizens Advisory Committee

June 28, 1999

The Honorable Jeanne M. Fox
Regional Administrator
EPA Region II
New York, NY 10007-1866

Dear Ms. Fox:

At its June 10, 1999 meeting, the Long Island Sound Study (LISS) Citizens Advisory Committee (CAC) unanimously adopted the following resolution:

Resolution to the Policy Committee and Management Committee of the Long Island Sound Study

After review of the1998 Comprehensive Conservation and Management Plan (CCMP) Implementation Tracking Report, the CAC supports LISS implementation actions in the following areas:

1) *Federal funding through Congress for CCMP implementation to match the significant New York and Connecticut state funding commitments for nitrogen reduction;*
2) *Creation of a Long Island Sound National Reserve system utilizing state funds and Federal Land and Water Conservation Funds (LWCF);*
3) *Expansion of biological research funding and establishing a long-term commitment to address unfunded CCMP research needs;*
4) *Encouragement to the states to move forward on a fast track basis with the development of a Dredged Material Management Plan for Long Island Sound consistent with state and Federal law;*
5) *Assistance by the states and Management Conference to increase the number of applicants and projects for habitat restoration; and*
6) *Analysis, coordination and development of Sound-wide Geographic Information System needs.*

The CAC urges the Management Committee to adopt these recommendations and provide them to the Policy Committee for consideration.

Furthermore, the CAC supports the acquisition of Calf Island off of Greenwich, Connecticut, through Federal LWCF funds and possible state/private dollars as part of a Long Island Sound Reserve system.

The CAC urges the LISS Policy and Management Committees to alert the Connecticut and New York Congressional delegations to support the Calf Island acquisition, as well as the applicable priority areas described above.

Respectfully submitted on behalf of the full CAC, we are yours truly,

John Atkin
Connecticut CAC Co-Chair

David Miller
New York CAC Co-Chair

cc: Management Committee
CAC Members

Identical letters sent to the Honorable John DeVillars; Arthur J. Rocque; and John M. Cahill.

ATTACHMENT 22

LONG ISLAND SOUND STUDY

Partnership to Restore and Protect the Sound

Citizens Advisory Committee

June 19, 2000

The Honorable Mindy Lubber
Regional Administrator
EPA Region I
1 Congress Street
Boston, MA 02203

Commissioner Arthur J. Rocque
Connecticut Department of
Environmental Protection
79 Elm Street
Hartford, CT 06016

The Honorable Jeanne M. Fox
Regional Administrator
EPA Region II
290 Broadway
New York, NY 10007

Commissioner John M. Cahill
New York State Department of
Environmental Conservation
50 Wolf Road
Albany, NY 12233

Dear LISS Policy Committee Members:

At the June 8th meeting of the Long Island Sound Study (LISS) Citizens Advisory Committee (CAC), the CAC reviewed the 1999 LISS Comprehensive Conservation and Management Plan (CCMP) Implementation Tracking Report and developed priority issue areas for the Policy Committee to consider. Last year, we provided you with a similar set of recommendations. From those recommendations, you provided us with your response and significant progress was made on several fronts.

One specific area to note is the passage in the U.S. House of Representatives of the *Long Island Sound Restoration Act*, which authorizes $80 million a year for four years for the implementation of the Long Island Sound CCMP. We must all continue our efforts on federal funding for the Sound and, specifically, ensure that the U.S. Senate passes the companion legislation this year.

Our six priority issues for 2000/2001 for your consideration on the proper implementation of the CCMP include:

1) Identification of a clear timetable for the development of a Long Island Sound Reserve Program, which includes CAC interaction with the Management and Policy Committee to achieve consensus on its scope and mechanisms to create a Long Island Sound Reserve program.

2) Development of a Long Island Sound research fund to provide resources specifically targeted for Long Island Sound biological research and analysis of broader ecosystem impacts.

3) Assurance that the states continue to move forward to implement the TMDLs with appropriate water quality standards to maintain the momentum and schedule of the Phase III agreement on nitrogen reduction.

4) Continuing the state and federal emphasis on implementing the habitat restoration strategy for the Sound, as well as securing state and federal funds for this effort.

5) An increased emphasis and greater defined program for toxics issues identified in the CCMP.

6) Review, assessment and consideration of the Sediment Concept paper, which the CAC approved at its June 8th meeting (see attached two-page paper).

During the next CAC meeting in September, we will have further discussions on these priorities and will provide to you, after that point, any additions or further information.

As CAC Co-Chairs, we respectfully request the opportunity to discuss with you these issue priorities at the fall meeting of the Policy Committee. We would also welcome your initial comments to these recommendations this summer to help prepare us for the fall Policy Committee meeting.

Thank you for considering our recommendations and we look forward to your response.

Yours truly,

David Miller
New York CAC Co-Chair

John Atkin
Connecticut CAC Co-Chair

Enclosure

cc: Citizens Advisory Committee