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# Long Island Sound Study Action Agenda

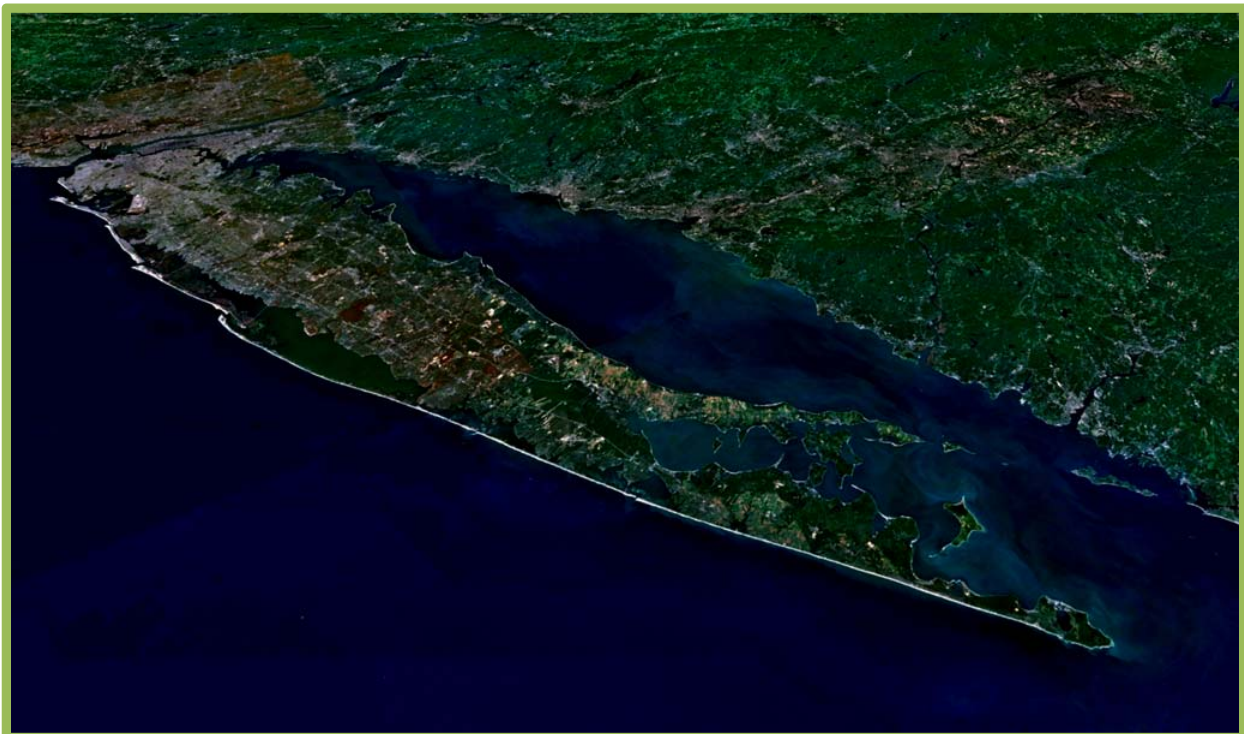
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2011-2013

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August 2011

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## List of Acronyms:

|              |   |
|--------------|---|
| BMP.....     | Best Management Practices                                     |
| BOCES.....   | Board of Cooperative Educational Services                     |
| CAC.....     | Citizens Advisory Committee                                   |
| CCMP.....    | Comprehensive Conservation and Management Plan                |
| CLEAR.....   | Center for Land Use Education and Research                    |
| CTDEEP.....  | Connecticut Department of Energy and Environmental Protection |
| CTSG.....    | Connecticut Sea Grant   |
| EBM.....     | Ecosystem–Based Management                                    |
| EPA.....     | United States Environmental Protection Agency                 |
| FY.....      | Fiscal Year   |
| GIS.....     | Geographic Information System                                 |
| LID.....     | Low Impact Development  |
| LISS.....    | Long Island Sound Study                                       |
| LIDAR.....   | Light Detection and Ranging                                   |
| NEIWPCC..... | New England Interstate Water Pollution Control Commission     |
| NGO.....     | Non-Governmental Organization                                 |
| NOAA.....    | National Oceanic and Atmospheric Administration               |
| NPS.....     | Nonpoint Source   |
| NPS&W.....   | Nonpoint Source and Watersheds                                |
| NRCS.....    | Natural Resource Conservation Service                         |
| NYSDEC.....  | New York State Department of Environmental Conservation       |
| NYSG.....    | New York Sea Grant  |
| STAC.....    | Science and Technical Advisory Committee                      |
| SWEM.....    | Systemwide Eutrophication Model                               |
| TMDL.....    | Total Maximum Daily Load                                      |
| UCONN.....   | University of Connecticut                                     |
| USFWS.....   | United States Fish and Wildlife Service                       |



## Introduction

Long Island Sound (LIS) is one of the largest urban estuaries (a coastal body of water where fresh water draining from the land mixes with salt water from the ocean) in the United States. It provides economic and recreational benefits to millions of people in Connecticut and New York, while also providing natural habitats to more than 1,200 species of invertebrates, 170 species of fish, and dozens of species of migratory birds.

The Long Island Sound Study (LISS), sponsored by the U.S. Environmental Protection Agency (EPA) and the states of Connecticut and New York, is a partnership of federal, state, and local agencies, universities, national and local environmental groups, businesses, and community groups whose mission is to restore and protect this great resource. The LISS partnership strives to be adaptable, collaborative, effective, and efficient in the implementation of a Comprehensive Conservation and Management Plan (CCMP) that was developed in 1994. The plan, approved by the Governors of Connecticut and New York and the EPA Administrator, serves as a blueprint for actions needed to improve water quality, restore habitats, conserve the land, and increase opportunities for human use and enjoyment of the Sound. This blueprint is being actively implemented by the many LISS partners.

Periodically, the LISS has developed agreements to guide and prioritize implementation of the CCMP – such agreements were developed in 1996, 2003, and 2006. This Action Agenda identifies priority actions to implement the 1994 CCMP from 2011 to 2013 and sets the stage for a more comprehensive update to the CCMP that is planned for 2014. The actions are structured to be specific and measurable, and will be tracked by the LISS.

This *Action Agenda* is intended to drive results from the LISS and its management conference partners. It is organized around four themes:

- Waters and Watersheds
- Habitats and Wildlife
- Communities and People
- Science and Management

Each theme identifies a goal and rationale, one or more desired outcomes to achieve the goal, and specific actions (not in priority order) that will lead to the desired outcomes.

This Action Agenda, developed by the Long Island Sound Study Management Conference, was approved by the Long Island Sound Study Management Committee on August 5, 2011, and subsequently adopted by the Long Island Sound Executive Steering Committee on August 24, 2011 with the following statement:

*"Consistent with the Comprehensive Conservation and Management Plan, the Executive Steering Committee of the Long Island Sound Study endorses the Long Island Sound Study Action Agenda: 2011-2013 as a path forward to guide priority actions to improve water quality, restore habitat, conserve the land, maintain biodiversity, and increase opportunities for human use and enjoyment of the Sound."*

## Waters and Watersheds

*Goal 1. Promote sustainable pollution control and prevention practices on land and in the water to improve the quality of watersheds and Long Island Sound.*

*Rationale: Healthy watersheds (the land where waters drain into a common water body) allow for clean waters that support abundant wildlife and provide for recreational and commercial fisheries. Because of the density of coastal developments, special effort must be made to mitigate the pollution—often arriving as polluted runoff—that threatens clean, productive coastal waters. In addition to assisting local decision-makers in implementing existing land use protection programs, public outreach and education must promote a greater understanding of the importance of healthy waters and watersheds, and encourage the public to become part of the solution.*

### Key accomplishments to date

- Established an enforceable plan in the states of Connecticut and New York in 2000 to reduce the amount of the nutrient nitrogen discharged into the Sound by 58.5% by 2014.
- Implemented innovative nitrogen permit and “trading” programs as a cost-effective mechanism for attaining the nitrogen reduction goals for sewage treatment plants, a major source of nitrogen to LIS.
- By the end of 2010, achieved 60% of the 2014 TMDL goal for nitrogen from wastewater treatment plants, with total planned investments of \$1.86 billion in New York and \$1.13 billion in Connecticut.
- Monitored pollutant loads and water quality since 1987 to identify status and trends, and evaluate the effectiveness of management efforts.
- Created a “No Discharge Zone” in Connecticut waters and drafted and submitted a petition to the EPA which, when approved, will designate the entire Sound as a vessel waste no discharge zone.
- Contributed more than \$2.2 million to various water quality improvements around the watershed through the LIS Futures Fund, which leveraged an additional \$5.5 million since 2005. Funded numerous projects to reduce polluted runoff and serve as examples for future projects, such as reducing the amount of paved surfaces in the Town of Mansfield, Connecticut, enhancing upland buffer habitat to reduce polluted stormwater runoff in Old Field, New York, and installing storm drain filters to remove pollutants in South Norwalk, Connecticut and Mamaroneck, New York.
- Worked with communities to develop and approve watershed-based plans and supported other watershed planning efforts in more than 30 sub-watersheds.

*Outcome 1.1: Policies, practices and infrastructure are maintained and enhanced to reduce pollutant loads.*

### Priority Actions

1. Continue to implement actions to achieve the nitrogen reduction targets for nitrogen to LIS 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 (TMDL) Analysis to Achieve Water Quality Standards for Dissolved Oxygen in Long Island Sound*.
  - Responsible Entities: EPA, CT, NY.
  - Funding: Will require continued capital project funding through Connecticut's Clean Water Fund and New York's State Revolving Fund program, as well as local town commitments.
  - Timeframe: Ongoing.
2. Revise the TMDL for attaining water quality standards for dissolved oxygen in LIS. The TMDL will set allocations watershed-wide (Massachusetts, New Hampshire, and Vermont, in addition to Connecticut and New York), and use a phased, adaptive management approach.
  - Responsible Entities: EPA, CT, and NY, working with VT, MA, and NH.
  - Funding: LISS FY 2008-2011 funding already provided for TMDL evaluation. Depending on tasks required for the evaluation, additional funding may be needed.
  - Timeframe: 2011-2013.
3. Continue to implement programs to mitigate combined sewer overflows and sanitary system overflows.
  - Responsible Entities: EPA, CT, and NY.
  - Funding: Will require continued capital project funding through Connecticut's Clean Water Fund and New York's State Revolving Fund program, as well as local town commitments.
  - Timeframe: Ongoing.
4. Research and quantify the effectiveness of stormwater management practices to reduce nitrogen.
  - Responsible Entities: LISS funded researchers.
  - Funding: LISS FY 2011 funding already provided for specific research projects. Additional funding may be needed to further investigate.
  - Timeframe: 2012-13.
5. Pilot bioharvesting of shellfish and algae to assess the effect of these actions on nutrient processing and removal, assessing the results for the feasibility of bioharvesting to be a component of an overall nutrient control strategy.
  - Responsible Entities: EPA, NOAA, UCONN.
  - Funding: FY 2009 and 2010 funding already provided by LISS and partners (NOAA, EPA, New York Attorney General's Office through the Bronx River Watershed Initiative) for pilot projects. Additional funding may be needed for expansion of pilots.
  - Timeframe: 2012-2013.
6. Upon EPA's approval of its application, New York State will designate all of the LIS waters in New York as a Vessel Waste No Discharge Zone, making all of LIS a No Discharge Zone/Area.
  - Responsible Entities: NY, EPA.
  - Funding: Supported by EPA and NYSDEC programs.
  - Timeframe: 2012.

7. Support enhancement of boat pumpout facilities and their use by the recreational and commercial boating community to comply with the no discharge zone designation.
  - Responsible Entities: LISS, United States Fish and Wildlife Service (USFWS), EPA, NYSDEC, CTDEEP.
  - Funding: Will require additional funding through LIS Futures Fund, Clean Vessel Act Program, and New York Environmental Facilities Corporation.
  - Timeframe: 2011-2013.
8. Work with the boating community to support marina BMP to reduce sources of toxic contaminants.
  - Responsible Entities: LISS Nonpoint Source and Watersheds (NPS&W) Work Group and Communication Team.
  - Funding: Can partly be accomplished with existing LISS staff and additional partnerships through the LIS Futures Fund. May require additional funding.
  - Timeframe: 2011-2013.
9. Develop and/or promote guidance to residential and municipal landowners and service/product providers for sustainable land care practices including non-agricultural turf fertilizer, pesticide use, lawn alternatives, and riparian buffer design using native plant species to be implemented through BMP, and which may be promoted through education, outreach, and legislation.
  - Responsible Entities: LISS, in conjunction with the effort currently underway by NEIWPCC and the New England states, CTSG, LISS NPS&W Work Group, and LISS Communication Team.
  - Funding: LISS staff will be primarily responsible.
  - Timeframe: 2011-2013.
10. Develop and/or promote guidance for agricultural fertilizer and pesticide use to be implemented through BMPs, and which may be promoted through education, outreach, and legislation.
  - Responsible Entities: Cornell Cooperative Extension, UCONN, NRCS.
  - Funding: Department of Agriculture funding.
  - Timeframe: 2012.
11. Participate in a regional initiative to work with the fertilizer industry to control nutrients in turf fertilizers.
  - Responsible Entities: LISS, in conjunction with the effort currently underway by NEIWPCC and the New England states.
  - Funding: LISS staff will be primarily responsible.
  - Timeframe: 2012.
12. Improve the performance of on-site wastewater treatment systems (e.g., cesspools and septic tanks) by:
  - Developing and distributing educational and outreach materials on the proper design, siting, construction, use, and maintenance of on-site wastewater treatment systems:
  - Promoting on-site wastewater management programs by the appropriate permitting agencies that include regular inspections and maintenance of on-site wastewater treatment systems.
  - Targeting educational campaigns at areas of known/suspected on-site wastewater treatment system contamination.
  - Researching and quantifying the nitrogen-contributions from traditional septic systems, and investigating aerobic treatment units.
    - Responsible entities: LISS NPS Work Group and Communications Team, LIS watershed states, local governments.
    - Funding: Will require additional funding.
    - Timeframe: 2011-2013.



13. Identify structural best management practices (BMP) and source control actions (i.e., pet waste pickup laws, nuisance wildlife control programs) that are effective at reducing pathogens and understand the mechanisms for pathogen reductions and how to quantify their effectiveness. This will include source tracking to better target BMP placement.
  - Responsible entities: The LISS, assisted by the NPS&W work group.
  - Funding: Will require additional funding.
  - Timeframe: 2011-2013.
  
14. Utilize the LIS Futures Fund to canvas municipalities that are adjacent to LIS or its embayments for BMP/restoration activities already completed. Assess improvements in water quality or habitat resulting from existing work.
  - Responsible entities: The LISS, assisted by the NPS&W work group.
  - Funding: Will require additional funding.
  - Timeframe: 2011-2013.

*Outcome 1-2: Low impact development and redevelopment maintains or restores the watershed's hydrologic and ecological functions.*

#### Priority Actions

15. Promote watershed planning efforts to implement Low Impact Development (LID) and other programs to reduce runoff volume and pollutant load from new development and retrofitting existing development, encouraging municipalities to adopt a “no net increase in runoff” approach that seeks to cap the water quality and quantity impacts of impervious surfaces in LIS watersheds.
  - Responsible Entities: LISS in partnership with states, local governments, and watershed coalitions, and other partners.
  - Funding: LISS and state water program staff will be primarily responsible, but may require additional funding.
  - Timeframe: 2011-2013.
  
16. Promote green storm water infrastructure projects in municipalities and at large facilities such as college campuses, shopping malls, and commercial industrial parks to reduce runoff from existing development.
  - Responsible Entities: The LISS, working with the states, local governments, and watershed coalitions, and other partners.
  - Funding: LISS and state water program staff will be primarily responsible, but may require additional funding.
  - Timeframe: 2011-2013.

## Habitats and Wildlife

*Goal 2. Restore and maintain Long Island Sound in a healthy, productive and resilient condition so that it can provide the services humans want and need.*

*Rationale: Healthy coastal habitats provide critical feeding, breeding, and migratory stopover sites for the diverse abundance of plants and animals that use LIS. In 1996, the LISS established the Habitat Restoration Initiative, and in 1998 established a goal of restoring and protecting 12 priority LIS habitat types around the Sound. The Initiative uses partnerships to accomplish the restoration objectives and leverage limited state, local, and federal funds. In addition, the LISS established the Stewardship Initiative in 2006 to conserve natural areas, increase access to the Sound, protect important habitats, and plan for multiple uses. The Stewardship Initiative identified places with significant ecological or recreational value throughout the Sound and developed a strategy to protect and enhance these special places. In 2006, the LISS adopted thirty-three inaugural Stewardship Areas that represent lands of outstanding or exemplary scientific, recreational, educational, or biological value for protection, management. These areas provide opportunities around the Sound to enhance the public's awareness and personal connection with our special estuary.*

### Key accomplishments to date

- From 1998-2010, completed 108 habitat restoration projects miles throughout the LIS watershed that restored 1,040 acres and opened 160.4 river miles for migratory fish.
- Designated 12 priority habitats in the LIS estuary: beaches and dunes, cliffs and bluffs, estuarine embayments, coastal and island forests, freshwater wetlands, coastal grasslands, intertidal flats, rocky intertidal zones, riverine migratory corridors, submerged aquatic vegetation beds, shellfish reefs, and tidal wetlands.
- Since 2005, contributed more than \$2.4 million to various habitat restoration projects around the watershed through the LISS Futures Fund, which leveraged an additional \$6.3 million.
- Tracked the size of fish populations in the Sound for the past 25 years through the CTDEEP LIS trawl survey.
- Monitored the abundance of fish in embayments and tributaries in the Sound through the NYSDEC and CTDEEP.
- Monitored the abundance of wildlife, including piping plovers, horseshoe crabs, and anadromous fish, around the Sound through state programs established by various environmental agencies, community groups, researchers, and environmental groups.
- Established the \$6 million Sound Cable settlement fund to map the seafloor of the Sound and help assess and manage potential conflicts resulting from energy projects and other commercial uses.
- Contributed more than \$1 million to various stewardship activities around the watershed, through the LIS Futures Fund, which leveraged an additional \$2.6 million since 2002.
- Created the 2006 Stewardship Atlas, which provides information on the location and ecological and recreational benefits in each of the 33 Inaugural Stewardship Areas.
- Funded more than \$1.7 million toward acquisition and acquired lands at several key sites in Connecticut and New York, including in Stonington, Connecticut and Setauket, New York near

the Barn Island and Stony Brook Harbor Stewardship Areas, respectively. Since 2006, at least 1,761 acres have been protected within the LIS coastal habitat boundary.

- Funded watershed planning efforts at various Stewardships Areas including Nissequogue River, Oyster Bay, Plum & Gull Islands (New York), and Milford Point and Great Meadows (Connecticut).
- Funded mapping of the change in land cover and impervious surfaces in Connecticut and New York over the past 25 years.

*Outcome 2-1: The ecosystem services provided by habits are protected, restored, and enhanced.*

### Priority Actions

1. Redefine the Habitat Restoration Work Group that was formed in 1998 to reflect a broader charge to protect, restore, or enhance habitats and the ecosystem services that they provide.
  - Responsible Entities: LISS.
  - Funding: LISS staff will be primarily responsible.
  - Timeframe: 2011.
2. Update the LIS habitat restoration plan.
  - Incorporate performance measures specific to habitat types to measure success
  - Include specific guidance for habitat considerations related to climate change, for example using high resolution Light Detection and Ranging (LIDAR) to determine wetland projects that will provide migration opportunities.
  - Update potential project list to include specific project sites
    - Responsible Entities: LISS Habitat Work Group.
    - Funding: LISS staff will be primarily responsible.
    - Timeframe: 2013.
3. Restore 200 acres of coastal habitat and reopen 80 miles of riverine migratory corridors to diadromous fish passage.
  - Responsible Entities: LISS Habitat Work Group through federal, state, and local partners.
  - Funding: Priority for funding under the LIS Futures Fund. Will require partnership funding from federal, state, and local programs.
  - Timeframe: From 2012 to 2013.
4. Assess the amount of fragmentation in forest cover in the Connecticut and New York portions of the watershed using available land use/land cover data. Through watershed planning and habitat protection, minimize this fragmentation of forest.
  - Responsible Entities: LISS, UCONN-CLEAR.
  - Funding: LISS 2010 and 2011 funding already provided to UCONN-CLEAR.
  - Timeframe: By 2012.
5. Identify stewardship priorities for land protection, public access, and site management using the LISS Stewardship Initiative Site Evaluation Tool, incorporating tidal wetland trends and inundation data in the evaluation.
  - Responsible Entities: LISS Stewardship Work Group.
  - Funding: LISS 2008 funding already provided to NEIWPC for Evaluation Tool. LISS staff will be primarily responsible for application.
  - Timeframe: In 2012.

6. Refine and document ecological data inventory to improve the basis for stewardship decision making, and include undeveloped islands as a priority habitat for characterization.
  - Responsible Entities: LISS, USFWS.
  - Funding: Partial LISS funded provided. May require additional funding.
  - Timeframe: In 2012.
7. Protect 820 acres of coastal habitat.
  - Responsible Entities: CT, NY, EPA, USFWS, NOAA, NRCS, land trusts, local governments.
  - Funding: Priority for funding under the LISS. Will require partnership funding from federal, state, and local programs.
  - Timeframe: From 2012 to 2013.
8. Enhance map products to support regulatory protection of coastal resources.
  - Initiate a pilot project with a local community to map coastal erosion hazard lines for that community using the most appropriate techniques.
  - Map coastal erosion hazard areas, considering natural protective features and coastal recession rates to further protection of these areas.
  - Update tidal wetland maps in New York using the tidal wetland trends data in order to better protect wetland and upland buffer resources.
  - Use 1' LIDAR based digital elevation models to predict wetland migration opportunities and incorporate this data into the Stewardship Tool and restoration site evaluations.
    - Responsible Entities: NY, CT, LISS.
    - Funding: New York State Energy Research and Development Authority will fund pilot project. Other projects will require additional funding.
    - Timeframe: Initiate in 2012-2013.

*Outcome 2-2: Diverse and balanced populations of fish, birds, and wildlife enhance ecosystem resiliency and function.*

#### Priority Actions

9. Create a GIS-based eelgrass habitat suitability model for LIS. From that model develop goals for restoration and protection of eelgrass in LIS embayments, considering future impacts of climate change.
  - Responsible Entities: LISS Eelgrass Team with input from LISS-funded research.
  - Funding: LISS FY 2009 funding provided to NEIWPC who selected a UCONN/Cornell Cooperative Extension team to perform work.
  - Timeframe: 2012.
10. Implement and assess pilot eelgrass plantings at sites in both Connecticut and New York.
  - Responsible Entities: Cornell Cooperative Extension of Suffolk County, UCONN, with LISS support.
  - Funding: LISS FY 2009 funding provided to Cornell Cooperative Extension/UCONN team to perform work.
  - Timeframe: 2012.
11. Continue monitoring the areal extent of eelgrass every three years, and develop protocols for assessing eelgrass habitat quality.
  - Responsible Entities: LISS, USFWS.

- Funding: Next survey already funded with LISS FY 2008 and USFWS FY 2010 funds. Ongoing monitoring will need to be supported.
  - Timeframe: 2012 and every three years after.
- 12. Support eelgrass protection legislation and development of eelgrass management areas.
  - Responsible Entities: LISS, states, CAC.
  - Funding: No cost associated with the action.
  - Timeframe: Ongoing.
- 13. Continue the Long Island Sound Finfish Trawl Survey
  - Responsible Entities: CTDEEP.
  - Funding: Provided through Federal Aid in Sport Fish Restoration Program.
  - Timeframe: Annually.
- 14. Continue to assess the health of tidal wetlands and specifically monitor losses from submergence, sudden vegetation dieback, accelerated sea level rise, and other causes. Devise adaptive management strategies for marsh loss attributable to the effects of climate change and other causes
  - Complete the Tidal Wetlands Trends Analysis and Wetland Loss Characterization in New York. The analysis will assess the quantitative and qualitative changes in tidal wetland vegetation throughout Long Island Sound's tidal wetlands since the last New York State regulatory inventory in 1974.
  - Compare the results with information on tidal wetland trends in Connecticut.
    - Responsible Entities: NYSDEC, Habitat Work Group, NEIWGCC.
    - Funding: FY 2010 funding provided by the EPA to NEIWGCC and NYSDEC to conduct project.
    - Timeframe: Ongoing.
- 15. Use Sound Cable settlement funds and other funds as available to initiate assessment and mapping of seafloor habitats to better manage uses of the Sound.
  - Responsible Entities: LIS Cable Fund Steering Committee.
  - Funding: There is more than \$7 million available in the Sound Cable account. Additional funds will be needed to comprehensively map the seafloor.
  - Timeframe: Continue work in 2011, initiate mapping and research in 2012.
- 16. Adopt the *Long Island Sound Aquatic Invasive Species Management Plan*.
  - Responsible Entities: CT, NY, USFWS.
  - Funding: LISS already supported development of the plan by CTSG.
  - Timeframe: 2011.
- 17. Assess restoration of molluscan bed habitats in LIS by establishing several experimental small-scale molluscan beds in the Sound to assess the factors controlling their development and the effect of reefs on the provision of ecological services (e.g. water quality and aquatic communities).
  - Responsible Entities: LISS Habitat Work Group.
  - Funding: LISS staff and workgroup members to develop plan. Additional funding needed to establish pilot studies.
  - Timeframe: 2013.

## Sound Communities

Goal 3. *Support vibrant, informed, and engaged communities that use and appreciate Long Island Sound.*

*Rationale: A public perception survey conducted by LIS in 2006 suggests that many LIS residents are not well informed about environmental issues and terms. Less than one-third of those questioned in the survey knew that storm drains empty into the Sound and its tributaries. The survey also indicated that environmentally knowledgeable residents are more likely to engage in behaviors to prevent pollution (such as lawn care practices to reduce fertilizer runoff) as compared to residents that were less knowledgeable. A public that understands and appreciates the economic, recreational, and cultural value of LIS is more likely to actively support and practice behaviors that will help contribute to a healthy LIS.*

Key accomplishments to date

- Contributed more than \$2.4 million to various educational projects around the watershed through the LIS Futures Fund since 2005, which has leveraged an additional \$6.3 million.
- Incorporated new social marketing techniques into the program to increase the effectiveness and efficiency of public outreach and education campaigns.
- Developed new programs, such as the *Sound Stewards* program in which more than 1,500 students have participated in research projects, to increase awareness and stewardship for LISS Stewardship sites.
- Conducted 22 Mentor Teacher workshops to enhance and reinforce awareness and understanding of the importance of LIS and its watershed since 2002. These workshops have taught 284 formal and informal educators in Connecticut and New York and, through them, more than 12,600 students.
- Updated the LISS website to make it easier for public to learn about LIS and LISS efforts to restore and protect the Sound.
- Developed publications such as newsletters, *Sound Health*, and *Protection and Progress* to keep the public informed about the health of LIS and the progress to restoration efforts.

*Outcome 3-1: The restoration effort involves and benefits all watershed communities and people.*

### Priority Actions

1. Support and build local partnerships for urban waterways that foster community involvement, connection, understanding, and stewardship, promote public access, and help communities become active participants in restoration and protection.
  - Encourage local governments to take advantage of training, technical assistance, and financing to incorporate habitat protection and effective water quality practices into local land use decision making.
  - Provide NPS and LID information to the public, landscape and building professionals, and trade organizations to support consistent land use and natural resources management practices in the region.
  - Promote pollution prevention public awareness and social marketing campaigns.

- Responsible Entities: LISS Stewardship and Habitat Restoration Work Groups, LISS Communications Team, state agencies, local organizations LISS.
  - Funding: To be accomplished with LISS staff and through the availability of Futures Fund grants and other resources.
  - Timeframe: Ongoing.
- 2. Increase public knowledge and awareness of water quality, ecology, natural history, culture, and heritage of the Sound through programs and across different formats, including the Web, print publications, and social media.
  - Responsible Entities: LISS educational partners and Communications Team.
  - Funding: To be accomplished with LISS staff and partnerships supported through LIS Futures Fund and other funding sources.
  - Timeframe: Ongoing.
- 3. Enhance and promote Stewardship Areas around the Sound to protect the values of and provide increased public access to these special areas.
  - Responsible Entities: LISS Stewardship Work Group and Communications Team.
  - Funding: To be accomplished by LISS staff and partnerships supported through LIS Futures Fund and other funding sources.
  - Timeframe: Ongoing.
- 4. Support a LIS field and learning experience for as many school children as possible in the New York and Connecticut portions of the LIS watershed by their graduation from high school using existing initiatives and educational tools and working with environmental agencies and organizations, local schools, BOCES, and parent-teacher associations.
  - Responsible Entities: LISS Communications Team working with federal, state, local, and non-governmental organization (NGO) partners.
  - Funding: To be accomplished with LISS staff and partnerships supported through LIS Futures Fund and other funding sources.
  - Timeframe: Ongoing.

*Outcome 3-2: Innovative tools are used to enhance personal and community stewardship.*

#### Priority Actions

- 5. Create and provide incentives to partners to develop outreach programs that use community-based social marketing techniques, and/or other education campaign tools, to engage the public to practice behaviors to contribute to a healthy Long Island Sound.
  - Responsible Entities: LISS Communications Team.
  - Funding: To be accomplished with LISS staff and partnerships supported through LIS Futures Fund and other funding sources.
  - Timeframe: Ongoing.
- 6. Support development Coastal Marine Spatial Planning that balances human use needs with ecosystem protection and is integrated with regional marine spatial plans.
  - Responsible Entities: CT and NY through the Sound Cable Fund Steering Committee.
  - Funding: Will need to compete for NOAA funding pending availability.
  - Timeframe: initiate in 2012.
- 7. Involve the public in the evaluation and ongoing development of the CAC's Sound Vision.
  - Responsible Entities: LIS CAC.
  - Funding: Existing LISS staff and activities by the CAC using external funding.
  - Timeframe: In the summer and fall of 2011.

*Outcome 3-3: Maintain and enhance water dependent uses of the Sound in an environmentally responsible manner.*

Priority Actions

8. Implement effective and environmentally sustainable dredge materials management to maintain access to the Sound and recreational areas.
  - Responsible Entities: CT, NY, LISS staff, LISS CAC Dredging Subcommittee, and, US Army Corps of Engineers.
  - Funding: Existing agency and LISS supported staff.
  - Timeframe: Ongoing.



## Science and Management

*Goal 4. Make ecosystem-based management (EBM) the foundational principle for management of Long Island Sound.*

*Rationale: Sound science is the foundation of sound management. EBM is an integrated approach to management that considers the entire ecosystem, including humans. The goal of EBM is to maintain an ecosystem in a healthy, productive and resilient condition so that it can provide the services humans want and need. With President Obama's 2010 Executive Order adopting the recommendations of the Ocean Policy Task Force, EBM is now a foundational principle of federal management of our coasts.*

### Key accomplishments to date

- Increased the scientific understanding of LIS to support effective management by supporting more than 30 research projects since 1999 as part of the Long Island Sound Research Grant Program.
- Monitored pollutant loads and water quality since 1987 to identify status and trends, and evaluate the effectiveness of management efforts.
- Mapped the status and trends in critical habitats such as seagrass and tidal wetlands
- Tracked and reported on CCMP implementation annually to evaluate progress and make management adjustments.
- Developed environmental indicators that provide the public with key measures to assess the health of LIS's water quality, fish populations, and habitats as well as management goals that track efforts to restore and protect the Sound. Developed and used computer models of the circulation and water quality of LIS to support nutrient management.

*Outcome 4-1: The scientific understanding of LIS to support management is increased through strengthened research, monitoring, assessment, mapping, and modeling.*

### Priority Actions

1. Complete and publish a scientific synthesis of LIS that will summarize the current state of knowledge, recommend priority science needs, and identify the implications for management.
  - Responsible Entities: LISS Science and Technical Advisory Committee (STAC).
  - Funding: LISS fiscal year (FY) 2007 and 2008 funding already provided to Connecticut Sea Grant (CTSG) and New York Sea Grant (NYSG) to administer.
  - Timeframe: 2012.
2. Evaluate current water quality monitoring programs to recommend improvements in the collection and integration of data from ship, buoy, and ferry monitoring platforms to better identify status and trends, and to evaluate management effectiveness in the most cost effective and scientifically defensible way. Implement recommended improvements based on available funding.
  - Responsible Entities: LISS STAC.

- Funding: To be accomplished with LISS staff and STAC member expertise. Additional funding may be needed to implement some of the recommended improvements.
  - Timeframe: 2011-12.
- 3. Evaluate options for enhancing and coordinating citizen and other monitoring in embayments and harbors and analyzing these data to improve sound-wide assessments of conditions. Subsequently, make recommendations based on the feasibility, efficacy, and available funding.
  - Responsible Entities: LISS, with New England Interstate Water Pollution Control Commission (NEIWPC) lead, in partnership with an entity selected through a competitive request for proposals.
  - Funding: LISS FY 2011 funding already provided to NEIWPC to compete and select a contractor to conduct the evaluation. Additional funding estimated at \$150,000/year will be needed for implementation.
  - Timeframe: 2011-2012.
- 4. Complete two embayment studies that will survey the health status of eight representative embayments in Connecticut and New York, and investigate the sources and fate of nitrogen in two diverse harbors on Long Island's north shore.
  - Responsible Entities: UCONN, Stony Brook University lead through LISS Research Grant Program support
  - Funding: LISS FY 2009 and 2010 funding already provided for two studies. Additional funding would be needed to support additional near shore and embayment evaluations.
  - Timeframe: 2011-2012.
- 5. Conduct a needs assessment for LIS Geographic Information System (GIS) analyses to identify priority GIS data needs, integration, analysis, and support.
  - Responsible Entities: LISS, with NEIWPC lead, in partnership with an entity selected through a competitive request for proposals.
  - Funding: LISS FY 2011 funding already provided for needs assessment. Additional funding will be needed for implementation.
  - Timeframe: 2011-2012.
- 6. Enhance the Systemwide Eutrophication Model (SWEM) to support the continuing assessment of eutrophication impairments to LIS. Transition the modeling to a community modeling framework to advance the cause of accessible, open-source environmental models of the LIS in support of research & management efforts.
  - Responsible Entities: NEIWPC with LISS funding.
  - Funding: LISS FY 2009 and 2010 funding already provided to NEIWPC to compete and select a contractor. Additional funding will be needed for ongoing applications.
  - Timeframe: 2011-13.
- 7. Update through 2010 the trends established from 1984-2006 in land cover, impervious surface cover, forested cover, and riparian buffers in the Connecticut and New York portions of the LIS watershed.
  - Responsible Entities: University of Connecticut (UCONN) Center for Land Use Education and Research (CLEAR), with LISS funding.
  - Funding: LISS 2010 and 2011 funding already provided to UCONN-CLEAR to conduct work.
  - Timeframe: 2011-12.
- 8. Implement the bi-state strategy for sentinel monitoring of the effects of global climate change on LIS.
  - Implement a pilot-scale program to demonstrate the approach.

- Pursue additional funding for expansion of the pilot-scale program.
- Synthesize and assess existing and historical datasets that have been identified by the LISS Sentinel Monitoring Work Group to identify trends in LIS and its ecoregions that could be related to climate change. Establish an on-line database of these data. From the analysis, report significant early-warning findings and develop recommendations for action by 2013.
  - Responsible Entities: LISS Sentinel Monitoring Work Group.
  - Funding: LISS FY 2008 and 2010 funding already provided for development of strategy and for pilot monitoring. Additional funds will be needed for continuation and expansion of monitoring.
  - Timeframe: Pilot field work in 2012.

*Outcome 4-2: The LISS CCMP is maintained and strengthened as a means to involve all levels of government and diverse stakeholders in developing cross-jurisdictional management goals and implementing actions to attain them.*

Priority Actions

9. Update the CCMP to reflect advances in science and to incorporate ecosystem based management and climate change.
  - Responsible Entities: LISS.
  - Funding: LISS staff will be primarily responsible, but funding will be needed to support public involvement and printing.
  - Timeframe: Conduct support work 2011-2013 with revised CCMP in 2014.

*Outcome 1-3: Implementation of the CCMP is continually improved by fostering innovation and adaptive management.*

Priority Actions

10. Continue to report on the health of LIS through environmental indicators, with a formal report every two years.
  - Responsible Entities: LISS Communications Team and Indicators Work Group.
  - Funding: LISS staff will be primarily responsible. Continued funding will be needed for report preparation and printing.
  - Timeframe: 2012 and every two years thereafter.
11. Continue to track and report on CCMP implementation annually with a formal public report every two years.
  - Responsible Entities: State, local, and federal agencies with CCMP implementation roles, LISS Communications Team
  - Funding: LISS staff will be primarily responsible. Continued funding will be needed for report preparation and printing.
  - Timeframe: 2011 and every two years thereafter.
12. Integrate climate change into all planning and implementation activities.
  - Responsible Entities: LISS.
  - Funding: No specific funding required.
  - Timeframe: Ongoing.

*Outcome 4-4: Public investments are maintained and enhanced.*

Priority Actions

13. Foster a broad based dialogue on the best ways to finance investments in the long term protection and enhancement of the Sound’s ecosystem services. Topics identified by the Citizens Advisory Committee (CAC) include:
- Federal investment levels in LIS, including funding for the LISS; current Clean Water Revolving Loan investment levels; and current combined United States Fish and Wildlife (USFW), Natural Resource Conservation Service (NRCS), and National Oceanic and Atmospheric Administration (NOAA) easement, wildlife, and restoration investments.
  - The Long Island Sound Restoration Act and Stewardship Act.
  - State capital investments in Connecticut Clean Water Fund and New York’s Environmental Protection Fund.
  - Another New York state environmental bond act.
  - Voluntary public donations to the Sound such as a) expanding the LIS License Plate concept in Connecticut and New York by creating a New York LIS voluntary license plate program, and implementing the voluntary re-registration of the LIS auto plate account in Connecticut; b) marketing the existing voluntary New York marine striped bass plate that supports marine resource protection in the Sound; and c) creating voluntary LIS trailer and boat registration plate purchase programs in Connecticut and New York.
  - A mix of revenue policies that protect and fund a healthy Sound.
  - Reducing plastic bag garbage in the Sound while helping to fund Sound restoration.
  - Private or public infrastructure bank.
    - Responsible Entities: LISS CAC.
    - Funding: Will require support by LISS CAC organizations.
    - Timeframe: 2012 through Sound Vision process.

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CONSERVING PROVISIONS

*Nothing herein shall be construed to require signatories to obligate or expend funds on behalf of the goals, objectives or responsibilities set forth in this Agreement, or give rise to a claim for compensation for services performed to further the goals of this Agreement. Any obligation or expenditure of funds by signatories in furtherance of the goals of this Agreement must be consistent with existing legal authorities. All obligations and expenditures of funds by signatories will be subject to the availability of appropriations and the signatories’ discretion in making budgetary determinations consistent with state or federal policy*