

Long Island Sound Study

A Partnership to Restore
and Protect the Sound

LONG ISLAND SOUND 2025 DRAFT COMPREHENSIVE CONSERVATION AND MANAGEMENT PLAN

September 23, 2024

DRAFT FOR PUBLIC COMMENT

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Section 1: Introduction

THE LONG ISLAND SOUND

Long Island Sound is an estuary, a body of water where salt water from the ocean mixes with fresh water from rivers flowing from the land. It abounds in fish, shellfish, and waterfowl—providing feeding, breeding, nesting, and nursery areas for diverse wildlife. For thousands of years, Long Island Sound has also been home for humans, treasured for its protected waters, diverse shoreline habitats, and abundant natural resources. Indigenous peoples built thriving communities along reliable trade routes here, followed by European colonists whose economies focused on agriculture and natural resource extraction, and over time, intense industrial activity. The Sound has become a combination home, nature refuge, recreation center, agricultural zone, and commercial and industrial district for the millions that live along its shores and in its watershed today. The Sound enriches the economy through a variety of water-dependent industries, yet parts remain as an open space for coastal communities and visitors to connect with nature.

ABOUT THE PROGRAM

In 1987, Congress created the National Estuary Program under Section 320 of the Clean Water Act. The Act authorized the EPA, in cooperation with the states of Connecticut and New York, to form a Management Conference to develop a Comprehensive Conservation and Management Plan (CCMP) for protecting and improving the health of Long Island Sound. Details on the Management Conference, authorization by Congress, history of the program, structure, governance, operations, and accomplishments are available on the Long Island Sound Study website at www.longislandsoundstudy.net.

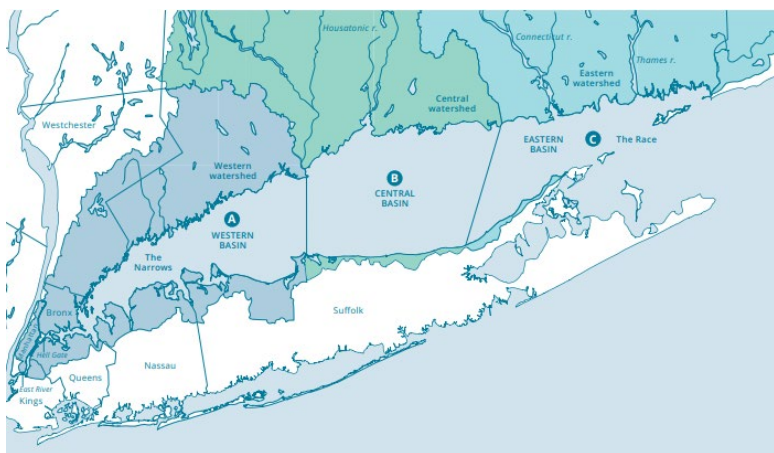


FIGURE 1. LONG ISLAND SOUND AND ITS BASINS

To assist in management, four regions of the Sound have been identified—the Narrows, the Western Basin, Central Basin, and Eastern Basin (Figure 1). Through the connection with the East River to the waters of New York-New Jersey Harbor, the Sound is influenced by the New York City metropolis.

Through four major south-flowing rivers, large portions of New England also affect the Sound. In total, the Long Island Sound watershed covers an area of more than 16,000 square miles, including virtually the entire state of Connecticut, and

portions of New York, Rhode Island, Massachusetts, Vermont, and New Hampshire, as well as a small area at the source of the Connecticut River in Quebec, Canada (Figure 2). The original study area of the program when established under the National Estuary Program in 1987 included only the portions of the watershed in Connecticut and New York. The program is now expanding the study area into the full watershed. The expanded study area is in support of the statutory directive to develop and implement plans to protect and restore Long Island Sound. It reflects the need for the program to plan and act on the whole watershed scale to meet that directive and emphasizes the program's commitment to expanding

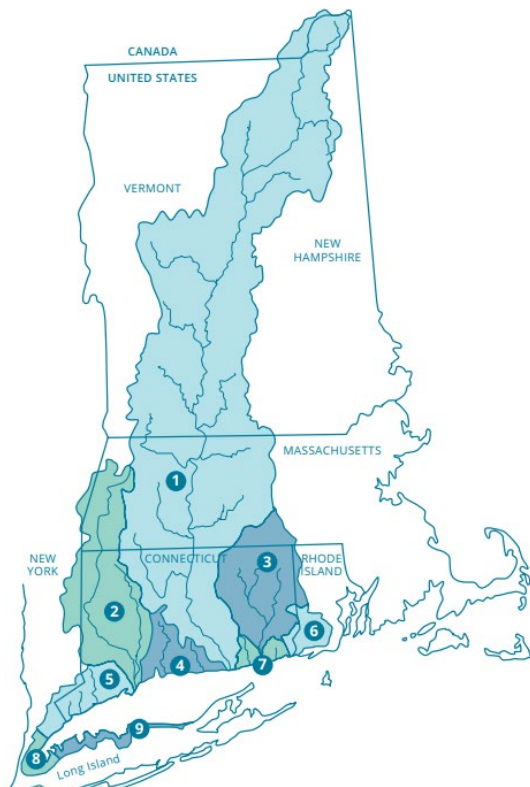


FIGURE 22. LAND AREAS DRAINING TO LONG ISLAND SOUND

1. CONNECTICUT RIVER
2. HOUSATONIC RIVER
3. THAMES RIVER
4. SOUTH CENTRAL COAST
5. SOUTHWEST COAST
6. PAWCATUCK RIVER
7. SOUTHEAST COAST
8. NEW YORK CITY
9. LONG ISLAND

establishes goals, objectives, and actions for the next ten years to further restore and protect the Sound. It reinforces existing goals to achieve cleaner water and healthier habitats, expands climate change resilience efforts, and sets a new goal to have the public around Long Island Sound informed and engaged.

communication, cooperation, and engagement. The study area change does not require the formal addition of new entities to the Management Conference.

For purposes of environmental management, the LISS has also established a coastal boundary area (Figure 3). The coastal boundary is based on climatological and topographical features, and political jurisdictions. In Connecticut, the boundary is the coastal hardwoods zone ecoregion (Dowhan and Craig, 1976). The northern extent of this ecoregion represents the inland extent of coastally influenced vegetation. In New York, the LISS project boundary follows the Harbor Hill moraine through Queens, Nassau, and Suffolk Counties where groundwater flows north to Long Island Sound. The western extent of the project boundary is the Robert F. Kennedy Bridge span that crosses the East River between Queens and the Bronx. The western project boundary in Bronx and Westchester Counties is drawn to include the Bronx River watershed.

INVESTING IN THE FUTURE

The program produced its first CCMP in 1994, revised it in 2015, and now after decades of concerted efforts, the health of Long Island Sound has improved significantly. Despite this progress, many challenges remain and new challenges such as climate change have emerged. To respond to the changing needs of communities, incorporate scientific and technological advances, and address new environmental challenges, the Management Conference produced this revised 2025 Comprehensive Conservation and Management Plan. It provides a blueprint for collaboration and



FIGURE 33. LONG ISLAND SOUND COASTAL AREA BOUNDARY

Section 2: Vision, Mission, Values, Goals

VISION

Long Island Sound and its watershed have clean waters, healthy habitats, thriving wildlife, resilient coasts, and an engaged public.

MISSION

The Long Island Sound Study leads a collective effort to restore and care for the Sound and its watershed.

VALUES

The Management Conference has adopted core values to guide the operation and activities of the program.

1. **Actionable Science:** Support innovative and high-quality science to understand and care for the health of the Sound and its watershed. Make science inclusive, equitable, and accessible by a) respecting, valuing, and incorporating where appropriate local and Indigenous Knowledge and b) advancing the principles and practices of Open Science.
2. **Respect and Trust:** Operate in a way that fosters respect and trust among collaborators, communities, and the public in decision-making and program implementation.
3. **Environmental Justice:** Justly treat and meaningfully involve people regardless of income, race, color, national origin, Tribal affiliation, or disability in decision-making and other activities that affect human health and the environment. Strive to uphold equitable, inclusive, and accessible practices in decision-making and implementation of the CCMP.
4. **Adaptive and Inclusive Management:** Use science-informed processes and learning from collective experiences, including local and Indigenous Knowledge, to make implementation and management decisions. Include everyone in caring for the Sound by engaging diverse audiences and working to make resources accessible to all.

CCMP ORGANIZATION

Goals

The CCMP has four goals, each with its own statement.

1. **Clean Waters and Healthy Watersheds:** Restore and maintain water quality in Long Island Sound and its watershed.
2. **Thriving Habitats and Abundant Wildlife:** Restore and protect the health and resilience of habitats and wildlife in Long Island Sound and its ecosystems.
3. **Sustainable and Resilient Communities:** Empower Long Island Sound communities to plan for and respond to environmental challenges in ways that prioritize well-being for all.
4. **Informed and Engaged Public:** Inspire and empower the public to appreciate, value, and protect Long Island Sound and the waters that flow into the Sound.

Objectives and Actions

The 2025 CCMP identifies objectives and actions to support the attainment of each goal.

- Objectives are specific, aspirational outcomes to be achieved by 2035 (unless stated otherwise). The objectives are ambitious goalposts to drive collective action. Each objective is structured to be Specific, Measurable, Achievable, Relevant, Time-bound, Inclusive and Equitable (a framework known as SMARTIE). The SMARTIE framework defines the outcome, making sure each is reasonable, and that progress can be clearly and precisely tracked over time. Explanations of each objective are included in Appendix B and full descriptions of how each objective follows the SMARTIE structure can be found in a CCMP technical support document on the Long Island Sound Study website.
- Actions are the broad, strategic activities to be taken in the next five years (2025-2029) to help achieve an objective. The actions are listed under a specific objective but may support attainment of other objectives. Full descriptions of each action are provided in a CCMP technical support document on the Long Island Sound Study website. LISS will review the actions every five years and update them as needed to allow for adaptive management and inclusion of emerging scientific and technological advances.

Program Name Change

When created, the partnership of entities participating in this program named it the *Long Island Sound Study*, emphasizing the need to conduct science to better understand how Long Island Sound was impaired and what could be done to restore it. The partnership launched numerous scientific investigations and initiated water quality monitoring programs. The data and information that resulted became the basis for comprehensive restoration efforts. While science is still integral to the program, the Management Conference believes that such studies are in the service of taking action, of coordinated implementation. Therefore, the program is considering changing its name from the Long Island Sound Study to better reflect the commitment to action. Three options are being considered:

1. *Long Island Sound Estuary Partnership (or Program)*
2. *Long Island Sound Restoration Initiative*
3. *Long Island Sound Restoration Partnership (or Program)*

Goal 1: Clean Waters and Healthy Watersheds

Goal Statement: Restore and maintain water quality in Long Island Sound and its watershed.

Introduction

Clean water is crucial for a healthy Long Island Sound. It supports public health, recreation, thriving fisheries, and productive habitats. The Sound's condition is influenced by the quality of the water from the entire watershed. The connection between the land and water, and between sustainable upland communities and a healthy Long Island Sound, forms the basis of the Clean Waters and Healthy Watersheds goal.

In the 1990s, New York, Connecticut and EPA recognized the need to take action to improve water quality and worked to develop the Total Maximum Daily Load to Achieve Water Quality Standards for Dissolved Oxygen in Long Island Sound (TMDL). In 2000, New York and Connecticut incorporated the point source limits set in the TMDL into their wastewater treatment plant permits. This has yielded dramatic results. Since 2017, the wastewater treatment plants have been below the allocations set in the TMDL for reducing nitrogen pollution. Through infrastructure investments of more than \$2.5 billion dollars to improve wastewater treatment, Connecticut and New York cut more than 47 million pounds of nitrogen annually from point sources alone. Additionally, both states have worked to achieve nutrient reductions from nonpoint and stormwater sources. As a result, nitrogen management actions have decreased the five-year rolling average in the maximum area of hypoxic waters by 54 percent compared to the pre-2000 average of 205 square miles.

While Long Island Sound's water is getting cleaner, the Sound still suffers from hypoxic "dead zones," beach closures, and other effects of contamination that keep all parts of the Sound from meeting water quality goals. Addressing these environmental conditions will require integrated approaches to reduce polluted surface and ground water, evaluate contaminants of emerging concern, and create resilient infrastructure. There is a continued need for land use planning that protects water resources under a changing climate to ensure the sustainable use of the Sound's resources. Climate change continues to exacerbate water quality issues (see Appendix D). Additional emphasis is needed on assessing and improving water and habitat quality of the Sound's open waters and its harbors and bays, where many people go for recreation and enjoyment.

Achieving the Clean Waters and Healthy Watersheds goal means addressing the factors that most impact Long Island Sound: nutrient pollution, pathogen contamination, toxic contaminants, marine debris, and land-use practices. Technical explanations of the objective for each factor and how LISS plans to address them can be found in Appendix B.

[Objective 1 – Nutrients](#)

(Click link above to view objective and action narratives)

Objective Statement: Reduce nutrients across the watershed to restore and protect water quality and mitigate impacts on ecosystem health in Long Island Sound and its embayments.

Measure of Success: Implement nutrient reduction actions established under Suffolk County and Nassau County Nine-Element Watershed-Based Plans. Develop nutrient reduction or protection targets for six priority embayments through Connecticut's Second-Generation Nitrogen Strategy. Develop additional

nutrient reduction or protection plans across the watershed to reduce eutrophic impairments in LIS and its embayments.

Actions for Nutrient Objective:

1. Implement nutrient reduction actions across the Long Island Sound watershed with an emphasis on the greatest contributing sources and their impacts on Long Island Sound and its embayments.
2. Support monitoring, modeling, and research, with appropriate data management, storage and accessibility requirements, to improve understanding of source contributions, their impacts to ecosystem health, and the relative performance and benefits of nutrient reduction actions.
3. Collaborate with stakeholders and partners to develop plans, tools, and strategies that support nutrient reduction actions to improve overall ecosystem management.

[Objective 2 – Watershed Health](#)

(Click link above to view objective and action narratives)

Objective Statement: Improve the ecosystem health of Long Island Sound and its watershed through conservation and positive land use practices.

Measure of Success: Conserve and protect an additional 5,000 acres of watershed land beyond the coastal boundary. Establish and maintain a 100-foot or wider riparian buffer across 75 percent of the waterways and in 90 percent of the subbasins.

Actions for Watershed Health Objective:

1. Preserve, restore, and steward natural landscapes and the ecosystem services they provide through land conservation and protection efforts beyond the coastal boundary.
2. Implement nature-based solutions and other practices that improve and maintain water quality and ecosystem health.

[Objective 3 – Pathogens](#)

(Click link above to view objective and action narratives)

Objective Statement: Reduce pathogens and increase monitoring to protect water quality and human health, ensuring safe recreational and commercial use.

Measure of Success: Through stormwater and wastewater infrastructure improvement projects, including 11,500 onsite wastewater treatment system replacements, upgrades, and removals, achieve a 5-year rolling average of 85 percent of beaches graded B- and above based on beach data from Sound Health Explorer. Additionally, increase the number of samples collected by 10 percent and increase the spatial coverage of monitoring relative to a 2023 baseline.

Actions for Pathogens Objective:

1. Evaluate and improve wastewater and stormwater infrastructure, and support replacement, upgrade, or sewer connections of inadequate onsite wastewater treatment systems located in critical or strategic watersheds.
2. Expand the spatial and temporal coverage of sampling and source tracking and encourage advancements in methodology.

Objective 4 – Toxic Contaminants

(Click link above to view objective and action narratives)

Objective Statement: Research, monitor, assess, and reduce emerging and legacy toxic contaminants to mitigate impacts on water and habitat quality in Long Island Sound.

Measure of Success: Reduce the area of impaired sediment in Long Island Sound by an additional 13 percent from the 2015 National Coastal Conditions Assessment Data baseline.

Actions for Toxic Contaminants Objective:

1. Identify existing and emerging contaminants of concern (COC) and support mitigation efforts related to the identified COCs.
2. Continue collection and evaluation of contaminant data (e.g., NCCA) for LIS and the embayments.
3. Encourage proactive research and assessment of emerging contaminants including but not limited to Per- and Polyfluoroalkyl Substances (PFAS), 1,4-Dioxane, and Trifluoroacetic acid.

Objective 5 – Marine Debris

(Click link above to view objective and action narratives)

Objective Statement: Achieve trash free waters by increasing clean-up efforts and preventing marine debris from entering Long Island Sound.

Measure of Success: Decrease the mass of marine debris collected per mile during the fall International Coastal Cleanup by ten percent from the 2013 baseline of 475 pounds per mile.

Actions for Marine Debris Objective:

1. Support research and monitoring efforts that aim to increase understanding of the extent of marine debris, sources of debris, and its impacts on the ecosystem.
2. Promote the advancement and implementation of interception technologies, tools, receptacle bins, and capture devices that remove debris and support education and outreach across the Long Island Sound watershed.
3. Support the removal of marine debris located within the coastal boundary and Long Island Sound.

4. Inform and support the development and implementation of new local, municipal and state policies, and management plans aimed at source reduction, prevention and interception practices as informed by available marine debris collection data.

Goal 2: Thriving Habitats and Abundant Wildlife

Goal Statement: Restore and protect the health and resilience of habitats and wildlife in Long Island Sound and its ecosystems.

Introduction

The habitats of the Long Island Sound watershed support diverse populations of wildlife and living resources, offer recreational opportunities, and function as an environmental infrastructure that provides services and benefits to the region. For hundreds of years, humans have greatly relied on these habitats and the ecosystem services they provide to sustain livelihoods, fuel local economies, and enhance overall quality of life. Since 1994, the LISS has recognized the importance of restoring and protecting habitats in the Long Island Sound watershed. In fact, since 2014, LISS has restored 681 acres of coastal habitat, reconnected 129 river miles, and protected 5,423 acres of open space. Building upon the

progress made from the 2015 CCMP, the Thriving Habitats and Abundant Wildlife goal is to further restore and protect the health and resilience of habitats and wildlife in Long Island Sound and its ecosystems.

Coastal habitats targeted for restoration and enhancement to sustain living resources and ecosystem services: 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.

Being an urbanized estuary, Long Island Sound habitats face multiple stressors including nutrient pollution, land development, and climate change pressures. While LISS partners have successfully restored and protected critical habitats, it is crucial to continue this work while incorporating innovative techniques and adaptive management to increase resilience to climate change impacts (see Appendix D). Without habitat restoration, protection, and management, Long Island Sound habitats, wildlife, and ecosystem services will be significantly diminished.

The objectives under this goal highlight four areas: Coastal Habitat, Offshore Habitat, Habitat Connectivity, and Protected Open Space. Overall, the desired outcomes over the next 10 years are to continue the progress made through habitat restoration and protection, prioritize research, monitoring, and modeling to better identify priority areas, explore innovative techniques and tools to combat unique stressors, enhance existing restored and protected areas through stewardship and management, and promote regional collaboration and communication. Additionally, LISS is prioritizing habitat restoration and protection efforts benefiting historically underserved and overburdened communities. Refer to Appendix B for more details on the objectives that will guide the partnership to sustain a healthy, productive, and resilient Long Island Sound benefiting all inhabitants.

[Objective 1 – Coastal Habitat](#)

(Click link above to view objective and action narratives)

Objective Statement: Protect, enhance, and assess the extent and health of coastal habitats and their associated wildlife through restorative measures and monitoring to combat deterioration and loss.

Measure of Success: Restore 1,000 acres of coastal habitat in the coastal boundary of Long Island Sound.

Actions for Coastal Habitat Objective:

1. Restore coastal habitat by supporting projects that implement established restoration techniques or help validate innovative techniques and include broad collaboration and communication.
2. Promote the installation of living shoreline methods for coastal habitat restoration and protection, including the conversion of existing hard-armored shorelines to a more natural condition.
3. Survey, research, and monitor changes and associated causes in extent and abundance of coastal habitat types and their associated wildlife with focus on tidal wetlands and eelgrass.

[Objective 2 – Offshore Habitat](#)

(Click link above to view objective and action narratives)

Objective Statement: Protect and enhance the health of offshore habitat and their associated species.

Measure of Success: Support and implement 25 restoration and management projects focused on seafloor habitat mapping, data collection, and species assessments.

Actions for Offshore Habitat Objective:

1. Promote science-based marine spatial planning that balances human uses and protects ecosystem functions of offshore habitat and species and is considerate of the existing natural, social, cultural, historic, and economic characteristics of Long Island Sound.
2. Support the LIS Seafloor Habitat Mapping Initiative and apply data collected to refine and expand upon other initiatives supporting coastal and marine spatial planning and designation of protected areas and buffer zones.
3. Promote stewardship and restoration of offshore habitat in the Sound by supporting the development and implementation of action plans and programs that incorporate meaningful community science, engagement, and participation.

[Objective 3 – Habitat Connectivity](#)

(Click link above to view objective and action narratives)

Objective Statement: Increase connectivity of coastal habitat to enhance biodiversity and support migratory pathways.

Measure of Success: Restore and/or protect 100 habitat patches; Reconnect 175 miles of riverine migratory corridors in the Connecticut and New York portions of the watershed.

Actions for Habitat Connectivity Objective:

1. Implement remote sensing, mapping tools, modeling, and field verification to target restoration and protection of habitat patches and river miles to maintain and enhance connectivity.
2. Complete stream barrier removal projects (i.e., dams or culverts) that result in full restoration of fish and wildlife migration, sediment transport, and other stream functions.

3. Promote regional collaborations to support development of streamlined permitting pathways to build regional capacity for habitat restoration.

Objective 4 – Conserved Open Space

(Click link above to view objective and action narratives)

Objective Statement: Conserve open space through land acquisition while maintaining and enhancing the total area of protected land.

Measure of Success: Conserve 5,000 acres of open space in the coastal boundary of Long Island Sound.

Actions for Conserved Open Space Objective:

1. Protect high-priority coastal habitat from development through implementation of land conservation plans that identify priorities for equitable conservation, management, and investment.
2. Increase equitable access and enhance sustainable stewardship of conserved lands particularly for historically underserved and overburdened communities.

Goal 3: Sustainable and Resilient Communities

Goal Statement: Empower Long Island Sound communities to plan for and respond to environmental challenges in ways that prioritize well-being for all.

Introduction

The coastal communities along Long Island Sound in Connecticut and New York are home to more than 4 million people. Local government decisions affecting land use planning and development, alongside impacts from a changing climate, affect the health of the Sound and its watershed, which is tied closely to the health of local economies and influences the overall quality of life for Sound communities. The Sustainable and Resilient Communities goal empowers communities to plan for and respond to environmental challenges in ways that prioritize well-being for all.

Long Island Sound communities are already experiencing the impacts of a changing climate, including flooding caused by heavier rainfall, more intense storms, and rising sea levels. In addition to flooding, other issues arising from a changing climate include increased water pollution that limits the use of the Sound, erosion that degrades habitat, and species changes that disrupt ecosystems (see Appendix D). These issues are complicated and costly for communities to manage because of the impacts on people, infrastructure, and the environment. In a needs assessment completed by LISS partners in 2023, many communities identified similar challenges to improving their sustainability and resilience to climate change, namely lack of capacity and technical expertise to move forward on projects, ineffective coordination across levels of government, lack of inclusion of historically underserved and overburdened communities, and difficulty accessing funding for projects.

The objectives highlighted under this goal target three critical areas of need: increasing the capacity of decision-makers to advance initiatives, supporting resilience planning that reflects community priorities, and encouraging the implementation of projects that help communities adapt to flooding and other climate impacts (see Appendix B). A coordinated response, as outlined under this goal, will advance the resilience of Long Island Sound communities and set the stage for sustainability in the future.

[Objective 1 – Informed Decision-Makers](#)

(Click link above to view objective and action narratives)

Objective Statement: Grow the number of municipal, nonprofit, and community leaders receiving training and support to increase capacity for adaptation to environmental challenges.

Measure of Success: Engage 100 new participants through LISS trainings and resources every year.

Actions for Informed Decision-Makers Objective:

1. Develop, deliver, and/or facilitate training programs relevant and responsive to community needs that assist with sustainability and resilience.
2. Develop or modify tools and support research and monitoring to help communities assess the effects of a changing climate and advance resilience.

Objective 2 – Community-Driven Resilience Planning

(Click link above to view objective and action narratives)

Objective Statement: Increase the number of municipalities that identify key resilience priorities through local and/or regional community-driven planning processes.

Measure of Success: All 135 municipalities within the LISS coastal boundary identify key resilience priorities.

Actions for Community-Driven Resilience Planning Objective:

1. Develop climate resilience plans, including the incorporation of climate-resilient strategies into existing municipal, regional, or watershed plans.
2. Coordinate across municipal boundaries to advance collective resilience priorities.
3. Empower and increase engagement of community members and groups, including historically underserved and overburdened communities, in local and regional resilience planning and decision-making.

Objective 3 – Resilience Initiative Implementation

(Click link above to view objective and action narratives)

Objective Statement: Implement initiatives to improve community resilience to flooding and other environmental challenges.

Measure of Success: Communities in the NY and CT portions of the LIS watershed implement 200 resilience initiatives.

Actions for Resilience Initiative Implementation Objective:

1. Increase community capacity to implement and manage sustainable and resilient initiatives.
2. Support the development and adoption of regulations, codes, and ordinances that increase community resilience.
3. Implement nature-based solutions that provide multiple benefits to address flooding and other climate impacts.
4. Implement priority infrastructure projects that increase community sustainability and resilience to flooding and other climate impacts.
5. Monitor, maintain, and adaptively manage resilience projects to ensure their long-term success.

Goal 4: Informed and Engaged Public

Goal Statement: Inspire and empower the public to appreciate, value, and protect Long Island Sound and the waters that flow into the Sound.

Introduction

Long Island Sound is nestled between several urban centers, including New York City, one of the most densely populated cities in the country. With more than 23 million people living within 50 miles of the Sound, there is immense pressure on its ecological health, which is further compounded by climate change (see Appendix D). Several of the challenges the Sound currently faces, such as marine debris and nitrogen pollution from fertilizer and septic systems, can be ameliorated by specific behavior changes from individuals and communities. However, competing social, cultural, and economic priorities prevent many people from enjoying, learning about, and engaging in sustainable behaviors related to the Sound. Limited access to the Sound and lack of education about its health and ecological processes are major challenges preventing people from engaging in its stewardship, which ultimately inhibits the full potential of ongoing restoration efforts.

A public that is informed and engaged on issues related to Long Island Sound can more fully appreciate and enjoy all the Sound has to offer and be active participants in its ongoing conservation. Residents that understand environmental issues can be better stewards of the watershed, adopting behaviors that help maintain or improve its health.

Adequate public access is an important first step to facilitating people's enjoyment and appreciation of the Sound and its watershed. The quality of access is determined by the availability of transportation options, reasonable cost, and appropriate amenities at the location. Once people can access and enjoy the Sound, they are more likely to be open to learning about it and what can be done to improve and sustain it. The LISS partnership can provide some of that education directly in addition to providing the tools and means for other organizations to reach additional students, adults, and user groups. Ultimately, increased access, education, and resources will encourage the public to engage in more stewardship and sustainable behaviors within the region – culminating in an improved Long Island Sound for all.

Achieving the Informed and Engaged Public goal means addressing the factors that most impact its realization: public access and sense of belonging, education and environmental literacy, and fostering stewardship and sustainable behaviors. Technical explanations of the objective for each factor and how LISS plans to address them can be found in Appendix B.

[Objective 1 – Public Access and Sense of Belonging](#) (Click link above to view objective and action narratives)

Objective Statement: Increase and improve opportunities for everyone to access and appreciate Long Island Sound and the waters that flow into the Sound.

Measure of Success: Create at least 40 new sites and improve at least 60 existing sites around Long Island Sound's shoreline and its connecting waterbodies in Connecticut and New York and show an increase in sense of belonging based on findings from the Long Island Sound Public Perception Survey. A site improvement consists of one or more physical and/or long-term programmatic changes to a site per project that improve the site's accessibility for the public, including *people with disabilities*,

families, and historically underserved and overburdened communities. At least half of the improved sites will benefit historically underserved and overburdened communities.

Actions for Public Access and Sense of Belonging Objective:

1. Collaborate with local government, environmental groups, and community leaders to develop a new public access plan and initiative to increase and improve public access and sense of belonging.
2. Develop and implement projects that increase the number and quality of public access sites in an equitable manner.
3. Promote sense of belonging at new or improved public access sites through events, festivals, celebrations, materials, and programming.

[Objective 2 – Education and Environmental Literacy](#)
(Click link above to view objective and action narratives)

Objective Statement: Increase, improve, and expand the environmental literacy of people interacting with the LIS watershed.

Measure of Success: Engage 275,000 members of the public - including youth, educators, and adults - in Long Island Sound education programming and outreach per year.

Actions for Education and Environmental Literacy Objective:

1. Increase collaboration between environmental education partners to elevate the visibility of existing programs and promote the creation of new environmental education initiatives.
2. Host and promote opportunities to participate in LIS-based formal and informal education programs tailored for multiple user groups and ages.
3. Develop engaging, multi-lingual, and innovative Long Island Sound educational materials, tools, and activities for people of all ages and abilities.
4. Support efforts to assess the public's understanding of Long Island Sound and its tributaries.

[Objective 3 – Fostering Stewardship and Sustainable Behaviors](#)
(Click link above to view objective and action narratives)

Objective Statement: Increase public engagement in environmental practices that protect and conserve Long Island Sound and its watershed.

Measure of Success: Support at least 20 projects or campaigns per year focused on promoting sustainable behaviors, stewardship, and behavior change. Additionally, engage at least 20,000 volunteers through LISS-supported efforts by 2035.

Actions for Fostering Stewardship and Sustainable Behaviors Objective:

1. Increase opportunities to involve the public in the monitoring, restoration, and conservation of Long Island Sound and its ecosystems through volunteerism, participatory science, and community-led action.
2. Investigate the relationship between the public and the Long Island Sound ecosystem through social science research.
3. Develop campaigns and share messages to encourage residents, both homeowners and renters, to engage in environmentally-friendly practices around their homes, schools, businesses, and communities.
4. Promote environmentally-friendly behaviors at the Sound, its coast, and its tributaries through outreach to beachgoers, boaters, anglers, and other users of the Sound.
5. Provide information, programming, resources, and incentives —such as educational toolkits— that enable local environmental groups, municipalities, schools, and other user groups to teach and promote sustainable practices in their communities.

Section 3: Monitoring Plan

Summary

LISS is committed to comprehensively monitoring the condition of Long Island Sound and to tracking progress in implementing actions to better inform adaptive, ecosystem-based management. Long-term monitoring supports the program's ability to evaluate the effectiveness of management actions, track progress towards environmental goals, and establish baseline knowledge of ecosystem condition to better plan for and respond to perturbations (e.g., storms, spills, and climate change). Long-term monitoring data is essential to many of the research projects and modeling tools supported by the LISS.

Environmental Monitoring

Across Long Island Sound water quality is monitored by state, interstate, and local agencies, academic institutions, environmental nongovernment organizations, and local volunteers and community groups. Typically, governmental agencies and universities monitor the open Sound and the rivers draining to it. Community organizations often contribute information on local streams, bays, and harbors. For example, begun in 2016, the Unified Water Study now coordinates 29 community organizations that contribute monitoring data on 49 embayments and harbors using standardized operating procedures.

Monitoring consists of measuring and analyzing physical, chemical, and biological properties of coastal waters and the watershed, including sediments, habitats, and aquatic life. Physical measurements such as the temperature and salinity of water can be used to track water mass movements which, along with dissolved oxygen levels, can indicate how suitable a particular area is for aquatic life. Chemical analyses of sediment and animal tissue can reveal what chemicals are present, including toxic chemicals. Data collected from animal tissue such as fish are used to assess health risks to aquatic organisms and humans that consume them.

LISS first prepared a monitoring plan in support of the 1994 CCMP to 1) measure the effectiveness of the management actions and programs implemented under the CCMP; 2) provide essential information that can be used to redirect and refocus the CCMP during implementation; and 3) inform and facilitate research and modeling efforts by providing a suite of baseline data on spatial and temporal variability of environmental conditions. Consistent through time have been the characteristics considered essential to a successful monitoring program:

- Have clear goals and objectives.
- Prioritize maintaining baseline monitoring, adding new elements as funding allows.
- Generate long-term commitments to monitoring.
- Deploy new technologies and methodologies as they become available.
- Comply with data management and quality assurance plans.
- Proactively consider key steps that come after data collection: data management, synthesis, analysis, integration, transformation, and accessibility.
- Develop and sustain a rich array of informational products that are carefully tailored to the special needs and interests of different constituencies.

The monitoring plan has been adapted, modified, and expanded over time. LISS has focused on financial support, coordination, synthesis, and communication to varying degrees for those components. The major elements, but not a comprehensive listing, of the monitoring program are described in Table 1 (*note: see separate spreadsheet*). Information on the overall program with links to specific monitoring

elements is available on the monitoring page of the LISS website at <https://longislandsoundstudy.net/research-monitoring/water-quality-monitoring/> The program uses the monitoring data to track environmental indicators of the status and trends in conditions, providing insight into the health of Long Island Sound and what drives change in those conditions. These indicators are communicated on the LISS website and through formal reports such as the biennial Report to Congress on program performance.

Programmatic Monitoring

In addition to environmental monitoring, LISS will track and record information on implementation of CCMP actions supporting plan objectives. This will include evaluation of multiple metrics—dollars spent, pounds of pollution reduced, acres of habitat restored or protected, and number of people engaged for example. These metrics will quantify LISS efforts contributing to the achievement of plan objectives. Environmental and programmatic monitoring in combination will be used to assess and report on whether progress in meeting the objectives is on schedule. The combined information will be regularly reported to keep partners and the public informed about program investments and activities, and the environmental progress made as a result.

Section 4: Funding Strategy

Sustainability Strategy --- Not Just Dollars

Long Island Sound has long served as the critical ecological link between the mid-Atlantic and the Gulf of Maine, as well as the economic engine and preferred home for millions. Since its establishment in 1985, first as a study area for the National Estuary Program and currently as an EPA-managed geographic program, LISS has taken on the job of science-based planning for and coordination of the protection and restoration of this matchless iconic and historic natural resource.

Through unwavering public support and the backing of the states and hundreds of organizations in New York and Connecticut, and the Long Island Sound watershed, that multi-decade effort has already paid off. A seemingly irreversible trend of worsening water quality and degraded or vanishing habitats has been halted and even reversed in many places.

Since its first CCMP in 1994, LISS has encouraged collective action to improve the Sound's ecological health. New challenges must be addressed even as we make progress on the old. We know the next generation of ecosystem-level protection and restoration will require enhanced support to address smaller, more diffuse pollutant sources, disturbances from continued land development, and the human and environmental effects of climate change. We have innovative tools at hand, but with them comes the urgent need to find and sustain the resources to deploy them. This sustainability strategy is built on the recognition that a resilient ecosystem is the key to a prosperous economy and to maintaining Long Island Sound as the region's premier human and natural ecosystem.

The wise investment in the natural assets of Long Island Sound and its watershed can secure resilient and sustainable returns in increased property values, water quality, storm protection, recreation and tourism, and other goods and services, particularly during a changing climate. Implementing this revised CCMP will require funding through diverse resources and partners. This includes maintaining funding from current sources of support, developing new funding sources, and identifying new partners.

The CCMP recommends an ambitious agenda to invest in the health of the Long Island Sound ecosystem and its watershed. These investments can produce real value, not just from improved environmental quality, but also to the region's economic vitality and quality of life. Long Island Sound is an asset with real value, worth investing in to protect and enhance that value. The needed investments will not come from a single program or level of government. Continued funding will be needed across jurisdictions, including federal, state, and local governments in partnership with the private sector, with each contributing dedicated resources. Ongoing federal and state environmental programs need to be maintained and enhanced, particularly for sustainable and resilient ecosystems and communities, and to support project implementation, most significantly upgrading wastewater and stormwater infrastructure.

Priorities for Funding

LISS funding to implement the CCMP has increased since 2016, reaching \$62.8 million in 2024. A key priority is to develop regional capacity to use funds strategically and effectively. Equally important will be collaboration of Management Conference partners to develop new and increased funding from non-EPA sources.

The increased funding has resulted in more projects on the ground, improving the health of Long Island Sound. Each year, the LISS Management Conference develops a work plan to implement priority

projects for the CCMP based on appropriations approved by Congress. The work plan budget shows how the funding is distributed to LISS partners as grants to be used for ongoing projects and programs, including the Long Island Sound Futures Fund, the Long Island Sound Nutrient Bioextraction Initiative, the Long Island Sound Water Quality Monitoring Program, and the Long Island Sound Study Research Grant Program.

Current Funding

LISS was established under Sections 320 and 119 of the federal Clean Water Act, which also authorizes funding for the program through EPA. In 2024, LISS received \$850,000 under Section 320 of the Clean Water Act through the National Estuary Program and \$40,002,000 under Section 119 of the Clean Water Act as an EPA Geographic Program for the continued Restoration and Protection of Long Island Sound.

On November 6, 2021, Congress passed the Infrastructure Investment and Jobs Act of 2021 (P.L. 117-58), also known as the Bipartisan Infrastructure Law or BIL, to enhance the nation's infrastructure and resilience. It authorizes funding to improve infrastructure and climate resilience throughout the United States. Under the legislation, LISS is receiving \$21.2 million per year over five federal years (2022–2026). A total of \$106 million, in addition to annual appropriations, will fund local BIL initiatives to improve the environmental health, climate resilience, and economic vitality of the Sound equitably.

Funding through the EPA was never intended to be the primary means of supporting implementation of the CCMP's actions. Other federal, state, regional and local programs provide essential sources of funding. Implementation of the CCMP's objectives and actions relies on the continued support for core, ongoing environmental programs conducted by many partner organizations through collaborative and strategic partnerships.

Grant recipients must meet statutory match requirements for funding. In addition to matching fund requirements the states, municipalities and partners provide additional leveraged funds for projects to implement the CCMP, including upgrades to wastewater treatment plants, stormwater infrastructure, and on-site wastewater treatment systems. For example, for every federal dollar appropriated to the program from 2015 to 2023, LISS partners leveraged an additional \$14 to implement projects, more than \$1.9 billion in total, demonstrating a great return on investment and reflecting the broader regional commitment to restore and protect the Sound. LISS will continue to pursue these opportunities as a means of financing the CCMP.

Short- and Long-term Resource Needs

Funding is needed to continue cooperative efforts under the LISS to coordinate implementation of the plan through ecosystem-based management. Anticipated cost ranges have been assigned to each action based on the best professional judgment of the LISS partners. These cost ranges are meant to be estimates and are not intended to represent final budgetary allocations. The cost ranges for each action will then provide a range of costs for achieving the objective the actions are associated with, leading to short- and long-term resource needs. Final cost adjustments will be established during project development and the implementation of an activity, when more detailed information can be accurately assessed.

Proposed Actions to Maintain or Garner New Support

While some of the proposed actions to be carried out over the next five years in support of the CCMP's objectives would be accomplished through ongoing support of existing programs, many actions will require funding beyond current levels to be accomplished. Coordination of all stakeholders is key to the efficient use of available resources to attain desired results. Congress, through provisions in the Clean Water Act, has charged EPA with providing overall coordination of, and support for, the regional effort. As an EPA-directed program, LISS is prohibited from engaging in lobbying, private fundraising, or seeking funding directly from private endowments.

As stated in the introduction, federal, state, regional and partner contributions are critical to the success of the LISS. Funding for implementation beyond CWA Section 320 and Section 119 funding is almost exclusively leveraged from state and federal public funding sources secured through grant opportunities by LISS directly, or implementation partners on a project level. LISS strives to be a catalyst for scientific inquiry and collective action, recognizing that grant-making is an effective approach to amplify social and environmental benefits to Long Island Sound. Some funding sources may yield relatively small amounts of revenue on an annual basis but may have the potential to do so consistently over multiple years. Other sources may be relatively large but only available on a one-time basis. Some may be implemented by changes in administrative practice while others may require regulatory or statutory changes.

Fundamental to the LISS funding strategy is acknowledgement that currently the biggest impediment to community-level implementation is a lack of capacity of local governments and non-governmental organizations, not available funding. This is especially true for historically underserved and overburdened communities. As a result, the LISS funding strategy emphasizes breaking down barriers to successful community-level project planning, design, and implementation. Resource limited communities need assistance to ensure that funding is equitable and progress broadly shared. This first requires listening to community needs followed by a commitment to serving those needs through multiple, tailored efforts, including:

- Annual community workshops to facilitate the implementation of practices, policies and tools related to land use, climate adaptation planning and implementation, water quality management, and habitat protection.
- Regularly updating a clearinghouse of tools and resources (the Long Island Sound Resilience Resource Hub), to facilitate access to the best available tools and information relevant to the Long Island Sound region and lessen reliance on multiple, redundant analyses.
- Technical assistance on navigating federal and state grant application systems, developing strong grant proposals, and effectively managing grant funding.
- Delivering training programs, in coordination with LISS partners, that are tailored to communities' needs identified through the LISS Sustainable and Resilient Communities Needs Assessment and subsequent evaluations such as 1) improving the use of existing technical tools or geospatial applications that illustrate and assess the effects of sea level rise, storm surge, and vulnerability for a variety of resilience topics 2) developing resilience plans, 3) updating codes, 4) sharing success stories and innovative applications of nature-based solutions/stormwater management/green infrastructure, 5) guidance on grant writing opportunities, requirements and management, 6) training on effective communication, 7) education on environmental issues for the public and community leaders, and 8) ecosystem service valuation.

- Improving coordination among levels of government, since policies and services are provided at different levels of government, and several of those policies and services will be affected by a changing climate (e.g. road flooding, culverts no longer adequate for drainage systems).
- Creating and maintaining the Community Impact Fund to provide direct technical and financial assistance to organizations working to address environmental justice issues in historically underserved and overburdened communities.
- Expanding engagement with historically underserved and overburdened communities.

This strategy is consistent with the federal Thriving Communities Network Initiative that is working towards a holistic government-wide framework for providing technical assistance and capacity building resources, particularly to those most in need. LISS will coordinate efforts with federally established technical assistance centers working to remove barriers and improve accessibility for historically underserved and overburdened communities.

Program success is measured by maximizing and optimizing direct EPA LISS funding as well as funding leveraged by EPA and partners in implementation, reported annually through the Government Performance and Results Act (GPRA) National Estuary Program Online Reporting Tool (NEPORT).

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Glossary

Glossary includes terms for the CCMP and Supplement Document.

Acidification (ocean) – Increased concentrations of carbon dioxide in sea water causing a measurable increase in acidity (i.e., a reduction in ocean pH). This may lead to reduced calcification rates of calcifying organisms such as corals, mollusks, algae, and crustaceans.

Adaptation Plan – A plan developed by a community to pro-actively adapt to future changes in climate and plan for associated riparian and coastal impacts.

Adaptive Management – A systematic approach for improving resource management by learning from management outcomes.

Anadromous – see Diadromous.

Anaerobic – In the absence of oxygen, e.g., anaerobic decomposition of organic matter leads to the production of methane (CH₄).

Anoxic – In the absence of oxygen. In some cases, management may functionally define water below a certain threshold (e.g., 1 mg/l) as anoxic, since it supports very little life, but to be truly anoxic, the concentration must drop to zero.

Anthropogenic – Caused by, or resulting from, human activities.

Aquaculture – The farming of aquatic organisms such as fish, shellfish and even plants. The term aquaculture refers to the cultivation of both marine and freshwater species and can range from land-based to open-ocean production.

Benthic – Pertaining to, or living on, the seafloor or river bottom.

Biodiversity – The number and variety of organisms found within a specified geographic region.

Bioextraction – Nutrient bioextraction (also called bioharvesting) is the practice of farming and harvesting shellfish and seaweed for the purpose of removing nitrogen and other nutrients from natural waterbodies.

Biota – All living organisms within an area or region; includes both plants and animals.

Climate Resilience Plan – A plan developed by a community to assess the risks, evaluate vulnerability, and identify resilience/climate adaptation priorities to address the impacts of climate change and hazardous events on the natural and built environment as well as social and economic systems.

Contaminant – Any physical, chemical, biological, or radiological substance found in air, water, soil, or biological matter that has a harmful effect on plants or animals (including humans); harmful or hazardous matter introduced into the environment.

Diadromous – A species, which spends part of its life cycle in fresh water, and part in salt water. Diadromous species can be anadromous, living in the ocean and migrating to fresh water to breed (e.g., salmon, alewife, herring) or, less commonly catadromous, living in fresh water but migrating to the ocean to breed (e.g., American eel).

Dredged Material – Sediment removed from the bottoms of navigable waters of the United States to maintain navigation channels and docks.

Ecosystem – A cohesive system formed by the interactions between a community of living organisms in a particular area with each other and the nonliving environment around them.

Ecosystem-based Management – An environmental management approach that recognizes the interactions within an ecosystem, rather than considering single issues, species, or ecosystem services in isolation.

Ecosystem Service – The processes by which the environment produces resources that support human wellbeing such as clean water, timber, habitat for fisheries, flood management, natural spaces for recreation, and pollination of native and agricultural plants.

Ecosystem Service Valuation – The term for the process of quantifying the value of the ecosystem service benefits to people provided by a given landscape or habitat type in a defined location.

Eelgrass – A marine flowering plant rooted in the sediment. It is the most abundant seagrass in Long Island Sound and is an important habitat for many species of fish and invertebrates. Its Latin species name is *Zostera marina*.

Environmental Education – Environmental education allows individuals to explore environmental issues, engage in problem solving, and improve the environment. As a result, individuals develop a deeper understanding of environmental issues and have the skills to make informed and responsible decisions.

Environmental Indicator – Documented measurement, statistic, or value of a substance or effect in an environment. Used as a barometer to identify the presence or level of the factor/ characteristic impacting the environment. The overall condition or quality of the environment is detailed by the set of such indicators and their periodic trend points.

Environmental Justice – The just treatment and meaningful involvement of all people regardless of income, race, color, national origin, Tribal affiliation, or disability, in decision-making and activities that affect human health and the environment so that people are fully protected from disproportionate and adverse human health and environmental effects (including risks) and hazards, including those related to climate change, the cumulative impacts of environmental and other burdens, and the legacy of racism or other structural or systemic barriers; and have equitable access to a healthy, sustainable, and resilient environment in which to live, play, work, learn, grow, worship, and engage in cultural and subsistence practices.

Environmental Literacy – The most widely accepted meaning of environmental literacy is that it comprises an awareness of and concern about the environment and its associated problems, as well as the knowledge, skills, and motivations to work toward solutions of current problems and the prevention of new ones (NAAEE 2004).

Estuary – A partially closed coastal body of water where freshwater and saltwater mix.

Eutrophication – The process by which a body of water becomes enriched in dissolved nutrients that stimulate the growth of aquatic plant life, usually resulting in the depletion of dissolved oxygen.

Formal Education – A structured system of education that's organized and regulated in a traditional school-based setting. Formal education programs follow state and/or federally mandated education and curriculum regulations.

Gray Infrastructure – traditional infrastructure such as gutters, drains, pipes, sewers, and retention basins to manage stormwater and wastewater and/or built structures such as dams, seawalls, and roads.

Green Infrastructure – Describes an array of technologies, approaches, and practices that protect and use natural systems, or systems engineered to mimic natural processes, to manage rainwater as a resource, to solve combined sewer overflows (CSOs), enhance environmental quality, and achieve other economic and community benefits, such as flood protection and climate regulation. Examples of green infrastructure include permeable pavement, rain gardens, bioretention cells (or bioswales), vegetative swales, infiltration trenches, green roofs, planter boxes, rainwater harvesting (rain barrels or cisterns), rooftop (downspout) disconnection, and urban tree canopies. Also, this term can be synonymous with natural infrastructure, in contrast with gray infrastructure, which uses traditional practices, such as sewers and pipes, for stormwater management and wastewater treatment.

Habitat – The physical and chemical environment in which a plant or animal lives.

Habitat Patches – A discrete habitat area (or patch) that is isolated.

Hard-Armored Shoreline – Traditional approach to shoreline protection which typically involves hard structures (e.g., bulkheads, seawalls, breakwaters, jetties, etc.).

Harmful Algal Bloom (HAB) – A bloom of algae (often phytoplankton) that causes negative impacts to other species often through use of toxins, but also through mechanical or other means.

Hazard Mitigation Plan – A municipal plan developed to reduce or eliminate long-term risk to human life and property from natural hazards.

Heavy Metals – A loosely defined term often used to refer to the group of metals and metalloids, which are associated with contamination or ecotoxicity. Typically includes transition metals, lanthanoids, actinoids, and some metalloids.

Hypoxic – Low in dissolved oxygen. While no universal threshold exists for what is considered hypoxia, most organizations use an operational definition of less than approximately 3 mg/l of oxygen (See Anoxic).

Impervious Cover – Any surface in the landscape that cannot effectively absorb or infiltrate rainfall.

Invasive Species – Non-native species whose introduction does, or is likely to, cause economic or environmental harm or harm to human health.

Informal Education – Typically refers to education that occurs outside of a traditional school-based setting and which may or may not follow state or federal curriculum standards. Examples can include educational programs at nature centers, afterschool programs, and museums.

Legacy Contaminants – Pollutants or chemicals that remain in the system long after they are discharged, such that their ecological impact continues even after discharge has been curtailed.

Light Detection and Ranging (LiDAR) – A remote-sensing (see remote-sensing definition) method used to examine the surface of the Earth.

Living shorelines – engineered structures installed to control shoreline erosion while allowing natural sediment movement, made of natural materials such as plants, oysters, sand, or rock. Unlike hardened shoreline structures, which impede the growth of plants and animals, living shorelines grow and provide

adaptability over time to changing conditions. Additionally, living shorelines improve, restore, or maintain the connection between the upland and water habitats, serve as carbon sinks, provide nutrient pollution remediation, wildlife habitat provision, and act as storm buffers.

Management Conference – The Long Island Sound Study management conference is a partnership of federal, state, interstate, and local agencies, universities, environmental groups, industry, and the public working together to implement the goals and objectives set forth in the CCMP. It is made up of the LISS committees and working groups— [http:// longislandsoundstudy.net/about/committees/](http://longislandsoundstudy.net/about/committees/).

Marine Spatial Planning (MSP) – A future-oriented process of evaluating and managing the spatial and temporal components of three-dimensional marine environments to achieve ecological, economic, and social objectives.

Monitoring – Measurements of water quality or other parameters made with the goal of detecting changes in the environment.

Moraine – An accumulation of boulders, stones, and debris carried and deposited by a glacier.

Nekton – Aquatic living organisms that can swim and move independently of currents.

Nitrogen – Nitrogen is a nutrient that is a natural part of aquatic ecosystems, supporting the growth of algae and aquatic plants, which provide food and habitat for fish, shellfish and smaller organisms that live in water. But when too much nitrogen enters the environment - usually from a wide range of human activities - the air and water can become polluted. Water pollution caused by excess nutrients (nitrogen and phosphorus) is one of the most widespread and challenging environmental problems faced by our nation. (See Phosphorus)

Nonpoint Source – A source of pollutants not restricted to a clearly identifiable discharge location like a river, pipe, or culvert (See Point Source).

Nutrient Loading – The mass of reactive nitrogen entering an aquatic system from external sources, e.g., WWTFs, OSWTSs, atmospheric deposition, fertilizer, etc.

Nutrients – Essential elements required by an organism for growth. In a marine context, this term is typically used to refer to nitrogen and phosphorus, but can also include silica (required by diatoms) and micronutrients such as iron, zinc, magnesium, etc.

Offshore Habitat – Habitat found beyond the 10-foot contour depth at Mean Low Lower Water including sponges and cold-water corals.

On-site Treatment and On-site Wastewater Treatment: Onsite wastewater treatment systems are used to treat sanitary wastewater from a home or business and return treated wastewater back into the receiving environment. Septic systems and cesspools (a drywell that receives untreated sanitary waste containing human excreta, which sometimes has an open bottom and/or perforated sides) are common examples of onsite wastewater treatment systems.

Open Science – The principle and practice of making research products and processes available to all, while respecting diverse cultures, maintaining security and privacy, and fostering collaborations, reproducibility, and equity (U.S. Department of Energy, 2024).

Participatory Science – The involvement of the public in the scientific process, often in collaboration with professional scientists and scientific institutions (*EPA’s Vision for Participatory Science*, Environmental Protection Agency, 2022).

Pathogen – Disease-causing bacteria, viruses, and protozoan often transmitted to people when they consume or come in contact with contaminated water.

Pelagic – The pelagic zone consists of the water column of the open ocean and can be further divided into regions by depth. The word pelagic is derived from Ancient Greek for open sea. Conditions in the water column change with depth: pressure increases, temperature and light decrease, salinity, oxygen, nutrients all change. Fish and other organism inhabit the pelagic zone.

Phosphorus – phosphorus is a nutrient that is a natural part of aquatic ecosystems, supporting the growth of algae and aquatic plants, which provide food and habitat for fish, shellfish and smaller organisms that live in water. But when too much phosphorus enters the environment - usually from a wide range of human activities - the water can become polluted. Water pollution caused by excess nutrients (phosphorus and nitrogen) is one of the most widespread and challenging environmental problems faced by our nation. (see Nitrogen)

Point Source – A specific localized and stationary source of a pollutant (e.g., nutrients, sediment, toxic metals) such as a pipe, culvert, or outfall (See Nonpoint Source).

Public Access – The Long Island Sound Study considers a public access site to be any site along the shoreline of Long Island Sound, and the vegetated areas around streams and lakes that flow into the Sound, that is open to the public for boat launching, swimming, fishing, birding, hiking, or any other general passive enjoyment of scenic waterfront views and vistas.

Remote Sensing – The science of obtaining information about objects or areas from a distance, typically from aircraft or satellites.

Resilience – The ability of a system and its component parts to anticipate, absorb, accommodate, or recover from the effects of a hazardous event in a timely and efficient manner, including through ensuring the preservation, restoration, or improvement of its essential basic structures and function.

Resilience Plan – A plan developed by a community to evaluate the vulnerability of infrastructure, riparian and coastal areas and develop strategies for making these features and infrastructure more resilient to hazardous events (e.g., sea level rise and/or weather events). The plan should include the preservation of natural means to protect built environment where practical and preserve and protect ecosystem services.

Riparian Buffer – The vegetated area adjacent to a river, stream, or other waterbody.

Runoff – Flows of water into a stream, lake, or estuary; typically from a rainfall event where rate of accumulation exceeds losses from infiltration and evapo-transpiration.

Sea level rise – an increase in the total volume of ocean water. It results from the addition of melting glaciers and polar ice sheets, as well as the natural expansion of water as it warms—both consequences of climate change, which is driven by the burning of fossil fuels.

Sense of Belonging – A sense of belonging—the subjective feeling of deep connection with social groups, physical places, and individual and collective experiences—is a fundamental human need that

predicts numerous mental, physical, social, economic, and behavioral outcomes (Allen et al, 2021). LISS uses sense of belonging to refer to people's feelings of connection with and attachment to Long Island Sound and its coastal and riverine environments.

Sentinel Monitoring – A national model for tracking the effects of climate change.

Septic System – A system that provides for the treatment and/or disposition of the combination of human and sanitary waste with water not exceeding 1,000 gallons per day, serving a single parcel of land, including residences and small businesses.

Social Media – The strategies by which people interact and create, share, or exchange ideas and information through the Internet (e.g., Facebook, Twitter, and LinkedIn).

Species of Greatest Conservation Need – Species designed by State Wildlife Action Plans of most in need of conservation action in that state or U.S. territory.

Stewardship – The conserving and managing of natural areas to plan for multiple uses, increase public access, and protect important habitats.

Stewardship Area – One of 33 areas in Long Island Sound identified by the Long Island Sound Study as having significant recreational and/or ecological value to Long Island Sound. The boundaries of the Stewardship Areas are not strictly defined.

Stewardship Site – A property, with defined parcel boundaries, within a Stewardship Area that has been identified as representing the values or features for the Area that is being highlighted. The landowner of each Stewardship Site has granted permission for the land to be designated as a Stewardship Site.

Stormwater Runoff – generated from rain and snowmelt events that flow over land or impervious surfaces, such as paved streets, parking lots, and building rooftops, and does not soak into the ground. The runoff picks up pollutants like trash, chemicals, oils, and dirt/sediment that can harm our rivers, streams, lakes, and coastal waters.

Stormwater - the rain and melting snow that falls on our rooftops, streets, and sidewalks.

Storm surge - an abnormal rise of water generated by a storm, over and above the predicted astronomical tide.

Sustainability – Meeting the needs of the present without compromising the ability of future generations to meet their own needs: in particular using natural resources wisely to ensure their availability in the future.

Targeted Habitat Types – Twelve habitat types that are targeted by the Long Island Sound Study Habitat Restoration Work Group for restoration and management. The twelve habitat types are 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.

Tidal Wetland Extent – A category of habitat that is included in the twelve habitat types identified by the LISS Habitat Restoration Work Group for management and restoration. Tidal wetland acres restored are included in the coastal habitat extent target as well as tidal wetland restoration target.

Tidal Wetland – A type of habitat that is frequently or continually inundated with water, influenced by the motion of the tides and characterized by emergent soft-stemmed vegetation adapted to saturated soil conditions.

Total Maximum Daily Load (TMDL) – The total maximum amount of a pollutant a waterbody can assimilate while still meeting water quality standards.

Turbidity – Measure of the amount of suspended particulate matter in water, which is inversely related to water clarity.

Wastewater Treatment – A process designed to clean and treat raw sewage to remove pollutants. Generally, a three-part process, consisting of primary treatment involving screening and settlement of large particles, secondary treatment, involving anaerobic digestion of organic sludge. Water is then chlorinated and/or treated with UV sterilization to remove bacterial contaminants and discharged into the receiving waterbody. Tertiary or advanced wastewater treatment removes inorganic nutrients (nitrogen and/or phosphorus) from effluent prior to discharge.

Watershed – The region draining into a river, lake, or other body of water.

Acronyms

ADA – Americans with Disabilities Act
BMP – Best Management Practice
CAC – (see LISS CAC)
CCMP – Comprehensive Conservation and Management Plan
CLEAR – Center for Land Use Education and Research (University of Connecticut)
CTDECD – Connecticut Department of Economic and Community Development
CTDEEP – Connecticut Department of Energy and Environmental Protection
CTDOA – Connecticut Department of Agriculture
CT NERR – Connecticut National Estuarine Research Reserve
CTSG – Connecticut Sea Grant
CSO – Combined Sewer Overflows
CWA – Clean Water Act
EPA – (see USEPA)
GI – Green Infrastructure
GIS – Geographic Information System
HAB – Harmful Algal Bloom
HUD – (see USHUD)
IEC – Interstate Environmental Commission
IEP – Informed and Engaged Public
LDEO – Lamont-Doherty Earth Observatory
LiDAR – Light Detecting and Ranging
LISFF – Long Island Sound Futures Fund
LISS – Long Island Sound Study
LISS CAC – Long Island Sound Study Citizens Advisory Committee
LISS HRWG – Long Island Sound Study Habitat Restoration Work Group
MACOORA – Mid-Atlantic Coastal Ocean Observing Regional Association
MASSDEP – Massachusetts Department of Environmental Protection
MS4 – Municipal Separate Storm Sewer Systems
NCCR – National Coastal Condition Report
NEIWPPC – New England Interstate Water Pollution Control Commission
NEP – National Estuary Program
NFWF – National Fish and Wildlife Foundation
NGO – Non-Governmental Organization
NHA – National Heritage Area
NOAA – National Oceanic and Atmospheric Administration
NRCS – Natural Resources Conservation Service
NYSDEC – New York State Department of Environmental Conservation
NYSERDA – New York State Energy Research and Development Authority
NYSG – New York Sea Grant
OSWTS – On-Site Wastewater Treatment System
PCBs – Polychlorinated Biphenyls
QAPP – Quality Assurance Project Plan
SCDHS – Suffolk County Department of Health Services (New York)
TMDL – Total Maximum Daily Load
UCONN – University of Connecticut
URI – University of Rhode Island
USEPA – United States Environmental Protection Agency
USFWS – United States Fish and Wildlife Service
USGS – United States Geological Survey
WWTF – Wastewater Treatment Facility

Appendix A: Progress Made Under 2015 CCMP

Background: Report Purpose

Clean Water Act Section 119 requires LISS to biennially submit a report to Congress that summarizes and assesses progress made in implementing the CCMP. These reports are an important part of the program's performance assessment and reporting practices. In 2020, LISS published *Returning the Urban Sea to Abundance: A five-year review of the 2015 Comprehensive Conservation and Management Plan*, which evaluated the program's five-year progress in meeting the performance goals and milestones of the plan. In 2022, LISS published *Returning the Urban Sea to Abundance: A Two-Year Review (2020-2021) of Implementation of the Comprehensive Conservation and Management Plan*. Both reports are available to the public on the LISS website. Building upon the *Returning the Urban Sea to Abundance* reports, this section summarizes the overall progress made under the 2015 CCMP.

The 2015 CCMP established 20 ecosystem targets that incorporated environmental data and performance objectives to help track progress toward restoration and management goals. The 2015 CCMP also included specific Implementation Actions (IAs) to support achievement of ecosystem targets and overall goals and objectives. These actions were organized around four major themes: Clean Waters and Healthy Watersheds, Thriving Habitats and Abundant Wildlife, Sustainable and Resilient Communities, and Sound Science and Inclusive Management. In 2020, LISS updated the CCMP with 136 IAs covering the period 2020 to 2024.

The following sections summarize the progress made toward meeting the goals of the 2015 CCMP through an overview of the Ecosystem Targets and IAs. To view a full assessment of each individual Ecosystem Target, please go to the [2015 CCMP Ecosystem Targets Assessment](#).

Overview of 2015 CCMP

Ecosystem Targets: As part of the LISS's effort to assess progress made on the 2015 Ecosystem Targets, program staff met with local subject matter experts to capture and communicate the strengths, weaknesses, and lessons learned from the 2015 Ecosystem Targets. During these meetings, LISS gleaned important information to help frame the conversation and expectations for the 2025 CCMP Revision. Below are the overarching lessons learned that were incorporated throughout the 2025 CCMP Revision:

- LISS should not have targets that cannot be tracked.
- There needs to be a clearly defined way to track each target.
- There needs to be a clearly defined person(s)/organization/office that will provide the tracking information.
- LISS needs to prioritize the development of tools to track Ecosystem Targets where methods to track do not exist.
- Targets should be specific, measurable, achievable, relevant, time-bound, inclusive, and equitable (SMARTIE).

Implementation Actions: LISS used its SharePoint Tracking and Reporting tool to assess progress in implementing the 2020-2024 IAs. These findings were used to inform the 2025 CCMP revision. Each IA was categorized with one of the following labels: Significant Progress, Partial Progress, and No

Progress. To assign categories for each action, LISS reviewed the key activities of each IA and the supporting projects of each action.

- Significant Progress: IAs that had significant financial investments. Many projects listed under these IAs were completed or significantly progressing.
- Partial Progress: The projects and efforts supporting these IAs were still underway.
- No Progress: IAs that did not have significant, or any, financial investments. There were no projects supporting IAs, or there was no approach identified to track if LISS had made any progress or not.

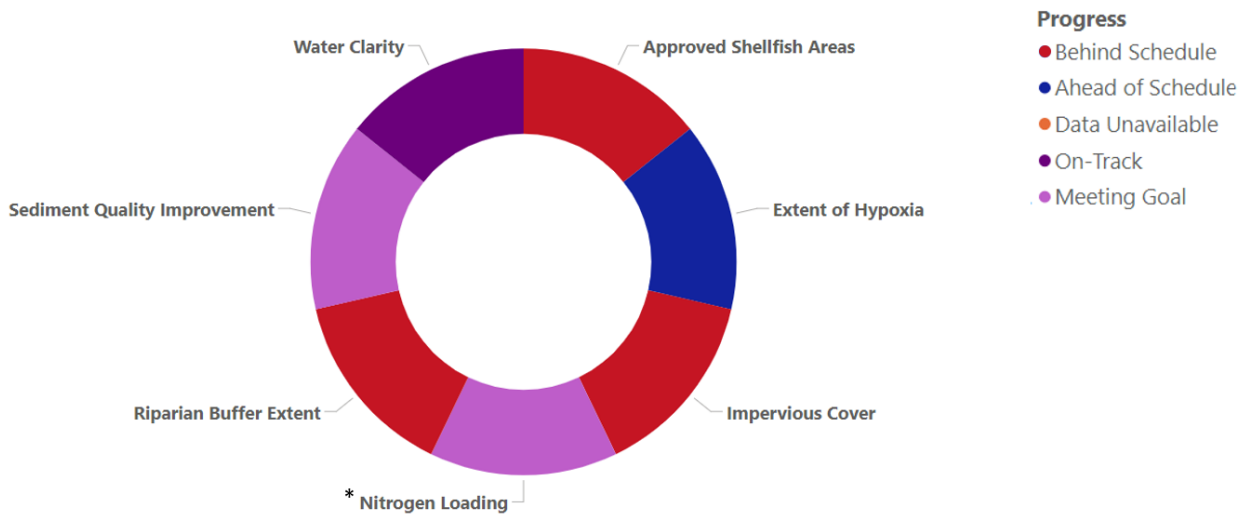
LISS compiled key lessons learned through this assessment and incorporated this information into the 2025 CCMP revision.

- LISS can track projects that are directly funded by the program but has no consistent way to track projects funded by other sources.
- Performance tracking for LISS-funded projects does not provide sufficient information to determine whether an IA has significant, partial, or no progress.
- There are limitations to relying on LISS-funded projects to evaluate success of an individual IA.
- LISS would like to emphasize tracking objectives as opposed to IAs to determine program success.

2015 CCMP: Progress by Theme

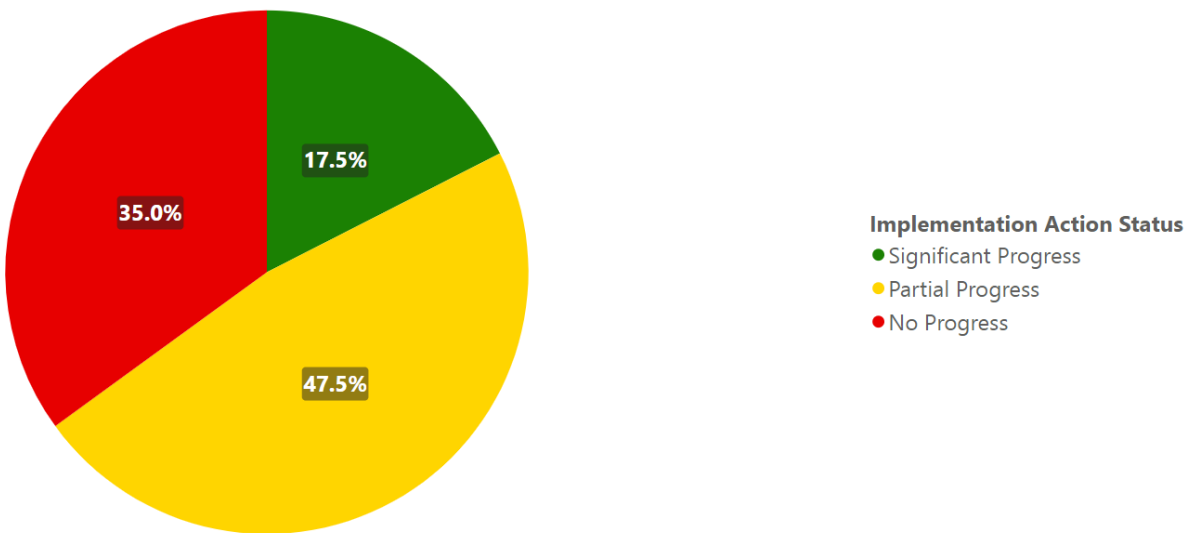
The following sections provide an overview of the 2015 CCMP Ecosystem Target and 2020-2024 IAs by theme.













Clean Waters and Healthy Watersheds: Out of the seven Ecosystem Targets under the Clean Waters and Healthy Watersheds theme, one is ahead of schedule (Extent of Hypoxia), two are meeting goals (Sediment Quality Improvement and Nitrogen Loading), one is on-track (Water Clarity), and three are behind schedule (Approved Shellfish Area, Riparian Buffer Extent, and Impervious Cover) (Figure 1). Some targets, such as the extent of hypoxia, were readily quantifiable with robust monitoring programs in place. There were challenges to meeting other targets that were subject to many variables outside of program management. To illustrate this point, LISS could easily track nitrogen loading but had difficulty quantifying changes in nonpoint source loading (where data remains unavailable).



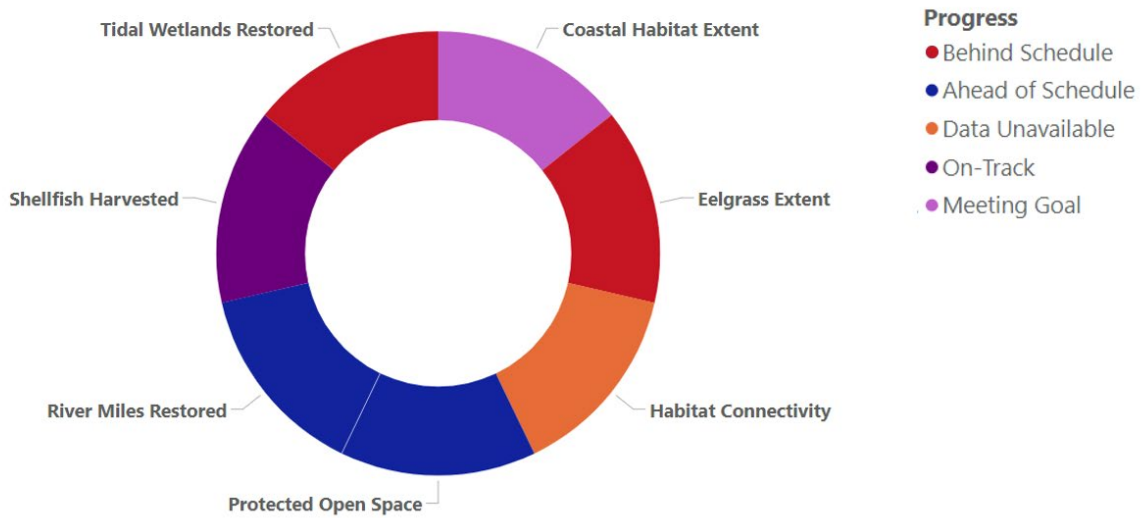
* Nitrogen Loading – 2017 Target for point source loading has been met; Data is not available for the 2025 Goal relative to NPS and Stormwater N loading. 1

Out of the 40 IAs supporting the targets, 17.5 percent had significant progress, 47.5 percent had partial progress, and 35 percent had no progress (Figure 2). The status of the 12 priority IAs are listed in Table 1.

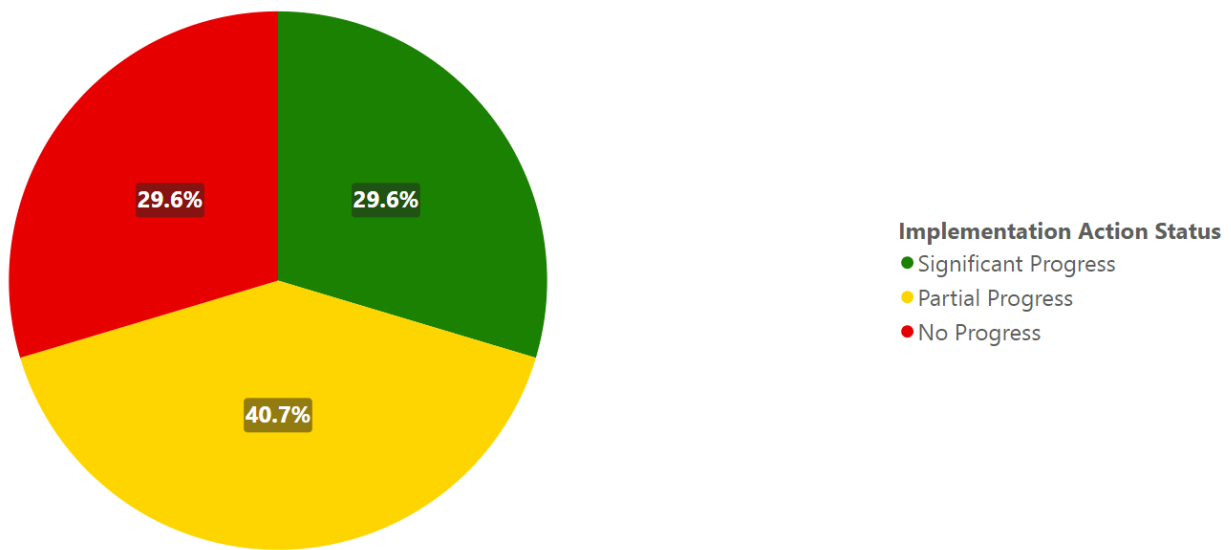














IA Number	Implementation Action Title	Status
WW-2	Continue to collaborate with municipalities, local partners and stakeholders to strategically plan for and implement capital improvements, Best Management Practices (BMPs), and improved operation and maintenance to mitigate point and nonpoint source pollution loadings, incorporating the analysis of potential future changes in loading (WW1).	
WW-7	Enhance implementation of the 2000 Dissolved Oxygen TMDL, particularly for nonpoint sources.	
WW-8	Conduct studies and research to better understand the ecosystem's response to nitrogen reductions to support an evaluation of the 2000 Dissolved Oxygen TMDL.	
WW-10	Develop a nonpoint source and stormwater tracking system tool for the Long Island Sound watershed.	
WW-12	Improve understanding, management, design, and implementation of denitrifying decentralized and residential, on-site wastewater treatment systems.	
WW-13	Improve efficiency and resiliency of existing/new waste treatment systems including septic, WWTF and stormwater infrastructure to be resilient to sea level rise, storm surge, and intense storms and flooding.	
WW-15	Increase permanent land protection of riparian corridors and wetland buffers at the municipal level.	
WW-16	Promote establishment and protection of riparian corridors and wetland buffers at the municipal level through development of local ordinances.	
WW-25	Evaluate challenges to implementation of bioextraction in Long Island Sound, including use conflicts, economic viability, permitting and testing requirements and potential environmental impacts, and make recommendations to overcome them.	
WW-27	Improve ability of models and/or studies to estimate contaminant and nutrient loads to embayments and evaluate the effectiveness of remedial actions.	
WW-28	Maintain and enhance the management utility of water quality monitoring of watershed nutrient loads and ecosystem responses to Long Island Sound and its embayments.	
WW-32	Improve the monitoring needed to assess the risk of climate change impacts including acidification on water quality.	

Thriving Habitat and Abundant Wildlife: Out of the seven ecosystem targets, two are ahead of schedule (River Miles Restored and Protected Open Space), one is meeting goal (Coastal Habitat Extent), one is on-track (Shellfish Harvested), two are behind schedule (Tidal Wetlands Restored and Eelgrass Extent), and one has no data available (Habitat Connectivity) (Figure 3). While targets such as coastal habitat extent were successful in meeting goals, some of the tracking could be misleading to the public. Coastal habitat extent is reported as restored habitat in acres rather than total existing habitat extent. This target also included 12 habitat types.

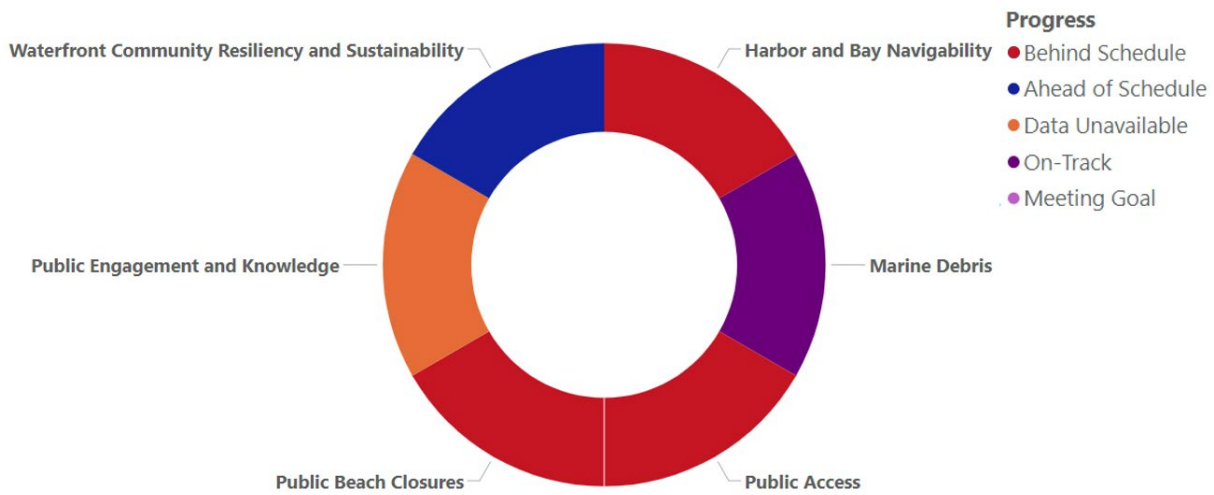


Out of the 27 IAs supporting these targets, 29.6 percent had significant progress, 40.7 percent had partial progress, and 29.6 percent had no progress (Figure 4). The status of the 12 priority IAs are listed in Table 2.

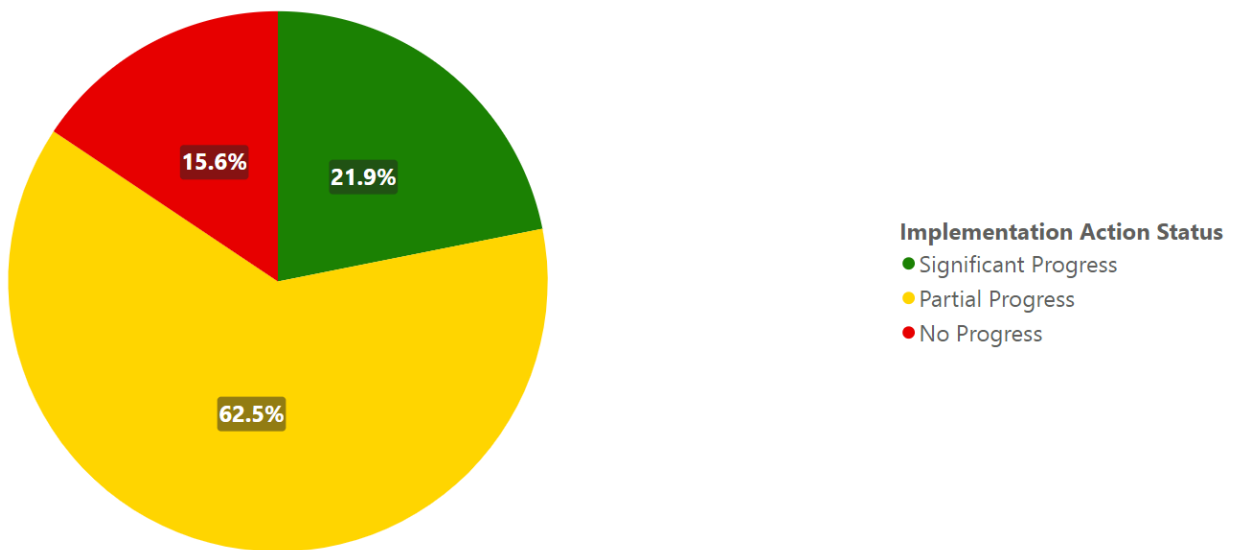


IA Number	Implementation Action Title	Status
HW-1	Complete projects that result in restoration of coastal habitat.	
HW-3	Complete projects that restore or maintain habitat connectivity (i.e., river miles reconnected and/or contiguous acres of coastal habitat protected or restored). Generate supporting GIS data to help measure extent of connectivity enhanced.	
HW-4	By 2024, agree upon an applicable habitat connectivity model and apply metrics for all restoration and protection projects.	
HW-5	Use remote sensing, mapping tools, modeling, and field verification to determine sites that are likely to be impacted by sea level rise, and which sites are ideal for habitat migration.	
HW-6	Develop and apply standardized habitat quality metrics and assessment methodology across targeted habitat types.	
HW-7	Use leading-edge design tools to prioritize future conservation investment and management plan development for Long Island Sound's most significant and imperiled terrestrial and intertidal coastal habitats.	
HW-8	Conduct an ecological assessment of lands and waters surrounding Long Island Sound Stewardship Sites and design green infrastructure/low-impact development pilot projects that minimize negative impacts and enhance beneficial ecosystem services of lands and waters within or surrounding the Sites.	
HW-9	Equitably protect high-priority coastal habitat from development through property acquisition and other means, support sustainable use of these properties, without discouraging wildlife use, and create a registry of protected areas in Connecticut and New York, which encompasses both existing protected properties and future acquisitions.	
HW-11	In lieu of hard armoring, develop and promote the use of living shoreline habitat protection methods (dunes, shorelines, coastal marshes) and standardized living shoreline monitoring protocols while considering the habitat needs of Species of Greatest Conservation Need, including forage species, and reducing wildlife conflicts.	
HW-14	Develop and implement invasive/non-native species management plans for priority terrestrial and aquatic sites.	
HW-16	Collect and analyze data on, and restore habitat for, Species of Greatest Conservation Need, including forage species.	
HW-25	Continue Long Island Sound eelgrass abundance surveys and promote eelgrass management.	

Sustainable and Resilient Communities: Out of the six ecosystem targets, one is ahead of schedule (Waterfront Community Resiliency and Sustainability), one is on-track (Marine Debris), three are behind schedule (Harbor and Bay Navigability, Public Access, and Public Beach Closures), and one has no data available (Public Engagement and Knowledge) (Figure 5). LISS was able to track the development of resilience plans under the waterfront community resiliency and sustainability target but had little to no ability to track degree or quality of implementation of these plans. Similarly, the public engagement and knowledge target did not have data available as it is difficult to measure knowledge gained through public engagement.

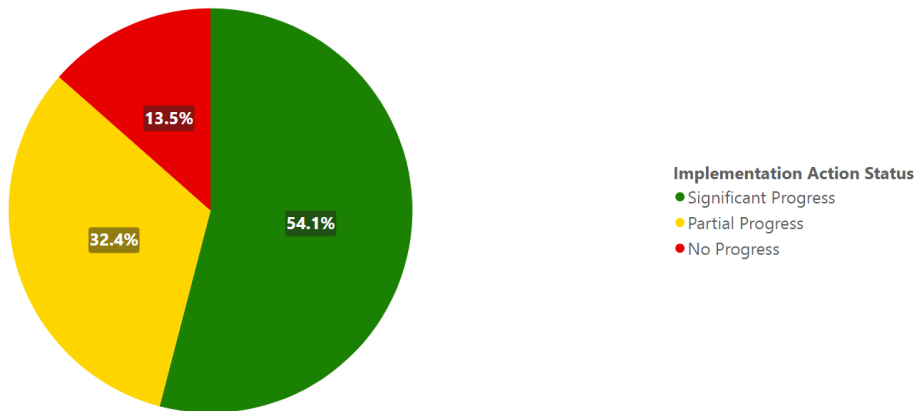














Out of the 32 IAs supporting these targets, 21.9 percent had significant progress, 62.5 percent had partial progress, and 15.6 percent had no progress (Figure 6). The status of the 12 priority IAs are listed in Table 3.



IA Number	Implementation Action Title	Status
SC-1	Support festivals, celebrations, events, campaigns and materials that reach priority audiences through multiple communication channels to promote education and encourage appreciation, responsible use, and stewardship of the Sound's natural, cultural, historical and maritime resources.	P
SC-5	Support or develop tools (e.g., training modules, websites, regulations, best practices, etc.) and conduct region-wide and town-specific workshops to assist municipalities in incorporating environmental justice in projects that implement CCMP actions.	P
SC-6	By 2024, develop and implement a 5-year coordinated communications plan that engages multiple audiences (e.g., elected officials and municipalities) in ongoing efforts to improve the health and resilience of Long Island Sound.	S
SC-14	Promote landscaping guidance, practices and policies to property owners and communities that encourage alternatives to chemical and nutrient-intensive landscaping, including establishment of natural vegetated buffers near waterbodies.	S
SC-15	Support efforts through technical and grant assistance to develop behavior change campaigns that result in measurable environmental improvements to the Sound's ecosystem.	P
SC-20	Provide support to municipalities on low-impact development and green infrastructure.	S
SC-22	Use the best available social science research methods to understand the public's role in the Long Island Sound ecosystem and use that information to help support campaigns to reduce pollution, improve water quality and steward healthy habitats and resilient communities.	P
SC-23	Develop tools (e.g., training modules, websites, regulations, best practices, etc.) and conduct region-wide and town-specific workshops to assist municipalities in the development of sustainability and resiliency plans and their integration into comprehensive plans.	P
SC-24	Support community development, adoption, and implementation of new or updated Municipal Sustainability Plans and Coastal Resiliency Plans.	P
SC-26	Identify and recommend removal and, or, protection of sensitive infrastructure in the coastal zone (e.g., oil tanks, pump, power stations, etc.) and work to prevent future siting of such infrastructure in vulnerable coastal floodplains.	N
SC-27	Implement standards, best practices, and educational materials for Green Infrastructure/Low-Impact Development planning and implementation.	P
SC-31	Support planning and implementation to increase the number of points and the length of the Sound's shoreline and rivers that provide equitable public access while also protecting and balancing the health and resilience of sensitive wildlife habitats and breeding areas.	P

Sound Science and Inclusive Management: There were no Ecosystem Targets under the Sound Science and Inclusive Management theme. Out of the 37 IAs, 54.1 percent had significant progress, 32.4 percent had partial progress, and 13.5 percent had no progress (Figure 7). The status of the 12 priority IAs are listed in Table 4.



IA Number	Implementation Action Title	Status
SM-1	Regularly update and refine the high-priority science needs relating to the understanding and attainment of management objectives and ecosystem targets.	
SM-8	Coordinate and leverage community water quality monitoring programs, enhancing the utility and application of data.	
SM-11	By 2024, complete the Integrated Systemwide Modeling Tool to support nitrogen management and Dissolved Oxygen TMDL assessment.	
SM-12	Link watershed and groundwater nutrient loading models to Long Island Sound water quality models to better elucidate the sources and contributions of nitrogen and support their management.	
SM-17	Establish and implement practices to effectively engage underrepresented stakeholders and communities in CCMP implementation and LISS Management Conference decision-making.	
SM-18	Convene senior EPA and State management to help direct, inform, and coordinate policy relevant to Long Island Sound.	
SM-20	Support the refinement and application of the Long Island Sound Blue Plan to <u>more comprehensively manage Long Island Sound resources.</u>	
SM-21	Conduct primary valuations of the critical ecosystem goods and services supported by Long Island Sound and its coastal habitats.	
SM-24	Research and develop innovative, locally appropriate funding mechanisms to provide sustained, reliable sources of investment capital to restore and protect ecosystem services.	
SM-30	Refine the ecosystem metrics and targets based on the underlying science of the Long Island Sound ecosystem to clearly identify the characteristics of a “restored” Long Island Sound.	
SM-36	Every five years develop a comprehensive, specific, target-oriented implementation plan engaging all Long Island Sound partners.	
SM-37	In 2021, develop a Sustainable and Resilient Communities five-year plan that identifies specific actions, which, when approved by the Management Conference, will be added to the 2020 CCMP update.	

Appendix B: Objective/Action Narrative

Clean Waters and Healthy Watersheds: Objective/Action Narratives

[Goal 1: Clean Waters and Healthy Watersheds](#)

(Click link above to return to Section 2)

Objective WW 1: Nutrients

Objective Statement: Reduce nutrients across the watershed to restore and protect water quality and mitigate impacts on ecosystem health in Long Island Sound and its embayments.

Measure of Success: Implement nutrient reduction actions established under Suffolk County and Nassau County Nine-Element Watershed-Based Plans. Develop nutrient reduction or protection targets for six priority embayments through Connecticut’s Second-Generation Nitrogen Strategy. Develop additional nutrient reduction or protection plans across the watershed to reduce eutrophic impairments in LIS and its embayments.

Technical Explanation: Nutrient pollution or the excessive accumulation of nitrogen and phosphorus in water is one of the most widespread, costly, and challenging environmental problems of our nation. Nutrient pollution has affected many of our waterbodies and impacted environmental health, human health, and the economy. (source: EPA website <https://www.epa.gov/nutrientpollution/basic-information-nutrient-pollution>). Excess nutrient pollution to LIS was the impetus for the creation of the Long Island Sound Study and subsequent development of the Total Maximum Daily Load (TMDL) plan (*A Total Maximum Daily Load Analysis to Achieve Water Quality Standards for Dissolved Oxygen in Long Island Sound*, December 2000). Since implementation of the TMDL, nitrogen from wastewater treatment plants has been reduced by 70 percent. Additional efforts including enhancements to stormwater general permits, public engagement, and implementation of watershed-based plans and agricultural nutrient management plans have worked to reduce diffuse sources of nitrogen and phosphorus throughout the watershed. As a result of these efforts, a 51 percent reduction in the area of summertime hypoxia that establishes in LIS has been achieved (based on the 5-year rolling average). This is ahead of schedule based on the 2015 CCMP which called for a 28 percent reduction in the area of hypoxia. Considering the recently published USGS dashboard of nitrogen loading, nitrogen flux rates have decreased by 13 percent between the 1995-1999 baseline and 2021 (based on the 5-year rolling average). The dashboard uses data collected from select tributaries located throughout the LIS watershed and represents the trends in both point and non-point sources. Although great strides have been made, nutrients continue to impact water quality as expressed by annual summer algal blooms and hypoxia. Also, Whitney and Vlahos (2021) stated that additional nitrogen reductions are needed to maintain the achievements in reducing the hypoxic area. This is due to water temperature increases that are expected to occur through 2050 and 2100. Additional reductions of nutrients are anticipated over the next decade as the result of implementation of NYSDEC’s watershed-based plans for Suffolk County and Nassau County, the nutrient bioextraction initiative, CT DEEP’s second-generation nitrogen and phosphorus strategies, and the development of additional nutrient reduction or protection plans such as nine element watershed-based plans and reduction targets specific for LIS.

Cost Estimate: \$\$\$\$\$ - >\$20M

How the Objective follows the SMARTIE structure:

Specific:

Who – Federal, state, and local governments, Interstate agencies, non-government organizations, large landowners (including turf dominated land and agriculture), watershed residents

What – Primarily non-point sources (fertilizers, onsite wastewater treatment systems, stormwater), secondarily point sources

When – Over 10 years, with 5-year milestones

Where – Spatially across the Long Island Sound watershed

Why – Improve and protect water quality and ecosystem health of Long Island Sound

Measurable:

Measurable	Measurement	Source	Frequency	Need
Nitrogen removed Phosphorus removed	Number of projects removing nitrogen and/or phosphorus Dollars spent per pound of nitrogen removed	319 Grant Reporting and Tracking System - CT and NY state NPS contacts Future's Fund Projects - NWFS grant administrator	Annual	N/A
Nine-Element Watershed Based Plans	Number of plans developed	319 Grant Reporting and Tracking System - CT and NY state NPS contacts Future's Fund Projects - NWFS grant administrator	Annual	N/A
Onsite wastewater treatment systems removed or upgraded	Number of systems removed (connected to sewer) or replaced with I/A systems	Nassau and Suffolk Counties, NY State contact	Annual	N/A
Nutrient Reduction or Protection Targets	Number of Embayments with Nutrient Reduction of Protection Targets	CT DEEP	5-year	N/A

Achievable: There are many efforts underway that will lead to additional implementation plans and actions over the next 10-years. These include the NYSDEC's action agenda for Long Island, nine element watershed-based plans for Suffolk and Nassau Counties, implementation of CT DEEP's second-generation nitrogen strategy and modeling of priority embayments, and NYC DEP/EPA-LISO eutrophication model for offshore Long Island Sound. Additionally, implementation of existing watershed-based plans as well as upgrades at WWTPs are anticipated to continue into the next 10 years.

Future's fund projects and 319 grant projects focused on nutrient reductions are also expected to continue over the next 10 years.

Relevant: This objective is relevant to the goal of restoring and maintaining water quality in LIS and its watershed since nutrients are the cause of eutrophication throughout the watershed and in LIS. The objective is within the influence of the LISS partnership.

Time-Bound: Over 10 years with 5-year milestones.

Inclusive: Nutrient pollution adversely impacts fresh and coastal waters, as well as Long Island Sound. Improvements to water quality and subsequently, ecosystem health will improve the interactions of all communities (including those that are historically underserved and overburdened) in the watershed and Long Island Sound.

Equitable: The objective outcomes of improved water quality and ecosystem health will benefit communities throughout the Long Island Sound watershed. However, steps can be taken to prioritize historically underserved and overburdened communities for development and implementation of nutrient reduction plans through funding options like the Long Island Sound Community Impact Fund. This would ensure an equitable process towards improvements without overburdening underserved communities.

Actions to support achievement of Objective WW 1:

Action WW 1-1

Implement nutrient reduction actions across the Long Island Sound watershed with an emphasis on the greatest contributing sources and their impacts on Long Island Sound and its embayments.

Action Description:

- Pursue opportunities to further improve wastewater treatment through technology upgrades at wastewater treatment plants, and wastewater and stormwater infrastructure improvements.
- Incorporate advanced treatment for inadequate and improperly functioning onsite wastewater treatment systems and/or connections to centralized treatment systems with nutrient reducing capacity.
- Encourage and implement practices to reduce nutrients from nonpoint sources (turf fertilizer, agriculture) and stormwater (regulated and non-regulated).
- Implement methods (e.g., bioextraction) for in-water nutrient reductions.
- Encourage water reuse infrastructure for new construction.
- Habitat Types Affected: Coastal and inland watersheds and receiving waterbodies, wetlands, Long Island Sound, and embayments

Cooperators and Partners: Federal agencies, State agencies, Local and county governments, regional planning organizations and commissions, non-governmental organizations and community organizations, Universities and research institutions, Private sector partners

Funding Sources: Federal and state grants and loans, Municipal budgets and bonds, Private foundation grants, Public-private partnerships, Environmental fines and penalties reinvested into infrastructure improvements

Funding Needs (range of potential costs): \$\$\$\$\$ - > \$20 M

Performance measures:

- BMPs delivered
- Pounds of nitrogen prevented
- Pounds of nitrogen removed
- Systems installed (nitrogen-reducing)

Expected Timeframe: 10 years

Climate Change Stressors Addressed: (1) warmer summers; (2) warmer winters; (3) warmer waters; (4) increasing drought; (5) increasing storminess; (6) sea level rise; and (7) ocean acidification

How the action will reduce/mitigate climate change risks to the goal: Frequent and intense rainfall events are a consequence of climate change in the northeast. These events often result in large amounts of runoff entering surface waters, carrying nutrients, pathogens, and other contaminants. This action combats increasing storm events by mitigating nutrient pollution from non-point sources that run off into surface waters. Furthermore, warmer winters lead to increasing snowmelt and rain events, carrying nutrient rich water and sediment downstream when dormant vegetation cannot absorb the influx. This action combats warmer winters by implementing nutrient reduction actions across the watershed, including the implementation of bioextraction initiatives that sequester nitrogen in the water.

Action WW 1-2

Support monitoring, modeling, and research, with appropriate data management, storage and accessibility requirements, to improve understanding of source contributions, their impacts to ecosystem health, and the relative performance and benefits of nutrient reduction actions.

Action Description (identify key activities to implement the action, including affected habitat types):

- Support and enhance monitoring of parameters associated with nutrients, hypoxia, coastal and ocean acidification, and harmful algal blooms to determine relationships and impacts on water quality and ecosystem health.
- Pursue opportunities that maintain or expand the long-term record of data, create efficiencies in data storage, access, and management among stakeholders and partners.
- Evaluate spatiotemporal shifts in nutrient contributions from point and nonpoint sources due to projected changes in regional climate.
- Develop predictive models that estimate nutrient loads and evaluate impacts as well as the effectiveness of management actions.
- Develop empirical and mechanistic models to evaluate the impact of concurrent changes in nutrients and climate on estuarine water quality. Climate change runs should consider short-term and long-term impacts and a range of pathway scenarios (e.g., Shared Socioeconomic Pathways) that are relevant to management decision making.
- Develop a watershed-estuarine-ecosystem modeling framework to connect changes in nutrient inputs from the watershed to effects on coastal habitats and key aquatic species.
- Support research that contributes to the understanding of nutrient sources, relationships and interactions, treatment technologies (e.g., water reuse), and outcomes to more efficiently manage current and future nutrient loads under changing climatic conditions.
- Support research to meet the goals of the nutrient bioextraction initiative.
- Habitat Types Affected: Coastal and inland watersheds and receiving waterbodies, wetlands, Long Island Sound, and embayments

Cooperators and Partners: Federal agencies, State agencies, Local and county governments, regional planning organizations and commissions, non-governmental organizations and community organizations, Universities and research institutions, Private sector partners

Funding Sources: Federal and state grants and loans, Municipal budgets and bonds, Private foundation grants, Public-private partnerships, Environmental fines and penalties reinvested into infrastructure improvements

Funding Needs (range of potential costs): \$\$\$\$ - \$1M-\$20

Performance measures:

- Monitoring events
- Monitoring groups
- Sets of data collected
- Monitoring devices deployed
- Number of research projects

Expected Timeframe: 10 Years

Climate Change Stressors Addressed: (1) warmer summers; (2) warmer winters; (3) warmer waters; (4) increasing drought; (5) increasing storminess; (6) sea level rise; and (7) ocean acidification

How the action will reduce/mitigate climate change risks to the goal: Climate change has multiple impacts on water quality. This action aims to improve the understanding of source contributions, the benefits of nutrient reduction actions, and the impacts to ecosystem health incorporating climate change factors. All climate change stressors will be considered when conducting analyses.

Action WW 1-3

Collaborate with stakeholders and partners to develop plans, tools, and strategies that support nutrient reduction actions to improve overall ecosystem management.

Action Description:

- Continue to support the development of watershed-based plans and other mitigation action plans focused on nutrient reductions to improve water quality and ecosystem health.
- Develop graphical interfaces that provide stakeholders access to water quality model output in order to inform nutrient reduction actions. Through collaborations, develop policies and strategies that alleviate barriers and/or expedite implementation of land- and water-based nutrient reducing practices, including bioextraction and water reuse.
- Evaluate embayment data to develop a hypoxia ecosystem indicator.
- Conduct data evaluations and literature syntheses to ensure sound science is included in policies and strategies that support nutrient reductions.
- Develop a strategy to coordinate and prioritize funding for implementation.
- Habitat Types Affected: Coastal and inland watersheds and receiving waterbodies, wetlands, Long Island Sound, and embayments.

Cooperators and Partners: Federal agencies, State agencies, Local and county governments, regional planning organizations and commissions, non-governmental organizations and community organizations, Universities and research institutions, Private sector partners

Funding Sources: Federal and state grants and loans, Municipal budgets and bonds, Private foundation grants, Public-private partnerships, Environmental fines and penalties reinvested into infrastructure improvements

Funding Needs (range of potential costs): \$\$\$ - \$150K-\$1M

Performance measures:

- Number of policies, strategies, or programs
- Number of TMDLs, mitigation plans, or protection plans
- Number of watershed-based plans
- Number of estuarine models
- Number of watershed models
- Number of groundwater models

Expected Timeframe: 10 Years

Climate Change Stressors Addressed: (1) warmer summers; (2) warmer waters; (3) sea level rise; and (4) ocean acidification

How the action will reduce/mitigate climate change risks to the goal: Climate change has multiple impacts on water quality. This action aims to improve the understanding of source contributions, the benefits of nutrient reduction actions, and the impacts to ecosystem health incorporating climate change factors. All climate change stressors will be considered when conducting analyses.

Goal 1: Clean Waters and Healthy Watersheds

(Click link above to return to Section 2)

Objective WW 2: Watershed Health

Objective Statement: Improve the ecosystem health of Long Island Sound and its watershed through conservation and positive land use practices.

Measure of Success: Conserve and protect an additional 5,000 acres of watershed land beyond the coastal boundary. Establish and maintain a 100-foot or wider riparian buffer across 75 percent of the waterways in 90 percent of the subbasins.

Technical Explanation: The objective to improve the health of Long Island Sound and its watershed through conservation and positive land use practices focuses on mitigating negative impacts from land conversion and impervious surfaces. This approach targets enhancing the watershed health of Long Island Sound (LIS), defined as the overall condition and functionality of the LIS watershed and its ability to support ecological processes, provide clean water, sustain biodiversity, and offer ecosystem services beneficial to humans and wildlife. Efforts include enhancing riparian buffers, increasing urban canopy coverage and land conservation and protection, and implementing sustainable land management practices, which will collectively help stabilize shorelines, filter pollutants, and reduce stormwater runoff, thereby promoting biodiversity and resilience against climate change. These initiatives align with broader strategies to improve watershed health by leveraging land cover data from the National Land Cover Database (and other available data sets) and engaging collaboratively with stakeholders to ensure measurable and sustained improvements. Progress made through this approach will be systematically tracked, and by 2030, a detailed report will be developed, documenting the extent of riparian buffers and the implementation of land management practices across the watershed.

Cost Estimate: \$\$\$\$\$ - >\$20M

How the Objective follows the SMARTIE structure:

Specific:

Who: Federal, state, and local governments, non-government organizations, large landowners (including turf dominated land and agriculture), watershed residents

What: Land use and management practices that impact watershed health.

When: Over 10 years, with 5-year milestones

Where: Spatially across the Long Island Sound watershed.

Why: A healthy watershed is essential for ensuring clean water, supporting biodiversity, reducing flood risks, supporting recreational activities, fostering sustainable economic development, and developing resiliency to climate change.

Measurable: The percent cover of riparian buffer in the HUC 12 subwatersheds will serve as a measurable indicator of progress. A 30 square meter resolution of land cover data for the LIS watershed has been recorded dating back to 1985 and is freely available through UConn CLEAR and the National Land Cover Database, although higher resolution landcover data is recommended for a more accurate

assessment. Progress toward the 5000 acres of land conserved will be reported by LISS Habitat Restoration Coordinators and compiled by the LISS Partnership.

Measurable	Measurement	Source	Frequency	Need
Riparian Buffer Extent	100-foot or wider riparian buffer extent of the waterways each subbasin.	UCONN CLEAR CL, NLCD, NOAA C-CAP	Every 2 Years	Currently have watershedwide 30 meter resolution imagery from NLCD, but higher resolution 1 meter data layers exist for portions of the watershed and would be desirable throughout for a watershed wide analysis
Land Acquisition	Acres Protected	LISS Habitat Restoration Coordinators	Annual	N/A
Riparian Buffer Extent Analysis	Report	LISS Partnership	5 years	Work group should guide the preparation of report.

Achievable: Given the growing emphasis on understanding watershed characteristics to safeguard water quality and ecosystem health the objective of enhancing watershed health is within reach. Intermediate actions and milestones are set to play a pivotal role in improving watershed conditions, including the assessment of key parameters and the implementation of targeted management practices.

Relevant: Improving watershed health is relevant for ensuring clean water, preserving biodiversity, reducing flood risks, supporting recreation, and fostering sustainable economic development and resilience to climate change.

Time-Bound: Over a 10-year period, with a 5-year milestone focused on acquiring the necessary data and completing a watershed-scale analysis of riparian buffer extent.

Inclusive: The objective includes a range of stakeholders and considers the needs of all communities within the watershed.

Equitable: Striving to achieve this objective will ultimately benefit communities throughout Long Island Sound by improving water quality, enhancing ecosystem health, and bolstering resilience and sustainability in watershed ecosystems, leading to healthier environments and greater socio-economic well-being for present and future generations.

Actions to support achievement of the Objective WW 2:

Action WW 2-1

Preserve, restore, and steward natural landscapes and the ecosystem services they provide through land conservation and protection efforts beyond the coastal boundary.

Action Description:

- Land Acquisition: Purchase or secure conservation easements at strategic locations to protect critical habitats and ecosystems.
- Restoration Projects: Implement restoration activities such as reforestation, wetland rehabilitation, and invasive species removal.
- Stewardship Programs: Develop and support programs for ongoing stewardship and management of conserved lands.
- Land Use Data Collection: Collect high-resolution GIS layer data on current and historical land use patterns to inform planning and monitoring.
- Model Development: Develop models to improve our understanding of ecosystem services provided by different habitat types and inform restoration activities.
- Habitat Types Affected: Upper watershed, embayments, wetlands, and recreational water bodies

Cooperators and Partners: Federal agencies, State agencies, Local and county governments, regional planning organizations and commissions, non-governmental organizations and community organizations, Universities and research institutions, Private sector partners

Funding Sources: Federal and state grants and loans, Municipal budgets and bonds, Private foundation grants, Public-private partnerships, Environmental fines and penalties reinvested into infrastructure improvements

Funding Needs (range of potential costs): \$\$\$\$ - \$1M-\$20M

Performance measures:

- Number of acres of conserved and restored
- Number of acres riparian buffer
- Number of acres of tree and urban canopy conserved and restored

Expected Timeframe: 10 years

Climate Change Stressors Addressed: (1) warmer summers; (2) warmer winters; (3) warmer waters; (4) increasing drought; (5) sea level rise

How the action will reduce/mitigate climate change risks to the goal: This action aims to preserve and restore natural landscapes as these areas are sources of carbon sequestration, they provide communities with storm protection and build the diversity of plant cover.

Action WW 2-2

Implement nature-based solutions and other practices that improve and maintain water quality and ecosystem health.

Action Description:

- **Green Infrastructure:** Install green infrastructure such as rain gardens, and green roofs to reduce runoff and filter pollutants.
- **Riparian Buffers:** Establish and maintain riparian buffers along waterways to intercept pollutants and stabilize stream banks.
- **Reduction in Impervious Surfaces:** Implement techniques like installation of permeable surfaces and tree filters to disconnection stormwater systems and reduce the effective area of impervious surfaces.
- **Wetland Restoration:** Restore and create wetlands to enhance water filtration and provide flood protection.
- **Urban Forestry:** Increase tree cover in urban areas to improve water infiltration and reduce the heat island effect.
- **Land Use Data Collection and Analysis:** Gather high-resolution GIS layer data on land use in order to assess land use impacts on ecosystem health and conduct watershed analysis, informing management of natural resources and mitigation of environmental stressors.
- **Habitat Types Affected:** Coastal watersheds, upper watershed, embayments, wetlands, and recreational water bodies

Cooperators and Partners: Federal agencies, State agencies, Local and county governments, regional planning organizations and commissions, non-governmental organizations and community organizations, Universities and research institutions, Private sector partners

Funding Sources: Federal and state grants and loans, Municipal budgets and bonds, Private foundation grants, Public-private partnerships, Environmental fines and penalties reinvested into infrastructure improvements

Funding Needs (range of potential costs): \$\$\$\$ - \$1M-\$20M

Performance measures:

- Number of acres riparian buffer
- Number of acres urban canopy
- Number of BMPs installed
- Number of land use reports

Expected Timeframe: 5-10 years

Climate Change Stressors Addressed: (1) warmer waters; (2) sea level rise; and (3) ocean acidification

How the action will reduce/mitigate climate change risks to the goal: Nature-based solutions, such as riparian buffers, will help to improve water quality along with ecosystem health by building resiliency to sea level rise and storm surge.

[Goal 1: Clean Waters and Healthy Watersheds](#)

(Click link above to return to Section 2)

Objective WW 3: Pathogens

Objective Statement: Reduce pathogens and increase monitoring to protect water quality and human health, ensuring safe recreational and commercial use.

Measure of Success: Through stormwater and wastewater infrastructure improvement projects, including 11,500 onsite wastewater treatment system upgrades and removals, achieve a 5-year rolling average of 85 percent of beaches graded B- and above based on beach data from Sound Health Explorer. Additionally, increase the number of samples collected by 10 percent and increase the spatial coverage of monitoring relative to a 2023 baseline.

Technical Explanation: Initially included in the 1994 CCMP, exposure to pathogens continues to be a concern for public health. Polluted runoff from developed land, leaking wastewater infrastructure, and improperly functioning on-site wastewater treatment systems can release pathogens into water bodies causing closure of beaches and restrictions on shellfishing areas. The term “pathogens” is used to describe disease-causing bacteria, viruses and other micro-organisms. The LISS partners monitor water for the presence of pathogens by testing for indicator bacteria. The presence of indicator bacteria at certain levels is used to presume the presence of pathogens. This objective aims to reduce pathogen contamination from wastewater and stormwater infrastructure and onsite treatment. To track progress, the 5-year rolling average of beaches graded B- and above based on beach data from Sound Health Explorer will be monitored, with a goal of 85 percent of beaches graded B- or above. The number of onsite wastewater treatment systems replaced will also be tracked to monitor progress. Another aspect of this objective aims to enhance our understanding and to better inform the management of pathogen contamination through increased monitoring. Number of samples collected, temporal and geographic distribution relative to a 2023 baseline will be analyzed to track progress of this objective. The 2023 baseline is 983 samples collected at 93 sites based on data provided by the Interstate Environmental Commission and Save the Sound.

Cost Estimate: \$\$\$\$\$ - >\$20M

How the Objective follows the SMARTIE structure:

Specific:

Who – Federal, state, and local governments, Interstate agencies, non-government organizations, watershed residents

What – Monitor, assess, track, and reduce pathogens

When – Over 10 years, with 5-year milestones

Where – Sources identified include old infrastructure, inadequate onsite wastewater treatment systems, CSOs, SSOs, NPS (Stormwater – Can include waterfowl, pet waste, etc.), agricultural runoff

Why – Increase commercial and recreational usage of water while protecting human health.

Measurable: Multiple measures of success have been identified – 5-year rolling average of beaches graded B- and above based on beach data from Sound Health Explorer, number of onsite wastewater treatment systems replaced or removed, and number of samples collected and geographic distribution. The objective will be achieved when a 5-year rolling average of 85 percent of beaches graded B- and above based on beach data from Sound Health Explorer is attained, 11,500 onsite wastewater treatment systems are replaced, and sample collection trends up and expands spatially (including priority shellfish areas)

Measurable	Measurement	Source	Frequency	Need
Beach grade data from Sound Health Explorer	5-year rolling average of beaches graded B- and above	Sound Health Explorer (Save the Sound)	Annual	N/A
Onsite wastewater treatment systems removed or upgraded	Number of systems removed (connected to sewer) or replaced with I/A systems	CT DEEP, Nassau and Suffolk Counties	Annual	N/A
Sample collection	Number of samples collected	IEC, Save the Sound	Annual	N/A
Spatial distribution of sample collection	Number of new sites sampled	IEC, Save the Sound	Annual	N/A

Achievable: Considering the attention paid to pathogens due to human health concerns and LISS partner’s current efforts to develop and conduct pathogen monitoring in the LIS, this objective is achievable. There are intermediate actions and milestones that will contribute to reducing beach and shellfish bed closures and increasing sample collection.

Relevant: This objective is relevant to the goal of restoring and maintaining water quality in LIS and its watershed since pathogens are abundant in parts of the Sound and pose major threats to human health.

Time-Bound: Over 10 years, with 5-year milestones

Inclusive: The EJ Needs Assessment identified a lack of clean and safe spaces as a barrier for historically underserved and overburdened communities using the Sound and its resources. This objective aims to restore water quality by reducing pathogen pollution, enhancing access to the LIS for many historically underserved and overburdened communities. Another goal of this objective is to increase monitoring both spatially and temporally across LIS. This will facilitate testing in areas without long term data sets and increase inclusiveness.

Equitable: Achieving this objective will benefit communities throughout the Long Island Sound watershed. However, steps can be taken to prioritize historically underserved and overburdened communities such as collecting data in underserved areas without long-term datasets, and prioritizing funding for pathogen related projects for historically underserved and overburdened communities.

Actions to support achievement of Objective WW 3:

Action WW 3-1

Evaluate and improve wastewater and stormwater infrastructure, and support upgrade or sewer connections of inadequate onsite wastewater treatment systems located in critical or strategic watersheds.

Action Description:

- **Assessment and Planning:** Conduct comprehensive assessments of current wastewater and stormwater infrastructure to identify areas needing upgrades.
- **Infrastructure Upgrades:** Implement necessary upgrades to wastewater and stormwater systems to enhance their efficiency in removing pathogens.
- **Onsite Wastewater Treatment System Improvements:** Promote and support the connections to centralized sewer systems or upgrade existing onsite wastewater treatment systems.
- **Public Education and Outreach:** Develop and disseminate educational materials to inform the public and local stakeholders about the importance of wastewater and stormwater management in reducing pathogen levels.
- **Habitat Types Affected:** Coastal watersheds, embayments, and recreational water bodies.

Cooperators and Partners: Federal agencies, State agencies, Local and county governments, regional planning organizations and commissions, non-governmental organizations and community organizations, Universities and research institutions, Private sector partners

Funding Sources: Federal and state grants and loans, Municipal budgets and bonds, Private foundation grants, Public-private partnerships, Environmental fines and penalties reinvested into infrastructure improvements

Funding Needs (range of potential costs): \$\$\$\$\$ - > 20 M

Performance measures:

- Number of onsite wastewater treatment systems upgraded
- Number of onsite wastewater treatment systems removed
- Wastewater and Stormwater improvements (e.g., systems installed, miles of piping repaired, etc.)
- Dollars spent on wastewater or stormwater infrastructure improvements

Expected Timeframe: 5-10 years

Climate Change Stressors Addressed: (1) increasing storminess

How the action will reduce/mitigate climate change risks to the goal: Frequent and intense rainfall events are a consequence of climate change in the northeast. These events put additional pressure on wastewater and stormwater systems, increasing the likelihood of raw sewage entering the environment. This goal combats increasing storminess by proactively evaluating and improving wastewater and stormwater systems, reducing the risk of overflows, pipe breaks, and other issues exacerbated by the changing climate.

Action WW 3-2

Expand the spatial and temporal coverage of sampling and source tracking and encourage advancements in methodology.

Action Description:

- **Expand Sampling Coverage:** Increase the number and geographic distribution of sampling sites across the coastal watershed to ensure comprehensive monitoring. Prioritize areas where shell fishing is restricted due to water quality impairments.
- **Enhance Temporal Coverage:** Increase frequency of sampling, including during wet weather events, to better understand pathogen dynamics.
- **Source Tracking:** Implement advanced source tracking techniques to identify specific sources of pathogen contamination, such as human sewage, agricultural runoff, or wildlife.
- **Method Advancements:** Encourage and fund research into new and improved methodologies for pathogen detection and source tracking, including molecular techniques and rapid testing methods.
- **Data Integration:** Develop systems for integrating and analyzing data from multiple sources to provide a comprehensive picture of pathogen presence and trends.
- **Model Development:** Develop process-based and empirical models to improve our understanding of pathogen pathways and patterns and assess potential changes due to climate change or human activities.
- **Habitat Types Affected:** Coastal watersheds, embayments, and recreational water bodies.

Cooperators and Partners: Federal agencies, State agencies, Local and county governments, regional planning organizations and commissions, non-governmental organizations and community organizations, Universities and research institutions, Private sector partners

Funding Sources: Federal and state grants, Municipal budgets and bonds, Private foundation grants, Public-private partnerships

Funding Needs (range of potential costs): \$\$\$ - \$150K-\$1M

Performance measures:

- Number of new waterbodies sampled
- Number of new sampling sites
- Number of samples collected
- Number of new pathogen detection methodologies developed
- Number of pathogen sources identified

Expected Timeframe: 5-10 Years

Climate Change Stressors Addressed: (1) increasing storminess

How the action will reduce/mitigate climate change risks to the goal: Frequent and intense rainfall events are a consequence of climate change in the northeast. These events often result in large amounts of runoff entering surface waters, carrying nutrients, pathogens, and other contaminants. Consequently, many beaches proactively close when heavy rain is forecasted. This action combats increasing storminess by improving our understanding of pathogen contamination, leading to better informed beach closures.

[Goal 1: Clean Waters and Healthy Watersheds](#)

(Click link above to return to Section 2)

Objective WW 4: Toxic Contaminants

Objective Statement: Research, monitor, assess, and reduce emerging and legacy toxic contaminants to mitigate impacts on water and habitat quality in Long Island Sound.

Measure of Success: Reduce the area of impaired sediment in Long Island Sound by an additional 13 percent from the 2015 National Coastal Conditions Assessment Data baseline.

Technical Explanation: Toxic contaminants can occur in the water column and sediment of Long Island Sound and its embayments. This includes “legacy” contaminants, such as heavy metals, pesticides, polychlorinated biphenyls (PCBs), and polycyclic aromatic hydrocarbons (PAHs); as well as “emerging” contaminants, such as per- and polyfluoroalkyl substances (PFAS), pharmaceuticals and personal care products, and nanomaterials to name a few. Many legacy toxic contaminants have been addressed through the National Pollutant Discharge Elimination System (NPDES) permitting process, as well as remediation actions taken at contaminated locations throughout the watershed and voluntary participation in contaminant reduction efforts through marine trade associations and other organizations. However, residuals of legacy contaminants may continue to pose a treat due to their persistence and bioaccumulative characteristics, as well as chemical reactions that may occur in estuarine waters. Emerging contaminants are increasingly being detected in surface waters and have the potential to harm aquatic organisms at various life stages, including early development and reproduction. This objective is supported by actions to address both legacy and emerging toxic contaminants and will be measured through the sediment quality index with data provided by the National Coastal Conditions Assessment. In this case, levels of toxic contaminants in sediment are considered to be representative of reduction efforts until additional measures can be developed. NCCA data collection will continue to build the long-term record for LIS and has been expanded to the embayments in 2020 and 2021. Intensification of data collection in the embayments in expected to continue in 2025 and will contribute to the development of a multi-metric assessment tool based on macroinvertebrates. Additionally, fish tissue data/indices should be evaluated as a supporting measure.

Cost Estimate: \$\$\$\$ - \$1M-\$20M

How the Objective follows the SMARTIE structure:

Specific:

Who – Federal, state, and local governments, municipalities, Interstate agencies, non-government organizations, Academic, research, and conservation institutions, water quality monitoring organizations

What – Both toxic contaminants (ex: PCBs, heavy metals) and emerging contaminants (ex: PFAS and PAHs) from point and nonpoint sources and processes that produce and/or utilize such contaminants

When – Over 10 years, with 5-year milestones

Where – Spatially across the Long Island Sound watershed, embayments, and Long Island Sound

Why – To reduce toxic contaminants in the embayments and Long Island Sound through actions, and further sampling and analysis.

Measurable: The sediment quality index will be used as a supporting metric. Currently, LISS tracks this index as an indicator and measures the “Percent to Target”. Data is collected every five years through the National Coastal Conditions Assessment. Beginning in 2020, LISS has supported additional collection and analysis of NCCA parameters for embayments. If continued, this data may be used to develop a measure specific to the embayments.

Measurable	Measurement	Source	Frequency	Need
Sediment Quality	Sediment Quality Index	EPA National Coastal Condition Assessment, https://www.epa.gov/national-aquatic-resource-surveys/ncca	5-years	Delineation of LIS in the dashboard is needed to efficiently capture and visualize LIS data and additional data collection is needed in embayments
Action Agenda	Report (roadmap with actions and measures) for LISS partners to implement in remaining 5 years, 2030 - 2035.	LISS partners	5-years	A LISS workgroup to undertake this task and guide the objective actions to produce the action agenda.

Achievable: Several partner efforts will contribute to this objective. Both the States of CT and NY have activities underway to assess PFAS and develop mitigation actions. Federal and state governments have programs in place to address legacy toxics. Several research projects on toxic contaminants have been completed or are underway.

Relevant: This objective is relevant to the goal of restoring and maintaining water quality in LIS and its watershed and is within the influence of the LISS partnership.

Time-Bound: Over 10-years with 5-year milestones.

Inclusive: The EJ Needs Assessment found that environmental hazards and injustices disproportionately affect historically underserved and overburdened communities, including proximity to hazardous waste. This objective would improve understanding of contaminants of concern and appropriate disposal to help mitigate them as a hazardous waste issue.

Equitable: Achieving this objective will benefit communities throughout the Long Island Sound watershed. However, steps can be taken to prioritize historically underserved and overburdened communities for implementation of reduction plans through funding options like the Long Island Sound Community Impact Fund. This would ensure an equitable process towards improvements without overburdening underserved communities.

Actions to support achievement of Objective WW 4:

Action WW 4-1

Identify existing and emerging contaminants of concern (COC) and support mitigation efforts related to the identified COCs.

Action Description:

- **Data Synthesis:** Gather information and data on existing and emerging toxins to identify COCs, determine data and information gaps, and develop an action agenda.
- **Model Development:** Develop process-based and empirical models to improve our understanding of the impacts of emerging contaminants on water and habitat quality and aquatic species health.
- **Action Agenda:** Based on the findings of the data synthesis effort, prepare an action agenda that addresses data and information gaps and identifies management actions specific to the identified COCs. The action agenda will provide a framework for partners regarding further research needs, data collection, and mitigation strategies.
- **Habitat Types Affected:** Coastal and inland watersheds and receiving waterbodies, wetlands, Long Island Sound, and embayments

Cooperators and Partners: Federal agencies, State agencies, Local and county governments, regional planning organizations and commissions, non-governmental organizations and community organizations, Universities and research institutions, Private sector partners

Funding Sources: Federal and state grants, Public-private partnerships, private foundation grants

Funding Needs (range of potential costs): \$\$\$\$ - \$1M-\$20M

Performance measures:

- Synthesis report
- Action plan
- Number of mitigation plans

Expected Timeframe: 5 years

Climate Change Stressors Addressed: (1) warmer waters; (2) sea level rise; and (3) ocean acidification

How the action will reduce/mitigate climate change risks to the goal: Frequent and intense rainfall events are a consequence of climate change in the northeast. These events often result in large amounts of runoff entering surface waters, carrying nutrients, pathogens, and other contaminants. Consequently, many beaches proactively close when heavy rain is forecasted. This action combats increasing storminess by improving our understanding of pathogen contamination, leading to better informed beach closures.

Action WW 4-2

Continue collection and evaluation of contaminant data (e.g., NCCA) for LIS and the embayments.

Action Description:

- Data collection: Continue to support collection of data associated with toxic contaminants by the National Coastal Conditions Assessment (NCCA) and other programs.
- Data evaluation: Pursue evaluations of NCCA and other qualified data including toxicity data, tissue analyses, and indicator species, such as benthic macroinvertebrates.
- Assessment tools/Metrics: Develop assessment tools to track trends in ecosystem health over time using indicator species and/or fish tissue contaminants.
- Habitat Types Affected: Coastal and inland watersheds and receiving waterbodies, wetlands, Long Island Sound, and embayments

Cooperators and Partners: Federal agencies, State agencies, non-governmental organizations and community organizations, Universities and research institutions

Funding Sources: Federal and state grants, Municipal budgets and bonds, Private foundation grants, Public-private partnerships

Funding Needs (range of potential costs): \$\$\$\$ - \$1M-\$20M

Performance measures

- Sets of data collected
- Sets of data evaluated
- Number of assessment tools

Expected Timeframe: 5-10 Years

Climate Change Stressors Addressed: (1) warmer waters; (2) ocean acidification

How the action will reduce/mitigate climate change risks to the goal: Collecting and evaluating containment data will help to improve water quality and mitigate effects of climate change the LIS.

Action WW 4-3

Encourage proactive research and assessment of emerging contaminants including but not limited to Per- and Polyfluoroalkyl Substances (PFAS), 1,4-Dioxane, and Trifluoroacetic acid.

Action Description:

- Proactive research: Support research initiatives aimed at understanding sources, concentrations, and impacts of emerging contaminants before they are listed as Contaminants of Emerging Concern (CEC) by the EPA.
- Habitat Types Affected: Coastal and inland watersheds and receiving waterbodies, wetlands, Long Island Sound, and embayments

Cooperators and Partners: Federal agencies, State agencies, Public-private partnerships, Private foundation grants

Funding Sources: Federal and state grants, Public-private partnerships, Private foundation grants

Funding Needs (range of potential costs): \$\$\$ - \$150K-\$1M

Performance measures

- Sets of data collected
- Sets of data evaluated

Expected Timeframe: 5-10 Years

Climate Change Stressors Addressed: (1) warmer summers; (2) warmer winters; (3) warmer waters; (4) increasing drought; (5) ocean acidification

How the action will reduce/mitigate climate change risks to the goal: Per- and Polyfluoroalkyl Substances (PFAS), 1,4-Dioxane, and Trifluoroacetic acid are among the top containments that can drive climate change. This action aims to address Per- and Polyfluoroalkyl Substances (PFAS), 1,4-Dioxane, and Trifluoroacetic acid by proactive research and monitoring as well as understanding how these containments effect coastal and inland habitats.

[Goal 1: Clean Waters and Healthy Watersheds](#)

(Click link above to return to Section 2)

Objective WW 5: Marine Debris

Objective Statement: Achieve trash free waters by increasing clean-up efforts and preventing marine debris from entering Long Island Sound.

Measure of Success: Decrease the mass of marine debris collected per mile during the Fall international coastal cleanup by ten percent from the 2013 baseline of 475 pounds per mile.

Technical Explanation: The 2015 CCMP included a strategy to “reduce generation of marine debris and improve and increase its cleanup in Long Island Sound waters”. One outcome of this strategy was the development of the Long Island Sound Marine Debris Action Plan (2022) prepared by Connecticut and New York Sea Grant College Programs with funding from National Oceanic and Atmospheric Administration (NOAA). This plan provides a comprehensive framework of strategic actions to mitigate the impacts of marine debris on Long Island Sound, its coasts, watersheds, people, and wildlife. Marine debris is defined by NOAA as “any persistent solid material that is manufactured or processed and directly or indirectly, intentionally or unintentionally, disposed of or abandoned into the marine environment or the Great Lakes”. Marine debris originates from both land- and water-based sources, including physical debris that may be dumped, swept, or blown from vessels, directly discarded into water bodies both intentionally and unintentionally (litter; abandoned, lost, or derelict fishing/aquaculture gear), discharged through storm water, and released by imperfect waste management practices. Physical debris in Long Island Sound adversely affects habitats and organisms, causes economic losses (tourism and vessel damage), and facilitates the movement of invasive species. This objective continues progress made through implementation of the 2015 CCMP and leverages the Marine Debris Action Plan, as well as other existing programs that work towards reducing physical debris in and around Long Island Sound. Tracking meaningful progress of marine debris reductions has challenged Long Island Sound Study in the past, so part of this objective aims to establish a framework for monitoring and tracking reductions of marine debris in the Sound by 2030. Until then, pounds of debris collected per mile will be used as a proxy to estimate the amount of debris in and around LIS, and to track reductions over time. Pounds of specific debris categories collected can also be used as an indicator to track progress of this objective. By 2030, a detailed report will be created, including marine debris hot spots and a framework for tracking reductions.

Cost Estimate: \$\$\$\$ - \$1M-\$20M

How the Objective follows the SMARTIE structure:

Specific:

Who – Federal, state, and local governments, municipalities, Interstate agencies, non-government organizations, Academic, research, and conservation institutions, watershed residents

What – Physical debris including: derelict fishing gear, floatable debris, macroplastic, microplastic

When – Over 10 years, with 5-year milestones

Where – Across LIS watershed, tributaries, embayments, and Long Island Sound

Why – Reduce physical debris to enhance water quality, increase access to the Sound, and improve ecosystem health

Measurable: Pounds of debris collected per mile will be used as a metric to track the progress of this objective. The current CCMP target of decreasing pounds of debris collected per mile relative to the 2013 baseline of 475 lbs/mi is on track for 2035. Data from the Ocean Conservancy’s International Coastal Cleanup includes weight of debris collected, distance covered, and number of bags filled. Data on specific categories of debris collected is also available through this database and can serve as a supporting indicator for this objective. ([Ocean Conservancy Cleanup Data](#)) Pounds of derelict fishing gear removed from the sound can also be used as an indicator.

Measurable	Measurement	Source	Frequency	Need
Marine debris collected in and around Long Island Sound	Pounds of debris collected per mile	American Littoral Society (NY) and Save the Sound (CT)	Annual	
Framework for monitoring and tracking reductions of marine debris	Report	LISS Partnership	5-years	Tracking meaningful progress of marine debris objectives has been challenging LISS since the 2015 CCMP. Framework will identify hot spots and establish a monitoring approach to track progress.
Identified hotspots for trash collection and removal in Long Island Sound	Report	LISS Partnership	5-years	

Achievable: There are multiple efforts to reduce marine debris in LIS. NOAA’s LIS Marine Debris Action Plan is a comprehensive framework of strategic actions to mitigate the impacts of marine debris on Long Island Sound, its coasts, watersheds, people, and wildlife. The Action Plan encompasses work from 2022-2027 ([LIS Marine Debris Action Plan](#)). A variety of groups and organizations hold beach clean-ups regularly throughout the warmer months.

Relevant: This objective is relevant to the goal of restoring and maintaining water quality in LIS and its watershed since marine debris impedes water quality and degrades habitat.

Time-Bound: Over 10 years, with 5-year milestones

Inclusive: The EJ Needs Assessment identified a lack of clean and safe spaces as a barrier for historically underserved and overburdened communities using LIS and its resources. Therefore, prioritizing clean up efforts and the installation of interception technologies in areas utilized by historically underserved and overburdened communities will provide direct benefit. Reducing marine debris across the Sound and its beaches will provide clean places for all people to enjoy the resource. As such, this objective is meaningful to historically underserved and overburdened communities.

Equitable: Achieving this objective will benefit communities throughout the Long Island Sound watershed. However, steps can be taken to prioritize historically underserved and overburdened communities such as prioritizing funding for cleanup projects that would benefit historically underserved and overburdened communities.

Link to LIS Marine Debris Action Plan:

https://seagrant.uconn.edu/wp-content/uploads/sites/1985/2022/05/ACCESSIBLE-2022-Long-Island-Sound-Marine-Debris-Action-Plan_FINAL-fix.pdf

Actions to support achievement of Objective WW 5:

Action WW 5-1

Support research and monitoring efforts that aim to increase understanding of the extent of marine debris, sources of debris, and its impacts on the ecosystem.

Action Description:

- Research:
 - Identify hotspots for trash collection and removal.
 - Complete report detailing marine debris hot spots across the watershed to help focus clean-up efforts by 2030.
 - Identify and address knowledge gaps so that new consumer debris efforts can be launched.
 - Focus on microplastics and microfibers in Long Island Sound to better understand and identify informational gaps and needs.
 - Improve understanding of the impacts of consumer debris on wildlife to inform public outreach campaigns and policymakers.
 - Identify and/or inform interception technology effectiveness or alternatives.
 - Focus on consumer debris to better inform decision-makers and raise public awareness.
 - Document local knowledge regarding ghost fishing gear and species impacted by lost and abandoned fishing/ aquaculture gear.
- Monitoring:
 - Support the development of a framework for tracking marine debris reductions.
 - Incorporate data from marine debris collection, clean-up efforts, precipitation, and other sources to create a framework to track marine debris reductions by 2030.
 - Promote support for surveys using standard metrics to identify sources and types of consumer debris collected in water.
 - Promote community science programs that collect data on marine debris to better inform decision-makers and raise public awareness.
 - Engage with coastal land managers/refuges, community science programs to monitor and document the extent/types of abandoned gear on public/ managed lands and cleanup costs.
- Habitat Types Affected: Coastal and inland watersheds and receiving waterbodies, wetlands, Long Island Sound, and embayments

Cooperators and Partners: Federal agencies, State agencies, Local and county governments, regional planning organizations and commissions, Non-governmental organizations and community organizations, Universities and research institutions

Funding Sources: Federal and state grants, Public-private partnerships, Private foundation grants

Funding Needs (range of potential costs): \$\$\$ - \$150K-\$1M

Performance measures:

- Number of research projects
- Monitoring groups
- Monitoring events
- Monitoring devices deployed
- Sets of data collected
- Monitoring framework report
- Marine debris hot spot report

Expected Timeframe: 5-10 years

Climate Change Stressors Addressed: (1) warmer summers; (2) warmer winters; (3) warmer waters; (4) increasing drought; (5) increasing storminess; (6) sea level rise; and (7) ocean acidification

How the action will reduce/mitigate climate change risks to the goal: Frequent and intense rainfall events are a consequence of climate change in the northeast. These events often result in large amounts of runoff entering surface waters, carrying land-based debris. This action combats increasing storm events by enhancing our understanding of marine debris hotspots and informing mitigation efforts to reduce debris in the Sound.

Action WW 5-2

Promote the advancement and implementation of interception technologies, tools, receptacle bins, and capture devices that remove debris and support education and outreach across the Long Island Sound watershed.

Action Description:

- **Advancement:** Support the development of new and innovative interception technologies, tools, receptacle bins and capture devices.
- **Implementation:** Implement interception technologies, tools, receptacle bins and capture devices to collect data and reduce additional debris from entering the Sound.
- **Education and Outreach:** Utilize interception technologies, tools, receptacle bins, and capture devices for education and outreach focused on preventing debris from reaching the Sound.
- **Habitat Types Affected:** Coastal and inland watersheds and receiving waterbodies, wetlands, Long Island Sound, and embayments

Cooperators and Partners: Federal agencies, State agencies, Local and county governments, regional planning organizations and commissions Non-governmental organizations and community organizations, Universities and research institutions, Private Sector Partners

Funding Sources: Federal and state grants, Private foundation grants, Public-private partnerships

Funding Needs (range of potential costs): \$\$\$ - \$150K-\$1M

Performance measures:

- Pounds of marine debris prevented

Expected Timeframe: 5-10 years

Climate Change Stressors Addressed: (1) warmer summers; (2) warmer winters; (3) warmer waters; (4) increasing drought; (5) increasing storminess; (6) sea level rise; and (7) ocean acidification

How the action will reduce/mitigate climate change risks to the goal: Frequent and intense rainfall events are a consequence of climate change in the northeast. These events often result in large amounts of runoff entering surface waters, carrying land-based debris. This action combats increasing storm events by supporting the interception and capture of marine debris in tributaries that lead to Long Island Sound.

Action WW 5-3

Support the removal of marine debris located within the coastal boundary and Long Island Sound.

Action Description:

- Coastal cleanups - Support cleanup efforts around land-based litter within the coastal boundary. The Coastal Boundary is defined as the nearshore watershed by the Long Island Sound Study.
- Derelict Fishing Gear Removal – Support removal of abandoned or lost fishing gear.
- Large scale removal – Support the removal of large-scale debris, such as debris from storms, discarded vessels, etc.
- Habitat Types Affected: Coastal and inland watersheds and receiving waterbodies, wetlands, Long Island Sound, and embayments

Cooperators and Partners: Federal agencies, State agencies, Local and county governments, Regional planning organizations and commissions Non-governmental organizations and community organizations, Universities and research institutions.

Funding Sources: Federal and state grants, Private foundation grants, Public-private partnerships

Funding Needs (range of potential costs): \$\$\$ - \$150K-\$1M

Performance measures

- Pounds of marine debris removed
- Miles of clean-ups

Expected Timeframe: 5-10 years

Climate Change Stressors Addressed: (1) warmer summers; (2) warmer winters; (3) warmer waters; (4) increasing drought; (5) increasing storminess; (6) sea level rise; and (7) ocean acidification

How the action will reduce/mitigate climate change risks to the goal: Frequent and intense rainfall events are a consequence of climate change in the northeast. These events often result in large amounts of runoff entering surface waters, carrying land-based debris. This action combats increasing storm events by removing debris that reaches the Sound following storm events.

Action WW 5-4

Inform and support the development and implementation of new local, municipal and state policies, and management plans aimed at source reduction, prevention and interception practices as informed by available marine debris collection data.

Action Description:

- Policy - Support the implementation of policies that address source reduction for consumer debris such as balloons, single-use plastic straws, single-use utensils, plastic bottles, etc.
- Management Efforts - Utilize clean up data to inform management efforts in debris hot spots.
- Habitat Types Affected: Coastal and inland watersheds and receiving waterbodies, wetlands, Long Island Sound, and embayments.

Cooperators and Partners: Federal agencies, State agencies, Local and county governments, regional planning organizations and commissions Non-governmental organizations and community organizations, Universities and research institutions.

Funding Sources: Federal and state grants, Private foundation grants, Public-private partnerships

Funding Needs (range of potential costs): \$\$ - \$25K-\$150K

Performance measures:

- Number of policies or laws implemented aimed at source reduction or prevention
- Pounds of debris collected by category

Expected Timeframe: 5-10 years

Climate Change Stressors Addressed: (1) warmer summers; (2) warmer winters; (3) warmer waters; (4) increasing drought; (5) increasing storminess; (6) sea level rise; and (7) ocean acidification

How the action will reduce/mitigate climate change risks to the goal: Frequent and intense rainfall events are a consequence of climate change in the northeast. These events often result in large amounts of runoff entering surface waters, carrying land-based debris. This action combats increasing storm events by supporting the implementation of source-reduction policies.

Thriving Habitats and Abundant Wildlife: Objective/Action Narratives

[Goal 2: Thriving Habitats and Abundant Wildlife](#)

(Click link above to return to Section 2)

Objective HW 1: Coastal Habitat

Objective Statement: Protect, and enhance, and assess the extent and, health, and wildlife benefits of coastal habitats and their associated wildlife through restorative measures and monitoring to combat deterioration and loss.

Measure of Success: Restore 1,000 acres of coastal habitat in the coastal boundary of Long Island Sound.

Technical Explanation: The 1994 CCMP identified habitats and living resources for management, monitoring, research, and protection. LISS and its partners have made great strides over the last three decades to accomplish these tasks. The LISS has targeted 12 types of coastal habitats for restoration to sustain living resources and ecosystem services: Beaches & Dunes, Cliffs & Bluffs, Estuarine Embayments, Coastal & Island Forests, Freshwater Wetlands, Coastal Grasslands, Intertidal Flats, Rocky Intertidal Zones, Riverine Migratory Corridors, Submerged Aquatic Vegetation Beds, Shellfish Reefs, and Tidal Wetlands. While these restoration efforts include the 12 coastal habitat types, LISS specifically calls out the following sub-goals for eelgrass and tidal wetlands as these had specific targets from the 2015 CCMP: 1) Restore the health and acreage of tidal wetlands by 250 acres; and 2) Restore 10 acres of eelgrass. In addition to restoration, this objective also includes coastal habitat extent where LISS is prioritizing not only the restoration but also the protection and enhancement of coastal habitat. According to the [2009 - 2019 USFWS Wetlands Status and Trends Report](#), US wetland loss has increased by more than 50 percent as both natural and anthropogenic pressures are increasing (i.e., sea level rise, land development, etc.). To better understand and minimize marsh losses due to anthropogenic impacts, LISS will monitor the existing extent for land-based coastal habitat, including tidal wetlands (e.g., high and low marsh defined by vegetation type), and eelgrass.

Cost Estimate: \$\$\$\$ (\$45 million for 10 years)

How the Objective follows the SMARTIE structure:

Specific: This objective describes how the LISS aims to protect existing coastal habitat and restore 1,000 acres of coastal habitat by 2035. Coastal habitats are critical ecosystems that provide essential/irreplaceable services for people and wildlife.

Measurable: This objective is measurable because it includes the following metric: restore 1,000 acres of coastal habitat by 2035.

Measurable	Measurement	Source	Frequency	Need
Coastal Habitat Restored	Acres by habitat type	LISS Habitat Restoration Coordinators	Annual	N/A

Coastal Habitat Extent (Indicator)	Acres by habitat type	Eelgrass: USFWS/URI Aerial (Intercomparison Study) / Marsh: CTDEEP	Eelgrass: Annual / Marsh: Every 5 years (in the near term, expand to NY)	LISS to fund surveys to ensure we have sufficient data for tracking and reporting.
Wildlife: Shorebirds (Indicator)	Counts	Terns, Plovers: NYSDEC, CTDEEP / Saltmarsh Sparrow: University of Connecticut (Dr. Elphick's Lab), CT DEEP, USFWS	Annual	N/A
Wildlife: Horseshoe Crab (Indicator)	Counts	NYSDEC, CTDEEP (including Millstone Lab), Sacred Heart University (kasinakj@sacredheart.edu)	Annual	N/A

Achievable: The objective is achievable, as it has been designed, developed, and reviewed by LISS partners responsible for conducting and tracking coastal habitat restoration projects and associated metrics. The objective tracks with current program objectives and aligns with past habitat restoration achievements of approximately 100 acres restored per year.

Relevant: The objective is directly relevant to the CCMP and goals of the LISS, as “thriving habitats and abundant wildlife” is one of the goals of the 2025 CCMP. This objective will result in improved coastal habitat for wildlife and communities.

Time-Bound: This objective is timebound, as it includes “by 2035” statement, meaning that the objective aims to be achieved within a ten-year timeframe. The group collects data that can support (at least) five-year updates on progress and allows for a re-calibration period in case actions need to be modified or better aligned to achieve the objective.

Inclusive: This objective is inclusive in that during action implementation the team will work to identify, engage, and include underserved communities in enhancing coastal habitat extent and restoration. The team will work with the Informed and Engaged Public team to hold events that are inclusive of underserved communities.

Equitable: The objective is equitable in that coastal habitat restoration will provide equitable benefits to communities. Of the 1,000 acres to be restored, 40 percent is to occur in areas that are accessible to underserved communities, ensuring that the benefits of restoration can be enjoyed by those communities.

Actions to support achievement of Objective HW 1:

Action HW 1-1

Restore coastal habitat by supporting projects that implement established restoration techniques or help validate innovative techniques and include broad collaboration and communication.

Action Description:

- Utilize criteria for prioritizing coastal habitat restoration:
 - Use of established habitat restoration techniques to ensure successful project completion of one or more of the NEP's 12 priority coastal habitat types.
 - Projects that can be implemented in areas suitable for habitat migration, particularly those that may be impacted by sea level rise.
 - Projects that support [New York](#) and [Connecticut](#)'s Species of Greatest Conservation Need
 - Projects that provide benefits to and can be accessed by underserved and marginalized communities, including tribal nations.
 - Projects that seek to reduce the impact of non-native invasive species.
 - Projects that beneficially reuse suitable dredged material to restore tidal marsh elevation. In particular, utilization of the US Army Corp of Engineers' Sediment Reuse Mapping [Tool](#).
 - Projects that aim to enhance ecosystem services provided by coastal habitats (for example, restoring shellfish reefs to enhance aquaculture activities).
 - Projects that incorporate a multi-faceted approach to restore on ecosystem-level (e.g., habitat and water quality).
- Research and develop list of innovative techniques/tools to be explored for future restoration.
- Apply standardized methods to monitor restoration sites to evaluate successes of innovative techniques.
- Support collaboratives and networks to enhance restoration and protection of priority coastal habitat types.
- Collaborate with partners (e.g., Coastal Restoration and Resiliency Coalition) to implement and advance pathways to streamline permitting, share best management practices region-wide, and collaborate and communicate more efficiently with agencies and regulators.
- Support the development of models to inform restoration activities, such as:
 - Prioritize the integration of socioeconomic and resource management drivers into computational frameworks that predict ecosystem change in LIS and adjoined embayments.
 - Forecast decadal scale projections of ecosystems and their natural resources.

Cooperators and Partners: Individual private landowners, landowner associations, conservation-based NGOs (e.g., Coastal Restoration and Resiliency Collaborative Coalition (Lead: Save the Sound/The Maritime Aquarium at Norwalk), academia, and federal, state, and municipal agencies.

Funding Sources: Federal and state funds acquired through competitive grant programs; cash contributions from state and municipal governments; additional cash contributions from NGOs, and other sources, including private donations; and in-kind services provided by project cooperators and partners.

Funding Needs: Potential costs for restoration projects will range from very low (\$ - <\$25K) to very high (\$\$\$\$ - >\$20M) depending on the project scope.

Performance Measures:

- Number of coastal habitat restoration projects completed
- Coastal habitat acres restored
- Tidal wetland acres restored

- Eelgrass acres restored
- Shellfish reefs restored

Expected Timeframe: Ongoing

Climate Change Stressors Addressed: (1) warmer summers; (2) warmer winters; (3) warmer waters; (4) increasing drought; (5) increasing storminess; (6) sea level rise; and (7) ocean acidification

How the action will reduce/mitigate climate change risks to the goal: Restoring and protecting habitat, while incorporating new research and innovative techniques, will mitigate climate change impacts associated with habitat degradation and loss.

Action HW 1-2

Promote the installation of living shoreline methods for coastal habitat restoration and protection, including the conversion of existing hard-armored shorelines to a more natural condition.

Action Description:

- Communicate the benefits of and sharing knowledge about different living shoreline techniques with the public, including educating them more broadly about hard-armored shorelines and their impact (i.e., shifting risk).
- Collaborate with partners to engage private landowners in living shoreline projects.
- Evaluate developing resources for decision-makers outlining best practices for policy and permitting related to living shorelines.
- Encourage broader use of completed projects for case studies/examples to gain additional support and drive policy change.
- Incorporate standardized monitoring protocols for living shoreline projects.
- Wherever feasible, work with property owners to incorporate public shoreline accessibility improvements into living shoreline and other coastal restoration projects, either at the restoration site or nearby.

Cooperators and Partners: Individual private landowners, landowner associations, conservation-based NGOs, academia, and federal, state, and municipal agencies, too many to list here.

Funding Sources: Federal and state funds acquired through competitive grant programs; cash contributions from state and municipal governments; additional cash contributions from NGOs, and other sources, including private donations; and in-kind services provided by project cooperators and partners.

Funding Needs: Potential costs for living shoreline projects will range from high (\$\$\$ - \$150K-\$1M) to very high (\$\$\$\$ - >\$20M). Anything in the low (\$) - <\$25K) to moderate (\$\$ - \$25K-\$150K) range is unlikely for well-designed living shoreline projects.

Performance Measures:

- Number of completed living shoreline projects
- Linear feet of living shoreline constructed
- Linear feet of hardened shoreline converted to living shoreline
- Linear feet of shoreline protected by a living shoreline project
- Acres of coastal habitat protected by a living shoreline project

Expected Timeframe: Ongoing

Climate Change Stressors Addressed: (1) warmer summers; (2) warmer winters; (3) warmer waters; (4) increasing storminess; (5) sea level rise

How the action will reduce/mitigate climate change risks to the goal: Implementing living shoreline and converting hard-armored shorelines will reduce shoreline erosion and provide suitable habitat for wildlife.

Action HW 1-3

Survey, research, and monitor changes and associated causes in extent and abundance of coastal habitat types and their associated wildlife with focus on tidal wetlands and eelgrass.

Action Description:

- Create a habitat quality assessment methodology resulting in practical quality metrics including wildlife metrics.
- Develop salt marsh health monitoring metrics.
- Expand the LISS's LiDAR tidal wetland mapping efforts into NY portion of LIS and continue on a 5-year cycle.
- Continue and advance eelgrass monitoring via remote sensing and mapping and establishment of monitoring sites (i.e., SeagrassNet) on an annual basis.
- Research the impacts of warming temperatures on coastal habitats (e.g., conducting research and experiments to understand resiliency).
- Monitor Species of Greatest Conservation Need that are using these critical habitat types (i.e., before/after monitoring surveys of at-risk bird species, nekton, etc.).
- Research, model, and monitor water quality, land use, climate change, etc. conditions to better support the habitat restoration and management.

Cooperators and Partners: Individual private landowners, landowner associations, conservation-based NGOs, academia, and federal, state, and municipal agencies.

Funding Sources: Monitoring of salt marsh and eelgrass habitat at this scale will require large amounts of federal dollars, likely through the National Estuary Program. These could potentially be matched with funds from additional sources (ex, state funds, academia / research funds). Annual eelgrass monitoring surveys are recommended for LISS Base Funding.

Funding Needs: Potential costs for monitoring at this scale will range from high (\$\$\$ - \$150K-\$1M) to very high (\$\$\$\$ - >\$1M), especially for Sound-wide tidal marsh LiDAR surveys. The low (\$) - <\$25K) to moderate (\$\$ - \$25K-\$150K) ranges of funding would be more-suitable for post-construction monitoring of individual habitat restoration and living shoreline projects.

Performance Measures:

- Annual eelgrass extent mapped on an annual basis
- Map of high, low, and upland tidal marsh habitat extent produced on a 5-year cycle
- Number of monitoring sites

Expected Timeframe: Ongoing

Climate Change Stressors Addressed: (1) warmer summers; (2) warmer winters; (3) warmer waters; (4) increasing drought; (5) increasing storminess; (6) sea level rise; and (7) ocean acidification

How the action will reduce/mitigate climate change risks to the goal: Monitoring and researching the impacts of climate change on eelgrass and tidal wetland extent and health will inform and strengthen restoration and protection efforts.

[Goal 2: Thriving Habitats and Abundant Wildlife](#)

(Click link above to return to Section 2)

Objective HW 2: Offshore Habitat

Objective Statement: Protect and enhance the health of offshore habitat and their associated species.

Measure of Success: Support and implement 25 restoration and management projects focused on seafloor habitat mapping, data collection, and species assessments.

Technical Explanation: The diverse biota of offshore habitat, like sponges and cold-water corals, are incredibly valuable in which many key recreational and commercial fishery species rely upon. A 2004 settlement between New York and Connecticut, two power companies and a cable company, provided \$6 million of funding to enhance the health of waters and associated resources of the Sound’s seafloor. Since then, the Long Island Sound Seafloor Habitat Mapping Initiative was developed to complete mapping of the entire seafloor including better understanding the ecological characterization, biodiversity, and threats (e.g., invasives, adverse impacts from electric transmission cable placement). This Initiative enables LISS to better protect the species that make up these critical ecosystems to preserve biodiversity. This objective will continue to progress this initiative by supporting and implementing 25 projects that focus on offshore habitat (e.g., beyond 10-foot contour depth at Mean Low Lower Water) management and restoration by 2035. For example, LISS will utilize the seafloor mapping data and other partner data to emphasize the future protection and enhancement of the health of offshore fragile habitats. Furthermore, LISS will support and encourage partners to preserve biodiversity of habitat and wildlife through the implementation of the regional plans, like the Long Island Sound Blue Plan and New York Ocean Action Plan, designation of protected areas and buffer zones (e.g., CT NERR), and implementation of federal, interstate, and state species management plans.

Cost Estimate: \$\$\$\$ (\$25 million for 10 years)

How the Objective follows the SMARTIE structure:

Specific: This objective describes how the LISS aims to protect and enhance the health of the offshore habitats of the Sound by 2035. The offshore habitats of the open Sound provide vital resources to maintain high biodiversity.

Measurable: This objective is measurable because it includes the following metric: 25 projects implemented to support the management and restoration of offshore habitat.

Measurable	Measurement	Source	Frequency	Need
Number of projects supported by LISS	Projects	LISS Tracking and Reporting Tool	Annual	LISS to support projects related to the management and restoration of offshore habitat.

Fragile Habitats (Sponge, Cold Water Corals) (Indicator)	Acres by habitat type	CT DEEP	Full characterization by 2035	LISS to support the completion of the full characterization.
Fish (Forage Fish, Finfish, Invertebrate Biomass, Game Fish) (Indicator)	Counts	CT DEEP Trawl Survey	Annual	N/A

Achievable: The objective is achievable, as it has been designed, developed, and reviewed by LISS partners responsible for leading the seafloor mapping initiative.

Relevant: The objective is directly relevant to the CCMP and goals of the LISS, as “thriving habitats and abundant wildlife” is one of the goals of the 2025 CCMP. This objective will result in enhance offshore habitat for wildlife and communities.

Time-Bound: This objective is timebound, as it includes “by 2035” statement, meaning that the objective aims to be achieved within a ten-year timeframe. The group collects data that can support (at least) five-year updates on progress and allows for a re-calibration period in case actions need to be modified or better aligned to achieve the objective.

Inclusive: This objective is inclusive in that the team will work to make the seafloor data accessible to broader audiences (i.e., Long Island Sound School Network, fishing community, public, etc.) by developing educational tools and signage to meaningfully educate and engage stakeholders. Additionally, the team will work with the Informed and Engaged Public to ensure resources (i.e., public access sites for fishing) are accessible.

Equitable: The objective is equitable in that LISS will prioritize data accessibility to underserved stakeholders and communities who may depend upon resources (i.e., sustenance, livelihood, etc.) and who may not have current public access to appreciate the benefits of the open Sound. Additionally, in future phases of offshore habitat related projects (i.e., seafloor mapping, Long Island Sound Blue Plan, NY Ocean Action Plan), LISS will prioritize the involvement and input of underserved stakeholders to guide the development of products and tools.

Actions to support achievement of Objective HW 2:

Action HW 2-1

Promote science-based marine spatial planning that balances human uses and protects ecosystem functions of offshore habitat and species and is considerate of the existing natural, social, cultural, historic, and economic characteristics of Long Island Sound.

Action Description:

- Support benthic studies to help identify areas unsuitable for underwater or buried cable placement.
- Support pelagic and demersal population studies that address spatial and seasonal distribution within offshore habitats.
- Use data collected to inform regulatory decision-making for the protection of offshore habitats, including forage species and other wildlife, and nonnative species management.

Cooperators and Partners: CTDEEP, NYSDEC, CT & NY Sea Grant offices, CT NERR

Funding Sources: a combination of federal and state funds acquired through competitive grant programs

Funding Needs: \$\$\$\$ - >\$1M (Each project is between \$1M and \$2.5M)

Performance measures:

- Number of offshore fisheries and seafloor habitat studies supported and completed and applied to regulatory decision-making
- Number of management plans/programs implemented
- Number of management plans/programs updated

Expected Timeframe: Ongoing

Climate Change Stressors Addressed: (1) warmer summers; (2) warmer winters; (3) warmer waters; (4) ocean acidification

How the action will reduce/mitigate climate change risks to the goal: Implementing and updating management plans and programs to protect offshore habitat will mitigate climate change impacts on marine wildlife.

Action HW 2-2

Support the LIS Seafloor Habitat Mapping Initiative and apply data collected to refine and expand upon other initiatives supporting coastal and marine spatial planning and designation of protected areas and buffer zones.

Action Description:

- Complete seafloor mapping of the entire LIS by 2035.
- Refine and expand the geospatial data products supporting coastal and marine spatial planning and decision-making.
- Monitor changes in seafloor habitat and communities including long-term (e.g., decadal) shifts in benthic species, such as *Mytilus edulis*, *Crepidula* spp, and *Haliclona* spp.

Cooperators and Partners: CTDEEP, NYSDEC, LISCF, NYDOS, NYSERDA, NOAA NCCOS, LIS Mapping and Research Collaborative, Columbia University Lamont-Doherty Earth Observatory, SBU SoMAS

Funding Sources: a combination of federal and state funds acquired through competitive grant programs

Funding Needs: \$\$\$\$ - >\$1M (Each project is between \$100K and \$2.5M)

Performance measures:

- Acres of seafloor habitat areas fully characterized
- Number of sites monitored

Expected Timeframe: Ongoing

Climate Change Stressors Addressed: (1) warmer summers; (2) warmer winters; (3) warmer waters; (4) ocean acidification

How the action will reduce/mitigate climate change risks to the goal: Mapping the seafloor will better understanding of offshore habitat and community shifts influenced by climate change and therefore support future management and planning efforts to mitigate impacts.

Action HW 2-3

Promote stewardship and restoration of offshore habitat in the Sound by supporting the development and implementation of action plans and programs that incorporate meaningful community science, engagement, and participation.

Action Description:

- Support the implementation of action plans and programs that provide strategic actions to address impacts to Long Island Sound offshore habitat (e.g., lobster trap and other fishing equipment removal).
- Reduce adverse impacts to Long Island Sound by communicating the importance of preventative and mitigating actions and collaborating on solutions.

Cooperators and Partners: federal, state, and municipal agencies, NGOs including Save the Sound, CT & NY Audubon Society, Harbor Watch, The Maritime Aquarium Project Oceanology, and SoundWaters

Funding Sources: a combination of federal and state funds acquired through competitive grant programs, NGOs, and other sources, including in-kind services provided by project cooperators and partners

Funding Needs: \$\$\$ - \$150K-\$1M

Performance measures:

- Number of action plans/programs developed
- Number of action plans/programs implemented

Expected Timeframe: Ongoing

Climate Change Stressors Addressed: (1) warmer summers; (2) warmer winters; (3) warmer waters; and (4) ocean acidification

How the action will reduce/mitigate climate change risks to the goal: Restoring offshore habitat, while incorporating stewardship and education activities to promote protection, will mitigate climate change impacts on habitat and marine wildlife.

[Goal 2: Thriving Habitats and Abundant Wildlife](#)

(Click link above to return to Section 2)

Objective HW 3: Habitat Connectivity

Objective Statement: Increase connectivity of coastal habitat to enhance biodiversity and support migratory pathways.

Measure of Success: Restore and/or protect 100 habitat patches; Reconnect 175 miles of riverine migratory corridors in the Connecticut and New York portions of the watershed.

Technical Explanation: Habitat connectivity is a critical component of fish and wildlife conservation. When habitat patches (i.e., discrete habitat areas that are isolated) are connected, fish and wildlife can freely move for day to day needs such as feeding, breeding, and resting, or for migration. Since the identification of the 12 coastal habitat types for restoration to sustain living resources and ecosystem services in the 1994 CCMP, more than 2,100 acres of habitat have been restored, over 8,000 acres of land have been protected from development, and 400 river miles have been reconnected. However, much still needs to be done to improve and protect the species and habitats found within and around Long Island Sound. Priority sites for habitat connectivity need to be selected and the cross-cutting variable of connectivity needs to be quantified by identifying and evaluating possible options for tracking habitat connectivity improvements within Long Island Sound. More specifically, priority sites may focus on opportunities to reconnect stream miles, through the removal of barriers (i.e., dams, culverts) in the New York and Connecticut portions of the watershed. Additionally, while barrier removal may be challenging in some areas due to restrictions, another approach is to restore or enhance the health of the streams (i.e., fish ladders). LISS specifically calls out the following sub-goals for habitat connectivity: Remove 100 barriers (dams and culverts combined) to reconnect stream miles in the New York and Connecticut portions of the watershed.

Cost Estimate: \$\$\$ (~\$5 million)

How the Objective follows the SMARTIE structure:

Specific: This objective describes how the LISS aims to protect and increase the connectivity of coastal and riverine habitat, including habitat patches and riverine migratory corridors. More specifically, projects will be prioritized in the LIS coastal boundary for habitat patches, and all of NY and CT for miles reconnected.

Measurable: This objective is measurable because it includes the following metric: restore and/or protect 100 habitat patches; reconnecting 175 miles of riverine migratory corridors in the CT and NY portions of the watershed by 2035.

Measurable	Measurement	Source	Frequency	Need
Habitat Patches Restored	TBD	LISS Habitat Restoration Coordinators	TBD	N/A
Stream Miles Reconnected	Miles	LISS Habitat Restoration Coordinators	Annual	N/A

Barrier Removals (Indicator)	Counts	LISS Habitat Restoration Coordinators (American Rivers for dam, LISFF)	Annual	N/A
Wildlife: Anadromous Fish (Indicator)	Counts	CT DEEP	Annual	N/A

Achievable: The objective is achievable, as it has been designed, developed, and reviewed by LISS partners responsible for conducting and tracking habitat connectivity and restoration projects and associated metrics. The objective tracks with current program objectives and aligns with past habitat restoration achievements of approximately 10 habitat patches restored/protected, 17.5 miles reconnected, and 10 barriers removed per year.

Relevant: The objective is directly relevant to the CCMP and goals of the LISS, as “thriving habitats and abundant wildlife” is one of the goals of the 2025 CCMP. This objective will result in improved habitat connectivity for wildlife.

Time-Bound: This objective is timebound, as it includes “by 2035” statement, meaning that the objective aims to be achieved within a ten-year timeframe. The group collects data that can support (at least) five-year updates on progress and allows for a re-calibration period in case actions need to be modified or better aligned to achieve the objective.

Inclusive: This objective is inclusive in that during action implementation the team will work to identify, engage, and include underserved communities in the planning and implementation habitat connectivity projects. The team will utilize a map of EJ communities to prioritize areas for work.

Equitable: The objective is equitable in that habitat connectivity will provide equitable benefits to communities, including dam removal and stream restoration for improved benefits for fishing and accessibility, including benefits downstream for underserved communities. Of the 175 additional miles of riverine migratory corridors, 50 percent of the miles will occur in locations accessible to underserved communities.

Actions to support achievement of the Objective HW 3:

Action HW 3-1

Implement remote sensing, mapping tools, modeling, and field verification to target restoration and protection of habitat patches and river miles to maintain and enhance connectivity.

Action Description:

- Invest in remote sensing, mapping tools, modeling, and field verification to help identify potential high priority restoration and protection sites.
- Through use of remote sensing, mapping tools, modeling, and field verification, advance our understanding about climate change impacts on priority aquatic and terrestrial habitats.
- Plan and implement projects, like land acquisition, to prepare for habitat migration due to sea level rise.
- Support the implementation of already existing standardized road stream crossing protocols.
- Complete the habitat connectivity model (funded in FY2020) for New York and Connecticut to target priority areas for reconnecting isolated habitat patches and river miles and protecting land most ideal for habitat migration.
- Support completion of road stream crossing assessments, land acquisition, and the planning of Phase 2 for habitat connectivity modeling.

Cooperators and Partners: LISS HRSWG, NYSDEC, CT DEEP, USFWS

Funding Sources: LISS program funds, USFWS, NOAA

Funding Needs: \$\$\$ - \$150K-\$1M / project

Performance measures:

- Number of projects focused on data collection/analysis
- Review of next modeling phase
- Publicly available list of priority areas for habitat connectivity
- Number of road stream crossings assessed

Expected Timeframe: Ongoing

Climate Change Stressors Addressed: (1) warmer summers; (2) warmer winters; (3) warmer waters; (4) increasing drought; (5) increasing storminess; (6) sea level rise

How the action will reduce/mitigate climate change risks to the goal: Monitoring and modeling will advance our understanding of climate change impacts on habitat patches and rivers miles to enhance habitat connectivity.

Action HW 3-2

Complete stream barrier removal projects (i.e., dams or culverts) that result in full restoration of fish and wildlife migration, sediment transport, and other stream functions.

Action Description:

- Complete barrier removal and fish passage restoration projects which may include partial barrier removal, targeting watershed-specific diadromous species. Stream barrier removal is defined as dam removal or culvert modification (i.e., right-sizing / replacement, etc.)
 - Consider implementation of partial-passage structures such as fish ladders and fish lifts when stream barrier removal is not an option. Stream miles reconnected via fish ladder will still count toward LISS numerical targets. Eel passage structures have a prioritization all their own, but stream miles are not counted.
 - Dam condition is important to consider the dam condition when fish ladder projects are proposed. Repairs that are not necessary for fish ladder installation are the sole responsibility of the dam owner.
 - Fish ladders are not complete restoration and therefore, are low priority (in general). These will only be considered after a feasibility study is unable to identify a better, complete removal option.
- Target and seek to address additional barriers (e.g., migratory), including thermal barriers, velocity barriers, invasive species, excessive debris floating downstream, and anything that could hinder the natural migration of diadromous species.
 - Promote additional stream functions and projects that will enhance fish passage, including water quality improvements, reduction of invasive species populations, improved stream flow, riparian buffers, woody debris, rock riffles, and other habitat features, and the repair and maintenance of existing fish passage devices.

Cooperators and Partners: Individual private landowners, landowner associations, conservation-based NGOs, academia, and federal, state, and municipal agencies, too many to list here.

Funding Sources: A combination of federal and state funds acquired through competitive grant programs, state and municipal governments, NGOs, and other sources, including mitigation funds and in-kind services provided by project cooperators and partners.

Funding Needs: Potential costs for restoration projects will range from very low (\$ - <\$25K) to very high (\$\$\$\$ - >\$1M) depending on the project scope.

Performance Measures:

- Stream miles reconnected
- Number of dams removed
- Number of culverts modified
- Number of fish ladders & fish lifts installed
- Number of eel passes installed
- Number of projects designed/planned - recognizing these projects take a long time

Expected Timeframe: Ongoing

Climate Change Stressors Addressed: (1) warmer summers; (2) warmer winters; (3) warmer waters; (4) increasing drought; (5) increasing storminess; (6) sea level rise

How the action will reduce/mitigate climate change risks to the goal: Restoring and reconnecting streams will mitigate climate change impacts associated with habitat degradation and loss.

Action HW 3-3

Promote regional collaborations to support development of streamlined permitting pathways to build regional capacity for habitat restoration.

Action Description (identify key activities to implement the action, including affected habitat types):

- Increase collaboration and communication among restoration managers and practitioners in all levels of government.
- Support the development of a pathway to streamline permitting for stream and river restoration projects. The River Restoration Network has already developed 11 collaborative pathways for cross-sector work to advance stream barrier removal.
- Collaborate with partners (e.g., River Restoration Network) to implement and advance these identified pathways to streamline permitting, share best management practices region-wide, and collaborate and communicate more efficiently with agencies and regulators.
- Form state-specific/regional work groups to address key issues (i.e., culverts, sediment management).
- Develop guidance (e.g., flow chart) documenting the steps and estimated timeline of the permitting process.
- Update or revise sediment management guidelines specific to dam removal projects.

Cooperators and Partners: LIS River Restoration Network, CT NERR

Funding Sources: LISS program funds, NRCS Environmental Quality Incentives Program, USFWS, Audubon Connecticut's In Lieu Fee Program

Funding Needs (range of potential costs): \$\$\$ - \$150K-\$1M

Performance measures:

- Number of projects permitted
- Guidance documenting permitting process steps

Expected Timeframe: Ongoing

Climate Change Stressors Addressed: (1) warmer summers; (2) warmer winters; (3) warmer waters; (4) increasing drought; (5) increasing storminess; (6) sea level rise

How the action will reduce/mitigate climate change risks to the goal: Promoting collaboration, specifically to streamline permitting, will increase habitat restoration activities and thereby mitigate climate change impacts.

[Goal 2: Thriving Habitats and Abundant Wildlife](#)

(Click link above to return to Section 2)

Objective HW 4: Conserved Open Space

Objective Statement: Conserve open space through land acquisition while maintaining and enhancing the total area of protected land.

Measure of Success: Conserve 5,000 acres of open space in the coastal boundary of Long Island Sound.

Technical Explanation: Conserving open space preserves natural and undeveloped areas is important in maintaining a vital ecosystem and/or providing natural resource-based recreational opportunities. Additionally, conserving open space has indirect benefits to improving water quality and quantity. The conservation of open spaces also promotes increasing opportunities for habitat connectivity (e.g., farmland protections). Since 2006, more than 8,100 acres have been protected mainly in the form of land acquisition. While LISS plans to continue to increase acreage in land acquisitions, there are also opportunities to increase acreage through easements throughout the watershed. Additionally, it is important to note that open space loss (i.e., from land development, sea level rise) may also be a factor in this objective, and therefore it is also critical to maintain what is already acquired. LISS also strives to equitably protect high-priority coastal habitat from development through property acquisition and other means, support sustainable use of these properties, without discouraging wildlife use, and create a registry of protected areas in Connecticut and New York, which encompasses both existing protected properties and future acquisitions.

Cost Estimate: \$\$\$\$

How the Objective follows the SMARTIE structure:

Specific: This objective describes how the LISS aims to conserve existing open space and acquire 5,000 acres of open space in the coastal boundary by 2035. Protecting open space preserves natural and undeveloped areas for the purpose of maintaining a vital ecosystem and/or providing natural resource-based recreational opportunities.

Measurable: This objective is measurable because it includes the following metric: conserve 5,000 acres of open space by 2035.

Measurable	Measurement	Source	Frequency	Need
Land Acquisition	Acres Protected	LISS Habitat Restoration Coordinators	Annual	N/A

Achievable: The objective is achievable, as it has been designed, developed, and reviewed by LISS partners responsible for conducting and tracking land acquisition projects and associated metrics. The objective tracks with current program objectives and aligns with past habitat restoration achievements of approximately 500 acres conserved per year.

Relevant: The objective is directly relevant to the CCMP and goals of the LISS, as “thriving habitats and abundant wildlife” is one of the goals of the 2025 CCMP. This objective will result in increased open space habitat for wildlife and communities.

Time-Bound: This objective is timebound, as it includes “by 2035” statement, meaning that the objective aims to be achieved within a ten-year timeframe. The group collects data that can support (at least) five-year updates on progress and allows for a re-calibration period in case actions need to be modified or better aligned to achieve the objective.

Inclusive: This objective is inclusive in that during acquisition, the team will prioritize to identify, engage, and include underserved communities in conserving open space. The team will work with the Informed and Engaged Public to better define access, hold events for the public, and meaningfully engage with students (e.g., Long Island Sound Schools Network) that are inclusive of underserved communities.

Equitable: The objective is equitable in that open space conservation will provide equitable benefits to communities. Of the 5,000 acres to be restored, at least 40 percent is to occur in areas that are accessible to underserved communities ensuring that the benefits of conservation can be enjoyed by those communities. Additionally, LISS will prioritize to increase or create access to acquired land.

Actions to support achievement of the Objective HW 4:

Action HW 4-1

Protect high-priority coastal habitat from development through implementation of land conservation plans that identify priorities for equitable conservation, management, and investment.

Action Description:

- Target, acquire, and manage high-priority conservation properties to minimize negative coastal development in the future. High-priority properties include those abutting important natural resources and existing conservation areas, benefitting underserved communities and/or have not historically benefited from land management investments, and lands that can accommodate climate change and sea level rise (e.g., habitat migration).
- Create a complete and accurate registry of protected conservation land in Connecticut and New York, which encompasses both existing protected properties and future acquisitions and conservation easements.
- Use New York and Connecticut's state-developed prioritization criteria to guide equitable investments and best management practices that limit human disturbance and protect functions availability of coastal and marine habitats for Species of Greatest Conservation Need.
- Use the underway habitat connectivity model to identify and prioritize land conservation.

Cooperators and Partners: CT DEEP, NYSDEC, municipalities within LISS coastal area, USFWS, NRCS, and various other land trusts and NGOs.

Funding Sources: Various federal and state funding sources, NRCS Farm and Ranchlands Protection Program, USFWS, Audubon Connecticut's In Lieu Fee Program, Audubon IBA Small Matching Grants Program, Great American Outdoors Act, and possibly through private donations.

Funding Needs: Land acquisition can range from very low (\$ - <\$25K) to very high (\$\$\$\$ - >\$1M) depending on the project scope.

Performance measures:

- Degree of completion of inventory database (registry) of protected conservation land and future acquisitions.
- Number of parcels and acres acquired.

Expected Timeframe: Ongoing

Climate Change Stressors Addressed: (1) warmer summers; (2) warmer winters; (3) warmer waters; (4) increasing drought; (5) increasing storminess; (6) sea level rise

How the action will reduce/mitigate climate change risks to the goal: Acquiring land and implementing conservation plans to protect habitat will mitigate climate change impacts associated with habitat degradation and loss.

Action HW 4-2

Increase equitable access and enhance sustainable stewardship of conserved lands particularly for historically underserved and overburdened communities.

Action Description:

- Support increasing equitable access and enhancing stewardship of conserved lands. Prioritize existing acquired land that are in or near underserved communities.
- Increase access to protected sites and maintain and manage existing open space to ensure its pristine condition.
- Support the management of the Stewardship Sites which represent essential, rare habitat found throughout Long Island Sound that support a diversity of plant and wildlife species, open space for people to enjoy, and outdoor laboratories for research.
- Develop a Stewardship Strategy to better connect and support education and management activities the 33 Stewardship Sites in Long Island Sound and explore the possibility of adding more sites to the Initiative.
- Support co-development and co-management of sites with the local communities, and tribal nations where possible, to ensure early engagement, provide financial and/or technical assistance, and amplify meaningful stewardship activities.

Cooperators and Partners: CT DEEP, NYSDEC, local municipalities, tribal nations, Stewardship Site managers

Funding Sources: LISS program funding, CT DEEP, NYSDEC

Funding Needs: \$\$\$ - \$150K-\$1M per site

Performance measures:

- Number of equitable public access sites added
- Number of sites maintained
- Number of Stewardship Sites added
- Development of a Stewardship Strategy

Expected Timeframe: Ongoing

Climate Change Stressors Addressed: (1) warmer summers; (2) warmer winters; (3) warmer waters; (4) increasing drought; (5) increasing storminess; (6) sea level rise

How the action will reduce/mitigate climate change risks to the goal: Increasing and enhancing access and stewardship activities to promote protection will mitigate climate change impacts on habitat and wildlife.

Sustainable and Resilient Communities: Objective/Action Narratives

Goal 3: Sustainable and Resilient Communities

(Click link above to return to Section 2)

Objective SRC 1: Informed Decision-Makers

Objective Statement: Grow the number of municipal, nonprofit, and community leaders receiving training and support to increase capacity for adaptation to environmental challenges.

Measure of Success: Engage 100 new participants through LISS trainings and resources every year.

Technical Explanation: Findings from a 2022 informal needs assessment conducted by the LISS SRC EPs showed that policy makers, resource managers, environmental professionals, and other stakeholders in coastal Long Island Sound communities need support to make decisions that will increase resilience of communities and improve management of Long Island Sound. Training and education programs targeted to their needs will help build capacity, provide technical guidance, and lay the foundation for a better-coordinated regional response to climate change and other environmental challenges. Interest in recent LISS-funded tools like the LIS Resilience Resource Hub and attendance at SRC organized trainings and events in 2023 and 2024 show an appetite for guidance and coordination opportunities that are tailored to local needs and offered in various formats.

Cost Estimate: \$\$\$\$: ~\$15M (\$500K LISS SRC Funds + \$1M partner funds each year x 10)

How the Objective follows the SMARTIE structure:

Specific: This objective is based on coordinating and providing training, tools, and support to community decision-makers in order to build capacity and enable a better regionally coordinated response to climate impacts and other environmental challenges.

Measurable:

Measurable	Measurement	Source	Frequency	Need
Number of municipal, nonprofit, and community leaders that receive training	Elected officials, municipal staff and committee members, nonprofit leaders, civic group or other community leaders, tribal leaders, consultants, and engineering firms reached by SRC or partner-led trainings.	SRC EPs, LISS Partners, LIS Futures Fund	Annual	N/A
New municipal, nonprofit, and community leaders engaged	Elected officials, municipal staff and committee members, nonprofit leaders, civic group or	SRC EPs, LISS Partners, LIS Futures	Annual	N/A

	other community leaders, tribal leaders, consultants, and engineering firms reached who haven't previously attended SRC offerings.	Fund		
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Achievable: Achieving this objective is a key part of the SRC Team's work. It is also applicable to other LISS partners. We are aiming for an average of 100 new participants engaging for the first time every year.

Relevant: Trained community decision-makers is one of the five outcomes of the SRC Workplan. See SRC Work Plan/SRC Needs Assessment.

Time-Bound: Measured annually.

Inclusive: Training and support will be available for all communities throughout the coastal boundary and any relevant materials, including presentations, recordings, etc. will be widely distributed.

Equitable: Training and support programs developed by the SRC Team and LISS partners will be reflective of stakeholder needs, with a particular focus on needs heard from underserved communities.

Actions to support achievement of the Objective SRC 1:

Action SRC 1-1

Develop, deliver, and/or facilitate training programs relevant and responsive to community needs that assist with sustainability and resilience.

Action Description: Regular training is necessary to ensure that policy makers, environmental professionals, and community decision-makers have the best available information to make decisions that will improve the health and management of Long Island Sound. Training programs should be responsive to community needs identified through the work of the LISS partnership, such as the [SRC Needs Assessment](#), [Environmental Justice Needs Assessment](#), or other relevant assessments/evaluations.

Activities in support of this action could include trainings on topics such as:

- Understanding and using technical tools that illustrate and assess the effects of sea level rise, storm surge, and other climate impacts;
- Resilience planning basics;
- Identifying resilience priorities;
- Communicating effectively;
- Navigating grants and funding mechanisms;
- Updating municipal codes;
- Sharing success stories and lessons learned;
- Innovative applications of nature-based solutions;
- Education on topical issues;
- Ecosystem service valuation.

Collaborations with State and other entities to develop and deliver training programs are encouraged. Consideration should be given to the format and delivery of training programs to ensure they are accessible to all communities, and to incentivize participation, for example through continuing education credits or transportation support.

Cooperators and Partners: CT/NY Sea Grant, Federal and State Agencies, State Climate Certification Programs, LISCIF, Nonprofit Partners, Academia, Local Governments, Tribal nations

Funding Sources: Federal, state, and local funds/grants, Private funds/grants

Funding Needs (range of potential costs): \$\$\$\$ - \$1M-\$20M

Performance measures:

- Unique trainings and event developed
- Number of municipal, nonprofit, and community leaders that receive training
- New municipal, nonprofit, and community leaders engaged

Expected Timeframe: Ongoing

Climate Change Stressors Addressed: (1) warmer summers; (2) warmer winters; (3) warmer waters; (4) increasing drought; (5) increasing storminess; (6) sea level rise; and (7) ocean acidification

How the action will reduce/mitigate climate change risks to the goal: This action will provide training programs to communities to ensure they have the best available information on climate risks and how to address and plan for these climate risks.

Action SRC 1-2

Develop or modify tools and support research and monitoring to help communities assess the effects of a changing climate and advance resilience.

Action Description: Accessible and user-friendly tools and resources that illustrate and assess the effects of a changing climate are essential to empower communities to understand, plan, and respond to environmental challenges. In recent years, there has been a focus on the development of technical tools on topics such as sea level rise, flooding, storm surge, habitat extent/changes, land use, and increased vulnerability of communities and infrastructure; however, there is a need to improve the impact and usability of these tools. The aim of this action is to promote the creation and use of tools and resources tailored to help LIS stakeholders make informed decisions regarding such challenges.

Activities in support of this action could include promotion, development, or improvement of Long Island Sound-focused tools and resources and conducting research and monitoring to assess the effects of a changing climate. Tools should be co-developed with communities to ensure they are relevant, accessible, and adaptive to community needs. The Long Island Sound Resilience Resource Hub will be kept up to date with available tools and resources.

Cooperators and Partners: CT/NY Sea Grant, Federal and State Agencies, State Climate Certification Programs, LISCIF, Nonprofit Partners, Academia, Local Governments, Community Groups/Organizations, Tribal Nations

Funding Sources: Federal, state, and local funds/grants, Private funds/grants

Funding Needs (range of potential costs): \$\$\$\$ - \$1M-\$20M

Performance measures:

- Resources developed and modified/improved

Expected Timeframe: Ongoing.

Climate Change Stressors Addressed: (1) warmer summers; (2) warmer winters; (3) warmer waters; (4) increasing drought; (5) increasing storminess; (6) sea level rise; and (7) ocean acidification

How the action will reduce/mitigate climate change risks to the goal: This action will ensure communities have the tools related to climate risks and associated impacts, such as flood risk models, to help them understand, plan, and respond to these climate risks.

Goal 3: Sustainable and Resilient Communities

(Click link above to return to Section 2)

Objective SRC 2: Community-Driven Resilience Planning

Objective Statement: Increase the number of municipalities that identify key resilience priorities through local and/or regional community-driven planning processes.

Measure of Success: All 135 municipalities within the LISS coastal boundary identify key resilience priorities.

Technical Explanation: Communities striving for sustainability and resilience should work from agreed-upon local or regional plans to strategically advance priorities. Ideally these plans will identify potential threats to key structures and functions within communities, understand the interconnection between a community’s economy, society, and ecology, and prioritize key resilience strategies and solutions. Development of plans should prioritize vulnerable communities and ensure that stakeholders are equitably convened and included in each step. Resilience plans/priorities should be reviewed at least every 10 years and updated as appropriate (28 were updated as of January 2023). While resilience planning is encouraged through the entire watershed, this objective will only track plans throughout the coastal boundary for capacity reasons.

Cost Estimate: \$\$\$\$\$: >\$20M (Average of \$100K per plan x 135 = \$13.5M, \$5M for coordination, \$5M for additional engagement)

How the Objective follows the SMARTIE structure:

Specific: This objective is focused on resilience planning in the coastal boundary of the LISS watershed. There are 77 coastal municipalities in NY and 58 in CT.

Measurable:

Measurable	Measurement	Source	Frequency	Need
# of municipalities that have identified resilience/climate adaptation priorities through a standalone plan, as a major component of other municipal plans, or are covered by a regional plan	Standalone climate vulnerability assessment and adaptation plan, standalone sustainability/resilience plan, or resilience priorities have been identified as a major component of another municipal plan or through a regional plan. Hazard mitigation plans and plans or priorities that are more than 10 years old and are not actively being reviewed and updated do	SRC EPs, State Climate Certification Programs	Annual	N/A

	not count toward this tracking.			
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Achievable: Achieving this objective is a key part of the SRC Work Group’s Work Plan. While resilience planning is encouraged through the entire watershed, this objective will only track plans throughout the coastal boundary for capacity reasons.

Relevant: See [SRC Work Group Work Plan/SRC Needs Assessment](#).

Time-Bound: By 2035, measured annually.

Inclusive: The development of resilience plans or priorities should include opportunities for community input from all stakeholders.

Equitable: Impacts and benefits to EJ communities should be considered during planning.

Actions to support achievement of Objective SRC 2:

Action SRC 2-1

Develop climate resilience plans, including the incorporation of climate-resilient strategies into existing municipal, regional, or watershed plans.

Action Description: Resilience planning is a critical process for communities to undertake in order to identify potential threats and hazards and strategize about the most effective ways to mitigate risks and adapt to a changing climate. Activities in support of this action include:

- Developing new climate resilience plans or updating existing plans to include climate resilience strategies.
- Increasing awareness about existing technical and financial resources available to Long Island Sound communities for resilience planning.
- Developing resilience plan templates and sharing examples of plans from Sound communities.
- Continuing to support community-driven planning through the Long Island Sound Resilience Planning Support Program and other similar programs.
- Working with the States, funding agencies, and other partners to build and implement programs that incentivize municipalities to develop climate resilience plans.

Cooperators and Partners: CT/NY Sea Grant, State Agencies, State Climate Certification Programs, Local Governments, Nonprofit Partners, Academia, Tribal Nations

Funding Sources: Federal, state, and local funds/grants, Private funds/grants

Funding Needs (range of potential costs): \$\$\$\$ - \$1-20M

Performance measures:

- Number of new or updated plans

Expected Timeframe: Ongoing

Climate Change Stressors Addressed: (1) warmer summers; (2) warmer winters; (3) warmer waters; (4) increasing drought; (5) increasing storminess; (6) sea level rise; and (7) ocean acidification

How the action will reduce/mitigate climate change risks to the goal: Creating plans to address these climate stressors/risks will allow communities to be proactive and act quickly when faced with environmental challenges exacerbated by climate change, such as strong storms.

Action SRC 2-2

Coordinate across municipal boundaries to advance collective resilience priorities.

Action Description: To establish and achieve resilience goals at the regional level, collaborative planning across political boundaries and involving stakeholders across broad geographical areas is necessary. Regional planning has the potential to expand the impact and influence of planning efforts as well as enhance project competitiveness for larger federal awards. Activities in support of this action could include:

- Establishing partnerships across neighboring communities and levels of government to align priorities and develop or advance implementation of sustainability and resilience plans.
- Providing programming, incentives, or support to encourage partnerships for resilience planning across neighboring communities or levels of government.

Cooperators and Partners: CT/NY Sea Grant, Federal and State Agencies, State Climate Certification Programs, Local Governments, Nonprofit Partners, Academia, Tribal Nations

Funding Sources: Federal, state, and local funds/grants, Private funds/grants

Funding Needs (range of potential costs): \$\$\$\$ - \$1M-\$20M

Performance measures:

- Number of established/active regional partnerships/collaborations

Expected Timeframe: Ongoing

Climate Change Stressors Addressed: (1) warmer summers; (2) warmer winters; (3) warmer waters; (4) increasing drought; (5) increasing storminess; (6) sea level rise; and (7) ocean acidification

How the action will reduce/mitigate climate change risks to the goal: Coordination among municipalities is a key action when mitigating climate impacts as the effects of these stressors are felt across the watershed and require a coordinated regional response.

Action SRC 2-3

Empower and increase engagement of community members and groups, including historically underserved and overburdened communities, in local and regional resilience planning and decision-making.

Action Description: To ensure that the needs of all community members are represented in local and regional resilience planning and decision-making it is important to expand participation in planning processes, particularly in underserved and/or vulnerable communities. Relationship building within a community and forming partnerships with municipal staff, extension specialists, regional groups, and/or local bridge organizations such as neighborhood associations or faith community groups can help to identify and inform opportunities for increasing engagement in planning and decision-making. Activities in support of this action could include:

- Providing technical support or financial incentives to community members for participation in planning and decision-making processes.
- Increasing capacity of staff dedicated to community engagement.
- Forge new relationships with relevant community groups and include them in resilience planning processes (also see Action 3-1).

Cooperators and Partners: CT/NY Sea Grant, Federal and State Agencies, State Climate Certification Programs, Local Governments, LISCIF, Nonprofit Partners, Academia, Tribal Nations, Community groups/Organizations/Neighborhood associations

Funding Sources: Federal, state, and local funds/grants, Private funds/grants

Funding Needs (range of potential costs): \$\$\$\$ - \$1M-\$20M

Performance measures:

- Number of new partners/community groups engaged in resilience planning/decision-making
- Number of new historically underserved and overburdened communities engaged in resilience planning/decision-making

Expected Timeframe: Ongoing

Climate Change Stressors Addressed: (1) warmer summers; (2) warmer winters; (3) warmer waters; (4) increasing drought; (5) increasing storminess; (6) sea level rise; and (7) ocean acidification

How the action will reduce/mitigate climate change risks to the goal: Engaging community members and groups in local and regional resilience planning and decision-making will empower communities to plan for and respond to climate risks.

Goal 3: Sustainable and Resilient Communities

(Click link above to return to Section 2)

Objective SRC 3: Resilience Initiative Implementation

Objective Statement: Implement initiatives to improve community resilience to flooding and other environmental challenges.

Measure of Success: Communities in the NY and CT portions of the LIS watershed implement 200 resilience initiatives.

Technical Explanation: Meeting existing and emerging environmental challenges to LIS communities requires implementing actions, engaging in adaptive management, sharing new approaches, and coordinating regionally. Prioritization and implementation of initiatives should follow the [PERSISTS framework](#), prioritize sustainable nature-based solutions, provide maximum benefits to vulnerable communities, and ensure that stakeholders are equitably convened and included in each step along the way. Initiatives could include implementation of green infrastructure, living shorelines, flood mitigation projects, stormwater management projects, road-stream crossing improvements, stream barrier removal projects, habitat restoration (e.g., marsh restoration, urban tree projects, etc.), policy improvements/changes, zoning and code updates, or new funding mechanisms to support resilience projects (e.g., creation of stormwater utilities).

Cost Estimate: \$\$\$\$\$ (average of at least \$1M per project)

How the Objective follows the SMARTIE structure:

Specific: This objective is focused on the implementation of initiatives in the NY and CT portions of the LISS watershed that prioritize nature-based solutions to increase community resilience,

Measurable:

Measurable	Measurement	Source	Frequency	Need
# of initiatives implemented	Initiatives <i>completed</i> using LISS support/funding or in coordination/partnership with LISS partners. Initiatives could include green infrastructure, living shorelines, flood mitigation projects, stormwater management projects, road-stream crossing improvements, stream barrier removal projects, habitat restoration, policy improvements/changes, zoning & code updates, or new funding mechanisms to support resilience projects.	SRC EPs, LISS Partners, Futures Fund projects	Annual (cumulative)	N/A
# of	Initiatives <i>in progress</i> using LISS	SRC EPs, LISS	Annual	N/A

initiatives in progress	support/funding or in coordination/partnership with LISS partners. Initiatives could include green infrastructure, living shorelines, flood mitigation projects, stormwater management projects, road-stream crossing improvements, stream barrier removal projects, habitat restoration, policy improvements/changes, zoning & code updates, or new funding mechanisms to support resilience projects.	Partners, Futures Fund projects	(progress indicator)	
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Achievable: Estimating 200 projects over 10 years based on 10 LISFF projects per year, plus 10 BDB planning support projects per year.

Relevant: Facilitated implementation of projects is one of the five outcomes of the [SRC Work Plan](#).

Time-Bound: By 2035, measured annually.

Inclusive: When working with partners and communities, we will encourage project prioritization and implementation strategies to follow the [PERSISTS framework](#).

Equitable: When working with partners and communities, we will encourage project prioritization and implementation strategies to follow the [PERSISTS framework](#).

Actions to support achievement of Objective SRC 3:

Action SRC 3-1

Increase community capacity to implement and manage sustainable and resilient initiatives.

Action Description: The [SRC Needs Assessment](#) identified limited capacity and lack of funding as two of the primary barriers to implementation of resilience initiatives. Programs, like the Long Island Sound Resilience Grant Writing Assistance and Planning Support Programs can help to address these capacity and financial challenges. Activities to enhance community capacity to implement, manage, and sustain initiatives could include continuation of existing financial and technical assistance programs, establishment of new programs, and efforts that support partnerships across municipal boundaries and levels of government and between municipalities and nonprofits and other experts.

Cooperators and Partners: CT/NY Sea Grant, Federal and State Agencies, State Climate Certification Programs, Local Governments, LISCIF, Nonprofit Partners, Academia, Tribal Nations, Community Groups/Organizations

Funding Sources: Federal, state, and local funds/grants, Private funds/grants

Funding Needs (range of potential costs): \$\$\$\$ - \$1M-\$20M

Performance measures:

- Number of capacity support programs established
- Number of capacity support programs maintained
- Amount of LISCIF capacity support funding allocated

Expected Timeframe: Ongoing

Climate Change Stressors Addressed: (1) warmer summers; (2) warmer winters; (3) warmer waters; (4) increasing drought; (5) increasing storminess; (6) sea level rise; and (7) ocean acidification

How the action will reduce/mitigate climate change risks to the goal: Capacity was identified as a major limiting factor in implementing resilience initiatives in the Long Island Sound watershed, therefore this action will help remove a major barrier to addressing these issues.

Action SRC 3-2

Support the development and adoption of regulations, codes, and ordinances that increase community resilience.

Action Description: This action encourages the development and implementation of regulations, codes, and/or ordinances that enhance community resilience to environmental challenges. Communities should evaluate and update their policies and regulations to make them consistent with their sustainability and resilience plans. Ideally, policies are coordinated among neighboring municipalities and/or reinforced across levels of government (see Action 2-2) to maximize benefits to communities and the environment. Specific activities to support this action could include development and/or adoption of proposed new or updated codes/regulations, provision of supporting funding and technical resources, and collaboration with partners to hold regional knowledge exchanges.

Cooperators and Partners: CT/NY Sea Grant, Federal and State Agencies, State Climate Certification Programs, Local Governments, Nonprofit Partners, Academia, Tribal Nations

Funding Sources: Federal, state, and local funds/grants, Private funds/grants

Funding Needs (range of potential costs): \$\$\$\$ - \$1M-\$20M

Performance measures:

- Number of regulations implemented
- Number of regulations in progress

Expected Timeframe: Ongoing

Climate Change Stressors Addressed: (1) warmer summers; (2) warmer winters; (3) warmer waters; (4) increasing drought; (5) increasing storminess; (6) sea level rise; and (7) ocean acidification

How the action will reduce/mitigate climate change risks to the goal: Codes and ordinances that account for climate stressors and promote sustainable activities and development can help increase community resilience to these stressors.

Action SRC 3-3

Implement nature-based solutions that provide multiple benefits to address flooding and other climate impacts.

Action Description: The aim of this action is to prioritize implementation of nature-based solutions that provide multiple benefits over traditional gray infrastructure methods. Nature-based solutions use natural features and processes to mitigate flooding, provide storm protection, sequester carbon, or address multiple other climate impacts. Nature-based solutions may include the protection and/or restoration of coastal habitats (such as beaches, dunes, coastal bluffs, wetlands, coastal forests, seagrass beds, and shellfish reefs), protection and/or restoration of riparian and/or upland habitats (such as reforestation, urban tree planting, and adding riparian vegetative buffers), implementation of living shorelines (shoreline erosion control techniques that incorporate natural living features alone or in combination with structural components), and establishment of green infrastructure (such as bioswales, rain gardens, green roofs, permeable pavement, and other green stormwater infrastructure innovations).

Activities that support this action could include stakeholders evaluating the use of nature-based solutions as an option or component of projects and installing projects. Activities under this action should incorporate elements of adaptive management (see Action 3-5).

Cooperators and Partners: CT/NY Sea Grant, Federal and State Agencies, State Climate Certification Programs, Local Governments, Nonprofit Partners, Academia, Tribal Nations, Community groups/organizations/Neighborhood associations

Funding Sources: Federal, state, and local funds/grants, Private funds/grants

Funding Needs (range of potential costs): \$\$\$\$\$ >\$20M

Performance measures:

- Number of nature-based initiatives implemented
- Number of nature-based initiatives in progress

Expected Timeframe: Ongoing

Climate Change Stressors Addressed: (1) warmer summers; (2) warmer winters; (3) warmer waters; (4) increasing drought; (5) increasing storminess; (6) sea level rise; and (7) ocean acidification

How the action will reduce/mitigate climate change risks to the goal: Nature-based solutions will be focused on mitigating climate risks, such as flooding, and provide many benefits over traditional gray infrastructure to help make our communities and natural environment more sustainable and resilient.

Action SRC 3-4

Implement priority infrastructure projects that increase community sustainability and resilience to flooding and other climate impacts.

Action Description: The aim of this action is to promote infrastructure projects that improve community sustainability and resilience to flooding and other climate impacts while ensuring the viability of coastal resources. Activities supporting this action could include upgrading, installing, improving, relocating, removing, or re-sizing infrastructure in a manner that maximizes sustainability. Where feasible, projects under this action should consider incorporating nature-based solutions (see Action 3-3) and elements of adaptive management (see Action 3-5). Ideally, the need for these infrastructure improvements has been identified through community-driven resilience planning (see Action 2-1).

Cooperators and Partners: CT/NY Sea Grant, Federal and State Agencies, State Climate Certification Programs, Local Governments, Nonprofit Partners, Academia, Tribal Nations, Utility/transportation entities

Funding Sources: Federal, state, and local funds/grants, Private funds/grants

Funding Needs (range of potential costs): \$\$\$\$\$ >\$20M

Performance measures:

- Number of infrastructure initiatives implemented
- Number of infrastructure initiatives in progress

Expected Timeframe: Ongoing

Climate Change Stressors Addressed: (1) warmer summers; (2) warmer winters; (3) warmer waters; (4) increasing drought; (5) increasing storminess; (6) sea level rise; and (7) ocean acidification

How the action will reduce/mitigate climate change risks to the goal: Infrastructure improvements that increase sustainability and resilience are vital to mitigating these climate risks.

Action SRC 3-5

Monitor, maintain, and adaptively manage resilience projects to ensure their long-term success.

Action Description: Adaptive management of resilience projects involves intentionally making decisions and adjustments in response to new information and/or circumstances. This action encourages development and implementation of maintenance and long-term monitoring strategies that provide information on performance, benefits, and best practices to inform ongoing management and shape future projects (see Action 1-2). Activities supporting this action could include:

- Implementation of monitoring, maintenance, and/or adaptive management strategies.
- Technical and monetary support for development of such strategies.
- Development of tracking and monitoring systems to evaluate projects region-wide and inform best practices.

Cooperators and Partners: CT/NY Sea Grant, Federal and State Agencies, State Climate Certification Programs, Local Governments, Nonprofit Partners, Academia, Tribal Nations, Community groups/organizations/Neighborhood associations

Funding Sources: Federal, state, and local funds/grants, Private funds/grants

Funding Needs (range of potential costs): \$\$\$\$ - \$1M-\$20M

Performance measures:

- Number of adaptive management strategies developed

Expected Timeframe: Ongoing

Climate Change Stressors Addressed: (1) warmer summers; (2) warmer winters; (3) warmer waters; (4) increasing drought; (5) increasing storminess; (6) sea level rise; and (7) ocean acidification

How the action will reduce/mitigate climate change risks to the goal: Managing and adapting projects that improve resiliency are key activities as it is important to improve functionality and efficiency as well as adapting to these risks as they change.

Informed and Engaged Public: Objective/Action Narratives

Goal 4: Informed and Engaged Public

(Click link above to return to Section 2)

Objective IEP 1: Public Access and Sense of Belonging

Objective Statement: Increase and improve opportunities for everyone to access and appreciate Long Island Sound and the waters that flow into the Sound.

Measure of Success: Create at least 40 new sites and improve at least 60 existing sites around Long Island Sound's shoreline and its connecting waterbodies in Connecticut and New York and show an increase in sense of belonging based on findings from the Long Island Sound Public Perception Survey. A site improvement consists of one or more physical and/or long-term programmatic changes to a site per project that improve the site's accessibility for the public, including people with disabilities, families, and historically underserved and overburdened communities. At least half of the improved sites will benefit historically underserved and overburdened communities.

Technical Explanation: It is widely understood that there is an insufficient amount of access to Long Island Sound and its coastline. For communities and individuals to be stewards of the Sound and its watershed, it is essential they have proper access to the Sound and feel a sense of connection and belonging. For many residents of the region, access to Long Island Sound can be difficult and limited. As an example, the 2023 LIS Beach Report published by Save the Sound reports that out of Westchester County's 23 beaches, all but five are privately owned. Public beaches in the region often come with their own sets of barriers, including limited available parking, high fees for non-residents, limited public transportation to beaches, etc. In the past, discriminatory policies and social norms effectively excluded people of color from many coastal beaches and parks, an issue that still lingers in some areas today and leads to a limited sense of belonging. This objective seeks to increase the number of access sites and opportunities for people to access and connect with Long Island Sound and the waters that flow into the Sound, including waterfront areas, shoreline parks and vegetated stream banks as well as the water. While the objective encourages increasing public access in the watershed, the area of focus will be on the coastal waters and tributaries of Long Island Sound in Connecticut and New York due to the limits of staff to track progress in the entire watershed. Additionally, while all new sites should strive to benefit and be accessible to historically underserved and overburdened communities, this objective will specifically track that at least 50 percent of the improvement projects benefit historically underserved and overburdened communities.

Cost Estimate: \$\$\$\$ - 10M – 100M

How the Objective follows the SMARTIE structure:

Specific: The objective describes what we are trying to achieve.

Measurable: Advances in this objective will be measured through LISS partner and grantee reporting, as well as through the Citizens Advisory Committee and the Communications, Outreach, and Engagement Work Group. When measuring numbers from grantees, numbers should not come from projected numbers, but from officially reported metrics once the project has been implemented. Some measurements under this objective will also come from assessments and evaluations such as the Public Perception Survey.

Measurable	Measurement	Source	Frequency	Need
New public access sites on coastal Long Island Sound and its connecting waterbodies.	New sites/year	CT DEEP, NYSDEC, municipal, county and state parks departments, LISFF, LISCIF	Annual	Conduct a survey of parks departments to identify new sites and track projects through the Futures Fund
Physical and programmatic improvements (including public transportation strategies) that improve access to existing public access sites around the coastal Long Island Sound and its connecting waterbodies. At least 50 percent are serving historically underserved and overburdened communities.	Number of improvements/year	NYS DEC, CT DEEP, LISFF, LISCIF, municipal, county and state parks departments	Annual	With support from partners, track the number of projects, which could include ramps, restrooms, signage in multiple languages, increased public transportation, bilingual staff, schedule changes, permit changes, cost changes, ongoing government-run cleanups, etc.)
State and LISS-supported programs, events, or major festivals that enable safe use and enjoyment of Long Island Sound and its connecting waterbodies.	Number of programs, festivals (at least 1-2 major festivals a year), and events per year	NYSDEC, CT DEEP, LISFF, LISCIF, CAC, and COE work group	annual	With support from partners, track the number of program and event activities, including, lessons or webinars related to swimming, fishing, boating, and events at coastal sites.
Increase in the number of people who feel welcome and a sense of belonging in shoreline sites on Long Island Sound and its connecting waterbodies. <i>(More people saying they feel welcomed and</i>	Percentage increase in sense of belonging	Long Island Sound Public Perception Survey, LISSFF	Every 3-5 years	Fund a public perception survey every five years that will include data on sense of belonging.

<i>a sense of belonging in parks and trails near waterbodies.)</i>				
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Achievable: The metric for new access sites is based on a slight increase in the number of new sites that were tracked from 2015-2024 under the existing the 2015 CCMP. The metric for physical and programmatic improvements is based on a review of projects that are funded through the Futures Fund grant program in recent years. The sense of belonging can be tracked through a Public Perception Survey funded every 3-5 years.

Relevant: 2006 Public Perception Survey found that more people will use and appreciate the Sound if they live closer to the Sound. In addition, the 2023 Environmental Justice Needs Assessment identified limited public access as one of the top barriers to connection with the Sound.

Time-Bound: Tracking of new and improved sites will be done every year, and the Sense of Belonging will be tracked every 3-5 years.

Inclusive: The objective will strive to improve access and sense of belonging for people who live in historically underserved and overburdened communities, as well as people with disabilities who face physical barriers to accessing the Sound.

Equitable: The objective has a metric that 50 percent of the physical and programmatic improvements will benefit historically underserved and overburdened communities.

Actions to support achievement of the Objective IEP 1:

Action IEP 1-1

Collaborate with local government, environmental groups, and community leaders to develop a new public access plan and initiative to increase and improve public access and sense of belonging.

Action Description: This action focuses on planning, coordination, and collaboration to achieve the public access and sense of belonging objective. Work under this action will include:

- Engaging communities to collaborate with the Long Island Sound Study in increasing and improving public access. A new LISS working group consisting of LISS partners and local municipal managers will be formed to develop the initiative. Through contract support, the initiative will develop a Public Access Plan that provides an understanding of the challenges to improve public access in Long Island Sound and identify solutions.
- Encouraging local municipalities and community groups to develop designs, plans, and community engagement efforts to increase and/or improve public access sites and increase programming at public access sites, including at LIS Stewardship Sites and Areas.
- Increasing collaborations between LISS, local government, community leaders, and community residents to develop locally-based solutions for creating and improving public access sites.
- Ensuring that residents from historically underserved and overburdened communities are included in collaborative efforts to increase and improve public access and sense of belonging.
- Ensuring that residents with physical disabilities who face physical barriers in enjoying public access sites are included in collaborative efforts to improve public access and a sense of belonging.
- Establishing criteria on what constitutes a new site, a physical improvement, and a long-term programmatic improvement that can be included in the target objective.
- Prioritizing public access that enhances natural habitats, supports wildlife, enhances the public's experience of connecting with clean water, and provides nature-based resilient solutions to environmental threats such as sea-level rise and extreme storms. This will be done with the assistance of members of the LISS Habitat Restoration and Stewardship work group, Sustainable and Resilient Communities work group, Watershed and Embayments work group and Environmental Justice work group.
- Reviewing the latest research as part of the Public Access Plan to enhance the understanding of what constitutes a sense of belonging in a public access site.
- Using the Public Access Plan to develop recommendations to improve actions 1a.2-1a.6 for the 2030 update of the CCMP.

Cooperators and Partners: CT DEEP, NYSDEC, HRSWG, SRCWG, EJWG, NFWF, US FWS, NYS Parks, NYC Parks, and municipalities and environmental organizations.

Funding Sources: LISS, LISFF, LISCIF, and other local, state, and federal grant sources.

Funding Needs: \$\$\$\$ - >\$1M

Performance measures:

- Working group established and stakeholders engaged
- Criteria for what constitutes public access and sense of belonging are developed
- Number of collaborations is increased, inspiring new projects for public access
- Number of plans and designs
- Public Access Plan is completed
- Public Access action statements are updated during the 5-year review with support from the Public Access Plan

Expected Timeframe: ongoing (five years)

Climate Change Stressors Addressed: All of the 7 listed stressors could impact public access sites and the public's ability/willingness to use them by making them less available. (1) warmer summers; (2) warmer winters; (3) warmer waters; (4) increasing drought; (5) increasing storminess; (6) sea level rise; and (7) ocean acidification.

How the action will reduce/mitigate climate change risks to the goal: Developing public access plans and community collaborations to design and plan for public access sites and improving sense of belonging will allow planners the opportunity to think about what is needed to make public access sustainable and available to inspire the public in the face of climate change.

Action IEP 1-2

Develop and implement projects that increase the number and quality of public access sites in an equitable manner.

Action Description: This action focuses on implementing public access projects with support from grant programs. Work under this action will include:

- Collaborating with grant program managers to increase the amount of grants available to create and improve public access sites and for increased programming at sites, including at LIS Stewardship Sites and Areas.
- Encouraging local municipalities and community groups to develop project proposals to increase and/or improve public access sites and increase programming at public access sites, including at LIS Stewardship Sites and Areas.
- Encouraging projects that improve public access of Long Island Sound for residents who live in historically underserved and overburdened communities.
- Encouraging projects that improve public access for people with disabilities.

Cooperators and Partners: CT DEEP, NYSDEC, HRSWG, SRCWG, EJWG, NFWF, and municipalities and environmental organizations.

Funding Sources: LISFF, LISCIF, and other local, state, and federal grant sources.

Funding Needs: \$\$\$\$ - >\$1M

Performance measures:

- Number of community stakeholders applying for LISS grants
- Number of grants awarded for increasing public access and sense of belong at public access sites
- Number of new public access sites in LIS costal study area are created (objective target)
- Number of existing sites in LIS watershed have physical or long-term programmatic improvements, including 50 percent of improvements that serve people in historically underserved and overburdened communities (objective target)
- Number of sites improved for accessibility (people with disabilities)
- Number of sites improved for resiliency
- Number of new physical and programmatic improvements for public access at Stewardship Sites

Expected Timeframe: ongoing (five years)

Climate Change Stressors Addressed: All of the 7 listed stressors could impact public access sites and the publics ability/willingness to use them by making them less available. (1) warmer summers; (2) warmer winters; (3) warmer waters; (4) increasing drought; (5) increasing storminess; (6) sea level rise; and (7) ocean acidification.

How the action will reduce/mitigate climate change risks to the goal: Developing and implementing projects to achieve this public access objective will give planners the opportunity to consider climate change risks for the new and improved sites.

Action IEP 1-3

Promote sense of belonging at new or improved public access sites through events, festivals, celebrations, materials, and programming.

Action Description: This action seeks to increase the usage of public access sites, including by developing opportunities to increase the sense of belonging and connection to the water. Work under this action will include:

- Raising awareness of public access sites and opportunities to engage with the Sound through communications materials and outreach efforts. This could include holding major festivals, celebrations, and events.
- Conducting research, including with existing resources such as the LISS Public Perception Survey and Environmental Justice needs assessment, to better understand the barriers toward people feeling welcome at public access sites.
- Working with local partners and other stakeholders to promote opportunities at Long Island Sound public access sites that promote a sense of belonging.
- Developing best management practices and share examples of projects that increase sense of belonging.
- Increasing LISS outreach at public access sites, including with existing programs such as Stewardship Days, and support festivals and special events at Stewardship sites and other public access sites.
- Increasing opportunities for youth and adults to swim, fish, boat, and other recreational activities that support a sense of belonging to the Sound.

Cooperators and Partners: NY Sea Grant, CT Sea Grant, NEIWPC, NYSDEC, US FWS, CT DEEP, NYSDEC, NYC Parks, NYS Park HRSWG, SRCWG, EJWG, and municipalities and environmental organizations.

Funding Sources: LISS, LISFF, LISCIF, and local, state, and federal grant sources

Funding Needs: \$\$\$\$ - >\$1M

Performance measures:

- Residents have a greater sense of belonging to public access sites (objective target per results of public perception survey and evaluations)
- Number of collaborations and stakeholders reached
- Number of signs promoting public access, including at Long Island Sound stewardship sites
- Number of number of new interpretive signage that's inclusive, including signs in multiple languages
- Number of articles and social media posts by LISS communications staff promoting public access
- Number of web visitors to the Long Island Sound Stewardship Atlas and the Connecticut Coastal Access Guide
- Number of youth reached in recreational programming to encourage public access (e.g., fishing, boating, swimming)
- Number of festivals and events scheduled at coastal access sites

Expected Timeframe: ongoing (five years)

Climate Change Stressors Addressed: All of the 7 listed stressors could impact public access sites and the public's ability/willingness to use them by making them less available. (1) warmer summers; (2) warmer winters; (3) warmer waters; (4) increasing drought; (5) increasing storminess; (6) sea level rise; and (7) ocean acidification.

How the action will reduce/mitigate climate change risks to the goal: Promoting a sense of belonging will allow planners the opportunity to think about what is needed to make public access sustainable and available to inspire the public in the face of climate change.

Goal 4: Informed and Engaged Public

(Click link above to return to Section 2)

Objective IEP 2: Education and Environmental Literacy

Objective Statement: Increase, improve, and expand the environmental literacy of people interacting with the LIS watershed.

Measure of Success: Engage 1 million members of the public - including youth, educators, and adults- in Long Island Sound education programming and outreach by 2030.

Technical Explanation: Effective environmental education programming and outreach leads to an increase in environmental literacy and encourages environmentally conscious behaviors and decision-making. This objective seeks to raise the public’s understanding of Long Island Sound and the watershed via the implementation of effective environmental education programming and outreach. Research has shown that environmental education can improve environmental literacy among participants (N. L. Sprague & Ekenga, 2021), which can lead to an increase in environmentally sustainable behaviors moving forward (Steffen et al., 2011). Additionally, effective environmental education programming may facilitate feelings of belonging and sense of ‘place-meaning’ among participants (Kudryavtsev, A., Stedman, R. C., & Krasny, M. E., 2012) – another predictor of pro-environmental behavior (Ardoin, N.M., 2014). Currently, programs like the Long Island Sound School Network, Mentor Teachers, and others engages populations in LIS watershed-focused education programs. However, there is a demonstrated need to continuously broaden the reach of these programs while pursuing the development of innovative, inclusive, and collaborative informal and formal education programming with partners. Equipping both students and adults with environmental knowledge of Long Island Sound positions them to become better decision-makers, collaborators, and stewards of the sound and its waters that flow into it.

Definitions

Environmental Education: Environmental education allows individuals to explore environmental issues, engage in problem solving, and improve the environment. As a result, individuals develop a deeper understanding of environmental issues and have the skills to make informed and responsible decisions.

Environmental Literacy: The most widely accepted meaning of environmental literacy is that it comprises an awareness of and concern about the environment and its associated problems, as well as the knowledge, skills, and motivations to work toward solutions of current problems and the prevention of new ones (NAAEE 2004).

Cost Estimate: \$\$\$ - 1M – 10M

How the Objective follows the SMARTIE structure:

Specific: Describes what we are trying to achieve.

Measurable: Advances in this objective will be measured through LISS staff reporting, partner reporting, and grantee reporting, as well as through LISS programs such as the Long Island Sound School Network, and through work groups and committees, including the Communications, Outreach, and Engagement Work Group and the Citizens Advisory Committee. When measuring numbers from

grantees, numbers should not come from projected numbers, but from officially reported metrics once the project has been implemented. Some measurements under this objective will also come from assessments and evaluations such as the Public Perception Survey.

Measurable	Measurement	Source	Frequency
Students engaged in both formal and informal LISS education programming	Number of students	LISN reporting, LISS-staff reporting, LISFF reporting, partner reporting	Annually
Educators engaged in professional development, workshops, and teacher trainings.	Number of formal and informal educators	LISN reporting, Mentor Teacher Program reporting, LISS-staff reporting, LISFF reporting, partner reporting	Annually
Engagement with LISS educational tools, activities, and virtual content	Number of individuals engaged	Social media and website analytics, print materials distributed, etc.; LISFF	Annually
Environmental understanding and literacy	Number of individuals demonstrating an increase in environmental understanding and literacy	Pre-and-post program surveys and evaluations, Public Perception Survey results; LISFF	Annually (evaluations); every 3-5 years (PPS)

Achievable: The metrics are informed by current LISS education programs – such as LISN – and reporting from grant programs.

Relevant: It is well understood that positive environmental education experiences are correlated with an increase in environmental literacy and pro-environmental behaviors.

Time-Bound: Tracking will be done on an annual basis and assessed at both 5- and 10-year intervals.

Inclusive: The objective will strive to extend the reach of environmental education programming for students and adults living in historically underserved and overburdened communities, as well as people of differing abilities who face barriers to engaging in educational content related to the sound.

Equitable: Educational outreach will specifically target historically underserved and overburdened communities using the EJ Needs Assessment and Public Perception Survey.

Actions to support achievement of the Objective IEP 2:

Action IEP 2-1

Increase collaboration between environmental education partners to elevate the visibility of existing programs and promote the creation of new environmental education initiatives.

Action Description: This action focuses on collaborating, networking, and sharing resources among groups in the region to support literacy efforts and promote unified messaging related to Long Island Sound education. Work in this action will include:

- Hiring an assistant outreach coordinator to develop and manage a network of environmental education partners/collaborators.
- Promoting opportunities for collaboration to facilitate information and resource sharing. This can include hosting networking opportunities and using social media to share existing messaging and educational tools.
- Create an online platform or portal that facilitates the sharing of educational resources in the LIS region.
- Collaborate with the state and national education networks, interpreter groups, and others.

Cooperators and Partners: Connecticut Sea Grant; New York Sea Grant; NEIWPC; Long Island Sound Study's Communication, Outreach, and Engagement Work Group; CT DEEP, NYDEC, Citizens Advisory Committee (LISS CAC); Long Island Sound School Network

Funding Sources: LISS, LISFF, LISCIF, and other local, state, and federal grant sources.

Funding Needs: \$\$\$ - \$150K-\$1M

Performance measures:

- Number of new environmental education initiatives supported by LISS
- Number of partners engaged in LISS-supported environmental education networking and resource sharing opportunities
- Number of research efforts exploring environmental education best practices supported

Expected Timeframe: Ongoing

Climate Change Stressors Addressed: All seven climate change stressors could be addressed through educational materials and activities focused on climate change. (1) warmer summers; (2) warmer winters; (3) warmer waters; (4) increasing drought; (5) increasing storminess; (6) sea level rise; and (7) ocean acidification.

How the action will reduce/mitigate climate change risks to the goal: Working with partners to develop and deliver environmental education programs will increase the public's understanding of environmental issues, including climate change stressors. An environmentally literate public is better positioned to adopt sustainable behaviors and advocate for climate resilience within their communities.

Action IEP 2-2

Host and promote opportunities to participate in LIS-based formal and informal education programs tailored for multiple user groups and ages.

Action Description:

This action focuses on hosting educational programs and opportunities tailored for diverse user groups and helping promote such events from other groups in the region. Work in this action will include:

- Continue programs such as the Long Island Sound Mentor Teacher Program and Long Island Sound School Network to provide formal and informal K-12 educators with learning opportunities for integrating Long Island Sound instruction into their classrooms.
- Expand environmental educational opportunities for youth and students.
- Host and promote informal education at aquariums, museums, and nature centers.
- Host and promote informal education opportunities in the field and on the coast.
- Host and promote educational programming online.
- Conducting outreach at festivals, conferences, community events, etc.

Cooperators and Partners: Connecticut Sea Grant; New York Sea Grant; NEIWPC; Long Island Sound Study's Communication, Outreach, and Engagement Work Group; CT DEEP, NYDEC, Citizens Advisory Committee (LISS CAC); Long Island Sound School Network; and additional organizations as they are formed/as opportunities present themselves.

Funding Sources: LISS, LISFF, LISCIF, and other local, state, and federal grant sources.

Funding Needs: \$\$\$ - \$150K-\$1M

Performance measures:

- Number of LISS-hosted or supported educational programs for students
- Number of LISS-hosted or supported educational events and programs
- Number of formal and informal educators engaged through LISS-supported professional development programs
- Number of students and youth involved in LISS-supported educational programs and events
- Number of adults engaged in LISS-supported educational programs and events
- Number of promotional materials shared
- Number of schools involved in LISN

Expected Timeframe: Ongoing

Climate Change Stressors Addressed: All seven climate change stressors could be addressed through educational materials and activities focused on climate change. (1) warmer summers; (2) warmer winters; (3) warmer waters; (4) increasing drought; (5) increasing storminess; (6) sea level rise; and (7) ocean acidification.

How the action will reduce/mitigate climate change risks to the goal: The development and delivery of environmental education programs will increase the public's understanding of environmental issues, including climate change stressors. An environmentally literate public is better positioned to adopt sustainable behaviors and advocate for climate resilience within their communities.

Action IEP 2-3

Develop engaging, multi-lingual, and innovative Long Island Sound educational materials, tools, and activities for people of all ages and abilities.

Action Description: This action focuses on developing, sharing, and promoting informational materials and tools for youth, students, and the general public. Work in this action includes:

- Providing science-based information products and supplemental resources such as lesson plans, exhibits, and educational interpretive signage for specific Long Island Sound topics.
- Assisting with the development of lesson plans and other informational materials.

Cooperators and Partners: Connecticut Sea Grant; New York Sea Grant; NEIWPC; Long Island Sound Study's Communication, Outreach, and Engagement Work Group; CT DEEP, NYDEC, Citizens Advisory Committee (LISS CAC); Long Island Sound School Network; and additional organizations as they are formed/as opportunities present themselves.

Funding Sources: LISS, LISFF, LISCIF, and other local, state, and federal grant sources.

Funding Needs: \$\$\$ - \$150K-\$1M

Performance measures:

- Number of clicks or site-visits to LISS educational resources
- Number of print materials distributed
- Number of educational materials, tools, and activities developed
- Number of users of educational tools and/or resource when applicable

Expected Timeframe: Ongoing

Climate Change Stressors Addressed: All seven climate change stressors could be addressed through educational materials and activities focused on climate change. (1) warmer summers; (2) warmer winters; (3) warmer waters; (4) increasing drought; (5) increasing storminess; (6) sea level rise; and (7) ocean acidification.

How the action will reduce/mitigate climate change risks to the goal: Development of appropriate educational tools, materials and activities that address climate change will facilitate better informed decisions by residents and community leaders.

Action IEP 2-4

Support efforts to assess the public's understanding of Long Island Sound and its tributaries.

Action Description: This action focuses on developing tools and methods to assess and monitor the public's environmental literacy as it pertains to Long Island Sound and the watershed. Work in this action includes:

- Creating a literacy index based on the results of the Public Perception Survey.
- Working with partners to develop standardized pre-and-post evaluation materials at LIS programming.
- Remaining current with research, professional development, and tools related to environmental education (EE) and best methods of environmental education.

Cooperators and Partners: Connecticut Sea Grant; New York Sea Grant; NEIWPC; Long Island Sound Study's Communication, Outreach, and Engagement Work Group; CT DEEP, NYDEC, Citizens Advisory Committee (LISS CAC); Long Island Sound School Network; and additional organizations as they are formed/as opportunities present themselves and contractors as needed.

Funding Sources: LISS, LISFF, LISCIF, and other local, state, and federal grant sources.

Funding Needs: \$\$\$ - \$150K-\$1M

Performance measures:

- Public Perception Survey
- Number of Social Media subscribers
- Results of pre-and-post program evaluations

Expected Timeframe: Ongoing

Climate Change Stressors Addressed: Assessing the public's understanding of the environment and environmental issues will inform salient and resonant education programming. All seven climate change stressors could be addressed through educational materials and activities focused on climate change. (1) warmer summers; (2) warmer winters; (3) warmer waters; (4) increasing drought; (5) increasing storminess; (6) sea level rise; and (7) ocean acidification.

How the action will reduce/mitigate climate change risks to the goal: Development of appropriate educational tools, materials and activities that address climate change will facilitate better informed decisions by residents and community leaders.

Goal 4: Informed and Engaged Public
 (Click link above to return to Section 2)

Objective IEP 3: Fostering Stewardship and Sustainable Behaviors

Objective Statement: Increase public engagement in environmental practices that protect and conserve Long Island Sound and its watershed.

Measure of Success: Support at least 20 projects or campaigns per year focused on promoting sustainable behaviors, stewardship, and behavior change. Additionally, engage at least 20,000 volunteers through LISS-supported efforts by 2035.

Technical Explanation: LIS is nestled between urban centers, including one of the most densely populated cities in the country. In order to protect it and sustainably co-exist, it is crucial for the people of the region to be stewards of the land and adopt sustainable behaviors that help maintain the health of the Sound. More than 23 million people live within 50 miles of the Sound. Its watershed is also expansive, with the Connecticut River—which supplies most of its freshwater—extending almost to the Canadian border. In order to protect and conserve the health of Long Island Sound, the people in the region must adopt sustainable behaviors in their daily lives that help maintain the Sound’s health. Volunteering and getting involved in stewardship projects such as participatory science can help further connect people to their environment, provide a sense of ownership, and help people better understand local environmental challenges and solutions. Additionally, mitigating several of the challenges the Sound currently faces, including marine debris and nitrogen pollution from fertilizer and septic systems, will require the adoption of specific behavior changes from individuals. Stewardship at different levels is being included under this objective, including at a community level through the adoption of sustainable practices, and at the individual level through participation in volunteer opportunities and engagement in sustainable behaviors.

Cost Estimate: \$\$ - 500K- 1M (5-year timeframe)

How the Objective follows the SMARTIE structure:

Specific: Technical explanation describes the objective.

Measurable:

Measurable	Measurement	Source	Frequency
Number of people involved in volunteer, participatory science, community action, or stewardship programs focused on Long Island Sound and its watershed.	Number of people per year involved in LISS-supported volunteer, participatory science, community action, or stewardship programs focused on Long Island Sound and its watershed.	NYSG, CTSG, LISFF, LISCIF, CAC	Yearly
	Number of groups per year involved LISS-	LISFF, LISCIF, Save the Sound,	Yearly

	supported participatory science or community action programs or events.	NYSG, CTSG, CAC	
	Number of stewardship events supported by LISS or through grants/technical assistance programs.	NYSG, CTSG, LISFF, LISCIF, CAC	Yearly
Number of people engaged in sustainable behaviors needed to enhance the health of their local watersheds and Long Island Sound.	Number of people engaged per year in LISS-supported programs and campaigns focused on sustainable behaviors and behavior change.	NEIWPC, NYSG, CTSG, LINAP, LISFF, LISCIF	Yearly
	Number of people who report engaging in sustainable behaviors or changing their behavior to enhance the health of their local watersheds and Long Island Sound.	LINAP, LISFF; Public Perception Survey	Yearly; Every 3-5 years

Measurable: Advances in this objective will be measured through LISS partner and grantee reporting, as well as through the Citizens Advisory Committee and the Communications, Outreach, and Engagement Work Group. When measuring numbers from grantees, numbers should not come from projected numbers, but from officially reported metrics once the project has been implemented. Some measurements under this objective will also come from assessments and evaluations such as the Public Perception Survey.

Achievable: Numbers in this objective were established based on the number of such projects funded through the LISFF in 2022 and 2023, and the number of engaged volunteers reported through LISFF in 2023, 2022, and 2021.

Relevant: The behaviors and priorities outlined by the actions that drive this objective were crafted to support to priorities identified under other CCMP goals. Coordination should continue among partners to ensure behaviors and practices promoted through this objective continue to reflect current priorities needed to achieve clean waters and healthy watersheds, thriving habitats and abundant wildlife, and sustainable and resilient communities as well as an informed and engaged public.

Time-Bound: Projects and volunteers will be reported yearly. The Public Perception Survey should be conducted every 3-5 years.

Inclusive: Projects, programs, and materials under this objective should strive to be accessible and tailored to different community needs and interests in order to fully engage all communities in the watershed, including historically underserved and overburdened communities and disabled individuals.

Equitable: Projects, programs, and materials under this objective should consider providing incentives and additional participant support, as well as multilingual resources, as appropriate to ensure opportunities, resources, and programs are accessible. Additionally, projects providing proper compensation should be prioritized over opportunities relying on unpaid or low-income positions.

Actions to support achievement of Objective IEP 3:

Action IEP 3-1

Increase opportunities to involve the public in the monitoring, restoration, and conservation of Long Island Sound and its ecosystems through volunteerism, participatory science, and community-led action.

Action Description: This action focuses on promoting volunteerism, participatory science, and community-led action. Work towards this action includes:

- Hosting and promoting volunteering events and opportunities for people to learn about and engage with participatory science tools and programs.
- Publishing a volunteer newsletter and updating volunteer opportunities in the LISS webpage.
- Encouraging participation in beach clean ups, invasive species pulls, tree plantings, etc.
- Encouraging participation in existing participatory science programs that contribute to the monitoring or management of the Sound's environment, such as the river herring monitoring program.
- Celebrating community leaders and champions working to advance volunteerism, participatory science, and community-led action. This could involve hosting an annual celebration of volunteers, publishing a report with volunteer numbers and achievements, and sharing successes achieved through volunteer work with volunteers and the public.

The EPA defines participatory science as “the involvement of the public in the scientific process, often in collaboration with professional scientists and scientific institutions” (Environmental Protection Agency, 2022). Community-led action refers to stewardship activities or initiatives driven by communities. While volunteering and participatory science opportunities are usually led by organizations or experts, community-led action defers to the collective decision-making of the community to identify problems and implement solutions.

Cooperators and Partners:

NYSG, CTSG, NYSDEC, CT DEEP, LISFF, LISCIF, Long Island Sound Study Citizens Advisory Committee; LISS Work Groups.

Funding Sources: LISS, LISFF, LISCIF, Long Island Sound Research Grant Program

Funding Needs: \$\$\$ - \$150K-\$1M

Performance measures:

- Number of LISS communications products promoting or celebrating volunteer and participatory science opportunities
- Number of volunteers engaged in LISS-supported volunteer, participatory science, or community-led action opportunities
- Number of volunteers engaged in volunteer, community-led action, or participatory science opportunities hosted by CAC member organizations
- Number of volunteers participating in Long Island Sound beach cleanups as part of the International Coastal Cleanup
- Number of groups participating in LISS-supported volunteering or participatory science programs
- Number of groups participating in LISS-supported community-led projects or programs

- Number of events and programs hosted by LISS staff or LISFF and LISCIF grantees to promote volunteerism, community-led action, and participatory science (example: invasive species pulls, tree plantings, webinars on participatory science tools, etc.)
- Number of events and programs hosted by CAC or COE and other LISS work group member organizations to promote volunteerism, community-led action, and participatory science (example: invasive species pulls, tree plantings, webinars on participatory science tools, etc.)
- Number of new sign-ups for LISS volunteer newsletters
- Visits to the LISS volunteer opportunities webpage

Expected Timeframe: Ongoing (Funding range is for a 5-year timeframe)

Climate Change Stressors Addressed: All seven climate change stressors are addressed by better public involvement. (1) warmer summers; (2) warmer winters; (3) warmer waters; (4) increasing drought; (5) increasing storminess; (6) sea level rise; and (7) ocean acidification.

How the action will reduce/mitigate climate change risks to the goal: By increasing public engagement in monitoring, restoration, and conservation, adaptation progress can be made at the local level, which in turn could inspire broader action on climate change.

Action IEP 3-2

Investigate the relationship between the public and the Long Island Sound ecosystem through social science research.

Action Description: This action focuses on social science research to better understand the relationship between the public and the environment. Projects under this action should be designed to be applicable in management efforts, such as to help guide or shape behavior change or stewardship campaigns. This work should include:

- Conducting a Public Perception Survey every 3 – 5 years.
- Identifying or studying potential methods and tools that encourage the adoption of sustainable environmental changes, practices, and behaviors.
- Identifying or studying the best methods for community co-development or involvement in planning.
- Exploring attitudes and barriers to community or individual adoption of resilience practices.

Cooperators and Partners: NYSG, CTSG, NEIWPC, LISS Research grantees.

Funding Sources: LISS, Long Island Sound Study Research Grant

Funding Needs: \$\$\$ - \$150K-\$1M

Performance measures:

- Number of LISS-supported social science research projects

Expected Timeframe: Ongoing (Funding range identified for 5 years)

Climate Change Stressors Addressed: (1) warmer summers; (2) warmer winters; (3) warmer waters; (4) increasing drought; (5) increasing storminess; (6) sea level rise; and (7) ocean acidification.

How the action will reduce/mitigate climate change risks to the goal: A better understanding of local environmental attitudes will inform the implementation of more resonant educational programs, many of which will target behaviors related to climate mitigation, sustainability, and resilience.

Action IEP 3-3

Develop campaigns and share messages to encourage residents, both homeowners and renters, to engage in environmentally-friendly practices around their homes, schools, businesses, and communities.

Action Description: This action focuses on promoting sustainable behaviors at home and in the community that result in clean water, healthy habitats, and resilient communities. It supports efforts to achieve objectives in other CCMP Goals. This can include fostering behaviors that contribute to:

- Watershed health and the reduction of nutrient pollution, such as sustainable lawncare practices, the implementation of green infrastructure, and septic tank system maintenance and replacement, the installation of riparian buffers in private property, etc.
- The reduction of marine debris, such as the adoption of technologies that reduce microplastics (for example, in washing machines).
- The reduction of pathogens in the water, such as proper dog waste disposal and boating sewage discharges.

Promotion of these behaviors can be through programs, informational resources, events, campaigns, etc.

Cooperators and Partners: NYSG, CTSG, NEIWPC, NYSDEC, CT DEEP, LINAP, LISFF, and LISCIF grantees

Funding Sources: LISS, LISFF, LISCIF

Funding Needs: \$\$\$ - \$150K-\$1M

Performance measures:

- Number of visits or clicks in LISS digital media channels for LISS-produced informational tools and resources
- Number of participants at LISS-supported events and webinars aimed at promoting sustainable behaviors in the LISS watershed
- Number of people who have demonstrated or committed to a change in behavior through pledges, by making use of incentive or reimbursement programs, etc. (This metric is specific to behaviors that do not take place on the Sound, its coast, and its tributaries, but can impact the Sound)
- Qualitative data suggesting an increase in adopted sustainable behaviors as indicated in program evaluations

Expected Timeframe: Ongoing (Funding range selected for 5 years).

Climate Change Stressors Addressed: (1) warmer summers; (2) warmer winters; (3) warmer waters; (4) increasing drought; (5) increasing storminess; (6) sea level rise; and (7) ocean acidification.

How the action will reduce/mitigate climate change risks to the goal: A better understanding of local environmental attitudes will inform the implementation of more resonant educational programs, many of which will target behaviors related to climate mitigation, sustainability, and resilience.

Action IEP 3-4

Promote environmentally-friendly behaviors at the Sound, its coast, and its tributaries through outreach to beachgoers, boaters, anglers, and other users of the Sound.

Action Description: This action focuses on fostering sustainable behaviors of user groups who are directly interacting with the Sound and its coast and tributaries, such as beachgoers, boaters, and anglers. This can be through programs, informational resources, events, campaigns, etc. Examples of this work can include, but are not limited to, outreach to:

- Boaters to encourage the use of pump-out stations, proper painting methods for boats, best practices to mitigate the spread of invasive species, best practices for eelgrass conservation, etc.
- Anglers to promote the proper disposal of fishing gear.
- Beachgoers to target littering behaviors and encourage sharing of the shore with wildlife.
- Any additional user-groups as needed.

Cooperators and Partners: NYSDEC, CTDEEP, NYSG, CTSG, NEIWPC, CAC, LIS Marine Debris Action Plan Partners, LISFF and LISCIF grantees

Funding Sources: LISFF, LISCIF, LISS

Funding Needs: \$\$\$ - \$150K-\$1M

Performance measures:

- Number of campaigns, programs, or materials developed to encourage behavior change for user groups of the Sound
- Number of visits or clicks in online webpages for LISS-produced informational tools and resources
- Number of participants at events and webinars hosted or supported by LISS that focus on sustainable behaviors at the Sound, its coast, and its tributaries
- Number of people who have demonstrated or committed to a change in behavior through pledges, by making use of incentive or reimbursement programs, etc. (This metric is specific to behaviors that take place on the Sound, its coast, and its tributaries)
- Qualitative data suggesting an increase in adopted sustainable behaviors as indicated in program evaluations

Expected Timeframe: Ongoing

Climate Change Stressors Addressed: (1) warmer summers; (2) warmer winters; (3) warmer waters; (4) increasing drought; (5) increasing storminess; (6) sea level rise; and (7) ocean acidification.

How the action will reduce/mitigate climate change risks to the goal: Promotion of environmentally-friendly behaviors on the Sound, its coast, and its tributaries is essential to help conserve coastal habitats and wildlife in the face of climate change (for example, eelgrass beds and salt marsh sparrow populations).

Action IEP 3-5

Provide information, programming, resources, and incentives —such as educational toolkits—that enable local environmental groups, municipalities, schools, and other user groups to teach and promote sustainable practices in their communities.

Action Description: This action focuses on supporting groups in the promotion of behavior change and sustainable practices locally. Work in this action includes:

- Creating a Behavior Change Index based on behavior questions from the Public Perception Survey. Use the index to develop an online dashboard stakeholders can use to inform behavior change campaigns in their communities.
- Developing and/or sharing informational tools and resources stakeholder groups can adapt and use to promote sustainable behaviors in their communities, such as brochures, toolkits, infographics, etc.
- Supporting programs and events that educate stakeholder groups on information and tools they can use to promote or incentivize sustainable behaviors locally.

Cooperators and Partners: NYSG, CTSG, NEIWPC, NYSDEC (LINAP), CT DEEP, LISFF or LISCIF grantees.

Funding Sources: LIS EPA, LISFF, LISCIF, LINAP

Funding Needs: \$\$\$ - \$150K-\$1M

Performance measures:

- Number of LISS-supported events that educate stakeholder groups on information and tools they can use to promote sustainable behaviors locally
- Number of individuals engaged at LISS-supported events that educate stakeholders on information and tools they can use to promote sustainable behaviors locally
- Number of community-based campaigns supported by LISS or LISS resources.
- Number of visits to the Behavior Change Dashboard
- Number of materials and tools developed to support communities in promoting sustainable practices locally
- Increase in improved behaviors as indicated by the behavior change index

Expected Timeframe: Ongoing

Climate Change Stressors Addressed: (1) warmer summers; (2) warmer winters; (3) warmer waters; (4) increasing drought; (5) increasing storminess; (6) sea level rise; and (7) ocean acidification.

How the action will reduce/mitigate climate change risks to the goal: By providing information, programming, resources, and incentives that enable user groups to teach and promote sustainable practices in their communities, awareness of actions to mitigate and adapt to climate change will be promoted locally.

Appendix C: Key to Actions Supplement

The CCMP has a 10-year horizon and includes actions to help achieve the plan goals and objectives. These actions describe the priority areas the LISS will focus on over the next five years. These actions are presented by goal; however, many of the actions will achieve progress in multiple goal areas. Four supplemental documents detailing the CCMP Actions by goal are available at:

www.LongIslandSoundStudy.net.

Each action includes:

- A description about the proposed action
- The lead or cooperating agencies and organizations
- Potential sources for funding and the level need within five categories
 - \$ Less than \$25,000
 - \$\$ \$25,000 to \$150,000
 - \$\$\$ \$150,000 to \$1,000,000
 - \$\$\$\$ \$1,000,000 to 15,000,000
 - \$\$\$\$\$ Greater than \$15,000,000
- Performance measures
- An approximate time frame for action completion

Review and development of actions every five years will allow for adaptive management and inclusion of emerging scientific and technological advances. Refining the actions every five years will keep the CCMP current and incorporate the most effective management practices on a regular basis.

The four funding level categories represent broad ranges in which to distinguish and group funding needs of actions. The needed level of funding for an action will also determine the types of funding sources (e.g., government grants, local foundations, clean water infrastructure grants and loans) most applicable to meeting that need.

LISS will assess implementation progress on a regular basis and update the website yearly. At the end of year four of each implementation cycle, LISS will revisit the actions based on implementation successes and on new drivers, pressures, or issues. New actions will be developed for the next five-year planning cycle to support attainment of the goals and objectives.

Appendix D: Climate Vulnerabilities

The Protect and Restore America’s Estuaries (PRAE) Act was signed into law on January 13, 2021. The PRAE Act amended Clean Water Act Section 320 by requiring each National Estuary Program to develop a comprehensive conservation and management plan that “addresses the effects of recurring extreme weather events on the estuary, including the identification and assessment of vulnerabilities in the estuary and the development and implementation of adaptation strategies.” In 2016, Battelle followed EPA’s workbook steps described in “Being Prepared for Climate Change: A Workbook for Developing Risk-Based Adaptation Plans” (EPA 2014) to develop vulnerability matrices for the Northeast National Estuary Programs. In 2019, the Long Island Sound Study supported the development of a report by Dr. Juliana Barrett titled “Long Island Sound Study Vulnerability Assessment Outreach” that adapted Battelle’s vulnerability matrices and tailored them to the Long Island Sound region based on feedback from Long Island Sound experts. This vulnerability assessment comprehensively reviewed the stressors and risks that affect accomplishment of goals of pollution control; habitat; fish, wildlife, and plants; and recreation and public water supplies.

Warmer temperatures, changes in precipitation, increasing storminess and extreme weather events, sea level rise, and ocean acidification will pose risks to the water quality and habitat goals set by National Estuary Programs across the nation. A description and relevant information of these stressors in the Long Island Sound region can be found in Appendix E of the Long Island Sound Study Vulnerability Assessment. The detailed report can be found on the Long Island Sound Study website at <https://longislandsoundstudy.net/2019/09/coastal-vulnerability-assessment-report/>.

The following section summarizes how the existing vulnerability assessment relates to the Long Island Sound Study’s 2025 CCMP goals. Three overarching climate risks, along with the likelihood and consequence of each risk (H/M/L), are identified for each CCMP goal. The CCMP supplemental document that details each objective and action highlights the climate change stressors that the action addresses and explains how the action will reduce or mitigate climate change risks to the associated objective and goal.

CCMP Goals

Clean Waters and Healthy Watersheds

Risk: Increased storm intensity and frequency will lead to heightened risks to public health due to impacts on wastewater and stormwater infrastructure, reducing our ability to meet water quality goals in nearshore waterways and beaches for primary contact recreation, shellfish, and floatable debris.

Likelihood of occurrence: High

Consequence of Impact: High

Risk: Warmer water temperatures may increase algal growth, including harmful algal blooms that impact aesthetics and availability of certain habitats to wildlife. In some cases, algal blooms can produce harmful toxins impacting shellfish, human recreation, and aquatic species.

Likelihood of occurrence: High

Consequence of Impact: Medium

Risk: Warmer water temperatures may decrease dissolved oxygen due to reduced solubility, increased respiration, and remineralization rates, and increased thermal stratification. Concurrent climate-driven changes in streamflow, wind, and sea level will also impact dissolved oxygen dynamics. Low dissolved oxygen limits the distribution and survivability of pelagic and benthic species.

Likelihood of occurrence: High
Consequence of Impact: Medium

Thriving Habitats and Abundant Wildlife

Risk: Shoreline erosion, exacerbated by increased storminess and sea level rise, may lead to loss of beaches, wetlands, islands, bluffs, eelgrass, and salt marshes and their associated fish and wildlife.

Likelihood of occurrence: High
Consequence of Impact: High

Risk: Warmer water and coastal acidification may cause habitat to become unsuitable for species, their larvae or juveniles, and their food sources.

Likelihood of occurrence: High
Consequence of Impact: High

Risk: Increased storminess in upstream habitats may cause stream erosion resulting in high turbidity and sedimentation and decreased salinity due to greater precipitation resulting in increased streamflow.

Likelihood of occurrence: High
Consequence of Impact: High

Sustainable and Resilient Communities

Risk: Increased storminess may increase the vulnerability of drinking and wastewater water infrastructure to flooding.

Likelihood of occurrence: High
Consequence of Impact: High

Risk: Sea level rise may cause beaches or public access sites to be lost to coastal erosion or inundation.

Likelihood of occurrence: High
Consequence of Impact: Medium

Risk: Installation of bulkheads, sea walls and revetments to limit coastal inundation due to sea level rise may decrease public access and natural shorelines that are important to many species.

Likelihood of occurrence: High
Consequence of Impact: Medium

Informed and Engaged Public

Risk: Increased storminess may bring more frequent or more intense storms that may impact coastal public access sites and decrease recreational opportunities.

Likelihood of occurrence: High
Consequence of Impact: Medium

Risk: With warmer water, species composition is changing, and some desired recreational fish may no longer be present.

Likelihood of occurrence: High
Consequence of Impact: Medium

Risk: With warmer water and increased storm activity and intensity, opportunities for the public to safely recreate on the water will be decreased.

Likelihood of occurrence: High
Consequence of Impact: low

Appendix E: Program Authorization and Organizational Structure

Congress appropriated funds in 1985 for the U.S. Environmental Protection Agency (EPA) to research, monitor, and assess the health of Long Island Sound. Congress formally strengthened the Clean Water Act in 1987 to protect the nation's coastal waters by creating the National Estuary Program (Section 320). The Act authorized the EPA, in cooperation with the states of Connecticut and New York, to develop a Comprehensive Conservation and Management Plan (CCMP) for protecting and improving the health of Long Island Sound.

To support development of the plan, in March 1988, EPA and the states of Connecticut and New York established the Long Island Sound Study (LISS), a Management Conference involving federal, state, interstate, and local agencies, universities, environmental groups, industry, and the public. In 1990, Congress amended the Clean Water Act again, passing the Long Island Sound Improvement Act (Section 119), which established an EPA Long Island Sound program office, further strengthening EPA's role in coordinating implementation strategies through cross-jurisdictional partnerships. The EPA Administrator and Governors of Connecticut and New York approved the first CCMP developed by the Management Conference in 1994 and a revised plan in 2015.

The Long Island Sound Management Conference is fundamentally a partnership of independent organizations sharing a common goal and purpose. The foundation of the Management Conference is a commitment to regional collaboration to protect and restore the health of the Long Island Sound ecosystem by fostering resource conservation and sustainable use. The Management Conference partners collaborate on research, governance, and management of Long Island Sound and its living resources, including humans in an approach called ecosystem-based management (Hartig et al. 2024). The program fosters mutual learning, shared experiences, and institutional capacity building. The Management Conference develops annual agreements, directing funds and mutual efforts toward implementing the CCMP. Details on the Management Conference structure, governance, and operations are available on the Long Island Sound Study website at www.longislandsoundstudy.net.

This page marks the end of the 2025 CCMP Text.