Long Island Sound Comprehensive Conservation and Management Plan 2025

Returning the Urban Sea to Abundance

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June 2025

Authorized by Congress in 1985, the Long Island Sound Partnership involves federal, state, interstate, and local government agencies, Tribes and Nations, non-government organizations, industries, universities, and community groups to restore and care for the Sound.
This report was a collaborative effort prepared by the Long Island Sound Partnership.

We want to express our gratitude to the CCMP writing team chairs, members, and contributing authors. Writing teams provided invaluable expertise and insight in drafting the final language of the CCMP. Their diligence in meeting ambitious deadlines was crucial to completing the CCMP and has allowed the Partnership to move forward with a focus on taking action to implement this plan. We are grateful to all who attended public meetings, provided comments, and informed the CCMP development process.

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The historic lighthouse at Lighthouse Point Park in New Haven.
Photo by Jon Bilous/Alamy Stock photo.

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 a home to 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 and uses, including recreational and commercial fishing, boating, beachgoing, and nature walks, benefiting coastal communities and visitors alike.

The history of Long Island Sound is the story of America. In the foreword to Tom Andersen's environmental history of Long Island Sound, *This Fine Piece of Water* (Andersen, 2002), Robert F. Kennedy, Jr., describes "a region of mythical productivity" observed by the first European explorers.

> *They smelled aromas from Long Island's flowers before sighting land and found four hundred bird species, many of which are gone today. Henry Hudson's lieutenant Robert Juett described rivers choked with salmon (probably striped bass) and mullet. Giant dolphin pods schooled in the East River and New York Harbor. F. Scott Fitzgerald, one of Long Island's most faithful chroniclers in recalling its legendary abundance, suggested that the Sound appeared to the first Dutch sailor as the "fresh green breast of the new world," compelling him to hold his breath in "an aesthetic contemplation he neither understood nor desired, face to face for the last time in history with something commensurate with his capacity for wonder."*

A STEEP WOODEN STAIRCASE descending to Long Island Sound from Horton Point Lighthouse in Southhold, Long Island. Photo by Randy Duchaine / Alamy Stock Photo.

The settlement and development of the coastline and watershed was a societal success story of human opportunity and adaptation; it also gave rise to pollution from agriculture, industry, and human populations. The urbanization of the Sound's lands, initiated in the nineteenth century, expanded quickly in the twentieth century. At the Sound's western border, New York City evolved into the world center of commerce and its associated economic and social developments ultimately sprawled eastward along the Westchester County, Long Island, and Connecticut shorelines. Called the "American Mediterranean" (Weigold, 2004) and the "Urban Sea" (Koppelman et al., 1976), human habitation is inherent to Long Island Sound's character. After decades of neglect, public and private efforts to protect and restore Long Island Sound have succeeded to the point of returning this urban sea to abundance, where humans enjoy a healthy environment and thriving economy.

ABOUT THE PARTNERSHIP

In 1985, Congress appropriated funds for the U.S. Environmental Protection Agency (EPA) and the states of Connecticut and New York to research, monitor, and assess the water quality of Long Island Sound. The Partnership was formalized and expanded in 1987, when Congress created the National Estuary Program under Section 320 of the Clean Water Act. The Act authorized the EPA, in cooperation with 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. The Management Conference, involving federal, state, interstate, and local agencies, universities, stakeholder groups, and

the public, called itself the Long Island Sound Study. The name appropriately captured the need for more research and data to better understand and improve the conditions in Long Island Sound.

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 planning of Long Island Sound and its living resources, including humans, in an approach called ecosystem-based management (Hartig et al., 2024).

The Management Conference produced its first comprehensive plan in 1994 and revised it in 2015. Coordinated action among multiple levels of government, the private sector, and the public has accomplished much in the past 30 years. Cooperating partners have translated the plan, year-by-year, into actions that have resulted in a Long Island Sound with cleaner water, healthier habitats, and a more aware and engaged public. Nitrogen pollution from Connecticut and New York wastewater treatment plants has been reduced effectively to a third of pre-management levels; the flow-normalized discharge of nitrogen from the rivers draining to Long Island Sound has been cut in half. As a result, water quality is improving—the average maximum summertime area of unhealthy levels of dissolved oxygen has shrunk in half. Partners have restored 2,400 acres of coastal habitat, of which 1,150 are tidal wetlands important for storm and flood protection, and reconnected 448 miles of rivers and streams to Long Island Sound for fish passage, contributing to healthier fish communities and recreationally and economically valued fisheries.

Despite this progress, many challenges remain along with new challenges such as emerging contaminants and coastal resiliency. To respond to the changing needs of communities, incorporate scientific and

FIGURE 1. Long Island Sound watershed and its basins and channels.

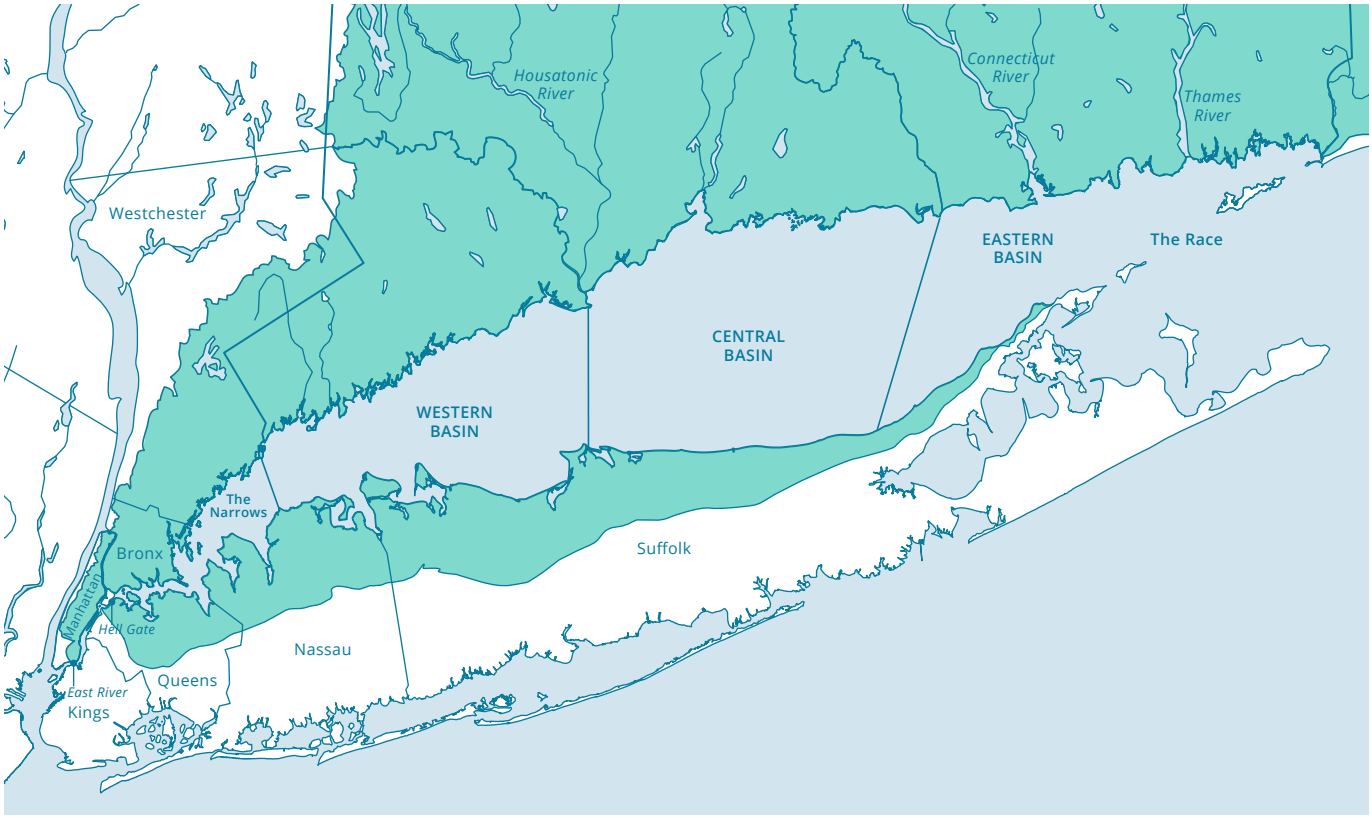
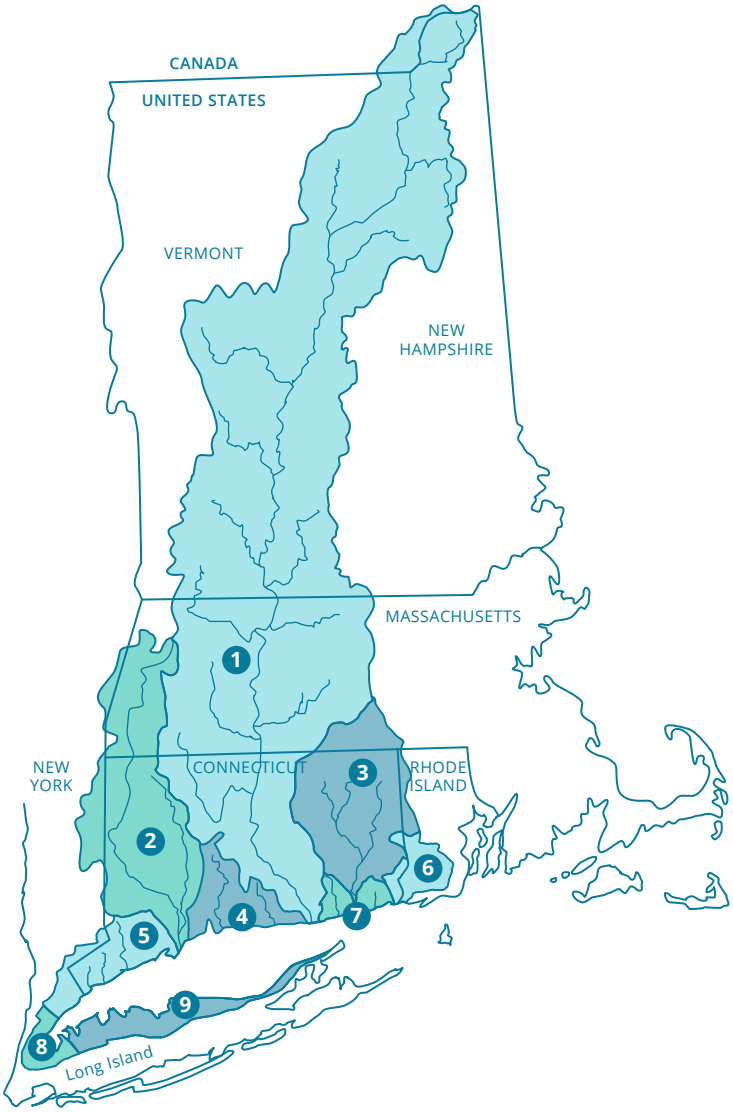


FIGURE 2. Land Area Draining to Long Island Sound –

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



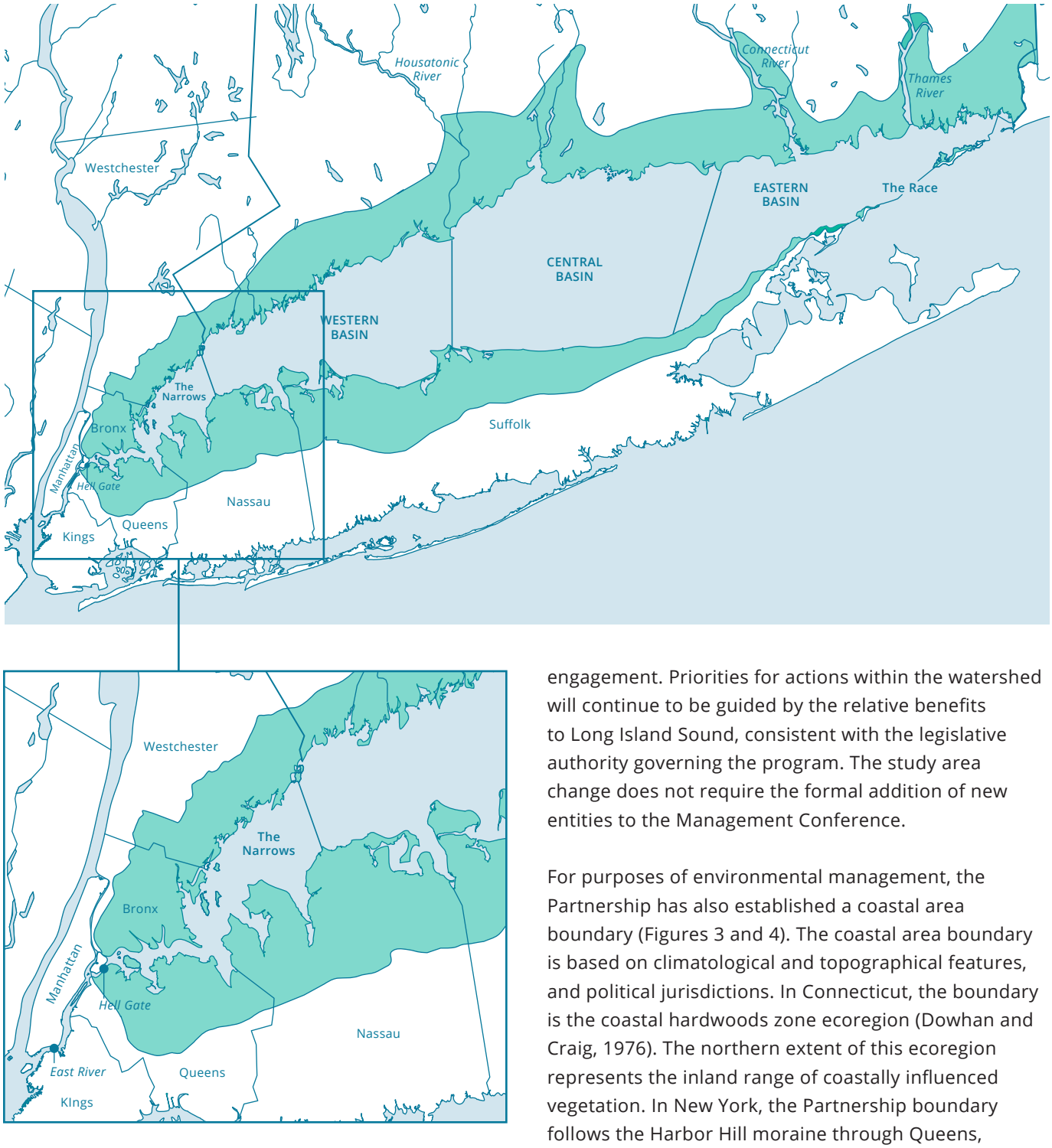
technological advances, and address new environmental challenges, the Management Conference has produced the 2025 CCMP. It provides a blueprint for collaboration and establishes goals, objectives, and actions for the next ten years to further restore and protect the Sound. It reinforces existing goals for cleaner water, healthier habitats, and more resilient communities while setting a new goal to inform and engage people in the effort. Detailed characterization of environmental conditions or program history published in prior CCMPs have been omitted here in favor of a concise action plan. Readers interested in further background are encouraged to visit Appendix A and the Partnership website.

The new plan is being released under a new organizational name. While the Management Conference has operated as the *Long Island Sound Study* for nearly 40 years, public feedback increasingly communicated that the name was misleading and confusing, emphasizing study rather than action. While scientific research and environmental monitoring are still integral to the program, the Management Conference believes that such studies should inform action and coordinated implementation. Therefore, after soliciting public input on name options, the Management Conference has selected *Long Island Sound Partnership* to better reflect the commitment to coordinate actions by all levels of government and diverse stakeholders.

GEOGRAPHY AND PROGRAM SCOPE

The Sound is characterized as having four regions: the Narrows, 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 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, 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 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 Partnership 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 planning and action on the whole watershed scale to meet that directive and emphasizes the Partnership's commitment to expanding communication, cooperation, and



FIGURES 3 AND 4. The Long Island Sound Coastal Boundary Area.

engagement. Priorities for actions within the watershed will continue to be guided by the relative benefits to Long Island Sound, consistent with the legislative authority governing the program. The study area change does not require the formal addition of new entities to the Management Conference.

For purposes of environmental management, the Partnership has also established a coastal area boundary (Figures 3 and 4). The coastal area 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 range of coastally influenced vegetation. In New York, the Partnership 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 boundary is the Robert F. Kennedy Bridge span that crosses the East River between Queens and the Bronx. The western boundary in the Bronx and Westchester Counties follows the Hutchinson River Parkway.

VISION, MISSION, VALUES, AND 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 Partnership leads a collective effort to restore and care for the Sound and its watershed.

VALUES

The Partnership has adopted core values to guide its operation and activities.

1. **Actionable Science:** Support innovative and high-quality science to understand and care for the health of the Sound and its watershed. Make science 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 individuals in decision-making and program implementation. 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.
3. **Adaptive 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 and work to make resources accessible to all.

GOALS

Four goals translate the Vision into specific action statements.

1. **Clean Waters and Healthy Watersheds (CWHW):** Restore and maintain water quality in Long Island Sound and its watershed.
2. **Thriving Habitats and Abundant Wildlife (THAW):** Restore and protect the health and resilience of habitats and wildlife in Long Island Sound and its ecosystems.
3. **Sustainable and Resilient Communities (SRC):** 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 (IEP):** 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 aspirational outcomes to be achieved by 2035 (unless stated otherwise). The objectives are ambitious goalposts to drive collective action. Each objective has one or more defined primary measures of success structured to be Specific, Measurable, Achievable, Relevant, and Time-bound (a framework known as SMART). The SMART framework helps define reasonable outcomes and ensures that progress can be clearly and precisely tracked over time. Each objective also identifies indicators that can provide supporting data and insight into the progress made. Explanations of and rationale for each objective, along with full descriptions of how each primary measure of success follows the SMART structure, are included in Appendix B.

Actions are broad, strategic activities to be taken in the next five years (2025-2029) to help achieve an objective. The actions, along with a brief description of the types of activities that contribute to the action, are listed under a specific objective but may also support the attainment of other objectives. Full descriptions of and rationale for each action and supporting activities are included in Appendix B. The crosscutting connections of actions contributing to the achievement of multiple objectives are shown in Appendix C. The Partnership will review the actions in five years and update them as needed to allow for adaptive management and inclusion of emerging scientific and technological advances.

CCMP GOALS

This section highlights the objectives and actions required to meet the goals of the CCMP. It starts with a two-page summary, "Our Plan at a Glance."

A WILLET ALONG THE ROCKS at Hammonasset Beach State Park, a Long Island Sound Stewardship Site, in Madison, CT. Photo by Bob Gundersen.

CLEAN WATERS AND HEALTHY WATERSHEDS

OBJECTIVES	ACTIONS
Nutrients: Reduce nutrients across the watershed to restore and protect water quality and mitigate impacts on ecosystem health in LIS and its embayments.	• Implement nutrient reduction actions across the LIS watershed focusing on the most impactful sources. • Support monitoring, modeling, and research, to improve understanding of source contributions, their impacts to ecosystem health, and the benefits of nutrient reduction actions. • Collaborate with stakeholders and partners to develop plans, tools, and strategies that support nutrient reduction actions.
Watershed Health: Improve the ecosystem health of LIS and its watershed through protection and positive land use practices.	• Preserve, restore, and steward natural landscapes and the ecosystem services they provide through land conservation and protection efforts beyond the coastal boundary. • Implement nature-based solutions that improve and maintain water quality and ecosystem health.
Pathogens: Reduce pathogens and increase monitoring to protect water quality and human health, ensuring safe recreational and commercial use.	• Evaluate and improve wastewater and stormwater infrastructure, and support upgrades or sewer connections of inadequate onsite wastewater treatment systems in the LIS coastal watershed boundary. • Expand sampling and source tracking and encourage advancements in methodology.
Toxic Contaminants: Research, monitor, assess, and reduce emerging and legacy toxic contaminants to mitigate impacts on water and habitat quality in LIS.	• Identify existing and emerging contaminants of concern and support mitigation efforts. • Continue collection and evaluation of contaminant data. • Encourage proactive research and assessment of emerging contaminants.
Marine Debris: Achieve trash free waters by increasing clean-up efforts and preventing marine debris from entering LIS.	• Support research and monitoring to better understand the extent, sources, and impacts of debris on the ecosystem. • Advance and implement interception technologies and tools that remove debris and support education and outreach. • Support the removal of marine debris in LIS and coastal watersheds. • Inform and support the development and implementation of municipal and state marine debris plans and policies to reduce, prevent, and intercept debris.

THRIVING HABITATS AND ABUNDANT WILDLIFE

OBJECTIVES	ACTIONS
Coastal Habitat: Protect and enhance the extent, health, and wildlife benefits of coastal habitats through restorative measures to combat deterioration and loss.	• Restore coastal habitat through established restoration techniques or help validate and communicate innovative approaches. • Install living shorelines for coastal habitat restoration and protection, including the conversion of existing hard-armored shorelines to a more natural condition. • Survey, research, and monitor changes in extent and abundance of coastal habitat types, focusing on tidal wetlands and seagrass.
Offshore Habitat: Protect and enhance the health of offshore habitat and their associated species.	• Promote marine spatial planning that balances human uses and protects ecosystem functions of offshore habitat and species. • Map the seafloor to characterize underwater habitats and use that data to enhance coastal and marine spatial planning and designation of protected areas and buffer zones. • Steward and restore offshore habitat, supporting the development and implementation of action plans and programs that incorporate community science, engagement, and participation.
Habitat Connectivity: Increase connectivity of coastal habitat to enhance biodiversity and support migratory pathways.	• Use remote sensing, mapping tools, modeling, and field verification to restore and protect habitat patches and river miles to enhance connectivity. • Remove stream barriers to restore fish and wildlife migration, sediment transport, and other stream functions. • Collaborate regionally to streamline permitting pathways to strengthen regional capacity for habitat restoration.
Conserved Open Space: Conserve open space through land acquisition while maintaining and enhancing the total area of protected land.	• Protect coastal habitat from development through the implementation of land conservation plans that identify priorities for conservation, management, and investment. • Increase access and enhance sustainable stewardship of conserved lands particularly for distressed communities.

SUSTAINABLE AND RESILIENT COMMUNITIES

OBJECTIVES	ACTIONS
Informed Decision-Makers: Grow the # of municipal, nonprofit, and community leaders receiving training and support to increase capacity for adaptation to environmental challenges.	• Deliver or facilitate sustainability and resilience training programs responsive to community needs. • Support community-centered research, monitoring, or development of tools to assess the effects of extreme weather events and advance resilience.
Community-Driven Resilience: Increase the # of municipalities that identify key resilience priorities through local or regional community-driven planning processes.	• Develop resilience plans, including the incorporation of resiliency strategies into existing municipal, regional, or watershed plans. • Coordinate across municipal boundaries to advance collective resilience priorities. • Empower and increase engagement of community members and groups in local and regional resilience planning and decision-making.
Resilience Initiative Implementation: Implement initiatives to improve community resilience to flooding and other environmental challenges.	• Increase community capacity to implement and manage sustainable and resilient initiatives. • Develop and adopt regulations, codes, and ordinances that increase resilience. • Implement nature-based solutions that address flooding and other climate impacts. • Implement infrastructure projects that increase community sustainability and resilience to flooding and other climate impacts. • Monitor, maintain, and adaptively manage resilience projects to ensure their long-term success.

INFORMED AND ENGAGED PUBLIC

OBJECTIVES	ACTIONS
Public Access and Sense of Belonging: Increase and improve opportunities for everyone to access and appreciate LIS and the waters that flow into the Sound.	• Collaborate with local governments, environmental groups, and community leaders to increase and improve public access and sense of belonging. • Develop and implement projects that increase the number and quality of public access sites. • Promote sense of belonging at public access sites through events, festivals, celebrations, materials, and programming.
Education and Environmental Literacy: Increase, improve, and expand the environmental literacy of people interacting with the LIS watershed.	• Increase collaboration among environmental education partners to elevate existing and initiate new environmental education programs. • Host and promote opportunities to participate in LIS-based education programs. • Develop engaging, multilingual, and innovative educational materials, tools, and activities. • Support efforts to assess the public's understanding of LIS and its watershed.
Fostering Stewardship and Sustainable Behaviors: Increase public engagement in environmental practices that protect and conserve LIS and its watershed.	• Involve the public in monitoring, restoration, and conservation of LIS and its ecosystems through volunteerism, participatory science, and community-led action. • Investigate the relationship between the public and the LIS ecosystem through social science research. • Develop campaigns and share messages to encourage residents to engage in environmentally friendly practices. • Promote environmentally friendly behaviors through outreach to beachgoers, boaters, anglers, and other Sound users. • Provide information, programming, resources, and incentives that enable local environmental groups, municipalities, schools, and others to teach and promote sustainable community practices.

CLEAN WATERS AND HEALTHY WATERSHEDS

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

INTRODUCTION

Clean water is an essential component to achieving the Partnership's vision and 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 State Department of Environmental Conservation (NYSDEC), Connecticut Department of Energy and Environmental Protection (CT DEEP), and the EPA recognized the need to take action to improve water quality and worked to develop *A Total Maximum Daily Load to Achieve Water Quality Standards for Dissolved Oxygen in Long Island Sound* (CT DEEP and NYSDEC, 2000), which set allocations for nitrogen entering Long Island Sound from throughout the watershed. Following approval of the Total Maximum Daily Load (TMDL), New York and Connecticut incorporated nitrogen limits into the permits for wastewater treatment plant discharges in the watershed. 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, New York and Connecticut 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. More recently, the EPA has added nitrogen limits to wastewater treatment plant discharges in the Massachusetts portion of the watershed. The cumulative decline in nitrogen pollution to the Sound has improved water quality, decreasing the five-year rolling average in the maximum area of hypoxia—or low dissolved oxygen—waters by more than half compared to the pre-2000 average.

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 Long Island Sound's open water and embayments from meeting water quality goals. Addressing these environmental conditions will require integrated approaches to reduce polluted surface water and groundwater, evaluate contaminants of emerging concern, and create resilient infrastructure. There is a continued need for land use planning that protects water resources to ensure the sustainable use of the Sound's resources. Extreme weather events and a changing climate can 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, which many people use for recreation and enjoyment.

The objectives under this goal address the factors that most impact Long Island Sound: nutrient pollution, pathogen contamination, toxic contaminants, marine debris, and land-use practices. Each objective is followed by actions and supporting activities to be taken in the next five years (2025-2029) to help achieve it. Refer to Appendix B for technical explanations of the objectives and actions.

Objective 1: Nutrients

CWHW 1: Reduce nutrients across the watershed to restore and protect water quality and mitigate impacts on ecosystem health in Long Island Sound and its embayments.

The primary measures of success are to: implement nutrient reduction actions established under Suffolk and Nassau counties' nine-element watershed-based plans; establish nutrient reduction or protection targets for six priority embayments through Connecticut's *Second-Generation Nitrogen Strategy*; and develop additional nutrient reduction and protection plans across the watershed to reduce impairments in Long Island Sound, including open-water hypoxia, and its embayments. Benthic conditions, hypoxia extent, duration and volume, water clarity, and nitrogen loading from wastewater treatment plants and rivers can provide indicators of progress in meeting the overall objective.

NYSDEC's nine-element watershed-based plans and CT DEEP's *Second-Generation Nitrogen Strategy* establish actions designed to reduce nutrient loading to support water quality and ecosystem health of Long Island Sound and its embayments. The nine-element watershed-based plans for both Suffolk and Nassau counties call for the removal and upgrade of substandard onsite wastewater treatment systems (OWTS), including connecting them to public sewers. Reduction of nutrients will be accounted for by tracking the number of OWTS that are removed or upgraded. CT DEEP is developing embayment specific nutrient reduction and protection targets and progress towards this measure will be tracked by the number of embayments with targets. Efforts to attain and maintain nitrogen loading targets supporting water quality standards under future conditions in Long Island Sound will continue, including assessments of monitoring data and regional water quality modeling tools. Other efforts, such as the Long Island Sound Futures Fund and state-managed 319 nonpoint source programs provide funding for the development of nutrient reduction plans and implementation actions that also work to support the water quality and ecosystem health of Long Island Sound and its embayments. Therefore, nutrient removal projects and the number of plans developed will be tracked as an additional measure of success for the nutrients objective.

ACTIONS

CWHW 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.

Activities under this action include upgrading wastewater treatment plants; improving wastewater and stormwater infrastructure, abating combined and sanitary sewer overflows (CSOs and SSOs) in support of approved long-term control plans and municipal separate stormwater sewer system permits; replacing traditional OWTS with enhanced onsite wastewater treatment systems or connections to centralized treatment systems; and supporting nutrient bioextraction projects.

CWHW 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.

Activities under this action include monitoring and researching nutrient sources and impacts, as well as developing multiple types of models and data management systems.

CWHW 1-3: Collaborate with stakeholders and partners to develop plans, tools, and strategies that support nutrient reduction actions to improve overall ecosystem management.

Activities under this action include developing additional watershed-based plans, policies, and

strategies that alleviate barriers and expedite implementation, and creating other tools to support nutrient reduction actions.

Other actions that support objective: CWHW 2-1, CWHW 2-2, CWHW 3-1, THAW 3-2, THAW 4-2, SRC 3-1, SRC 3-2, SRC 3-3, SRC 3-4, IEP 3-1, IEP 3-3

Objective 2: Watershed Health

CWHW 2: Improve the ecosystem health of Long Island Sound and its watershed through protection and positive land use practices.

The primary measures of success are to establish and maintain a 100-foot or wider riparian buffer across 75 percent of the waterways and in 90 percent of the subbasins, and achieve and maintain the permanent protection of 35 percent of the Long Island Sound watershed by 2035. Impervious cover and changes in forest cover can provide indicators of progress in meeting the overall objective.

Protecting land in key areas prevents habitat loss, reduces pollution from stormwater runoff, and safeguards ecosystems that serve as natural buffers against climate impacts. The Partnership will prioritize areas that safeguard water quality, support biodiversity, enhance climate resilience, and provide access to green spaces for all communities. These targets build upon regional initiatives like "30 by 30," which aim to protect 30 percent of land by 2030 while promoting ecological and community health. Additionally establishing 100-foot or wider riparian buffers aid in filtering pollutants, stabilizing streambanks, and reducing runoff.

ACTIONS

CWHW 2-1: Preserve, restore, and steward natural landscapes and the ecosystem services they provide through land conservation and protection efforts beyond the coastal boundary.
Activities under this action include acquiring land, restoring habitat, implementing stewardship programs, collecting GIS data, and developing models to protect and enhance ecosystem services.

CWHW 2-2: Implement nature-based solutions and other practices that improve and maintain water quality and ecosystem health.
Activities under this action include installing green infrastructure, establishing riparian buffers, reducing impervious surfaces, restoring wetlands, enhancing urban forestry, and collecting GIS data to improve water quality and ecosystem health.

Other actions that support objective: THAW 4-2, SRC 3-1, SRC 3-3, IEP 3-3

Objective 3: Pathogens

CWHW 3: Reduce pathogens and increase monitoring to protect water quality and human health, ensuring safe recreational and commercial use.

The primary measures of success are, through stormwater and wastewater infrastructure improvement projects, to: complete 11,500 OWTS replacements, upgrades, and removals; achieve a five-year rolling average of 85 percent of beaches graded B- and above based on beach data from Sound Health Explorer; increase the number of samples collected by 10 percent; and increase the spatial coverage of monitoring relative to a 2023 baseline. Approved shellfish areas and public beach closures can provide indicators of progress in meeting the overall objective.

The target of 11,500 OWTS upgrades was determined by combining targets established under Suffolk and Nassau counties' NYSDEC approved nine element watershed-based plans, and CT DEEP's 10-year target for OWTS upgrades. The Sound Health Explorer target was developed using the five-year rolling averages of the percentage of beaches graded "A" or "B" (B- and above) from 2003-2023. The five-year rolling average of beaches graded B- and above for 2003-2023 is 75.5 percent, while 2023 reported 77.5 percent. It was determined that a five-year rolling average of 85 percent of beaches graded B- and above is an achievable target based on these long-term trends and would improve safe access to beaches. A 10 percent increase in sampling was determined using pathogen monitoring data from the Interstate Environmental Commission and Save the Sound. In 2023, 983 samples were collected across 93 stations in Long Island Sound. It was determined that a 10 percent increase was achievable given the programs' capacity and would help fill geographic data gaps.

ACTIONS

CWHW 3-1: Evaluate and improve wastewater and stormwater infrastructure, and support replacement, upgrade, or sewer connections of inadequate OWTS located in critical or strategic watersheds.
Activities under this action include: assessing wastewater and stormwater infrastructure; implementing infrastructure improvements; abating combined and sanitary sewer overflows in support of approved long-term control plans and municipal separate stormwater sewer system permits; and replacing traditional OWTS with enhanced OWTS or connections to centralized treatment systems.

CWHW 3-2: Expand the spatial and temporal coverage of sampling and source tracking and encourage advancements in methodology.
Activities under this action include expanding spatial and temporal coverage of pathogen monitoring and microbial source tracking, integrating data, and developing models.

Other actions that support objective: CWHW 1-1, THAW 4-2, SRC 3-1, SRC 3-3, SRC 3-4, IEP 3-1, IEP 3-3

Objective 4: Toxic Contaminants

CWHW 4: Research, monitor, assess, and support mitigation efforts on emerging and legacy toxic contaminants to reduce impacts on water and habitat quality in Long Island Sound.
The primary measure of success is to increase the area of sediment in good condition in Long Island Sound by 20 percent from the 2005 baseline by 2035. The area of sediment in good condition in Long Island Sound from the 2005 National Coastal Condition Assessment (NCCA) was 53 percent. This goal, if achieved, would raise the proportion of sediment in good condition from 53 percent to 63.6 percent, which is both ecologically significant and technically feasible based on past trends and ongoing management efforts.

ACTIONS

CWHW 4-1: Identify existing and emerging contaminants of concern and support mitigation efforts as warranted.
Activities under this action include synthesizing data, conducting gap analyses, modeling impacts, developing an action agenda, and identifying potential mitigation approaches.

CWHW 4-2: Continue collection and evaluation of contaminant data (e.g., NCCA) for Long Island Sound and its embayments.
Activities under this action include collecting and evaluating data and developing assessment tools using indicator species or fish tissue.

CWHW 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.
Activities under this action include supporting research to evaluate contaminants that are lesser known.

Other actions that support objective: IEP 3-3

Objective 5: Marine Debris

CWHW 5: Achieve trash free waters by increasing clean-up efforts and preventing marine debris from entering Long Island Sound.

The primary measure of success is to decrease the mass of marine debris collected per mile during the fall International Coastal Cleanup by 10 percent from the 2022 five-year rolling average baseline of 174 pounds per mile. Identification of marine debris by category and number of volunteers at coastal cleanups can provide indicators of progress in meeting the overall objective.

Data from the International Coastal Cleanup held every fall is used because the Partnership can reliably obtain this information annually. The database includes type and weight of debris collected, distance covered, and number of bags filled. Improved frameworks to track marine debris reductions for Long Island Sound will be evaluated and established as needed within a five-year timeline.

ACTIONS

CWHW 5-1: Support research and monitoring efforts that aim to increase understanding of the extent and sources of marine debris and its impact on the ecosystem.
Activities under this action include identifying marine debris hot spots and contributing sources, and developing a framework to track reductions in marine debris abundance over time.

CWHW 5-2: Promote the advancement and implementation of interception technologies, tools, receptacle bins, and capture devices that remove debris, while supporting education and outreach across the Long Island Sound watershed.
Activities under this action include preventing and removing marine debris from upstream sources in the Long Island Sound watershed.

CWHW 5-3: Support the removal of marine debris located within the coastal boundary and Long Island Sound.
Activities under this action include supporting cleanup efforts and removing derelict fishing gear and large-scale debris within the coastal watershed.

CWHW 5-4: Inform and support the development and implementation of new local and state policies, and management plans aimed at source reduction, prevention, and interception practices as identified by available marine debris collection data.
Activities under this action include collecting data to inform decision-making (e.g., management and policies) related to specific marine debris sources**.**

Other actions that support objective: THAW 2-3, THAW 4-2, IEP 3-1, IEP 3-3, IEP 3-4

THRIVING HABITATS AND ABUNDANT WILDLIFE

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 both aquatic and terrestrial wildlife and other 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 Partnership has recognized the importance of restoring and protecting habitats in the Long Island Sound watershed. In fact, since 2014, the Partnership has restored 681 acres of coastal habitat, reconnected 129 river miles, and protected 5,423 acres of open space. The Thriving Habitats and Abundant Wildlife goal is fundamental to achieving the Partnership's vision through restoring and protecting the health and resilience of habitats and wildlife in Long Island Sound and its ecosystems.

Being an urbanized estuary, Long Island Sound habitats face multiple stressors including nutrient pollution, land development, and extreme weather events and a changing climate. While the Partnership has successfully restored and protected critical habitats, it is crucial to continue this work while incorporating innovative techniques and adaptative management to increase resilience to extreme weather events and a changing climate (see Appendix D). Without habitat restoration, protection, and management, Long Island Sound habitats and wildlife, and the ecosystem services they support, will be significantly diminished.

The objectives under this goal highlight four areas: coastal habitat, offshore habitat, habitat connectivity, and conserved open space. Each objective is followed by actions and supporting activities to be taken in the next five years (2025-2029) to help achieve it. Overall, the plan aims to continue 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, the Partnership is prioritizing habitat restoration and protection efforts that are broadly shared across communities. Changes in federal, state, and local regulatory authorities may influence the approaches for protection and restoration work, such as re-prioritization of issues or ecosystems, but the Partnership will adapt to any changes to ensure objectives and actions are met. Refer to Appendix B for technical explanations of the objectives and actions that will guide the Partnership to sustain a healthy, productive, and resilient Long Island Sound benefiting all inhabitants.

> **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.

Objective 1: Coastal Habitat

THAW 1: 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.

The primary measure of success is to restore 1,000 acres of coastal habitat in the coastal boundary of Long Island Sound. Of the 1,000 acres to be restored, 40 percent will be in areas lacking in natural habitat to ensure that benefits of restoration can be enjoyed by more communities. The measure is based on financial resources, institutional capacity to plan, permit, and restore habitat, and previous program achievements. Coastal habitat extent, embayment water clarity, shorebird counts, and horseshoe crab counts can provide indicators of progress in meeting the overall objective.

ACTIONS

THAW 1-1: Restore coastal habitat by supporting projects that implement established restoration techniques or help validate innovative techniques and include broad collaboration and communication.

Activities under this action include supporting projects to ultimately restore habitat and thereby protect wildlife and enhance ecosystem services.

THAW 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.

Activities under this action include enhancing communication and collaboration with partners, decision-makers, and the public to encourage broader use of living shorelines.

THAW 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 seagrass.

Activities under this action include increasing the level of detail and accuracy of mapping the extent and monitoring the health of tidal marsh and seagrass habitats and their wildlife to mitigate stressor impacts.

Other actions that support objective: CWHW 1-2, CWHW 5-1, CWHW 5-3, THAW 3-1, THAW 3-2, THAW 3-3, THAW 4-2, SRC 1-1, SRC 1-2, SRC 3-1, SRC 3-2, SRC 3-3, SRC 3-4, SRC 3-5, IEP 3-1, IEP 3-4

Objective 2: Offshore Habitat

THAW 2: Protect and enhance the health of offshore habitats and their associated species.

The primary measure of success is to support and implement 25 restoration and management projects focused on seafloor habitat mapping, data collection, and species assessments. The measure is based on the goals in the Long Island Sound Seafloor Habitat Mapping Initiative, which aims to complete mapping of the entire seafloor to better understand the ecological characterization, biodiversity, and threats (e.g., invasives and adverse impacts from electric transmission cable placement). Fragile habitat extent (e.g., sponge, cold water corals), fish abundances (e.g., forage fish, finfish, and game fish), and invertebrate abundance (e.g., lobsters) can provide indicators of progress in meeting the overall objective.

ACTIONS

THAW 2-1: Promote science-based marine spatial planning that balances human use of the Sound and protects ecosystem functions of offshore habitat and species while considering the existing natural, social, cultural, historic, and economic characteristics of Long Island Sound.
Activities under this action include supporting studies to protect fragile benthic habitat as well as pelagic and demersal wildlife, and using data to inform decision-makers to enhance conservation efforts.

THAW 2-2: Support the Long Island Sound Seafloor Habitat Mapping Initiative and apply the collected data to refine and expand upon other initiatives supporting coastal and marine spatial planning and designation of protected areas and buffer zones.
Activities under this action include completing seafloor mapping, initiating monitoring to document changes to fragile habitats and their communities, and using data to support planning and decision-making.

THAW 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.
Activities under this action include supporting action plans and programs, enhancing communication and collaboration, and advancing innovative restoration approaches.

Other actions that support objective: CWHW 5-1

Objective 3: Habitat Connectivity

THAW 3: Increase connectivity of coastal habitat to enhance biodiversity and support migratory pathways.
The primary measures of success are to restore or protect 100 habitat patches and reconnect 175 miles of riverine migratory corridors in the Connecticut and New York portions of the watershed. Of the 175 additional miles of riverine migratory corridors, 50 percent of the miles will occur in locations where communities have not typically benefited from habitat connectivity projects. These measures are based on financial resources, institutional capacity to plan, permit, and restore habitat, and previous program achievements. Barrier removals and the number of anadromous fish in riverine migratory corridors can provide indicators of progress in meeting the overall objective.

ACTIONS

THAW 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.
Activities under this action include identifying high priority sites for restoration, monitoring stressor impacts to habitat and their wildlife, and utilizing models, assessments, and tools to inform planning efforts.

THAW 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.
Activities under this action include fully removing and addressing stream barriers to protect wildlife and enhance ecosystem services provided by riverine systems.

THAW 3-3: Promote regional collaborations to support development of streamlined permitting pathways to build regional capacity for habitat restoration.
Activities under this action include increasing collaboration and communication specifically to develop streamlined pathways for permitting, sharing best management practices, and working more efficiently to accomplish restoration goals.

Other actions that support objective: CWHW 2-1, THAW 1-1, THAW 1-2, THAW 1-3, THAW 4-1, THAW 4-2, SRC 1-2, SRC 3-1, SRC 3-2, SRC 3-4, SRC 3-5

Objective 4: Conserved Open Space

THAW 4: Conserve open space through land acquisition while maintaining and enhancing the total area of protected land.
The primary measure of success is to conserve 5,000 acres of open space in the coastal boundary of Long Island Sound. Of the 5,000 acres to be conserved, at least 40 percent will be in areas where communities have not typically benefited from conservation projects. The measure is based on financial resources, institutional capacity to plan, permit, and restore habitat, and previous program achievements. Impervious cover, changes in forest cover, and watershed population can provide indicators of progress in meeting the overall objective.

ACTIONS

THAW 4-1: Protect high-priority coastal habitat from development through implementation of land conservation plans that identify priorities for conservation, management, and investment.
Activities under this action include minimizing impacts from land development, and utilizing tools, assessments, and existing protection plans to assist in acquisitions and conservation.

THAW 4-2: Increase access and enhance sustainable stewardship of conserved lands particularly for distressed communities.
Activities under this action include supporting stewardship activities, increasing access and use, and ultimately connecting the public to conserved land and its resources.

Other actions that support objective: SRC 3-2, IEP 1-1, IEP 1-2, IEP 1-3, IEP 2-2, IEP 3-1

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.

INTRODUCTION

The coastal communities along Long Island Sound in Connecticut and New York are home to more than four 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 is key to achieving the Partnership's vision for resilient coasts by empowering communities to plan for and respond to environmental challenges in ways that prioritize well-being for all.

Long Island Sound communities are already experiencing extreme weather events and a changing climate, including flooding caused by heavier rainfall, more intense storms, and rising sea levels. Impacts can also include increased water pollution that limits the use of the Sound, erosion that degrades habitat, and changes in species 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 Regional Needs Assessment to Help Build a Sustainable and Resilient Long Island Sound* (LISS, 2023), communities identified similar challenges to improving their sustainability and resilience to extreme weather events and a changing climate. These challenges include limited capacity and technical expertise to advance projects, ineffective coordination across levels of government, inadequate support of communities, and difficulty accessing project funding.

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. Each objective is followed by actions and supporting activities to be taken in the next five years (2025-2029) to help achieve it. Refer to Appendix B for technical explanations of the objectives and actions. 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

SRC 1: Increase the number of government officials, practitioners, and community leaders receiving training and support to increase their capacity to adapt to environmental challenges.

The primary measure of success is to engage 100 new decision-makers through Partnership trainings and resources every year. The total number of government officials, practitioners, and community leaders engaged can provide an indicator of progress in meeting the overall objective. Since 2022, more than 800 decision-makers (i.e., government officials, practitioners, and community leaders that influence or make policy decisions) have participated in Long Island Sound training and educational programs developed in response to findings from the 2023 needs assessment. Tracking the number of new decision-makers participating each year will measure the continued reach of training programs that build capacity, provide technical guidance, and lay the foundation for a better-coordinated regional response to extreme weather events, a changing climate, and other environmental challenges.

ACTIONS

SRC 1-1: Develop, deliver, and facilitate training programs relevant and responsive to community needs that assist with sustainability and resilience.

Activities under this action include conducting training programs such as webinars, in-person workshops, and field trips on a variety of topics, such as resilience planning basics, accessing funding, using technical tools, updating municipal codes, and sharing case studies and best practices.

SRC 1-2: Support community-centered research, monitoring, and development of tools to assess the risks from extreme weather events and a changing climate and advance resilience.

Activities under this action include developing new user-friendly tools, improving existing tools to increase accessibility, and conducting research or monitoring that will help communities understand, plan, and respond to environmental challenges. All activities should include community involvement to ensure their relevance.

Other actions that support objective: THAW 1-3, THAW 2-1, THAW 2-2, THAW 3-1, SRC 2-1, SRC 3-5, IEP 1-1, IEP 3-5

Objective 2: Community-Driven Resilience Planning

SRC 2: Increase the number of municipalities that identify key resilience priorities through local or regional community-driven planning processes.

The primary measure of success is that all 135 municipalities within the Partnership coastal boundary identify key resilience priorities. Twenty-eight of the 135 municipalities within the Long Island Sound coastal boundary have updated resilience plans or priorities as of January 2023. Plan development should prioritize vulnerable communities and ensure that stakeholders are convened and included in each step. Resilience plans or priorities should be reviewed and updated at least every 10 years. While resilience planning is encouraged through the entire watershed, this objective will only track plans throughout the coastal boundary due to capacity reasons.

ACTIONS

SRC 2-1: Develop climate resilience plans and strategies into existing municipal, regional, and watershed plans.

Activities under this action include updating existing or creating new climate vulnerability assessment and adaptation plans; identifying resilience priorities in other municipal, regional, or watershed

plans; and supporting the development of climate resilience plans through incentive programs or technical assistance. Hazard mitigation plans and other plans or priorities that are older than 10 years old do not count toward this action.

SRC 2-2: Coordinate across municipal boundaries to advance collective resilience priorities.
Activities under this action include providing programming, incentives, and support to encourage partnerships between neighboring communities and levels of government to align priorities and develop or advance implementation of sustainability and resilience plans.

SRC 2-3: Empower and increase engagement of community members and groups in local and regional resilience planning and decision-making.
Activities under this action include providing technical support and financial incentives to community members for participation in planning and decision-making processes; increasing capacity of staff dedicated to community engagement; and forging new relationships with relevant community groups to facilitate inclusion in planning processes.

Other actions that support objective: CWHW 1-3, CWHW 5-4, THAW 2-3, THAW 4-1, THAW 4-2, SRC 1-1, SRC 3-2, IEP 1-1, IEP 2-1, IEP 3-1

Objective 3: Resilience Initiative Implementation

SRC 3: Implement initiatives to improve community resilience to flooding and other environmental challenges.
The primary measure of success is the implementation of 200 resilience initiatives by communities in the New York and Connecticut portions of the Long Island Sound watershed. This measure is based on the current number of projects supported annually through Long Island Sound Futures Fund and the Long Island Sound Sustainable and Resilient Communities assistance programs. 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 and urban tree projects), policy improvements or changes, zoning and code updates, and new funding mechanisms to support resilience projects (e.g., creation of stormwater utilities). Prioritization and implementation of initiatives should follow the PERSISTS framework, which serves as a guide for Long Island Sound communities to move projects from concept to implementation.

ACTIONS

SRC 3-1: Increase community capacity to implement and manage sustainable and resilient initiatives.
Activities under this action include enhancing community capacity to implement, manage, and sustain initiatives through continuation of existing financial and technical assistance programs (e.g., Long Island Sound Resilience Grant Writing Assistance and Planning Support Programs), establishing new programs, and efforts supporting new partnerships.

SRC 3-2: Support the development and adoption of regulations, codes, and ordinances that increase community resilience.
Activities under this action include developing and adopting proposed new or updated codes and regulations and providing programming and technical resources to aid municipalities with reviewing and updating local codes.

SRC 3-3: Implement nature-based solutions to address flooding and other climate impacts while providing multiple benefits.
Activities under this action include protecting and restoring coastal, riparian, and upland habitats; implementing living shorelines and green infrastructure projects; and evaluating the use of nature-based solutions as an option or component of resilience projects.

SRC 3-4: Implement priority infrastructure projects that increase community sustainability and resilience to flooding and other climate impacts.
Activities under this action include integrating nature-based solutions when feasible and modifying infrastructure (i.e., install, upgrade, resize, relocate, and remove) in a manner that maximizes sustainability and ensures viability of coastal resources.

SRC 3-5: Monitor, maintain, and adaptively manage resilience projects to ensure their long-term success.
Activities under this action include providing technical and monetary support for the development and implementation of monitoring, maintenance, and adaptive management strategies; and developing tracking and monitoring systems to evaluate projects region-wide to inform best practices.

Other actions that support objective: CWHW 2-1, CWHW 2-2, CWHW 3-1, CWHW 5-2, CWHW 5-4, THAW 1-1, THAW 1-2, THAW 3-2, THAW 4-1, THAW 4-2, SRC 2-2, SRC 2-3, IEP 1-1, IEP 1-2

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.

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 nearly 25 million people living within 50 miles of the Sound, the pressure on its ecological health is immense, further compounded by extreme weather events and a changing climate (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 insufficient education about its health and ecological processes hinder community engagement in its stewardship, ultimately limiting the effectiveness and 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, which is vital to achieving the Partnership's vision. Residents that understand environmental issues can be better stewards of the watershed and adopt 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 each 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 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 requires addressing the factors that most impact its realization: public access and sense of belonging, education and environmental literacy, and fostering stewardship and sustainable behaviors. Each objective is followed by actions and supporting activities to be taken in the next five years (2025-2029) to help achieve it. Refer to Appendix B for technical explanations of the objectives and actions.

Objective 1: Public Access and Sense of Belonging

IEP 1: Increase and improve opportunities for everyone to access and appreciate Long Island Sound and the waters that flow into the Sound.

The primary measures of success are to create 40 new sites and improve 60 existing sites, including 30 improved sites in communities with limited access opportunities, around Long Island Sound's shoreline and its connecting waterbodies in Connecticut and New York. Success will also be measured by an increased sense of belonging, based on findings from public perception surveys of Long Island Sound watershed residents. The numerical targets for new and improved sites were established by calculating the number of sites created under the 2015 CCMP and those improved in recent years through the Long Island Sound Futures Fund grant program and slightly increasing those numbers. The measure for increasing access is based on a recent public perception survey that shows that existing coastal access in these communities is inadequate. State and Partnership-supported programs, events, and major festivals that enable safe use and enjoyment of Long Island Sound and its connecting waterbodies can provide indicators of progress in meeting the overall objective.

A site improvement consists of one or more physical or long-term programmatic changes that improves the site's accessibility for the public, including people with disabilities, families, and distressed communities.

ACTIONS

IEP 1-1: Collaborate with local government, environmental groups, and community leaders to increase and improve public access and a sense of belonging.

Activities under this action include planning, coordinating, and collaborating to develop new strategies to expand public access to the Sound and foster a sense of belonging.

IEP 1-2: Develop and implement projects that increase the number and quality of public access sites.

Activities under this action include implementing projects through the support of grant programs.

IEP 1-3: Promote a sense of belonging at public access sites through events, festivals, celebrations, materials, and programming.

Activities under this action include increasing the usage of public access sites by raising awareness and developing opportunities to increase a sense of belonging and connection to the water.

Other actions that support objective: THAW 4-1, THAW 4-2, IEP 2-2, IEP 2-3

Objective 2: Education and Environmental Literacy

IEP 2: Improve and expand the public's environmental knowledge of Long Island Sound and its watershed.

The primary measure of success is to engage 1.3 million members of the public, including youth, educators, and adults, in Long Island Sound educational programming and outreach by 2030. The numeric target is based on engaging a total of 275,000 people a year, which is a 10 percent increase from the 2023 Long Island Sound Futures Fund reporting and program data.

ACTIONS

IEP 2-1: Increase collaboration between environmental education partners to expand the visibility of existing programs and to promote the creation of new initiatives.
Activities under this action include collaborating, networking, and resource sharing to support environmental literacy efforts and promote unified messaging.

IEP 2-2: Host and promote opportunities to participate in Long Island Sound-based formal and informal educational programs tailored for multiple user groups and ages.
Activities under this action include hosting educational programs and opportunities for diverse user groups and promoting other such events throughout the region.

IEP 2-3: Develop engaging, multilingual, and innovative Long Island Sound educational and informational materials, tools, and activities for people of all ages and abilities.
Activities under this action include developing, sharing, and promoting informational materials and tools.

IEP 2-4: Support efforts to assess the public's understanding of Long Island Sound and its watershed.
Activities under this action include developing tools and methods to assess and monitor the public's environmental literacy as it pertains to Long Island Sound and its watershed.

Other actions that support objective: CWHW 5-1, THAW 2-3, THAW 4-2, IEP 1-2, IEP 1-3, IEP 3-2, IEP 3-3, IEP 3-4

Objective 3: Fostering Stewardship and Sustainable Behaviors

IEP 3: Increase public engagement in environmental practices that protect and conserve Long Island Sound and its watershed.

The primary measure of success is to support 18 projects or campaigns per year focused on promoting sustainable behaviors and stewardship. An additional measure is to engage 28,000 volunteers through Partnership-supported efforts. These targets are based on a review of the number of behavior change projects and volunteer events in 2022 and 2023, for which the Partnership provided financial, hands-on, or technical support.

ACTIONS

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.
Activities under this action include encouraging stewardship by promoting existing opportunities, developing new ways to connect with the public, and recognizing community champions and volunteers.

IEP 3-2: Investigate the relationship between the public and the Long Island Sound ecosystem through social science research.
Activities under this action include economic evaluations and social science research, surveys, and assessments to help inform outreach campaigns.

IEP 3-3: Develop campaigns and share messages to encourage residents, both homeowners and renters, to adopt environmentally friendly practices at home, school, work and in their communities.
Activities under this action include encouraging sustainable practices on land that can help conserve Long Island Sound.

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.
Activities under this action include encouraging sustainable practices in the Sound's waters and shorelines.

IEP 3-5: Provide information, programming, incentives, and resources (e.g., educational toolkits) that enable local environmental groups, municipalities, schools, and other user groups to teach and promote sustainable practices in their communities.
Activities under this action include providing support and resources to local groups so that they can promote sustainable practices in their communities.

Other actions that support objective:
CWHW 3-1, CWHW 5-1, CWHW 5-2, CWHW 5-3, CWHW 5-4, THAW 1-1, THAW 2-3, THAW 4-2, SRC 3-3, IEP 1-2, IEP 1-3, IEP 2-2, IEP 2-3

STUDENTS FROM BRIEN MCMAHON HIGH SCHOOL in Norwalk use nets to capture, identify, and measure fish in a salt marsh environment adjacent to Boccuzzi Park in Stamford. Photo by Frances V. Isaac – FVI Photography.

MONITORING PLAN

SUMMARY

The Partnership 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 conditions 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 Partnership.

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. Analyses of sediment and animal tissue can reveal the presence of toxic chemicals. Data collected from animal tissue such as fish are used to assess health risks to aquatic organisms and humans that consume them.

The Partnership first prepared a monitoring plan in support of the 1994 CCMP to measure the effectiveness of the management actions and programs implemented under the CCMP; provide essential information that can be used to redirect and refocus the CCMP during implementation; and inform and facilitate research and modeling efforts by providing a suite of baseline data on spatial and temporal variability of environmental conditions. The following characteristics are 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. The Partnership has focused on financial support, coordination, synthesis, and communication to varying degrees for those components. A partial listing of the major elements of the monitoring program are described in Table 1. Information on the overall program with links to specific monitoring elements is available on the monitoring page of the Partnership's website. The program uses monitoring data to track environmental indicators of the status and trends in conditions, providing insight into the health of Long Island Sound and the factors driving those changes. These indicators are communicated on the website and through formal reports such as the biennial report to Congress on program performance.

KIMARIE YAP measures dissolved oxygen and other water quality indicators in Manhasset Bay for a 2023 coastal acidification study. At the time she was working for the Interstate Environmental Commission. Photo by Jade Rae Kaiser.

PROGRAMMATIC MONITORING

In addition to environmental monitoring, the Partnership will track and report the implementation of CCMP actions supporting plan objectives. This will include evaluation of multiple metrics such as dollars spent, pounds of pollution reduced, acres of habitat restored or protected, and number of people engaged. These metrics will quantify Partnership efforts that contribute to achieving plan objectives. Environmental and programmatic monitoring will be combined to assess and report on progress toward meeting the objectives. The information will be regularly reported so partners and the public are informed about program investments and activities, and the environmental progress made as a result.

Activity (Data Collected)	Lead/ Partners	Actions	Collection Frequency	Timeframe
Open Sound water quality monitoring, including temperature, salinity, dissolved nitrogen, nutrients, and dissolved oxygen	CT DEEP	CWHW 1-2	Monthly, Sept.-Jan.; Every two weeks, Feb.-Aug.	1991-ongoing
Narrows and Western LIS Basin water quality monitoring	IEC	CWHW 1-2	Monthly, Oct.-May; Every two weeks, June-Sept.	1991-ongoing
LIS Connecticut River and tributary nutrient monitoring, embayment monitoring	CT DEEP, USGS	CWHW 1-2	Discrete and continuous river monitoring year-round; Discrete and continuous embayment monitoring, 5 CT embayments for 2 years each	1975-ongoing, recently expanded
Embayment water quality monitoring Tier 1 monitoring measures — dissolved oxygen, water clarity, temperature, salinity, chlorophyll a, qualitative macrophytes. Tier 2 adds continuous dissolved oxygen, nitrogen, phosphorus, quantitative macrophytes	Unified Water Study of Save the Sound	CWHW 1-2	Tier 1: Every two weeks, May-Oct.; Tier 2 nutrients, every two weeks, May-Oct.	2017-ongoing
Embayments on the North Shore of Suffolk County — salinity, temperature, dissolved oxygen, pH, nutrients, chlorophyll, organic carbon	Suffolk County Department of Health Services	CWHW 1-2	Mostly bimonthly to quarterly, with some as needed	1976-ongoing
Buoy-based time-series monitoring of wave, weather, and water quality data	UConn, NERACOOS	CWHW 1-2	Continuous at several depths	2003-ongoing
Long-term water quality monitoring stations in southeastern CT	CT NERR	CWHW 1-2	n/a	New in 2024
Acidification monitoring	CT DEEP, UConn, USGS, IEC	CWHW 1-2	pH, TA, DIC-monthly in open Sound and embayments, sometimes more frequently in the Western Narrows; continuous pH, pCO2, in open Sound from buoys	2022-ongoing
Harbor water quality survey (85 stations total) by NYCDEP provides data on fecal coliform and enterococcus pathogens in the Upper East River and Western Long Island Sound (26 stations) as well as water quality indicators such as dissolved oxygen levels and concentrations of microscopic plants and animals, nutrients, and organic carbon. NYSDEC does water quality testing of fecal coliforms in relation to shellfish harvesting and biotoxin monitoring every spring	NYCDEP, NYSDEC	CWHW 3-2	Weekly, May-Oct.; Monthly, Nov.-April	1909-ongoing
Embayments on the North Shore of Suffolk County — total coliform, fecal coliform	Suffolk County Department of Health Services	CWHW 3-2	Mostly bimonthly to quarterly, with some as needed	1976-ongoing

Activity (Data Collected)	Lead/ Partners	Actions	Collection Frequency	Timeframe
Watershed pathogen monitoring for fecal indicator bacteria, routine monitoring and track-down of problem areas, initially in five waterbodies with future increases	CT DEEP, Maritime Aquarium, IEC, Harbor Watch, CT NERR	CWHW 3-2	Initially every two weeks, increasing to weekly in future years	2023-2025
Beach closures	EPA BEACON 2.0	CWHW 3-2	Annual	2004-ongoing
National Coastal Condition Assessment (NCCA) of water quality, sediment quality, biota, habitat, and ecosystem integrity	EPA	CWHW 4-2	NCCA every five years; 2010, 2015, 2020; The first National Coastal Condition Report (NCCR 1), published in 2001, used data from 1990-1996	1990-ongoing
Pounds of debris collected per mile of coastline	Ocean Conservancy, Save the Sound, American Littoral Society	CWHW 5-1	Annual	2015-ongoing
Land cover	UConn CLEAR	CWHW 2-1, THAW 4-1	Every two years	1985-ongoing
Eelgrass	URI, USFWS, CT DEEP, NYSDEC, USGS, EPA	THAW 1-3	Aerial imagery every three years and satellite imagery annually	2002, 2006, 2009, 2012, 2017, 2024, and continuing
Shellfish beds	CT Dept. of Agriculture, NYSDEC	CWHW 3-2	Annual	2010-ongoing
Seafloor mapping	UConn, Stony Brook University, Columbia University, NOAA	THAW 2-2	Once initial seafloor mapping is complete, 10-year cycle to update each phase of mapping	2013-ongoing
Long Island Sound Trawl Survey	CTDEEP	THAW 2-1	Annual	1984-ongoing
Wildlife shorebirds	NYSDEC, CTDEEP	THAW 1-1	Annual	1990-ongoing
Wildlife horseshoe crab	NYSDEC, CTDEEP, Sacred Heart University	THAW 1-1	Annual	1976-ongoing
Migratory fish runs of CT	CT DEEP	THAW 3-2	Annual	1967-ongoing

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 of people. Since its establishment in 1985, first as a study area for the National Estuary Program and currently as an EPA-managed geographic program, the Partnership has assumed a lead role for science-based planning and coordination for 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 the Long Island Sound watershed, that multi-decade effort has already greatly improved the Sound. A seemingly irreversible trend of worsening water quality and degraded or vanishing habitats has been halted and even reversed in many places.

Since the first CCMP in 1994, the Partnership has encouraged collective action to improve the Sound's ecological health. New challenges must be addressed even as we make progress on the old ones. 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 extreme weather events and a changing climate. With innovative tools at hand 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 ecosystem for nature and humans.

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. 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 expanding collaboration.

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. 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 entity 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

Partnership 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 with 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 Partnership 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 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 Research Grant Program.

CURRENT FUNDING

The Partnership was established under Sections 320 and 119 of the federal Clean Water Act, which also authorizes funding for the program through the EPA. In 2024, the Partnership 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), to enhance the nation's infrastructure and resilience. It authorizes funding to improve infrastructure and resilience throughout the United States. Under the legislation, the Partnership 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 initiatives to improve the environmental health, coastal resilience, and economic vitality of the Sound.

Funding through the EPA was never intended to be the primary means of supporting implementation of the CCMP actions. Other federal, state, regional, and local programs provide essential sources of funding. The successful implementation of CCMP objectives and actions relies on sustained support for core environmental programs, carried out by numerous 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 every federal dollar appropriated to the program from 2015 to 2023, the Partnership leveraged an additional $14 to implement projects, more than $1.9 billion in total, demonstrating a sizable return on investment and reflecting the broader regional commitment to restore and protect the Sound. The Partnership 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 Partnership 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 Partnership. 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 approximate costs for achieving the objectives leading to short- and long-term resource needs. Final costs 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 that support the CCMP's objectives over the next five years will be accomplished through ongoing support of existing programs, many actions will require funding beyond current levels to be accomplished. Effective coordination of all stakeholders is essential to the efficient use of available resources to achieve the desired results. Congress, through provisions in the Clean Water Act, has charged the EPA with providing overall coordination of, and support for, the regional effort. As an EPA-directed program, the Partnership is prohibited from engaging in lobbying, private fundraising, or seeking funding directly from private endowments.

As stated in the Introduction, federal, state, regional, local, and nongovernmental contributions are critical to the success of the Partnership. Financing for implementation beyond Section 320 and Section 119 of the Clean Water Act funding is leveraged from state and federal public funding sources secured through grant opportunities by the Partnership directly, or implementation partners on a project level. The Partnership 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 sources may be implemented by changes in administrative practice while others may require regulatory or statutory changes.

At the core of the Partnership's funding strategy is the recognition that the primary barrier to community-level implementation is the limited capacity of local governments and non-governmental organizations, rather than a lack of available funding. As a result, the Partnership funding strategy emphasizes breaking down barriers to successful community-level project planning, design, and implementation. Resource-limited communities need assistance to ensure that progress is broadly shared. This first requires listening to community needs followed by a commitment to serving those needs through multiple, tailored efforts, including:

- Holding 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 (e.g., the Long Island Sound Resilience Resource Hub), to facilitate access to the best available information relevant to the Long Island Sound region and to lessen reliance on multiple, redundant analyses.
- Providing technical assistance for navigating federal and state grant application systems, developing strong grant proposals, and effectively managing grant funding.
- Delivering training programs, in coordination with partners, that are tailored to communities' needs identified through the Partnership's *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, or green infrastructure, 5) providing guidance on grant writing opportunities, requirements and management, 6) training on effective communication, 7) educating the public and community leaders on environmental issues, and 8) conducting economic valuations of ecosystem services.
- Enhancing coordination across all levels of government, recognizing that policies and services are delivered at different levels and many will be impacted by a changing climate (e.g., road flooding and culverts no longer adequate for drainage systems).
- Maintaining the Community Impact Fund to provide direct technical and financial assistance to organizations working to address issues in distressed communities.
- Expanding engagement with distressed communities.

This strategy is consistent with the federal thriving communities technical assistance centers that are working towards a holistic government-wide framework for providing technical assistance and capacity building resources, particularly to those most in need. The Partnership will coordinate efforts with federally established technical assistance centers working to remove barriers and improve accessibility for distressed communities.

Program success is measured by maximizing and optimizing direct EPA funding as well as funding leveraged by the 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 Appendix B technical explanations.

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 proactively 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.

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. 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.

Best Management Practice (BMP) – A practice or combination of practices considered by an entity to be the most effective means (including technological, economic, and institutional considerations) of preventing or reducing the amount of pollution by nonpoint sources to a level compatible with water quality goals.

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 and adaptation priorities to extreme weather events on the natural and built environment, as well as social and economic systems.

Combined Sewer Overflow (CSO) – A combined sewer system collects rainwater runoff, domestic sewage, and industrial wastewater into one pipe. Under normal conditions, it transports all the wastewater it collects to a wastewater treatment plant, where it receives treatment, before it is then discharged as treated effluent to a nearby waterbody. During wet weather (e.g., rainfall events or snowmelt), the volume of combined wastewater can sometimes exceed the capacity of the combined sewer system or wastewater treatment plant. When this occurs, untreated or partially treated combined wastewater discharges from an outfall directly to nearby streams, rivers, and other water bodies. This is called a combined sewer overflow.

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.

Demersal – A species living close to the bottom (sediment) of the water body.

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 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 with 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 Health – A measure of the stability and sustainability of ecosystem functioning or ecosystem services that depends on an ecosystem being active and maintaining its organization, autonomy, and resilience over time.

Ecosystem Service – The processes by which the environment produces resources that support human well-being 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. The Latin species name eelgrass is *Zostera marina.*

Embayment – A protected coastal body of water with an open connection to the sea in which saline sea water is measurably diluted by fresh water, including tidal rivers, bays, lagoons, harbors, and coves.

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 or 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 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 is organized and regulated in a traditional school-based setting. Formal educational programs follow state-mandated 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 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 Connectivity – Refers to how and to what degree distinct habitat patches are connected, which influences the distribution, genetic diversity, and health of wildlife.

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).

Harmful Algal Bloom – A bloom of algae (often phytoplankton) that causes negative impacts to other species often through the production of, 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 (also 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 method used to examine the Earth's surface (see Remote Sensing).

Living Shorelines – Engineered structures made of natural materials such as plants, oysters, sand, or rock installed to control shoreline erosion while allowing natural sediment movement. Unlike hardened shoreline structures, which impede the growth of plants and animals, living shorelines grow and adapt over time to changing conditions. Additionally, living shorelines improve, restore, and maintain the connection between upland and water habitats; serve as carbon sinks; provide nutrient pollution remediation; provide wildlife habitat; and act as storm buffers.

Management Conference – The Long Island Sound Partnership Management Conference involves federal, state, interstate, and local agencies, universities, environmental groups, industries, and the public working together to implement the goals and objectives set forth in the CCMP. It includes committees and working groups.

Marine Spatial Planning – 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 that detect the status and trends 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 – 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. 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 nitrogen and phosphorus (see Phosphorus) is one of the most widespread and challenging environmental problems faced by our nation.

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., wastewater treatment plants (WWTPs), OWTSs, atmospheric deposition, and fertilizer.

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, and magnesium.

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

Onsite Treatment and Onsite Wastewater Treatment System (OWTS) – 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 dry well that receives untreated sanitary waste containing human excreta, which sometimes has an open bottom or perforated sides) are common examples of onsite wastewater treatment systems.

Open Science – Open Science refers to the movement that aims to make scientific research, data, code, and publications freely accessible to everyone without barriers. It promotes transparency, collaboration, and reproducibility in research to increase the accessibility and impact of scientific knowledge.

Open Space – Includes all unbuilt areas, whether publicly or privately owned, protected, or unprotected.

Participatory Science – The involvement of the public in the scientific process, often in collaboration with professional scientists and scientific institutions (EPA, 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, and salinity, oxygen, and nutrients all change. Fish and other organisms inhabit the pelagic zone.

Phosphorus – 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. 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 phosphorus and nitrogen is one of the most widespread and challenging environmental problems faced by the U.S. (also 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 – Any site along the Long Island Sound shoreline 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 community plan that evaluates the vulnerability of infrastructure and riparian and coastal areas and develops strategies for making them more resilient to hazardous events (e.g., sea level rise, weather events). The plan should include the preservation of natural means to protect the built environment where practical and preserve and protect ecosystem services.

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

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.

Sanitary Sewer Overflows (SSOs) – Discharges of raw sewage from sanitary sewers. SSOs are prohibited under the Clean Water Act. Depending on where the problem occurs in the sewer system, SSOs can release untreated sewage out of manholes and onto city streets, into basements or into waterbodies.

Sea Level Rise – An increase in the total volume of ocean water. Sea level rise results from the addition of melting glaciers and polar ice sheets, as well as from the natural expansion of water as it warms.

Sense of Belonging – The subjective feeling of deep connection with social groups, physical places, and individual and collective experiences. A sense of belonging is a fundamental human need that predicts numerous mental, physical, social, economic, and behavioral outcomes (Allen et al., 2021). The Partnership uses the term to refer to people's feelings of connection with and attachment to Long Island Sound and its coastal and riverine environments.

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

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

Species of Greatest Conservation Need – Species designated by State Wildlife Action Plans as 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 Partnership as having significant recreational or ecological value to the Sound. Stewardship Area boundaries 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 that does not soak into the ground. Stormwater runoff picks up pollutants like trash, chemicals, oils, dirt, or sediment that can harm our rivers, streams, lakes, and coastal waters.

Stormwater – The rain and melting snow that falls on 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 Partnership Thriving Habitats and Abundant Wildlife 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 – 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.

Toxic Contaminant – Any element, substance, compound, or mixture, including disease-causing agents, which after release into the environment and upon exposure, ingestion, inhalation, or assimilation in to any organism, either directly from the environment or indirectly by ingestion through food chains, will or may reasonably be anticipated to cause death, disease, behavioral abnormalities, cancer, genetic mutation, physiological malfunctions (including malfunctions in reproduction) or physical deformations, in such organisms or their offspring.

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 (in the absence of oxygen) of organic sludge. Water is then chlorinated or treated with ultraviolet sterilization to remove bacterial contaminants and discharged into the receiving waterbody. Tertiary or advanced wastewater treatment removes inorganic nutrients (nitrogen or phosphorus) from effluent prior to discharge.

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

Wildlife – Any wild and living species, including fauna and flora.

ACRONYMS

BMP – Best Management Practice
CAC – Citizens Advisory Committee
CCMP – Comprehensive Conservation and Management Plan
CLEAR – Center for Land Use Education and Research (University of Connecticut)
CSO – Combined Sewer Overflows
CT DEEP – Connecticut Department of Energy and Environmental Protection
CT NERR – Connecticut National Estuarine Research Reserve
CTSG – Connecticut Sea Grant
CWHW – Clean Waters and Healthy Watersheds
EPA – Environmental Protection Agency
GIS – Geographic Information System
IEC – Interstate Environmental Commission
IEP – Informed and Engaged Public
LiDAR – Light Detection and Ranging
LISCIF – Long Island Sound Community Impact Fund
LISFF – Long Island Sound Futures Fund
LISSN – Long Island Sound Schools Network
NCCA – National Coastal Condition Assessment
NEIWPCC – New England Interstate Water Pollution Control Commission
NOAA – National Oceanic and Atmospheric Administration
NPDES – National Pollutant Discharge Elimination System
NPS – Nonpoint Source
NYSDEC – New York State Department of Environmental Conservation
NYSG – New York Sea Grant
OWTS – Onsite Wastewater Treatment System
PAHs – Polycyclic Aromatic Hydrocarbons
PCBs – Polychlorinated Biphenyls
PFAS – Per- and Polyfluoroalkyl Substances
SMART – Specific, Measurable, Achievable, Relevant, and Time-bound
SRC – Sustainable and Resilient Communities
SRC EPs – Sustainable and Resilient Communities Extension Professionals
SSO – Sanitary Sewer Overflow
THAW – Thriving Habitats and Abundant Wildlife
TMDL – Total Maximum Daily Load
UCONN – University of Connecticut
URI – University of Rhode Island
USFWS – United States Fish and Wildlife Service
USGS – United States Geological Survey
WWTP – Wastewater Treatment Plant

APPENDICES

STUDENTS FROM SOUNDWATERS' Science Stars program examine the shells and shellfish they collected along Cove Island Park in Stamford. Photo by Frances V. Isaac – FVI Photography.

PROGRESS MADE IMPLEMENTING THE 2015 CCMP

REPORT PURPOSE

Clean Water Act Section 119 requires the Partnership 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, the Partnership 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, the Partnership published *Returning the Urban Sea to Abundance: A Two-Year Review (2020-2021) of Implementation of the Comprehensive Conservation and Management Plan.* Building upon the *Returning the Urban Sea to Abundance* reports, this section summarizes the overall progress made implementing 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 139 specific Implementation Actions (IAs), for the period 2015 to 2019, 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, the Partnership updated the IAs in the CCMP, which resulted in 136 IAs for 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. The Partnership's website provides a full assessment of each Ecosystem Target.

OVERVIEW OF 2015 CCMP

Ecosystem Targets

As part of the Partnership's effort to assess progress made on the 2015 Ecosystem Targets, program staff met with local subject matter experts to identify and communicate the strengths, weaknesses, and lessons learned from the 2015 Ecosystem Targets. During these meetings, the Partnership gleaned important information to help frame the conversation and expectations for the 2025 CCMP.

The following recommendations were identified and incorporated into the 2025 CCMP:

- Do not set targets that cannot be tracked.
- Develop and implement clearly defined ways to track each target.
- Identify the people, organization, and office that will be responsible for providing the tracking information.
- Prioritize the development of tools to track Ecosystem Targets where methods do not exist.
- Use the SMART framework for each target: Specific, Measurable, Achievable, Relevant, and Time-Bound.

Implementation Actions

The Partnership used its tracking and reporting tool to assess progress in implementing the 2020-2024 IAs. These findings were used to inform the 2025 CCMP. Each IA was categorized with one of the following labels: Significant Progress, Partial Progress, or No Progress. The Partnership reviewed the key activities and supporting projects of each IA and assigned categories for each action:

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

HIGH SCHOOL STUDENTS PLANT NATIVE SPECIES at Great Meadows Marsh in Stratford, CT as part of Audubon's WildLife Guard program. Since 2019, a joint effort led by USFWS and other conservation partners and supported by the Long Island Sound Partnership has helped to restore 34 acres of the marsh, resulting in reduced mosquito populations, the return of native plants, and greater biodiversity. Photo by Maya Ray.

The Partnership compiled key lessons learned through this assessment and considered these lessons during development of the 2025 CCMP:

- Projects that are directly funded by the Partnership can be tracked but there is no consistent way to track projects funded by other sources.
- Performance tracking for Partnership-funded projects does not provide sufficient information to determine whether an IA has made significant, partial, or no progress. As a result, the Partnership has limitations to comprehensively evaluating the success of an individual IA.
- The Partnership should 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 Targets and 2020-2024 IAs by theme.

CLEAN WATERS AND HEALTHY WATERSHEDS

Status of Priority Implementation Actions		
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).	C
WW-7	Enhance implementation of the 2000 Dissolved Oxygen TMDL, particularly for nonpoint sources.	P
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.	N
WW-10	Develop a nonpoint source and stormwater tracking system tool for the Long Island Sound watershed.	P
WW-12	Improve understanding, management, design, and implementation of denitrifying decentralized and residential, on-site wastewater treatment systems.	P
WW-13	Improve efficiency and resiliency of existing/new waste treatment systems including septic, WWTP and stormwater infrastructure to be resilient to sea level rise, storm surge, and intense storms and flooding.	P
WW-15	Increase permanent land protection of riparian corridors and wetland buffers at the municipal level.	N
WW-16	Promote establishment and protection of riparian corridors and wetland buffers at the municipal level through development of local ordinances.	N
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.	P
WW-27	Improve ability of models and/or studies to estimate contaminant and nutrient loads to embayments and evaluate the effectiveness of remedial actions.	P
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.	C
WW-32	Improve the monitoring needed to assess the risk of climate change impacts including acidification on water quality.	C

Out of the seven Ecosystem Targets, two are meeting goals (Extent of Hypoxia and Nitrogen Loading); one is on track (Approved Shellfish Areas); and four are behind schedule (Water Clarity, Sediment Quality Index, Riparian Buffer Extent, and Impervious Cover). 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, the Partnership could easily track nitrogen loading but had difficulty quantifying changes in nonpoint source loading (where data remains unavailable).

Out of the 40 IAs, 17.5 percent had Significant Progress, 47.5 percent had Partial Progress, and 35 percent had No Progress. The status of the 12 priority IAs are listed in the table.

Implementation Action Status

- Complete/significant progress **17.5%**
- Progress **47.5%**
- No progress **35%**

THRIVING HABITATS AND ABUNDANT WILDLIFE

Status of Priority Implementation Actions		
HW-1	Complete projects that result in restoration of coastal habitat.	C
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.	P
HW-4	By 2024, agree upon an applicable habitat connectivity model and apply metrics for all restoration and protection projects.	P
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.	P
HW-6	Develop and apply standardized habitat quality metrics and assessment methodology across targeted habitat types.	P
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.	N
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.	N
HW-9	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.	C
HW-11	In lieu of hard armoring, develop and promote the use of living shoreline habitat protection methods (e.g., dunes, shorelines, and 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.	P
HW-14	Develop and implement invasive/non-native species management plans for priority terrestrial and aquatic sites.	P
HW-16	Collect and analyze data on, and restore habitat for, Species of Greatest Conservation Need, including forage species.	C
HW-25	Continue Long Island Sound eelgrass abundance surveys and promote eelgrass management.	P

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); three are behind schedule (Shellfish Harvested, Tidal Wetlands Restored, and Eelgrass Extent); and one has no data available (Habitat Connectivity). 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, 29.6 percent had Significant Progress, 40.7 percent had Partial Progress, and 29.6 percent had No Progress. The status of the 12 priority IAs are listed in the table.

SUSTAINABLE AND RESILIENT COMMUNITIES

Status of Priority Implementation Actions		
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.	C
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.	C
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.	C
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

Out of the six Ecosystem Targets, three are meeting goals (Waterfront Community Resiliency and Sustainability, Marine Debris, and Public Access); one is behind schedule (Public Beach Closures); and two have no data available (Public Engagement and Knowledge and Harbor and Bay Navigability). The Partnership 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. The Public Engagement and Knowledge target did not have available data, as it is difficult to measure knowledge gained through public engagement.

Out of the 32 IAs, 21.9 percent had Significant Progress, 62.5 percent had Partial Progress, and 15.6 percent had No Progress. The status of the 12 priority IAs are listed in the table.

Implementation Action Status

- Complete/significant progress **21.9%**
- Progress **62.5%**
- No progress **15.6%**

SOUND SCIENCE AND INCLUSIVE MANAGEMENT

Status of Priority Implementation Actions		
SM-1	Regularly update and refine the high-priority science needs relating to the understanding and attainment of management objectives and ecosystem targets.	C
SM-8	Coordinate and leverage community water quality monitoring programs, enhancing the utility and application of data.	C
SM-11	By 2024, complete the Integrated Systemwide Modeling Tool to support nitrogen management and Dissolved Oxygen TMDL assessment.	P
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.	C
SM-17	Establish and implement practices to effectively engage underrepresented stakeholders and communities in CCMP implementation and LISS Management Conference decision-making.	P
SM-18	Convene senior EPA and State management to help direct, inform, and coordinate policy relevant to Long Island Sound.	C
SM-20	Support the refinement and application of the Long Island Sound Blue Plan to more comprehensively manage Long Island Sound resources.	P
SM-21	Conduct primary valuations of the critical ecosystem goods and services supported by Long Island Sound and its coastal habitats.	P
SM-24	Research and develop innovative, locally appropriate funding mechanisms to provide sustained, reliable sources of investment capital to restore, and protect ecosystem services.	N
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.	C
SM-36	Every five years develop a comprehensive, specific, target-oriented implementation plan engaging all Long Island Sound partners.	C
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.	C

There were no Ecosystem Targets for this 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. The status of the 12 priority IAs are listed in the table.

Implementation Action Status

- Complete/significant progress **54.1%**
- Progress **32.4%**
- No progress **13.5%**

OBJECTIVE AND ACTION TECHNICAL EXPLANATIONS

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 Partnership 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. The technical explanations in Appendix B provide a full description of and rationale for each action and supporting activities in the CCMP.

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
- Identification of the extreme weather events the action addresses
- Description of how the action will contribute to the adaptation strategy for vulnerabilities

Reviewing and updating actions every five years will enable adaptive management and the integration of emerging scientific and technological advancements. This regular refinement will ensure the CCMP remains current and incorporates the most effective management practices.

The five 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, and clean water infrastructure grants and loans) most applicable to meeting that need.

The Partnership will assess implementation progress on a regular basis and update the website yearly. Before the conclusion of each implementation cycle, the Partnership 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.

GOAL 1: CLEAN WATERS AND HEALTHY WATERSHEDS

OBJECTIVE CWHW 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.

Measures of Success: Implement nutrient reduction actions established under Suffolk and Nassau counties' nine-element watershed-based plans; establish nutrient reduction or protection targets for six priority embayments through Connecticut's *Second-Generation Nitrogen Strategy*; and develop additional nutrient reduction and protection plans across the watershed to reduce impairments in Long Island Sound, including open-water hypoxia, and its embayments.

NYSDEC's nine-element watershed-based plans and CT DEEP's *Second-Generation Nitrogen Strategy* establish actions designed to reduce nutrient loading to support water quality and ecosystem health of Long Island Sound and its embayments. The nine-element watershed-based plans for both Suffolk and Nassau Counties call for the removal and upgrade of substandard onsite wastewater treatment systems, including connecting them to public sewers. Reduction of nutrients will be accounted for by tracking the number of OWTS that are removed or upgraded.

CT DEEP is developing embayment-specific nutrient reduction and protection targets and progress towards this measure will be accounted for by the number of embayments with targets. Other efforts, such as the Long Island Sound Futures Fund and state-managed Clean Water Act Section 319 nonpoint source programs, provide funding for the development of nutrient reduction plans and implementation actions that also work to support the water quality and ecosystem health of Long Island Sound and its embayments. Therefore, nutrient removal projects and the number of plans developed will be tracked as an additional measure of success for the nutrient's objective.

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 (EPA, 2024.) The main symptom of excess nutrients is 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. Long Island Sound's excess nutrient pollution was the impetus for the creation of the Partnership and subsequent development of the Total Maximum Daily Load (TMDL) plan (CT DEEP and NYSDEC, 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 summertime hypoxia that occurs in Long Island Sound has been achieved (based on the five-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 from the years of 1995 - 2016, nitrogen flux rates have decreased by 13 percent between the 1995-1999 baseline and 2021 (based on the five-year rolling average). The dashboard uses data collected from select tributaries located throughout the Long Island Sound 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 due to water temperature increases. Additional reductions of nutrients are anticipated over the next decade as the result of implementation of NYSDEC's nine-element watershed-based plans for Suffolk and Nassau Counties, the nutrient bioextraction initiative, CT DEEP's *Second-Generation Nitrogen Strategy* 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 Long Island Sound. The Nutrients objective aims to improve water quality and ecosystem health across the Long Island Sound by identifying and reducing areas of nutrient loading and pollution.

Cost Estimate: $$$$$

SMART Framework for this Objective:

Specific: This objective aims to improve and protect water quality and ecosystem health across the Long Island Sound and its watershed by reducing primarily nonpoint sources (fertilizers, onsite wastewater treatment systems, stormwater) as well as secondarily point sources over the next ten years.

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 LISFF 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 LISFF Projects - NWFS grant administrator	Annual	N/A
Onsite wastewater treatment systems removed or upgraded	umber of systems removed (connected to sewer) or replaced with Innovative/Alternative systems	Nassau and Suffolk Counties, NY State contact	Annual	N/A
Nutrient reduction or protection targets	Number of nutrient reduction or protection targets relative to the Sound and its embayments	CT DEEP	Five year	N/A
Biological Condition (Indicator)	Benthic index	EPA National Coastal Condition Assessment	Five year	N/A
Hypoxia (Indicator)	Extent, duration, volume, and severely hypoxic and anoxic areas	CT DEEP Water Quality Monitoring Report	Annual	N/A
Water Clarity (Indicator)	Secchi disk depth	Save the Sound Report Card (CT DEEP's Long Island Sound Monitoring Program)	Annual	N/A
Nitrogen Loading (Indicator)	Trade equalized pounds per day from WWTPs	CT DEEP/NYSDEC	Annual	N/A

Achievable: There are many efforts underway that will lead to additional implementation plans and actions over the next ten 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 over the next 10 years. Long Island Sound Futures Fund projects and Clean Water Act Section 319 grant projects focused on nutrient reductions are also expected to continue over the next ten years.

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

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

Actions to Support Achievement of Objective CWHW 1:

Action CWHW 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.
- Abate combined and sanitary sewer overflows (CSOs and SSOs) in support of approved long-term control plans and municipal separate stormwater sewer system permits.
- Incorporate advanced treatment for inadequate and improperly functioning onsite wastewater treatment systems 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., bioextractive aquaculture) for in-water nutrient reductions.
- Encourage water reuse infrastructure for new construction.
- Affected Habitat Types: coastal and inland watersheds and receiving waterbodies, wetlands, Long Island Sound, and embayments

Cooperators and Partners: federal agencies, Tribes/Nations, state agencies, local and county governments, regional planning organizations and commissions, nongovernmental 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: $$$$$

Performance Measures:

- BMPs delivered
- Pounds of nitrogen prevented

- Pounds of nitrogen removed
- Systems installed (nitrogen-reducing)

Expected Time Frame: 10 years

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

Adaptation Strategy for Vulnerabilities: Frequent and intense rainfall events are a consequence of extreme weather events and a changing climate 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 CWHW 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:

- 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, and 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.
- Affected Habitat Types: coastal and inland watersheds and receiving waterbodies, wetlands, Long Island Sound, and embayments

Cooperators and Partners: federal agencies, Tribes/Nations, state agencies, local and county governments, regional planning organizations and commissions, nongovernmental 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: $$$$

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

Expected Time Frame: 10 Years

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

Adaptation Strategy for Vulnerabilities: A changing climate 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 changing climatic factors. All stressors will be considered when conducting analyses.

Action CWHW 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 to inform nutrient reduction actions.
- Through collaborations, develop policies and strategies that alleviate barriers 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.
- Affected Habitat Types: coastal and inland watersheds and receiving waterbodies, wetlands, Long Island Sound, and embayments.

Cooperators and Partners: federal agencies, Tribes/Nations, state agencies, local and county governments, regional planning organizations and commissions, nongovernmental 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: $$$

Performance Measures:
- Number of policies, strategies, and programs
- Number of TMDLs, mitigation plans, and protection plans
- Number of watershed-based plans
- Number of estuarine models
- Number of watershed models
- Number of groundwater models

Expected Timeframe: 10 years

Extreme Weather Events Addressed: (1) warmer summers; (2) warmer waters; (3) sea level rise; and (4) ocean acidification

Adaptation Strategy for Vulnerabilities: A changing climate 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 changing climatic factors. All stressors will be considered when conducting analyses.

GOAL 1: CLEAN WATERS AND HEALTHY WATERSHEDS

OBJECTIVE CWHW 2: WATERSHED HEALTH

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

Measures of Success: Establish and maintain a 100-foot or wider riparian buffer across 75 percent of the waterways and in 90 percent of the subbasins, and achieve and maintain the permanent protection of 35 percent of the Long Island Sound watershed by 2035.

Protecting land in key areas prevents habitat loss, reduces pollution from stormwater runoff, and safeguards ecosystems that serve as natural buffers against climate impacts. The Partnership will prioritize areas that safeguard water quality, support biodiversity, enhance resilience, and provide access to green spaces for all communities. These targets build upon regional initiatives such as "30 by 30," which aim to protect 30 percent of land by 2030 while promoting ecological and community health. Additionally establishing 100-foot or wider riparian buffers aid in filtering pollutants, stabilizing streambanks, and reducing runoff.

Technical Explanation: The objective to improve the health of Long Island Sound and its watershed through protection 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, defined as the overall condition and functionality of the Long Island Sound 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. These efforts will collectively help stabilize shorelines, filter pollutants, and reduce stormwater runoff, thereby promoting biodiversity and resilience. 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 protection of land across the watershed.

Cost Estimate: $$$$$

SMART Framework for this Objective:

Specific: This objective aims to improve the health of the Long Island Sound and its watershed over the next 10 years by ensuring better land use practices. 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 extreme weather events.

Measurable: The percent cover of riparian buffer in subwatersheds at the 12-digit hydrologic unit level will serve as a measurable indicator of progress. Hydrologic units represent the area of the landscape that drains to a portion of the stream network. The dataset at the 12-unit level is the most refined that is complete for the United States. Riparian buffers are naturally vegetated zones around the shorelines of all waterbodies that provide a buffer that has been shown to be effective in removing contaminants from

groundwater before it enters receiving waters. When calculating percent cover naturally vegetated land classifications include forest, grassland, shrub, and wetland land, but not turf grass or agriculture field classes. A 30-square meter resolution of land cover data for the Long Island Sound 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 35 percent of land protected will be reported by the 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 Two Years	Currently have watershed wide 30-meter resolution imagery from NLCD, but higher resolution one meter data layers exist for portions of the watershed and would be desirable throughout for a watershed wide analysis
Land protected	Percent of Long Island Sound watershed protected	State and Federal Agencies, Nongovernmental organizations	Five Years	Work group should guide the preparation of report and methods of tracking.
Land protected report	Report	The Partnership	Five Years	Work group should guide the preparation of report.
Riparian buffer extent analysis	Report	The Partnership	Five year	Work group should guide the preparation of report.
Impervious Cover (Indicator)	Square miles	UCONN CLEAR CL, NLCD, NOAA C-CAP	Every Two Years	N/A
Changes in Forest Cover (Indicator)	Square miles	UCONN CLEAR CL, NLCD, NOAA C-CAP	Every Two Years	N/A

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. 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.

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

Actions to Support Achievement of Objective CWHW 2

Action CWHW 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:

- Purchase or secure conservation easements at strategic locations to protect critical habitats and ecosystems.
- Implement restoration activities such as reforestation, wetland rehabilitation, and invasive species removal.
- Develop new and support ongoing programs that manage conserved lands, promote stewardship activities and assist land use management efforts.
- Collect high-resolution GIS layer data on current and historical land use patterns to inform planning and monitoring.
- Develop models to improve our understanding of the ecosystem services provided by different habitat types and inform restoration activities.
- Affected Habitat Types: upper watershed, embayments, wetlands, and recreational water bodies

Cooperators and Partners: federal agencies, Tribes/Nations, 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: $$$$

Performance Measures:

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

Expected Time Frame: 10 years

Extreme Weather Events Addressed: (1) warmer summers; (2) warmer winters; (3) warmer waters; (4) increasing drought;(5) sea level rise; (6) increasing flooding (7) increasing storm surge events

Adaptation Strategy for Vulnerabilities: 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 CWHW 2-2: Implement nature-based solutions and other practices that improve and maintain water quality and ecosystem health.

Action Description:

- Install green infrastructure such as rain gardens, native plant species, and green roofs to reduce runoff and filter pollutants.
- Establish and maintain riparian buffers along waterways to intercept pollutants and stabilize stream banks.

- Implement techniques, such as the installation of permeable surfaces and tree filters to disconnection stormwater systems, that reduce the effective area of impervious surfaces. Restore and create wetlands to enhance water filtration and provide flood protection.
- Increase tree cover in urban areas to improve water infiltration and mitigate higher temperatures. Gather high-resolution GIS layer data on land use to assess land use impacts on ecosystem health and conduct watershed analysis, informing management of natural resources and mitigation of environmental stressors.
- Affected Habitat Types: coastal watersheds, upper watershed, embayments, wetlands, and recreational water bodies

Cooperators and Partners: federal agencies, Tribes/Nations, 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: $$$$

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

Expected Time Frame: Five to 10 years

Extreme Weather Events Addressed: (1) warmer waters; (2) sea level rise; and (3) ocean acidification

Adaptation Strategy for Vulnerabilities: 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

OBJECTIVE CWHW 3: PATHOGENS

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

Measures of Success: Through stormwater and wastewater infrastructure improvement projects: complete 11,500 OWTS replacements, upgrades, and removals; achieve a five-year rolling average of 85 percent of beaches graded B- and above based on beach data from Sound Health Explorer; 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 shellfish harvesting areas. The term "pathogens" is used to describe disease-causing bacteria, viruses and other micro-organisms. The Partnership monitors 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 five-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, and 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: $$$$$

SMART Framework for this Objective:

Specific: This objective aims to increase commercial and recreational usage of water while protecting human health through monitoring, assessing, tracking and reducing pathogens over 10 years with five-year milestones. Specific sources of pathogens are old infrastructure, inadequate onsite wastewater treatment systems, CSOs, SSOs, and NPS and agricultural runoff.

Measurable: Multiple measures of success have been identified – five-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, number of samples collected and geographic distribution. The objective will be achieved when a five-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 in 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 Innovative/ Alternative 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
Approved Shellfish Area (Indicator)	Acres approved	NYSDEC, CT DEEP	Annual	N/A
Public Beach Closures (Indicator)	Number of days Long Island Sound beaches are closed	EPA Beach Advisory and Closing Online Notification (BEACON)	Annual	N/A

Achievable: Considering the attention paid to pathogens due to human health concerns and partner efforts to develop and conduct pathogen monitoring in the Long Island Sound, 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 Long Island Sound and its watershed since pathogens are abundant in parts of the Sound and pose major threats to human health. This objective aims to restore water quality by reducing pathogen pollution, enhancing access to the Long Island Sound for many communities. Another goal of this objective is to increase monitoring both spatially and temporally across Long Island Sound. This will facilitate testing in areas without long-term data sets.

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

Actions to support achievement of Objective CWHW 3

Action CWHW 3-1: Evaluate and improve wastewater and stormwater infrastructure, and support replacement, upgrade, or sewer connections of inadequate OWTS located in critical or strategic watersheds.

Action Description:

- Conduct comprehensive assessments of current wastewater and stormwater infrastructure to identify areas needing upgrades.
- Implement necessary upgrades to wastewater and stormwater systems to enhance their efficiency in removing pathogens.
- Abate combined and sanitary sewer overflows (CSOs and SSOs) in support of approved long-term control plans and separate municipal stormwater sewer system permits.
- Promote and support wastewater treatment system connections to centralized sewer systems or upgrade existing onsite wastewater treatment systems.

- Develop and disseminate educational materials to inform the public and local stakeholders about the importance of wastewater and stormwater management in reducing pathogen levels.
- Affected Habitat Types: coastal watersheds, embayments, and recreational water bodies

Cooperators and Partners: federal agencies, Tribes/Nations, state agencies, local and county governments, regional planning organizations and commissions, nongovernmental 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: $$$$$

Performance Measures:
- Number of onsite wastewater treatment systems upgraded
- Number of onsite wastewater treatment systems removed
- Wastewater and stormwater improvements (e.g., systems installed and, miles of piping repaired)
- Amount of money spent on wastewater or stormwater infrastructure improvements

Expected Time Frame: Five-10 years

Extreme Weather Events Addressed: (1) increasing storminess

Adaptation Strategy for Vulnerabilities: Frequent and intense rainfall 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 a changing climate.

Action CWHW 3-2: Expand the spatial and temporal coverage of sampling and source tracking and encourage advancements in methodology.

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

Cooperators and Partners: federal agencies, Tribes/Nations, state agencies, local and county governments, regional planning organizations and commissions, nongovernmental 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: $$$

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 Time Frame: Five- 10 years

Extreme Weather Events Addressed: (1) increasing storminess

Adaptation Strategy for Vulnerabilities: Frequent and intense rainfall 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

OBJECTIVE CWHW 4: TOXIC CONTAMINANTS

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

Measures of Success: Increase the area of sediment in good condition in Long Island Sound by 20 percent from the 2005 baseline by 2035. The area of sediment in good condition in Long Island Sound from the 2005 National Coastal Condition Assessment (NCCA) was 53 percent. This goal, if achieved, would raise the proportion of sediment in good condition from 53 percent to 63.6 percent, which is both ecologically significant and technically feasible based on past trends and ongoing management efforts.

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, personal care products, and nanomaterials. 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 threat 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 (NCCA). 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 Long Island Sound and was 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: $$$$

SMART Framework for this Objective:

Specific: This objective aims to reduce toxic contaminants such as PCBs and heavy metals in Long Island Sound and its embayments through actions, and further sampling and analysis over a 10 year period.

Measurable: The sediment quality index will be used as a supporting metric. Currently, the Partnership tracks this index as an indicator and measures the "Percent to Target." Data is collected every five years through the National Coastal Conditions Assessment (NCCA). Beginning in 2020, the Partnership 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,	Five Years	Delineation of Long Island Sound in the dashboard is needed to efficiently capture and visualize Long Island Sound data and additional data collection is needed in embayments
Action Agenda	Report (roadmap with actions and measures) for partners to implement in remaining 5 years, 2030 - 2035.	The Partnership	Five Years	A Long Island Sound Partnership 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 Connecticut and New York are actively assessing PFAS and developing mitigation actions. Federal and state governments have programs in place to address legacy toxic containments. 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 Long Island Sound and its watershed and is within the influence of the Partnership. This objective would also improve understanding of contaminants of concern and appropriate disposal to help mitigate them as hazardous waste.

Time-Bound: Over 10 years with year milestones.

Actions to support achievement of Objective CWHW 4

Action CWHW 4-1: Identify existing and emerging contaminants of concern and support mitigation efforts as warranted.

Action Description:

- Gather information and data on existing and emerging toxins to identify contaminants of concern determine data and information gaps, and develop an action agenda.
- 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.
- 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 contaminants of concern. The action agenda will provide a framework for partners regarding further research needs, data collection, and mitigation strategies.
- Affected Habitat Types: coastal and inland watersheds and receiving waterbodies, wetlands, Long Island Sound, and embayments

Cooperators and Partners: federal agencies, Tribes/Nations, state agencies, local and county governments, regional planning organizations and commissions, nongovernmental 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: $$$$

Performance Measures:
- Synthesis report
- Action plan
- Number of mitigation plans

Expected Time Frame: Five years

Extreme Weather Events Addressed: (1) warmer waters; (2) sea level rise; and (3) ocean acidification

Adaptation Strategy for Vulnerabilities: Identification of existing and emerging contaminants will lead to better planning for water quality improvements.

Action CWHW 4-2: Continue collection and evaluation of contaminant data (e.g., NCCA) for Long Island Sound and its embayments.

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

Cooperators and Partners: federal agencies, Tribes/Nations, state agencies, nongovernmental 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: $$$$

Performance Measures:
- Sets of data collected
- Sets of data evaluated
- Number of assessment tools

Expected Time Frame: Five – 10 years

Extreme Weather Events Addressed: (1) warmer waters; and (2) ocean acidification

Adaptation Strategy for Vulnerabilities: Collecting and evaluating contaminant data will help improve water quality and mitigate effects of a changing climate in Long Island Sound.

Action CWHW 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:

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

Cooperators and Partners: federal agencies, Tribes/Nations, state agencies, public-private partnerships, private foundation grants

Funding Sources: federal and state grants, public-private partnerships, private foundation grants

Funding Needs: $$$

Performance Measures:

- Sets of data collected
- Sets of data evaluated

Expected Time Frame: Five – 10 years

Extreme Weather Events Addressed: (1) warmer summers; (2) warmer winters; (3) warmer waters; (4) increasing drought; and (5) ocean acidification

Adaptation Strategy for Vulnerabilities: Proactive research and monitoring of per- and polyfluoroalkyl substances (PFAS), 1,4-dioxane, and trifluoroacetic acid will improve understanding of how these contaminants affect coastal and inland habitats.

GOAL 1: CLEAN WATERS AND HEALTHY WATERSHEDS

OBJECTIVE CWHW 5: MARINE DEBRIS

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

Measures of Success: Decrease the mass of marine debris collected per mile during the fall International Coastal Cleanup by 10 percent from the 2022 five-year rolling average baseline of 174 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* in 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; abandoned, lost, or derelict fishing and aquaculture gear, and litter discharged through stormwater, released by imperfect waste management practices, or generated from wreckage of homes and vessels during severe storm events.

Physical debris in Long Island Sound adversely affects habitats and organisms, causes economic losses (e.g., 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 the Partnership 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 Long Island Sound, 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 generated, which will include marine debris hot spots and a framework for tracking reductions.

Cost Estimate: $$$$

SMART Framework for this Objective:

Specific: This objective aims to reduce physical debris such as derelict fish gear, microplastics and macroplastics in the Long Island Sound, its watershed, embayments and tributaries, to enhance water quality, improve ecosystem health, and increase access to the Sound over a 10-year period.

Measurable: Pounds of debris collected per mile will be used as a metric to track the progress of this objective. Data from the Ocean Conservancy's International Coastal Cleanup, and local organizations in Long Island Sound 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, Trash

Information and Data for Education and Solutions, and can serve as a supporting indicator for this objective. 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	N/A
Framework for monitoring and tracking reductions of marine debris	Report	The Partnership	Five years	Tracking meaningful progress of marine debris objectives has been challenging the Partnership 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	The Partnership	Five years	N/A
Marine Debris by Category (Indicator)	Pounds of debris collected per mile separated by categories	The Ocean Conservancy's Trash Information and Data for Education and Solutions (TIDES)	Annual	N/A
Volunteers at Coastal Cleanup (Indicator)	Number of volunteers participating in the cleanups	American Littoral Society (NY) and Save the Sound (CT)	Annual	N/A

Achievable: There are multiple efforts to reduce marine debris in Long Island Sound. NOAA's *Long Island Sound 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. 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 Long Island Sound and its watershed since marine debris impedes water quality and degrades habitat. Achieving this objective will benefit communities throughout the Long Island Sound watershed.

Time-Bound: Over ten years, with five-year milestones

Actions to support achievement of Objective CWHW 5

Action CWHW 5-1: Support research and monitoring efforts that aim to increase understanding of the extent and sources of marine debris and its impact on the ecosystem.

Action Description:

- 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.
- Evaluate the effectiveness of interception technologies and identify potential alternatives.
- Create consumer debris campaigns to better inform decision-makers and raise public awareness.
- Document local knowledge regarding ghost fishing gear and species impacted by lost and abandoned fishing and aquaculture gear.
- Support the development of a framework for tracking marine debris reductions.
- Incorporate data from marine debris collection, clean-up efforts, participation, 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, and community science programs to monitor and document the extent and types of abandoned gear on public or managed lands and cleanup costs.
- Affected Habitat Type: coastal and inland watersheds and receiving waterbodies, wetlands, Long Island Sound, and embayments

Cooperators and Partners: federal agencies, Tribes/Nations, state agencies, local and county governments, regional planning organizations and commissions, nongovernmental organizations and community organizations, universities and research institutions

Funding Sources: federal and state grants, public-private partnerships, private foundation grants

Funding Needs: $$$

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 Time Frame: Five - 10 years

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

Adaptation Strategy for Vulnerabilities: Frequent and intense rainfall 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 CWHW 5-2: Promote the advancement and implementation of interception technologies, tools, receptacle bins, and capture devices that remove debris, while supporting education and outreach across the Long Island Sound watershed.

Action Description:

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

Cooperators and Partners: federal agencies, Tribes/Nations, state agencies, local and county governments, regional planning organizations and commissions, nongovernmental 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: $$$

Performance Measures:

- Pounds of marine debris prevented from entering the Sound

Expected Time Frame: Five - 10 years

Extreme Weather Events Addressed: (1) warmer summers; (2) warmer winters; (3) warmer waters; (4) increasing storminess; and (5) sea level rise; (6) sea level rise; and (7) ocean acidification

Adaptation Strategy for Vulnerabilities: Frequent and intense rainfall 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 CWHW 5-3: Support the removal of marine debris located within the coastal boundary and Long Island Sound.

Action Description:

- Support cleanup efforts of land-based litter within the coastal boundary. The coastal boundary is defined as the nearshore watershed by the Long Island Sound Partnership.
- Support removal of abandoned or lost fishing gear.
- Support the removal of large-scale debris, such as debris from storms, and discarded vessels.
- Affected Habitat Types: coastal and inland watersheds and receiving waterbodies, wetlands, Long Island Sound, and embayments

Cooperators and Partners: federal agencies, Tribes/Nations, state agencies, local and county governments, regional planning organizations and commissions, nongovernmental organizations and community organizations, universities and research institutions

Funding Sources: federal and state grants, private foundation grants, public-private partnerships

Funding Needs: $$$

Performance Measures:
- Pounds of marine debris removed
- Miles of clean-ups

Expected Time Frame: Five - 10 years

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

Adaptation Strategy for Vulnerabilities: Frequent and intense rainfall 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 CWHW 5-4: Inform and support the development and implementation of new local and state policies and management plans aimed at source reduction, prevention, and interception practices as identified by available marine debris collection data.

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

Cooperators and Partners: federal agencies, Tribes/Nations, state agencies, local and county governments, regional planning organizations and commissions, nongovernmental organizations and community organizations, universities and research institutions

Funding Sources: federal and state grants, private foundation grants, public-private partnerships

Funding Needs: $$

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

Expected Time Frame: Five - 10 years

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

Adaptation Strategy for Vulnerabilities: Frequent and intense rainfall 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.

GOAL 2: THRIVING HABITATS AND ABUNDANT WILDLIFE

OBJECTIVE THAW 1: COASTAL HABITAT

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.

Measures of Success: Restore 1,000 acres of coastal habitat in the coastal boundary of Long Island Sound. Of the 1,000 acres to be restored, 40 percent will be in areas lacking in natural habitat to ensure that benefits of restoration can be enjoyed by more communities.

Technical Explanation: The 1994 CCMP identified habitats and living resources for management, monitoring, research, and protection. The Partnership and its partners have made great strides over the last three decades to accomplish these tasks. The Partnership has targeted 12 types of coastal habitats for restoration 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. While these restoration efforts include the 12 coastal habitat types, this objective aims to restore at least 10 acres of seagrass and 250 acres of tidal wetlands to continue to build upon the 2015 CCMP. In addition to restoration, this objective also includes coastal habitat extent where the Partnership is prioritizing the protection and enhancement of coastal habitat, thereby providing resiliency to extreme weather events. According to the *2009 - 2019 USFWS Wetlands Status and Trends Report*, U.S. wetland loss has increased by more than 50 percent as both natural and anthropogenic pressures grow (i.e., sea level rise and land development). To better understand and minimize marsh losses due to anthropogenic impacts, the Partnership will monitor the existing extent for land-based coastal habitat, including tidal wetlands (i.e., high and low marsh defined by vegetation type), and seagrass. Furthermore, by restoring and protecting coastal habitat, this objective and its actions, aims to preserve the longevity of the ecosystem services provided by coastal habitats. These services include, but are not limited to, providing habitat and food sources for wildlife and their juveniles, storing and cycling nutrients, protecting the shoreline from erosion, and serving as wildlife biodiversity hotspots.

Cost Estimate: $$$$$

SMART Framework for this Objective:

Specific: This objective describes how the Partnership aims to protect existing coastal habitat and restore 1,000 acres of coastal habitat by 2035. Coastal habitats are critical ecosystems that provide essential or 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	Partnership 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 five years (in the near term, expand to NY)	The Partnership to fund surveys to ensure we have sufficient data for tracking and reporting
Embayment Water Clarity (Indicator)	Secchi disk depth and light attenuation coefficient	Save the Sound	Annual	N/A
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	Annual	N/A

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

Relevant: This objective is directly relevant 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 time-bound, as it includes "by 2035" meaning that the objective aims to be achieved within a 10-year time frame. The group collects data that can support (at least) five-year updates on progress and allows for a recalibration period in case actions need to be modified or better aligned to achieve the objective.

Actions to support achievement of Objective THAW 1

Action THAW 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:

- Prioritize coastal habitat restoration projects activities using the following criteria:
  - Use established habitat restoration techniques to ensure successful project completion of one or more of the Partnership's 12 targeted 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's and Connecticut's Species of Greatest Conservation Need.
  - Projects that provide benefits to and can be accessed by distressed communities and Tribes and Nations.
  - Projects that seek to reduce the impact of non-native invasive species (e.g., plant native species and remove non-native invasive species).
  - Projects that beneficially reuse suitable dredged material to restore coastal habitat (e.g., tidal marsh elevation). For example, utilization of the U.S. Army Corp of Engineers' Beneficial Use Planning Tool.
  - Projects that aim to enhance ecosystem services provided by coastal habitats (e.g., restoring shellfish reefs to enhance aquaculture activities).
  - Projects that incorporate a multi-faceted approach to restore coastal habitat on an ecosystem level (e.g., habitat and water quality).
- Research and develop innovative techniques and tools to be explored for future restoration.
- Explore the further advancement and application of dredged material to benefit coastal habitat restoration.
- Apply standardized methods to monitor restoration sites and evaluate successes of innovative techniques.
- Support collaboratives and networks that enhance restoration and protection of priority coastal habitat types.
- Work with partners to streamline permitting processes, promote best management practices region-wide, and enhance communicate 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 Long Island Sound and adjoined embayments.
  - Forecast decadal scale projections of ecosystems and their natural resources.
- Affected Habitat Types: 12 targeted coastal habitat types

Cooperators and Partners: individual private landowners, landowner associations, conservation-based nongovernmental organizations, academia, and federal, Tribes/Nations, state, and municipal agencies

Funding Sources: federal, state, and local funds and grants, private funds and grants, and in-kind services provided by project cooperators and partners

Funding Needs: Potential costs for restoration projects will range from $ to $$$$$, depending on the project scope.

Performance Measures:
- Number of coastal habitat restoration projects completed
- Coastal habitat acres restored
- Tidal wetland acres restored
- Seagrass acres restored
- Shellfish reefs restored

Expected Time Frame: Ongoing

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

Adaptation Strategy for Vulnerabilities: Restoring and protecting coastal habitat, while incorporating new research and innovative techniques, will mitigate extreme weather event impacts associated with habitat degradation and loss.

Action THAW 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:

- Educate the public on the benefits of various living shoreline techniques, while raising awareness about hard-armored shorelines and their impacts (i.e., shifting risk).
- Collaborate with partners to engage private landowners in implementing living shoreline projects.
- Evaluate resources for decision-makers outlining best practices for policy and permitting related to living shorelines.
- Encourage broader use of completed projects as case studies and examples to gain additional support and inform 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.
- Affected Habitat Types: 12 targeted coastal habitat types

Cooperators and Partners: individual private landowners, landowner associations, conservation-based nongovernmental organizations, academia, and federal, Tribes/Nations, state, and municipal agencies

Funding Sources: federal, state, and local funds and grants, private funds and grants, and in-kind services provided by project cooperators and partners

Funding Needs: Potential costs for living shoreline projects will range from $$$ to $$$$$

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 Time Frame: Ongoing

Extreme Weather Events Addressed: (1) warmer summers; (2) warmer winters; (3) warmer waters; (4) increasing storminess; and (5) sea level rise

Adaptation Strategy for Vulnerabilities: Implementing living shoreline methods and converting hard-armored shorelines will reduce erosion and provide suitable habitat for wildlife.

Action THAW 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 seagrass.

Action Description:

- Create a habitat quality assessment methodology resulting in practical quality metrics including wildlife metrics.
- Develop salt marsh health monitoring metrics. Once developed, these metrics will be applied to future salt marsh monitoring in Long Island Sound (note: this project is in progress and funded by the Partnership).
- Expand the Partnership's LiDAR tidal wetland mapping efforts into the New York portion of Long Island Sound and continue on a five-year cycle.
- Continue and advance seagrass monitoring via remote sensing and mapping and establish monitoring sites (i.e., SeagrassNet) on an annual basis.
- Research the impacts of warming temperatures on coastal habitats (e.g., conduct research and experiments to understand resiliency).
- Monitor Species of Greatest Conservation Need that are using these critical habitat types (i.e., before and after monitoring surveys of at-risk bird species, and aquatic animals).
- Research, model, and monitor water quality, land use, and other conditions to better support habitat restoration and management.
- Affected Habitat Types: submerged aquatic vegetation, tidal wetlands

Cooperators and Partners: individual private landowners, landowner associations, conservation-based nongovernmental organizations, academia, and federal, Tribes/Nations, state, and municipal agencies

Funding Sources: federal, state, and local funds and grants, private funds and grants

Funding Needs: Potential costs for monitoring at this scale will range from $$$ to $$$$, especially for Sound-wide tidal marsh LiDAR surveys.

Performance Measures:

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

Expected Time Frame: Ongoing

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

Adaptation Strategy for Vulnerabilities: Monitoring and researching the impacts of a changing climate on eelgrass and tidal wetland extent and health will inform and strengthen restoration and protection efforts.

GOAL 2: THRIVING HABITATS AND ABUNDANT WILDLIFE

OBJECTIVE THAW 2: OFFSHORE HABITAT

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

Measures 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 and to better understanding the ecological characterization, biodiversity, and threats (e.g., invasives and adverse impacts from electric transmission cable placement). This Initiative enables the Partnership to better protect and preserve the biodiversity that make up these critical ecosystems. This Offshore Habitat objective will continue the progress from 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, the Partnership 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, the Partnership 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: $$$$$

SMART Framework for this Objective:

Specific: This objective describes how the Partnership 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 the Partnership	Projects	Partnership Tracking and Reporting Tool	Annual	The Partnership 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	Partnership to support the completion of the full characterization
Fish (Forage Fish, Finfish, Game Fish) (Indicator)	Counts	CT DEEP Trawl Survey	Annual	N/A
Invertebrates Abundance (Lobster) and Biomass (Indicator)	Counts	CT DEEP Trawl Survey	Annual	N/A

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

Relevant: This objective is directly relevant as "thriving habitats and abundant wildlife" is one of the goals of the 2025 CCMP. This objective will result in enhanced offshore habitat for wildlife and communities. Seafloor data will be accessible to broader audiences through educational tools and signage to meaningfully educate and engage stakeholders.

Time-Bound: This objective is time-bound, as it includes "by 2035" meaning that the objective aims to be achieved within a 10-year time frame. The group collects data that can support (at least) five-year updates on progress and allows for a recalibration period in case actions need to be modified or better aligned to achieve the objective.

Actions to support achievement of Objective THAW 2

Action THAW 2-1: Promote science-based marine spatial planning that balances human use of the Sound and protects ecosystem functions of offshore habitat and species while considering 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.
- Affected Habitat Types: offshore habitat, estuarine embayments, coastal and island forests.

Cooperators and Partners: federal, Tribes/Nations, state, and local agencies, conservation-based nongovernmental organizations, and academia

Funding Sources: federal and state funds and grants

Funding Needs: $$$$ per project

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

Expected Time Frame: Ongoing

Extreme Weather Events Addressed: (1) warmer summers; (2) warmer winters; (3) warmer waters; and (4) ocean acidification

Adaptation Strategy for Vulnerabilities: Implementing and updating management plans and programs to protect offshore habitat will mitigate extreme weather event impacts on marine wildlife.

Action THAW 2-2: Support the Long Island Sound Seafloor Habitat Mapping Initiative and apply the collected data 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 Long Island Sound 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* species, and *Haliclona* species.
- Affected Habitat Types: offshore habitat, estuarine embayments, coastal and island forests.

Cooperators and Partners: federal, Tribes/Nations, state, and local agencies, academia, and other researchers

Funding Sources: federal and state funds and grants

Funding Needs: $$$ to $$$$ per project

Performance Measures:
- Acres of seafloor habitat areas fully characterized
- Number of sites monitored

Expected Time Frame: Ongoing

Extreme Weather Events Addressed: (1) warmer summers; (2) warmer winters; (3) warmer waters; and (4) ocean acidification

Adaptation Strategy for Vulnerabilities: Mapping the seafloor will lead to better understanding of offshore habitat and community shifts influenced by a changing climate and therefore support future management and planning efforts to mitigate impacts.

Action THAW 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.
- Explore the further advancement and application of dredged material to benefit coastal habitat restoration.
- Affected Habitat Types: offshore habitat, estuarine embayments, coastal and island forests.

Cooperators and Partners: federal, Tribes/Nations, state, and municipal agencies, conservation-based nongovernmental organizations

Funding Sources: federal and state funds and grants, private funds or grants, and other sources, including in-kind services provided by project cooperators and partners

Funding Needs: $$$

Performance Measures:

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

Expected Time Frame: Ongoing

Extreme Weather Events Addressed: (1) warmer summers; (2) warmer winters; (3) warmer waters; and (4) ocean acidification

Adaptation Strategy for Vulnerabilities: Restoring offshore habitat, while incorporating stewardship and education activities to promote protection, will mitigate extreme weather event impacts on habitat and marine wildlife.

GOAL 2: THRIVING HABITATS AND ABUNDANT WILDLIFE

OBJECTIVE THAW 3: HABITAT CONNECTIVITY

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

Measures of Success: Restore or protect 100 habitat patches and reconnect 175 miles of riverine migratory corridors in the Connecticut and New York portions of the watershed. Of the 175 additional miles of riverine migratory corridors, 50 percent of the miles will occur in locations where communities have not typically benefited from habitat connectivity projects.

Technical Explanation: Habitat connectivity is a critical component of wildlife conservation. Protecting existing coastal habitat patches (i.e., discrete habitat areas that are isolated) prevents loss of areas where connections can be restored. Restoring areas between isolated habitat areas increases the habitat connectivity (i.e., contiguous acres of coastal habitat protected or restored). By increasing habitat connectivity, fish and wildlife can freely move for day-to-day needs such as feeding, breeding, and resting, or for migration. Since the 12 coastal habitat types were identified and targeted for restoration 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. This objective aims to restore or protect 100 habitat patches, measured in acres. Of these 100 patches, the Partnership is aiming to restore at least 50 acres of habitat to enhance connectivity. Priority sites for habitat connectivity must be selected, and options for tracking improvements in habitat connectivity within Long Island Sound need to be identified and evaluated. More specifically, priority sites may focus on opportunities to reconnect stream miles, through the removal of barriers (i.e., dams and 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). The Partnership specifically mentions the following sub-goal 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: $$$

SMART Framework for this Objective:

Specific: This objective describes how the Partnership 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 Long Island Sound coastal boundary for habitat patches, and in all of New York and Connecticut for miles reconnected.

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

Measurable	Measurement	Source	Frequency	Need
Habitat Patches Restored or Protected	Acres	Habitat restoration coordinators	Annual	N/A
Stream Miles Reconnected	Miles	Habitat restoration coordinators	Annual	N/A
Barrier Removals (Indicator)	Counts	Habitat restoration coordinators (data sources: American Rivers for dams, LISFF)	Annual	N/A
Wildlife: Anadromous Fish (Index of Anadromous Fish Runs, Shad and Blueback Herring-Long Island Sound) (Indicator)	Counts	CT DEEP	Annual	N/A

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

Relevant: This objective is directly relevant 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 and aims to provide communities with access to benefits of habitat connectivity, such as improved fishing opportunities and stream restoration projects.

Time-Bound: This objective is time-bound, as it includes "by 2035" meaning that the objective aims to be achieved within a 10-year time frame. The group collects data that can support (at least) five-year updates on progress and allows for a recalibration period in case actions need to be modified or better aligned to achieve the objective.

Actions to support achievement of Objective THAW 3

Action THAW 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.
- Using remote sensing, mapping tools, modeling, and field verification, advance our understanding about extreme weather event 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 II for habitat connectivity modeling.
- Affected Habitat Types: 12 targeted coastal habitat types

Cooperators and Partners: federal, Tribes/Nations, state, and local agencies, nongovernmental organizations, academia

Funding Sources: federal and state funds and grants

Funding Needs: $$$ per project

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

Expected Time Frame: Ongoing

Extreme Weather Events Addressed: (1) warmer summers; (2) warmer winters; (3) warmer waters; (4) increasing drought; (5) increasing storminess; and (6) sea level rise

Adaptation Strategy for Vulnerabilities: Monitoring and modeling will advance our understanding of extreme weather event impacts on habitat patches and rivers miles to enhance habitat connectivity.

Action THAW 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 (e.g., right-sizing or replacement).
  - 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 the Partnership numerical targets. Eel passage structures have a prioritization all their own, but stream miles are not counted. Dam condition is important to consider 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.
- Support dissemination of trainings and resources to build capacity in assessments and monitoring.
- 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.
- Affected Habitat Types: 12 targeted coastal habitat types

Cooperators and Partners: individual private landowners, landowner associations, conservation-based nongovernmental organizations, academia, and federal, Tribes/Nations, state, and municipal agencies

Funding Sources: federal, state, and local municipal government funds and grants, private funds and donations, 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 $ to $$$$, depending on the project scope.

Performance Measures:
- Stream miles reconnected
- Number of dams removed
- Number of culverts modified
- Number of fish ladders and fish lifts installed
- Number of eel passes installed
- Number of projects designed and planned

Expected Time Frame: Ongoing

Extreme Weather Events Addressed: (1) warmer summers; (2) warmer winters; (3) warmer waters; (4) increasing drought; (5) increasing storminess; and (6) sea level rise

Adaptation Strategy for Vulnerabilities: Restoring and reconnecting streams will mitigate extreme weather event impacts associated with habitat degradation and loss.

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

Action Description:
- 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. More specifically, the Partnership should strive to identify pathways to issue permits within three to six months.
- Support partners to implement more transparency, consistency, and efficient e-permitting dashboards to achieve shorter permitting timelines.
- Collaborate with partners 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 and regional working 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. This process should include:
  - Identify permitting timelines (collecting more information on how long it takes to write permits, submit permits, review permits, and receive permits).
  - Explore the use of a state and federal programmatic review to cover the priority ecological restoration work identified by the 2025 CCMP.

- Update or revise sediment management guidelines specific to dam removal projects.
- Affected Habitat Types: 12 targeted coastal habitat types

Cooperators and Partners: federal, Tribes/Nations, state, and local agencies, conservation-based nongovernmental organizations, academia

Funding Sources: federal and state funds and grants, private funds and donations

Funding Needs: $$$

Performance Measures:
- Number of projects permitted
- Number of permits issued under one year
- Guidance documenting permitting process steps

Expected Time Frame: Ongoing

Extreme Weather Events Addressed: (1) warmer summers; (2) warmer winters; (3) warmer waters; (4) increasing drought; (5) increasing storminess; and (6) sea level rise

Adaptation Strategy for Vulnerabilities: Promoting collaboration, specifically to streamline permitting, will increase habitat restoration activities and thereby mitigate extreme weather event impacts.

GOAL 2: THRIVING HABITATS AND ABUNDANT WILDLIFE

OBJECTIVE THAW 4: CONSERVED OPEN SPACE

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

Measures of Success: Conserve 5,000 acres of open space in the coastal boundary of Long Island Sound. Of the 5,000 acres to be conserved, at least 40 percent will be in areas where communities have not typically benefited from conservation projects.

Technical Explanation: Conserving open space preserves natural and undeveloped areas is important to maintain a vital ecosystem and provide natural resource-based recreational opportunities. Additionally, conserving open space has indirect benefits that improve water quality and quantity. The conservation of open spaces also promotes increasing opportunities for habitat connectivity. Since 2006, more than 8,100 acres have been protected mainly in the form of land acquisition. While the Partnership plans to continue to increase acreage through 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 (e.g., invasive removal and habitat enhancements). The Partnership also strives to 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: $$$$

SMART Framework for this Objective:

Specific: This objective describes how the Partnership 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 and helps to maintain a vital ecosystem while 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	Habitat restoration coordinators	Annual	N/A
Changes in Forest Cover (Indicator)	Square miles	UCONN CLEAR CL, NLCD, NOAA C-CAP	Every two years	N/A
Impervious Cover (Indicator)	Square miles	UCONN CLEAR CL, NLCD, NOAA C-CAP	Every two years	N/A
Watershed Population (Indicator)	People	U.S. Census	Every 10 years	N/A

Achievable: This objective is achievable, as it has been designed, developed, and reviewed by partners responsible for conducting and tracking land acquisition projects and associated metrics. This 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 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. Efforts will be made to identify public access locations associated with the conserved open spaces.

Time-Bound: This objective is time-bound, as it includes "by 2035" meaning that the objective aims to be achieved within a 10-year time frame. The group collects data that can support (at least) five-year updates on progress and allows for a recalibration period in case actions need to be modified or better aligned to achieve the objective.

Actions to support achievement of Objective THAW 4

Action THAW 4-1: Protect high-priority coastal habitat from development through implementation of land conservation plans that identify priorities for 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, those that benefit distressed communities or have lacked land management investments, and lands that can accommodate extreme weather events and sea level rise (e.g., habitat migration).
- Create a complete and accurate registry of protected conservation land within Long Island Sound's coastal boundary.
- Use prioritization criteria developed by partner state and Tribal governments to guide investments and best management practices that limit human disturbance and protect coastal and marine habitats for Species of Greatest Conservation Need or species of cultural significance.
- Use the habitat connectivity model underway to identify and prioritize land conservation.
- Affected Habitat Types: 12 targeted coastal habitat types

Cooperators and Partners: federal, Tribes/Nations, state, and local agencies, conservation-based nongovernmental organizations, and land trusts

Funding Sources: federal and state funds and grants, and private funds and donations

Funding Needs: Land acquisition can range from $ to $$$$, 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 Time Frame: Ongoing

Extreme Weather Events Addressed: (1) warmer summers; (2) warmer winters; (3) warmer waters; (4) increasing drought; (5) increasing storminess; and (6) sea level rise

Adaptation Strategy for Vulnerabilities: Acquiring land and implementing conservation plans to protect habitat will mitigate extreme weather event impacts associated with habitat degradation and loss.

Action THAW 4-2: Increase access and enhance sustainable stewardship of conserved lands particularly for distressed communities.

Action Description:

- Support increasing access and enhancing stewardship of conserved lands. Prioritize existing acquired land that is in or near distressed 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 educational activities and management of the 33 Stewardship Sites in Long Island Sound and explore the possibility of adding more Stewardship Sites.
- Conduct a coastal land and cumulative impacts analysis to identify areas most suitable for land acquisition to increase the area of existing Stewardship Areas or to establish new Stewardship Areas.
- Support co-development and co-management of sites with local communities, and Tribes/Nations where possible to ensure early engagement, provide financial and technical assistance, and amplify meaningful stewardship activities.
- Broaden partnerships with communities that have not typically benefited from projects to foster increased stewardship and access.
- Affected Habitat Types: 12 targeted coastal habitat types

Cooperators and Partners: federal, Tribes/Nations, state, and local agencies, conservation-based nongovernmental organizations, academia

Funding Sources: federal and state funds and grants, and private funds and donations

Funding Needs: $$$ per site

Performance Measures:

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

Expected Time Frame: Ongoing

Extreme Weather Events Addressed: (1) warmer summers; (2) warmer winters; (3) warmer waters; (4) increasing drought; (5) increasing storminess; and (6) sea level rise

Adaptation Strategy for Vulnerabilities: Increasing and enhancing access and stewardship activities to promote protection will mitigate extreme weather event impacts on habitat and wildlife.

GOAL 3: SUSTAINABLE AND RESILIENT COMMUNITIES

OBJECTIVE SRC 1: INFORMED DECISION-MAKERS

Objective Statement: Increase the number of government officials, practitioners, and community leaders receiving training and support to increase their capacity to adapt to environmental challenges.

Measures of Success: Engage 100 new decision-makers through Partnership trainings and resources every year.

Technical Explanation: Findings from a 2022 informal needs assessment conducted by the Sustainable and Resilient Communities extension professionals (SRC EPs) showed that decision-makers (defined as government, practitioner, and community leaders that influence or make policy decisions) 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 extreme weather events, a changing climate and other environmental challenges. Interest in recent Partnership-funded tools like the Long Island Sound 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: $$$$

SMART Framework for this Objective:

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

Measurable:

Measurable	Measurement	Source	Frequency	Need
New municipal, non-profit, and community leaders engaged (Indicator)	Elected officials, municipal staff and committee members, nonprofit leaders, civic group or other community leaders, tribal leaders, consultants, and engineering firms reached who haven't previously attended SRC offerings.	SRC EPs, partners (anyone receiving Partnership funding or participating in Partnership work groups or committees), LISFF	Annual	N/A
Total 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, partners (anyone receiving Partnership funding or participating in Partnership work groups or committees), LISFF	Annual	N/A

Achievable: Achieving this objective is a key focus of the SRC work. It is also applicable to other partners. The SRC team engaged nearly 200 participants at the first and second annual bi-state

workshop, just one of the many training and educational programs run throughout the year. The aim is to engage an average of 100 new participants each year.

Relevant: Trained community decision-makers is one of the five outcomes of the SRC Integrated Work Plan for the Long Island Sound Partnership Working Group (2021-2026) and one of the key steps from the SRC needs assessment. Training and support programs developed by the SRC team and partners will be reflective of stakeholder needs and will be available for all communities throughout the coastal boundary area and any relevant materials, including presentations, recordings, and other content will be widely distributed.

Time-Bound: Measured annually.

Actions to support achievement of Objective SRC 1

Action SRC 1-1: Develop, deliver, and facilitate training programs relevant and responsive to community needs that assist with sustainability and resilience.

Action Description:

- Deliver regular training that 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.
- Develop training programs that are responsive to community needs identified through the work of the Partnership, such as the SRC needs assessment and other relevant assessments/evaluations.
- Develop webinars, in-person workshops, or field trips 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 basic
    - Identifying resilience priorities
    - Communicating effectively
    - Navigating grants and funding mechanisms
    - Updating municipal codes
    - Sharing success stories and lessons learned
    - Innovating applications of nature-based solutions
    - Education on topical issues
    - Ecosystem service valuation
- Affected Habitat Types: Long Island Sound coastal watershed

The partnership encourages collaborations with state and other entities to develop and deliver training programs. Training programs should be formatted and delivered in a way that ensures accessibility for all communities. Participation could be incentivized, for example through continuing education credits or transportation support.

Cooperators and Partners: CT/NY Sea Grant, federal agencies, Tribes/Nations, state agencies, local governments, state climate certification programs, LISCIF, nonprofit partners, academia

Funding Sources: federal, state, and local funds and grants, private funds and grants

Funding Needs: $$$$

Performance Measures:

- Number of unique trainings and events developed (Trainings, workshops, field trips, or other educational events)
- Number of decision-makers that receive training, either by SRC or partners (elected officials, government staff and committee members, nonprofit leaders, civic group or other community leaders, Tribal leaders, consultants, practitioners, and engineering firms reached.)
- New decision-makers engaged (number of elected officials, government staff and committee members, nonprofit leaders, civic group or other community leaders, Tribal leaders, consultants, practitioners, and engineering firms reached who haven't previously attended SRC offerings.)

Expected Time Frame: Ongoing

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

Adaptation Strategy for Vulnerabilities: 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: Support community-centered research, monitoring, and development of tools to assess impacts from extreme weather events and a changing climate and advance resilience.

Action Description:

- Develop 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.
- Promote the creation and use of tools and resources tailored to help Long Island Sound stakeholders make informed decisions regarding such 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.
- Promote, develop, and improvement of Long Island Sound-focused tools and resources that advance resilience.
- Conduct research and monitoring to assess the effects of a changing climate.
- Co-develop research, monitoring activities, and tools with communities to ensure their relevance, accessibility, and adaptiveness to community needs.
- Continuously update the Long Island Sound Resilience Resource Hub with available tools and resources.
- Affected Habitat Types: Long Island Sound coastal watershed

Cooperators and Partners: CT/NY Sea Grant, federal agencies, Tribes/Nations, state agencies, local governments, state climate certification programs, LISCIF, nonprofit partners, academia, community groups and organizations

Funding Sources: federal, state, and local funds and grants, private funds and grants

Funding Needs: $$$$

- Resources developed and modified/improved (research products, monitoring outputs, and tools that are within the influence of the Partnership.)

Expected Time Frame: Ongoing.

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

Adaptation Strategy for Vulnerabilities: This action will ensure communities have the tools, such as flood risk models, to help them understand, plan, and respond to climate risks and associated impacts.

GOAL 3: SUSTAINABLE AND RESILIENT COMMUNITIES

OBJECTIVE SRC 2: COMMUNITY-DRIVEN RESILIENCE PLANNING

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

Measures of Success: All 135 municipalities within the Partnership coastal boundary identify key resiience 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, and 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 convened and included in each step. Resilience plans and priorities should be reviewed at least every 10 years and updated as appropriate (30 were updated as of January 2025). While resilience planning is encouraged through the entire watershed, this objective will only track plans throughout the coastal boundary for capacity reasons.

Cost Estimate: $$$$$

SMART Framework for this Objective:

Specific: This objective is focused on resilience planning for the coastal municipalities within the Partnership coastal boundary: 77 in New York and 58 in Connecticut.

Measurable:

Measurable	Measurement	Source	Frequency	Need
Number 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 not count toward this tracking.	SRC EPs, state climate certification programs	Annual	N/A

Achievable: Achieving this objective is a key part of the SRC 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: Resilience planning is needed to help communities identify their priorities and move forward with projects. The importance of these plans is outlined the SRC work plan. The development of resilience plans or priorities should include opportunities for community input from all stakeholders.

Time-Bound: By 2035, measured annually.

Actions to support achievement of Objective SRC 2

Action SRC 2-1: Develop climate resilience plans and strategies, into existing municipal, regional, and watershed plans.

Action Description:

- Support resilience planning as it is a critical process for communities to undertake to identify potential threats and hazards and strategize about the most effective ways to mitigate risks and adapt to a changing climate.
- Develop new climate resilience plans or update existing plans to include climate resilience strategies.
- Increase awareness about existing technical and financial resources available to Long Island Sound communities for resilience planning.
- Develop resilience plan templates and share examples of plans from Sound communities.
- Continue to support community-driven planning through the Long Island Sound Resilience Planning Support Program and other similar programs.
- Work with the states, funding agencies, and other partners to build and implement programs that incentivize municipalities to develop climate resilience plans.
- Affected Habitat Types: Long Island Sound coastal watershed

Cooperators and Partners: CT/NY Sea Grant, Tribes/Nations, state agencies, local governments, state climate certification programs, nonprofit partners, academia

Funding Sources: federal, state, and local funds and grants, private funds and grants

Funding Needs: $$$$

Performance Measures:

- Number of new or updated plans (Includes standalone climate vulnerability assessment and adaptation plans, standalone sustainability/resilience plans, and resilience priorities that have been identified as a major component of a watershed plan or other municipal, local, and regional plans. Hazard mitigation plans as well as plans or priorities that are more than 10 years old and not actively being completed, reviewed, and/or updated do not count toward this tracking.)

Expected Time Frame: Ongoing.

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

Adaptation Strategy for Vulnerabilities: Creating plans to address these 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:

- Support collaborative planning across political boundaries and involving stakeholders across broad geographical to establish and achieve resilience goals at the regional level. Regional planning has the potential to expand the impact and influence of planning efforts as well as enhance project competitiveness for larger federal awards.
- Establish partnerships across neighboring communities and levels of government to align priorities

and develop or advance implementation of sustainability and resilience plans.
- Provide programming, incentives, and support to encourage partnerships for resilience planning across neighboring communities and levels of government.
- Affected Habitat Types: Long Island Sound coastal watershed

Cooperators and Partners: CT/NY Sea Grant, federal agencies, Tribes/Nations, state agencies, local governments, state climate certification programs, nonprofit partners, academia

Funding Sources: federal, state, and local funds and grants, private funds and grants

Funding Needs: $$$$

Performance Measures:
- Number of established/active regional partnerships/collaborations (Collaborations supported or influenced by the Partnership that involve two or more entities working across municipal boundaries to plan for and advance collective resilience goals.)

Expected Time Frame: Ongoing.

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

Adaptation Strategy for Vulnerabilities: 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 in local and regional resilience planning and decision-making.

Action Description:
- Help expand participation in planning processes to ensure that the needs of all community members are represented in local and regional resilience planning and decision-making
- Help to identify and inform opportunities for increasing engagement in planning and decision-making through 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.
- Provide technical support or financial incentives to community members for participation in planning and decision-making processes.
- Increase capacity of staff dedicated to community engagement.
- Forge new relationships with relevant community groups and include them in resilience planning processes (see Action 3-1).
- Affected Habitat Types: Long Island Sound coastal watershed

Cooperators and Partners: CT/NY Sea Grant, federal agencies, Tribes/Nations, state agencies, local governments, state climate certification programs, LISCIF, nonprofit partners, academia, community groups and organizations and neighborhood associations

Funding Sources: federal, state, and local funds and grants, private funds and grants

Funding Needs: $$$$

Performance Measures:
- Number of new partners/community groups engaged in resilience planning/decision-making (new communities that have engaged with the Partnership to advance resilience planning.)
- Number of new underserved communities engaged in resilience planning/decision-making.

Expected Time Frame: Ongoing.

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

Adaptation Strategy for Vulnerabilities: 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

OBJECTIVE SRC 3: RESILIENCE INITIATIVE IMPLENTATION

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

Measures of Success: Communities in the New York and Connecticut portions of the Long Island Sound watershed implement 200 resilience initiatives.

Technical Explanation: Meeting existing and emerging environmental challenges to Long Island Sound 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 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 and changes, zoning and code updates, or new funding mechanisms to support resilience projects (e.g., creation of stormwater utilities).

Cost Estimate: $$$$$

SMART Framework for this Objective:

Specific: This objective is focused on the implementation of initiatives in the New York and Connecticut portions of the Partnership watershed that prioritize nature-based solutions to increase community resilience.

Measurable:

Measureable	Measurement	Source	Frequency	Need
Number of initiatives implemented	Initiatives completed using Partnership support/funding or in coordination with 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 and code updates, or new funding mechanisms to support resilience projects.	SRC EPs, partners (anyone receiving Partnership funding or participating in Partnership work groups or committees), LISFF projects	Annual (Cumulative)	N/A
Number of initiatives in progress	Initiatives in progress using Partnership support/funding or in coordination/partnership with partners. Initiatives could include green infrastructure, living shorelines, flood mitigation projects, stormwater management projects, road-stream crossing improoements, stream barrier removal projects, habitat restoration, policy improvement/ changes, zoning and code updates, or new funding mechanisms to support resilience projects.	SRC EPs, partners (anyone receiving Partnership funding or participating in Partnership work groups or committees), LISFF projects	Annual (progress indicator)	N/A

Achievable: Estimating 200 projects over 10 years based on 10 LISFF projects per year, plus 10 Breaking Down Barriers planning support projects per year.

Achievable: Achieving this objective is a key part of the SRC 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: Facilitated implementation of projects is one of the five outcomes of the SRC work plan.

Time-Bound: By 2035, measured annually. 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:

- Enhance community capacity to implement, manage, and sustain initiatives as the SRC needs assessment identified limited capacity and lack of funding as two of the primary barriers to implementation of resilience initiatives.
- Continue existing financial and technical assistance programs like the Long Island Sound Resilience Grant Writing Assistance and Planning Support Programs which can help to address these capacity and financial challenges.
- Establish of new programs
- Support efforts that support partnerships across municipal boundaries and levels of government and between municipalities and nonprofits and other experts.
- Affected Habitat Types: Long Island Sound coastal watershed

Collaborators and Partners: CT/NY Sea Grant, federal agencies, Tribes/Nations, state agencies, local governments, state climate certification programs, LISCIF, nonprofit partners, academia, community groups and organizations

Funding Sources: federal, state, and local funds and grants, private funds and grants

Funding Needs: $$$$

Performance Measures:

- Number of capacity support programs established (programs created using Partnership support or funding or in coordination with Partners [anyone receiving Partnership funding or participating in Partnership work groups or committees] that provide communities with related technical or financial assistance.)
- Number of capacity support programs maintained (programs continued using Partnership support or funding or in coordination with Partners [anyone receiving Partnership funding or participating in Partnership work groups or committees] that provide communities with related technical or financial assistance.)
- Amount of LISCIF capacity support funding allocated (amount of funding dedicated through the Long Island Sound Community Impact Fund [LISCIF] to support capacity-building activities.)

Expected Time Frame: Ongoing

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

Adaptation Strategy for Vulnerabilities: 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:

- Encourage the development and implementation of regulations, codes, and 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 reinforced across levels of government (see Action SRC 2-2) to maximize benefits to communities and the environment.
- Support the development and adoption of proposed new or updated codes or regulations.
- Provide programming or technical resources to aid municipalities with reviewing and updating local codes
- Affected Habitat Types: Long Island Sound coastal watershed

Cooperators and Partners: CT/NY Sea Grant, federal agencies, Tribes/Nations, state agencies, local governments, state climate certification programs, nonprofit partners, academia

Funding Sources: federal, state, and local funds and grants, private funds and grants

Funding Needs: $$$$

Performance Measures:

- Number of regulations implemented (initiatives completed using Partnership support or funding or in coordination with Partners [anyone receiving Partnership funding or participating in Partnership work groups or committees] involving new or updated regulations.)
- Number of regulations in progress (initiatives in progress using Partnership support or funding or in coordination with Partners [anyone receiving Partnership funding or participating in Partnership work groups or committees] involving new or updated regulations.)

Expected Time Frame: Ongoing

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

Adaptation Strategy for Vulnerabilities: 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 to address flooding and other climate impacts while providing multiple benefits.

Action Description:

- 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. Activities under this action should incorporate elements of adaptive management (see Action SRC 3-5).
- Protect or restore coastal habitats (such as beaches, dunes, coastal bluffs, wetlands, coastal forests, seagrass beds, and shellfish reefs).
- Protect or restore riparian and upland habitats (such as reforestation, urban tree planting, and adding riparian vegetative buffers).
- Implement living shorelines (shoreline erosion control techniques that incorporate natural living features alone or in combination with structural components).
- Establish green infrastructure (such as bioswales, rain gardens, green roofs, permeable pavement, and other green stormwater infrastructure innovations).
- Evaluate the use of nature-based solutions as an option or component of projects.
- Affected Habitat Type: Long Island Sound coastal watershed

Cooperators and Partners: CT/NY Sea Grant, federal agencies, Tribes/Nations, state agencies, local governments, state climate certification programs, nonprofit partners, academia, community groups and organization, and neighborhood associations

Funding Sources: federal, state, and local funds and grants, private funds and grants

Funding Needs: $$$$

Performance Measures:

- Number of nature-based initiatives implemented (initiatives completed using Partnership support or funding or in coordination with Partners [anyone receiving Partnership funding or participating in Partnership work groups or committees] that include protection or restoration of coastal, riparian, or upland habitats, living shorelines, or green infrastructure.)
- Number of nature-based initiatives in progress (initiatives in progress using Partnership support or funding or in coordination with Partners [anyone receiving Partnership funding or participating in Partnership work groups or committees] that include protection or restoration of coastal, riparian, or upland habitats, living shorelines, or green infrastructure.)

Expected Time Frame: Ongoing

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

Adaptation Strategy for Vulnerabilities: 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:

- Promote infrastructure projects that improve community sustainability and resilience to flooding and other climate impacts while ensuring the viability of coastal resources. Where feasible, projects under this action should consider incorporating nature-based solutions (see Action SRC 3-3) and elements of adaptive management (see Action SRC 3-5). Ideally, the need for these infrastructure improvements has been identified through community-driven resilience planning (see Action SRC 2-1).
- Install, upgrade, improve, re-size, relocate, or remove infrastructure in a manner that maximizes sustainability.
- Affected Habitat Types: Long Island Sound coastal watershed

Cooperators and Partners: CT/NY Sea Grant, federal agencies, Tribes/Nations, state agencies, local governments, state climate certification programs, nonprofit partners, academia

Funding Sources: federal, state, and local funds and grants, private funds and grants

Funding Needs: $$$$$

Performance Measures:

- Number of infrastructure initiatives implemented (initiatives completed using Partnership support or funding or in coordination with Partners [anyone receiving Partnership funding or participating in Partnership work groups or committees].)
- Number of infrastructure initiatives in progress (initiatives in progress using Partnership support or funding or in coordination with Partners [anyone receiving Partnership funding or participating in Partnership work groups or committees].)

Expected Time Frame: Ongoing

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

Adaptation Strategy for Vulnerabilities: 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:

- Encourage 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 SRC 1-2). Adaptive management of resilience projects involves intentionally making decisions and adjustments in response to new information and/or circumstances.
- Implementation of monitoring, maintenance, or adaptive management strategies.
- Technical and monetary support for the development of such strategies.
- Development of tracking and monitoring systems to evaluate projects region-wide and inform best practices.
- Affected Habitat Types: Long Island Sound coastal watershed

Cooperators and Partners: CT/NY Sea Grant, federal agencies, Tribes/Nations, state agencies, local governments, state climate certification programs, nonprofit partners, academia, community groups and organizations and neighborhood associations

Funding Sources: federal, state, and local funds and grants, private funds and grants

Funding Needs: $$$$

Performance Measures:
Number of adaptive management strategies developed (strategies developed using Partnership support or funding or in coordination with Partners [anyone receiving Partnership funding or participating in Partnership work groups or committees] that account for ongoing monitoring, maintenance, and management.)

Expected Time Frame: Ongoing

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

Adaptation Strategy for Vulnerabilities: Managing and adapting projects to enhance resiliency are critical activities. These efforts focus on improving functionality and efficiency while ensuring adaptation to evolving climate risks.

GOAL 4. INFORMED AND ENGAGED PUBLIC

OBJECTIVE IEP 1: PUBLIC ACCESS AND A 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.

Measures of Success: Create 40 new sites and improve 60 existing sites, including 30 improved sites in communities with limited access opportunities around Long Island Sound's shoreline and its connecting waterbodies in Connecticut and New York. Success will also be measured by an increased sense of belonging, based on findings from the Public Perception Survey of Long Island Sound watershed residents. The numerical targets for new and improved sites were established by calculating the number of sites created under the 2015 CCMP and those improved in recent years through the Long Island Sound Futures Fund grant program and slightly increasing those numbers. The measure for increasing access is based on a recent public perception survey for the Long Island Sound Watershed, which shows that existing coastal access in many communities is inadequate. State and Partnership-supported programs, events, and major festivals that enable safe use and enjoyment of Long Island Sound and its connecting waterbodies can provide indicators of progress in meeting the overall objective.

A site improvement consists of one or more physical or long-term programmatic changes that improves the site's accessibility for the public, including people with disabilities, families, and communities with limited access opportunities.

Technical Explanation: It is widely understood that there is insufficient 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. For example, Save the Sound's 2023 *Long Island Sound Beach Report* published by Save the Sound points out that out of Westchester County's 23 beaches, all but five are privately owned. Other barriers to accessing public beaches in the region include limited available parking, high fees for nonresidents, and inadequate public transportation. This objective seeks to increase the number of 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 the general public, this objective will specifically aim to have 50 percent of the improvement projects benefit communities with limited access opportunities.

Cost Estimate: $$$$$

SMART Framework for this Objective:

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

Measurable: This objective will be measured through partner and grantee reporting, as well as through the Citizens Advisory Committee and the Informed and Engaged Public 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 LIS 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; 50% are serving communities with limite access opportunities.	Number of improvements/ year	NYSDEC, CT DEEP, LISFF, LISCIF, municipal, county, and state parks departments	Annual	With support from partners, track the number of projects, which could include ramps, accessible restrooms, signage in multiple languages, increased public transportation, bilingual staff, schedule changes, permit changes, cost changes, and ongoing government-run cleanups.
State and Partnership-supported programs, events, or major festivals that enable safe use and enjoyment of Long Island Sound and its connecting waterbodies. (Indicator)	Number of programs, festivals (at least 1-2 major festivals a year), and events per year	NYSDEC, CT DEEP, LISFF, LISCIF, CAC, and IEP 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 (*more people say they feel welcomed and have a sense of belonging in parks and trails near waterbodies)*	Percentage increase in a sense of belonging	Long Island Sound Public Perception Survey, LISFF	Every 3-5 years	Fund a public perception survey every three to five years that will include data on sense of belonging.

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 2015 CCMP. The metric for physical and programmatic improvements is based on a review of projects that are funded through the Long Island Sound Futures Fund grant program in 2023. The sense of belonging can be tracked through a public perception survey funded every three to five years.

Relevant: A 2006 public perception survey found that more people will use and appreciate the Sound if they live closer to the Sound. In addition, a recent public perception survey for the Long Island Sound Watershed identified limited public access as one of the top barriers to connection with

the Sound. The objective will strive to improve access and a sense of belonging for people who live in communities with limited public access, as well as for people with disabilities who face physical barriers to accessing the Sound.

Time-Bound: Tracking of new and improved sites will be conducted every year, and a sense of belonging will be tracked every three to five years.

Actions to support achievement of Objective IEP 1

Action IEP 1-1: Collaborate with local government, environmental groups, and community leaders to increase and improve public access and a sense of belonging.

Action Description:

- Plan, coordinate, and collaborate to achieve the public access and a sense of belonging objective.
- Engage and collaborate with communities to collaborate with the Long Island Sound Partnership to increase and improve public access. A new working group consisting of partners and local municipal managers will be formed with the Partnership to coordinate the implementation of the objective, including through developing guidelines and criteria for public access sites throughout Long Island Sound. Through contract support, the effort will provide an understanding of the challenges to improve public access in Long Island Sound and identify solutions.
- Encourage local municipalities and community groups to develop designs, plans, and community engagement efforts to increase, improve, and maintain public access sites while expanding programming at public access sites, including at Long Island Sound Stewardship Sites and Areas.
- Increase collaborations between the Partnership, local government, community leaders, and community residents to develop locally based solutions for creating and improving public access sites.
- Ensure that residents from communities are included in collaborative efforts to increase and improve public access and a sense of belonging.
- Ensure that residents with physical disabilities who face physical barriers in accessing public access sites are included in collaborative efforts to improve public access and foster a sense of belonging.
- Establish criteria on what constitutes a new site, a physical improvement, and a long-term programmatic improvement that can be included in the target objective.
- Prioritize 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 achieved with the assistance of members of the Partnership, including the work groups formed to support each of the four plan goals: Clean Waters and Healthy Watersheds, Thriving Habitats and Abundant Wildlife, Sustainable and Resilient Communities, and Informed and Engaged Public.
- Support research that explores the value of public access and improves understanding of what constitutes a sense of belonging at a public access site.
- Develop recommendations to improve this list of actions for the 2030 update of the CCMP.
- Affected Habitat Types: coastal and inland watersheds and Long Island Sound

Cooperators and Partners: federal, Tribe/Nation, and state agencies; municipalities, transit agencies and environmental organizations

Funding Sources: federal, state, and local funds and grants

Funding Needs: $$$

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 supported
- Public access action statements are updated during the five-year review

Expected Time Frame: Ongoing (five years)

Extreme Weather Events Addressed: All seven listed stressors could impact public access sites and the public's ability and 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

Adaptation Strategy for Vulnerabilities: Community collaborations to design and plan for public access sites and improve 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 extreme weather events and a changing climate.

Action IEP 1-2: Develop and implement projects that increase the number and quality of public access sites.

Action Description:
- Implement public access projects with support from grant programs.
- Collaborate with grant program managers to increase the amount of funding to create and improve public access sites and to increase programming at sites, including at Long Island Sound Stewardship Sites and Areas.
- Encourage local municipalities and community groups to develop projects that increase or improve public access sites and increase programming at public access sites, including at Long Island Sound Stewardship Sites and Areas.
- Encourage projects that improve public access of Long Island Sound for residents who live in communities with limited access opportunities.
- Encourage projects that improve public access for people with disabilities.
- Affected Habitat Types: coastal and inland watersheds and Long Island Sound

Cooperators and Partners: federal, Tribe/Nation, and state agencies; municipalities, transit agencies, and environmental organizations

Funding Sources: federal, state, and local funds and grants

Funding Needs: $$$$$

Performance Measures:
- Number of community stakeholders applying for Partnership grants
- Number of grants awarded for increasing public access and a sense of belonging at public access sites
- Number of new public access sites created in Long Island Sound coastal study area (objective target)

- Number of existing sites in Long Island Sound watershed with physical or long-term programmatic improvements, 50 percent of these sites serve people in communities with limited access opportunities (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 Time Frame: Ongoing (five years)

Extreme Weather Events Addressed: All seven listed stressors could impact public access sites and the public's ability and 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

Adaptation Strategy for Vulnerabilities: Developing and implementing projects to achieve this public access objective will give planners the opportunity to consider climate risks for the new and improved sites.

Action IEP 1-3: Promote a sense of belonging at public access sites through events, festivals, celebrations, materials, and programming.

Action Description:

- Increase the safe and sustainable usage of public access sites, including by developing opportunities to increase the sense of belonging and connection to the water.
- Raise awareness of public access sites and opportunities to engage with the Sound through communication materials and outreach efforts, such as holding major festivals, celebrations, and events.
- Conduct research, including with existing resources such as the Partnership's public perception survey, to better understand the barriers preventing people from feeling welcome at public access sites.
- Work with local partners and other stakeholders to promote opportunities at Long Island Sound public access sites that promote a sense of belonging.
- Develop best management practices and share examples of projects that increase a sense of belonging.
- Increase Partnership 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.
- Increase opportunities for youth and adults to swim, fish, boat, and participate in other recreational activities that support safe and sustainable use of public access sites and promote a sense of belonging to the Sound.
- Affected Habitat Types: coastal and inland watersheds and Long Island Sound

Cooperators and Partners: federal, Tribe/Nation, and state agencies; municipalities, and environmental organizations

Funding Sources: federal, state, and local funds and grants

Funding Needs: $$$$

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 new interpretive signs, including signage in multiple languages
- Number of articles and social media posts by Partnership communications staff promoting public access
- Number of web visitors to the Long Island Sound Stewardship Atlas and the Connecticut Coastal Access Guide
- Number of youths reached with public access and recreational programming (e.g., fishing, boating, and swimming)
- Number of festivals and events scheduled at coastal access sites

Expected Time Frame: Ongoing (five years)

Extreme Weather Events Addressed: All seven listed stressors could impact public access sites and the public's ability and 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

Adaptation Strategy for Vulnerabilities: 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.

GOAL 4: INFORMED AND ENGAGED PUBLIC

OBJECTIVE IEP 2: EDUCATION AND ENVIRONMENTAL LITERACY

Objective Statement: Improve and expand the public's environmental knowledge of Long Island Sound and its watershed.

Measures of Success: Engage 1.3 million members of the public, including youth, educators, and adults, in Long Island Sound educational programming and outreach by 2030. The numeric target is based on engaging a total of 275,000 people a year for five years, which is a 10 percent increase from the 2023 Long Island Sound Futures Fund reporting and program data.

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 through implementation of environmental education programming, and the development of informational materials and general outreach regarding the condition, management, and restoration of the Sound. Research has shown that environmental education can improve environmental knowledge and literacy among participants (Sprague, 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 a sense of "place-meaning'" among participants (Kudryavtsev et al., 2012) – another predictor of pro-environmental behavior (Ardoin, 2014). Currently, programs like the Long Island Sound Schools Network and Mentor Teachers engage people in Long Island Sound watershed-focused educational programs. However, there is a demonstrated need to continuously broaden the reach of these programs while pursuing the development of innovative and collaborative informal and formal educational 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 watershed.

Cost Estimate: $$$$$

SMART Framework for this Objective:
Specific: Describes what we are trying to achieve.

Measurable: Advances in this objective will be measured through Partnership staff reporting, partner and grantee reporting, as well as through Partnership programs such as the Long Island Sound Schools Network, and through work groups and committees, including the Informed and Engaged Public 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 Partnership educational programming	Number of students	LISSN reporting, Partnership-staff reporting, LISFF reporting, partner reporting	Annually
Educators engaged in professional development, workshops, and teacher trainings	Number of formal and informal educators	LISSN reporting, Mentor Teacher program reporting, Partnership-staff reporting, LISFF reporting, partner reporting	Annually
Engagement with Partnership educational tools, activities, and virtual content	Number of individuals engaged	Social media and website analytics, print materials distributed, 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 three to five years (PPS)

Achievable: The metrics are informed by current Partnership educational programs, such as Long Island Sound Schools Network (LISSN), and reporting from grant programs.

Relevant: Positive environmental education experiences are correlated with an increase in environmental literacy and pro-environmental behaviors. This objective will strive to extend the reach of environmental education programming for students and adults living in distressed communities, as well as people of differing abilities who face barriers to engaging in educational content related to the Sound.

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

Actions to support achievement of Objective IEP 2

Action IEP 2-1: Increase collaboration between environmental education partners to expand the visibility of existing programs and to promote the creation of new initiatives.

Action Description:

- Collaborate, network, and share resources among groups in the region to support literacy efforts and promote unified messaging related to Long Island Sound education.
- Hire an assistant outreach coordinator to develop and manage a network of environmental education partners and collaborators.
- Promote 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 Long Island Sound region.
- Collaborate with the state and national education networks, interpreter groups, and other relevant groups.
- Affected Habitat Types: coastal and inland watersheds and Long Island Sound

Cooperators and Partners: federal, Tribe/Nation, interstate, and state agencies; municipalities, and environmental and educational organizations

Funding Sources: federal, state, and local funds and grants

Funding Needs: $$$$

Performance Measures:
- Number of new environmental education initiatives supported by the Partnership
- Number of partners engaged in Partnership-supported environmental education networking and resource sharing opportunities

Expected Time Frame: Ongoing

Extreme Weather Events Addressed: All seven stressors could be addressed through educational materials and activities: (1) warmer summers; (2) warmer winters; (3) warmer waters; (4) increasing drought; (5) increasing storminess; (6) sea level rise; and (7) ocean acidification

Adaptation Strategy for Vulnerabilities: Working with partners to develop and deliver environmental education programs will increase the public's understanding of environmental issues and stressors. An environmentally literate public is better positioned to adopt sustainable behaviors and advocate for resilience within their communities.

Action IEP 2-2: Host and promote opportunities to participate in Long Island Sound-based formal and informal educational programs developed for multiple user groups and ages.

Action Description:
- Host educational programs and opportunities developed for diverse user groups and help promote such events from other groups in the region.
- Continue programs such as the Long Island Sound Mentor Teacher Program and the Long Island Sound Schools Network to provide formal and informal K-12 educators with learning opportunities to integrate Long Island Sound instruction into their classrooms.
- Expand environmental education 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.
- Conduct outreach at festivals, conferences, and community events.
- Affected Habitat Types: coastal and inland watersheds and Long Island Sound

Cooperators and Partners: federal, Tribe/Nation, interstate, and state agencies; municipalities, and environmental and educational organizations

Funding Sources: federal, state, and local funds and grants

Funding Needs: $$$$

Performance Measures:
- Number of Partnership-hosted or supported educational programs for students

- Number of Partnership-hosted or supported educational events and programs
- Number of formal and informal educators engaged through Partnership-supported professional development programs
- Number of students and youth involved in Partnership-supported educational programs and events
- Number of adults engaged in Partnership-supported educational programs and events
- Number of promotional materials shared
- Number of schools involved in Long Island Sound Schools Network

Expected Time Frame: Ongoing

Extreme Weather Events Addressed: All seven stressors could be addressed through educational materials and activities: (1) warmer summers; (2) warmer winters; (3) warmer waters; (4) increasing drought; (5) increasing storminess; (6) sea level rise; and (7) ocean acidification

Adaptation Strategy for Vulnerabilities: The development and delivery of environmental education programs will increase the public's understanding of environmental issues and stressors. An environmentally literate public is better positioned to adopt sustainable behaviors and advocate for resilience within their communities.

Action IEP 2-3: **Develop engaging, multilingual, and innovative Long Island Sound educational and informational materials, tools, and activities for people of all ages and abilities.**

Action Description:

- Develop, share, and promote informational materials and tools for youth, students, and the public.
- Communicate accurate science-based information to the public.
- Communicate information about safe and sustainable use of the Sound and its resources, such as safe fish and shellfish consumption, and water quality.
- Support the development of resources such as exhibits and educational signage for specific Long Island Sound topics.
- Assist with the development of lesson plans and other informational materials.
- Affected Habitat Types: coastal and inland watersheds and Long Island Sound

Cooperators and Partners: federal, Tribe/Nation, and state agencies; municipalities, and environmental and educational organizations

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

Funding Needs: $$$$

Performance Measures:

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

Expected Time Frame: Ongoing

Extreme Weather Events Addressed: All seven stressors could be addressed through educational materials and activities: (1) warmer summers; (2) warmer winters; (3) warmer waters; (4) increasing drought; (5) increasing storminess; (6) sea level rise; and (7) ocean acidification

Adaptation Strategy for Vulnerabilities: Development of appropriate educational tools, materials and activities that address extreme weather events and a changing climate 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 watershed.

Action Description:

- Develop tools and methods to assess and monitor the public's environmental literacy as it pertains to Long Island Sound and its watershed.
- Create a literacy index based on the results of a public perception survey.
- Work with partners to develop standardized pre- and post- evaluation materials for Long Island Sound programming.
- Keep up to date on research, professional development, and tools related to environmental education and best methods of environmental education.
- Affected Habitat Types: coastal and inland watersheds and Long Island Sound

Cooperators and Partners: federal, Tribe/Nation, and state agencies; municipalities, and environmental and educational organizations

Funding Sources: federal, state, and local funds and grants

Funding Needs: $$$

Performance Measures:

- Public perception survey results
- Number of social media subscribers
- Results of pre- and post- evaluations of programs
- Number of research projects exploring environmental education best practices

Expected Time Frame: Ongoing

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

Adaptation Strategy for Vulnerabilities: Development of appropriate educational tools, materials and activities that address extreme weather events and a changing climate will facilitate better informed decisions by residents and community leaders.

GOAL 4: INFORMED AND ENGAGED PUBLIC

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.

Measures of Success: Support 18 projects or campaigns per year focused on promoting sustainable behaviors and stewardship. An additional measure is to engage 28,000 volunteers through Partnership-supported efforts by 2035. These targets are based on a review of the number of behavior change projects and volunteer events in 2022 and 2023, for which the Partnership provided financial, hands-on, or technical support.

Technical Explanation: Long Island Sound is nestled between urban centers, including one of the most densely populated cities in the country. To protect it and sustainably co-exist, it is crucial for people in 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. To protect and conserve the health of Long Island Sound, people 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 them 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: $$$$$

SMART Framework for this Objective:
Specific: Technical explanation describes the objective.

Measurable: Advances in this objective will be measured through partner and grantee reporting, as well as through the Citizens Advisory Committee and the Informed and Engaged Public 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 a public perception survey.

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 Partnership-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 Partnership-supported participatory science or community action programs or events	LISFF, LISCIF, Save the Sound, NYSG, CTSG, CAC	Yearly
	Number of stewardship events supported by Partnership 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 Partnership-supported programs and campaigns focused on sustainable behaviors and behavior change	NEIWPCC, 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 three to five years for survey

Achievable: Values 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 priorities identified under other CCMP goals. Coordination should continue among partners to ensure behaviors and practices promoted through this objective reflect current priorities needed to achieve clean waters and healthy watersheds, thriving habitats and abundant wildlife, sustainable and resilient communities, and an informed and engaged public. Projects, programs, and materials under this objective should strive to be accessible and tailored to different community needs and interests to fully engage all communities in the watershed. They should also consider providing incentives and additional participant support, as well as multilingual resources, as appropriate to ensure opportunities, resources, and programs are accessible.

Time-Bound: Projects and volunteers will be reported yearly. A public perception survey should be conducted every three to five years.

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:

- Promote volunteerism, participatory science, and community-led action.
- Host and promote volunteering events and opportunities for people to learn about and engage with participatory science tools and programs.
- Publish a volunteer newsletter and update volunteer opportunities on the Partnership website and social media.
- Encourage participation in beach clean ups, invasive species pulls, tree plantings, etc.

- Encourage 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.
- Celebrate 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 number of volunteers and achievements, and sharing successes achieved through volunteer work with volunteers and the public.
- Affected Habitat Types: coastal and inland watersheds and Long Island Sound

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: federal, Tribe/Nation, and state agencies; municipalities, environmental organizations, and Partnership committees and work groups

Funding Sources: federal, state, and local funds and grants

Funding Needs: $$$$

Performance Measures:
- Number of Partnership communications products promoting or celebrating volunteer and participatory science opportunities
- Number of volunteers engaged in Partnership-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 Partnership-supported volunteering or participatory science programs
- Number of groups participating in Partnership-supported community-led projects or programs
- Number of events and programs hosted by Partnership staff or LISFF and LISCIF grantees to promote volunteerism, community-led action, and participatory science (e.g., invasive species pulls, tree plantings, and webinars on participatory science tools)
- Number of events and programs hosted by CAC or IEP WG and other Partnership work group member organizations to promote volunteerism, community-led action, and participatory science (e.g., invasive species pulls, tree plantings, and webinars on participatory science tools)
- Number of new sign-ups through Partnership volunteer channels (i.e., newsletters, mailing lists, and other groups)
- Visits to the Partnership volunteer opportunities webpage

Expected Time Frame: Ongoing

Extreme Weather Events Addressed: All seven 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

Adaptation Strategy for Vulnerabilities: By increasing public engagement in monitoring, restoration, and conservation, progress can be made on the local level, which in turn could inspire broader action on resiliency to extreme weather events and a changing climate.

Action IEP 3-2: Investigate the relationship between the public and the Long Island Sound ecosystem through social science research.

Action Description:

- Conduct 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.
- Conduct a public perception survey every three to five years.
- Identify or study potential methods and tools that encourage the adoption of sustainable environmental changes, practices, and behaviors.
- Identify or study the best methods for community co-development or involvement in planning.
- Evaluate the economic value of Long Island Sound environmental resources and the ecosystem services they provide.
- Explore attitudes and barriers to community or individual adoption of resilience practices.
- Identify priority gaps between environmental needs and public participation.
- Affected Habitat Types: coastal and inland watersheds and Long Island Sound

Cooperators and Partners: state and interstate organizations and Partnership research grantees

Funding Sources: federal, state, and local funds and grants

Funding Needs: $$$$

Performance Measures:

- Number of Partnership-supported social science research projects

Expected Time Frame: Ongoing

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

Adaptation Strategy for Vulnerabilities: A better understanding of how people view the environment will inform the implementation of more resonant educational programs, many of which will target behaviors related to sustainability and resilience.

Action IEP 3-3: Develop campaigns and share messages to encourage residents, both homeowners and renters, to adopt environmentally friendly practices at home, school, work, and their communities.

Action Description:

- Promote sustainable behaviors at home and in the community that contribute to the conservation

of Long Island Sound and its watershed.
- Encourage behaviors that improve watershed health and reduce nutrient pollution, such as through sustainable lawncare practices, the implementation of green infrastructure, septic tank system maintenance and replacement, and the installation of riparian buffers on private property, and other relevant actions.
- Encourage behaviors that reduce marine debris through the adoption of technologies that reduce microplastics (e.g., in washing machines).
- Encourage behaviors that reduce pathogens in the water such as through proper dog waste disposal and boating sewage discharges.
- Encourage behaviors that reduce toxic contaminants in the water, such as through proper disposal of pharmaceuticals, cleaning products, and other contaminants.
- Affected Habitat Types: coastal and inland watersheds and Long Island Sound

Cooperators and Partners: state and interstate organizations and agencies, LISFF, and LISCIF grantees

Funding Sources: federal, state, and local funds and grants

Funding Needs: $$$$

Performance Measures:
- Number of visits or clicks on Partnership digital media channels for Partnership-produced informational tools and resources
- Number of participants at Partnership-supported events and webinars aimed at promoting sustainable behaviors in the Partnership watershed
- Number of people who have demonstrated or committed to a change in behavior through pledges, by making use of incentive or reimbursement programs (specific to the priorities identified under this action)
- Qualitative data suggesting an increase in adopted sustainable behaviors as indicated in program evaluations

Expected Time Frame: Ongoing

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

Adaptation Strategy for Vulnerabilities: A better understanding of local environmental attitudes will inform the implementation of more resonant educational programs, many of which will target behaviors related to 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:
- Foster sustainable behaviors of user groups who are directly interacting with the Sound and its coast and tributaries. This can be through programs, informational resources, events, campaigns, and other actions.
- Encourage boaters to use pump-out stations, proper boat painting methods, best practices to mitigate the spread of invasive species and for eelgrass conservation, and other relevant actions.

- Encourage anglers to properly dispose of fishing gear.
- Educate beachgoers on behaviors to reduce litter and encourage them to share the shore with wildlife.
- Affected Habitat Types: coastal and inland watersheds and Long Island Sound

Cooperators and Partners: federal, Tribe/Nation, state and interstate organizations and agencies, LISFF, and LISCIF grantees

Funding Sources: federal, state, and local funds and grants

Funding Needs: $$$$

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 Partnership-produced informational tools and resources
- Number of participants at events and webinars hosted or supported by the Partnership 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. (specific to the priorities identified under this action)
- Qualitative data suggesting an increase in adopted sustainable behaviors as indicated in program evaluations

Expected Time Frame: Ongoing

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

Adaptation Strategy for Vulnerabilities: 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 extreme weather events and a changing climate.

Action IEP 3-5: Provide information, programming, incentives, and resources (e.g., educational toolkits) that enable local environmental groups, municipalities, schools, and other user groups to teach and promote sustainable practices in their communities

Action Description:
- Support local groups in the promotion of behavior change and sustainable practices.
- Create a Behavior Change Index based on behavior questions from the Public Perception Survey and use it to develop an online dashboard that stakeholders can use to inform behavior change campaigns in their communities.
- Develop and share informational tools and resources that stakeholder groups can adapt and use to promote sustainable behaviors in their communities, such as brochures, toolkits, and infographics.
- Support programs and events that educate stakeholder groups about information and tools they can use to promote or incentivize sustainable behaviors locally.
- Affected Habitat Types: coastal and inland watersheds and Long Island Sound

Cooperators and Partners: state and interstate organizations and agencies, LISFF or LISCIF grantees

Funding Sources: federal, state, and local funds/grants

Funding Needs: $$$$

Performance Measures:
- Number of Partnership-supported events that educate stakeholder groups on information and tools they can use to promote sustainable behaviors locally
- Number of individuals engaged at Partnership-supported events that educate stakeholders on information and tools they can use to promote sustainable behaviors locally
- Number of community-based campaigns supported by the Partnership or Partnership 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 Time Frame: Ongoing

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

Adaptation Strategy for Vulnerabilities: By providing information, programming, resources, and incentives that enable user groups to teach and promote sustainable practices in their communities, awareness of ways to adapt to extreme weather events and a changing climate will be promoted locally.

CROSSCUTTING CONNECTIONS

Actions focus on the activities needed to achieve the objectives and goals in the CCMP. Some actions contribute to the progression of objectives under other goals beyond the focus area where they are listed. These crosscutting connections are demonstrated in the table below to show where actions contribute to multiple objectives.

Action #	2025 Action	Connection to Additional 2025 Objectives
CWHW 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.	Pathogens
CWHW 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.	Coastal Habitat
CWHW 1-3	Collaborate with stakeholders and partners to develop plans, tools, and strategies that support nutrient reduction actions to improve overall ecosystem management.	Community-Driven Resilience Planning
CWHW 2-1	Preserve, restore, and steward natural landscapes and the ecosystem services they provide through land conservation and protection efforts beyond the coastal boundary.	Nutrients, Habitat Connectivity, Resilience Initiative Implementation
CWHW 2-2	Implement nature-based solutions and other practices that improve and maintain water quality and ecosystem health.	Nutrients, Resilience Initiative Implementation
CWHW 3-1	Evaluate and improve wastewater and stormwater infrastructure, and support replacement, upgrade, or sewer connections of inadequate OWTS located in critical or strategic watersheds.	Nutrients, Fostering Stewardship and Sustainable Behaviors, Resilience Initiative Implementation
CWHW 3-2	Expand the spatial and temporal coverage of sampling and source tracking and encourage advancements in methodology.	N/A
CWHW 4-1	Identify existing and emerging contaminants of concern and support mitigation efforts as warranted.	N/A
CWHW 4-2	Continue collection and evaluation of contaminant data (e.g., NCCA) for Long Island Sound and its embayments.	N/A
CWHW 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.	N/A

Action #	2025 Action	Connection to Additional 2025 Objectives
CWHW 5-1	Support research and monitoring efforts that aim to increase understanding of the extent and sources of marine debris and its impact on the ecosystem.	Coastal Habitat, Offshore Habitat, Education and Environmental Literacy, Fostering Stewardship and Sustainable Behavior
CWHW 5-2	Promote the advancement and implementation of interception technologies, tools, receptacle bins, and capture devices that remove debris, while supporting education and outreach across the Long Island Sound watershed.	Resilience Initiative Implementation, Fostering Stewardship and Sustainable Behavior
CWHW 5-3	Support the removal of marine debris located within the coastal boundary and Long Island Sound.	Coastal Habitat, Fostering Stewardship and Sustainable Behavior
CWHW 5-4	Inform and support the development and implementation of new local and state policies, and management plans aimed at source reduction, prevention, and interception practices as identified by available marine debris collection data.	Community-Driven Resilience Planning, Fostering Stewardship and Sustainable Behavior, Resilience Initiative Implementation
THAW 1-1	Restore coastal habitat by supporting projects that implement established restoration techniques or help validate innovative techniques and include broad collaboration and communication.	Habitat Connectivity, Resilience Initiative Implementation, Fostering Stewardship and Sustainable Behaviors
THAW 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.	Habitat Connectivity, Resilience Initiative Implementation
THAW 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 seagrass.	Habitat Connectivity, Informed Decision-Makers
THAW 2-1	Promote science-based marine spatial planning that balances human use of the Sound and protects ecosystem functions of offshore habitat and species while considering the existing natural, social, cultural, historic, and economic characteristics of Long Island Sound.	Informed Decision-Makers
THAW 2-2	Support the Long Island Sound Seafloor Habitat Mapping Initiative and apply the collected data to refine and expand upon other initiatives supporting coastal and marine spatial planning and designation of protected areas and buffer zones.	Informed Decision-Makers
THAW 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.	Marine Debris, Education and Environmental Literacy, Community-Driven Resilience Planning, Fostering Stewardship and Sustainable Behaviors
THAW 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.	Coastal Habitat, Informed Decision-Makers
THAW 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.	Nutrients, Coastal Habitat, Resilience Initiative Implementation

Action #	2025 Action	Connection to Additional 2025 Objectives
THAW 3-3	Promote regional collaborations to support development of streamlined permitting pathways to build regional capacity for habitat restoration.	Coastal Habitat, Community-Driven Resilience Planning
THAW 3-3	Promote regional collaborations to support development of streamlined permitting pathways to build regional capacity for habitat restoration.	Coastal Habitat, Community-Driven Resilience Planning
THAW 4-1	Protect high-priority coastal habitat from development through implementation of land conservation plans that identify priorities for conservation, management, and investment.	Habitat Connectivity, Resilience Initiative Implementation, Community-Driven Resilience Planning, Public Access and Sense of Belonging
THAW 4-2	Increase access and enhance sustainable stewardship of conserved lands particularly for distressed communities.	Nutrients, Pathogens, Marine Debris, Watershed Health, Coastal Habitat, Habitat Connectivity, Resilience Initiative Implementation, Community-Driven Resilience Planning, Public Access and Sense of Belonging, Education and Environmental Literacy, Fostering Stewardship and Sustainable Behaviors
SRC 1-1	Develop, deliver, and facilitate training programs relevant and responsive to community needs that assist with sustainability and resilience.	Coastal Habitat, Community-Driven Resilience Planning
SRC 1-2	Support community-centered research, monitoring, and development of tools to assess the risks from extreme weather events and a changing climate and advance resilience.	Coastal Habitat, Habitat Connectivity
SRC 2-1	Develop climate resilience plans and strategies into existing municipal, regional, and watershed plans.	Informed Decision-Makers
SRC 2-2	Coordinate across municipal boundaries to advance collective resilience priorities.	Resilience Initiative Implementation
SRC 2-3	Empower and increase engagement of community members and groups in local and regional resilience planning and decision-making.	Resilience Initiative Implementation
SRC 3-1	Increase community capacity to implement and manage sustainable and resilient initiatives.	Coastal Habitat, Habitat Connectivity, Watershed Health, Nutrients, Pathogens
SRC 3-2	Support the development and adoption of regulations, codes, and ordinances that increase community resilience.	Coastal Habitat, Nutrients, Community-Driven Resilience Planning, Habitat Connectivity, Conserved Open Space
SRC 3-3	Implement nature-based solutions to address flooding and other climate impacts while providing multiple benefits.	Nutrients, Coastal Habitat, Fostering Stewardship and Sustainable Behaviors, Watershed Health, Pathogens
SRC 3-4	Implement priority infrastructure projects that increase community sustainability and resilience to flooding and other climate impacts.	Coastal Habitat, Habitat Connectivity, Nutrients, Pathogens
SRC 3-5	Monitor, maintain, and adaptively manage resilience projects to ensure their long-term success.	Coastal Habitat, Habitat Connectivity, Informed Decision-Makers

Action #	2025 Action	Connection to Additional 2025 Objectives
IEP 1-1	Collaborate with local government, environmental groups, and community leaders to increase and improve public access and a sense of belonging.	Conserved Open Space, Informed Decision-Makers, Resilience Initiative Implementation, Community-Driven Resilience Planning
IEP 1-2	Develop and implement projects that increase the number and quality of public access sites.	Conserved Open Space, Resilience Initiative Implementation, Education and Environmental Literacy, Fostering Stewardship and Sustainable Behaviors
IEP 1-3	Promote a sense of belonging at public access sites through events, festivals, celebrations, materials, and programming.	Conserved Open Space, Education and Environmental Literacy, Fostering Stewardship and Sustainable Behaviors
IEP 2-1	Increase collaboration between environmental education partners to expand the visibility of existing programs and to promote the creation of new initiatives.	Community-Driven Resilience Planning
IEP 2-2	Host and promote opportunities to participate in Long Island Sound-based formal and informal educational programs tailored for multiple user groups and ages.	Conserved Open Space, Public Access and Sense of Belonging, Fostering Stewardship and Sustainable Behaviors
IEP 2-3	Develop engaging, multilingual, and innovative Long Island Sound educational and informational materials, tools, and activities for people of all ages and abilities.	Public Access and Sense of Belonging, Fostering Stewardship and Sustainable Behaviors
IEP 2-4	Support efforts to assess the public's understanding of Long Island Sound and its watershed.	N/A
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.	Nutrients, Pathogens, Marine Debris, Coastal Habitat, Conserved Open Space, Community-Driven Resilience Planning
IEP 3-2	Investigate the relationship between the public and the Long Island Sound ecosystem through social science research.	Education and Environmental Literacy
IEP 3-3	Develop campaigns and share messages to encourage residents, both homeowners and renters, to adopt environmentally friendly practices at home, school, work and in their communities.	Nutrients, Watershed Health, Pathogens, Toxic Contaminants, Marine Debris, Education and Environmental Literacy
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.	Marine Debris, Coastal Habitat, Education and Environmental Literacy
IEP 3-5	Provide information, programming, incentives, and resources, (e.g., educational toolkits) that enable local environmental groups, municipalities, schools, and other user groups to teach and promote sustainable practices in their communities.	Informed Decision-Makers

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, EPA contracted Battelle to follow the 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 Partnership supported a report by the University of Connecticut's 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 conducted a comprehensive review of the stressors and risks impacting the achievement of goals related to pollution control; habitat; fish, wildlife, and plants; as well as recreation and public water supplies. The information in the 2019 report continues to be valid and relevant to assessing climate risks to the CCMP goals. Moving forward, the Partnership plans to update the existing vulnerability assessment to evaluate climate vulnerabilities to the updated CCMP goals.

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 of these stressors in the Long Island Sound region can be found in Appendix E of the *Long Island Sound Study Vulnerability Assessment* Outreach.

The following section summarizes how the existing vulnerability assessment relates to the Long Island Sound Partnership'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 technical descriptions for each objective and action in Appendix B highlight the extreme weather events that the action addresses and explains how the action serves as an adaptation strategy for climate vulnerabilities of the associated objective and goal. Each action in the 2025 CCMP is considered part of the adaptation strategy.

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 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 water and wastewater infrastructure due 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 from sea level rise may reduce waterfront public access and degrade natural shorelines that are vital 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: Warmer water temperatures may alter species composition, potentially leading to the absence of certain desirable recreational fish.

Likelihood of Occurrence: High
Consequence of Impact: Medium

Risk: With warmer water and increased storm activity and intensity, there may be fewer opportunities for the public to safely recreate on the water.

Likelihood of Occurrence: High
Consequence of Impact: Low

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