

2020–2024 Long Island Sound Comprehensive Conservation and Management Plan Update

This update contains new and revised Implementation Actions (IAs)
for the 2020-2024 planning cycle. The full CCMP with the original IAs is at:
longislandsoundstudy.net/2015/09/2015-comprehensive-conservation-and-management-plan.

January 2021



CLEAN WATERS AND HEALTHY WATERSHEDS

Goal: Improve water quality by reducing contaminant and nutrient loads from the land and the waters impacting Long Island Sound.

ECOSYSTEM TARGETS

The following ambitious, but achievable, ecosystem targets have been developed to drive progress toward attaining the Clean Waters and Healthy Watersheds (WW) goal. Achieving these targets can also contribute to the goals for the other themes. Likewise, multiple strategies and implementation actions throughout the four theme areas apply directly and indirectly to these targets. Measuring, tracking, and reporting environmental indicators of each ecosystem target will provide information to assess progress and refine and adapt management as needed. A detailed explanation about the rationale and quantification of these targets is included in Appendix of the CCMP.

Extent of Hypoxia: Measurably reduce the area of hypoxia in Long Island Sound from pre-2000 Dissolved Oxygen TMDL averages to increase attainment of water quality standards for dissolved oxygen by 2035, as measured by the five-year running average size of the zone.

Nitrogen Loading: Attain WWTF nitrogen loading limits at the 2000 Dissolved Oxygen TMDL allocation level by 2017 and maintain the loading cap. Have practices and measures instituted to attain the allocations for stormwater and nonpoint source inputs from the entire watershed by 2025.

Water Clarity: Improve water clarity by 2035 to support healthy eelgrass communities and attainment of the eelgrass extent target.

Impervious Cover: Through green infrastructure, low impact development, and stormwater disconnections, decrease by 10 percent the area of effective impervious cover in the Connecticut and New York portions of the watershed by 2035 relative to a 2010 baseline.

Riparian Buffer Extent: Increase the percent area of natural vegetation within 300 feet of any stream or lake in the Connecticut and New York portions of the Long Island Sound watershed to 75 percent by 2035 from the 2010 baseline of 65 percent.

Approved Shellfish Areas: Upgrade 5 percent of the acreage restricted or closed for shellfishing in 2014 by 2035.

Sediment Quality Improvement: Reduce the area of impaired sediment in Long Island Sound by 20 percent by 2035 from a 2006 baseline.

OUTCOMES, OBJECTIVES, STRATEGIES, AND IMPLEMENTATION ACTIONS

To accomplish the Clean Waters and Healthy Watersheds goal and to achieve progress toward the ecosystem targets, the plan includes specific outcomes, objectives, strategies, and actions. The Implementation Actions (IAs) have been formulated to carry out the WW theme strategies (and are numbered WW-1, WW-2, etc.). All IAs are important to meeting the plan's objectives and outcomes. While recognizing that the priorities of each implementing organization will vary according to its mission and the purpose of available funds, the CCMP identifies the highest overall priorities, whether for new or underway actions, by consensus of the Management Conference partners. Highest priority actions are indicated by a "♦" symbol. The complete five-year implementation action plans (further described in Appendix of the CCMP) are included in the supplement to the CCMP posted on the LISS website.

1-1 OUTCOME: CONTAMINANT AND NUTRIENT LOADS FROM LAND-BASED SOURCES IN THE WATERSHED OF LONG ISLAND SOUND ARE REDUCED.

Objective 1-1a: To reduce contaminant and nutrient loads from point and nonpoint sources:

<p>Strategy 1-1a1: Continue mitigation of Combined Sewer Overflows (CSOs) and Municipal Separate Storm Sewer Systems (MS4s), incorporating climate change and sea level rise in planning, regulation, and BMPs.</p>	<p>WW-1: Evaluate how drivers of pollutant loads and management responses will affect current and future pollutant loads from point and nonpoint sources.</p> <p>◆ 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).</p>
<p>Strategy 1-1a2: Evaluate and improve the clean water infrastructure for wastewater treatment facilities (WWTFs), conveyance systems, and associated sewer lines.</p>	<p>WW-3: Expand point source and establish nonpoint source nutrient trading programs for the Long Island Sound watershed.</p> <p>WW-4: Pursue opportunities to further improve nitrogen removal, including low-cost retrofits, at WWTFs throughout the watershed but particularly in the upstream states.</p> <p>WW-5: Encourage municipalities to do sustainable asset management through their sewage collection system.</p> <p>Other actions that support strategy: WW-1, WW-2</p>
<p>Strategy 1-1a3: Enhance implementation of the existing 2000 Dissolved Oxygen Total Maximum Daily Load throughout the watershed; and adapt and revise it based on monitoring, modeling, research, and how climate change may affect attainment of water quality standards in the future.</p>	<p>WW-6: By 2024, develop a plan to meet the Ecosystem Target of having all practices and measures installed to attain the 2000 Dissolved Oxygen TMDL nitrogen allocations for stormwater and nonpoint source inputs for the entire watershed.</p> <p>◆ WW-7: Enhance implementation of the 2000 Dissolved Oxygen TMDL, particularly for nonpoint sources.</p> <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.</p> <p>Other actions that support strategy: SM-19, SM-31</p>
<p>Strategy 1-1a4: Ensure cross department collaboration and cooperation at the municipal level to implement MS4 BMPs (e.g., involve highway departments).</p>	<p>Actions that support strategy: SM-19</p>
<p>Strategy 1-1a5: Assess and mitigate agricultural nonpoint source loads.</p>	<p>WW-9: Improve and enforce pesticide/herbicide/fertilizer regulations and other Best Management Practices for agriculture and urban turf.</p>
<p>Strategy 1-1a6: Implement low impact development and green infrastructure for new and existing development, and mitigate pollution from commercial and industrial sources.</p>	<p>◆ WW-10: Develop a nonpoint source and stormwater tracking system tool for the Long Island Sound watershed.</p> <p>Other actions that support strategy: WW-1, WW-5, WW-6, WW-18, SC-24, SM-37</p>
<p>Strategy 1-1a7: Improve comprehensive management and performance of decentralized wastewater treatment systems, and residential, on-site wastewater treatment systems (OSWTSs).</p>	<p>WW-11: Develop and implement performance-based policies and strategies in support of Best Management Practices for decentralized wastewater management districts and onsite wastewater treatment systems.</p> <p>◆ WW-12: Improve understanding, management, design, and implementation of denitrifying decentralized and residential, on-site wastewater treatment systems.</p> <p>Other actions that support strategy: WW-10, SM-1, SM-19</p>
<p>Strategy 1-1a8: Incorporate climate change and sea level rise in planning, regulation, and BMPs for stormwater and wastewater treatment.</p>	<p>◆ WW-13: Improve efficiency and resiliency of existing/new waste treatment systems including septic, WWTF and stormwater infrastructure to be resilient to sea level rise, storm surge, and intense storms and flooding</p> <p>Other actions that support strategy: SC-23, SC-24, SC-26, SM-26, SM-37</p>

Objective 1-1b: To balance multiple uses and maximize ecosystem services through watershed-based planning:

Strategy 1-1b1: Develop and implement watershed management plans in Long Island Sound communities and sub-watersheds.

WW-14: Support collaborative and inclusive development of new and updated restoration/protection plans for Connecticut and New York embayment subwatersheds with pollution load reduction targets.

Strategy 1-1b2: Protect wetlands, healthy watersheds, riparian buffers, and open land to minimize land disturbance and impervious cover through land protection, sustainable development, and green infrastructure.

◆ WW-15: Increase permanent land protection of riparian corridors and wetland buffers at the municipal level.

◆ WW-16: Promote establishment and protection of riparian corridors and wetland buffers at the municipal level through development of local ordinances.

WW-17: By 2024, develop a plan to meet the Ecosystem Target of decreasing by 10% the area of effective impervious cover in the Connecticut and New York portions of the watershed by 2035 relative to a 2010 baseline.

Other actions that support strategy: HW-3, SC-24, SM-37

Objective 1-1c: To restore and protect the natural hydrologic and ecological functions of the watershed:

Strategy 1-1c1: Preserve hydrologic function (e.g., flooding, buffer zones, resiliency, groundwater, etc.) in developing watersheds and restore in impaired watersheds.

WW-18: Support implementation of stormwater permit guidance requiring all new development and substantial redevelopment to capture and infiltrate runoff from the 90th percentile storm, (generally a 0.8-1.3 inch storm).

Other actions that support strategy: WW-18, SC-24, SM-37

1-2 OUTCOME: NEGATIVE IMPACTS OF CONTAMINANTS AND NUTRIENTS IN THE WATERS AND SEDIMENTS OF LONG ISLAND SOUND AND TRIBUTARIES/EMBAYMENTS ARE REDUCED.

Objective 1-2a: To reduce direct sources of nutrients, contaminants, and debris to the Long Island Sound ecosystem:

Strategy 1-2a1: Minimize vessel/marina discharge impacts.

WW-19: Improve environmental practices (boat wrap, bottom paint, pump out, etc.) at marinas.

WW-20: Support activities to achieve trash-free waters.

WW-21: Develop a comprehensive marine debris reduction plan.

Strategy 1-2a2: Reduce generation of marine debris and improve and increase its cleanup in Long Island Sound waters.

Actions that support strategy: WW-19, WW-20, WW-21

Objective 1-2b: To mitigate impacts of nutrients and contaminants to human health and to the biota and ecosystem of Long Island Sound:

Strategy 1-2b1: Mitigate impacts from emerging and existing toxic contaminants in water and sediment.

WW-22: Support and promote pharmaceutical and prescription medicine take-back programs at the state and municipal level to inform the general public about the pathways and impacts of emerging contaminants entering the waters and sediments of Long Island Sound.

Strategy 1-2b2: Reduce human health risks through increased or targeted pathogen beach and embayment monitoring and fish and shellfish contaminant testing.

WW-23: Encourage state and local health departments to adopt emerging rapid bacterial detection technologies that would allow shorter duration administrative beach/shellfish closings than those based on rainfall only.

WW-24: Implement field studies with standardized procedures and clearly defined data acceptance metrics to demonstrate the use of microbial source tracking to help resolve local water quality challenges.

Strategy 1-2b3: Develop and implement methods (e.g., bioextraction) for removal of nutrients and contaminants.

◆ WW-25: Evaluate challenges to implementation of bioextraction in Long Island Sound, including use conflicts, economic viability, permitting and testing requirements and potential environmental impacts, and make recommendations to overcome them.

WW-26: Improve the permitting and certification process for new aquaculture projects with products intended for human consumption, particularly those projects with a bioextraction focus.

1-3 OUTCOME: RESEARCH, MONITORING, AND MODELING TO SUPPORT ATTAINMENT OF WATER QUALITY OBJECTIVES IS MAINTAINED AND IMPROVED.

Objective 1-3a: To further improve understanding of the causes and impacts of eutrophication and hypoxia:

Strategy 1-3a1: Understand the effects that nutrient ratios (nitrogen, phosphorus, carbon) have on ecosystem structure and function in freshwaters, embayments, and in Long Island Sound and consider them in setting nutrient control policies.

Action that supports Strategy: SM-28

Strategy 1-3a2: Better understand eutrophication dynamics, effects, and mechanisms and continue support for modeling and synthesis efforts and their application to management scenarios.

◆ WW-27: Improve ability of models and/or studies to estimate contaminant and nutrient loads to embayments and evaluate the effectiveness of remedial actions.

Other actions that support strategy: SM-1, SM-11, SM-12

Objective 1-3b: To research, monitor, and assess water quality and factors that contribute to water quality change:

Strategy 1-3b1: Improve identification and source tracking of nonpoint sources (e.g., watershed, groundwater, atmospheric deposition) and sinks of nutrients and their impacts on water and habitat quality.

◆ WW-28: Maintain and enhance the management utility of water quality monitoring of watershed nutrient loads and ecosystem responses to Long Island Sound and its embayments.

WW-29: Develop and implement a water quality monitoring strategy for nitrogen in the upper basin states of Massachusetts, Vermont, and New Hampshire.

Other actions that support strategy: WW-35, SM-4, SM-5, SM-19

Strategy 1-3b2: Research, monitor, and assess emerging and legacy toxic contaminants and their impacts on water and habitat quality.

WW-30: Assess and identify the impact of emerging (e.g., PBDE, pharmaceuticals) and legacy (e.g., heavy metals, PCBs) contaminants on the ecosystem services and biota of Long Island Sound.

WW-31: Initiate contaminant level and effects monitoring in Long Island Sound embayments through an expansion of the NCCA monitoring protocols.

Strategy 1-3b3: Improve understanding of climate change impacts (e.g., acidification, sea level rise, temperature) on Long Island Sound water and habitat quality and biota, and their interaction with other water quality issues (e.g., eutrophication).

◆ WW-32: Improve the monitoring needed to assess the risk of climate change impacts including acidification on water quality.

WW-33: Implement the 2018 Sentinel Monitoring Strategy.

WW-34: Conduct periodic (five year, or earlier) review and revision of Sentinel Monitoring Strategy document.

Other actions that support strategy: SM-4, SM-5, SM-26

Strategy 1-3b4: Research, monitor, and assess pathogens, their sources and their impacts on water quality.

WW-35: Assess sources of pathogens and nutrients and work with communities to abate or alleviate those sources.

Strategy 1-3b5: Research, monitor, and assess Harmful Algal Blooms (HABS) and their impacts on water quality and public health.

WW-36: Monitor occurrences of biotoxin and HABS.

WW-37: Research contributing factors of habs and biotoxin outbreaks and identify and execute mitigation actions.

Objective 1-3c: To improve access and usage of information, databases, and resources and incorporation of data into management actions:

Strategy 1-3c1: Support collaboration between Long Island Sound Study partner organizations, including upper basin agencies/partners (USGS, CTDEEP, CTDOA, NYSDEC, MassDEP, SCDHS, etc.), to improve utility of monitoring data and the sentinel monitoring program.

WW-38: Maintain and strengthen the Long Island Sound Climate Change and Sentinel Monitoring Work Group and conduct 1-2 Sentinel Monitoring workshops by 2024.

WW-39: Develop, maintain and share research and monitoring resources and supporting infrastructure with regional agencies/partners (USGS, NOAA, NERR, USFWS, EPA, CTDEEP, Project Oceanology, UConn, Stony Brook Univ., etc.) including but not limited to equipment, staff, vessels, docking facilities, etc.

Other actions that support strategy: SC-8, SM-4, SM-5, SM-25

Strategy 1-3c2: Implement improved data storage and sharing solutions to support collaboration and incorporation of data into management decisions.

WW-40: Continue to support, improve, and utilize the Sentinel Monitoring Data Citation Clearinghouse and other data synthesis, storage, and sharing efforts.

Other actions that support strategy: SM-4, SM-5

THRIVING AND ABUNDANT WILDLIFE

Goal: Restore and protect the Sound's ecological balance in a healthy, productive, and resilient state to benefit both people and the natural environment.

ECOSYSTEM TARGETS

The following ambitious, but achievable, ecosystem targets have been developed to drive progress toward attaining the Thriving Habitats and Abundant Wildlife (HW) goal. Achieving these targets can also contribute to the goals for the other themes. Likewise, multiple strategies and implementation actions throughout the four theme areas apply directly and indirectly to these targets. Measuring, tracking, and reporting environmental indicators of each ecosystem target will provide information to assess progress and refine and adapt management as needed. A detailed explanation about the rationale and quantification of these targets is included in Appendix of the CCMP.

Coastal Habitat Extent: Restore 350 acres of coastal habitat by 2020 and a total of 3,000 acres by 2035 from a 2014 baseline, including:

- **Eelgrass Extent:** Restore and maintain 2,000 additional acres of eelgrass by 2035 from a 2012 baseline of 2,061 acres.
- **Tidal Wetland Extent:** Restore 515 additional acres of tidal wetlands by 2035 from a 2014 baseline.

River Miles Restored for Fish Passage: Open 200 additional miles of fish riverine migratory corridors in the Connecticut and New York portions of the watershed by 2035 from a 2014 baseline.

Shellfish Harvested: Increase the harvest of oysters, clams, and scallops in the Sound through a combination of habitat management and shellfish aquaculture.

Habitat Connectivity: Increase connectivity of coastal habitat by 2035 by restoring and/or protecting habitat patches that increase biodiversity and support migratory pathways.

Protected Open Space: Conserve an additional 4,000 acres of Connecticut land and 3,000 acres of New York land within the LIS coastal boundary by 2035, while maintaining the total area of protected lands.

OUTCOMES, OBJECTIVES, STRATEGIES, AND IMPLEMENTATION ACTIONS

To accomplish the Thriving Habitats and Abundant Wildlife goal and to achieve progress toward the ecosystem targets, the plan includes specific outcomes, objectives, strategies, and actions. The Implementation Actions (IAs) have been formulated to carry out the HW theme strategies (and are numbered HW-1, HW-2, etc.). All IAs are important to meeting the plan's objectives and outcomes. While recognizing that the priorities of each implementing organization will vary according to its mission and the purpose of available funds, the CCMP identifies the highest overall priorities, whether for new or underway actions, by consensus of the Management Conference partners. Highest priority actions are indicated by a "♦" symbol. The complete five-year implementation action plans (further described in Appendix of the CCMP) are included in the supplement to the CCMP posted on the LISS website.

2-1 OUTCOME: SYSTEM RESILIENCY AND FUNCTION ARE MAINTAINED BY PROTECTING, RESTORING, AND ENHANCING HABITATS.

Objective 2-1a: To restore and enhance targeted habitat types:

Strategy 2-1a1: Develop and implement innovative and effective habitat restoration plans and projects including restoring quality and quantity of coastal habitat and fish passage.

◆ HW-1: Complete projects that result in restoration of coastal habitat.

HW-2: Develop a list of current and new or innovative restoration techniques.

◆ 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.

Other actions that support Strategy: HW-6

Strategy 2-1a2: Restore and enhance connectivity of targeted habitat types.

◆ HW-4: By 2024, agree upon an applicable habitat connectivity model and apply metrics for all restoration and protection projects.

Other actions that support Strategy: WW-15, WW-16, WW-17, HW-3

Objective 2-1b: To protect targeted habitat types through acquisition and other mechanisms:

Strategy 2-1b1: Identify high-priority areas to protect using a repeatable, criteria-based process to minimize bias, supplemented by expert knowledge.

◆ HW-5: Use remote sensing, mapping tools, modeling, and field verification to determine sites that are likely to be impacted by sea level rise, and which sites are ideal for habitat migration.

◆ HW-6: Develop and apply standardized habitat quality metrics and assessment methodology across targeted habitat types.

◆ HW-7: Use leading-edge design tools to prioritize future conservation investment and management plan development for Long Island Sound's most significant and imperiled terrestrial and intertidal coastal habitats.

◆ HW-8: Conduct an ecological assessment of lands and waters surrounding Long Island Sound Stewardship Sites and design green infrastructure/low-impact development pilot projects that minimize negative impacts and enhance beneficial ecosystem services of lands and waters within or surrounding the Sites.

Other actions that support Strategy: HW-4, SC-32

Strategy 2-1b2: Conserve and enhance natural areas and open space to benefit ecosystem function and wildlife.

◆ HW-9: Equitably protect high-priority coastal habitat from development through property acquisition and other means, support sustainable use of these properties, without discouraging wildlife use, and create a registry of protected areas in Connecticut and New York, which encompasses both existing protected properties and future acquisitions.

HW-10: Promote management practices that limit human disturbance and protect functional availability of coastal and marine habitats for Species of Greatest Conservation Need, including forage species and other wildlife.

Strategy 2-1b3: Conserve and enhance natural areas and open space to benefit public access, recreation, and shoreline and community protection.

Actions that support Strategy: HW-9, HW-10

Objective 2-1c: To increase or maintain resiliency of coastal habitats and the services they provide:

Strategy 2-1c1: Identify and prioritize upland, wetland, and aquatic habitats that are vulnerable to climate change impacts and take action to mitigate or adapt to these impacts (e.g., remove or mitigate barriers to habitat migration).

◆ HW-11: In lieu of hard armoring, develop and promote the use of living shoreline habitat protection methods (dunes, shorelines, coastal marshes) and standardized living shoreline monitoring protocols while considering the habitat needs of Species of Greatest Conservation Need, including forage species, and reducing wildlife conflicts.

HW-12: Promote the conversion of existing armored shorelines (seawalls, riprap, bulkheads, etc.) to softer, nature-based living shorelines to enhance habitat and habitat connectivity.

Other actions that support Strategy: HW-5

2-2 OUTCOME: SYSTEM RESILIENCY AND FUNCTION ARE MAINTAINED BY DIVERSE, BALANCED, AND ABUNDANT POPULATIONS OF FISHES, BIRDS, AND OTHER WILDLIFE.

Objective 2-2a: To manage invasive species:

Strategy 2-2a1: Develop volunteer stewardship programs to manage invasive species to ensure habitats are healthy and include representative plant and animal species.

HW-13: Promote directed volunteer-driven invasive species reconnaissance and removal work.
Other actions that support Strategy: SC-12

Strategy 2-2a2: Teach and promote measures that will help to prevent the introduction and spread of invasive biota in Long Island Sound and connected upland areas.

◆ HW-14: Develop and implement invasive/non-native species management plans for priority terrestrial and aquatic sites.
HW-15: Assess adequacy of current legislation and programs that target prevention, spread, and removal of invasive/non-native species.
Other actions that support Strategy: HW-13, SC-12

Objective 2-2b: To manage state and federal listed species and species whose Long Island Sound population is regionally or globally important:

Strategy 2-2b1: Prioritize habitat restoration projects for targeted and Trust Species.

◆ HW-16: Collect and analyze data on, and restore habitat for, Species of Greatest Conservation Need, including forage species.

Strategy 2-2b2: Manage habitat threats (e.g., climate change driven threats and predator-prey relationships) to targeted and Trust Species.

HW-17: Reduce and manage threats to populations of Species of Greatest Conservation Need, including forage species.
Other actions that support Strategy: SC-2

Objective 2-2c: To manage and restore populations of harvested species:

Strategy 2-2c1: Create or update species management plans for commercially and recreationally important species.

HW-18: Develop a shellfish management plan for aquaculture, recreation, and restoration that ensures sustainable marine populations.

Objective 2-2d: To maintain or improve diverse/resilient communities of native fish, birds, and other wildlife:

Strategy 2-2d1: Promote projects that protect and restore biological and ecological diversity.

HW-19: Update and implement Connecticut and New York State Wildlife Action Plans as they pertain to Long Island Sound, and continue to update or draft new site-specific management plans as needed.
Other actions that support Strategy: HW-13, HW-14, HW-15, SC-12

2-3 OUTCOME: THE PUBLIC IS EDUCATED AND INVOLVED IN RESTORATION AND PROTECTION OF HABITATS AND LIVING RESOURCES.

Objective 2-3a: To educate and engage the public, particularly in urban areas, in both large and small-scale habitat restoration projects, research, monitoring, management, and stewardship associated with priority habitat types and living resources:

Strategy 2-3a1: Promote the creation of educational and outreach programs tailored for multiple user groups.

HW-20: Develop and support programs to engage landowners in understanding the importance of habitat protection and management methods and in implementing them on their properties.
HW-21: Support inclusive participation of communities and stakeholders in the design and implementation of the Long Island Sound National Estuarine Research Reserve management plan and reserve education and research programs.
Other actions that support Strategy: HW-22, SC-4, SC-5, SC-6, SC-11, SC-12, SC-16

Strategy 2-3a2: Communicate the importance of ecosystem services to the public and municipal leaders.

Actions that support Strategy: HW-10, HW-20, HW-21, HW-22, SC-11, SC-12

Objective 2-3b: To instill a sense of stewardship by increasing people's awareness of, and visitation to, priority habitats and LISS Stewardship Sites:

Strategy 2-3b1: Enhance and promote innovative and relevant ways of connecting people to Stewardship Sites. HW-22: Engage local communities in design, development, implementation, and promotion of habitat restoration, stewardship and monitoring projects.

2-4 OUTCOME: KNOWLEDGE OF HABITATS AND LIVING RESOURCES IS ADVANCED THROUGH MONITORING, ASSESSMENT, AND RESEARCH.

Objective 2-4a: To enhance knowledge of habitats and living resources through research, collaboration, and distribution of useful habitat and living resource data:

Strategy 2-4a1: Support ecosystem science research such as habitat modeling and landscape design efforts to enhance protection of living terrestrial and aquatic resources. HW-23: Collect and analyze data on LISS 12 targeted coastal habitat types in order to improve habitat assessment and adaptive management.

Other actions that support Strategy: HW-4, HW-5, SM-1

Strategy 2-4a2: Inventory status and trends in quality, quantity, and distribution of priority habitats and species. HW-24: Explore adding new coastal habitat types to the 12 currently targeted for restoration.
 ♦ HW-25: Continue Long Island Sound eelgrass abundance surveys and promote eelgrass management.

Other actions that support Strategy: HW-6, HW-8, HW-23

Strategy 2-4a3: Identify surrogate/representative species for long-term monitoring to evaluate ecosystem health. HW-26: Determine whether monitoring of surrogate species, including those of high conservation priority, is a cost-effective way to track habitat restoration.

Other actions that support Strategy: HW-17, SC-2

Strategy 2-4a4: Identify water quality conditions necessary to support priority habitats and use suitability models to evaluate appropriate restoration priorities through pollution controls. HW-27: Assess causes and extent of tidal marsh change through research and monitoring and use this information to create a model to prioritize sites for restoration and conservation.

Other actions that support Strategy: SM-1

SUSTAINABLE AND RESILIENT COMMUNITIES

Goal: Support vibrant, informed, and engaged communities that use, appreciate, and help protect Long Island Sound.

ECOSYSTEM TARGETS

The following ambitious, but achievable, ecosystem targets have been developed to drive progress toward attaining the Sustainable and Resilient Communities (SC) goal. Achieving these targets can also contribute to the goals for the other themes. Likewise, multiple strategies and implementation actions throughout the four theme areas apply directly and indirectly to these targets. Measuring, tracking, and reporting environmental indicators of each ecosystem target will provide information to assess progress and refine and adapt management as needed. A detailed explanation about the rationale and quantification of these targets is included in Appendix of the CCMP.

Waterfront Community Resiliency and Sustainability:

All coastal municipalities have prepared plans for shoreline resiliency and infrastructure sustainability and resiliency by 2025, with all future development compliant with those plans by 2035.

Harbor and Bay Navigability: Maintain all federal navigation channels in harbors and bays and manage dredged material in a cost-effective and environmentally sound manner, consistent with a bi-state Dredged Material Management Plan, by 2035.

Public Engagement and Knowledge: Increase the knowledge and engagement of the public in the protection and/or restoration of Long Island Sound compared to the 2006 public perception survey.

Public Beach Closures: Reduce by 50 percent the number of beaches reporting at least one closure day or the total number of beach-day closures per monitored beach due to water quality impairments by 2035, compared to a five-year rolling average from 2014.

Marine Debris: Decrease the mass of marine debris in Long Island Sound by 2035.

Public Access to Beaches and Waterways: Increase by at least 10 percent the number of public access points to the Sound and its rivers by 2035.

OUTCOMES, OBJECTIVES, STRATEGIES, AND IMPLEMENTATION ACTIONS

To accomplish the Sustainable and Resilient Communities goal and to achieve progress toward the ecosystem targets, the plan includes specific outcomes, objectives, strategies, and actions. The Implementation Actions (IAs) have been formulated to carry out the SC theme strategies (and are numbered SC-1, SC-2, etc.). All IAs are important to meeting the plan's objectives and outcomes. While recognizing that the priorities of each implementing organization will vary according to its mission and the purpose of available funds, the CCMP identifies the highest overall priorities, whether for new or underway actions, by consensus of the Management Conference partners. Highest priority actions are indicated by a "♦" symbol. The complete five-year implementation action plans (further described in Appendix of the CCMP) are included in the supplement to the CCMP posted on the LISS website.

3-1 OUTCOME: RESIDENTS HAVE THE AWARENESS, KNOWLEDGE, AND SKILLS TO PROTECT THE SOUND.

Objective 3-1a: To increase appreciation of Long Island Sound and opportunities for residents to get a meaningful experience on the Sound and on its shoreline:

Strategy 3-1a1: Encourage opportunities to enjoy Long Island Sound through activities such as fishing, swimming, and bird watching.

◆ 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.

SC-2: Support efforts and projects that promote environmentally sustainable recreational activities and protection of the Sound's environmental and wildlife resources.

SC-3: Continue programs to promote recreational fishing and boating as healthy and sustainable activities, while incorporating education on environmental issues and ways to enhance stewardship.

Other actions that support Strategy: HW-17

Strategy 3-1a2: Support maritime and cultural heritage awareness.

Actions that support Strategy: SC-1

Strategy 3-1a3: Connect/reconnect urban populations, including underserved and non-English language communities, to the Sound.

SC-4: Support federal, state and local environmental justice initiatives that promote equitable access, appreciation, and understanding of the Long Island Sound.

◆ 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.

Other actions that support Strategy: HW-20, HW-22, SC-6

Objective 3-1b: To increase public knowledge and understanding of the ecological health of Long Island Sound:

Strategy 3-1b1: Provide information products that educate communities about the health of Long Island Sound and about the collaborative efforts to restore and protect the Sound.

◆ 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.

SC-7: Produce informational materials to engage multiple audiences in stewardship and increase the public's understanding of the ecological, cultural, and recreational value of Long Island Sound.

SC-8: Develop projects with the Long Island Sound National Estuarine Research Reserve and other partners to disseminate knowledge and results from Long Island Sound monitoring and research.

SC-9: Raise awareness through various media formats about the Sound's water quality conditions that could impact human health.

SC-10: Expand efforts, through the LISS website and social media channels, to educate the public about the impacts of climate change on Long Island Sound and in Long Island Sound Stewardship Areas.

Other actions that support Strategy: SM-25, WW-39

Objective 3-1c: To increase public stewardship, at home and in the community, to protect the natural resources of the Sound

Strategy 3-1c1: Involve the public in the cleanup and restoration of Long Island Sound through volunteerism and community action.

SC-11: Support local volunteer organizations that are working toward the ecological restoration of the Sound and its tributaries.

SC-12: Continue support for Sound Stewardship volunteer projects and other outreach activities at New York and Connecticut Stewardship Areas.

SC-13: Continue the Long Island Sound Citizens Summit and support other Sound-wide events that encourage dialogue between resource managers, environmental stakeholders, and residents.

Other actions that support Strategy: HW-13, HW-22

Strategy 3-1c2: Encourage residents, both homeowners and renters, to engage in environmentally-friendly practices around their homes and communities.

◆ 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.

◆ 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.

SC-16: Develop a Sound-wide campaign to increase the public's connection to and safe and sustainable use of the Sound.

3-2 OUTCOME: FUTURE GENERATIONS HAVE THE SKILLS TO BECOME LEADERS AND STEWARDS FOR THE SOUND.

Objective 3-2a: To incorporate Long Island Sound topics, including its ecology and history, into New York and Connecticut classrooms and curriculum, and informal settings:

Strategy 3-2a1: Support professional development of formal and informal educators. SC-17: Continue and expand efforts such as the Long Island Sound Mentor-Teacher Program to provide formal and informal K-12 educators with opportunities to learn how to include Long Island Sound instruction in their classrooms.

Strategy 3-2a2: Provide science-based information products and supplemental resources such as lesson plans for specific Long Island Sound topics. Actions that support Strategy: SC-17

Objective 3-2b: To provide youth with opportunities to learn about Long Island Sound and its related issues:

Strategy 3-2b1: Support informal education at aquariums, museums, and coastal environments with facilities such as nature centers. SC-18: Support and encourage informal education activities on Long Island Sound. SC-19: Support programs and opportunities that promote in-the-field and hands-on learning through classroom and informal activities.

Strategy 3-2b2: Engage youth in stewardship opportunities. Actions that support Strategy: SC-12, HW-13, HW-22

3-3 OUTCOME: POLICY MAKERS, RESOURCE MANAGERS, AND OTHER STAKEHOLDERS HAVE THE INFORMATIONAL RESOURCES TO UNDERTAKE COLLABORATIVE EFFORTS TO RESTORE AND PROTECT THE SOUND.

Objective 3-3a: To ensure that policy makers, environmental professionals, health professionals, and other stakeholders have the best available information in order to make decisions that will improve the management of Long Island Sound:

Strategy 3-3a1: Support the dissemination of the best practices to reduce contaminants, improve water quality, and protect habitats through professional development training and workshops. ♦ SC-20: Provide support to municipalities on low-impact development and green infrastructure. Other Actions that support Strategy: HW-10

Strategy 3-3a2: Update and disseminate information on the best available scientific, socioeconomic, and environmental trends to policy makers, resource managers, and stakeholders. SC-21: Provide support, including funding and technical assistance, for the development and dissemination of environmental technical manuals and studies to environmental decision makers and resource managers. ♦ 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. Other actions that support Strategy: HW-21

3-4 OUTCOME: NEW AND EXISTING DEVELOPMENT IS SUSTAINABLE AND RESILIENT.

Objective 3-4a: To encourage and facilitate the development of regional, state, and local sustainability, mitigation, and resiliency plans and integrate them into community comprehensive plans:

Strategy 3-4a1: Provide support to municipalities to facilitate the development and updating of sustainability and resiliency plans that incorporate current concepts on these topics. ♦ 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. ♦ SC-24: Support community development, adoption, and implementation of new or updated Municipal Sustainability Plans and Coastal Resiliency Plans. Other actions that support Strategy: SM-37, WW-13, WW-18

Strategy 3-4a2: Ensure consistency among economic development and sustainability and resiliency planning efforts. SC-25: Develop guidance for assessing the benefits and costs of sustainability activities and economic development, including protection of ecosystem function versus infrastructure protection, to incorporate into sustainability and resiliency planning efforts. Other actions that support Strategy: WW-18

Objective 3-4b: To develop and implement sustainability and resiliency plans for new and existing development, housing, transportation, emissions control, energy efficiency, and job creation programs for all municipalities:

Strategy 3-4b1: Revise zoning, permitting, and related regulations to ensure that future development and redevelopment conform to sustainability, mitigation, and resiliency plans.

◆ 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.

Other actions that support Strategy: SC-24, SM-37, WW-13, WW-18

Strategy 3-4b2: Provide technical assistance and training for homeowners, municipal officials, developers, engineers, and consultants on sustainability, adaptation, and resiliency concepts and opportunities for implementation.

◆ SC-27: Implement standards, best practices, and educational materials for Green Infrastructure/Low-Impact Development planning and implementation.

Other actions that support Strategy: SC-24, SM-37, WW-13, WW-18

Strategy 3-4b3: Balance waterfront recreational, commercial, and industrial uses according to sustainability and resiliency plans.

SC-28: Remediate and sustainably develop abandoned and underutilized sites (brownfields).

SC-29: Pursue further study and support for beneficial use and other alternatives to open water placement of dredged material.

Other actions that support Strategy: SC-25

3-5 OUTCOME: PUBLIC ACCESS AND SUSTAINABLE ECONOMIC ACTIVITIES ALONG THE WATERFRONT ARE ENHANCED, BALANCED, AND RESILIENT.

Objective 3-5a: To encourage communities to identify priority waterfront economic development activities and then to implement economic development strategies and infrastructure planning that result in vibrant, resilient, and environmentally sustainable communities:

Strategy 3-5a1: Establish programs and provide support to communities to help them in obtaining recognition for exemplary sustainability programs.

SC-30: Provide technical and financial assistance to municipalities to implement sustainable and resilient community projects.

Strategy 3-5a2: Improve access to Long Island Sound and its embayments, maintain and enhance view corridors and blueways, and enhance water-dependent uses.

◆ 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.

SC-32: Encourage the sustainable use of natural coastal areas, including Long Island Sound Stewardship Areas, through support of sustainable blueways, bikeways, and greenways.

Other actions that support Strategy: HW-7

SOUND SCIENCE AND INCLUSIVE MANAGEMENT

Goal: Manage Long Island Sound using sound science and cross-jurisdictional governance that is inclusive, adaptive, innovative, and accountable.

The **Sound Science and Inclusive Management (SM)** theme addresses EBM through research, monitoring, modeling, and assessment. Monitoring is further detailed in Section 4. These efforts need to be maintained and enhanced to increase understanding of Long Island Sound and support management outcomes. In addition, this theme addresses the coordination of the many entities involved in CCMP implementation, funding, and application of an adaptive management framework.

OUTCOMES, OBJECTIVES, STRATEGIES, AND IMPLEMENTATION ACTIONS

To accomplish the Sound Science and Inclusive Management goal and to achieve progress toward the ecosystem targets, the plan includes specific outcomes, objectives, strategies, and actions. The Implementation Actions (IAs) have been formulated to carry out the SM theme strategies (and are numbered SM-1, SM-2, etc.). All IAs are important to meeting the plan's objectives and outcomes. While recognizing that the priorities of each implementing organization will vary according to its mission and the purpose of available funds, the CCMP identifies the highest overall priorities, whether for new or underway actions, by consensus of the Management Conference partners. Highest priority actions are indicated by a "♦" symbol. The complete five-year implementation action plans (further described in Appendix of the CCMP) are included in the supplement to the CCMP posted on the LISS website.

4-1 OUTCOME: THE SCIENTIFIC UNDERSTANDING OF LIS TO SUPPORT MANAGEMENT IS INCREASED THROUGH STRENGTHENED RESEARCH, MONITORING, ASSESSMENT, MAPPING, AND MODELING.

Objective 4-1a: To enhance the research portfolio to answer questions relevant to Long Island Sound management:

Strategy 4-1a1: Identify and support science activities needed to transparently link outcomes and objectives to strategies and actions, setting priorities based on management relevance and scientific merits.

◆ SM-1: Regularly update and refine the high-priority science needs relating to the understanding and attainment of management objectives and ecosystem targets.

Other actions that support Strategy: WW-12, WW-27, WW-30, HW-27

Objective 4-1b: To maintain and enhance monitoring and assessment programs to increase understanding of Long Island Sound and assess progress toward management outcomes:

Strategy 4-1b1: Characterize, inventory, and map open and shallow water habitats to support resource management and marine spatial planning.

SM-2: Complete seafloor mapping conducted under the Sound Cable Fund, and use results to guide additional mapping.

Strategy 4-1b2: Characterize, inventory, and map human uses, both recreational and commercial, of open and shallow water habitats to support resource management and marine spatial planning.

SM-3: Refine and expand the data supporting coastal and marine spatial planning under the Blue Plan for Long Island Sound.

Strategy 4-1b3: Evaluate, enhance, integrate, and coordinate ongoing monitoring programs.

SM-4: Develop metadata for major monitoring programs relevant to LISS Ecosystem Targets for use in an Integrated Data Management Plan including community science.

SM-5: Develop an Integrated Data Management Plan considering local, regional, and national observing initiatives.

SM-6: Re-interpolate aerial estimates of hypoxia, from 1991 to present, using both CTDEEP and IEC data.

SM-7: Continue National Coastal Condition Assessment monitoring of Long Island Sound.

Other actions that support Strategy: WW-29, WW-32, WW-38, WW-39, WW-40, SC-8, SM-25

Strategy 4-1b4: Strengthen monitoring of conditions in embayments and near-shore waters, and integrate the resulting data and assessments into open water monitoring programs.

◆ SM-8: Coordinate and leverage community water quality monitoring programs, enhancing the utility and application of data.

Other actions that support Strategy: WW-28, WW-29, WW-32, WW-35

Strategy 4-1b5: Improve regional identification, storage, and sharing of spatial and temporal data.

SM-9: Assess options for establishing a secure, long-term Long Island Sound data portal, such as LIQWIDS, that can access other data systems, including WQX.

SM-10: Ensure all geospatial data needed for LISS Ecosystem Targets is formatted and has sufficient metadata to be interoperable among common GIS applications.

Objective 4-1c: To develop and improve modeling capabilities to provide predictive assessments of resources, physical dynamics, and water quality:

Strategy 4-1c1: Transition existing and new models to a community modeling framework that provides open source access to facilitate external collaboration, assessments, and enhancements.

◆ SM-11: By 2024, complete the Integrated Systemwide Modeling Tool to support nitrogen management and Dissolved Oxygen TMDL assessment.

◆ SM-12: Link watershed and groundwater nutrient loading models to Long Island Sound water quality models to better elucidate the sources and contributions of nitrogen and support their management.

Other actions that support Strategy: WW-27

4-2 OUTCOME: ACTIONS ARE IMPLEMENTED THROUGH COORDINATED STRATEGIES BY ALL LEVELS OF GOVERNMENT AND DIVERSE STAKEHOLDERS.

Objective 4-2a: To increase communication, coordination, and reduce institutional barriers to cooperation on an ecosystem level among all levels of government, stakeholder groups, and the general public:

<p>Strategy 4-2a1: Maintain and enhance the Long Island Sound Management Conference as the coordinating entity to implement the CCMP, and expand opportunities for local government involvement.</p>	<p>SM-13: Continue program administrative, financial, and technical assistance support to Management Conference.</p> <p>SM-14: Continue state program coordination and involvement in the Management Conference.</p> <p>SM-15: Optimize structure and function of the Management Conference with a focus on implementation of the revised CCMP.</p> <p>SM-16: Reauthorize Clean Water Act sections 119 and 320 in 2024.</p> <p>◆ SM-17: Establish and implement practices to effectively engage underrepresented stakeholders and communities in CCMP implementation and LISS Management Conference decision-making.</p>
<p>Strategy 4-2a2: Ensure that the CCMP is incorporated into and carried out through existing state and local policies and regulatory programs.</p>	<p>No actions to support Strategy for 2020-2024</p>
<p>Strategy 4-2a3: Maintain EPA, NYSDEC, and CTDEEP support of the Management Conference to provide leadership and accountability.</p>	<p>◆ SM-18: Convene senior EPA and State management to help direct, inform, and coordinate policy relevant to Long Island Sound.</p>
<p>Strategy 4-2a4: Enhance opportunities for cooperation and involvement of the tributary states of Massachusetts, New Hampshire, Rhode Island, and Vermont to address stressors that contribute to downstream effects on LIS.</p>	<p>SM-19: Foster continued involvement of the tributary states in Management Conference activities relating to nutrient science and management.</p> <p>Other actions that support Strategy: WW-7, WW-8, WW-10, WW-11, WW-12, WW-29</p>
<p>Strategy 4-2a5: Through Marine Spatial Planning, facilitate the management of multiple human uses of the Sound compatible with the conservation of natural resources and habitats.</p>	<p>◆ SM-20: Support the refinement and application of the Long Island Sound Blue Plan to more comprehensively manage Long Island Sound resources.</p>
<p>Objective 4-2b: To maintain and enhance efficient public investments in restoration and management:</p>	
<p>Strategy 4-2b1: Apply concepts of economic valuations of the natural capital of LIS and its watershed (i.e., the value of the goods and services supported by natural ecosystems) to inform and sustain investment in protecting and restoring those assets.</p>	<p>◆ SM-21: Conduct primary valuations of the critical ecosystem goods and services supported by Long Island Sound and its coastal habitats.</p> <p>SM-22: Conduct return-on investment analysis for Long Island Sound restoration and preservation strategies to inform priority-setting for implementation of the CCMP.</p>
<p>Strategy 4-2b2: Identify critical funding needs for protection and restoration projects, science, education, and involvement, and relate these needs to available or new funding sources.</p>	<p>SM-23: Capitalize Connecticut Clean Water Fund and New York State Revolving Fund adequately to finance Clean Water infrastructure needs.</p> <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.</p> <p>SM-25: Coordinate, collaborate and leverage funding opportunities with the Long Island Sound National Estuarine Research Reserve for implementation and restoration, science, and public involvement and education projects.</p> <p>Other actions that support Strategy: WW-39, SC-8</p>
<p>Strategy 4-2b3: Evaluate cross-agency expenditures on Long Island Sound to identify how funding levels match with priority needs, assess whether resources are being optimally applied, and identify leveraging opportunities.</p>	<p>No actions to support Strategy for 2020-2024</p>

4-3 OUTCOME: IMPLEMENTATION IS ADAPTED AND IMPROVED THROUGH THE APPLICATION OF NEW INFORMATION AND KNOWLEDGE.

Objective 4-3a: To frame sustainability, adaptation, and resilience in relation to the drivers of ecosystem change:

Strategy 4-3a1: Include important environmental drivers (e.g., climate change) in all relevant management planning initiatives. SM-26: Incorporate climate change-driven factors such as temperature, acidification, and sea level rise in model applications to assess factors that can influence future attainment of water quality standards and habitat protection and restoration goals.

SM-27: Determine how climate change will impact attainment of CCMP Ecosystem Targets, goals and objectives using LISS vulnerability assessment and other resources.

SM-28: Evaluate the potential limitation of primary productivity, modification of species composition, and other impacts by nutrients other than nitrogen in embayments and the main Sound; as well as the ratios of these nutrients to nitrogen.

Other actions that support Strategy: WW-13, WW-32, WW-33, WW-34,

Strategy 4-3a2: Consider the spectrum of desired ecosystem outcomes when planning and implementing resiliency of both built and natural systems. SM-29: Continue collaboration with Connecticut Institute for Resiliency and Climate Adaption (CIRCA).

Objective 4-3b: To apply an adaptive management framework to CCMP implementation when warranted by the level of uncertainty in the underlying science:

Strategy 4-3b1: Establish baselines of historical or pre-historical conditions of ecosystem attributes and magnitudes of change to help provide a basis for setting restoration goals. ♦ 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.

Strategy 4-3b2: Utilize and learn from cutting edge approaches and methods to improve management options for pollution mitigation and ecosystem protection (e.g., marine spatial planning, innovative source reduction technologies, and in situ extractive technologies). SM-31: Incorporate bioextraction analyses in Dissolved Oxygen TMDL assessments on the assimilative capacity of Long Island Sound to process nutrients without loss of designated uses.
Other actions that support Strategy: WW-7, WW-8

Strategy 4-3b3: Prepare periodic progress reports on the health of the Sound and on implementation progress. SM-32: By 2024, update the CCMP tracking system to address GAO recommendations and communicate progress to the public.
SM-33: Continue to issue “report cards” on water quality conditions in Long Island Sound that are easily understood by the public and scientifically defensible.
SM-34: Refine and communicate information on the Long Island Sound ecosystem and watershed using environmental indicators (drivers, pressures, conditions, and response indicators).

Strategy 4-3b4: At five-year intervals refine implementation actions and priorities by incorporating and integrating new information (including emerging issues) relating to science and management. SM-35: Develop annual Long Island Sound Study work plans that consider progress made and recommendations for improving implementation to achieve desired outcomes.
♦ SM-36: Every five years develop a comprehensive, specific, target-oriented implementation plan engaging all Long Island Sound partners.
♦ SM-37: In 2021, develop a Sustainable and Resilient Communities five-year plan that identifies specific actions, which, when approved by the Management Conference, will be added to the 2020 CCMP update.

Other actions that support Strategy: SC-24