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LR-1

Develop and implement a comprehensive resource action plan for native oyster populations in Great Bay and other suitable sites in the Piscataqua Region

Highest

A comprehensive resource action plan is needed to address the range of factors that have led to the current diminished oyster resource in Great Bay and to garner public and private financial support for restoration efforts. The plan must integrate restoration targets, harvest regulations, oyster reef habitat restoration, disease control methods, shell management, partner organization roles, and monitoring protocols for natural and restored reefs. PREP’s objective is to increase the abundance of adult oysters at the six documented beds in the Great Bay Estuary to 10 million oysters and restore 20 acres of oyster reef habitat.

ACTIVITIES:

* Convene stakeholders from New Hampshire and Maine to discuss a cooperative management plan for oysters that integrates harvest management, shell management, and habitat restoration objectives.
* Evaluate existing and potential locations for shellfish spawning sanctuaries1 and support larval recruitment studies.
* Support capacity for long-term oyster reef restoration and shell management activities.
* Continue working with private aquaculture industry on oyster restoration.
* Synthesize and conduct research on oyster disease resistance and non-native species predation impacts on shellfish and incorporate the findings into oyster conservation and restoration management actions.
* Continue to encourage recreational harvesters to follow regulations, use best harvest practices, and adopt voluntary measures to aid oyster recovery.
* Conduct a cost/benefit analysis of establishing oyster reefs to remove nutrients in the Great Bay Estuary and explore feasibility of funding restoration work with nutrient offset credits.
* Continue regular monitor of all major natural and created oyster reef areas for areal coverage, oyster density, abundance, age class structure, disease, and mortality.
* Compile spatial data on current and potential restoration locations to facilitate spatial planning efforts in the Region.

MEASURING PROGRESS:

Outputs:

* Bi-state oyster restoration study committee
* List of suitable shellfish spawning sanctuaries
* Report on permitting process regarding oyster restoration
* Recycled Shell Program
* Oyster Conservationist Program
* Report on oyster disease, non-native species predation impacts, and nitrogen bioextraction potential of oyster culture
* Outreach campaign to oyster harvesters on following regulations and adopting BMPs and voluntary measures
* Research reports on oyster disease
* Cost/benefit analysis of using oysters to sequester nutrients in Great Bay Estuary
* Restored oyster reefs
* Oyster distribution and abundance reports
* Spatial data for estuarine planning

Outcomes:

Coordinated oyster restoration between NHFGD and MDMR

Greater public understanding of the role of oysters in estuarine health

Increased oyster population and reef area

Enhanced filtration of sediments, nutrients, and contaminants from tidal waters

Implementation Metrics:

Standing stock of adult oysters in Great Bay beds

Prevalence of oyster disease

Recreational harvest of oysters

Restored oyster beds

Issues Addressed:

* Critical Species
* Habitat Restoration
* Nutrients
* Shellfish

Leads:

* MDMR
* NHDES
* NHFGD
* PREP
* TNC-NH
* UNH-JEL

Cooperators:

* Aquaculturalists
* CCA-NH
* Dock Owners
* NOAA
* NRCS
* Shoreland Owners
* USFWS

Funding:

* CCA
* NHCF
* NOAA
* NRCS
* PREP
* TNC

Critical Guidance:

1Odell, Eberhardt, Burdick, & Ingraham. 2006. Great Bay Estuary Restoration Compendium.

LR-2

Assess and improve soft-shell clam populations in Piscataqua Region estuaries

High

Clam populations have fluctuated in the Hampton-Seabrook and Great Bay Estuaries due to harvest pressures, invasive predators, and disease. Outreach to harvesters through NHDES Shellfish Program website and NHFG Saltwater Digest website provide harvest regulations and digging methods that minimize incidental damage to unharvested clams.

Annual clam surveys of the Hampton-Seabrook clam flats have been completed by Seabrook Station (NextEra Energy) and biological consultants (Normandeau Associates Inc.) as directed by state and federal permits since the 1970s. NHFGD has worked with surveyors to design sampling and annually review results. Management changes have been made in response to some evidence of drops in clam abundance.

Previous research funded by PREP has documented significant clam mortality from non-native green crabs. Research also suggests that the clam disease “neoplasia” is likely a significant contributor to clam population mortality. Therefore, minimizing predation by non-native species and reducing mortality from clam diseases are important to protect sustainable clam populations.

ACTIVITIES:

* Continue to encourage public to report illegal clam harvest to Operation Game Thief.
* Continue to investigate and promote commercial harvest of non-native shellfish predators (i.e. green crabs) for bait or other uses that reduce population.
* Continue to support research on clam diseases and use results to guide management actions.
* Continue to promote harvesting methods that minimize negative impacts to juvenile clams and benthic habitat using websites and license sale brochures. Explore use of signs at major bed access points.
* Continue annual assessments of clam bed area, density, and populations (Seabrook Station), and control harvest pressure to ensure increasing trends to clam standing stock.
* Support research on identifying causes of juvenile clam mortality between spat settlement and age in the Hampton-Seabrook Estuary and identify strategies for reducing mortality.1
* Compile spatial data on current and potential restoration locations to facilitate spatial planning efforts in the Region.
* Research accuracy of current age classes based on clam length.

MEASURING PROGRESS:

Outputs:

* Outreach campaign to public on continued use of Operation Game Thief program to report illegal clam harvest
* Clam harvest information for recreational harvesters
* Clam monitoring reports
* Research on clam diseases and causes of juvenile mortality
* Pilot commercial harvest program for green crabs
* Spatial data for estuarine planning

Outcomes:

Increased compliance with clam harvest rules and best practices for harvesting

Increased clam populations

Reduced green crab predation and disease incidence in clams

Implementation Metrics:

Standing stock of adult clams in major beds of Hampton Seabrook Harbor

Abundance of green crabs on clam flats

Recreational harvest of clams

Prevalence of clam disease

Issues Addressed:

* Critical Species
* Habitat Restoration
* Invasive Species
* Nutrients
* Shellfish

Leads:

* NHFGD

Cooperators:

* CCA-NH
* Commercial Fishermen
* ME Sea Grant
* MDMR
* NH Sea Grant
* NH Shellfish Program
* PREP
* UME
* UNH-JEL

Funding:

* NHFGD
* NOAA

Critical Guidance:

1Beal. 2005. Large-Scale, Manipulative Field Tests Involving Cultured and Wild Juveniles of the Soft-Shell Clam.

LR-3

Implement a comprehensive recovery strategy for eelgrass throughout the Great Bay Estuary

Highest

Eelgrass restoration, mitigation, and recovery efforts in the Great Bay Estuary have had varying degrees of success likely due to insufficient water clarity. Restoring large areas of eelgrass will require successful reductions in nutrient and sediment pollution loading, addressed by WR-5, WR-8, WR-9, and WR-16. These pollution abatement actions are essential components of the eelgrass restoration strategy described in this action plan. PREP’s objectives are to increase the areal extent of eelgrass cover to 2900 acres and restore connectivity of eelgrass beds throughout the Great Bay Estuary by 2020.

Active eelgrass planting and re-seeding efforts should be limited to areas where water quality/clarity would be expected to support self-sustaining eelgrass meadows. UNH-JEL developed a site suitability model and maps for the Great Bay Estuary that identify historic eelgrass meadows and where environmental conditions may support restoration efforts. These maps were incorporated into the Great Bay Restoration Compendium.1 Potential restoration sites should be evaluated on a case-by-case basis, based on current water quality conditions/trends and small-scale test plantings. Sites that show high survival rates of test plantings should be priorities for larger scale restoration efforts.

ACTIVITIES:

* Conduct eelgrass test plantings at potential restoration sites1,2,3 and where current water quality conditions would support eelgrass.
* Monitor success rates of test plantings and conduct intensive eelgrass restoration at sites with the best survival rates.
* Site eelgrass restoration sites in proximity to oyster restoration sites to test synergistic effects.
* Complete restoration projects in suitable areas to reestablish eelgrass throughout the estuary.
* Compile spatial data on current and potential restoration locations to facilitate spatial planning efforts in the Region.
* Study interactions related to eelgrass and shellfish aquaculture and restoration.

MEASURING PROGRESS:

Outputs:

* Research reports on success rates of test eelgrass plantings
* Restored acres of eelgrass
* Projected list of suitable sites for large-scale eelgrass recruitment
* Spatial data for estuarine planning

Outcomes:

Increased areal extent of existing eelgrass beds

Increased eelgrass biomass

Reestablishment of eelgrass beds in the Great Bay Estuary

Improved ecological function of estuarine system

Implementation Metrics:

Eelgrass distribution

Eelgrass biomass

Restored eelgrass beds

Issues Addressed:

* Critical Species
* Eelgrass
* Habitat Restoration

Leads:

* UNH-JEL

Cooperators:

* CCA-NH
* MDMR
* NHFGD
* PREP
* TNC
* USFWS

Funding:

* Dredging Mitigation Funds
* NOAA
* NRCS
* USFWS

Critical Guidance:

1Odell, Eberhardt, Burdick, & Ingraham. 2006. Great Bay Estuary Restoration Compendium.

2Short, Davis, Kopp, Short, & Burdick. 2002. Site Selection Model for Optimal Restoration of Eelgrass, *Zostera marina* in the Northeastern US.

3Short, Davis, Kopp, Gaeckle, & Burdick. 2006. Using TERFS and Site Selection for Improved Eelgrass Restoration Success.

LR-4

Develop and implement diadromous fish restoration plans for priority rivers in the Piscataqua Region with the goal of restoring historical river distributions to the maximum extent practicable

Highest

Dams and road crossing restrictions can prevent fish passage. A strategy is needed for restoring diadromous fish to the maximum practical extent of their historic habitat range by estimating the production potential of currently blocked habitat and implementing a systematic approach to correcting fish passage barriers and restoring degraded habitat reaches.

Historical distribution of diadromous fisheries and dams on major rivers that block migratory fish in the Region have been defined1,2, however, a detailed plan for correcting fish passage at these dams that estimates the population recovery benefits associated with providing access to blocked habitat has not been developed. Without clearly defining goals and a strategy for diadromous fish restoration, it is difficult to communicate the benefits of barrier removal and shoreland protection to the public or potential restoration funders. A plan that identifies restoration targets for each river system and regional priorities for restoration would be an important resource when building political and financial support to rebuild native diadromous fish stocks.

ACTIVITIES:

* Convene an interagency technical team to oversee plan development.1,2
* Evaluate the production potential of blocked river reaches for various species based on existing or potential habitat condition/area and evaluate cost and ecological benefit of barrier removals or fish passage structures. Consider other wildlife, water quality, cultural, economic, and hydrologic factors.
* Compile spatial data on current and potential restoration locations to facilitate spatial planning efforts in the Region.
* Investigate and quantify upstream and downstream efficacy of existing fish passage structures and prioritize improvements.
* Continue to improve priority fish passage structures as feasible and monitor fisheries population response.
* Continue to evaluate fish harvest and stocking policies as needed to maximize native fish population recovery in restored river reaches.

MEASURING PROGRESS:

Outputs:

* Interagency diadromous fish restoration technical team
* Report on production potential of blocked river reaches that evaluates cost and ecological benefit
* Spatial data for estuarine planning
* Report on fish passage efficacy and prioritized improvements
* Improved fish passage (including dam removals and culvert replacements)
* Feasibility study on requiring dams to provide upstream and downstream fish passage and adding efficiency monitoring to hydroelectric dam FERC relicensing
* Diadromous fish restoration plans for all major river tributaries

Outcomes:

Improved diadromous fish access to habitat

Restored river habitat/connectivity

Increased populations of diadromous fish and dependent species

Implementation Metrics:

Anadromous fish returns

Issues Addressed:

* Critical Species
* Dam Removal
* Fish Ladders
* Fisheries
* Land Protection
* Stream Connectivity

Leads:

* MDIFW
* MDMR
* NH River Restoration Task Force
* NHFGD

Cooperators:

* Aquatic Recreationalists
* CCA-NH
* Dam Owners
* Land Owners
* Land Protection Organizations
* Municipalities
* NH Coastal Program
* NHDES
* NRCS
* PREP
* TNC
* TU
* UME
* UNH
* USFWS
* Watershed Organizations

Funding:

* CCA
* NHCF
* NOAA
* NRCS
* PREP
* TNC
* TU

Critical Guidance:

1Odell, Eberhardt, Burdick, & Ingraham. 2006. Great Bay Estuary Restoration Compendium.

2Eberhardt & Burdick. 2009. Hampton-Seabrook Estuary Habitat Restoration Compendium.

LR-5

Support state funding for feasibility studies and dam removals in New Hampshire and Maine to be used as a source to match federal funding for river restoration

Moderate

There are numerous public and private dams in New Hampshire and Maine that require maintenance and permitting. Many of these dams are nonessential and the owners may want to remove them to eliminate maintenance costs and liability risks. Feasibility studies are often needed to assess the costs and benefits of removal versus repair.

Dam removal can be a long and expensive process. Prior to removal, a feasibility study is often needed to evaluate potential positive and negative impacts of removal. While substantial federal funding is available to support dam removal for river restoration, non-federal matching dollars are required in order to access these funds. State funding to assist with dam removal for priority streams or high hazard dams would speed the dam removal process and increase the likelihood of well managed projects.

ACTIVITIES:

* Review funding needs for feasibility studies and dam removal with state agencies.
* Research potential funding sources for dam removals in New Hampshire and Maine.
* Advocate for state funding for feasibility studies and dam removals.

MEASURING PROGRESS:

Outputs:

* Report on dam removal feasibility studies that includes review of potential funding sources
* Advocacy campaign to policy makers to make state funding available for feasibility studies and dam removals
* State funding for dam removal feasibility studies and implementation

Outcomes:

Increased financial capacity to leverage federal restoration funding into Piscataqua Region for dam removal

Increase in the successful removal of dams for fisheries and river restoration

Implementation Metrics:

None

Issues Addressed:

* Dam Removals
* Fisheries
* Stream Connectivity

Leads:

* CCA-NH
* NH River Restoration Task Force
* PREP
* TU

Cooperators:

* American Rivers
* Dam Owners
* MDEP
* MDIFW
* Municipalities
* NHFGD
* NOAA
* NRCS
* Shoreland Owners

Funding:

* American Rivers
* Conservation Foundations
* NHDES – State Revolving Fund

LR-6

Identify, protect, and restore existing populations of native eastern brook trout

High

The Eastern Brook Trout Joint Venture (EBTJV) is a cooperative effort between federal, state, and local organizations and entities to survey, protect, and restore eastern brook trout populations along the East Coast. NHFGD and MDIFW coordinate with EBTJV’s regional effort to assess, protect, and restore trout habitats and populations.

The Piscataqua Region has documented populations of native brook trout that appear to be associated with streams significantly fed by groundwater. Brook trout are sensitive indicators of water quality and watershed integrity, and generally disappear from watersheds with increasing impervious cover (even as low as 4%) and decreasing forest cover. Some existing brook trout populations persist in subwatersheds with relatively high impervious cover, which may be due to the close association of those streams being fed by groundwater. Roads and culverts fragment habitat and can warm stream temperatures beyond the tolerance of brook trout. Taking actions to protect brook trout meets numerous CCMP goals by protecting subwatershed areas with high water quality, low impervious cover, and intact natural landcover.

ACTIVITIES:

* Support and participate in the ongoing efforts of the EBTJV.1
* Identify current native trout populations with intensive field surveys.
* Collaborate with researchers on cold-water stream models and identify areas for protection.
* Prioritize low order cold headwater streams based on habitat quality.
* Work with other partners on stream buffer protection and restoration, correcting fish passage problems (culverts/dams), and stream habitat restoration on priority streams identified in the activity above.
* Educate towns on the locations of priority streams identified in activity #4 and work with communities in these priority watersheds to maintain low impervious thresholds, minimize roads, and protect aquifers and forested land cover.

MEASURING PROGRESS:

Outputs:

* Maps of current and potential EBT stream habitat
* Restoration plan for improving or sustaining EBT habitat
* Monitoring plan for long-term habitat evaluation

Outcomes:

Habitat protection for EBT

Greater public awareness of trout habitat threats and restoration opportunities

Intensive protection of high quality, sensitive subwatersheds

Improved database for species and habitat monitoring

Implementation Metrics:

Stream miles of Eastern brook trout habitat

Issues Addressed:

* Buffers
* Critical Species
* Fisheries
* Restoration
* Stream Connectivity

Leads:

* MDIFW
* NHFGD
* TU

Cooperators:

* CCA-NH
* EBTJV
* TU
* USFS
* USFWS

Funding:

* CCA-NH
* EBTJV
* TU
* USFS
* USFWS

Critical Guidance:

1Eastern Brook Trout Joint Venture. 2010. Eastern Brook Trout Joint Venture.

LR-7

Establish long term population database for migratory and resident shorebirds and salt marsh breeding bird species

High

Both Great Bay and Hampton-Seabrook estuaries are key components of the Atlantic Flyway for migratory birds, officially recognized by the National Audubon Society as Important Bird Areas, and provide essential habitat for migratory and resident bird species.

Salt marshes in these estuaries are used as critical resting and foraging stopover sites during annual latitudinal migrations by migratory shorebirds such as Semipalmated Plovers, Semipalmated Sandpipers, Black-bellied Plovers, Greater and Lesser Yellowlegs, Least Sandpipers, and Short-Billed Dowitchers. Salt marshes are also used as breeding sites for Saltmarsh Sparrows, Nelson’s Sparrows, Seaside Sparrows, Willets, and Common Terns. Saltmarsh Sparrows are listed in the Maine Wildlife Action Plan as a highest priority category species in “Greatest Conservation Need” and in the NH Wildlife Action Plan as a species of special concern. Willets are recognized as “species of high concern” by the North Atlantic Regional Shorebird Plan. NHA has been studying shorebird and salt marsh breeding bird populations and recently released a report describing the observed distribution and abundance of these birds in the Hampton-Seabrook Estuary. Continued monitoring is important to supplement these findings and track annual and long-term trends in population. These results will help support restoration efforts and track long-term successes and threats.

ACTIVITIES:

* Implement monitoring program based on the Program for International Shorebird Monitoring (PRISM) or similar shorebird monitoring program.1 Emphasize collaboration with multiple partners.
* Train volunteers to assist in monitoring and reporting.
* Support restoration of shorebird and salt marsh bird habitats in coordination with the Atlantic Coast Joint Venture.2 Emphasize collaboration with multiple partners.

MEASURING PROGRESS:

Outputs:

* Shorebird monitoring data
* Trained shorebird monitoring volunteers
* Outreach materials on monitoring for volunteers
* Restored shorebird and salt marsh bird habitats

Outcomes:

Development of long-term data on shorebird and salt marsh breeding bird populations

Improved understanding of coastal bird populations’ status and trends

Implementation Metrics:

None

Issues Addressed:

* Critical Species
* Shorebirds

Leads:

* MDIFW
* ME Audubon
* NH Audubon
* NHFGD

Cooperators:

* Land Owners
* Municipalities
* UME
* UNH-DNR

Funding:

* Atlantic Coast Joint Venture
* NH Coastal Program
* NHFGD/MDIFW – Wildlife Action Plan Grants
* USFWS – Survey Assessment & Monitoring Program

Critical Guidance:

1Clark & Niles. 2000. Northern Atlantic Regional Shorebird Plan.

2Atlantic Coast Joint Venture. 2009. Atlantic Coast Joint Venture Strategic Plan.

LR-8

Develop and implement a restoration program to restore Saltmarsh Sparrows to five currently unoccupied sites

High

Saltmarsh Sparrows (*Ammodramus caudacutus*) reside in salt marshes typical of pre-ditched conditions. This species is a national and global conservation priority and is listed in the Maine Wildlife Action Plan as a highest priority category species in “Greatest Conservation Need” and in the NH Wildlife Action Plan as a species of special concern. The birds tend to breed in grass dominated salt marshes greater than 20 hectares in size and are indicators of salt marsh health and integrity. Salt marsh restoration projects in suitable areas should increase Saltmarsh Sparrow populations.

ACTIVITIES:

* Obtain baseline data on Saltmarsh Sparrow distribution and abundance within the coastal watershed.1,2,3,4
* Evaluate qualities of nesting sites to be reestablished and prioritize restoration locations.5
* Restore tidal flow and improve tidal connectivity to priority sites for increasing potential Saltmarsh Sparrow habitat.
* Research the efficacy of salt marsh restoration and management techniques at selected nesting sites in the Hampton-Seabrook Marsh to enhance Saltmarsh Sparrow habitat.
* Protect marsh and contiguous upland in restoration areas.
* Compile spatial data on current and potential restoration locations to facilitate spatial planning efforts in the Region.
* Monitor populations of Saltmarsh Sparrow annually.

MEASURING PROGRESS:

Outputs:

* Report with maps of Saltmarsh Sparrow distribution, current, and potential habitat
* Restored tidal flows and improve tidal connectivity to priority marshes
* Restoration plan for Saltmarsh Sparrow
* Spatial data for estuarine planning
* Reports on efficacy of salt marsh restoration and management techniques

Outcomes:

Improved and protected habitat for Saltmarsh Sparrow

Increase in Saltmarsh Sparrow populations

Improved salt marsh ecological function

Implementation Metrics:

Population of Saltmarsh Sparrows in Hampton-Seabrook Harbor Estuary

Issues Addressed:

* Critical Species
* Land Protection
* Salt Marsh
* Shorebirds

Leads:

* MDIFW
* ME Audubon
* NH Audubon
* NHFGD

Cooperators:

* Conservation Commissions
* Land Protection Organizations
* NH Coastal Program
* NHDOT
* RCCD
* UNH-DNR
* USFWS

Funding:

* Atlantic Coast Joint Venture
* NH Coastal Program
* NHFGD/MDIFW – Wildlife Action Plan Grants
* NRCS
* USFWS – Survey Assessment & Monitoring Program

Critical Guidance:

1McKinley & Hunt. 2008. Avian Use of the Hampton-Seabrook Estuary: 2006-2007.

2Eberhardt & Burdick. 2009. Hampton-Seabrook Estuary Habitat Restoration Compendium.

3New Hampshire Fish & Game Department. 2015. New Hampshire Wildlife Action Plan.

4Frazer & Charry. 2006. Beginning with Habitat: Conserving Wildlife in Maine’s Coastal Habitat.

5Atlantic Coast Joint Venture. 2009. Atlantic Coast Joint Venture Strategic Plan.

LR-9

Assess, prioritize, and restore shoreland and riparian buffers

Highest

Adequate buffers along rivers, streams, and coastlines protect water quality, slow floodwaters, and provide and protect habitat for aquatic and riparian plants and animals. Multiple organizations participate in buffer evaluation and restoration processes. This action coordinates the buffer assessment and restoration process on a regional basis.

ACTIVITIES:

* Assemble existing data on riparian buffer conditions.
* Prepare a standardized buffer assessment methodology.
* Conduct a high-resolution detailed buffer analysis to identify the status of buffers and the best opportunities for restoration.
* Prepare watershed-specific prioritized buffer restoration plans and timelines.
* Restore, monitor, and maintain priority buffers identified in plans.

MEASURING PROGRESS:

Outputs:

* Standardized buffer assessment methodology
* Maps of current buffer conditions
* Watershed-specific prioritized buffer restoration plans
* Restored riparian areas

Outcomes:

Improved riparian habitat

Improved water quality

Implementation Metrics:

Stream miles of restored shoreline buffers

Issues Addressed:

* Buffers
* Habitat
* Water Quality

Leads:

* BwH
* MDEP
* NHDES
* PREP

Cooperators:

* Conservation Commissions
* Environmental Consultants
* Land Protection Organizations
* NHFGD
* NRCS
* RCCD
* SCCD
* TNC-NH
* UNH-CE
* Watershed Organizations
* YCSWC

Funding:

* MDEP
* NH Coastal Program
* NHDES – 319 Grants
* NOAA
* USEPA
* USFWS

Critical Guidance:

1Buffer Options for the Bay, New Hampshire. 2018.

LR-10

Promote the implementation of stream crossing inventories in all significant estuarine tributaries to identify, prioritize, and correct crossings that are aquatic species passage barriers or have significant negative impacts on the physical, chemical, or biological integrity of waterways

Highest

Stream crossings are structures (i.e., culverts, bridges, arches) that carry a road over a river, lake, wetland, or small stream. Undersized stream crossings can have deleterious effects on both natural habitats and human infrastructure, including increased erosion and bank destabilization, damaging road washouts, and decreased or prevented aquatic species passage. To proactively identify problem culverts for replacement before they can fail and cause damage, comprehensive inventory and standardized assessment efforts have been undertaken throughout the Piscataqua Region, including the New Hampshire Stream Crossing Assessment and the New Hampshire Tidal Crossing Assessment. The results of these inventories can help prioritize stream crossing restoration projects that will benefit stream habitat quality, stream connectivity/processes, and aquatic organism movement along stream corridors.

ACTIVITIES:

* Support existing state stream crossing steering team and methods to ensure continued consistent standards are used for all new assessments.1,2
* Identify restoration priorities for each watershed based on the inventory results.
* Promote the integration of culvert replacement priorities into town and state plans.
* Support stream crossing restoration projects throughout the Region.
* Assess the success of restoration efforts through follow up monitoring as needed.

MEASURING PROGRESS:

Outputs:

* Stream crossing inventories
* Restoration priority maps and reports
* Stream crossing restoration projects
* Evaluation of stream crossing restoration projects

Outcomes:

Greater connectivity for aquatic habitat

Improved passage for diadromous/resident fish

Reduced flooding and hydrologic alteration along stream corridors due to road crossings

Implementation Metrics:

Stream miles upstream of obstacles that are connected through dam removal or culvert repair

Issues Addressed:

* Flooding
* Habitat
* Stream Connectivity

Leads:

* NH Coastal Program
* NHDES
* NHFGD
* NHGS
* PREP
* TNC
* Watershed Organizations

Cooperators:

* MDEP
* MDIFW
* MDOT
* Municipalities
* NHDES
* NHDOT
* RCCD
* RPC
* SCCD
* SMRPC
* SNHPC
* SRPC
* USFWS
* YCSWCD

Funding:

* EBTJV
* FEMA (FEH assessments)
* ME Coastal Program
* MDOT
* NH Coastal Program
* NHDES – 319 Grants & In-Lieu Fee mitigation funds
* NHDOT
* NOAA
* PREP
* TU
* USFWS

Critical Guidance:

1New Hampshire Department of Transportation. 2019. Statewide Asset Data Exchange System (SADES): New Hampshire Stream Crossing Initiative.

2Steckler, Lucey, Burdick, Glode, & Flanagan. 2017. New Hampshire’s Tidal Crossing Assessment Protocol.

LR-11

Remove non-essential dams on streams and rivers in the Piscataqua Region Watershed, with a priority on dams located within the natural zone of tidal influence

Highest

There are numerous dams in the New Hampshire seacoast blocking most major and minor tributaries to the estuaries and ocean. When located in the tidal zone, these dams have eliminated a natural transition between saltwater and freshwater and have thereby almost completely eliminated important brackish marsh habitats. Additionally, many dams hinder or prevent upstream passage for some diadromous fish species. With the successful removal of the Winnicut Dam in Greenland and the Great Dam in Exeter, there is increased momentum for evaluating dam removal to reestablish hydrology and fish passage on tidal rivers. PREP supports dam removal especially for key dams within natural tidal influence. Outreach to landowners and concerned citizens as well as local decision makers is a high priority. This may be best accomplished by working with watershed associations, conservation commissions and other local opinion leaders. PREP will work with partners and cooperators to encourage local participation in all aspects of the dam removal process

ACTIVITIES:

* Use the evaluation conducted as part of LR-4 to identify the dams within the Piscataqua Region Watershed that would restore the greatest habitat area for diadromous fish passage (priority dams).1,2
* Support municipalities, watershed organizations, LAC’s, and agencies to conduct removal feasibility studies of priority dams.
* Work with partners on removal of dams or proper management and/or modification.

MEASURING PROGRESS:

Outputs:

* Prioritized list of dam removal sites
* Feasibility studies for removal of priority dams
* Outreach campaign to municipal staff and boards, policy makers, and the public to remove priority dams. Emphasize ecological and fiscal benefits of removal

Outcomes:

Better informed local decision makers and residents

Cooperative efforts on priority dam removal projects

Implementation Metrics:

Stream miles upstream of obstacles that are connected through dam removal

Issues Addressed:

* Critical species
* Dams
* Fisheries
* Stream Connectivity

Leads:

* MDIFW
* NH River Restoration Task Force
* NHDES – Dam Bureau
* NHFGD

Cooperators:

* American Rivers
* CCA-NH
* Conservation Commissions
* ME Rivers
* MDEP
* Municipalities
* NH Coastal Program
* NH Rivers Council
* NHDES
* PREP
* Shoreland Owners
* TNC
* TU
* Watershed Organizations

Funding:

* NHDES Aquatic Resource Mitigation Fund

Critical Guidance:

1Odell, Eberhardt, Burdick, & Ingraham. 2006. Great Bay Estuary Restoration Compendium.

2Eberhardt & Burdick. 2009. Hampton-Seabrook Estuary Habitat Restoration Compendium.

LR-13

Identify and protect undeveloped land adjacent to Piscataqua Region estuaries through purchase, easements, or regulation to allow shoreline and marsh migration in response to sea-level rise

Highest

As sea-levels rise from climate change, estuarine coastlines and salt marsh habitat will need to migrate landward. Land protection along these vulnerable shorelines will protect infrastructure, preserve high quality upland buffer areas, and allow coastal marshes to develop or persist in response to sea level rise.

ACTIVITIES:

* Create a plan to protect priority lands along estuaries and salt marshes that includes a GIS layer of priority lands, map, model ordinances, and recommendations for land owners and municipalities.
* Encourage land owners and municipalities to adopt recommendations from the plan.
* Support and implement land protection efforts on identified vulnerable lands.
* Compile spatial data on current and potential restoration locations to facilitate spatial planning efforts in the Region.
* Advocate for funding of state-funded conservation grant programs.

MEASURING PROGRESS:

Outputs:

* Plan, including a GIS layer and map, to protect priority lands from the impacts of sea-level rise
* Outreach campaign to land owners and municipalities on plan recommendations and the benefits of protecting lands along estuaries and salt marshes to minimize impacts of sea-level rise
* Protected lands vulnerable to sea-level rise (includes purchases, easements, or regulations)
* Spatial data for estuarine planning
* Advocacy campaign to policy makers on funding state-funded land conservation grant programs

Outcomes:

Natural shoreline buffers preserved around future estuarine shoreline

Protected natural areas to allow for marsh and other estuarine habitat migration in response to sea-level rise

Implementation Metrics:

Protected lands vulnerable to sea-level rise

Issues Addressed:

* Buffers
* Climate Change
* Flooding
* Land Protection

Leads:

* BwH
* Land Protection Organizations
* ME Natural Areas Program
* RPC
* SMRPC
* SNHPC
* SRPC

Cooperators:

* Conservation Commission
* GBNERR
* NHCAW
* PREP
* RCCD
* SCCD
* Shoreland Owners
* SPNHF
* TNC-NH
* UNH-CE
* USFWS
* WNERR
* YCSWCD

Funding:

* FEMA
* NOAA – Coastal Services Center
* PREP
* USFWS

LR-14

Identify and implement salt marsh restoration and enhancement projects

Highest

Salt marshes are among the most productive ecosystems in the world and provide many services, such as habitat, food web support, and buffering from storms and pollution. Most salt marshes in the Piscataqua Region Watershed have been degraded over time due to development and past management activities. Also, as the rate of sea level rise increases, salt marshes will experience impacts that will change marsh composition, cause erosion or force these marshes to migrate landward. Efforts to restore or enhance salt marshes in the Region will continue with a focus on reestablishing and improving tidal hydrology, researching effectiveness of salt marsh restoration and management approaches, supporting the implementation of living shorelines and marsh migration pathways, and monitoring the changes of our marshes in response to climate change.

ACTIVITIES:

* Articulate broad goals for desired extent of salt marsh habitat.
* Prioritize and implement salt marsh restoration and tidal crossing enhancement projects identified in the GBERC, HSERC, and evaluations from the NH Resilient Tidal Crossings project.1,2,3 Incorporate inundation and climate change forecasts and Saltmarsh sparrow (*Ammodramus caudacutus*) habitat needs in design of restoration projects.
* Support research and effectiveness monitoring into salt marsh restoration and management techniques (e.g. ditch remediation, ditch plug removal, runnels, thin layer deposition) that focus on improving salt marsh processes, functions, and values.
* Coordinate salt marsh monitoring, data collection, and assessments to better inform how marshes are changing.
* Engage with partners and communities to support marsh migration, rolling easements, buffer regulations, and wetland policies.
* Support the identification, monitoring, and eradication efforts for invasive plants in salt marshes.

MEASURING PROGRESS:

Outputs:

* Goals for desired extent of salt marsh habitat
* Salt marsh restoration plans, permits, and/or projects, including identification of migration pathways
* Reports on efficacy of salt marsh restoration and management techniques
* Land use policies that support marsh migration
* Invasive species management projects in salt marshes

Outcomes:

Increased acreage of salt marsh

Salt marshes with higher function and value

Implementation Metrics:

Restored salt marsh

Salt marsh extent and condition

Issues Addressed:

* Climate Change
* Invasive Species
* Salt Marsh
* Wetlands

Leads:

* GBNERR
* MDEP
* MDIFW
* ME Coastal Program
* NH Coastal Program
* NRCS
* PREP
* RCCD
* SCCD
* TNC
* UNH-JEL
* USFWS
* YCSWCD

Cooperators:

* Conservation Commissions
* MDOT
* ME Audubon
* NH Audubon
* NHDOT
* Spruce Creek Association
* Wells NERR

Funding:

* FEMA
* MDEP
* ME Coastal Program
* NH & ME Corporate Wetland Restoration Funds
* NH Coastal Program
* NOAA
* NRCS
* USFWS – North American Wetlands Conservation Act Grants

Critical Guidance:

1Eberhardt & Burdick. 2009. Hampton-Seabrook Estuary Habitat Restoration Compendium.

2Odell, Eberhardt, Burdick, & Ingraham. 2006. Great Bay Estuary Restoration Compendium.

3New Hampshire Department of Environmental Services. 2019. Resilient Tidal Crossings: An Assessment and Prioritization to Address New Hampshire’s Tidal Crossing Infrastructure for Coastal Resilience.

4New Hampshire Fish & Game Department. 2014. Sea Level Affecting Marshes Model (SLAMM) for New Hampshire.

LR-15

Support existing programs, initiatives, and partnerships to limit the introduction and control the spread of terrestrial and freshwater aquatic nuisance species in the Piscataqua Region Watershed

High

Several effective programs have been developed to control terrestrial and freshwater invasive species in Maine and New Hampshire, including volunteer lake monitoring and the Lake Host programs where volunteers check boats at landings and inform boaters about aquatic invasives.

ACTIVITIES:

* Support invasive species planning and management projects that coordinate activities of New Hampshire and Maine communities and Maine Natural Areas Program. Emphasize bi-state coordination.
* Support research on sustainable control methodologies for aquatic and terrestrial invasives.

MEASURING PROGRESS:

Outputs:

* Site-specific restoration plans
* Research reports on sustainable control methodologies for aquatic and terrestrial invasives

Outcomes:

Reduced invasive plant dominance in key natural areas

Implementation Metrics:

None

Issues Addressed:

* Habitat
* Invasive Species
* Wetlands

Leads:

* GBNERR
* MDEP
* MDIFW
* ME Natural Areas Program
* NH Coastal Program
* NHDES
* NHFGD

Cooperators:

* DNCR
* Land Protection Organizations
* Municipalities
* NH Department of Agriculture
* NHDOT
* NRCS
* RCCD
* SCCD
* Shoreland Owners
* TNC-NH
* UNH-CE
* USFS
* Watershed Organizations
* WNERR
* YCSWCD

Funding:

* MDEP
* NHDES
* NOAA
* NRCS
* TNC
* USFWS

LR-16

Support the development and implementation of marine aquatic nuisance species management plans for Piscataqua Region estuaries

High

Research that evaluates the susceptibility of estuaries to marine invasive species suggests that temperature and salinity are important factors in survivability. Development of a management plan will highlight the most effective measures to minimize impact on existing habitats and decrease the establishment of additional marine invasives in Piscataqua Region estuaries.

ACTIVITIES:

* Complete rapid assessment surveys for marine invasives in selected estuarine areas.
* Add marine invasives monitoring to PREP monitoring plan.
* Support researchers and agencies to develop marine invasive species management plans.
* Evaluate ballast water control regulations and hull monitoring for seagoing vessels.
* Support research on marine invasives in Piscataqua Region estuaries.

MEASURING PROGRESS:

Outputs:

* Rapid assessment surveys for marine invasive species
* Marine invasive species monitoring reports
* Marine invasive species management plan
* Evaluation report of ballast water control regulations and hull monitoring for seagoing vessels
* Marine invasive species research reports

Outcomes:

Early warning of spread of marine invasives

Reduced impact of marine invasives on estuarine habitats

Reduction in invasion vectors through improved management practices

Implementation Metrics:

Prevalence of marine aquatic nuisance species

Issues Addressed:

* Habitat
* Invasive Species

Leads:

* MDEP
* MDMR
* NHDES
* UNH-JEL

Cooperators:

* Boaters
* MMISWG
* PREP
* Shipping

Funding:

* NOAA
* USEPA

LR-17

Incorporate environmental standards with the rules that govern new tidal moorings, head of tide docks, and bridge abutments

High

Moorings can be detrimental to or destroy eelgrass beds. Head of tide docks, moorings, and bridge abutments can also impact benthic habitat if improperly built and can impact spawning reaches for some diadromous species.

Maine has developed head of tide dock guidelines that could be adopted in New Hampshire to limit habitat degradation in these critical areas. In Maine, the US Army Corps of Engineers (USACOE) has oversight of municipal mooring programs.

ACTIVITIES:

* Evaluate existing regulations on tidal moorings, docks, and bridge abutments for adequacy of benthic habitat protection. Include examination of Maine head of tide and tidal mooring guidelines and regulations. Develop recommendations for New Hampshire.
* Compile spatial data on current and potential tidal mooring, head of tide docks, and bridge abutment locations to facilitate spatial planning efforts in the Region.
* Advocate for incorporation of recommended head of tide and tidal mooring guidelines and regulations into Maine and New Hampshire state regulations.

MEASURING PROGRESS:

Outputs:

* Report on head of tide and tidal mooring guidelines and regulations that includes recommendations for New Hampshire
* Spatial data for estuarine planning
* Advocacy campaign to relevant agencies to adopt recommendations for head of tide and tidal mooring guidelines and regulations for New Hampshire and Maine

Outcomes:

Improved benthic habitat in tidal rivers

Implementation Metrics:

None

Issues Addressed:

* Benthic Habitat
* Critical Species
* Regulation

Leads:

* ME Coastal Program
* NH Coastal Program
* USACOE

Cooperators:

* Boaters
* Land Owners
* Marinas
* Marine Retailers
* MDOT
* Municipalities
* NHDOS
* NHDOT
* Pease Development Authority
* PREP

Funding:

* PREP
* State Agencies

LR-18

Work with retailers and marinas to offer incentives for “conservation moorings” that greatly reduce mooring impacts to eelgrass beds

High

Mooring blocks and mooring chains, when used in eelgrass and oyster beds, scour and degrade the beds and benthic habitat. They can also make these scoured areas susceptible to invasion by exotic species. Finally, these moorings increase turbidity especially in areas of multiple moorings.

Moorings are available that minimize impacts at mooring sites. Studies in mooring fields in Massachusetts demonstrate the effectiveness of these conservation moorings and has led the state to develop partnerships to address this issue.

ACTIVITIES:

* Identify mooring hardware that minimizes benthic impacts and are suitable for conservation moorings in the Region.
* Prioritize sites where conservation moorings could improve estuarine habitat.
* Encourage marine retailers to promote and stock conservation moorings.
* Create a financial incentive program for marinas and boat owners to use conservation moorings.
* Encourage marinas and boat owners to use conservation moorings.
* Consider including information in boating certificate training.
* Advocate including requirements for conservation mooring installation with mooring relicensing.
* Monitor sites where conservation moorings are used to determine efficacy of program.

MEASURING PROGRESS:

Outputs:

* List of mooring hardware that minimizes benthic impacts and is suitable for conservation moorings in the Region
* Maps indicating priority area sites for conservation moorings
* Outreach campaign to marine retailers on selling conservation moorings
* Conservation mooring incentive program
* Advocacy campaign to relevant state agencies to update mooring requirements to include conservation moorings
* Monitoring report on efficacy of conservation mooring program

Outcomes:

Reduced destruction of estuarine habitat at mooring sites

Implementation Metrics:

Number of conservation moorings in Piscataqua Region estuaries

Issues Addressed:

* Benthic Habitat
* Critical Species

Leads:

* DNCR
* MDEP
* NH Coastal Program
* PREP

Cooperators:

* Boaters
* Marinas
* Marine Retailers
* NHDOS
* Pease Development Authority

Funding:

* NOAA

LR-19

Inventory, map, and implement restoration of rare habitats and habitats for rare, threatened, or endangered species

High

Multiple regional and state-led efforts on wildlife and habitat protection and restoration have been conducted in the Piscataqua Region. Key species and habitats of concern have been identified which include rare or exemplary habitats and habitats for rare, threatened, or endangered species and species of concern as recognized by state or federal agencies.

These programs and reports include:

The Land Conservation Plan for New Hampshire’s Coastal Watersheds1

The Land Conservation Plan for Maine’s Piscataqua Region Watersheds2

Great Bay Restoration Compendium3

Hampton Seabrook Restoration Compendium4

Maine’s Comprehensive Wildlife Conservation Strategy (MECWCS)5

New Hampshire Wildlife Action Plan (NHWAP)6

Many of these evaluations relied on remote imagery and habitat suitability models to determine the presence of species important for protection and restoration. Additional efforts in local surveying and compilation of local knowledge of habitat and species distribution will greatly assist in prioritizing restoration projects.

ACTIVITIES:

* Support local field-based surveys and mapping of species and habitats of concern to improve effectiveness of conservation efforts.
* Prioritize habitat restoration implementation using best available data and opportunities.1,2,3,4,5,6
* Compile spatial data on current and potential restoration locations to facilitate spatial planning efforts in the Region.
* Support implementation of restoration projects at the local and regional level.
* Support protection of high quality and restored habitats.

MEASURING PROGRESS:

Outputs:

* Field-verified maps of rare habitat/species occurrences
* List of prioritized habitat restoration projects
* Spatial data for estuarine planning
* Restoration projects

Outcomes:

Restoration and permanent protection of key habitats

Better coordination of restoration efforts

Implementation Metrics:

None

Issues Addressed:

* Critical Species
* Habitat

Leads:

* TNC-NH

Cooperators:

* Land Owners
* Land Protection Organizations
* MDIFW
* ME Natural Areas Program
* Municipalities
* NH Natural Heritage Bureau
* NHDES
* NHFGD
* NRCS
* PREP
* RCCD
* SCCD
* USFWS
* YCWCD

Funding:

* Land Owners
* Municipalities
* NOAA
* NRCS
* USFWS

Critical Guidance:

1Zankel, Copeland, Ingraham, Robinson, Sinnott, Sundquist, Walker, & Alford. 2006. The Land Conservation Plan for New Hampshire’s Coastal Watershed.

2Walker, Smith, Schumacher, Czapiga, Sowers, Oman-Saltmarsh & Dest. 2010. The Land Conservation Plan for Maine’s Piscataqua Region Watersheds.

3Odell, Eberhardt, Burdick, & Ingraham. 2006. Great Bay Estuary Restoration Compendium.

4Eberhardt & Burdick. 2009. Hampton-Seabrook Estuary Habitat Restoration Compendium.

5Maine Department of Inland Fisheries & Wildlife. 2005. Maine’s Comprehensive Wildlife Conservation Strategy.

6New Hampshire Fish & Game Department. 2015. New Hampshire Wildlife Action Plan.

LR-21

Streamline historical/cultural and wetland permit requirements for aquatic habitat restoration projects

High

Restoration projects must be carefully planned and implemented to avoid negative impacts on cultural resources and the environment. However, restoration of degraded habitats is a top priority for sustaining/increasing ecosystem services and should be easier to receive permits to conduct than development proposals. Bureaucracy, expensive cultural documentation/mitigation requirements, and stringent review processes can greatly hinder the pace and increase the cost of implementing restoration work. Streamlined processes are needed to support aggressive, yet responsible, restoration actions. The purpose of this action is to identify time/cost bottlenecks in regulatory permitting processes associated with restoration activities and to streamline them to the extent possible. This action was identified as a need in New Hampshire, but opportunities for improvements may also exist in Maine.

ACTIVITIES:

* Secure agency leadership support and approval of streamlining efforts.
* Convene interagency task force to study permitting process (policies, regulations, and procedures) related to habitat restoration and develop recommendations for streamlining the process.
* Advocate for adoption of streamlining recommendations from task force by relevant agencies.
* Evaluate streamlined permitting procedures and adjust as needed.

MEASURING PROGRESS:

Outputs:

* Interagency task force to streamline historical/cultural and wetland permitting process
* Streamlining recommendations from task force
* Advocacy campaign to relevant permitting agencies to adopt streamlining recommendations from task force

Outcomes:

Reduced time/cost for restoration permitting processes

Implementation Metrics:

None

Issues Addressed:

* Critical Species
* Habitat
* Wetlands

Leads:

* NH Division of Historic Resources
* NHDES – Wetlands Bureau

Cooperators:

* USACE

Funding:

* NHDES
* USEPA