CHAPTER 7: PARTNERS IN NORTHEAST CONSERVATION

SWAP Element 7

Descriptions of the plans for coordinating, to the extent feasible, the development, implementation, review, and revision of the Plan-Strategy with Federal, State, and local agencies and Indian tribes that manage significant land and water areas within the State or administer programs that significantly affect the conservation of identified species and habitats.

Suggested Components:

A. *The State describes the extent of its coordination with and efforts to involve Federal, State, local agencies, and Indian Tribes in the development of its Strategy.*
B. *The State describes its continued coordination with these agencies and tribes in the implementation, review, and revision of its Strategy.*

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HOW TO USE THIS CHAPTER:

Chapter 7 of this Regional Conservation Synthesis provides a summary of available information on collaborating with partners in the development, revision, and implementation of State Wildlife Action Plans (SWAPs).

- The Regional Overview (Section 7.0) describes the purpose and need for collaborative partnerships in fish and wildlife conservation.
- Section 7.1 discusses established regional partnerships and programs in the Northeast, organized by major watershed.
- Section 7.2 describes federal agency partners engaged in fish, wildlife, and habitat conservation, organized by how they can contribute to SWAP development and implementation.
- Section 7.3 provides information and resources for engaging Tribal partners.
- Section 7.4 discusses botanical partners and resources.
- Section 7.5 addresses inter-regional collaboration opportunities among the AFWA regions and summarizes shared RSGCN, Proposed RSGCN, and Watchlist [Deferral to an adjacent region] species.
- Section 7.6 highlights academic partners and programs in the region that can enhance state agency capacity to fill research, inventory, and monitoring needs identified in SWAPs.
- Section 7.7 describes opportunities to collaborate with sister state agencies, non-governmental organizations, and land trusts in fish and wildlife and habitat conservation.

7.0 INTRODUCTION

The Association of Fish and Wildlife Agencies (AFWA) recognizes the value of partnership contributions and opportunities in state wildlife action planning. The AFWA Best Practices recommend that state fish and wildlife agencies collaborate with other agencies and non-governmental organizations (NGOs) in long-term, multi-state efforts to assess species populations, habitats, and the effectiveness of conservation actions (AFWA 2012). The Northeast region has a rich and well-established history of partner collaboration to advance fish and wildlife conservation, as described in *Chapter 1* for species or taxonomic group focused efforts, *Chapter 2* for those that are habitat-based, and *Chapter 5* for research, inventory, and monitoring partnerships. This Chapter focuses on landscape-scale partnerships that include multiple taxonomic groups and/or habitat types.

The AFWA Blue Ribbon Panel Relevancy Working Group reaffirmed the importance of partners in conservation in 2018 (AFWA 2018). The Blue Ribbon Panel found that state fish and wildlife agencies "need to acknowledge [that] NGOs [non-governmental organizations] and partners are [a] legitimate part of [the] conservation institution and have important and significant contributions to conservation" and that agencies "need to find common ground with NGOs and partners and leverage their resources but recognize their constraints" (2018, p. 2).

In 2021, AFWA Resolution 2021-05-07 recommended that states ensure State Wildlife Action Plans (SWAPs) are developed and implemented collaboratively and in partnership with a diverse set of partners. AFWA adopted the recommendations of the SWAP and Landscape Conservation Work Group, as described in **Leading At-Risk Fish and Wildlife Conservation: A framework to enhance landscape-scale and cross-boundary conservation through coordinated State Wildlife Action Plans**, which call for engaging partners (AFWA 2021).

Conservationists in the Northeast can be proud of a long history of cooperative, collaborative conservation efforts. Even as threats to wildlife and habitat seem to grow, state fish and wildlife agencies have banded together to address pressing regional conservation problems. With increasing demands on scarce federal and state funds, these types of coordinated activities appear to have an especially bright future. Collaboration provides states with opportunities to share funds, staff and staff time, equipment and technical expertise, and other limited resources. Through collaborative efforts with adjoining states, each of the individual Northeast states can help address shared conservation concerns and tackle larger-scale regional priorities that would be difficult for each state to address alone. The Northeast Association of Fish and Wildlife

Agencies (NEAFWA) and its partners provide a firm foundation for regional collaboration, and these continued efforts will help to ensure that the Northeast states continue to teem with fish and wildlife for generations to come.

Some organizations and agencies in the Northeast states have identified "keystone" or "focal" species that can serve as "umbrella taxa" for cross-jurisdictional partnerships. Moving forward, these organizations will be focusing their conservation investments on projects and partnerships that benefit these species. Funding organizations that have adopted this approach include the National Fish and Wildlife Foundation (NFWF) and the U.S. Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS). The **United States Fish and Wildlife Service (USFWS), Wildlife and Sport Fish Restoration (WSFR) Program** administers the State Wildlife Grants (SWG) and Competitive State Wildlife Grants (CSWG) Programs, among others[1]. These grant programs support the development and implementation of State and Tribal Wildlife Action Plans and foster cross-jurisdictional partnerships.

By including information about the cooperative conservation ventures described in this Regional Conservation Synthesis in their SWAPs, individual states can provide a more robust picture of the full range of conservation planning activities focused on Northeast wildlife species and their habitats. Collaborative conservation planning efforts demonstrate partnerships that are broader than just the coalition of partners assembled in each state. Collaboration can also mean additional leverage and funding from competitive grants programs, such as the Regional Conservation Needs (RCN) Grants Program, and private funders such as the Doris Duke Charitable Foundation, and the National Fish and Wildlife Foundation.

The programs and funding sources described in the following sections can serve as mechanisms or sources of support for regional collaboration among state fish and wildlife agencies. Additional information on partners will be available through the online suite of resources and tools for this Regional Conservation Synthesis on the Northeast Fish and Wildlife Diversity Technical Committee (NEFWDTC) website (https://northeastwildlifediversity.org).

7.1 REGIONAL LANDSCAPE AND SEASCAPE PARTNERSHIPS

Numerous landscape- and seascape-level partnerships exist in the Northeast region, each of which can enhance the capacity of state fish and wildlife agencies to address all eight required elements of SWAPs. These partnerships are organized by major watershed.

7.1.1 GREAT LAKES

Chapter 2 (*Section 2.14*) describes the Great Lakes habitats in the Northeast region, which includes three lakes: Lake Champlain, Lake Ontario, and Lake Erie. The Great Lakes support at least 36 Northeast RSGCN and Watchlist species, not including those in connected habitats along the lakeshore, its beaches, wetlands, and tributaries. More than a dozen landscape scale plans, agreements, and collaborative partnerships are addressing the conservation needs of the Great Lakes in the NEAFWA region.

GREAT LAKES WATER QUALITY AGREEMENT

The **Great Lakes Water Quality Agreement** is a joint agreement between the U.S. and Canada to protect and restore the waters of the Great Lakes initially signed in 1972 and updated in 2012 (US and Canada 2012). In the US, the Environmental Protection Agency (EPA) coordinates activities under the agreement.

THE GREAT LAKES RESTORATION INITIATIVE

The **Great Lakes Restoration Initiative** (GLRI) is an interagency partnership established by Executive Order in 2004 administrated by the Environmental Protection Agency (EPA) with a mission to protect and restore the freshwater system of the Great Lakes[2]. Nine federal agencies serve on the GLRI Regional Working Group. The partnership collaborates with states, tribes, local communities, regional bodies, and other partners in the Great Lakes region to implement shared management goals and objectives. Since 2004, the Initiative has leveraged more than $3.3 billion for over 6850 projects. Competitive grants are available for conservation projects throughout the Great Lakes watersheds and are not limited to the Great Lakes waterbodies themselves.

The Great Lakes Restoration Initiative updates an Action Plans every five years that includes terrestrial shoreline habitat as well as aquatic habitats (GLRI 2019). The **Great Lakes Restoration Initiative Action Plan III** for fiscal years 2020-2024 includes a long-term goal of protecting and restoring habitat to sustain healthy ecosystem functions and native species (GLRI 2019). Conservation measures the Action Plan uses for tracking progress include the acres of habitat restored, protected or enhanced and the number of species benefiting from implemented projects. The return of breeding Piping Plovers to beaches in Pennsylvania and New York is considered a success story towards this goal. Northeast RSGCN and Watchlist species identified as potential target species for conservation activities include Piping Plover (*Charadrius melodus*), Mitchell's Satyr (*Neonympha mitchellii mitchellii*), Moose (*Alces alces*) and Rusty-patched Bumble Bee (*Bombus affinis*).

The Great Lakes Restoration Initiative has five focus areas in its 2020-2024 GLRI Action Plan (GLRI 2019):

- Toxic substances and areas of concern
- Invasive species
- Nonpoint source pollution impacts on nearshore health
- Habitats and species
- Foundations for future restoration actions

Each focus area has targets and objectives which are monitored as performance measures, many of which address the effectiveness of management actions. Monitored targets and objectives as part of this program are described in *Chapter 5* (Section 5.2). Conservation targets for 2024 include the protection, restoration, or enhancement of 442,000 acres of coastal wetland, nearshore, and other habitats; restoration of 6540 miles of aquatic connectivity in the watershed; and conservation benefits for eight federally-listed species.

The GLRI provides annual results on these monitored measures of conservation progress[3]. Through Fiscal Year 2021, cumulatively project partners have:

- protected, restored, or enhanced more than 479,000 acres of habitat, including 65,000+ acres of coastal wetlands,
- improved aquatic connectivity on more than 6700 river miles,
- protected or restored 43.6 miles of Great Lakes shoreline or riparian corridors,
- conducted invasive species control activities on more than 216,000 acres,
- provided technical and financial assistance for nutrient management on over 1.8 million acres of Great Lakes watersheds,
- reduced more than 2 million pounds of phosphorous loads in priority watersheds,
- captured more than 413 million gallons of untreated urban runoff annually,
- salvaged 53 Piping Plover eggs from historically high flooding in 2020, successfully incubating and hatching 85% of the eggs and releasing 39 captively reared chicks,
- conducted education and stewardship projects with more than 627,000 youth

GREAT LAKES COMMISSION

The **Great Lakes Commission**, established in 1955 by the **Great Lakes Basin Compact**, is a partnership among the eight states of the Great Lakes and St. Lawrence Seaway watershed, with the Canadian Provinces of Quebec and Ontario serving as associate members[4]. The mission of the Great Lakes Commission is to balance the use, development, and conservation of the Great Lakes' water resources by addressing issues

of common concern, developing shared solutions, and collectively advancing the environmental health and economic prosperity of the region.

The Commission partners with the United States Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS) in its **Great Lakes Sediment and Nutrient Reduction Program**, established more than 30 years ago[5]. The program offers grants to reduce runoff and improve water quality in the Great Lakes watershed. In 2019 an annual **Great Lakes Aquatic Invasive Species Blitz** was established to educate boaters on how to prevent the spread of aquatic invasive species[6]. The Commission has a Memorandum of Understanding with the United States Geological Survey (USGS) to collaborate on scientific priorities for research and to facilitate incorporation of scientific information into decision-making by Commission partners. The **Great Lakes Harmful Algal Blooms Collaborative** is coordinated by the Commission, with support from the USGS, to address the threats and information needs of harmful algal blooms in the Great Lakes[7]. The **Great Lakes Phragmites Collaborative** develops and shares resources to identify, map, monitor, and adaptively manage for the non-native forms of *Phragmites* in the basin[8]. The **Invasive Mussel Collaborative** monitors, conducts research, manages, and controls invasive freshwater mussels throughout the Great Lakes system[9].

The **Great Lakes Stormwater Collective** is a network of and for water management professionals in the basin, both in Canada and the US, to develop and adopt innovative best management practices (BMPs) for stormwater management. Other activities of the Great Lakes Commission and its partners include habitat restoration projects, protection of drinking water supplies, advocacy of federal lawmakers for investment in the Great Lakes system (including in the Great Lakes Restoration Initiative), and strategic planning to support the economic development, infrastructure, and resiliency of the Great Lakes basin. A library of resources and spatial datasets are available on the Commission's website[4].

The Commission's **Blue Accounting** framework and interactive map tracks regional progress on meeting the shared goals of the Great Lakes Water Quality Agreement[10]. The **Great Lakes Regional Water Use Database** maintains an inventory of water withdrawals, diversions, and consumptive uses in the basin[11], implementing portions of the **Great Lakes – St. Lawrence River Basin Water Resources Compact** and **Great Lakes – St. Lawrence River Basin Sustainable Water Resources Agreement**.

GREAT LAKES - ST. LAWRENCE RIVER BASIN WATER RESOURCES COUNCIL

The **Great Lakes – St. Lawrence River Basin Water Resources Council**, also known as the **Great Lakes Compact Council**, promotes the efficient use and

conservation of the waters of the Great Lakes and St. Lawrence River basin[12]. The Council consists of the Governors (or their representatives) of the eight Great Lakes states. Established in 2008, the Council is governed by the **Great Lakes – St. Lawrence River Basin Water Resources Compact**, which is enacted as both state and federal law. The Compact outlines how the states will collaborate to manage and protect the basin and provides a framework for each state to enact laws and programs for its protection.

The Council monitors water withdrawals from the Great Lakes, which in general have a ban on new water diversions with limited exceptions. Regional goals and objectives are developed and/or reviewed by the Council for water conservation and efficiency every five years. State water conservation and efficiency programs may be voluntary or mandatory. The Council identifies science and research strategies every each of the subsequent three years. In 2020 the science focus was estimating consumptive use, which contributes to the Great Lakes Regional Water Use Database mentioned in the previous section[13]. In 2021 water quantity and improving measurement and estimation of water budget components was the science focus. In 2022 water conservation and water use efficiency were the focus topic. Every five years the Council conducts a comprehensive cumulative impact assessment of water withdrawals, diversions, and consumptive uses.

GREAT LAKES INDIAN FISH AND WILDLIFE COMMISSION

The **Great Lakes Indian Fish and Wildlife Commission** was formed in 1984 and provides natural resource management expertise, legal and policy analysis, conservation enforcement, and public information services throughout treaty ceded territories[14]. Although focused on the western Great Lakes outside of the Northeast region, the Traditional Ecological Knowledge and expertise of the Commission is relevant to the Northeast because the Great Lakes are connected and face shared threats. The Great Lakes Indian Fish and Wildlife Commission has multiple focus areas relevant to SWAPs:

- Climate change
- Forest pests
- Great Lakes fisheries
- Inland fisheries
- Mercury levels in inland lakes
- Environmental contaminants in the Great Lakes
- Invasive species
- Mining
- Wildlife
- Wild plants, particularly wild rice
- Conservation law enforcement

The Commission issues off-reservation harvest permits for its eleven member Ojibwe Tribes. Environmental education materials and technical reports are available, including materials on monitored threats to fish and wildlife resources, invasive species control, cumulative impacts assessments of proposed pipeline construction projects, and application of climate change adaptation frameworks to Tribal lands. The Great Lakes Indian Fish and Wildlife Commission participates in the Great Lakes Restoration Initiative, which established a Distinct Tribal Programming initiative to fund Tribal projects that are consistent with the goals and objectives of the Great Lakes Restoration Initiative.

GREAT LAKES FISHERY COMMISSION

The **Great Lakes Fishery Commission** monitors fish populations and habitat within the Great Lakes, including State of the Lake Reports every five years[15]. Fish species managed by the Great Lakes Fishery Commission include Walleye (*Sander vitreus*), Yellow Perch (*Perca flavescens*), White Bass (*Morone chrysops*), Lake Whitefish (*Coregonus clupeaformis*), Black Bass (*Micropterus dolomieu* and *M. salmoides*), Muskellunge (*Esox masquinongy*), and steelhead Rainbow Trout (O*ncorhynchus mykiss*). Lake Trout (*Salvelinus namaycush*), Lake Sturgeon (*Acipenser fulvescens*), Cisco (*Coregonus artedi*) and Sauger (*Sander canadensis*) are species undergoing restoration or preservation programs with the Commission. Lake Sturgeon is a Northeast RSGCN and Lake Whitefish, the native population of Lake Trout, and Sauger are Northeast Watchlist [Assessment Priority] species, as is the diadromous population of Sea Lamprey. Several prey fish are also monitored to understand predator-prey relationships. Control of invasive Sea Lamprey (*Petromyzon marinus*) is another strategic focus of the Commission. Abiotic factors monitored by the Commission include trends in productivity and status of critical fish habitat, plus several water quality parameters.

The Great Lakes Fishery Commission produces State of the Lake reports every five years that summarizes recent trends in fish populations and progress toward reaching fish community objectives within each of the lakes. The Commission has individual lake committees to develop recommended actions and coordinate management among partners geographically. Databases are maintained and publicly available for Great Lakes fish stocking, Lake Sturgeon tag identification, lampricide research, and historical commercial fish catch or production.

EPA GREAT LAKES NATIONAL PROGRAM OFFICE

The Environmental Protection Agency (EPA) **Great Lakes National Program Office** coordinates the binational Great Lakes Water Quality Agreement and the Great Lakes Restoration Initiative[16]. As part of these efforts, the EPA coordinates **Lakewide Action and Management Plans** for each of the Great Lakes and their watersheds[17].

The EPA monitors water quality and ecological conditions in the freshwater of the Great Lakes as part of the **National Coastal Condition Assessment (NCCA)**[18]. The NCCA is conducted every five years and uses standardized sampling procedures and quality assurance protocols to assess coastal conditions at the regional and national scale. Other conservation activities of the EPA in the Great Lakes include remediation of contaminated sediments, pollution prevention and reduction, and community assistance for localized Remedial Action Plans.

GREAT LAKES SEA GRANT NETWORK

The National Oceanic and Atmospheric Administration (NOAA) operates a national system of Sea Grant Programs in coastal and Great Lake states. The **Great Lakes Sea Grant Network** conducts research, education, and outreach on behalf of the Great Lakes system with eight programs based across a dozen universities in the basin, including in Lake Champlain[19]. The Network has more than 130 Sea Grant Extension Agents across the region that provide technical and financial assistance to partners. The Great Lakes Sea Grant Network currently has five regional initiatives:

- Center for Great Lakes Literacy: collaborative effort to support environmental education and promote Great Lakes literacy among educators, scientists, and the public[20].
- Great Lakes Aquaculture Collaborative: federally-funded project (2019-2023) to support environmentally responsible, competitive, and sustainable aquaculture in the Great Lakes with science-based recommendations[21].
- Hazardous Material Transport Outreach Network: collaborative effort to improve public safety, the region's economy, and environmental stewardship of water resources related to the transport of crude oil and other hazardous materials[22].
- Cooperative Science and Monitoring Initiative: coordinated effort between the EPA and Environment and Climate Change Canada federal agencies to fill data gap priorities identified in Lakewide Action and Management Plans under the Great Lakes Water Quality Agreement, rotating field years among the five Great Lakes[23].
- Great Lakes Water Levels Resources: collated resources across partners and programs about water levels and their fluctuations in the Great Lakes to inform outreach activities[24].

NOAA GREAT LAKES ENVIRONMENTAL RESEARCH LABORATORY

The **NOAA Great Lakes Environmental Research Laboratory** and its partners conduct innovative research on the Great Lakes' dynamic environments and ecosystems to inform resource use and management decisions[25]. The Laboratory operates three research programs. The Ecosystem Dynamics program focuses on ecological data collection and experimental research on ecosystem processes. The Integrated Physical

and Ecological Modeling and Forecasting program conducts research to predict the effects of changes in the Great Lakes system. The Observing Systems and Advanced Technology program develops and operates technologies for scientific observations in the basin. Ecosystem focused projects include a benthic organism surveys and monitoring, aquatic invasive species, harmful algal blooms, and spatial and temporal variability in the food web. Data and products generated by the research programs of the Great Lakes Environmental Research Laboratory are available on the program's website[26].

The Great Lakes Environmental Research Laboratory and NOAA maintain the **Great Lakes Aquatic Nonindigenous Species Information System (GLANSIS)**, a one-stop shop for information about aquatic nonindigenous species in the region[27]. GLANSIS provides tools to generate custom lists of species for a geographic area of interest, explore species distributions and data through a map tool, and access risk assessment literature, methods and project results from partners. The system integrates spatial datasets from collaborators, allowing exploration of habitat relationships and creation of custom maps. Partners supporting GLANSIS include the Great Lakes Sea Grant Network, GLRI, USGS, and others.

GREAT LAKES ACOUSTIC TELEMETRY OBSERVATION SYSTEM (GLATOS)

The **Great Lakes Acoustic Telemetry Observation System (GLATOS)** is a network of Canadian and American researchers collaboratively using acoustic telemetry to research and monitor fish behavior in the Great Lakes. Monitoring stations have been installed throughout Lake Champlain, Lake Ontario and Lake Erie within the NEAFWA region. Fishery project leaders have shared and maintained a basin-wide database of tag detections since 2010. GLATOS is administered by the Great Lakes Fishery Commission, USGS, Michigan State University and the Great Lakes Observing System as a node within the global Ocean Tracking Network. A searchable list of research projects, maps, data and publications is available on the GLATOS website[28].

INVASIVE CARP REGIONAL COORDINATING COMMITTEE

The **Invasive Carp Regional Coordinating Committee** is a binational partnership to prevent invasive Asian carp from becoming established in the Great Lakes and beyond[29]. Committee partners represent more than 40 federal, state, tribal, provincial, and local organizations. A national **Management and Control Plan for Bighead, Black, Grass, and Silver Carp** was published in 2007 and provides a strategic framework for the Committee (Conover et al. 2007). The Committee coordinates early detection, monitoring, and assessment efforts among partners in both the US and Canada. Binational ecological risk assessments were conducted for Bighead and Silver Carp (*Hypophthalmichthys nobilis* and *H. molitrix*, respectively) in 2012 and Grass

Carp (*Ctenopharyngodon idella*) in 2017 (Cudmore et al. 2012, 2017). An ecological risk assessment for Black Carp (*Mylopharyngodon piceus*) is under development.

The Invasive Carp Regional Coordinating Committee partners identify and close potential pathways that could allow invasive carp to be introduced or spread, through primary and secondary routes as well as through law enforcement of illegal activities related to commercial fishing, aquaculture, bait, pet, aquarium, live fish market, and transportation industries. Partners are investigating acoustic deterrents, elevated levels of carbon dioxide, and other new technologies to strengthen existing barrier systems and develop new ones. Contracted commercial fishing of invasive carp reduces carp abundance and thus migration pressure towards barriers. Other research efforts involve improving harvest techniques and gear to increase targeted harvest of the invasive fish.

LAKE CHAMPLAIN BASIN PROGRAM

The **Lake Champlain Basin Program** is a collaboration of government agencies in Vermont, New York, and Quebec, plus non-governmental organizations, local communities, and individuals[30]. The mission of this partnership is to coordinate and fund actions that benefit the Lake Champlain basin's water quality, fisheries, wildlife, wetlands, recreation, and cultural resources. The Program's comprehensive management plan updated in 2022 guides these efforts with four goals: (1) clean water, (2) healthy ecosystems, (3) thriving communities, and (4) an informed and involved public (Lake Champlain Basin Program 2022).

Since 1992, the Program has funded more than 1600 research, demonstration, and conservation projects throughout the basin, awarding more than $20 million to implement the management plan. Funding for the Lake Champlain Basin Program historically has been appropriated through the EPA but in recent years has also received funding through the Great Lakes Fishery Commission and National Park Service (the Champlain Valley National Heritage Partnership). Recent projects undertaken as part of the Lake Champlain Basin Program include:

- Removal of aquatic invasive species
- Spiny Softshell Turtle (*Apalone spinifera*) conservation (a Northeast Watchlist [Assessment Priority] species)
- Culvert replacements
- Mapping fish distribution
- Monitoring fish communities
- Dam removals
- Stormwater management with BMPs
- Reducing road salt
- Reducing phosphorous nutrient loads

- Environmental education

The Bipartisan Infrastructure Law of 2021 includes $40 million spread over five years (2022-2027) to support the Lake Champlain Basin Program, allowing the partnership to prioritize projects that address ecosystem and wetland restoration, nature-based infrastructure, stormwater treatment and control, community resilience, resilient shorelines, and environmental education.

WATERKEEPERS

The Waterkeeper Alliance is a global effort to preserve and protect water quality, with local Riverkeepers and Lakekeepers in communities worldwide[31]. Four Waterkeeper organizations are active in the Great Lakes system in the Northeast region. In the Great Lakes basin, the **Buffalo Niagara Waterkeeper** focuses on conservation of the Niagara River watershed, which connects Lakes Erie and Ontario, with five initiatives: protecting headwaters, revitalizing waterways, living shorelines, education and engagement, and restoration of Scajaquada Creek[32]. The **Upper St. Lawrence Riverkeeper**, through Save The River organization, has a mission to protect and preserve the ecological integrity of the Upper St. Lawrence River[33].

The **Lake Erie Waterkeeper** works to protect the water quality of Lake Erie to support drinkable water, fishing, and recreation[34]. The **Lake Champlain Lakekeeper**, hosted by the Conservation Law Foundation, is dedicated to protecting and restoring the natural resources of the Lake Champlain system[35]. Each of these organizations are community-based with extensive environmental education and public engagement programs. They also actively monitor their waterbodies for illegal pollution, and to monitor ecological health, serving as stewards for their geographic areas.

7.1.2 CONNECTICUT RIVER WATERSHED

Partners throughout the Northeast work to protect and conserve the region's big rivers, with one landscape level effort focused on the Connecticut River watershed in New England. The Connecticut River watershed is 11,250 square miles in size across four states – New Hampshire, Vermont, Massachusetts, and Connecticut, draining into Long Island Sound. A small portion of the Canadian Province of Quebec is also within the headwaters of the river basin. The **Ramsar Convention** identifies wetland and estuarine sites of global significance, and the Connecticut River Estuary and Tidal Wetlands Complex is one of four such sites designated in the Northeast region[36]. Multiple partnerships are collaborating on the landscape scale conservation of this large watershed in the Northeast.

CONNECT THE CONNECTICUT

Connect the Connecticut is a collaborative effort to develop and implement a landscape conservation design for the Connecticut River watershed, identifying priority places to establish and maintain a network of lands and waters for species migration, habitat restoration and conservation, and development[37]. A gallery of science products developed by more than 30 partners is available to inform conservation planning, prioritize a network of core areas, anticipate future changes related to land use and climate, and restoring and enhancing terrestrial and aquatic connectivity. High quality habitat was identified for 15 species of fish and wildlife, including Northeast RSGCN and Watchlist species Moose (*Alces alces*), American Woodcock (*Scolopax minor*), Blackpoll Warbler (*Setophaga striata*), Eastern Meadowlark (*Sturnella magna*), Prairie Warbler (*Setophaga discolor*), Ruffed Grouse (*Bonasa umbellus*), Wood Thrush (*Hylocichla mustelina*), Brook Trout (*Salvelinus fontinalis*), and Wood Turtle (*Glyptemys insculpta*). Partners contributing to the Connect the Connecticut conservation design and associated tools include the four primary watershed states (CT, MA, NH, VT), USFWS, Designing Sustainable Landscapes project at the University of Massachusetts Amherst, EPA, USGS, and several non-governmental organizations.

CONNECTICUT RIVER CONSERVANCY

Formerly known as the Connecticut River Watershed Council (pre-2017), the **Connecticut River Conservancy**[38] has addressed water pollution threats in the watershed through watershed planning efforts since 1952. The mission of the conservation organization is to advocate for and protect the Connecticut River watershed from its headwaters to the sea. The organization currently has six focus areas:

- Reconnecting habitat for fish
- Preventing sewage discharges into streams and rivers
- Preparing for floods through environmental education
- Planting trees for healthy riverbanks
- Cleaner and greener hydropower
- Review of pollution and development proposals and permits that could degrade the watershed

The Connecticut River Conservancy offers volunteer activities and programs to engage the public in monitoring fish populations, invasive species control, water quality monitoring, river clean-ups, and riparian restoration projects. The organization also provides a library of environmental education and outreach materials[39].

SILVIO O. CONTE NATIONAL FISH AND WILDLIFE REFUGE

The **Silvio O. Conte National Fish and Wildlife Refuge** was established in 1997 to protect, conserve, and enhance the biodiversity and ecosystems of the Connecticut River watershed[40]. The refuge currently includes nearly 40,000 acres across 22 disjunct locations (managed through ten divisions and 12 units) in New Hampshire, Vermont, Massachusetts, and Connecticut. This watershed scale refuge system conserves multiple Northeast RSGCN and Watchlist species and their key habitats, from headwater creeks to floodplains to tidal wetlands. Each division of the system offers varying degrees of public access for hunting, fishing, hiking, wildlife observation, photography, environmental education, and interpretation.

The Nulhegan Basin Division is in remote Vermont near the Canadian border, protecting more than 26,600 acres of forest, wetlands, streams, rivers, and riparian habitats. The Pondicherry Division in New Hampshire includes 6405 acres of ponds, wetlands, forests, and riparian communities, which has been recognized as a National Natural Landmark. The Fannie Stebbins Unit (362 acres) that protects a portion of the Connecticut River floodplain in Massachusetts has also been designated a National Natural Landmark. The 293-acre Fort River Division protects the longest free-flowing tributary to the Connecticut River in Massachusetts. The Whalebone Cove Division consists of 160 acres at the confluence of the Connecticut River and Whalebone Cove in Connecticut, preserving tidal wetlands, a kettle pond wetland, upland meadows, mature forests, and the largest stand of wild rice in the state of Connecticut.

DECISION-SUPPORT TOOLS

The **Interactive, GIS-Based Application to Estimate Continuous, Unimpacted Daily Streamflow at Ungauged Locations in the Connecticut River Basin Project** RCN project developed an interactive map-based decision-support tool to estimate continuous unimpacted daily streamflow at ungagged locations in the Connecticut River basin (Archfield et al. 2013; see *Chapter 4* for further details). Work from this project allows users to identify a stream reach of interest in the Connecticut River basin and obtain estimated continuous daily, unregulated or "natural" streamflow at the selected location. The **Connecticut River UnImpacted Streamflow Estimator (CRUISE)** tool spans the entire Connecticut River basin, including the states of Connecticut, Massachusetts, New Hampshire, and Vermont. This work expands on a method developed for Massachusetts to estimate daily streamflow at ungagged locations. The CRUISE software tool and user manual are available through the USGS[41].

The **Connecticut River Flow Restoration Study**, led by The Nature Conservancy, U.S. Army Corps of Engineers, and University of Massachusetts Amherst, developed a watershed-scale assessment of the potential to restore river and stream flow in the

Connecticut River basin through re-operation of dams (Kennedy et al. 2018). This project assessed the current alteration of river and stream flows in the basin, assessed the ecological flow needs, developed hydrological models, assessed the impacts of high and low streamflows, and evaluated multiple management alternatives[42]. Optimized flow management actions for operations at U.S. Army Corps of Engineers dams were identified. The study concluded that additional flow management in the Connecticut River watershed beyond flow operations at U.S. Army Corps of Engineers operated facilities may be needed to fully restore river health and function in some locations.

7.1.3 LONG ISLAND SOUND

Long Island Sound is the second largest estuary in the Northeast, spanning approximately 1268 square miles. This large estuary is connected to the watersheds of the Connecticut River (see Section 7.1.2 above), Housatonic River, and Thames River on its northern Connecticut side and several smaller watersheds on the North Shore of Long Island, New York, on its southern side. With over 600 miles of shoreline, Long Island Sound is long (110 miles), narrow (21 miles at its widest), and shallow (averaging 65 feet; Van Patten et al. 2009). The Long Island Sound basin includes New Hampshire, Vermont, Massachusetts, Connecticut, Rhode Island, and New York (plus a small bit of Quebec). In addition to the partners involved in the largest of its river basins, the Connecticut River, described in the previous section, other partners are collaborating on conservation of the second largest estuary in the region.

LONG ISLAND SOUND STUDY

The **Long Island Sound Study** is a National Estuary Program with multiple state and federal partners[43]. The partnership is guided by the **Comprehensive Conservation and Management Plan (CCMP) for Long Island Sound**, which is updated periodically much like a SWAP[44]. National Estuary Program CCMPs are implemented through Implementation Actions, which are prioritized by each program and share some similarities to SWAP conservation actions. The Long Island Sound CCMP was revised in 2015 and the Long Island Sound Study issued a list of **Implementation Actions for 2020-2024**[45]. Example Implementation Actions include the projects that restore or maintain habitat connectivity, development of a habitat connectivity model, identification of which sites are likely to be impacted by sea level rise and which are ideal for habitat migration, and the development and application of standardized habitat quality metrics and assessment methodologies for targeted habitat types. Ecosystem Indicators that measure the health of the estuary and measure performance to achieve Ecosystem Targets identified in the plan are described in *Chapter 5*.

The **Long Island Sound Study Climate Change and Sentinel Monitoring Program** is a part of the **Integrated Sentinel Monitoring Network**[46]. The Long Island research and monitoring program[47] includes several climate change indicators in the estuary and its watershed that are described in *Chapter 5*.

The Long Island Sound Study conducts conservation activities throughout its basin to improve ecological conditions in the estuary. As of 2019 more than 2000 acres of habitat, including forest and tidal wetlands, have been restored in the Long Island Sound watershed in New York and Connecticut as part of the Long Island Sound Study program, as has more than 400 miles of river connectivity for anadromous fish passage.

LONG ISLAND SOUND WATER QUALITY MONITORING PROGRAM

The **Long Island Sound Water Quality Monitoring Program** is conducted by the state of Connecticut and the Interstate Environmental Commission, collecting water quality data in both surface and bottom waters of the estuary[48]. Monitoring indicators include water temperature, salinity, dissolved oxygen, particulate nitrogen, and dissolved nitrogen, which is collected both by research vessels (monthly from October to May plus bi-weekly hypoxia surveys from June to September) and continuously on monitoring station buoys throughout the estuary. The **Unified Water Study** monitoring protocol enables citizen scientists and community organizations to collect and contribute water quality data to the Long Island Sound Study monitoring program.

WILDLIFE MONITORING NETWORK OF LONG ISLAND

The **Wildlife Monitoring Network of Long Island** collects observations of wildlife from citizen scientists and the public for Horseshoe Crabs, birds, crustaceans, fish, mammals, reptiles, and insects[49]. This network supports organized monitoring projects and educational workshops and offers field guides and wildlife rescue resources.

WATERKEEPERS

Three members of the Waterkeeper Alliance are devoted to the Long Island Sound watershed. The **Long Island Soundkeeper**[50] is hosted by **Save the Sound**, a conservation organization focused on ecological restoration, healthy waters, protected lands, and climate resiliency across the Long Island Sound region[51]. Save the Sound issues a Long Island Sound Report Card on the health of the estuary every two years, with an interactive **Sound Health Explorer** platform to review environmental indicators and trends[52]. The Long Island Soundkeeper and Hudson Riverkeeper were two of the founding members of the international Waterkeeper Alliance.

The **Housatonic Riverkeeper** is sponsored by the Housatonic River Initiative[53]. This ad hoc coalition of environmental groups and concerned citizens are dedicated to the restoration and maintenance of a fishable, swimmable river through public engagement

in the clean-up of toxic pollution in the Housatonic River. The **Peconic Baykeeper** monitors, protects, and restores the Peconic Estuary of eastern Long Island, part of Long Island Sound[54]. Programs conducted by the Peconic Baykeeper include a community oyster restoration program, Horseshoe Crab monitoring, water quality monitoring, commercial oyster aquaculture, patrolling for pollution, diadromous fish restoration, green marinas, and environmental education.

7.1.4 HUDSON RIVER WATERSHED

The Hudson River watershed encompasses 13,390 square miles of New York and New Jersey, including the New York City metropolitan area, and small portions of Vermont and Massachusetts. Tidally influenced for nearly half of its 315-mile length, the Hudson River and its tributaries provide drinking water to nine million people in New York City and the Hudson Valley through an extensive system of reservoirs, aqueducts, and pipelines. Several conservation partners are involved in the protection and conservation of the Hudson River watershed and the drinking water it supplies at the landscape scale.

HUDSON RIVER FOUNDATION

For more than four decades the **Hudson River Foundation** has promoted science-based stewardship of the Hudson River watershed[55]. Programs and initiatives conducted by the Hudson River Foundation include restoring signature fisheries, restoring and improving habitats, improving water and sediment quality, supporting public access and stewardship, addressing climate change, and promoting public understanding. The Foundation has developed numerous environmental education materials[56] and other outreach materials in support of its public access mission, such as a paddling guide for the river's estuary.

The organization provides grants through its **Hudson River Fund** to support scientific research on all aspects of the Hudson River ecosystem (including its estuary) with a particular emphasis on studies that inform its human uses. The Fund administers grants through the New York – New Jersey Harbor and Estuary Program to assist citizen science projects, habitat restoration, public access, and stewardship activities. Graduate and undergraduate fellowships also are offered by the Hudson River Foundation.

The Hudson River Foundation recently assumed administration of the **Champlain Hudson Environmental Trust**, also known as the Hudson River and Lake Champlain Habitat Enhancement, Restoration and Research / Habitat Improvement Project Trust. This Trust is funded to address impacts from the Champlain Hudson Power Express project, which will connect hydroelectric dams in Quebec to Astoria,

Queens via a high voltage direct current line installed underwater. The Trust will appropriate $117.5 million over 35 years to protect, restore, and improve aquatic habitats and fisheries resources in the Hudson River estuary, Harlem and East Rivers, Lake Champlain, and their tributaries. Governing committee members include the Hudson River Foundation, state of New York, New York City, the Hudson Riverkeeper, and Scenic Hudson.

NEW YORK / NEW JERSEY HARBOR AND ESTUARY PROGRAM

The **New York – New Hersey Harbor and Estuary Program**, a part of the National Estuary Program, is supported by the Hudson River Foundation, described above. The Hudson River Foundation and the New York - New Jersey Harbor and Estuary Program developed an **Environmental Monitoring Plan**[57] for the watershed's estuary in 2018. The Plan includes 40 key indicators to monitor the health of the estuary with five goals:

- Water quality
- Habitat and ecological health of five key habitats (marine, riparian, shorelines and shallows, terrestrial, and wetlands)
- Public access and stewardship
- Toxic contamination related to legacy port and maritime industries
- Community engagement

The Estuary Program partners with the New York State Department of Environmental Conservation to produce periodic **State of the Hudson** reports[58], the most recent in 2020. These reports are based on the set of indicators outlined in the Environmental Monitoring Plan.

Habitat restoration supported by the Program is guided in part by the **Hudson-Raritan Estuary Comprehensive Restoration Plan**, developed in collaboration with the US Army Corps of Engineers and The Port Authority of New York and New Jersey (USACE et al. 2016). The associated Waters We Share collaboration includes more than 100 partners representing federal, state, and local government agencies, academia, research foundations, non-profit organizations, business interests, and others. The Restoration Plan describes the existing conditions of the estuary and defines target ecosystem characteristics. Funding partners and sources are identified to assist in implementing the recommended management actions. The Hudson River Foundation and the New York – New Jersey Harbor and Estuary Program track restoration activity progress to implement the plan with an interactive map that can be used to find opportunities for restoration, including as mitigation for natural resources damages funding[59].

Other activities of the Estuary Program include oyster restoration, water quality monitoring, aquatic habitat restoration along riverfront parks, environmental education programs, identification of opportunities to advance wetland migration pathways, and investigating the impacts of climate change on the health and biological integrity of the estuary.

SCENIC HUDSON

Scenic Hudson[60] actively preserved, protected, and revitalized land and communities in the Hudson River Valley since 1963. The largest environmental organization in the region in membership, Scenic Hudson's mission is to preserve and strengthen the open spaces, working forms, and historic cities and town centers of the Hudson River Valley and the natural resources that all of them depend upon. The organization's roots are in a grassroots-led effort to halt a proposed industrial project from developing Storm King Mountain in the Hudson Highlands. Since then, Scenic Hudson has successfully transformed contaminated industrial sites along the river into public parks. To date more than 48,000 acres across ten counties have been conserved by the organization, including the creation of more than 40 public parks. They also create and maintain land and paddle trails. Much of their land protection activities is through the use of conservation easements to protect scenic vistas, working farms, wetlands, woodlands, and river shorelines.

A climate change adaptation framework guides the organization's work to protect tidal wetlands along the Hudson River estuary. The **Hudson Valley Conservation Strategy** provides a framework for landscape level conservation in the basin. A **Foodshed Conservation Plan** secures a supply of fresh, local food for the region and New York City by supporting working agricultural lands[61]. Other activities of Scenic Hudson include efforts to improve climate resilience, regenerative agriculture, and extensive environmental education programs and resources.

HUDSON RIVER WATERSHED ALLIANCE

The **Hudson River Watershed Alliance** seeks to protect the water resources of the river basin[62]. The Alliance supports 32 local watershed groups, participates in municipal watershed planning, and has produced several watershed and subwatershed maps to inform decision-making. The organization hosts an Annual Watershed Conference for its partners to share information and promote collaboration. Technical and strategic assistance, training workshops, monitoring water quality, environmental education, stream cleanups, tree plantings, and partnering with academic institutions to conduct research are some of the Alliance's other activities that contribute to conservation of the Hudson River watershed.

WATERKEEPERS

Two members of the international Waterkeeper Alliance operate in the Hudson River watershed and its estuary. The **Hudson Riverkeeper** is one of the founding members of the Alliance, active since 1966 in protecting the resources of the Hudson River[63]. Originally established to combat pollution of the river, the Hudson Riverkeeper continues to monitor the waterways of the river for sources of pollution and water quality, continue recovery and restoration of the basin's ecosystem, protect drinking water supplies, improve wildlife habitat, foster sustainable energy development, restore local river fronts, and increase investment in water supply and sewer systems.

The **New York / New Jersey Baykeeper** considers itself the citizen guardian of the New York – New Jersey Harbor Estuary[64]. Since 1989 the Baykeeper has worked to protect, preserve, and restore the ecological integrity and productivity of the estuary's waterways and habitats. The Baykeeper preserves and restores habitat, champions public access, educates the public, influences land use decisions, and monitors water quality and sources of pollution. Active in both New York and New Jersey, the **Baykeeper Auxiliary** volunteers patrol the bay for pollution violations. The Baykeeper has assisted in natural resources damage assessments and recovery from oil spills, participated in dredged materials management planning, and advocated for federal, state, and local investments in habitat restoration.

7.1.5 DELAWARE RIVER WATERSHED

From the Catskill Mountains of New York to an estuary of global and hemispheric significance, the Delaware River watershed includes portions of five states, although only 8 square miles of Maryland are in the watershed. The 326-mile Delaware River is the longest undammed river east of the Mississippi River and forms the borders between Pennsylvania and New Jersey, New Jersey and Delaware, and a portion of Pennsylvania and New York. More than 15 million people live in the watershed, which covers 13,500+ square miles of landscape in the Northeast region (USFWS 2017). The Delaware River is tidal as far north as Trenton, New Jersey (DRBC 2001).

The Upper Delaware Scenic and Recreational River, Middle Delaware Scenic and Recreational River, and Delaware Water Gap National Recreation Area are managed by the National Park Service. Other protected lands along this 326-mile-long big river and its estuary include several National Wildlife Refuges and state parks and forests. Delaware Bay (at 782 square miles) is designated as a Western Hemisphere Shorebird Reserve of hemispheric importance and an Important Bird Area of global significance, supporting a critical migratory bird stopover site for millions of shorebirds every year.

As of 2010, the Delaware River watershed was 47% forest, 24% agricultural lands, 16% developed, 9% wetland, and 2% open water (PDE 2019).

More than 50 conservation partners actively are collaborating on the conservation of the fish and wildlife resources and their habitats in the Delaware River watershed, with significant investments for landscape level conservation over the past decade (Figure 7.1.1). Multi-state collaboration began in 1961 with the Delaware River Basin Compact, expanded with a newly established Delaware Estuary Program in 1989, and then benefited from a watershed ecological condition assessment from the Delaware River Basin Initiative in 2011 that identified priority conservation areas and actions (TNC et al. 2011). More recently, federal investments in landscape level conservation in the basin exceeded $16.7 million in Fiscal Year 2022, with $15.8 million of that available in competitive grants for conservation projects. With a five-year funding supplement from the Bipartisan Infrastructure Bill, that annual funding level is expected to continue through Fiscal Year 2026.

DELAWARE RIVER BASIN COMMISSION

The **Delaware River Basin Commission (DRBC)** is a partnership between the states of New York, New Jersey, Pennsylvania, and Delaware and federal agencies to protect the Delaware River watershed and estuary with both regulatory and non-regulatory programs and initiatives[65]. Created by the **Delaware River Basin Compact** in 1961, the powers and duties of the Commission address water supply, pollution control, flood protection, watershed management, hydroelectric power, recreation, and water withdrawals and diversions (DRBC 1961).

In accordance with the Delaware River Basin Compact, the DRBC developed a **Delaware River Basin Comprehensive Plan** that was updated in 2001 (DRBC 2001). This Comprehensive Plan describes general characteristics of the basin and more than 1700 projects spanning 39 years undertaken by the Commission, which include existing reservoir projects, proposed reservoir projects, municipal water supply and waste disposal projects, non-urban recreation areas, and stream gaging stations. The Commission annually adopts a water resources program for the next six years which must be based on the Comprehensive Plan. Proposed projects that may have a substantial effect on the water resources of the Delaware River basin are subject to regulatory approval by the Commission for conflict with the Comprehensive Plan.

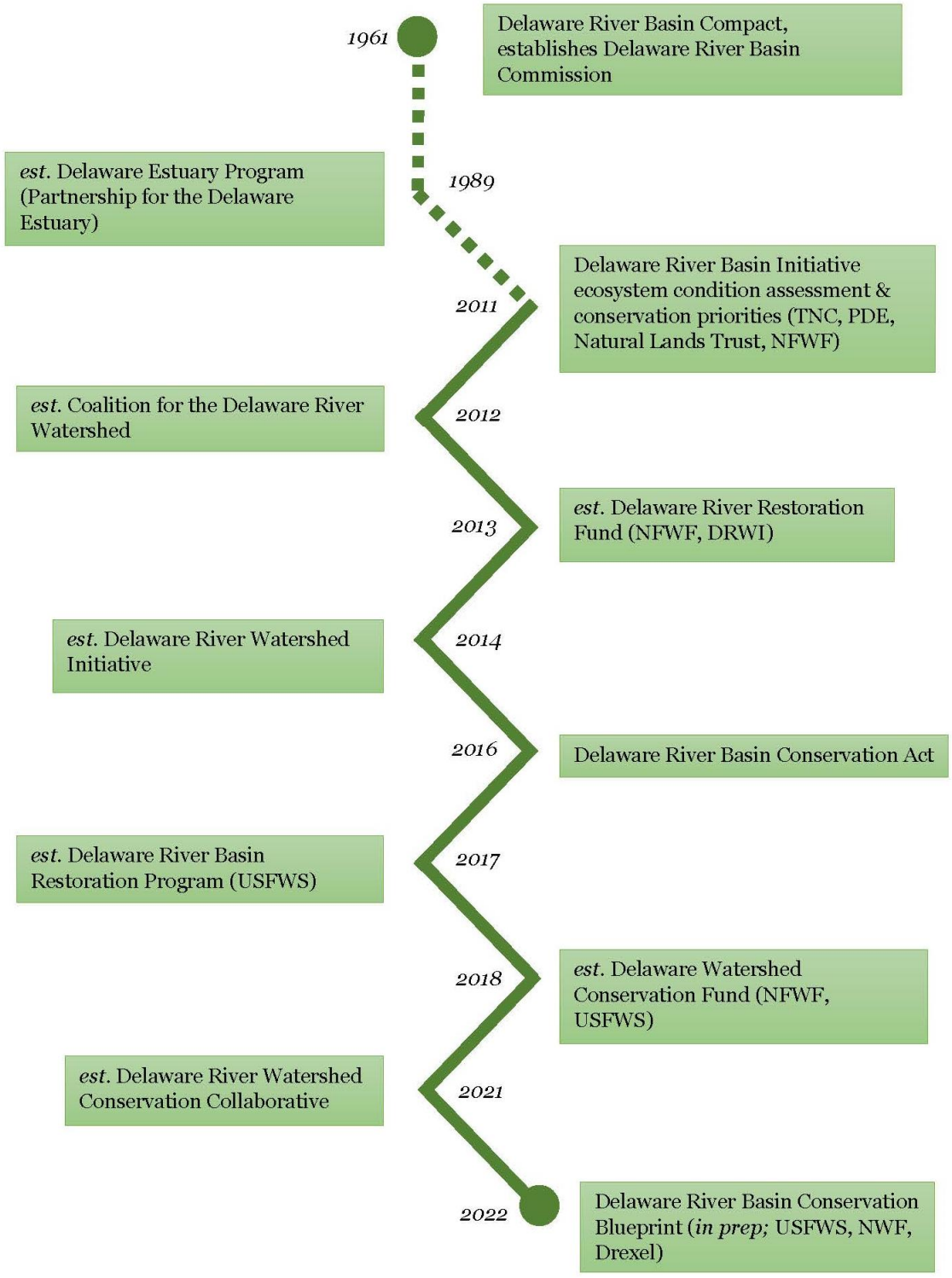

Figure 7.1.1 Timeline of landscape level collaborative partnerships and conservation programs in the Delaware River watershed in New York, Pennsylvania, New Jersey, and Delaware discussed in this section.

The **Delaware River Basin Water Code**, as amended, regulates water resources and sets water quality standards throughout the basin (DRBC 2013). The Code's regulations identify pollutant minimization plans for toxic pollutants, interstate water quality zones, interstate operation formulas for reservoirs, and flow objectives during drought periods. Priority water conservation uses during times of drought are specified at reservoirs and dams to balance recreation, water supply, and salinity. Major water supply reservoirs in the Delaware River basin managed by the Commission include those that supply New York City, Trenton, Philadelphia, and other large urban areas in Pennsylvania, New Jersey and Delaware. The Commission also regulates flood plain use, hydraulic fracturing, and groundwater protected areas in the basin.

The Commission collates monitoring reports, surveys, and research findings, particularly on water quality[66]. Every two years the Delaware River Basin Commission compiles a **Delaware River and Bay Water Quality Assessment** for the EPA, which includes four surface water quality monitoring programs on the non-tidal and tidal portions of the river, plus chronic toxicity monitoring in the estuary and macroinvertebrate monitoring in the non-tidal portion of the river. The biennial assessment supplements Commission monitoring data with monitoring program data from each of the four participating states, the United States Geological Survey, National Oceanic and Atmospheric Administration, and Environmental Protection Agency.

DELAWARE RIVER BASIN RESTORATION PROGRAM

The Delaware River Basin Conservation Act of 2016 established the **Delaware River Basin Restoration Program**[67]. The USFWS and over 35 partners developed a strategic framework for the new program in 2017 (USFWS 2017). The goals of the Delaware River Basin Restoration Program are (USFWS 2017):

- Sustain and enhance fish and wildlife habitat restoration and conservation activities
- Improve and maintain water quality to support fish and wildlife, as well as habitats for fish and wildlife, and drinking water for people
- Sustain and enhance water resource management for volume and flood damage mitigation improvements to benefit fish and wildlife habitat
- Improve opportunities for public access and recreation in the basin consistent with the ecological needs of fish and wildlife habitat
- Engage the public through outreach, education, and citizen involvement to increase capacity and support for coordinated restoration and protection activities in the basin

- Facilitate strategic planning to maximize resiliency of natural systems in changing watershed conditions
- Increase scientific capacity to support planning, monitoring, and research activities necessary to carry out coordinated restoration and conservation activities in the basin
- Provide technical assistance for restoration and conservation activities
- Conserve areas of regional significance

The National Fish and Wildlife Foundation (NFWF) provides Delaware River Basin Restoration Program grant funding through its Delaware River Program. The NFWF Delaware River Program administers the **Delaware Watershed Conservation Fund** and **Delaware River Restoration Fund**[68]. These annual competitive grant programs are dedicated to restoring the water quality of the Delaware River and its tributaries and restoring fish and wildlife habitats. Funding partners for the grants are the USFWS, William Penn Foundation, and AstraZeneca. The Bipartisan Infrastructure Law of 2021 appropriated $26.2 million in supplemental funding to the Delaware Watershed Conservation Fund to be distributed over five years. Funding goals and objectives are described in the **Delaware River Watershed Business Plan for 2017-2027,** as updated in January 2023 (NFWF 2023).

Since its inception in 2018, the Delaware Watershed Conservation Fund has awarded $40.4 million to 159 projects that leveraged an additional $59.7 million in matching funds from 59 grantees. More than 22 miles of riparian habitat and 76 miles of stream habitat were restored in the first five years of the program. More than 1300 acres of wetlands have been conserved and enhanced, over 27,105 acres of forest habitat has been improved, and 4179 acres opened for public access[68].

The Delaware River Basin Restoration Program partners are developing a **Conservation Blueprint** for the basin to prioritize non-regulatory restoration and conservation efforts. The National Wildlife Federation, with technical assistance from Drexel University, is coordinating this effort. The Conservation Blueprint will conduct outreach with multiple user groups, identify data gaps and strategies to fill them, build upon the existing strategic and conservation plans of partners, and incorporate environmental justice metrics (Schaeffer et al. 2022).

Programs modeled after the Delaware River Basin Restoration Program have been proposed for the New York – New Jersey Harbors and Estuary and the Connecticut River basin.

DELAWARE RIVER WATERSHED INITIATIVE

The **Delaware River Watershed Initiative**, established in 2014, is a collaboration among more than 50 organizations and academic institutions to conserve the terrestrial

and aquatic resources of the watershed across New York, Pennsylvania, New Jersey, and Delaware[69]. The mission of the Initiative is to safeguard clean water for the basin's 15 million residents, foster green and livable communities that filter polluted runoff, and support river friendly farms. Eight priority target areas identified by the Initiative concentrate conservation efforts in locations with the highest potential for lasting impacts.

The Initiative uses a science-based approach to landscape conservation through a combination of modeling, monitoring, and community science. Delaware River Watershed Initiative partners conduct monitoring throughout the watershed. The partnership's monitoring program intends to detect incremental changes in the health of the basin's waters through the collaboration of research teams, conservation partners, and citizen scientists. Monitoring data is then incorporated into modeling efforts to evaluate the effectiveness of on-the-ground conservation projects.

The **Delaware River Restoration Fund** administered by NFWF pre-dates the Delaware River Basin Restoration Program, launched in late 2013 to assist government agencies and community-based organizations to collaborate on cleaning up and restoring polluted waters in the river basin. Habitat improvements for targeted species like Brook Trout and river herring is another goal of the fund. The Fund awards approximately $2 million annually with three priorities: (1) working lands stewardship, (2) restoration of wetlands, floodplains, and stream corridors, and (3) promoting the adoption of green infrastructure in urban and suburban landscapes. Since 2014 the Delaware River Restoration Fund has awarded 108 grants worth $18.6 million, which leveraged $28.2 million in matching funds. Best management practices to improve water quality have been installed on over 30,000 acres. Sixty-two miles of riparian and instream habitat and more than 143 acres of wetlands have been restored. The Delaware River Restoration Fund is administered by NFWF in cooperation with the Delaware River Watershed Initiative.

DELAWARE RIVER WATERSHED CONSERVATION COLLABORATIVE

The **Delaware River Watershed Conservation Collaborative** is a partnership among 40 partners that have shared priorities and goals in the conservation of the river basin. The Delaware River Basin Restoration Program enabling legislation mandated that the USFWS create a technical assistance program to identify, prioritize, and implement meaningful and coordinated conservation in the watershed, which was affirmed in 2019 when the governors of the watershed states committed to interstate collaboration. The collaborative relationship of the partners was formalized in an organizational governance system in 2021 (USFWS 2021a). The four strategic areas of the Collaborative are:

- Conserving and restoring fish and wildlife habitat

- Improving and sustaining water quality
- Upgrading water management, and reducing flood damage
- Enhancing recreational opportunities and public access

A Delaware River Watershed Conservation Collaborative Steering Committee will establish priorities for and provide guidance on the operation of the Delaware Watershed Conservation Fund that is administered by NFWF to achieve landscape scale conservation.

DELAWARE RIVER BASIN FISH AND WILDLIFE MANAGEMENT COOPERATIVE

The **Delaware River Basin Fish and Wildlife Management Cooperative** is a partnership between the states of New York, Pennsylvania, New Jersey, Delaware, the USFWS, and the National Marine Fisheries Service to manage fish species in the basin, including diadromous fish RSGCN like American Shad (*Alosa sapidissima*). The Delaware River Basin Commission is a liaison member of the Cooperative and other supporting organizations include the National Park Service, Philadelphia Water Department, and The Nature Conservancy. The Cooperative organizes annual surveys to monitor American Shad and other managed fish species. Management of these species is under the direction of the Atlantic States Marine Fisheries Commission.

PARTNERSHIP FOR THE DELAWARE ESTUARY

The Delaware Bay is part of the National Estuary Program and as such is managed by the **Partnership for the Delaware Estuary** as the Delaware Estuary Program[70]. The mission of the Partnership for the Delaware Estuary is to lead collaborative, science-based conservation efforts to improve the Delaware River and Bay in Delaware, New Jersey, and Pennsylvania. With a vision for clean water, thriving fish and wildlife communities, and accessible recreational activities that supports people, communities, and a robust economy, the organization is dedicated to collaboration, science, innovation, engagement, and social justice.

As part of the National Estuary Program, the Partnership for the Delaware Estuary maintains a **Comprehensive Conservation and Management Plan for the Delaware Estuary** that identifies strategic conservation priorities and performance measures (Partnership for the Delaware Estuary 2019). The Bipartisan Infrastructure Law of 2021 provided supplemental funding to the National Estuary Program, allowing the Partnership for the Delaware Estuary to implement the conservation strategies and projects identified in their updated CCMP more quickly.

A **Technical Report for the Estuary and Basin** is prepared every five years, assessing more than 70 environmental indicators[71]. The most recent assessment report

was published in 2022, which graded the state of the Delaware Estuary as "fair," unchanged from 2017. The program continually conducts scientific studies and analyses to inform decision-making and conservation priorities, from exploring the use of freshwater mussels to improve water quality in stormwater management ponds to the effects of coastal flooding on tree growth in forested wetlands. Studies and reports are available to the public online[72] and a **Standard Methods Bank** provides guidance on the methods and metrics most appropriate for a project, along with the availability of funding[73].

The Partnership for the Delaware Estuary has three goals related to fish and wildlife habitat: prevent wetland loss, stem the loss of forest, and increase and improve fish and shellfish habitat. To achieve these goals, the program conducts habitat restoration projects, develops natural and nature-based techniques for habitat restoration, and conducts habitat inventory and assessment projects to identify priority sites for protection, enhancement, and restoration. Horseshoe Crabs, Oysters, and freshwater mussels are of particular interest. The **Mussels for Clean Water Initiative** is a partnership between the estuary program and the Pennsylvania Infrastructure Investment Authority to construct and operate a multi-million-dollar, large scale freshwater mussel hatchery and research center that broke ground in 2020, building on the organization's existing freshwater mussel propagation research at the Fairmount Water Works[74]. The geographic focus area of this initiative is both the Delaware and Susquehanna River basins, depending on funding.

COALITION FOR THE DELAWARE RIVER WATERSHED

The **Coalition for the Delaware River Watershed** coordinates the protection and restoration work of 170+ member organizations and stakeholders in the Delaware River basin to enhance their capacity[75]. Formed in 2012, the Coalition coordinates communications and advocate policy at the state and federal levels, considering itself the voice of nonprofit organizations to the Delaware River Basin Restoration Program. In 2020, the Coalition adopted a 5-year strategic plan that describes shared goals, objectives, and activities (Coalition for the Delaware River Watershed 2020). The five goals of the Coalition identified in their 2021 – 2026 Strategic Direction are:

1. To address systemic racism, the Coalition will advance its diversity, equity, inclusion, and justice efforts to serve as a clearinghouse for resources and peer-to-peer learning.
2. As a convener of organizations throughout the region, the Coalition will strive to empower and engage a larger, more inclusive constituency to support watershed-wide planning and advocacy initiatives.

3. Advocate for robust federal restoration funding to support the watershed's restoration and protection needs (particularly through the Delaware River Basin Restoration Program).
4. Ensure federal and state policies, spending, and implementation support a resilient and healthy Delaware River watershed.
5. Respond in a swift and unified manner to defend the watershed against emergent and systemic threats on the state and federal level as they relate to our mission of protecting and restoring the land and waters in the Delaware River Basin.

The Coalition for the Delaware River Watershed maintains a **Diversity, Equity, Inclusion and Justice (DEIJ) Resource Hub** that provides access to a DEIJ Workgroup, a DEIJ Lens and Screening Tool, and resources for individual learning and training, external engagement practices, internal organizational practices, and communications and digital media[76]. The Coalition's website also collates funding, grant, and support opportunities for both DEIJ efforts and infrastructure.

WATERKEEPERS

Since 1988 the **Delaware Riverkeeper Network** works throughout the entire Delaware River watershed in support of healthy waterways and their resources[77]. As with other Waterkeepers, the Delaware Riverkeeper Network conducts volunteer monitoring programs, effective environmental advocacy, habitat and stream restoration projects, public education, and when necessary, litigation to ensure enforcement of environmental laws. The organization's citizen science volunteers conduct water quality monitoring through the **Water Watch** program[78], established in 1992. Data collected since 2007 as part of this program has trained 85 watershed groups and 3000+ residents and alerted regulatory officials of more than 170 incidents of pollution through a Water Watch Pollution Hotline. Monitoring protocols and tools are available, customized to different types of environmental conditions (e.g., streams underlain by shale, vernal pools). The **For the Generations Initiative** is a nationwide project to advance constitutional rights to pure water, clean air, and a healthy environment.

The Habitat Restoration Program provides ecological design services and assists municipalities, agencies, local conservation and community groups, and private landowners to develop restoration plans and implement projects. Example projects include ecological master plans, riparian corridor restoration, tree plantings, bioswale installation, rain gardens, trails, woodland restoration, and invasive species removal.

7.1.6 CHESAPEAKE BAY WATERSHED

The Chesapeake Bay watershed spans more than 64,000 square miles in six states – New York, Pennsylvania, Maryland, Delaware, West Virginia, Virginia - and the District of Columbia. Chesapeake Bay is the largest estuary in the United States and third largest in the world, with approximately 4480 square miles of open water and tidal wetlands and flats and around 3600 fish, wildlife and plant species. Nearly one million waterfowl winter on or near the bay, roughly one-third of the Atlantic Coast's migratory waterfowl population (USFWS 2021b). The Chesapeake Bay Estuarine Complex has been identified as an internationally important wetland under the Ramsar Convention[36]. The Susquehanna River is the dominant river in the bay's watershed, with other major tributaries being the Potomac River, Rappahannock River, York River, and James River. Altogether there are 180,000 miles of rivers and streams in the watershed and more than 11,680 miles of estuarine shoreline along Chesapeake Bay. More than 18 million people live in the bay's watershed.

Like the Delaware River basin, existing landscape scale conservation partnerships in the Chesapeake Bay watershed have received supplemental federal investments from the Bipartisan Infrastructure Law. An expected boost of $248 million over five years, Fiscal Years 2022 – 2026, is shared among existing competitive grant programs (i.e., the Chesapeake Bay Stewardship Fund, Chesapeake Bay Program) and as part of the EPA's Most Effective Basins Program that provides funding for state-based implementation of projects in the most effective river basins. Several conservation partnerships in the Chesapeake Bay watershed provide opportunities to advance SWAP implementation and leverage enhanced funding programs.

CHESAPEAKE BAY PROGRAM

The **Chesapeake Bay Program**, established in 1983, is a regional partnership implementing the goals of the Chesapeake Bay Watershed Agreement[79]. The **Chesapeake Bay Watershed Agreement** is a multi-state and federal agreement that includes all the states within the Bay's watershed. The 2014 Agreement, as amended in August 2022, has ten goals and 31 outcomes (conservation targets) guiding the restoration of Chesapeake Bay and its watershed[80]. State specific plans with pollution reduction goals for 2025 address Environmental Protection Agency pollution limits for the estuary that were set in 2010. The EPA issues two-year milestones on implementation of the state **Watershed Implementation Plans**[81]. The October 2022 evaluation found that there were new significant successes in 2022, but most of the watershed's states are not on track to meet the 2025 water quality restoration goals. Only West Virginia and the District of Columbia are on track to meet their cleanup goals of the nation's largest estuary.

The Chesapeake Bay Program partnership coordinates citizen science and non-traditional monitoring of water quality and benthic macroinvertebrates in the Chesapeake watershed through the **Chesapeake Monitoring Cooperative**[82]. The program's **Chesapeake Data Explorer** allows citizen scientists to store and manage data they collect and the public an opportunity to access data collections. The Program provides technical assistance to interested organizations or members of the public who desire to start a monitoring program.

Similar to the programs in the Delaware River basin, the NFWF, EPA, Chesapeake Bay Program, USFWS and other partners administer the **Chesapeake Bay Stewardship Fund** in a public-private partnership[83]. The Chesapeake Bay Stewardship Fund offers four grant programs, which awarded $22.4 million in grants in Fiscal Year 2021 (NFWF 2022). While the **Pennsylvania Most Effective Basins Grants Program** is state-based to assist the state of Pennsylvania in implementing its Watershed Implementation Plan for the Chesapeake Bay, the other three grant programs are regional in scope.

The **Small Watershed Grants Program** is supported by the EPA, Chesapeake Bay Program, US Forest Service, US Department of Agriculture, and Altria to provide planning and technical assistance grants to enhance local capacity or to implement projects that restore water quality, species, or habitat. The **Innovative Nutrient and Sediment Reduction Grants Program** supported by the EPA and Chesapeake Bay Program funds water quality improvement projects using practices approved by the Chesapeake Bay Program for crediting under the Chesapeake Bay Total Maximum Daily Load (TMDL) pollution limits and associated state Watershed Implementation Plans. Supplemental funding for the Small Watershed and Innovative Nutrient and Sediment Reduction Grants Programs through the Bipartisan Infrastructure Law prioritizes projects that restore riparian forest buffers; create, rehabilitate, or enhance tidal and non-tidal wetlands; restore floodplains; manage shorelines; and plant and/or maintain urban tree canopies. The **Chesapeake Watershed Investments for Landscape Defense (WILD) Grants Program** is described in the next section.

The NFWF **Chesapeake Bay Business Plan** describes the funding priorities of the Chesapeake Bay Stewardship Fund (NFWF 2018). Between 1999 and 2022, the Chesapeake Bay Stewardship Fund awarded over 1350 grants worth more than $248 million, leveraging over $351 million in matching funds[83]. According to NFWF, these projects have:

- Reduced annual nitrogen pollution loading by an estimated 28 million pounds
- Reduced annual phosphorus loading by an estimated 5.4 million pounds
- Reduced annual sediment loading by an estimated 1.3 billion pounds
- Restored more than 3,700 miles of streams
- Treated stormwater runoff from 14,764 acres of impervious surfaces

- Reached an estimated 7.5 million residents through outreach efforts
- Restored more than 15,987 acres of wetlands and 2,443 miles of forested riparian buffers
- Installed more than 2,175 miles of livestock exclusion stream fencing
- Reconnected more than 581 miles of rivers and streams for fish passage
- Established 396 acres of oyster reefs
- Protected 171,291 acres of forests

The Program also maintains a list of grant opportunities and requests for proposals related to Bay conservation[84]. More than 125 maps, figures, and infographics on Chesapeake Bay and its ecological conditions are available from the Chesapeake Bay Program, which can inform SWAPs and education and outreach by the Bay's conservation partners[85].

The policy direction of the Chesapeake Bay Program is established by the **Chesapeake Executive Council**. Council members are the governors of the six watershed states, the mayor of the District of Columbia, the chair of the Chesapeake Bay Commission, and the administrator of the EPA[86].

CHESAPEAKE BAY COMMISSION

The **Chesapeake Bay Commission** is a legislative body serving Pennsylvania, Maryland, and Virginia[87]. Recently celebrating its 40th anniversary, the Commission was established to be a catalyst for the coordinated leadership of state legislative and policy actions to restore Chesapeake Bay. The Commission represents the state legislative interests in the Chesapeake Bay Program partnership and as a liaison to the US Congress on budgetary and policy matters for the watershed. Three citizen representatives serve on the Chesapeake Bay Commission, along with five legislators and the cabinet secretary of natural resources from each state.

The Commission's enabling legislation adopted by the three states has five goals[88]:

1. To assist the legislatures in evaluating and responding to mutual Bay concerns;
2. To promote intergovernmental cooperation and coordination for resource planning;
3. To promote uniformity of legislation where appropriate;
4. To enhance the functions and powers of existing offices and agencies; and
5. To recommend improvements in the management of Bay resources.

The Chesapeake Bay Commission is a member of the Chesapeake Executive Council, a signatory on the Chesapeake Bay Watershed Agreement, and the Chesapeake Bay Program partnership.

CHESAPEAKE WILD

The **Chesapeake Watershed Investments for Landscape Defense (WILD) Program**, established in 2020 by the **America's Conservation Enhancement Act**, requires the USFWS establish a non-regulatory program with three purposes (USFWS 2021b):

1. Coordination among federal, state, local, and regional entities to establish a shared vision for sustaining natural resources and human communities throughout the Chesapeake Bay and its watershed.
2. Engagement of diverse agencies and organizations to build capacity and generate funding that address shared restoration and conservation priorities.
3. Collaboration to administer a grant program and implement projects to conserve, steward, and enhance fish and wildlife habitats and related conservation values.

The **Chesapeake WILD Framework** completed in 2021 has five Program pillars to fulfill the purposes of the enabling legislation (USFWS 2021b):

- Fish and Wildlife Habitats: Conserve, restore, enhance, and sustain a resilient network of fish and wildlife habitats and connecting corridors, with an emphasis on at-risk and federally listed species.
- Climate Change: Advance climate change adaptation and land-use planning by increasing science capacity to support improved strategic planning, conservation design, monitoring, and applied science activities necessary to ensure resilience of natural ecosystems and habitats.
- Community Partnership: Increase capacity and support for coordinated restoration and conservation activities in the Chesapeake Bay watershed, particularly in historically and systemically under-resourced communities, through outreach, education, and civic engagement.
- Public Access: Enhance recreational opportunities and public access with a strong emphasis on equitable access to nature and all associated benefits, consistent with the ecological needs of fish and wildlife habitat.
- Water Quality: Improve and sustain water quality, upgrade water management capability, and reduce flood damage to support fish and wildlife, habitats of fish and wildlife, and drinking water for people.

The **Chesapeake Watershed Investments for Landscape Defense (WILD) Grants Program**[89] supported by the USFWS, with private contributions from Altria, focuses on efforts to improve the condition and connectivity of habitats for fish and wildlife species in the Chesapeake Bay watershed in accordance with these five pillars. NFWF administers the Chesapeake WILD Grant Program through the Chesapeake Bay Stewardship Fund.

CHESAPEAKE CONSERVATION PARTNERSHIP

The **Chesapeake Conservation Partnership** was established in 2009 as a network of conservation partners representing a diverse cross-section of stakeholders and partners[90]. The mission of the Partnership is to foster collaboration to conserve the ecologically and culturally important landscapes of the Chesapeake Bay watershed to benefit people, economies, and nature. Formerly known as the Chesapeake Large Landscape Conservation Partnership, the Chesapeake Conservation Partnership brings together partners with shared principles of conservation, preservation, information sharing, and long-term sustainability.

The Chesapeake Conservation Partnership collaborated with experts across the region to create the **Chesapeake Conservation Atlas**, incorporating science and decision-support tools from Nature's Network (see *Chapter 2*), the earlier **LandScope Chesapeake**, and other resources[91]. The Chesapeake Conservation Atlas, version 1.1 completed in March 2018, maps existing natural resources that relate to the long-term conservation goals for habitats, forests, farms, heritage, and human health. The priorities identified in the Atlas provide a foundation for the Chesapeake WILD Program. The Chesapeake Conservation Partnership has also created a **Green Space Equity Tool** that highlights in an interactive map low-income communities and communities of color that have limited access to open space in the Chesapeake Bay watershed[92].

Federal **Executive Order 13508, Chesapeake Bay Protection and Restoration** of 2009 identified a need for greater federal leadership in conservation of Chesapeake Bay. In 2010 the resulting **Strategy for Protecting and Restoring the Chesapeake Bay Watershed** aligned with the goals and objectives of the existing Chesapeake Bay Program, which recommended protection of an additional two million acres of land and creation of 300 public access sites by 2025 (Federal Leadership Committee for the Chesapeake Bay 2010). The Chesapeake Conservation Partnership broadened its focus to include these priorities as well as priorities to address diversity, equity, inclusion, and justice considerations. The Partnership now includes a broad coalition of the Chesapeake Bay Program, USFWS, other federal agencies, natural resource agencies from the six watershed states, and the District of Columbia, and more than 50 organizations and agencies engaged in land conservation, habitat restoration, outdoor recreation access, and related work (USFWS 2021b).

CHESAPEAKE PROGRESS

The Chesapeake Bay Program and its federal, public and internal oversight groups track the Program's progress toward reaching the goals and outcomes of the Chesapeake Bay Watershed Agreement through **Chesapeake Progress**[93]. Chesapeake Progress is an online platform repository of status and trends data on clean water, abundant life,

conserved lands, engaged communities, and climate change goals of the Chesapeake Bay Program. More than two dozen indicators of environmental health, restoration, and stewardship are tracked with accurate, up-to-date and accessible data available to the public and partners (see *Chapter 5* for the list of indicators). Indicator data is compiled from multiple sources, from government agencies, nongovernmental organizations, and academic institutions to direct demographic and behavior surveys. The data and analysis provided by Chesapeake Progress informs the adaptive management based decision-making process of the Chesapeake Bay Program.

One of the shared goals of the Chesapeake Bay Program, Chesapeake WILD, and the Chesapeake Conservation Partnership, as adopted in the Chesapeake Bay Watershed Agreement, is to protect an additional two million acres of the watershed between 2010 and 2025 (Federal Leadership Committee for the Chesapeake Bay 2010). Chesapeake Progress is tracking progress towards this goal (Figures 7.1.2, 7.1.3). As of early 2019, nearly 1.36 million acres had been protected, bringing the total to 9.2 million acres, or 22% of the watershed. The performance monitoring target is on target and has been

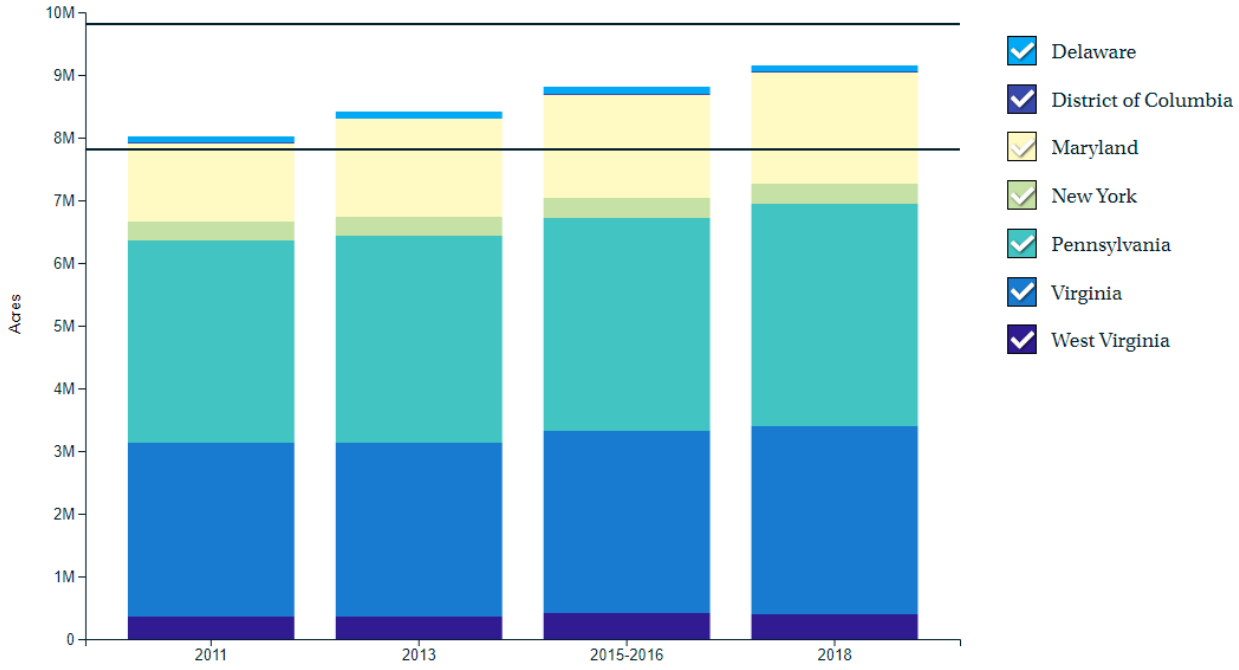

Figure 7.1.2. The area of protected lands in the Chesapeake Bay watershed from 2011 to 2018, as tracked by Chesapeake Progress for each of the watershed states and the District of Columbia[94].

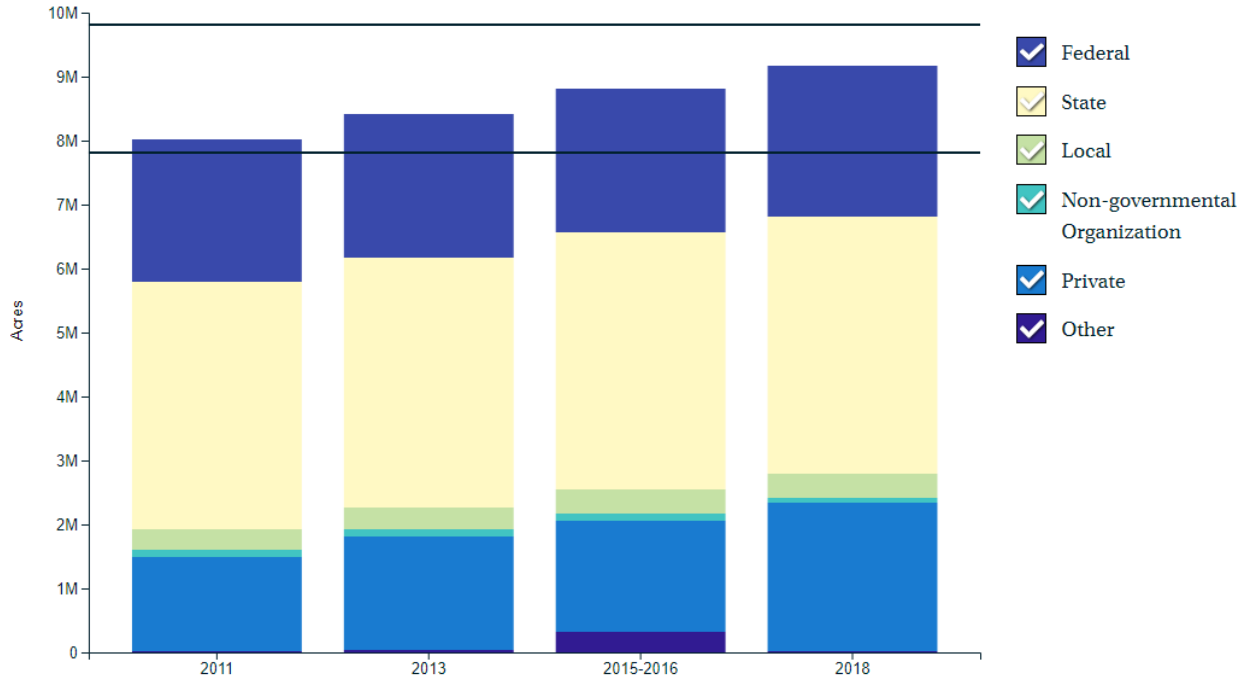

Figure 7.1.3. The area of protected lands in the Chesapeake Bay watershed from 2011 to 2018, as tracked by Chesapeake Progress by type of land ownership[94].

revised to target 30% protected lands by 2030 in accordance with the **America the Beautiful Initiative[95]** and the Chesapeake Executive Council's **Directive No. 21-2: Collective Action for Climate Change**. State lands are the largest contributors to the watershed's land protection, owning approximately 44% of the protected lands (Figure 7.1.3).

SUSQUEHANNA RIVER BASIN COMMISSION

The **Susquehanna River Basin Commission (SRBC)** is a regulatory and non-regulatory partnership between the states of New York, Pennsylvania, and Maryland as per the 1961 Susquehanna River Basin Compact[96]. The Commission is structured and functions similar to the Delaware River Basin Commission. The updated **Comprehensive Plan and Water Resources of the Susquehanna River Basin** describes the Commission's vision, needs, and strategy to effectively manage the 27,500 square mile river basin's water resources for 20 years – from 2021 to 2041 (SRBC 2021). The Plan identifies four Priority Management Areas for water supply, water quality, flooding and drought, and watershed management.

The Monitoring and Protection Program of the Susquehanna River Basin Commission conducts biological, chemical, and physical monitoring of the streams in the river basin,

including water quality monitoring for fish, macroinvertebrates, stormwater, sediment and nutrient loadings, and abandoned mine drainage. The **Susquehanna Atlas** provides an interactive online platform to explore the river basin, Commission projects and program locations, and many spatial datasets for environmental characteristics and settings[97]. The Commission also provides online public access to regulated water use projects, monitoring data on quarterly water usage and passby volumes, post-hydrofracture reports, historical water usage and passby monitoring data, continuous instream monitoring data, sediment and nutrient assessments, water quality indices, invasive species eDNA monitoring, and chemical data associated with mine drainage impacts to rivers and streams. Resources for the Commission's environmental education programs, such as **Eels in the Classroom**, are also available through a series of story maps and dashboards[98].

The Commission provides grants for projects that improve the sustainability of streamflows and groundwater during times of drought, with up to $6 million available in 2023. Other grants are available for monitoring groundwater levels.

UPPER SUSQUEHANNA CONSERVATION ALLIANCE

The **Upper Susquehanna Conservation Alliance** was created in 2010 by the New York Ecological Services Field Office of the USFWS to promote landscape level conservation in the upper portion of the Susquehanna River and Chesapeake Bay watershed[99]. The Alliance has brought together 50 organizations with shared conservation interests in the watershed. The USFWS hosts annual meetings of the Upper Susquehanna Conservation Alliance to share information, strengthen partnerships, share funding opportunities, and collaborate on conservation projects. The Alliance has eight work groups:

- Landscape Conservation and Planning Work Group
- Flood Work Group
- Invasive Species Work Group
- Roadside Ditch Work Group
- Eastern Brook Trout Work Group
- Eastern Hellbender Work Group
- Pearly Mussel / American Eel Work Group
- Outreach Work Group

Example projects and accomplishments of the Upper Susquehanna Conservation Alliance include technical assistance with mapping analyses to identify important habitat connectivity areas, landscape areas for restoration and protection, and priority floodplains for protection; grants for land purchases; aquatic barrier removals; stream and wetland restoration; outreach to municipalities; professional training; a roadside

ditch improvement program; development of standardized species survey protocols; species reintroductions; and species management plans for the watershed.

UPPER SUSQUEHANNA COALITION

The **Upper Susquehanna Coalition** is a partnership of 22 soil and water conservation districts in New York and Pennsylvania, representing 99% of the upper Susquehanna River watershed upstream of Towanda, Pennsylvania[100]. Together these districts include 16,800 miles of rivers and streams, 17,000 miles of roads, and 7500 square miles of watershed. Since 1992 the Coalition has collaborated to address water quality in the headwaters of Chesapeake Bay. In 2006 the Coalition formalized their partnership with a legally-binding Memorandum of Understanding. The partnership plans and implements restoration projects to improve water quality, including programmatic approaches that address barriers to effective conservation. Priority issues for the group are flooding, streambank erosion, gravel deposition, and nutrient loading. The Coalition has developed BMPs for timber harvesting operations and a climate change resiliency toolkit that prioritizes BMP locations and types to maximize their efficiency to assist farms with climate adaptation.

CHESAPEAKE CONSERVANCY

The **Chesapeake Conservancy** nonprofit organization contributes to the conservation of Chesapeake Bay through land protection, public access sites, and the use of innovative technology to accelerate progress in conserving the Bay's landscapes and cultural heritage while providing equitable access to people[101]. The Conservancy's Conservation Innovation Center, for example, is using cutting-edge technology approaches for the **Precision Conservation Partnership** to streamline farmer outreach and grant administration, identify the most important and impactful sites for stream restoration, and implement a rapid de-listing strategy for rivers and streams in the Susquehanna River watershed impaired on the Clean Water Act Section 303(d) list[102].

The organization has assisted in creating 206 new public access sites throughout the Bay and is a partner with the National Park Service on the **Chesapeake Bay Gateways Network[103]**. The National Park Service's Chesapeake Bay Gateways and Watertrails Program was established in 1998 to enhance conservation stewardship through connecting people with the Bay with outdoor recreation opportunities, interpretive trail signage and exhibits, and youth programs. The National Park Service program provides financial and technical assistance for community projects that improve public access and support the outdoor recreation economy of the Bay, supporting 360 projects to date.

Defining **Indigenous Cultural Landscapes** is a focus area for the Chesapeake Conservancy. Cultural landscapes are defined by the National Park Service as areas that reveal people's relationship with place and strengthen understanding of historic events, significant people, and patterns in American history[104]. Indigenous Cultural Landscapes associated with the Captain John Smith Chesapeake National Historic Trail, which spans the Chesapeake Bay watershed, are places where uniquely Indigenous perspectives can inform land management decisions. These landscapes include both cultural and natural resources that would have supported the lifestyles and settlement patterns of an Indian group as a whole. The Chesapeake Conservancy has contributed to studies defining Indigenous Cultural Landscapes for the Greater York River, Rappahannock, Nanticoke, Nanjemoy and Mattawoman Creek, and Lower Susquehanna Area[105].

The Chesapeake Conservancy also is a partner with the USFWS, Chesapeake Conservation Partnership, Chesapeake Bay Program, Bureau of Land Management, and other regional and community collaborations to protect the resources of Chesapeake Bay.

CHESAPEAKE BAY FOUNDATION

The **Chesapeake Bay Foundation**, founded in 1966, is the largest independent nongovernmental organization dedicated solely to the conservation of Chesapeake Bay[106]. With the motto "Save the Bay," the Chesapeake Bay Foundation advocates for effective and science-based solutions to pollution that is degrading the Bay and its rivers and streams. The organization operates offices across the watershed, engaging public leaders in making commitments to restoration of Chesapeake Bay. The Chesapeake Bay Foundation's mission to restore water quality in the Bay is defined as reaching a score of 70 (out of 100) on the organization's Health Index, with a perfect score of 100 equivalent to the theoretical condition of the Bay at the time of Colonial exploration in the early 1600s. To that end, the group monitors the Bay's water quality and issues **State of the Bay Reports** every two years using 13 indicators (described in *Chapter 5*).

In addition to monitoring the condition of Chesapeake Bay and its watershed, the Chesapeake Bay Foundation performs restoration work with partners to restore forests, wetlands, and oyster reefs in particular. The Foundation works with farmers to implement regenerative agriculture practices and increase resilience to climate change. Trees for restoration projects are grown on a sustainable farm operated by the organization, which are planted at restoration and urban forestry sites by hundreds of volunteers annually all across the watershed. Another initiative supported by the Foundation is the **Mountains-to-Bay Grazing Alliance**, a collaboration of private and public partners to promote rotational grazing and related conservation practices

and increase the number of pasture-based livestock operations in Pennsylvania, Maryland, and Virginia[107].

The Chesapeake Bay Foundation conducts extensive environmental education programs, both in the classroom and in the field. Their **Chesapeake Classrooms** program trained 260 teachers in outdoor education curriculum as ambassadors for environmental education in 2022. A **Student Leadership** program teaches students how to build advocacy skills, work together to study their local environments, and take action on conservation projects in their communities.

WATERKEEPERS

There are 16 Waterkeeper groups in the Chesapeake Bay watershed, monitoring thousands of miles of waterways across four states and the District of Columbia under the regional umbrella of **Waterkeepers Chesapeake[108]**. Together these 16 Waterkeeper groups enlist the support of nearly 18,000 volunteers and members to protect the water resources of the watershed. Individual Waterkeepers serve the following subwatersheds:

- Anacostia Riverkeeper
- Baltimore Harbor Waterkeeper
- Chester Riverkeeper
- Choptank Riverkeeper
- Gunpowder Riverkeeper
- James Riverkeeper
- Lower Susquehanna Riverkeeper
- Middle Susquehanna Riverkeeper
- Miles-Wye Riverkeeper
- Patuxent Riverkeeper
- Potomac Riverkeeper
- Sassafras Riverkeeper
- Severn Riverkeeper
- Shenandoah Riverkeeper
- South, West and Rhode Riverkeeper
- Upper Potomac Riverkeeper

More information can be found about each of these Waterkeepers on the Waterkeeper Alliance website[109].

7.1.7 MARINE COUNCILS AND COMMISSIONS

The **Northeast Regional Ocean Council (NROC)** is a state and federal partnership to assist New England partners at the regional level address ocean and coastal issues including the conservation of the region's ocean and coastal resources[110]. NROC was formed by the five Governors of the states of New England, from Maine to Connecticut, in 2005. The three primary focus areas of NROC, which each have a standing committee, are:

- Ocean and Coastal Ecosystem Health: promoting sustainability through science-based management
- Ocean planning: coordinating regional planning for ocean industry, conservation, and recreation
- Coastal Hazard Resilience: providing data and tools to prepare for storms, erosion, and inundation

Climate change is recognized by NROC as a major driver that affects all three focal areas and as such is addressed by all three committees. Each committee develops two-year work plans with strategic priorities. The **Ocean and Coastal Ecosystem Health Committee** has two subcommittees addressing New England estuaries and marine nearshore habitats – the **Marsh Migration Group** and the **Living Shorelines Group**, both aiming to improve understanding and enhancement of habitat resiliency. Resources developed by both subcommittees can be found on the NROC website[110].

The **Mid-Atlantic Regional Council on the Ocean (MARCO)**[111] a collaboration of five states (NY, NJ, DE, MD and VA) formed by their Governors in 2009. MARCO established a **Mid-Atlantic Committee on the Ocean** to facilitate collaboration among state, federal and tribal partners plus the MAFMC and other stakeholders. Shared regional priorities include adaptation to climate change, marine habitats, water quality and renewable energy. MARCO maintains the **Mid-Atlantic Ocean Data Portal** for the southern portion of the NEAFWA region, with some data layers extending farther north or south[112]. To increase awareness and appreciation of the biodiversity of the region's deep-sea canyons, MARCO and partners have developed a multiple webinar series and educational materials that showcase research about and imagery of these remote habitats[113].

Numerous RSGCN and Watchlist species are managed by the National Marine Fisheries Service (NOAA Fisheries), **New England Fishery Management Council (NEFMC)**, **Mid-Atlantic Fishery Management Council (MAFMC)** and **Atlantic States Marine Fisheries Commission (ASMFC)**, with management plans that address habitat as well as species populations. A group of highly migratory species (HMS) of marine fish, for example, are managed jointly by the National Marine Fisheries Service under the **Atlantic HMS Fishery Management Plan**[114]. RSGCN

and Watchlist marine fish managed as HMS in this management plan include Bluefin Tuna (*Thunnus thynnus*), Common Thresher Shark (*Alopias vulpinus*), Scalloped Hammerhead (*Sphyrna lewini*), Shortfin Mako (*Isurus oxyrinchus*), and White Shark (*Carcharodon carcharias*). Internationally HMS are managed by the **International Commission for the Conservation of Atlantic Tunas (ICCAT)** and include RSGCN Bluefin Tuna and White Marlin (*Kajikia albida*), although several pelagic oceanic sharks are also of interest like Watchlist Blue Shark (*Prionace glauca*) and RSGCN Shortfin Mako[115].

The **Atlantic Coast Fish Habitat Partnership** is the regional Fish Habitat Partnership to conserve, protect, restore and enhance habitat for native Atlantic coastal, diadromous and estuarine-dependent fishes, from river headwaters to the edge of the continental shelf, with a focus on estuarine habitats. The ACFHP has identified several conservation objectives for the North Atlantic and Mid-Atlantic regions for coastal fish habitat in their **Conservation Strategic Plan 2017-2021** and accompanying **Conservation Strategic Plan 2020-21** (ACFHP 2017, 2020).

The ACFHP conducts conservation actions throughout the Northeast, from restoring aquatic connectivity on Rivers and Streams habitat to restoring oyster reefs, salt marsh and SAV beds. In Estuaries, ACFHP priority habitats include shellfish beds, live hardbottoms, unvegetated substrates, SAV, macroalgae and associated Tidal Wetlands. In the North Atlantic region the three priority habitats for ACFHP conservation efforts are riverine bottoms (for diadromous fish), SAV and marine and estuarine shellfish beds. In the Mid-Atlantic priority conservation habitats include the same three plus Tidal Wetlands (ACFHP 2017). The Partnership provides funding through the National Fish Habitat Partnership for habitat conservation projects. All five projects funded by the ACFHP in 2022 are within the NEAFWA region and include a fish passage project for Atlantic Salmon in Maine, oyster restoration in Chesapeake Bay, and dam removals in Massachusetts, Connecticut and New Jersey.

The ACFHP has developed a number of decision-making tools addressing the conservation needs of fish and their habitats along the Atlantic coast, including a species-habitat matrix tool[116] to evaluate the relative importance of specific habitat types for a given life history stage of an individual species (Kritzer et al. 2016) and the estuarine and diadromous sections of the **Fish Habitat Decision Support Tool** that visualizes and ranks fish habitat[117].

7.2 FEDERAL PARTNERS

Federal agency partners provide an integral role in conserving the Northeast's fish and wildlife resources and their habitats. These national conservation partners contribute to protecting, conserving, and restoring the fish and wildlife resources of the NEAFWA region in a myriad of ways that can leverage state resources to develop, revise, and implement State Wildlife Action Plans. The following federal agencies, programs, and projects, a representative set of examples that is by no means exhaustive, provide opportunities to inform and contribute to SWAP implementation in six key ways. Additional information about these agencies, programs, and projects are available online through each agency.

7.2.1 LAND PROTECTION AND MANAGEMENT

Several federal agency partners own land and/or conservation easements in the Northeast that create opportunities for habitat protection, restoration and/or enhancement. The USFWS operates the **National Wildlife Refuges System**, with at least 87 National Wildlife Refuges in the NEAFWA region. Each refuge has a **Comprehensive Conservation Plan** describing its natural resources, conservation needs and priorities. The US Forest Services owns and manages six **National Forests** in the Northeast covering more than 4.4 million acres of land.

The National Park Service has at least 38 **National Parks, Recreation Areas, Historic Sites, and Trails** with significant landholdings, plus countless smaller historical parks and National Monuments. The NOAA has three **National Marine Sanctuaries and Monuments** in the Northeast: Gerry E. Studds / Stellwagen Bank National Marine Sanctuary, Northeast Canyons and Seamounts Marine National Monument, and Mallows Bay – Potomac River. Additional National Marine Sanctuaries have been proposed for the Hudson Canyon offshore New York and New Jersey and on Lake Ontario, with the formal designation process starting in June 2022 for the former and April 2019 for the latter.

The US Department of Defense operates approximately 90 military installations in the NEAFWA region, each with an **Integrated Natural Resources Management Plan** in coordination with the USFWS and state in which the installation is located. These installations own and manage 1.2 million acres of land (Ineson and Tur 2022), one of which (Fort Indiantown Gap in Pennsylvania) hosts the only extant population of the RSGCN eastern subspecies Regal Fritillary (*Argynnis idalia idalia*). The **Department of Defense Partners in Amphibian and Reptile Conservation** Network[118] and the **National Military Fish and Wildlife Association**[119] offer partnership opportunities for natural resource managers, such as the use of BMPs for turtles on

military lands. The **Sentinel Landscapes Partnership** is a coalition of federal agencies (Department of Defense, Department of the Interior and USDA), state and local governments, and nongovernmental organizations that partners with private landowners surrounding military installations and ranges to advance sustainable land management practices and protect the installations from incompatible land uses[120]. In the NEAFWA region, the **Middle Chesapeake Sentinel Landscape** was established in 2015 and as of 2022 has protected 51,107 acres of land and enrolled 203,259 acres in management programs, enhancing habitat for more than 120 rare, threatened, or endangered species[121].

The **United States Army Corps of Engineers** (USACE) is perhaps a less well recognized landowner in the Northeast region[122]. The USACE operates and manages 2700 miles of navigation channels, 54 dams, 63 miles of levees, and 22 storm and hurricane barriers in the NEAFWA region. In collaboration with partners, oftentimes state agencies, the USACE owns and/or manages 179 recreational sites in the Northeast with seven lakes, 763 miles of trails, and nearly 2500 campsites that received 10 million visits in 2019.

7.2.2 ENVIRONMENTAL REVIEW AND PERMITS

Several federal agencies have regulatory authorities that can inform and advance SWAP conservation. Federal partners who manage permitting programs or regulatory oversight can, and sometimes already do, incorporate SGCN, RSGCN, and key habitats as priorities, creating opportunities to avoid and minimize adverse impacts. Some of these regulatory programs delegate, coordinate, or have oversight of state authorities and programs, such as individual state coastal zone management programs approved and overseen by NOAA under the **Coastal Zone Management Act of 1972**. The federal consistency provision of the Coastal Zone Management Act requires that federal actions that have a reasonably foreseeable effect on any coastal land or water use, or natural resources of the coastal zone, be consistent with the state's federally approved coastal management program[123]. Federal actions include agency activities (e.g., construction, dredging, shoreline stabilization), license or permit activities, and funding. In this way there is a dual federal-state partnership to manage coastal resources, offering opportunities to incorporate SWAP priorities in environmental and consistency reviews plus permitting activities.

The USFWS and National Marine Fisheries Service (NMFS) have regulatory authority under the **Endangered Species Act of 1972**, as amended, to protect species listed under the Act. The status of federally-listed species is often included as a selection criteria for RSGCN or SGCN, and conservation of SGCN and RSGCN that are not federally-listed offer opportunities to conserve a species and preclude listing. The **Magnuson-Stevens Fishery Conservation and Management Act of 1976**, as

amended, is administered by NMFS and governs marine fisheries management in federal waters of the US. In the Northeast, the New England and Mid-Atlantic Fishery Management Councils operate under this Act. Subsequent revisions to the Act in 1996 and 2002 established provisions to designate Essential Fish Habitat and Habitat Areas of Particular Concern that have important ecological functions and/or are particularly vulnerable to degradation. Many marine species managed under the Magnuson-Stevens Fishery Conservation and Management Act have been identified as SGCN or RSGCN in the Northeast and Essential Fish Habitat has been designated in virtually the entirety of the marine waters of the NEAFWA region (see *Chapter 2* for more information).

The USACE and the EPA administer provisions of the **Clean Water Act of 1972**, with permits issued by the USACE under Section 404 for projects that would impact waters and wetlands. Permit requirements include provisions to avoid, minimize, and mitigate for adverse impacts. Environmental reviews undertaken as part of the permitting process are an opportunity to incorporate threats and impacts to SGCN, RSGCN, and their key habitats. The USACE has a similar authority under the **Rivers and Harbors Act of 1899**, issuing permits under Section 10 for construction projects in or above navigable waterways.

The EPA regulates point and non-point source pollution under the federal Clean Water Act, designating waters that are impaired due to pollution under Section 303(d) and providing National Water Quality Reports. States are required to assess water pollution and report to the EPA every two years on the waters that have been evaluated or assessed. Impaired waters have regulatory Total Maximum Daily Loads of pollutants allowed to address the water quality impairments. The EPA uses this state monitoring information in the Assessment and Total Maximum Daily Load Tracking and Implementation System (ATTAINS) to monitor water quality conditions of surface waters across the country[124].

The **Sikes Act Improvement Act of 1997** requires that the Department of Defense prepare and manage their lands with an Integrated Natural Resource Management Plan in coordination with and approved by the USFWS and the relevant state fish and wildlife agency. Where applicable and appropriate, these plans must also provide for public access for outdoor recreation on military lands. A Memorandum of Agreement between the USFWS, Department of Defense, and AFWA defines the respective roles and responsibilities of the partners and agrees to an ecosystem-based management approach. Integrated Natural Resource Management Plans, which are updated every five years, provide opportunities to advance SWAP conservation actions on the 1.2 million acres of military lands in the Northeast.

The **Fish and Wildlife Coordination Act of 1934** grants authority to the USFWS, and sometimes NMFS, to conduct environmental reviews and evaluations of proposed

water resources development projects. Federal agencies proposing to construct, license, or permit a project that may impact fish and wildlife resources must consult with the federal fish and wildlife agencies, and the relevant state fish and wildlife agencies, to characterize the fish and wildlife resources in a project area, evaluate potential adverse impacts, and identify measures to avoid, minimize, and mitigate those impacts. Inclusion of SGCN and RSGCN and their key habitats within Fish and Wildlife Coordination Act planning aid letters, evaluations, and reports could address threats to and conservation needs of those species as identified in SWAPs.

The USFWS and NMFS also maintain regulatory authority for species conservation under the **Migratory Bird Treaty Act of 1918**, **Bald Eagle Protection Act of 1940**, and **Marine Mammal Protection Act of 1972**.

7.2.3 CONSERVATION PLANNING

One of the key ways that federal partners can inform and contribute to SWAPs is through conservation planning resources and assistance. Federal partners with landholdings have existing management plans (e.g., Comprehensive Conservation Plans for National Wildlife Refuges, State Forest Action Plans, Integrated Natural Resource Management Plans for military installations, Comprehensive Conservation and Management Plans for the National Estuary Program) that do or could incorporate SWAP elements and priorities. Federal agencies with regulatory authorities are involved with the siting of new projects (e.g., infrastructure, pipelines, wind turbines, dredging channels, mines, transportation corridors) that could incorporate SWAP elements and avoid SGCN and RSGCN and their key habitats, minimizing habitat fragmentation and modification. The regional partnerships described above in Section 7.1 involve multiple federal partners in conservation that involves collaborative conservation planning at the landscape scale.

State Wildlife Action Plans can be informed by monitoring programs and projects of federal partners, particularly for Elements 1, 2 and 3, as described in *Chapter 5*. Many federal partners have habitat management projects and programs that can inform SWAP Elements 2 and 3 (see *Chapter 2*). Some agencies maintain their own lists of priority species for conservation, such as the Sensitive Species list of the US Forest Service[125]. The Northeast At-Risk Species Program of the USFWS included the RSGCN status of species when evaluating and identifying At-Risk Species for the region (USFWS 2021c).

7.2.4 RESEARCH, INVENTORY, AND MONITORING

Conservation partners have scientific research and/or survey programs or resources that do or could contribute to improved understanding of SGCN, RSGCN, their key habitats, threats and conservation needs, thus informing SWAPs. *Chapter 5* describes research,

inventory, and monitoring programs in the Northeast, including numerous programs and projects conducted by federal partners. The USFWS, NOAA, USGS, and EPA in particular offer status, trends, and assessment information for fish and wildlife conservation. The NOAA, USGS, and USDA maintain science research centers across the country. By collaborating with the existing research, inventory, and monitoring programs of federal partners, state fish and wildlife agencies can expand capacity and inform research and monitoring priorities of those partners.

The recently established At-Risk Species Program teams in the Northeast, described throughout this Regional Conservation Synthesis, are a valuable resource to collaborate on the research, inventory, and monitoring needs of SWAPs, as are the other projects of the Science Applications program of the USFWS.

The Northeast Climate Adaptation Science Center (NECASC), supported by the USGS, is based at the University of Massachusetts, Amherst (UMass), but involves a consortium of scientists across the Northeast[126]. The Northeast collaboration with the NECASC / USGS / UMass consortium includes a team of climatologists, biologists, ecologists, and hydrologists with cutting-edge approaches to address major challenges posed by climate change. The Center's robust scientific contributions have produced valuable tools and information on addressing climate change in the Northeast. One of the most significant contributions was the 2015 Northeast Climate Change Synthesis to support the 2015 Northeast SWAP revisions (Staudinger et al. 2015). NECASC has again initiated a project to assist the 2025 SWAP revision process and to update the 2015 Synthesis which will be available in late 2023 (Staudinger et al. 2023 *in press*).

NE CASC established a Northeast Climate Change Working Group to solicit information leading to a better understanding of the climate change-related needs of state fish and wildlife agencies and their key partners, and then to develop and deliver science to meet those needs. Collaboration with natural and cultural resource managers has provided the climate change science to help inform fish and wildlife management decision-making and produce actionable products and results including more than 160 research projects and tools to facilitate climate change adaptation strategies for the Northeast as of 2022. A searchable inventory of research projects and assessments prepared by NE CASC is available on the Center's website[127]. Recent NE CASC projects particularly relevant to SWAPs are summarized in *Chapters 4* and *5*.

The National Estuarine Research Reserve (NERR) program within NOAA, not to be confused with the National Estuary Program of the EPA, offers long-term research and monitoring programs focused on coastal ecosystems[128]. Ten of the 30 NERR in the United States are located in the NEAFWA region, one in every Atlantic coastal state. The Connecticut NERR was newly established in 2022, protecting 52,160 acres of Long Island Sound estuary, tidal wetlands and flats, and adjacent beaches, dunes, bluffs,

grasslands, shrublands, and forest. The nation's NERR also serve as environmental education and coastal stewardship resources.

7.2.5 TECHNICAL ASSISTANCE

Multiple federal conservation partners offer technical assistance programs that do or could incorporate SGCN, RSGCN and/or their key habitats as priorities for conservation. Oftentimes these programs can facilitate implementation of conservation practices and BMPs on private lands, such as the **Partners for Fish and Wildlife Program** of the USFWS[129] and the **Natural Resources Conservation Service** of the USDA[130] in particular. The USDA **Animal and Plant Health Inspection Service (APHIS)** provides technical assistance to partner government agencies and private landowners on wildlife management, predator control, wildlife health, and invasive species[131]. The **US Forest Service**, also within the USDA, provides technical assistance to state and private forestry programs, including guiding the development of State Forest Action Plans that are required to incorporate SWAP priorities (see *Chapter 2*). The **Engineer Research and Development Center** of the USACE offers technical guidance and resources for both civil and military activities, including nature-based solutions for coastal management (see *Chapter 2*). The Federal Highways Administration has several offices that provide technical assistance resources on transportation decision-making, such a **Wildlife Crossing Structure Handbook[132]** and resources for designating National Scenic Byways or Bikeways[133].

7.2.6 FINANCIAL ASSISTANCE

Just as several federal conservation partners offer technical assistance resources, multiple agencies offer financial assistance as well. These financial assistance programs can support implementation of conservation actions on private lands or can provide matching funds for SWAP implementation. Grant programs such as the Delaware River Restoration Fund, Delaware Watershed Conservation Fund, and the Chesapeake Bay Stewardship Fund described in Section 7.1 are investing millions of dollars every year in Northeast conservation projects. The Natural Resources Conservation Service provides millions of dollars in annual financial assistance programs for private farm owners throughout the region, as described in *Chapter 2* (see Sections 2.22 and 2.23).

The Federal Highways Administration **Recreational Trails Program** provides funds to states to develop and maintain recreational trails and trail-related facilities, both motorized and non-motorized[134]. The Recreational Trails Program received supplemental funding through 2026 as part of the Bipartisan Infrastructure Law of 2021. Transportation projects that include measures to reduce vehicle-caused wildlife mortality or that restore and/or maintain connectivity among aquatic or terrestrial habitats are eligible for funding through the **Surface Transportation Block Grant**

Program[135], **Highway Safety Improvement Act Program**[136], **Tribal**[137] **and Federal Lands Transportation Programs**[138], and **Federal Lands Access Program**[139].

The US Forest Service **Landscape Scale Restoration Grant Program** is a competitive grant program to address landscape level issues on state, tribal, and private forests and woodlands such as watershed protection and restoration, the spread of invasive species, disease, insect infestation, and wildfire risk reduction. Conservation strategies of State Forest Action Plans are prioritized and projects are evaluated and awarded regionally. A **Landscape Scale Restoration Manual** and **Landscape Scale Restoration Project Planning Tool** are available to guide conservation projects. An inventory of Landscape Scale Restoration Projects is available online[140].

In addition to financial assistance available through the Chesapeake Bay Program and Great Lakes Restoration Initiative described in the previous section, the EPA also offers financial assistance programs that can contribute to SWAP implementation[141]. **Multipurpose Grants Program** awards financial assistance to states and Tribes for high priority activities that complement programs under established environmental statutes – i.e., pollution, climate change, and environmental justice[142]. Competitive and non-competitive grants and rebate programs are available for projects and programs relating to air quality, transportation, climate change, and other related topics[143]. Grants are available to assess, clean up, and redevelop brownfields or contaminated sites, including non-competitive financial assistance for states and tribes to establish or enhance brownfields response programs[144]. **Environmental Education Grants** are available for projects that promote environmental awareness and stewardship[145]. Matching funds are available through the **Pollution Prevention Grant Program** and **Source Reduction Assistance Grant Program** for states and tribes to support pollution prevention, develop state-based programs, and conduct research, experiments, surveys, education, training, and demonstration projects[146].

7.3 TRIBAL PARTNERS

Twenty-five federally recognized Tribal Nations reside in the Northeast Region. All are generally supportive of efforts to conserve the region's native fish, wildlife, and plant species. While each Tribal Nation is unique, they all contend with similar challenges, which include the need to protect their sovereignty and self-determination and to keep their people safe. Tribal Leaders must address a wide variety of concerns, and conservation competes with other priorities. Some Tribes have well-developed conservation programs, with staff who are experienced in preparing grant proposals and

have the capacity to conduct projects. Other Tribes may have only one Natural Resource Coordinator (their titles vary), and some either do not have such a position or have no one in place to fill it (T. Binzen, USFWS Tribal Liaison, pers. communication, January 20, 2023).

From the Indigenous perspective, the ancestors were given a world that was in balance ecologically. It is the duty of those now living to conduct themselves in ways that maintain and restore that balance and give consideration to the generations yet to come. People are not separate from nature and no one has ownership of the land. Distinctions between natural resources and cultural resources are artificial. In some traditions, fish and wildlife are considered as kin to human beings. What happens to the animals happens to the people (T. Binzen, USFWS Tribal Liaison, pers. communication, January 20, 2023).

Common concerns and objectives for Tribal conservationists in the Region involve climate change; aquatic connectivity and fish passage; habitat restoration; biodiversity; invasive species; environmental contaminants; water and air quality; technical capacity; food security; preservation of traditional cultural practices; and environmental education. Possibly the greatest challenge for Tribal conservation at this time is ensuring that Tribal Nations have access to available funding and resources, to ensure they have the capacity and expertise to implement projects on the ground in ways that will benefit their communities (T. Binzen, USFWS Tribal Liaison, pers. communication, January 20, 2023).

7.3.1 INDIGENOUS KNOWLEDGE

In November 2022 the White House Office of Science and Technology Policy (OSTP) and Council on Environmental Quality (CEQ) released guidance to assist government agencies in understanding Indigenous Knowledge, fostering mutually beneficial relationships with Tribal Nations and Indigenous peoples, and incorporating Indigenous Knowledge into policies, research, and decision-making (OSTP and CEQ 2022). The **Guidance for Federal Departments and Agencies on Indigenous Knowledge** includes practices that consider and apply Indigenous Knowledge in a way that respects Tribal sovereignty and provides benefits for Indigenous and Tribal communities.

Recognizing that Indigenous Knowledge is unique and specific to a Tribe or Indigenous people, the guidance assists agencies that often lack expertise in appropriately considering and applying Indigenous Knowledge in planning and decision-making. Traditional Ecological Knowledge is a valuable resource for natural resource management and can also be informative for SWAPs. At the federal level, the

importance of Indigenous Knowledge is recognized in formal policies of the Departments of Agriculture and Interior, Environmental Protection Agency, National Oceanic and Atmospheric Administration, Advisory Council on Historic Preservation, and the U.S. Global Change Research Program (which produces the National Climate Assessments).

The federal guidance describes Indigenous Knowledge and how it relates to other systems of knowledge. It also provides a list of federal statutes where Indigenous Knowledge may be relevant, including the Endangered Species Act, Marine Mammal Protection Act, Magnuson-Stevens Fishery Conservation and Management Act, and National Environmental Policy Act, statutes that are also relevant wildlife conservation and SWAPs. Recommended Tribal engagement activities include public meetings, listening sessions, and other outreach activities. Out of respect for Tribal sovereignty, agencies should only engage with Tribal leaders directly or with individuals who are designated or appointed Tribal leadership. The federal guidance recommends that state engagement policies align with federal policies where possible and that any differences be clearly communicated to Tribal Nations and Indigenous peoples. Four Appendices in the guidance provide examples of how Indigenous Knowledge has been applied through collaboration between the federal government and Tribes and Indigenous peoples (OSTP and CEQ 2022, Appendix A); references and links to federal agency guidance documents (Appendix B); a framework for treating Indigenous Knowledge as highly influential scientific assessments under the Information Quality Act (OSTP and CEQ 2022, Appendix C); and additional references and resources for planning, engagement, decision-making, shared management structures, recognizing Indigenous methodologies, honoring Indigenous languages, applying Indigenous voice and style in writing, citing Indigenous Knowledge, and more.

Indigenous Knowledge is informing climate change adaptation nationally, and this includes the Northeast. The Northeast Climate Adaptation Science Center has a Tribal Liaison to engage Indigenous people and incorporate their Traditional Ecological Knowledge into adaptation strategy guidance and tools. Indigenous cultural practices regarding burning, for example, can inform larger climate adaptation strategies where regionally appropriate (Ryan et al. 2013, Oswald et al. 2020, Adlam et al. 2022). In the Northeast, one project currently in development is the creation of a **Wabanaki Climate Adaptation and Adaptive Management Framework**[147]. The Climate Change Response Framework of the Northern Institute of Applied Climate Science developed an extensive collection of climate change adaptation strategies for forest management using Indigenous Knowledge, the **Dibaginjigaadeg Anishinaabe Ezhitwaad: Tribal Climate Adaptation Menu** (Tribal Adaptation Menu Team 2019).

7.3.2 TRIBAL ENGAGEMENT - USFWS

Like other federal agencies, the U.S. Fish & Wildlife Service (USFWS) has a trust responsibility to the federally recognized Tribal Nations. The trust responsibility stems from the fact that all places in the United States were Indigenous homelands at one time. Historically, the government wanted the Tribes' lands and the resources they contained and wanted hostilities to cease. The government obtained these things, and in return, the Tribal Nations received the government's promise that the Tribes' sovereignty and self-determination would be respected, the Tribes' interests would be protected, and the Tribes would be provided with a land base for their occupation and benefit. Honoring these promises is a perpetual obligation for the federal government. This is the basis of the trust responsibility (T. Binzen, USFWS Tribal Liaison, pers. communication, January 20, 2023).

The Northeast Region of the US Fish and Wildlife Service works to uphold the trust responsibility in a variety of ways. There are many things that the USFWS is called upon to do with Tribes, or for Tribes, as required by policy or regulation. For anything that the USFWS funds, permits, or does, the agency considers whether that proposed action has the potential to affect the interests of any federally recognized Tribal Nation. If it does, the USFWS informs the Tribe, listens to any concerns, and does what is feasible within the agency's authority to address those concerns. The USFWS's actions may warrant Tribal consultation under the Endangered Species Act, National Environmental Policy Act, National Historic Preservation Act (Sec. 106), and Bald and Golden Eagle Protection Act, among other laws (T. Binzen, USFWS Tribal Liaison, pers. communication, January 20, 2023). In 2018 the USFWS released an updated **Tribal Consultation Handbook** that describes the rights and responsibilities of Tribal Nations, provides information on cultural diversity and awareness, and outlines recommended consultation protocols (Monette et al. 2018).

In addition to the USFWS's obligatory relations with Tribal Nations, there are ways that the various programs within the agency can seek alignment of conservation priorities with Tribes, as well as seek partnerships, which may in turn involve technical assistance or funding. USFWS programs that work with Tribes in the Northeast include Ecological Services, Fisheries and Aquatic Conservation, and the National Wildlife Refuge System. For more than two decades, the agency's Tribal Wildlife Grants Program (TWG) has provided funding for Tribes' conservation projects and capacity-building. TWG is administered by the USFWS's Wildlife and Sport Fish Restoration program (T. Binzen, USFWS Tribal Liaison, pers. communication, January 20, 2023).

7.3.3 TRIBAL SPATIAL RESOURCES

The **Native Lands Advocacy Project** and **Native Land Information System**, established in 2019 and sponsored by the Indian Land Tenure Foundation, Native American Agriculture Fund, and Village Earth, includes five thematic hubs of information[148]. The **Agriculture Resource Management Plans – Integrated Resource Management Plans Planning Portal** is a toolkit for Tribal Resource Management Plans, enabled by the American Indian Agricultural Resource Management Act of 1993. The **Food-System Transition Index for US Native Land** is a tool of 20 key indicators that measure the transition to healthy food-systems in support of sustainable Tribal land use planning. The **Lost Agriculture Revenue Database** helps to quantify the impacts of land cessions and discriminatory agriculture policies of the US government by allowing more than 175 years of county-level agriculture census data to be disaggregated into smaller blocks, facilitating data re-aggregation for areas that overlap county boundaries. The **Native Agriculture** hub collates datasets and other resources to inform the current extent, demographics, and potential for expanding agriculture on Indigenous lands. Lastly, the **Status of Native Lands** collects data resources to inform assessment of the US Bureau of Indian Affairs' management of lands and subsurface mineral estates held in trust for Indigenous peoples and Tribes. All of the project's datasets are available in the **Native Land Data Portal**[149].

The **Native Land Digital** platform is a global map of the best available information on the extent of Indigenous territories but does not represent the current legal boundaries of those territories[150]. For each territory on the map, there is an associated resource with Tribal links, related maps, information sources, a list of updates or changes to the known extent of the territory, and a place to submit corrections. Established in 2018 in Canada, this native lands resource is led by Indigenous peoples from across the world. Information on languages and applicable treaties is also included.

7.3.4 TERRITORY ACKNOWLEDGEMENTS

Federal guidance calls for agencies to acknowledge the historical context and past injustice and marginalization of Indigenous peoples (OSTP and CEQ 2022). This acknowledgement is needed to foster Tribal engagement and develop collaborative partnerships that are more equitable and inclusive, whether the Indigenous peoples are Federally-Recognized Tribes or not. Although the Native Lands Digital map can indicate the Indigenous peoples of a specific area like the Northeastern United States (Figure 7.3.1), it is recommended that the information be verified by contacting the Tribal Nations directly and inquiring if and how they wish to be acknowledged. Resources to inform territory acknowledgement is available online at Native Land Digital[151].

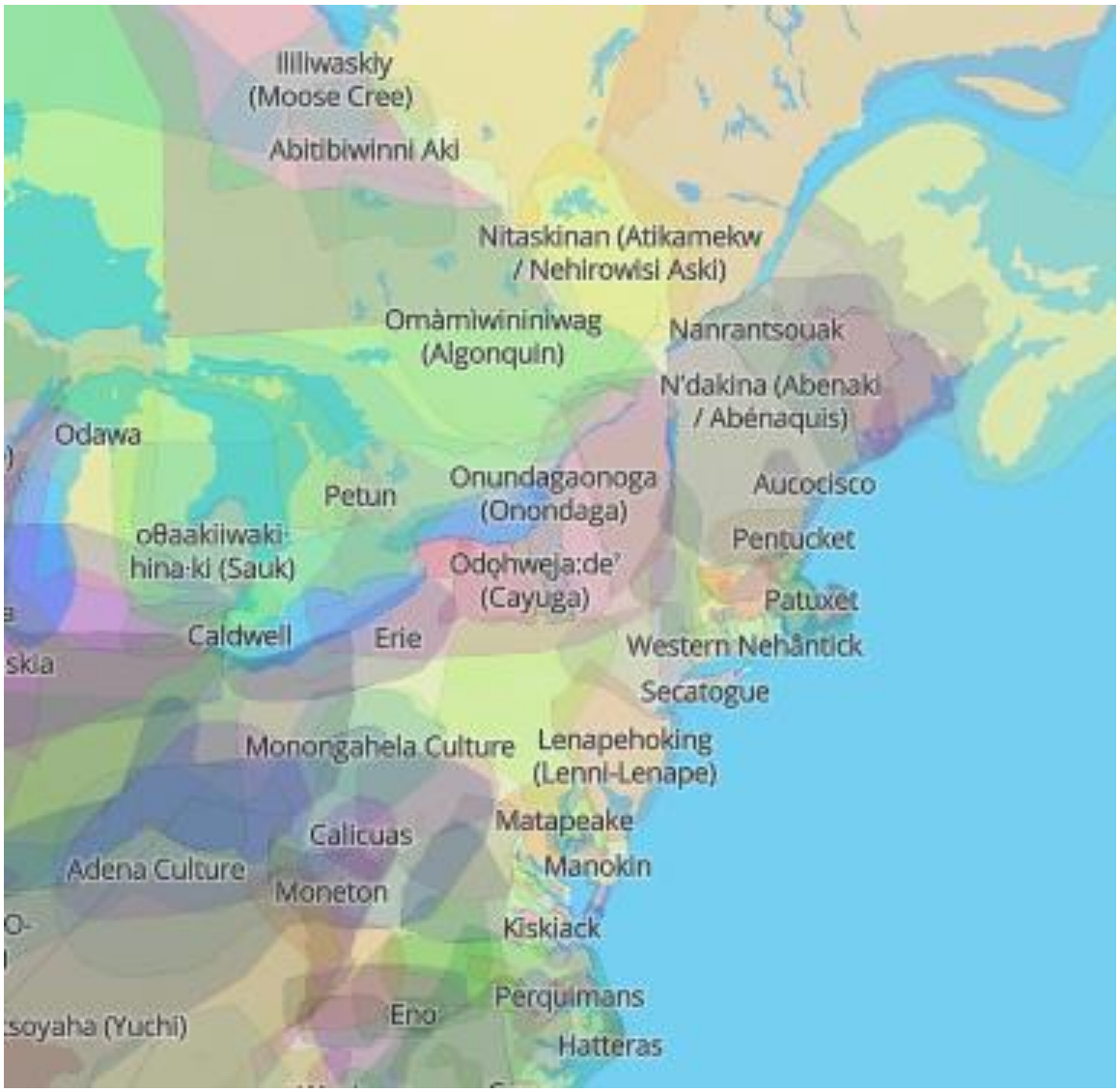

Figure 7.3.1. The Native Lands Digital identifies the best available information on the Indigenous peoples of the Northeast region and their historical territories, which often overlap[152].

7.3.5 TRIBAL NATURAL RESOURCE ORGANIZATIONS

INSTITUTE FOR TRIBAL ENVIRONMENTAL PROFESSIONALS (ITEP)

The **Institute for Tribal Environmental Professionals (ITEP)** has extensive resources for Indigenous natural resource management on climate change, air and water quality standards, clean transportation, status assessments, and more[153]. The organization hosts conferences and workshops, as well as classroom and online training on current topics of interest. Internships and scholarships are available to support

Indigenous education in the environmental fields. ITEP was founded at Northern Arizona University, in collaboration with EPA to act as a catalyst among Tribal governments, academia, government agencies at all levels, and the private sector, in support of environmental protection of Tribal and Indigenous natural resources. The mission of ITEP is to strengthen the capacity and sovereignty of Tribes in natural resource and environmental management through culturally relevant education, research, partnerships, and policy-based services to foster a healthy environment for strong, self-sustaining Tribal communities.

The **ITEP Tribes and Climate Change Program** distributes a monthly newsletter with information, news, and opportunities relevant to Tribal and Indigenous climate change planning efforts. The program hosts a biennial **National Tribal and Indigenous Climate Conference** and prepared **The Status of Tribes and Climate Change Report** in 2021 (STACC Working Group 2021). Tribal profiles with active climate change programs and projects are provided on the program's website, sorted by region. ITEP, the Affiliated Tribes of Northwest Indians, Bureau of Indian Affairs, various host institutions, and the Northwest, Southwest, and Southcentral Climate Adaptation Science Centers have hosted an annual Tribal Climate Camp since 2016. This professional Camp supports delegations of Tribal leaders, climate change coordinators, planners, and program managers to gather information, build skills, and develop Tribal plans and policies needed to address climate change impacts.

NATIVE AMERICAN FISH AND WILDLIFE SOCIETY

The mission of the **Native American Fish and Wildlife Society** (NAFWS) is to protect, conserve, and enhance Tribal fish and wildlife resources[154]. The organization facilitates and coordinates inter-tribal communications on matters relating to fish and wildlife; protects and conserves the wise use and management of Tribal fish, wildlife and recreation resources; provides environmental education on best management practices; serves as administrative support and expertise to Tribal governments; improves the general welfare of Tribal people through education and enhancement of fish and wildlife resources; and provides professional publications to share information among members and their conservation partners.

Current NAFWS initiatives of the Native American Fish and Wildlife Society focus on climate change, invasive species, Tribal wildlife corridors, wildlife health, and Tribal conservation law enforcement program enhancement. One ongoing project supports Tribal involvement in SWAPs[155]. The Society also actively supported the proposed Recovering America's Wildlife Act.

GREAT LAKES INDIAN FISH AND WILDLIFE COMMISSION

The **Great Lakes Indian Fish and Wildlife Commission** (GLIFWC) was formed in 1984 and provides natural resource management expertise, legal and policy analysis, conservation enforcement, and public information services throughout treaty ceded territories[156]. Although focused on the western Great Lakes outside of the Northeast region, the Traditional Ecological Knowledge and expertise of the Commission is relevant to the Northeast because the Great Lakes are connected and face shared threats. The GLIFWC has multiple focus areas relevant to SWAPs:

- Climate change
- Forest pests
- Great Lakes fisheries
- Inland fisheries
- Mercury levels in inland lakes
- Environmental contaminants in the Great Lakes
- Invasive species
- Mining
- Wildlife
- Wild plants, particularly wild rice
- Conservation law enforcement

The Commission issues off-reservation harvest permits for its eleven member Ojibwe Tribes. Environmental education materials and technical reports are available, including materials on monitored threats to fish and wildlife resources, invasive species control, cumulative impacts assessments of proposed pipeline construction projects, and application of climate change adaptation frameworks to Tribal lands. The Great Lakes Indian Fish and Wildlife Commission participates in the Great Lakes Restoration Initiative, which funds Tribal projects consistent with its goals and objectives.

I-COLLECTIVE

The **I-Collective** is a community of Indigenous chefs, herbalists, seed and knowledge-keepers, and activists working together within the framework of four guiding principles: Indigenous, Inspired, Innovative, and Independent[157]. The collective seeks to highlight Indigenous contributions to resiliency and innovation in agriculture, gastronomy, the arts, and society. By recognizing and supporting Indigenous food sovereignty, the effort addresses many health issues and the historical exploitation of resources and people. Member projects are reindigenizing the landscape, cultivating Indigenous sense of place, and promoting traditional knowledge.

7.4 BOTANICAL PARTNERS

Opportunities exist for enhanced partnerships with botanical organizations and agencies to advance fish and wildlife conservation and implement SWAPs. In addition to state Natural Heritage Programs that offer resources and expertise for plants within a state and regionally, national and regional botanical resources are available. In January 2023, the National Academies of Science, Engineering, and Medicine completed a multi-year **Assessment of Native Seed Needs and the Capacity for their Supply** (National Academies of Sciences, Engineering, and Medicine 2023). This Assessment includes the native seed needs of federal agencies, state agencies, and tribal organizations. Information is provided about seed suppliers and summarizing knowledge gaps and research needs to support the supply of native seeds. Numerous cooperative partnerships for native seed development, supply, and usage are described, from state and municipal-level programs (e.g., the Greenbelt Native Plant Center and Mid-Atlantic Regional Seed Bank in New York) to regional and national programs (e.g., USDA, USFS, Plant Conservation Alliance).

The **Plant Conservation Alliance** is a public-private partnership of organizations sharing the same goal to protect native plants by ensuring that native plant populations and their communities are maintained, enhanced, and restored[158]. As of 2022 the Alliance included 40 federal agencies and over 400 non-federal partners nationwide. The **Southeastern Plant Conservation Alliance** includes Virginia and West Virginia in its geographic focus area and is in the process of identifying regional priority plant species in partnership with the Southeast Association of Fish and Wildlife Agencies, NatureServe, the Atlanta Botanical Garden, and the USFWS[159]. The Mt. Cuba Center and other partners are establishing a **Mid-Atlantic Plant Conservation Alliance,** which would include New York, New Jersey, Pennsylvania, Delaware, Maryland, the District of Columbia, Virginia, and West Virginia. These regional partnerships offer opportunities to inform SWAPs and contribute to SWAP implementation.

Nationally, the USDA has several botanical programs. The USDA maintains the **Plant List of Attributes, Names, Taxonomy, and Symbols (PLANTS) Database[160]**. This inventory provides a standardized information about the vascular plants, liverworts, mosses, lichens, and hornworts of the US and its territories. The 2020 **National Wetland Plant List** identifies wetland indicator species (8000+) and is included in the PLANTS Database with species profile pages, searchable by region[161]. The PLANTS Database website now includes related resources and tools for pollinators, ecosystem dynamics, plant identification keys, culturally significant plants, invasive and noxious weeds, federally and state-listed plants, and technical publications from the

Plant Materials Program. The Natural Resources Conservation Service maintains state plant lists available online[162].

The US Forest Service manages the tribally guided **Intertribal Nursery Council** to advance the interests of Indigenous peoples involved with plant production in nurseries[163]. The goals of the Intertribal Nursery Council are to share information and technology transfer, preserve ecological knowledge, provide nursery training, conduct conservation education, and contribute to reforestation and habitat restoration projects by propagating native plants. The **Nursery Manual for Native Plants: A Guide for Tribal Nurseries** handbook contains detailed information on native plant propagation from seed collection to holistic pest management (Dumroese et al. 2009).

The US Forest Service maintains a **National Seed Laboratory** that propagates seeds of native plants for conservation and restoration projects and conducts research on restoring and sustaining native plant communities[164]. The Laboratory has developed a Native Plant Protocol for handling, germinating and storing seeds, provides training materials to transfer technology, and conserves seeds for genetic diversity. The **Reforestation, Nurseries and Genetic Resources Program** is a collaborative partnership sponsored by the US Forest Service to share technical information with land managers and nurseries related to the production and planting of trees and other native plant species for reforestation, restoration and conservation of forests and woodlands[165]. Numerous guidelines and resources have been developed by the Program and its partners, including a **Propagation Protocol Database** and the **Native Plant Network**.

In the Northeast, botanical gardens and herbarium collections contribute knowledge and conservation of native plant species, propagation, and environmental education programs. Notable examples are the US Botanic Garden, US National Arboretum, New England Botanical Society, Native Plant Trust (formerly the New England Wild Flower Society), Cornell Botanical Garden, Brooklyn Botanic Garden, Longwood Gardens, Mt. Cuba Center, and Winterthur Museum, Garden and Library. The New England Botanical Society, for example, has been active since 1896 and publishes a peer-reviewed scientifical journal (*Rhodora*)[166]. The environmental education and stewardship programs of some of these partners are extensive, from grades K-12 to professional horticulturalists and teachers worldwide.

The Partnership for the Delaware Estuary (see Section 7.1.5) collaborates with several botanical partners to research, propagate, and install native plants (aquatic and terrestrial) as part of habitat restoration and living shorelines projects, including Bartram's Garden, Longwood Gardens, and Winterhur. Their partnership with Bartram's Garden in Philadelphia contributes to restoration in the Delaware River

watershed through an **Ecosystems Education Center** and a freshwater mussel hatchery[167].

7.5 AFWA AND OTHER AFWA REGIONS

The Association of Fish and Wildlife Agencies is divided into four regions. Each of the AFWA regional associations shares at least two states with a neighboring region. In the Northeast, Virginia and West Virginia are members of both the Northeast and Southeast Associations of Fish and Wildlife Agencies. In the Midwest, Missouri and Kentucky are members of both the Midwest and Southeast Associations of Fish and Wildlife Agencies. Canadian Provinces are members of NEAFWA and MAFWA as well. In 2022, AFWA, USGS, and the National Wildlife Federation completed a project to identify recommendations to facilitate implementation of the AFWA (2021) **Framework to Enhance Landscape-scale and Cross-boundary Conservation through Coordinated SWAPs** and for improving the USGS **SGCN National Database** (Kanter and Newsome 2022). This effort identified several recommendations to implement the AFWA (2021) guidance on landscape-scale and cross-boundary conservation within and between the regions:

- Establish consistency in habitat classification and mapping, geographic prioritization, species distribution modeling and state/regional SGCN determination, and data / database structure and management, both between regions and the USGS SGCN National Database.
- A committee of regional Wildlife Diversity Committee Chairs and representative State Wildlife Action Plan Coordinators should meet quarterly to share progress and practices among their multi-state efforts.
- The inter-regional committee should establish Work Groups to share information and best practices for:
    - Species conservation planning (SGCN and RSGCN),
    - Habitats and landscape analysis, and
    - Data and database management.
- A Data and Information Coordination Committee should be established to clarify the roles of AFWA, USFWS, USGS, NatureServe, and Terwilliger Consulting, Inc., to clarify their respective roles for providing data, information, and expertise to support SWAP revisions and cross-boundary planning and implementation.

Since the Northeast Association of Fish and Wildlife Agencies first identified a list of Regional Species of Greatest Conservation Need, the adjacent Southeast Association of Fish and Wildlife Agencies (SEAFWA) and Midwest Landscape Initiative (MLI) /

Midwest Association of Fish and Wildlife Agencies (MAFWA) also have identified RSGCN. The Southeast identified RSGCN animals (vertebrates, crayfish, freshwater mussels, and bumble bees) in 2019 as shared priorities for its 15 member states[168]. In 2021, the 13 states of the Midwest identified RSGCN animals for 13 taxonomic groups[169]. The three regions have used consistent RSGCN selection methodology, with slight advancements each time (see *Chapter 1*).

Comparison of the three AFWA RSGCN lists illustrates opportunities for shared cross-regional collaboration (Table 7.6.1). The Northeast and Southeast share the highest number of RSGCN and Proposed RSGCN species with 120. The Northeast and Midwest share 64 RSGCN and Proposed RSGCN. All three regions have 30 RSGCN and Proposed RSGCN representing eight taxonomic groups in common. Of these 30 shared species, nine are listed as Very High Concern by all three regions: three bats, one bumble bee, and five freshwater mussels. Seven of these shared Very High Concern RSGCN are federally-endangered, one is federally-threatened (Northern Long-eared Bat [*Myotis septentrionalis*]), and one is under review for federal listing (Little Brown Bat [*Myotis lucifugus*). The federally-endangered, Very High Concern RSGCN are Indiana Bat (*Myotis sodalis*), Rusty-patched Bumble Bee (*Bombus affinis*), Rough Pigtoe (*Pleurobema plenum*), Orangefoot Pimpleback (*Plethobasus cooperianus*), Sheepnose (*Plethobasus cyphyus*), Snuffbox (*Epioblasma triquetra*), and Cracking Pearlymussel (*Hemistena lata*). Conservation of these highest concern species benefits from cross-regional collaboration and partnership with the USFWS.

Table 7.6.1. The number of species identified as RSGCN or Proposed RSGCN in more than one region, with the 2023 Northeast RSGCN list, 2021 Midwest RSGCN list[170], and 2019 Southeast RSGCN list[171].

AFWA Regions	Number of Shared RSGCN and Proposed RSGCN Species
NEAFWA and SEAFWA	120
NEAFWA and MLI / MAFWA	64
NEAFWA, SEAFWA, and MLI / MAFWA	30

In the most recent RSGCN projects in the Midwest (2021) and Northeast (2023) a new Watchlist [Deferral to adjacent region] category was incorporated to capture species for which a region had conservation concern but limited regional responsibility, typically for species on the edge of their ranges. Watchlist [Deferral] species recognize the shared

conservation stewardship of species that span multiple AFWA regions, informing the region with primary regional responsibility of the conservation status and trends in adjacent regions on the periphery of species ranges.

In the 2023 update to the Northeast RSGCN list, Watchlist [Deferral] species were identified for the Southeast, Midwest, Canada, and on rare occasion to the Western Association of Fish and Wildlife Agencies (WAFWA; Table 7.6.2).

Table 7.6.2. The 2023 Northeast RSGCN update identified 95 species as Watchlist [Deferral to an adjacent region] species, species for which the Northeast has conservation concern but low regional responsibility.

Watchlist [Deferral] Region	Number of Species
SEAFWA	56
MAFWA / MLI	18
SEAFWA and MAFWA	15
Canada	2
Canada and WAFWA	3
MAFWA and WAFWA	1
Total	**95**

The high number of species deferred to the Southeast (56) reflect the high level of endemism in the Appalachian and coastal ecological regions between the two AFWA regions, plus the shared status of Virginia and West Virginia. Twenty-one of these Southeast Deferral species are Southeast RSGCN. All but six of the 18 species deferred to the Midwest are listed as RSGCN or Watchlist species by MLI and MAFWA. Nine of the 15 Deferral species to both SEAFWA and MAFWA are already listed as RSGCN in those regions, eight by both regions and one by just SEAFWA.

The Evening Grosbeak (*Coccothraustes vespertinus*) is experiencing continent-wide declines but is deferred to both the Midwest and West as having primary regional responsibility. The two Watchlist [Defer to Canada] species are dragonflies – Boreal Snaketail (*Ophiogomphus colubrinus*) and Canada Whiteface (*Leucorrhinia patricia*) - with range shifts occurring or expected due to climate change. Within the US portion of NEAFWA, both species are only known to occur in Maine at present.

The three species deferred to both Canada and WAFWA are the Olive-sided Flycatcher (*Contopus cooperi*), Indiscriminate Cuckoo Bumble Bee (*Bombus insularis*), and Suckley's Cuckoo Bumble Bee (*Bombus suckleyi*). The Olive-sided Flycatcher is listed as Special Concern by Canada and Near Threatened by the International Union for the Conservation of Nature (IUCN), as well as SGCN in ten NEAFWA states. The bird's breeding range is retracting north and the population is in steep decline, resulting in less regional responsibility for the Northeast and more for Canada and the West. Records of the Indiscriminate Cuckoo Bumble Bee are rare in the region, with larger populations in the Canadian Maritime Provinces and western US. The Suckley's Cuckoo Bumble Bee is listed Threatened by Canada and Critically Endangered by IUCN, experiencing severe decline across its range in the last two decades. Modern records of the species in the Northeast US are uncertain, with a disjunct population in the Canadian Maritimes. The new Northeast and Midwest Watchlist [Deferral] species lists inform cross-regional conservation collaboration efforts between not only those adjacent regions, but all four AFWA regions and the Canadian Provinces which are also members of AFWA.

7.6 ACADEMIC PARTNERS AND PROGRAMS

Academic institutions and programs actively contribute to fish and wildlife conservation in the Northeast, informing SWAPs, and addressing research, inventory, and monitoring needs. The University of Massachusetts at Amherst, for example, hosts the Northeast Climate Adaptation Science Center in partnership with the USGS and the Designing Sustainable Landscapes program, which created and maintains a number of spatial analysis tools and datasets of the region's landscape. The Cornell Lab of Ornithology maintains some of the best bird information resources in the world, hosting Birds of the World, the K. Lisa Yang Center for Conservation Bioacoustics, the Center for Avian Population Studies, and the Macaulay Library archive of natural history audio, video, and photograph specimens. The Cornell University Center for Conservation Social Science has developed resources to inform understanding of public wildlife values, agency relevancy, and outreach techniques (see *Chapter 8*). The Virginia Tech Shorebird Program is a consortium of university conservation biologists that studies, tracks, and develops management tools for shorebird conservation on the Atlantic and Gulf of Mexico coasts.

Some colleges and universities host long term coastal research programs and sites. The University of Connecticut is a key partner in the newly established Connecticut National Estuarine Research Reserve. Rutgers University is a partner in the Jacques Cousteau National Estuarine Research Reserve in New Jersey and also has research programs for

shorebirds and grassland birds. The Virginia Coast Reserve Long Term Ecological Research program is hosted by the University of Virginia and involves numerous academic partners across the region. Academic partners in the Saltmarsh Habitat and Avian Research Program (SHARP) include the University of Maine, University of New Hampshire, State University of New York College of Environmental Science and Forestry, University of Connecticut, and the University of Delaware.

Several formal academic partnerships with federal fish and wildlife agencies also can inform state wildlife action planning.

7.6.1 USGS COOPERATIVE RESEARCH UNITS

The USGS has a collaborative partnership with academic institutions, the Wildlife Management Institute, and state agencies through the **Cooperative Fish and Wildlife Research Unit Program**[172]. Established in 1935, the national program now supports 41 Units in 39 states. Cooperative Fish and Wildlife Research Units conduct a wide range of scientific studies, with more than 1000 research projects underway as of early 2023. The mission of the Program is to enhance graduate education in fish and wildlife sciences and to facilitate research and technical assistance between natural resource agencies and academic universities on topics of mutual concern. In the Northeast, Cooperative Fish and Wildlife Research Units are located at the University of Maine[173], University of Massachusetts – Amherst[174], Cornell University[175], Penn State[176], University of Vermont[177], Virginia Tech[178], and West Virginia University[179]. The national program maintains a searchable database of projects, research publications, presentations, technical publications, theses, and dissertations[180].

7.6.2 COOPERATIVE ECOSYSTEMS STUDIES UNITS

Cooperative Ecosystem Study Units (CESU) are a collaborative partnership of federal, university, NGO, museum, and other entities, with 17 Units nationwide. In the Northeast region, the **North Atlantic Coast Cooperative Ecosystems Studies Unit** is hosted by the University of Rhode Island and has nine federal partners, one tribal partner (the Narragansett Indian Tribe), and 35 colleges, universities, research institutions, conservation organizations and marine aquarium partners[181]. The Unit supports research, education and technical assistance to inform decision-making within a number of natural and cultural resources areas, including estuaries, tidal wetlands and flats, beaches and dunes, other shorelines, and the marine nearshore. Detailed information about North Atlantic Coast CESU projects can be found online[182].

7.6.3 STATE COOPERATIVE EXTENSION SERVICE & AGRICULTURAL EXPERIMENT STATIONS

The United States Department of Agriculture operates two partnership programs with academic institutions. The **USDA Cooperative Extension Service** partners with land-grant colleges, historically black colleges and universities, and tribal colleges to provide education and outreach to the public of research-based information[183]. In the Northeast every state and the District of Columbia have at least one Cooperative Extension Service, with major Cooperative Extension programs that have informed fish and wildlife conservation at the landscape scale (beyond state borders) including those located at Cornell, Penn State, and Virginia Tech. These programs develop best management practices, guidelines, and tools for the public and private landowners, which are not limited to agricultural landowners. Cooperative Extension offices oftentimes offer Master Watershed Stewards and Master Gardener programs to train and educate citizen scientists in a number of conservation topics. These programs typically operate offices in each county of a state, providing education and outreach activities at the local level.

The USDA also partners with academia to host **Agricultural Experiment Stations**. Similar to the Cooperative Extension Service, there is at least one Agricultural Experiment Station in each NEAFWA state, located at a land-grant college or university[184]. These scientific research centers investigate potential improvements in agribusiness and food production. This research is then incorporated into educational and outreach programs of the Cooperative Extension Service.

7.6.4 NOAA COOPERATIVE INSTITUTES

The National Oceanic and Atmospheric Administration operates three national, formal partnerships with academic institutions. The **Cooperative Institutes** program funds consortiums of academic institutions and research institutes on a five-year cycle to focus research on a particular suite of topics[185]. There are currently four NOAA Cooperative Institutes in the NEAFWA region which can inform SWAPs, particularly Element 3 on understanding, assessing, and monitoring threats to fish and wildlife and their habitats.

The **Cooperative Institute for the North Atlantic Region (CINAR)** is hosted by the Woods Hole Oceanographic Institution, with a consortium of seven other universities and institutes across the Northeast (Rutgers, University of Maine, University of Maryland – Eastern Shore, University of Maryland Center for Environmental Science, University of Massachusetts - Dartmouth, University of Rhode Island, and the Gulf of Maine Research Institute)[186]. The **Cooperative Institute for the North Atlantic Region** has five research themes for its current funding period (2019-2024):

- Sustained ocean observations and climate research
- Ecosystem research, observation, and modeling
- Stock assessment research
- Protected species protection and recovery
- Ecosystem based fisheries management

The **Ocean Exploration Cooperative Institute (OECI)**, located at University of Rhode Island, has a consortium with the University of New Hampshire, University of Southern Mississippi, Woods Hole Oceanographic Institute and the Ocean Exploration Trust[187]. The Ocean Exploration Cooperative Institute currently has three research themes:

- Exploration planning and execution
- Ocean exploration technology
- Increase utility of ocean exploration information

The **Cooperative Institute for Modeling the Earth System (CIMES)** is hosted by Princeton University in partnership with the NOAA Geophysical Fluid Dynamics Laboratory[188]. The Cooperative Institute for Modeling the Earth System has three research themes for its current funding period (2018-2023):

- Earth system modeling – numerical models that simulate the climate and earth system to allow prediction of future changes
- Seamless prediction across time and space scales – application of the earth system models on time scales that range from days to centuries on spatial scales that range from an extreme event to global
- Earth system science: Analysis and applications – using earth system models to better understand the impacts of environmental variations and changes on marine ecosystems, weather extremes, drought, air quality, and other priority issues

The **Cooperative Institute for Satellite Earth System Studies (CISESS)**, located at the University of Maryland, College Park[189], is a consortium of 21 members across the country (including TNC), with three research themes for its current funding period (2019-2024):

- Satellite services
- Earth system observations and services
- Earth system research – to enhance monitoring and predicting ecosystems at regional to basin scales

These agency-academic partnerships provide opportunities for the NEAFWA states and the District of Columbia to increase scientific capacity and leverage resources to fill research, inventory, and monitoring needs of SWAPs.

7.6.5 NOAA SEA GRANT PROGRAM

The second formal agency-academic partnership program of NOAA that can inform SWAPs and contribute to their implementation is the **National Sea Grant College Program**[190]. Similar to the USDA Cooperative Extension Service in that Sea Grant Programs are located in every coastal and Great Lakes state and provide extensive environmental education and outreach programming, Sea Grant Programs also offer technical and financial assistance. The mission of the program is to enhance the use and conservation of Great Lakes, coastal, and marine resources to create a sustainable economy and environment. The four focus areas of the Sea Grant Program are healthy coastal ecosystems, sustainable fisheries and aquaculture, resilient communities and economies, and environmental literacy and workforce development.

National resources available target seafood industry professionals, learning at home, and storm preparedness. At the state level, more specific resources and tools are available from the 13 Sea Grant Programs in the NEAFWA region. The **Woods Hole Sea Grant Program**, for instance, conducts annual surveys of kelp forests in New England at 15 sites from Rhode Island to Maine as part of the global **Kelp Ecosystem Ecology Network (KEEN)**, which indicate that kelp forests have been declining in the Gulf of Maine since the late 1970s[191]. The **Lake Champlain Sea Grant Program**, established in 2018, is a cooperative program with the University of Vermont and State University of New York Plattsburgh that focuses on understanding and management of Lake Champlain, Lake George, and their watersheds[192]. In 2020 the program developed 25 new environmental literacy tools and engaged more than 6100 people in educational activities and programs. The **Maryland Sea Grant Program** recently completed a manual to train and certify landscape professionals in reducing runoff and provided training and technical support to the state's oyster aquaculture industry[193]. The **Pennsylvania Sea Grant Program** has developed resources and projects for green infrastructure and invasive species management[194]. The research, extension, and education resources of these state-based programs can contribute to implementing SWAPs throughout the Northeast region.

7.6.6 NOAA REGIONAL COLLABORATION NETWORK

The third academic partnership program of NOAA is the **Regional Collaboration Network**[195]. The mission of the Regional Collaboration Network is to identify, communicate, and respond to regional needs, catalyze collaboration among partners, and connect people and capabilities to advance NOAA's agency mission and priorities.

Eight interdisciplinary regional programs address issues specific to that particular region.

The North Atlantic Regional Collaboration Network and Great Lakes Regional Collaboration Network are both located in the NEAFWA region. The **North Atlantic Regional Collaboration Network** currently has two focus topics – climate and watersheds, and coastal and ocean uses[196]. Partners in the North Atlantic Regional Collaboration Network include the four Cooperative Institutes and Sea Grant Programs described above, the Consortium on Climate Change in the Urban Northeast, the Northeastern and Mid-Atlantic Regional Association of Coastal Ocean Observing Systems (see *Chapter 5*), the Northeast Regional Climate Center, the National Estuarine Research Reserves of the region, and each of the state coastal zone management programs. The **Great Lakes Regional Collaboration Network** includes all of the NOAA-affiliated programs and partners, as well as the Great Lakes Restoration Initiative and other regional partners. Recent projects of the Network collaborated on understanding and monitoring water levels in the Great Lakes and understanding how climate change is impacting Indigenous communities in the Great Lakes region.

7.7 OTHER PARTNERS AND PROGRAMS

7.7.1 SISTER STATE AGENCIES

One important consideration for the management of terrestrial animals and aquatic resources is that responsibility may be shared with other state agencies. Jurisdictional authority for fish, wildlife, and plant conservation varies among the states. For example, state marine programs usually have jurisdiction over marine plants and animals, though diadromous fish are often shared responsibilities. Some state fish and wildlife agencies may not have authority for all invertebrates or plants. They work closely with those regulatory authorities (e.g., state Department of Agriculture) and often have cooperative agreements with these agencies. Implementation of conservation actions may call for partnerships with other state agencies, such as Departments of Transportation to minimize threats to SGCN or RSGCN (e.g., aquatic connectivity, wildlife crossings). Departments of Agriculture may manage invasive species and wildlife disease, or they may offer opportunities to implement best practices on agricultural lands to address species threats. State fish and wildlife agencies need to clearly communicate and share information with sister state agencies on the highest priority species, activities that threaten imperiled species and their habitats, and opportunities to collaborate on species and habitat conservation.

7.7.2 NON-GOVERNMENTAL ORGANIZATIONS (NGOS)

Northeast NGO partners are described throughout this Regional Conservation Synthesis, with active contributions to all of the SWAP Elements. Non-governmental partners involved in research, inventory, and monitoring programs described in *Chapter 5* and regional conservation projects through Regional Conservation Needs (RCN) Grant and Competitive State Wildlife Grant projects are described in *Chapter 4*. Numerous NGOs partners involved in regional collaborations are described in Section 7.1 of this chapter.

Countless NGO partners focus on species or taxonomic groups. **Partners in Amphibian and Reptile Conservation**, and their Northeast chapter, focus on herptofauna conservation[197]. The **American Fisheries Society** is dedicated to freshwater and marine fish conservation[198]. **Partners in Flight** is an international NGO addressing the scientific and conservation needs of birds[199]. **Bat Conservation International** works to prevent bat extinctions across the globe[200]. The **North American Butterfly Association** conserves, monitors, and educates the public about butterflies[201]. The **Xerces Society for Invertebrate Conservation** advances the conservation of invertebrate species, especially pollinators and at-risk species[202].

Within the Northeast region, the **Atlantic Coast Joint Venture** coordinates landscape scale conservation of birds on the Atlantic Flyway[203]. This Joint Venture, like other Joint Ventures with different geographic focus areas, assesses the status and trends of bird populations, related population and habitat objectives to specific actions and locations, and evaluates the impact of conservation and management. The **Coastal Marsh Inventory and Saltmarsh Sparrow Project Inventory**, for example, tracks conservation projects throughout the region and the adjacent Southeast. Spatial datasets are available for impoundments, tidal marsh vegetation, and priority areas for salt marsh restoration and marsh migration projects. Landscape prioritization tools are available for Eastern Black Rail (*Laterallus jamaicensis jamaicensis*) and Saltmarsh Sparrow (*Ammospiza caudacuta*), two Northeast RSGCN, as are spatial analyses of predicted occupancy and density for several coastal species.

The **Appalachian Mountains Joint Venture** similarly serves as a partner for bird conservation but in the Appalachian Mountains[204]. The **Focal Landscape Initiative** of the Joint Venture strategically targets capacity and resources on the highest priority regions established with partners[205]. Four of the six Focal Landscapes are located entirely or partially within the NEAFWA region: Allegheny Highlands (PA, NY), Greebriar (WV), Virginia Highlands (VA, WV), and Southern Appalachian High Country (VA, TN, NC). In 2022, the Appalachian Mountains Joint Venture launched an **Outreach Toolkit** that offers guidance and resources to effectively communicate and engage with the public on managing Appalachian forests for birds and other wildlife[206].

Resources in the Toolkit include forest management, forest carbon, prescribed fire, urban forestry, and other topics to engage communities and private landowners in conservation. The Appalachian Mountains Joint Venture also provides technical and financial assistance to private landowners to manage and enhance wildlife habitat.

The **National Audubon Society** and numerous state and local Audubon organizations undertake countless activities related to the conservation, management and monitoring of bird species. These organizations own several nature preserves in the Northeast. The National Audubon Society is a key partner in Atlantic Flyway Shorebird Initiative and the Joint Ventures. Partnering with the Cornell Lab or Ornithology and others, Audubon launched a **Bird Migration Explorer** resource in 2022 that aggregates millions of bird observation data into an interactive map to illustrate the migratory paths and stopover sites for hundreds of bird species, including shorebirds and waterbirds in the Northeast[207]. The migratory pathways illustrated on the Bird Migration Explorer clearly highlights the importance of the NEAFWA region as a migration corridor.

Additional NGO with species or taxonomic group conservation missions are discussed in *Chapter 1*.

Many NGO partners focus on habitats and improving habitat condition, oftentimes protecting and restoring habitat nationally or in the Northeast. Some organizations also operate scientific programs that can inform SWAPs. Scientists with **The Nature Conservancy (TNC)**, for example, have developed habitat classification systems and conducted many ecological condition assessments for the Northeast and the nation (Anderson and Frohling 2015, Anderson and Olivero Sheldon 2011, Anderson et al. 2013a and 2013b, Anderson et al 2016a and 2016b, Anderson et al. 2023, Greene et al. 2010, Olivero Sheldon and Anderson 2008 and 2016, Olivero Sheldon et al. 2015). Products and tools developed by TNC are available through their **Conservation Gateway** portal[208].

The **National Wildlife Federation** partners with AFWA and its regional associations to advance landscape scale conservation, promote the use of SWAPs, and advocate for federal funding investments like the Farm Bill and the proposed Restoring America's Wildlife Act (see Section 7.5). With a long history of environmental education and public outreach programs, the National Wildlife Federation has improved habitat across the country at the local, grassroots level. Their **Critical Paths Project** is collaborating with state and federal partners in the Northeast to identify priority zones for wildlife crossings to reconnect habitat and protect wildlife[209]. The National Wildlife Federation recently launched a **Nature-based Solutions Funding Database** that helps community planners and other stakeholders connect with federal funding sources for projects that include nature-based elements[210]. At the local level, the National Wildlife

Federation offers several programs to encourage private landowners to improve wildlife habitat, including the **Million Pollinator Garden Challenge**[211] (see also *Chapter 2*, Section 2.24).

Additional NGOs with habitat and habitat condition conservation missions are discussed in on in *Chapter 2*.

Several institutes with conservation missions contribute to fish and wildlife conservation in the Northeast. The **Wildlife Management Institute** has a long-standing partnership with NEAFWA and the USFWS in the Northeast, administering and managing grant programs like the RCN Program. The Wildlife Management Institute is a national organization, however, that is involved in a wide range of conservation issues, policy, research, and education[212]. The organization leads national conservation partner initiatives, is a cooperator in the Cooperative Fish and Wildlife Research Unit Program (see Section 7.6.1), publishes journals and books on ecology and natural resource management, and hosts an annual North American Wildlife and Natural Resources Conference. The **Eagle Hill Institute and Foundation** also sponsors multiple journals that that contribute to scientific knowledge in the region (inc. *Northeastern Naturalist*), conducts natural history training, and sponsors the annual Northeast Natural History Conference[213]. The **Electric Power Research Institute (EPRI)** offers as a gateway to the energy industry, conducting scientific studies on interactions between the industry and fish and wildlife and developing best practices to avoid and minimize impacts[214]. Their **Ecosystem Risk and Resilience Program** has developed tools and resources relating to environmental justice, nature-based solutions, water resources, wildfires, and climate change. Recent projects and initiatives of the EPRI **Endangered and Protected Species Program** include energy infrastructure impacts to bats (e.g., survey techniques, wind turbine mortality), pollinators (e.g., co-locating solar installations with pollinator habitat), eagles, freshwater mussels, and grassland birds.

7.7.3 LAND TRUSTS

Land trusts play an important role in habitat conservation, benefiting fish and wildlife resources through local preservation and habitat management. The Northeast region supports more than 125 land trusts organizations, many of whom are partners in the Northeast Motus Collaboration[215] (see *Chapter 5*). “With access to enormous expanses of privately held property, land trusts are in a unique position to translate the data provided by Motus into on-the-ground conservation action, ensuring that conservation efforts are as strategically directed and permanent as possible.”[215] Land trusts and other landowning conservation organizations were pivotal partners in the RCN Xeric Habitat for Pollinators project as well[216].

Although land trust organizations are often local, several state, regional, and national land trust associations offer opportunities to engage land trusts at the landscape level. **WeConservePA**, formerly the Pennsylvania Land Trust Association, is a partnership of land trust organizations and partners with a common goal to acquire land and conservation easements to advance land and water conservation[217]. More than 80 land trust organizations are members of WeConservePA across the state of Pennsylvania. The **Trust for Public Land** protects land and create park to provide access for everyone to the outdoors, and the national organization has developed tools to assess and plan access to outdoor recreation (see *Chapter 8*)[218]. The **Land Trust Alliance** is a national collaboration of land trust organizations, with more than 950 members across the country that owns and/or manages land in 93% of the nation's counties[219]. This national organization provides policy, standards, training, and education resources to support local land trusts in their conservation efforts. The **North American Land Trust** coordinates with private landowners to conserve their lands, holding more than 500 conservation easements in 23 states[220].

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7.9 ENDNOTES

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