

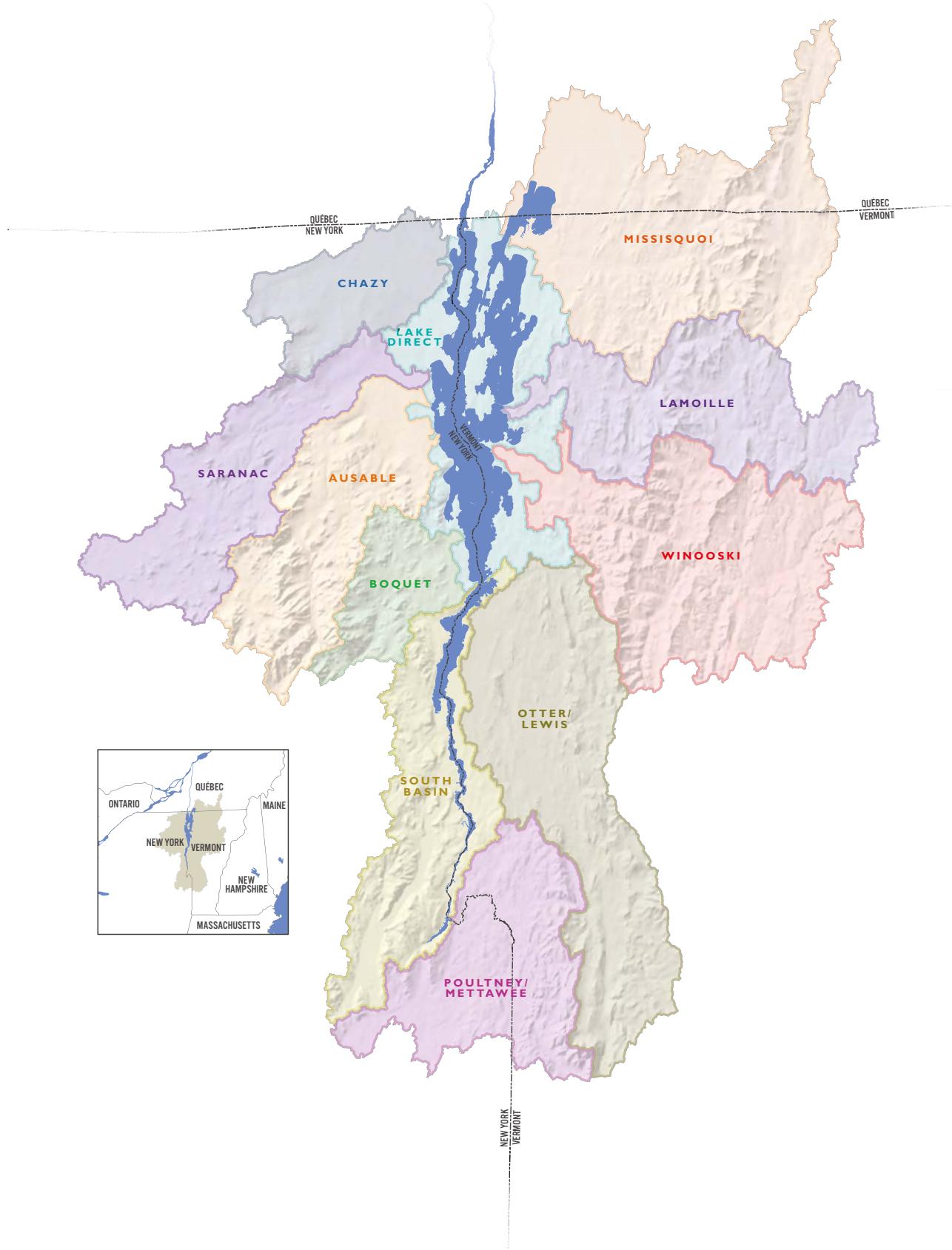
PARTNERS in ACTION

Federal Agencies at Work in the Lake Champlain Basin

NOVEMBER 2017



The Lake Champlain Basin



Introduction

Efforts to improve water quality and ecosystem integrity in the Lake Champlain Basin rely

on the programs and support of a number of U.S. federal agencies. These agencies play a pivotal role in implementing the goals of the Lake Champlain management plan *Opportunities for Action* (plan.lcbp.org). They provide financial and technical support to state and local partners, and implement key projects of their own to restore and protect the Lake and its watershed.

The Lake Champlain Federal Partners are committed to working together to ensure that the activities of each agency collectively support the work of the Lake Champlain Basin Program, the States of Vermont and New York, and the many local and regional partners. Our agencies are responsible for ensuring that this work is done as effectively and efficiently as possible. The Federal Partners Workgroup is an important piece in the effort to achieve coordinated and focused action.

The Federal Partners Workgroup has been meeting formally since the 1990s. As we work on the latest concerns for the Lake and its watershed, as identified in the 2017 *Opportunities for Action*, our collaboration is as critical as ever. The complexities of improving or maintaining water quality and the ecosystem of Lake Champlain are ever changing and challenging. To meet these challenges, we must work together by using our individual strengths and resources. We look forward to meeting the restoration and protection goals of the Lake!

Keith Robinson
Director, USGS New England Water Science
Chair, Lake Champlain Federal Partners Workgroup
October 2017

Table of Contents

6

United States Environmental
Protection Agency



8

National Park Service



10

Lake Champlain Sea Grant



12

United States Army
Corps of Engineers



US Army Corps
of Engineers.

14

**United States Department
of Agriculture**



Vermont
United States Department of Agriculture
Natural Resources Conservation Service

16

**United States Fish and
Wildlife Service**



18

**United States
Geological Survey**



U.S. Environmental



Photo credit: USEPA

A group of public and private partners has conducted comprehensive surveys of the Lake shoreline to identify vulnerable sites and prepare for potential spills.

Emergency Preparedness



The EPA has developed Geographic Response Plans (GRPs) on Lake Champlain to protect natural, historic, cultural, economic, and other resources after spills of oil or hazardous materials. GRPs are location-specific, map-based response strategies developed to help emergency responders minimize the environmental impact and to facilitate recovery of the spilled material. The EPA established a workgroup with diverse backgrounds and areas of expertise consisting of representatives

from Federal, State, Tribal, and Local governmental agencies along with environmental response contractors, the oil/chemical industry, and local environmental advocacy groups. The workgroup identified and prioritized sites, and recommended protection strategies based on the vulnerability of the resources and the risk of spills. Lake Champlain will be better protected and emergency responders will be better prepared to respond to environmental hazards impacting this important resource.

Protection Agency

The mission of the EPA is to protect human health and the environment—air, water, and land—upon which all life depends. Both EPA Region 1 (based in Boston, Massachusetts) and EPA Region 2 (based in New York, New York) have been actively involved with the Lake Champlain Basin Program since its inception in 1990. In addition to serving as the primary funding agency for the LCBP, EPA has worked to provide grant funds and technical expertise through a wide range of programs to help advance environmental education and preserve and enhance the Basin's ecological function.

Pollution Reduction

EPA Region 1 recently completed an update of the Total Maximum Daily Loads (TMDLs) for phosphorus for the 12 Vermont segments of the Lake Champlain watershed. A TMDL is a “pollution diet” that sets the maximum amount of a pollutant that can enter a waterbody and still allow the waterbody to meet water quality standards. This collaborative effort with the State of Vermont included an update to the model used to establish these limits in the Lake and the development of a new model that established limits for inputs of phosphorus and reduction goals for each sub-watershed and land use sector for the entire Basin. The TMDLs include a detailed package of steps the State will take (many stemming from Vermont’s Act 64 of 2015) to achieve reduction goals. The TMDL was issued in June of 2016. EPA is now working closely with the State to track progress towards implementation milestones. EPA Region 2 continues to work with New York State DEC on its implementation plan for the TMDL for the New York portion of the Lake.



Photo credit: LCBP

TMDLs—or “pollution diets”—for phosphorus in Lake Champlain will help to ensure that beaches are closed less often as a result of cyanobacteria blooms.

National Park Service

Heritage Preservation

The Champlain Valley National Heritage Partnership (CVNHP) preserves, protects, and interprets the historical, cultural, and recreational resources of the Champlain Valley. The CVNHP works with state and provincial governments, local communities, and non-profit organizations to improve the understanding and appreciation of this heritage and foster its stewardship. CVNHP partnerships and projects leverage greater investment for long-term preservation and promotion as an integral part of sustainable economic development. The CVNHP has led efforts to recognize

hallmark anniversaries, including the quadricentennial of Samuel de Champlain's 1609 exploration of Lake Champlain, the bicentennial of the War of 1812, the sesquicentennial of the American Civil War, and the 100th anniversary of the establishment of the National Park Service. One recent project—the Lake Champlain Bridge Quest—links the communities of Crown Point, NY and Chimney Point, VT that are the “heart” of the CVNHP. Visitors follow clues on the Quest Map to answer seven riddles about the area’s past, and to obtain the quest’s treasure: a commemorative coin.



Photo credit: LCBP

The ruins of the British Fort at Crown Point are at the heart of the CVNHP and a riddle clue in the Lake Champlain Bridge Quest.



Photo credit: ROOST

The first Questers—from London, England—reported that search was “a great deal of fun!” after collecting their commemorative coin.



Pr

The National Park Service fosters local stewardship of the region's natural and cultural heritage, and strengthens sense of place and community pride. NPS provides technical assistance and funding support for efforts in historic preservation, natural resource conservation, recreation, heritage tourism, and education.



Photo credit: Brodie Haenke

After much consultation between the National Park Service and local communities, the first Wild and Scenic Rivers in the Basin were designated in 2014. NPS offers 54 programs to help communities protect their cultural and natural resources.

Enhancing Recreation, Fostering Stewardship

The National Park Service has helped to plan, enhance, and promote a number of the recreation trails and other activities that provide pathways to discovery of the region's natural beauty and history. In December 2014, the U.S. Congress designated 46.1 miles of the Upper Missisquoi River and the Trout River in Vermont as part of the National Wild and Scenic River System. These designated rivers are preserved and safeguarded for their remarkable scenic, recreational, geologic, fish and wildlife, historic, and cultural values. The NPS worked closely with the locally-based Wild and Scenic Study Committee to craft a vision and plan to promote and protect this nationally-significant waterway. Wild and Scenic River designation brings recognition to a region, and can boost the local economy through tourism and new opportunities to build greater capacity for river stewardship through matching grants, in-kind support, volunteer assistance, and the NPS-supported River Community Grants Program.

Objects

Lake Champlain Sea

Lake Champlain Sea Grant is a cooperative program of the National Oceanic and Atmospheric Association (NOAA), the University of Vermont, and the State University of New York (SUNY) at Plattsburgh. Lake Champlain Sea Grant integrates research, outreach, and education, and partners with organizations to develop and share science-based knowledge that benefits the environment and economies of the Lake Champlain Basin.

Alternative Stormwater Management

Lake Champlain Sea Grant (LCSG) funds and partners to conduct groundbreaking research on alternative stormwater management practices. With LCSG support, the University of Vermont Bioretention Laboratory analyzed the effectiveness of rain gardens at removing sediment, nutrients, and water volume from stormwater runoff. They tested the performance of different hydrologic conditions, soil mixtures, and vegetation. Researchers observed nutrient leaching when phosphorus-rich compost was used in the soil mixture to grow rain garden plants. Those results drove changes in state recommendations for design of rain gardens. Currently LCSG staff are evaluating the effectiveness of floating wetlands to remove nutrients from a stormwater pond in a residential development. The City of South Burlington is partnering on the research. Results of these and other research projects is extended to community partners through the Green Infrastructure Collaborative, a partnership of LCSG with Vermont Department of Environmental Conservation. The Collaborative promotes best practices in Vermont watersheds for the management of stormwater runoff from developed lands.

At this experimental plot at the University of Vermont, researchers observed nutrient leaching when phosphorus-rich compost was used to grow rain garden plants. This led to changes in the state recommendations for design of rain gardens.



Photo credit: Lake Champlain Sea Grant

Projects

Watershed Alliance

UVM Extension and LCSG partner to sponsor the Watershed Alliance program. This K-12 student and educator-focused program integrates classroom instruction, hands-on field science, and community outreach to educate students and teachers about watersheds, aquatic invasive species, and nonpoint source pollution. Participating students are trained as citizen scientists to use the scientific method to gain a better understanding of aquatic ecosystems – by testing chemical, biological, and physical parameters of a local stream or in Lake Champlain while aboard the R/V *Melosira*. The program provides curriculum, equipment, and instructors to schools and youth groups participating in programs, as well as support and guidance to teachers who wish to integrate watershed education into their current curricula. On average, 23 schools participate in the program each year, reaching 2,000 students. The program also trains and supports undergraduate student interns to serve as Watershed Educators.

Lake Research



Photo credit: Lake Champlain Sea Grant

LCSG research results are shared with stakeholders, support collaboration among research institutions, and contribute to the improved understanding of the Lake, its Basin and the broader Great Lakes-St. Lawrence ecosystem.



Photo credit: Lake Champlain Sea Grant

Students on UVM’s research vessel, the Melosira, learn about current research and then apply scientific tools and techniques to collect data and apply critical thinking skills about the challenges of lake stewardship.

Lake Champlain Sea Grant supports and engages in research that provides important information used to better understand and manage Lake Champlain. One study considered concerns about the sustainability of catch-and-release black bass tournaments. Over the last decade, Lake Champlain bass tournaments have become an important component of the regional tourism economy. More than 70 tournaments are held on the Lake each year, drawing competitive anglers from throughout North America. Nonetheless, stakeholders have expressed concerns about fish kills, movement of trophy fish away from essential habitat areas, and other potential negative impacts of tournaments on fish populations. A study that tracked live-released fish during 13 tournaments demonstrated that fish mortality was very low. Additional study findings were used to develop recommendations to ensure fish are handled and released in a manner most likely to enhance their survival. Extension of research results has allayed numerous stakeholder concerns about tournament impacts. To ensure future sustainability, local government and industry partners developed and adopted a conservation plan to guide the frequency and timing of future bass tournaments in Plattsburgh, NY.

U.S. Army Corps of

The U.S. Army Corps of Engineers (USACE) offers a variety of planning, design, and implementation capabilities aimed at improving water quality, restoring ecosystems, and more in the Lake Champlain watershed. USACE services are made available through several assistance programs that support the needs of non-federal partners.

Watershed Environmental Assistance

The USACE works in partnership with the LCBP to implement the Watershed Environmental Assistance Program under Section 542 of the Water Resources Development Act of 2000. The goal of the program is to provide assistance with planning, designing and implementing large scale projects that protect and enhance water quality, water supply, ecosystem integrity and other water related issues within the watershed. The LCBP coordinates the solicitation and review of requests for support from qualifying organizations. The USACE selects projects for implementation, considering the recommendations of the LCBP's Technical Advisory Committee, and provides planning and technical services and project coordination. A recent project with the City of South Burlington, Vermont will reduce the negative impact of stormwater runoff and manage flooding by upgrading failing drainage infrastructure in two suburban neighborhoods. The project constructed drainage swales and grass channels, a bioretention area, infiltration trenches, wetland ponds, and a new drainage system of larger pipes and catch basins.



Photo credit: LCBP

The Bartlett Brook North Stormwater Treatment Project will help to reduce sediment and nutrient loading to Lake Champlain from suburban landscapes with large areas of impervious surfaces.

Engineers

Invasive Plant Control

USACE works with state and other federal agencies to control aquatic invasive species that can impair navigation, recreation, and habitat. Invasive plants cost the nation an estimated \$250 billion annually. The Aquatic Plant Control Research Program uses the best available science to provide recommendations for effective and economically efficient methods for controlling invasive species. This research helps managers address threats to the Lake ecosystem. The critical funding provided through the program has helped to support successful efforts to control water chestnut in Lake Champlain. This floating invasive plant forms dense leafy mats that impede boat traffic, crowd out native plants, and reduce oxygen available to fish and other aquatic organisms. Mechanical and hand harvesting of water chestnut has helped to reduce substantially the extent of the plant's infestation in the South Lake over the last twenty years.



Photo credit: US EPA



**US Army Corps
of Engineers.**

Continued funding from the Army Corps of Engineers has been critical to one of Lake Champlain's success stories in the reduction of water chestnut infestations in the South Lake.

rojects

U.S. Department of

The USDA Natural Resources Conservation Service (NRCS) is committed to working with farmers in Lake Champlain's watersheds where water quality is most impaired. NRCS is helping farmers plan and implement conservation practices which will help meet the required phosphorus reduction goals for Lake Champlain.

Conservation Assistance

NRCS works with farmers to protect and improve soil and water quality through the Environmental Quality Incentives Program (EQIP). This voluntary approach to conservation provides financial and technical assistance for planning and implementing conservation practices. In 2016, Vermont NRCS helped write more than 150 EQIP contracts totaling nearly \$7 million in the Lake Champlain Basin. EQIP may provide financial assistance for the implementation of conservation practices based on the average cost to install the practice. Increased payment is available for limited resource producers, new and beginning farmers, and veteran farmers. Vermont NRCS targets the watersheds with the heaviest concentrations of agricultural phosphorus runoff to the Lake. Pike River, Rock River, St. Albans Bay in Franklin County, and McKenzie Brook in Addison County are priority areas for the next three years. The Vermont and New York offices of NRCS work together to target conservation practices in the South Lake. This focused approach

should result in improvements in these watersheds more quickly than it would with a traditional approach of funding projects throughout the Basin.

New York NRCS is using EQIP funds to collaborate with the Miner Agricultural Research Institute on two Edge of Field (EOF) monitoring projects that will assist producers in measuring the effectiveness of a suite of conservation practices. A controlled drainage project is examining the use of structural techniques to adjust water levels in a tile-drained field. By raising the depth of a drainage outlet for a tile system, water is held in the field during periods when drainage is not needed. This increases the amount of time that water is held in the soil, potentially reducing nitrogen, phosphorus and sediment in surface and subsurface runoff. A second, upcoming project will compare various tillage practices on heavy clay soils and measure water quality impacts to surface runoff and tile drainage water.

After



NRCS provides technical and financial assistance to help producers address natural resource concerns including erosion, water quality and animal health.

Pr

Agriculture



Vermont
United States Department of Agriculture
Natural Resources Conservation Service

Wetland Restoration and Protection



Photo credit: NRCS

Wetland conservation projects reflect the collaborative approach among partner agencies. NRCS works closely with the U.S. Fish and Wildlife Service (USFWS) to evaluate projects and provide technical assistance for vegetation and hydrologic restoration.

NRCS works with private landowners to protect, restore, and enhance valuable wetland habitat by providing technical and financial assistance directly to landowners through the purchase of wetland reserve easements. Working through the Agricultural Conservation Easement Program (ACEP), eligible landowners can receive assistance to restore and protect wetlands and agricultural land. The voluntary nature of this program allows wetland restoration on working landscapes, providing benefits to farmers and to local communities. In 2016, NRCS in Vermont worked with private landowners to obligate \$215,000 through ACEP to purchase wetland reserve easements. Under the Agricultural Land Easement (ALE) component of ACEP, NRCS in Vermont allocated \$4 million to enroll nearly 4,000 acres of easements on 32 farms throughout the state.

Before



objects

U.S. Fish and Wildlife

The mission of the U.S. Fish and Wildlife Service (USFWS) is to work with others to conserve, protect, and enhance fish, wildlife and plants and their habitats for the continuing benefit of the American people. In the Lake Champlain Basin, the Lake Champlain Fish and Wildlife Conservation Office, Dwight D. Eisenhower and White River National Fish Hatcheries and the Missisquoi National Wildlife Refuge work with partners to protect, restore and manage fish and wildlife and their habitats.

Habitat Connectivity Restoration

Restoration of wetlands and riparian areas are critical tools in conserving fish and wildlife habitat and reaching water quality goals. Since 2009, a collaborative partnership among USFWS, the U.S. Department of Agriculture Natural Resources Conservation Service, and other agencies and organizations has led to the restoration of more than 4,000 acres of wetland habitat and 153 miles of riparian habitat.

Dams and undersized road crossings have segmented habitat on every major river system in the Basin. These barriers impede fish passage to historic spawning waters, cold water refuge streams, and feeding grounds. USFWS focuses on restoring connectivity on waters essential to landlocked Atlantic salmon and Eastern brook trout; however, all fish species and aquatic organisms benefit. Restoration and stabilization of in-stream habitat ensures that those important areas remain viable for fish, despite fluctuations in climate, that result in flooding and high temperatures. Since 1992, USFWS has restored 32 miles of in-stream habitat and opened 740 miles to fish passage in the Basin and across Vermont.



The replacement of culverts that block the passage of fish and other aquatic organisms through road crossings open upstream habitat for spawning and feeding.



Service

Habitat Protection

The Missisquoi National Wildlife Refuge was established in 1943 to provide habitat for migratory birds. It consists of 6,729 acres of mostly wetland habitats that support a variety of migratory birds and other wildlife. The 900-acre Maquam bog is designated as a Research Natural Area, and the refuge was designated as an Important Bird Area in partnership with the Audubon Society. The Refuge, in partnership with other publicly owned lands, has been designated a Wetland of International Importance under the Ramsar Convention. A mosaic of wetland habitats offers opportunities to see and manage more than 200 species of birds. Fall migration features as many as 25,000 migrating ducks. Nesting bald eagles, osprey, and a great blue heron colony numbering more than 300 nests are present on the refuge. The Refuge includes a 262-acre parcel in New York and a 457-acre parcel on the shores of Lake Memphremagog collaboratively managed with the Vermont Fish and Wildlife Department. In addition, Missisquoi NWR manages 377 acres of conservation easements in both New York and Vermont.



Photo credit: LCBP

The Missisquoi National Wildlife Refuge is an important link in a chain of refuges for migratory birds that extends between northern breeding grounds and southern wintering areas along the Atlantic Flyway.



Photo credit: USFWS

Native Fish Restoration

As part of the Lake Champlain Fish and Wildlife Management Cooperative, USFWS works with state partners and others to restore native fish that are ecologically, culturally, and economically important to the region for commercial and recreational fishing. USFWS is restoring landlocked Atlantic salmon, Eastern brook trout, lake trout, American eel and other priority species in the Lake Champlain Basin. These species are restored through a combination of activities, including monitoring fish populations, controlling sea lamprey and other aquatic nuisance species, cooperating on applied research, removing obstacles to fish movement and migration, restoring fish and wildlife habitat, and boosting dwindling populations with hatchery-reared fish. Effective sea lamprey control and hatchery stocking have increased the value of the fishery for Atlantic salmon and lake trout in Lake Champlain by more than \$40 million annually.

Efforts to increase river runs of hatchery salmon in tributaries of Lake Champlain are resulting in greater numbers and larger fish.

Projects

U.S. Geological Survey

The U.S. Geological Survey (USGS) serves the Nation by providing reliable scientific information to describe and understand the Earth; minimize loss of life and property from natural disasters; manage water, biological, energy, and mineral resources; and enhance and protect our quality of life. In the Lake Champlain Basin, the USGS's New England and New York Water Science Centers are active in a number of water data collection and interpretative studies.

The Vermont Cooperative Fish and Wildlife Research Unit is one of 40 units that constitute the Cooperative Research Unit program, which is in the Ecosystems Mission Area of USGS. Over the last 26 years, the Vermont Unit has conducted a broad range of fisheries and aquatic research on Lake Champlain.

Endangered Species: Lake Sturgeon in Lake Champlain

The USGS, Vermont and Maine Cooperative Research Units, in collaboration with the Vermont Fish & Wildlife Department, are studying Vermont state-endangered lake sturgeon. While scientists have documented sturgeon spawning successfully, no estimate of the number of adult sturgeon in Lake Champlain currently exists. As part of the project, researchers are investigating the use of two types of sonar—side-scan sonar and dual-frequency identification sonar—to image adult sturgeon. This would allow biologists to estimate population size without handling fish during the spawning run. Additionally, researchers expect to learn more about juvenile sturgeon by using acoustic tags to track their movements in the Lake. Field work for the project began in early 2017, and will continue over the next three years. This work will provide managers with methods for future assessments and enable Vermont Fish & Wildlife Department staff to track progress toward recovery targets.



Recent efforts of USGS at the Vermont Cooperative Fish and Wildlife Research Unit are helping to document the status of the lake sturgeon population in Lake Champlain.

Key Projects

Hydrologic Studies in the Lake Champlain Basin

The USGS conducts a variety of studies using the most advanced scientific techniques that provide water resource managers with effective information for decision making. These studies have evaluated the effects of urban best management practices on water quality and quantity in Englesby Brook in Burlington, VT, the effectiveness of storm-water detention basins at removing contaminants from water, the sources and transport of mercury in the entire Lake Champlain Basin, and high-elevation recreational development influences on the hydrology of streams on Mt. Mansfield. Other projects have mapped flooded lands during high water levels, developed tools for estimating how climate change could influence river flows, and determined long-term changes in water quality indicators for tributaries, such as phosphorus and nitrogen.



Photo credit: LCBP

The USGS works with partners to monitor, assess, and conduct targeted research on a wide range of water resources and conditions, including streamflow, groundwater, water quality, and water use and availability.

Monitoring River Flows and Lake Levels

USGS operates 33 streamflow gages and 5 lake level gages that are used to continuously measure the amount and height of water in streams and rivers, and the height of Lake Champlain. The information collected at these gages is posted in near real-time at water data.usgs.gov. These data are used for flood warning and forecasting, estimating the amount of nutrients and sediment entering Lake Champlain from tributaries, hydropower operations, drought monitoring and forecasting, hydrologic research, fisheries management, and recreational water activities such as boating. The USGS operates the gages in cooperation with the States of New York and Vermont, numerous local governments, hydropower and dam operators, and the International Joint Commission.



Photo credit: LCBP

Data collected at Lake and stream gages by USGS staff is critical for long-term research and management of Lake Champlain and its tributaries.

The Lake Champlain Basin Program (LCBP) works in partnership with government agencies at the federal level and from New York, Vermont, and Québec, and also with non-governmental organizations, local communities, and individuals to coordinate and fund efforts that benefit the Lake Champlain Basin's water quality, fisheries, wetlands, wildlife, recreation, and cultural resources. These efforts are guided by the management plan *Opportunities for Action*.

Many of the U.S. federal agencies that support the plan have signed a memorandum of understanding to enhance their cooperation and coordination. The Lake Champlain Basin Program (LCBP) helps to facilitate the Federal Partners Workgroup's functions and activities. Representatives of these agencies participate in LCBP's advisory committees, sharing information about federal resources and coordinating activities across agencies and with non-federal partners.

The U.S. Environmental Protection Agency (EPA) is responsible for implementation and enforcement of the Clean Water Act. The EPA provides funding through its annual appropriation to support activities identified by the Lake Champlain Steering Committee. This funding supports coordination of activities implementing *Opportunities for Action*. In addition, the LCBP receives funding from the National Park Service and the Great Lakes Fishery Commission to support additional work in the Champlain region.



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