New York Chapter
American Fisheries Society

2015 Annual Meeting
Presentation Abstracts

Esocid Management and Research Session

Esocid management in New York State

Jeff Loukmas
New York State Department of Environmental Conservation

New York State has exceptional fisheries for Northern Pike, Muskellunge and Tiger Muskellunge. These fisheries are managed through a combination of research and monitoring, habitat protection and enhancement, propagation and stocking, and fishing regulations. NYSDEC's Esocid management programs, collaborations, and other actions will be reviewed as part of an introduction to the Esocid Research and Management Session.

Ecology and management of St. Lawrence River Esocids: from program foundations to meeting future challenges

John Farrell
State University of New York College of Environmental Science and Forestry

A long-term commitment to building informed management for improved St. Lawrence River muskellunge and northern pike populations began in the 1980s with young scientists guided by legendary mentors. This fishery conservation legacy started with management plans that led to significant research and monitoring towards understanding esocid ecology. Management improvements initiated a St. Lawrence River muskellunge population rebound, peaking after the new millennium, but since that time invasive VHSV disease and nursery habitat factors have stalled this trend. Disease outbreaks, invasive species, prey community shifts, and habitat change represent identified stressors that potentially affect contemporary esocid recruitment. Northern pike population changes have been at the core of the International Joint Commission (IJC) water level management policy issue and its effects on critical habitat. Long-term research helped guide development of the IJC Plan 2014, in addition to recent habitat restoration efforts for both species under the Fish Habitat Conservation Strategy. Additionally, student scientists recently led a muskellunge program expansion into the Niagara River. This presentation will explore the future of natural recruitment in a changing environment, discuss research and management highlights from a variety of past and ongoing studies, and provide updates from long-term population and habitat monitoring.

Northern Pike habitat restoration efforts in the Thousand Islands section of the St. Lawrence River

Brandy L. Brown, Jacob Runner, and John M. Farrell
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Restoration efforts of Northern Pike habitat in the Thousand Islands has focused on re-establishing connectivity to remaining coastal wetland spawning habitat that has been negatively impacted by the invasive cattail, *Typha x. glauca* and the suppression of water level fluctuations. Spawning marshes, excavated channels, and spawning pools are three techniques that were used and evaluated since 2002. Fish usage and density of emigrating age-0 Northern Pike was compared among the three restoration techniques. Restored channels and pools attracted both spawning and resident fishes and captured numerous age-0 Northern Pike, indicating successful reproductive function. Surveys indicate spawning marshes have not reached expected juvenile production despite a positive habitat response, likely due in part to changes in adult spring migrations. Recent habitat improvement however, continues, and it is anticipated that Northern Pike populations will benefit from these projects at the local level. System-wide population responses may require a larger scale intervention, such as changes to water levels management policy. Specific project successes, challenges, and lessons learned from a restoration and management perspective will be highlighted and discussed.

Lake Champlain Northern Pike: building a foundation for a better fishery

Shawn Good
Vermont Fish and Wildlife Department

Northern pike (*Esox lucius*) is one of the most targeted species in Vermont waters, and in particular, Lake Champlain. Statewide Angler Opinion Surveys conducted in 1990, 2000 and 2010 reveal that northern pike has consistently been the second most targeted fish species during the ice fishing season, with almost 200,000 angler-days expended during the winter of 2009. Despite the vast amount of habitat and forage available in Lake Champlain, the overall quality (size) of northern pike observed through fisheries surveys and angler catches is small compared to other smaller inland lakes and ponds. We conducted ice-out trapnet surveys in 2009, 2010, and 2011 at 10 known spawning marshes in Lake Champlain to assess length distribution of northern pike. Cleithra were removed from some fish collected during trapnet surveys, and cleithra were collected from anglers and taxidermists from larger harvested specimens, for age estimation and growth rate calculation. Our data indicates that Lake Champlain northern pike have high growth rates, but are not attaining their maximum growth potential. We will discuss potential causes of this, and alternative management strategies that could be implemented to help Lake Champlain's northern pike populations realize their potential in providing high quality angling opportunities.

Management of constructed northern pike spawning marshes in Conesus Lake

M.J. Sanderson
New York State Department of Environmental Conservation

Northern pike and walleye are two popular and important sport fish in Conesus Lake. Since 1984, northern pike spawning has been maintained and/or enhanced by the construction of spawning marshes within the Conesus Inlet Wildlife Management Area (WMA). In the spring, northern pike and walleye utilize the clear waters of Conesus Lake Inlet to spawn and are often quite visible to stream bank observers. During the spawning runs, the large numbers of big, mature fish draw impressive numbers of "fish watchers" to WMA to observe the spawning runs. Parking lots information kiosks, and trails were constructed in this public area to facilitate viewing opportunities. In 2000, an estimated 3,900 people spent 2,600 hours at the WMA to view the spawning run. In recent years, deteriorated water level control structures of the spawning marshes prevented the production of optimal spawning habitat acreage. In 2011 and 2012, repairs were made to the structures, restoring the lost spawning habitat acreage.

Management of the Chautauqua Lake Muskellunge, a historical perspective

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New York State Department of Environmental Conservation

The Chautauqua Muskellunge has been actively managed since the late 1800s. Primitive angling methods and relatively low levels of effort expanded rapidly with the development of wire lines, motorized boats and the expansion of easy transportation - the automobile. Early culture efforts focused on the rearing of fry with little consideration for post-stocking survival. Harvest regulations focused on social issues with little consideration for angling mortality and recruitment. The Muskellunge population declined through the 1930s until a size limit, a creel limit and the stocking of pond fingerlings were instituted. Muskellunge abundance was sustained at acceptable levels through the 1950s when a drastic decline in abundance occurred. In the 1960s, in-hatchery culture became the preferred practice and walleye had become established. Subsequent studies showed that fingerlings reared by pond or extensive culture (in-hatchery culture followed by pond finishing) experienced significantly higher levels of survival when compared to in-hatchery fingerlings. Extensive culture combined with restrictive harvest regulations and the increasing popularity of catch and release angling have contributed to the recovery of the Chautauqua Muskellunge population. Management efforts should continue to focus on maintaining a healthy and genetically diverse brood stock source.

Trophy muskellunge populations and fisheries can be sustainable

John M. Casselman
Queen's University, Department of Biology

Sustainability of trophy muskellunge (*Esox masquinongy*) populations and fisheries was examined using long-term catch data from Muskies Inc. and 35 years of data and cleithra (2,633) submitted to *The Cleithrum Project*. Catch has increased substantially, but harvest decreased greatly because of increased size limits, in Ontario set on a biological basis using growth potential, and voluntary catch and release. Although fewer samples have been submitted to the Project in recent years, they indicate a significant increase in total length and weight of trophy samples; this pivotal change occurred in the mid-1990s (means—1979–1994, TL=105.9 cm, TW=9.01 kg, age=11.6 yr; 1995–2013, 119.0 cm, 11.74 kg, 15.1 yr). Age data (35-yr period) were used to estimate mean annual mortality rate of muskellunge, using observed mean annual age; mean age increased from 10.2 to 15.8 yr, corresponding to a predicted mean annual mortality rate decrease from 31 to 22%. Although angling pressure has increased in recent years, size and longevity of angled trophy muskellunge have increased substantially. Considering mortality rate and exploitation, to ensure that trophy muskellunge and fisheries are sustainable, fish younger than 15 should not be harvested (A=25%, where F=M). To ensure sustainability, late-season handling mortality requires special consideration.

Genetic information used to guide muskellunge management in Minnesota

Loren Miller
Minnesota Department of Natural Resources

The Minnesota Department of Natural Resources has increasingly used genetic information to help manage one of the premier muskellunge fisheries in the U.S. The initial impetus to consider genetics was the poor growth of a strain being widely stocked. A common-garden experiment demonstrated a likely genetic component to this poor growth and a new broodstock was developed. Genetic markers were able to track persisting ancestry from the poor-growing strain and demonstrate that its descendants were not attaining large size. Management responses have included stocking with a different strain to dilute the poor strain and targeted removal of its descendants. The study also showed that native genetics persist in several lakes despite years of stocking. Another study examined the current muskellunge stocking program. Reductions in genetic diversity compared with the source population indicated likely bottleneck effects in brood and stocked lakes. Sperm competition evaluations showed that males contribute unequally when sperm is pooled before fertilization. Genetic markers are also being used as part of mark-recapture estimates of population size. The ability to extract DNA from scales allowed anglers to participate in non-lethal collection of recapture samples. Population estimates and precision were similar for electrofishing and angler recaptures. Genetic tools and principles have provided benefits for muskellunge management.

Egg predation by the invasive round goby on two broadcast spawning species: Northern Pike and Muskellunge

Andrew Miano and John M. Farrell
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Egg predation by the Round Goby is a commonly referenced concern associated with their recent invasion of the Great Lakes. While nest-building species may be affected by Round Goby egg predation, broadcast spawning species may be particularly vulnerable as they do not guard their eggs. This study used a 2x7 factorial designed experiment to investigate Round Goby egg predation rates on two broadcast spawning species, Northern Pike and Muskellunge, among seven different habitat treatments (bare, silt, sand, shoal, cobble, filamentous algae, and submerged aquatic vegetation). Round Goby egg predation rates were higher on substrates with lower complexity such as bare, sand, and silt, although the rates were similar between Northern Pike and Muskellunge. Across all substrates and egg types, the mean and median predation rate was at least 50% eggs consumed in 24 hours, with bare, sand, and silt substrates nearly reaching 100%. Both Northern Pike and Muskellunge overlap in spawning strategy and prefer to spawn over submerged aquatic vegetation, suggesting that the continued expansion of the Round Goby has the potential to negatively impact broadcast spawning species due to egg predation.

Aquatic Invasive Species Session

AIS: a resource stewardship challenge for DEC

Phil Hulbert
New York State Department of Environmental Conservation

Aquatic invasive species (AIS) have become widely established in numerous locations in New York and elsewhere within this country. Species such as the zebra mussel, round goby, water chestnut and hydrilla have produced harmful effects to native plant and animal communities through means such as altering energy flow through food webs, outcompeting or preying upon native biota and serving as vectors for pathogens. Efforts to limit the spread and control the adverse impacts of AIS are costly, and eradication is often difficult to achieve.

The New York State Department of Environmental Conservation (DEC) has broad authority and responsibility to protect the state's natural resources. DEC's efforts to deal with the problems posed by AIS are diverse; they include education and outreach, planning and coordination, working with numerous partners, funding control or management programs, scoping and supporting research efforts, and establishing regulations. Educational materials such as tip strips included in boat registration materials, website content, and the New York Invasive Species Clearinghouse help increase the public's awareness of AIS. Currently DEC is in the process of updating a statewide AIS management plan aimed at preventing or limiting the introduction and spread of AIS within the state. Partnering with others occurs through the New York State Invasive Species Council, as well as through eight PRISMs (Partnerships for Regional Invasive Species Management). AIS control programs have targeted hydrilla in Cayuga Lake, Eurasian watermilfoil and Asian clam in Lake George, water chestnut in waters including Lake Champlain, and northern snakehead fish in the headwaters of the Wallkill drainage. Within the past year DEC has enacted regulations establishing lists of prohibited and regulated invasive species (ie. northern snakehead and rusty crayfish) and severely limiting activities involving those species, while also adopting regulations requiring watercraft using access sites administered by DEC to "arrive clean/drained and depart clean/drained." Additionally, in response to statewide legislation passed in September 2014 DEC is developing new regulations to specify reasonable precautions that boaters must take at <u>all</u> public launches to prevent the spread of AIS.

Challenges abound in dealing with what is now a very high profile issue. DEC and others must consider numerous factors in moving forward with efficient and effective programs to slow the spread of AIS. We know that recreational fishing and boating are important contributors to economic activity in New York, yet boating is well recognized as a significant pathway by which AIS can be moved. Providing for the use and enjoyment of New York's aquatic resources while protecting them from the introduction or spread of AIS will indeed be a resource stewardship challenge for years to come.

Monitoring and managing aquatic invasive species in the Adirondack Park

Erin Vennie-Vollrath
Adirondack Chapter of The Nature Conservancy

The Adirondack Park in New York is comprised of 2.4 million hectares of public and private lands that hold some of the most ecologically intact ecosystems in the United States. Most of the park remains relatively free of invasive species, which presents an exciting opportunity in conservation at a scale rarely seen anywhere else in the country. In 1998, a regional partnership of government and private organizations formed the Adirondack Park Invasive Plant Program (APIPP) to effectively manage invasive species at a landscape level by focusing on prevention & preparedness, early detection & rapid response, strategic management, and education & outreach. Invasive species management is most effective when addressed at the landscape level with the synergy of diverse partnerships. A coalition of more than 30 cooperating organizations, the APIPP has successfully incorporated this strategy by utilizing the strengths of each partner, organizing hundreds of volunteers and approaching the daunting issue of invasive species in a comprehensive, systematic, and cooperative manner that has produced real on-the-ground results. This presentation will discuss the aquatic program goals, strategies, and activities and highlight ways in which partnerships and public involvement are essential to effective prevention, early detection, and management programs.

Using iMapInvasives to share aquatic invasive species data in NYS.

Jennifer Dean and Meg Wilkinson
New York Natural Heritage Program (A partnership between the NYS DEC and SUNY ESF)

Preventing the spread of aquatic invasive species requires coordinated efforts to collect and share information effectively across organizational and geographic boundaries. The New York Natural Heritage Program manages the state invasive species database using the online mapping tool iMapInvasives. This tool provides volunteers and professionals with online reporting, data searching, and early detection alerting. Currently, over 10,000 observations of 63 aquatic plant and animal species have been aggregated from more than one hundred different organizations. Detailed treatments and presence/absence lake surveys are also recorded. This talk will provide an overview of the available aquatic invasive species data and highlight some of the iMapInvasives tools designed to help stakeholders effectively communicate important findings and management efforts across the state.

Threats and management strategies for AIS in Lake Champlain

Meg Modley
Lake Champlain Basin Program

Lake Champlain is home to 50 known nonnative and invasive aquatic species. An overview of the most invasive species such as water chestnut, zebra mussels, alewife, Eurasian watermilfoil, and the new arrival of spiny waterflea will be reviewed as well as a look at the emerging species of concern knocking on the Lake Champlain basin. Pathways of species introduction and programs developed to address the pathways will be reviewed.

Stewardship and AIS prevention case study: AsRA River Steward Program

Carrianne Pershyn
2014 River Steward, Ausable River Association

There are a number of nuisance and invasive aquatic species (AIS) that threaten Adirondack ecosystems. While much has been done to educate users and slow the spread of these species in Adirondack lakes, less attention has been paid across the region to stop the spread of invasive species in river systems. The Ausable River Association (AsRA), with support from the Lake Champlain Basin Program and the Adirondack Chapter of The Nature Conservancy, created a River Steward program, which has reached thousands of river users since its inception in 2010. The program, modeled after the regional boat launch steward program, places a steward at the most used access points along the entire river corridor during periods of highest use from May through October. The steward's focus is streamside education and outreach to all river users. From its inception, the River Steward program demonstrated to AsRA staff that human awareness and actions are integral to early AIS identification and spread limitation. Data collected in angler and boater surveys over four years indicate that river users are gaining increased awareness of these threats and are taking steps to prevent the spread of AIS. While the program was created primarily to educate users about Didymo, the educational message has been redefined to promote all users to clean their boots, boats, and all other gear when they move between water bodies. In 2015, an Ausable River Steward will be retained to distribute the spread prevention message, serve as an information resource to the river users, and monitor the river's condition for presence or absence of AIS across the watershed. AsRA's River Steward Program is unique in the Adirondack region, and can be used as a model for other high-use recreational rivers and streams in New York State.

USFWS Aquatic Invasive Species Program in the Lower Great Lakes

Sandra Keppner
United State Fish and Wildlife Service

The U.S. Fish and Wildlife Service (Service) has been a leader in the fight against aquatic invasive species for many years. Since the opening of the Lower Great Lakes Fish and Wildlife Conservation Office in 1991, aquatic invasive species have been a priority for the Service in Lake Erie, Lake Ontario and the Niagara River. Early detection, monitoring, management, and prevention have been the keys to implementing a successful program. Since 2010, aquatic invasive species efforts have been enhanced significantly through funds made available through the Great Lakes Restoration Initiative. These funds have made basin-wide early detection and monitoring possible, advanced risk assessment screening efforts to strategize prevention alternatives, expanded Asian carp prevention and detection efforts, and provided state partners with grants supporting implementation of state aquatic invasive species management plans.

Updated invasion risk assessment of Ponto-Caspian fishes to the Great Lakes

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Dr. Randal Snyder, Alexander Y. Karatayev and Dr. Lyubov E. Burlkova
Buffalo State College

Previous risk assessments based on analysis of available biological information of 112 Ponto-Caspian fish have identified 66 potentially invasive fish species to the Great Lakes. In this study, risk assessments were conducted on 42 species using translated Russian data resulting in the identification of 10 species as having biological characteristics conducive for successful invasion to the Great Lake, based on their abilities to withstand ballast water exchange. Species capable of withstanding exposure to salinities exceeding 28ppt across all life stages pose the highest risk of surviving ballast water exchange and introduction to the Great Lakes. This information can serve as the basis for identification and early detection of these species, including the use of native surrogate species sharing similar biological characteristics as locating areas for establishing early warning protocols. Species descriptions of 10 potentially invasive Ponto-Caspian fishes are included in this presentation.

Oneida Lake as a melting pot: the impact of invasive species on historic and modern fisheries

Randy Jackson
Cornell University

The fisheries resources of Oneida Lake have represented a primary cultural and economic resource in central New York throughout its history. Upon the completion of the New York-Eerie Barge Canal in 1925, Oneida Lake was opened up to potential aquatic invaders from both the Great Lakes to the west and the Atlantic coast to the east. To date, at least 12 species of fish, 5 mollusc species, 4 species of crustacea and 7 plant species have been documented in Oneida Lake. While many of these invasives have had little detectable impact on the fisheries of Oneida Lake, others have profoundly changed the ecosystem. Zebra and quagga mussels have contributed to significant clearing of the water column and contributed to enhanced growth of nearshore macrophytes. White perch may now outnumber yellow perch as the lake's most abundant species. These changes are associated with shifts in abundance of Oneida Lake's sport fish species as well as the nature of the fishery. A review of the connections between invasive species and changes to Oneida Lake's fisheries suggests that few changes can be easily classified as simply positive or negative, but instead depend on the values and priorities of user groups.

Contributed Session I: Aquatic Ecology/Species of Greatest Conservation Need

The development and application of a New York State specific fish based index of biotic integrity (IBI)

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SUNY Environmental Science and Forestry
Dr. Alexander J. Smith and Brian Duffy
New York State Department of Environmental Conservation

Assessments of biotic integrity have been widely utilized for nearly forty years as an inexpensive and effective method to evaluate the condition of aquatic systems. Today, many studies and biomonitoring programs use only a single set of taxa to assess stream quality, despite the different response of aquatic assemblages to environmental changes and perturbations. Evaluating multiple assemblages is necessary to adequately assess stream condition and ecological integrity. We used historical fish community data collected by the New York State Department of Environmental Conservation (NYSDEC) to identify candidate metrics that aptly represent the changes in fish communities along environmental gradients. During the summer of 2014, fish community data were collected from across New York to verify and calibrate selected metrics. In the future, comparisons will be made between this fish IBI and the macroinvertebrate index currently in use by the Stream Biomonitoring Unit (SBU) of NYSDEC. Developing a robust index of biotic integrity that is specific to New York State fishes will aid government agencies and researchers from New York and the Northeast to evaluate the integrity of streams.

Spatial differences in contemporary fish assemblages of the Mohawk River

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U.S. Geological Survey New York Water Science Center.
Scott Wells
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The Mohawk River, including the NYS Barge Canal, supports a diverse fishery that is used extensively by recreational anglers. The last comprehensive fish survey was conducted in the lower basin by the New York State Department of Environmental Conservation (NYSDEC) from 1979-1983. The river has experienced a number of substantial changes since then including several major storm events, establishment of Zebra Mussels (*Dreissena polymorpha*), and declining runs of anadromous Blueback Herring (*Alosa aestivalis*). In 2014, the U.S. Geological Survey and the NYSDEC began a two year study to assess temporal and spatial differences in contemporary fish assemblages. Preliminary results from boat electrofishing surveys conducted at 12 sites suggest fish communities currently differ substantially between permanently and seasonally impounded sections of the river. Catch per unit effort for the entire fish community in permanently impounded sections was more than twice that of seasonally impounded sections. Centrarchids and Yellow Perch (*Perca flavescens*) contributed most strongly to these differences but popular gamefish such as Smallmouth Bass (*Micropterus dolomieu*) and Walleye (*Sander vitreus*) were also more abundant in permanently impounded reaches. Results from an additional 12 surveys in 2015 will be used to complete the contemporary dataset and fully assess spatial and temporal differences.

Fatty acid signatures of major predator and prey fish in Lake Ontario: spatio-temporal variability in prey and differences among predator species

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Fatty acid signatures (FAS) are currently used in food web studies to assess trophic interactions between predator and prey. If we are able to distinguish differences in the FAS of major prey fish in Lake Ontario, we can use these FAS to assess feeding habits of top predators. In this study, three major prey fish (alewife – *Alosa pseudoharengus*, rainbow smelt – *Osmerus mordax*, and round goby – *Neogobius melanostomu*s) were collected at three sites along the south shore of Lake Ontario (Olcott, Rochester, and Oswego) during the spring and fall of 2013. Major predator species (including lake trout – *Salvelinus namaycush*, brown trout – *Salmo trutta*, chinook salmon – *Oncorhynchus tshawytscha*, and coho salmon – *Oncorhynchus kisutch*) were collected along the south shore of Lake Ontario during the summer of 2013. Using multivariate statistics, FAS were compared among all predator and prey species as well as among location and between seasons for prey fish. Differences in FAS among prey species were greater than any spatio-temporal differences detected. FAS among predator species were also significantly different. Our results demonstrate the applicability of FAS as a tool for assessing predator feeding habits and provide needed FAS data for species of interest in Lake Ontario.

Are larval lampreys homebodies? Using elastomer tags to study open populations of lampreys

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Larval lampreys are assumed to be sedentary, but this assumption has only been tested in a limited manner. Using elastomer implants, larval lampreys at two streams were tagged from June until October of 2014 with permanent and unique marks. Some individuals were recaptured during every sampling event, which provided important data on mortality and growth rates. However, most animals were never recaptured after being tagged, or were at most captured once, suggesting that larval lampreys may be less sedentary than predicted. Increasing the number of sampling events and decreasing the time between events will determine if animals were not recaptured because they vacated the site, or if the populations of larvae were so large that recapturing individual animals was unlikely.

The present study also evaluated the use of elastomer tags in larval lampreys, and found that they were suitable for the long term marking. To produce tags that would not fade or become lost, careful application of the tag was required. However, tagging of larvae that underwent metamorphosis was ineffective because the elastomer tags did not persist in the juvenile. Elastomer tags are an efficient way to mark large numbers of lampreys with unique combinations for long term monitoring.

Mapping the deep chlorophyll layer (DCL) in Lake Ontario: Using autonomous glider technology to collect high-resolution profile data

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Accurately quantifying deep chlorophyll layer (DCL) magnitude and composition is an important step in assessing the ecological structure of Lake Ontario during summer months. Most efforts to characterize DCL formation in the Great Lakes have relied upon profiling technologies that are deployed at stationary points across a lake. However, towed instruments and autonomous underwater vehicles (AUVs) are emerging as common sampling methods for the study of large-scale patterns in aquatic systems. These technologies capture data with excellent spatial resolution and allow for the examination of both large- and fine-scale processes that cannot be readily studied using stationary profile data. During an intensive study year for Lake Ontario, both a Triaxus towed vehicle and an AUV glider were deployed to characterize DCL properties across the lake in greater detail. This study compares results from continuous and stationary profiling methods, and aims to elucidate benefits and challenges of employing these various technologies for quantifying primary production patterns.

Contaminants in fish from Lake Erie, the Niagara River, Cayuga Creek and Lake Ontario, New York: mercury is stable while PCBs, pesticides and dioxins have declined

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We analyzed over 600 individual fish samples from the New York State waters of Lake Erie, Cayuga Creek, the Niagara River and Lake Ontario for mercury, polychlorinated biphenyls (PCBs), chlorinated dioxins and furans, organochlorine pesticides and polybrominated diphenyl ethers (PBDEs), and compared these recent data to historical results as far back as 1970. Mean mercury concentration was relatively low at 0.16 ppm. Mercury concentrations dropped between 1970 and the eight year sampling period beginning in 1988 but showed little subsequent change. In contrast, PCB and pesticide concentrations continued to decline. PCB concentrations ranged from non-detect to 11.0 ppm, with 99% of fish below 2 ppm. DDT and metabolites were detected in most fish, but at low concentrations. Mirex, a primary cause of consumption advisories for the Niagara River and Lake Ontario, dropped considerably with most fish below the detection limit. Other organochlorine pesticides were detected infrequently and at low concentrations. Dioxin also declined, with only Cayuga Creek having TEQs that exceeded health advisory guidelines. PBDEs were found in all fish with an overall mean concentration of 29.0 ppb. These findings enabled the NYS Department of Health to relax advisories for several important Lake Ontario and lower Niagara River fish species.

Habitat preferences of Hudson River Atlantic Sturgeon

Amanda Higgs
New York Department of Environmental Conservation

Little is known on detailed habitat use for Atlantic sturgeon in the Hudson River Estuary. Atlantic sturgeon were the most important commercial fish species in NY at the turn of the 20th century. Very high catches in the late 1880s collapsed the stock and fishing remained low until the 1980s and 1990s when an upsurge in harvest began. NY State closed the fishery in 1996 due to excessive harvest and efforts turned toward stock recovery. We sonic tagged both adults and juveniles to identify important areas used seasonally for essential activities: spawning, nursery and over-wintering. The technology used allows for pinpoint locations of fish. Locations are then compared to detailed benthic map recently completed for the Hudson. Sturgeon use areas of particular bottom types and not those most commonly found. Once identified, these areas can be protected to assist species recovery.

Rekindling the association with the declining American Eel

Colleen Burliuk and John M. Casselman
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American eels (*Anguilla rostrata*) have long been revered and relied upon as a dependable food resource by Aboriginal peoples of the St. Lawrence River system. This valued association is rapidly being lost to everyone because of the dramatic decline of the species caused by many factors including the unique migratory life cycle of eels. Stocking, formal declarations, and stewardship are all important techniques in rekindling this association. Stocking ensures species presence and maintains awareness, declarations formally announce concern and build profile, and outreach and stewardship increases familiarity with the species by engaging people. Stewardship has been initiated through school outreach that involves students and engages the young. These programs have been initiated through the Society of Conservation Biology in schools in the Kingston area by using activities and games developed specifically for the project (e.g., Eel Jeopardy, Eel Ladders and Chutes). We also emphasize the use of eel biology, such as ongoing studies of winter habitat and the communal wintering "balling" in soft bottom silt, to inform students of the unique behaviors and mysteries of eels. Instilling knowledge, respect, and passion for eels will inspire all people to become better stewards of the species and to encourage their recovery and rehabilitation.

Confirmation of cisco spawning in Chaumont Bay, Lake Ontario using an egg pumping device

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Cisco *Coregonus artedii* are an important prey fish for many Great Lakes predators, including lake trout *Salvelinus namaycush*. Their numbers have declined drastically in the last century due to the impacts of invasive species such as sea lamprey *Petromyzon marinus* and alewife *Alosa pseudoharengus*, overfishing, and habitat degradation. Chaumont Bay, New York contains one of the last remaining spawning populations of cisco in Lake Ontario. In February and March 2014 we collected coregonine eggs from 30 locations within Chaumont Bay using an egg pumping device specially designed to retrieve eggs through the lake ice. Eggs were identified to species using genetic analysis. Cisco appear to rely heavily on rocky, shallow substrate during spawning, and egg distribution is closely associated with shoal areas in Chaumont Bay. The results from this study will be used to inform further investigations on the spawning behavior of cisco, as well as guide any future restoration efforts in Lake Ontario.

The latest news in native fish management

Lisa Holst
Rare Fish Unit Leader, New York State Department of Environmental Conservation, Bureau of Fisheries

There are some developments in the world of imperiled native fish management that should be of interest to all fisheries professionals. Get the latest information on the update of New York's Wildlife Action Plan and associated fish Species of Greatest Conservation Need; status and new direction for management of Round Whitefish; good news about Sauger, Gilt Darter and Bluebreast Darter; disappointments with Northern Sunfish; new initiatives with Pugnose Shiner and more as time allows. Placement of this presentation at the end of the contributed session will allow time for extended discussion by members of the Native Fishes Committee and others.

Contributed Session II: Coldwater Sportfish

Restoring river-runs of landlocked Atlantic Salmon in Lake Champlain

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Andrew Harbicht, Dylan Fraser
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Landlocked Atlantic salmon (*Salmo salar*) were extirpated from Lake Champlain in the early 1800s. Management actions, including sea lamprey control and stocking yearling smolts, provide for a popular salmon fishery in the lake. However, spawning runs of salmon to rivers (i.e., river-runs) have remained low. In 2010, we initiated a long-term adaptive management experiment focused on increasing river-runs of salmon to enhance in river fisheries and restore natural populations. Examples of ongoing experiments include: (1) identifying indicators of smolting to optimize timing of stocking to periods when fish are likely to imprint on rivers and (2) evaluating alternative hatchery rearing methods. We identified gill Na+/K+ ATPase activity during the spring as a potential indicator of smolting for landlocked salmon but activity levels were much lower than observed in anadromous populations. We also observed a large impact of alternative hatchery rearing on adult returns to a focal river in 2013. There was a fourfold increase in adult return rate of smolts reared in river water with an ambient temperature profile compared to smolts reared on well water with an increased temperature profile. Our results demonstrate potential for rapid increases in river-runs using hatchery smolts combined with targeted research and adaptive management.

Survival and growth assessment of Atlantic Salmon strains: an ecological approach to restoration in central New York

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Reestablishing self-sustaining populations of Atlantic Salmon *Salmo salar* in central New York has historically produced limited regional results. Extirpation of the original Lake Ontario strain in the late 1800s has directed contemporary restoration efforts to include the stocking and assessment of alternative strains to identify a successful candidate for reintroduction. In the current study, juvenile Atlantic Salmon of Sebago Lake and Lake Memphremagog (Magog) strains were stocked in tributaries of Oneida Lake and the southeastern Lake Ontario Drumlins region in early June 2014. The objective was to evaluate survival and growth of fry and parr during the first summer of stream residency. Habitat parameters also were evaluated to determine the suitability of current rearing conditions. Survival estimates ranged from 0-27% for the Sebago and 0-22% for the Magog strain, respectively. Magog juveniles expressed significantly greater specific length and weight growth rates than comparatively-sized Sebago strain individuals. Habitat in the Oneida Lake watershed was generally more suitable han in Drumlins tributaries. However, sub-optimal conditions for Pacific salmonids in the Drumlins, particularly sublethal summer temperatures, provide locations of consideration for further Atlantic Salmon stocking and analysis. Evaluations in 2015 will target additional tributaries and/or strains to assess potential for Atlantic Salmon restoration.

Atlantic Salmon restoration: A bioenergetics modeling approach to assess spatial and temporal variability in juvenile rearing-habitat quality

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Efforts to restore landlocked Atlantic Salmon (*Salmo salar)* to the Lake Ontario Watershed have been renewed in the past decade. These fish represent a native top-predator that if restored, could provide additional recreational opportunity and economic gain. Currently Atlantic Salmon parr are being stocked annually in the watershed by several entities with mixed results. We propose to utilize a bioenergetics modeling approach to assess habitat quality for Atlantic Salmon parr during their first summer. By combining model components from two earlier studies we seek to develop a spatially explicit, strain-specific model with increased accuracy and utility. Laboratory experiments will be used to obtain strain-specific bioenergetics parameters. Data on flow, temperature and aquatic insect drift will be collected at multiple stream locations throughout the Fish Creek and Lake Ontario Drumlins regions from June-August of 2015. These data will be integrated into the bioenergetics model via a foraging sub-model. Concurrent parr stocking and subsequent backpack electrofishing at each site will be used to investigate fish survival and feeding patterns. Field data on growth, and diets will be used to validate model predictions. The spatially explicit bioenergetics model for juvenile Atlantic Salmon will allow managers and conservation organizations to identify optimal habitat for parr stocking, when other indicators such as the presence/absence of Rainbow Trout (*Oncorhynchus mykiss*) are not available.

Variations in water temperature and implications for brown trout populations in the Upper Schoharie Creek, 2010-12

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Water temperatures generally determine the suitability of stream habitat for most fish species. Continuous *in situ* loggers and airborne thermal infrared (TIR) sensing were used to characterize contemporary thermal conditions, temporal and spatial variations in stressful water temperatures, and the availability of thermal refuges in the Upper Schoharie Creek and West Kill from Oct 2010-Oct 2012. Continuous loggers showed summer temperatures exceeded 1-d and 7-d thermal tolerance limits for survival of Brown Trout at five of seven fixed sites both years. Results of the August 7, 2012 TIR indicated there were only nominal thermal-refuge areas. Only 0.009% (59 m^2) of the 690,170 m^2 of water-surface area mapped on the Schoharie was more than 1.0 ºC cooler and no areas were more than 2.0 ºC cooler than or "below" median temperatures (BMT). Only 0.085% (67 m^2) and 0.018% (14 m^2) of 79,098 m^2 mapped in the West Kill were BMT by 1 ºC and 2 ºC, respectively. Results indicate that waters in most of the two sub-basins are unsuitable for trout growth and survival during warm summer months. Additional study is needed to verify that resident trout are in poor condition or absent from parts of the system during these periods.

Inter-reach movements of brook trout (*Salvelinus fontinalis*) in Smitty Creek Watershed in Franklin County, New York

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This field study examined inter-reach movement of brook trout (*Salvelinus fontinalis*) between four reaches in the Smitty Creek Watershed in Franklin County, New York, during the fall season of 2014. The objectives of this study were to determine how many fish moved, the direction of their movement, and differences between age-0 fish and older fish. Brook trout were sampled in mid-September using a backpack electrofishing unit, and again in early November. Each reach was sampled with a minimum of three passes. All individuals sampled in September were given reach-specific fin-clips. Individuals sampled in November were examined for fin clips in order to determine movement and direction of movement. A considerable proportion of fish (n=130 of 186) sampled in November did not have identifiable fin-clips, indicating movement both in and out of reaches in a large percentage of individuals. Only small numbers of age-0 individuals (n=7) were found to have moved to a different reach, and all of these fish had moved upstream to lower-order reaches. These results suggest that a majority of the individuals moved based on the relatively large proportion of unmarked fish sampled and the low proportion of fish with fin-clips sampled in November. The percentages of fish moving downstream or upstream could not be determined. Upstream movement of some young individuals suggests that natural obstructions (e.g. debris dams) that were thought to be potential barriers did not completely inhibit their upstream movement.

Assessing spawning site fidelity of Brook Trout (*Salvelinus fontinalis*) using multiple, independent, small – scale PIT arrays

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Passive integrated transponder (PIT) tags are a commonly used technique for identifying and tracking fishes. These tags are often detected using permanent, stream-width arrays capable of identifying nearly all tagged organisms passing a particular point, but require significant infrastructure to install and maintain. Portable backpack detection units are more suited to small streams and short-term work, but rely on labor-intensive manual surveys and may be disruptive to fish behavior. To complement these methods, we developed a technique using multiple, independent, small-scale PIT readers. An array of these readers is cost-effective and can collect data autonomously. The use of pass-over antennas allows for placement in nonlinear waterbodies, such as lakes, where travel direction cannot be assumed. We evaluated the feasibility of this technique for studying spawning movement within a recovering brook trout (*Salvelinus fontinalis*) population in Honnedaga Lake, NY. Nine readers were installed at known spawning locations and operated for a period of 25 days. A total of 183 adult fish were collected, tagged, and released. During sampling, 21% of tagged fish were redetected and 19.5% of those detected were recorded at multiple locations. These results suggest that fish do move between spawning locations and confirm the utility such arrays.

A three year study of an isolated Brook Trout population in the eastern Adirondacks: sustainability, propagation and genetics

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Over the past several years changing weather patterns have led to costly and destructive storms that are damaging both environmentally and economically. In recent years, Hurricane Irene in 2011 was an unusual storm because it struck the eastern Adirondack Mountains in New York. The Adirondack region mainly relies on tourists to make money and fishing is a large part of what draws people to this region. Three years ago a study was started to explore the impact of Hurricane Irene on the brook trout population. During the first year, stream bed and water quality were analyzed to determine if a brook trout population could be supported a year after Hurricane Irene. After determining conditions could support a brook trout population, the fish were aged using their scales, invertebrate counts were collected and dissolved oxygen levels were collected to determine if the stream could support the continued survival of the brook trout population even though glacial till from 10,000 years ago was exposed from flooding. The genetics of three samples of brook trout (n=60, length) are being analyzed to see how much deviation has occurred since the last event of domestic strain stocking over 20 years ago.

Effects of thermal stress on survivorship of brook trout in north temperate lakes

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Brook trout (*Salvelinus fontinalis*) are common in waters ranging from the Appalachian mountains to the Arctic circle. These popular, coldwater sport fish face an uncertain fate in light of several climate change scenarios. Assessing the potential influence of variable temperature and hydrological regimes on brook trout populations poses an important challenge to fisheries biologists. We conducted a robust design mark-recapture study in three Adirondack lakes with contrasting thermal conditions to estimate population parameters related to survival, abundance, detection probability and movement. Each lake provides either ample, minimal or no thermal refuge during the warm summer months due to differences in morphometry, landscape position and stratification. The data analysis supports the hypothesis that brook trout experience reduced survivorship in lakes with little to no thermal stratification due to thermal stress in hot, dry years. Additionally, by incorporating covariates into the model set, the effects of a host of individual and environmental factors (e.g., body length, fat content, maximum summer water temperature, cloud cover, etc.) on movement, survival and detection probability were evaluated.

Dam removal to facilitate Salmonid passage in New York: two case studies

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Fish passage is important to the protection and restoration of fish and their habitats. The U.S. Fish and Wildlife Service works with conservation organizations, municipalities, tribes and citizens to evaluate barriers in order to improve fish passage. Barriers can include undersized culverts; perched culverts; stream fords; and dams. Construction of fish passage/dam removal restores the natural hydrologic function of the river, re-establishing connectivity within the system. Here I will present case studies illustrating two different approaches to providing passage upstream of two dams; Rauber Sky Acres (RSA) dam in Livingston County, and Fallbrook Dam (FD) in Oswego County. In both cases, one of the main project objectives was fish passage: for brook trout at RSA, and brook and brown trout at FD. To that end, natural channel design methodologies were used to provide passage for target species, yet maintain sediment storage in the former impoundments.

Use of acoustic telemetry to evaluate Lake Trout use of constructed reefs

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In 2010-2011, 29 reefs were constructed in Thunder Bay, Lake Huron, to mitigate degradation of a natural spawning reef and improve spawning success of lake trout. Reefs were designed to study characteristics that may attract spawning lake trout and maximize egg incubation success, including size, height, and compass? Orientation. Reef attraction, compared with two degraded reefs and a large area of natural reefs, was evaluated for four years post-construction by assessment of egg and fry density. In 2012, 40 lake trout were implanted with acoustic tags and tracked in fall, 2012-2013, within a virtual positioning array of receivers encompassing all of the study reefs. Lake trout movements were focused on a small area of the large natural reef; virtually no fish were detected on the degraded reefs. Lake trout spent little time on the constructed reefs in 2012, but explored all of the reefs in 2013; they appeared to prefer tallest and largest constructed reefs and ignored the smallest reefs. Telemetry data identified lake trout preferences for individual reefs and identified new potential spawning areas with more precision, encompassing a much wider area, than was possible with egg, fry, or adult collections.

Poster Abstracts

NYS DEC's Angler Achievement Awards Program - a summary of trophy-size Muskellunge

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New York State offers anglers some of the finest freshwater fishing in the country with numerous trophy class fish landed each year. The Angler Achievement Awards Program acknowledges these angling achievements and helps promote the fantastic fishing opportunities the state's waters provide. The Angler Achievement Awards Program is divided into three categories: Catch and Release, Annual Award, and State Record. The program not only offers an incentive to anglers to report their catches, but it is also an effective tool in learning where they're fishing, what they're catching and what baits they're using.

Muskellunge, commonly referred to as the "fish of 10,000 casts," are just one of the forty-four eligible fish species in the program. Only 36 eligible entries for muskies have been received since the turn of the century. Muskies entered into the program range from 48 inches to 60 inches and have primarily been caught from the St. Lawrence River and Chautauqua Lake. The controversial 69 lb. 15 oz. muskellunge caught in 1957 remains the current state record for New York and once held a world record standing before it's disqualification in 1992.

Environmental determinants of sex ratio in St. Lawrence River Northern Pike (*Esox lucius*): development of a molecular sex identification tool and experimentation with physical and chemical variables

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Sex determination and gender ratio within fish populations can be influenced by environmental factors and selective mortality and therefore represents an important marker of population health. We examine female dominance in St. Lawrence River Northern Pike with field data and novel techniques. Sex ratio is typically assessed in mature adult fish during the reproductive phase or through internal examination however, gender determination at early stages of development (e.g., egg and larval) presents a challenge because gonads are not identifiable, precluding investigation of sex linked biological processes. We are engaged in the development of a molecular diagnostic tool to determine gender at any life stage in Northern Pike. A known gender set of males (N=3) and females (N=5) was sampled to sequence the entire genome. Based on next generation sequencing data, a cDNA library was developed to produce gender specific transcriptomes whereby male linked markers were identified for development of a molecular assay. Potential gender specific markers have been identified and were used to test their diagnostic capability. If successful, the male specific assay will be used to investigate the St. Lawrence River Northern Pike sex ratio and its potential relationship to environmental factors (e.g. xenoestrogen and temperature).

Northern Pike and Muskellunge habitat preferences in US tributaries of the St. Lawrence River

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Fish assemblage data collected at 551 sites on six tributaries of the St. Lawrence River were used to characterize the habitat occupied by Northern Pike *(Esox Lucius*) and Muskellunge (*Esox masquinongy*). Collections with seines, gillnets, and backpack and boat electroshocking yielded 93 Esocids at 60 sites. The catch per unit effort of each species varied among the tributaries sampled. Northern Pike were more abundant in certain tributaries and Muskellunge were absent from three of the six tributaries. Associations were observed among habitats occupied by Esocids. Statistical analyses identified habitat characteristics preferred by Northern Pike, Muskellunge, or both Esocids. Both species preferred to be near open water and Muskellunge inhabited areas with denser aquatic vegetation at lower elevation. Using local habitat measurements and broad-scale characteristics, we are developing predictive models for Northern Pike and Muskellunge. Effective species distribution model predictions may assist managers with their stocking and population management strategies for these species.

Round goby expansion into Oneida Lake in 2014

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Round gobies have expanded towards Oneida Lake for several years with angler reports at the west end of the lake in 2013, though none were found in Cornell University fisheries sampling. In 2014, we sampled intensively for round gobies within Oneida Lake and connecting waterways to better understand population growth and effects on the system. We employed six sampling gears (433 samples), and examined predator diets to assess goby distribution. No gobies were caught in spring sampling. During summer, nine gobies were caught in the lake, all near the western-most entrance. Concurrent sampling in Oneida and Seneca Rivers to Onondaga Lake caught >700 gobies. Bottom trawling began catching gobies midsummer, with 63 caught by October. Seining and bottom trawling were most effective for gobies, while minnow traps and electrofishing were not. Diets of 1,064 fish of 11 different species from gillnetting found one goby in a white perch diet. Diets of 98 gobies were dominated by Dreissenid mussels. Most gobies caught in Oneida Lake were age-1, while Oneida River and Onondaga Lake gobies were age-0 to age-2. Results indicate gobies expanded from the Oneida River during summer 2014 and throughout the lake by October 2014, but still in very low numbers. Continued goby expansion is likely, with an increased role in predator-prey dynamics.

Changes in vertical distribution of native crustaceans in Lake Ontario: potential impacts by *Bythotrephes* on zooplankton migration behaviors

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Introduction of the exotic predatory cladoceran *Bythotrephes* has led to substantial changes in native zooplankton community dynamics in Lake Ontario since its initial detection in the early 1980's. Increased densities of *Bythotrephes* present in the water column influences the vertical distribution of zooplankton communities in offshore waters. Ultimately, redistribution negatively affects feeding, reproductive, and predator avoidance strategies, thus altering important trophic interactions between native predators and their prey. In this study, intensive sampling was conducted in Lake Ontario during May, July, and September of 2013 as part of the Cooperative Science and Monitoring Initiative (CSMI). We collected depth stratified zooplankton samples of the epiliminion, metalimnion, and hypolimnion using a vertical closing net. Results indicate low densities of *Bythotrephes* in 2013. In comparison to previous years with high densities of this invasive, differences in zooplankton vertical community structure were apparent in 2013. Furthermore, vertical distribution of zooplankton communities paralleled historical documentation. Future research efforts should focus on elucidating the potential overlap of influences caused by native limnetic predators in an effort to develop accurate food-web models of the lower trophic levels in Lake Ontario.

Catskills Watershed Steward Program: a SUNY Oneonta Biological Field Station (BFS) & Catskill Regional Invasive Species Partnership (CRISP) collaboration

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The Catskill Regional Invasive Species Partnership and SUNY Oneonta noted local interest in watershed steward programs (WSP) and initiated a pilot program in 2012. In 2014, we participated in State-wide train the trainer training and, then, trained three steward classes for the NYCDEP, the Village of Cooperstown (Otsego Lake), the Town of Springfield (Otsego Lake), the Canadarago Lake Improvement Association and the National Park Service (Delaware River). Classes focused on local invasive threats and provided lectures, organism familiarity, boat and equipment inspection techniques, and interpretive messaging. Following classes, stewards inspected and advised waterbody users at waters' edges. We followed up with visits to the stewards. Visits reinforced correct techniques, expanded exotics knowledge, and corrected incorrect techniques. Additionally, we refined our steward field manual and assisted in the development of State-wide steward guidance. Stewards collected data regarding water body access and waterbody user AIS prevention practices. We recommend expanded WSP training to include other citizen groups, municipalities, and government entities. New programs reinforce neighboring program effectiveness, and steward training costs decline with economies of scale. Stewards are motivated to excellence waterbody concerns more than by a focus on remuneration and their enthusiasm is reinforced by supervisory attention and access to expertise.

St. Lawrence - Thousand Islands fish community response to goby invasion

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New York State Department of Environmental Conservation R6

The St. Lawrence River supports one of the major fisheries in New York State, ranking from second through fourth in angling effort during recent years, based on the Statewide Angler Survey. Most of this effort occurs in the 48 mile long stretch of river known as the Thousand Islands. Ecosystem disturbances such as declining dissolved phosphorus, increasing water temperature and cormorant expansion have been reported in earlier studies. This study concerns the invasion and expansion of Round Goby. Examined in terms of numerical dominance, those trophic guilds most similar to gobies, insectivores (e.g. Brown Bullhead) and invertivores (e.g. Yellow Perch), showed the most pronounced negative impact to goby establishment. Piscivores (e.g. Smallmouth Bass) showed a moderate positive effect and omnivores (e.g. White Sucker) continued a preceding decline.

Biocontrol of *Myriophyllum spicatum* in three NY & CT Lakes

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Eurasian watermilfoil (*Myriophyllum spicatum*) is a widespread invasive plant that disrupts recreational uses of New York and Connecticut lakes and ponds. Bluegill (*Lepomis macrochirus*) in DeRuyter and Lebanon Reservoirs, Madison County, NY are nonnative. Bluegill in Woodridge Lake, Litchfield County, CT are believed to be nonnative. Bluegill have unique abilities to remove insect herbivores from milfoil, therefore reducing their density and effects on existing milfoil populations. The growing season is longer in the Connecticut Lake than the NY lakes, which can have pronounced effects on life histories of these herbivorous insects. Augmentation of New York lakes with milfoil insect herbivores has not provided a consistently satisfactory milfoil control result whereas manipulating fish populations to control bluegill appears to indirectly control milfoil. The three lakes were stocked with walleye (*Sander vitreus*) in late 2013 to initiate a trophic cascade to reduce Eurasian watermilfoil biomass. The population of an important caddis fly herbivore crashed in DeRuyter Reservoir in 2014 whereas the populations of a midge fly provided the most control in all three waterbodies. Milfoil reached the surface and flowered in small areas of each treated waterbody in 2014 but not extensively. More aggressive walleye stocking is recommended for 2014 and 2015.

Virkon® Aquatic is an ineffective disinfectant against Zebra Mussels

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The effectiveness against viral, bacterial and fungal pathogens has made Virkon® Aquatic a commonly used disinfectant for fisheries and aquaculture equipment. While the focus of its application has been on preventing the spread of fish pathogens, in New York waters preventing the spread of zebra mussels (*Dreissena polymorpha*) is often of equal importance. In this study, lab experiments were conducted to determine the effectiveness of Virkon® Aquatic on zebra mussels collected from Otsego Lake, NY. Tests were conducted on the effects of time exposure (1, 2, & 3 hours), concentration (5, 10, 20, 25 g/l) and temperature (50, 60, 70, 80°F). Zebra mussel mortality increase by 3% when Virkon® concentration increased from 5g/l to 25g/l. Mortality increased a total of 45% with temperature increases from 50 to 80°F, and decreased 9% when exposure time was increased from 1 to 3 hours. Total mortality ranged from 6.7% to 93.3%. Temperature and concentration levels had a significant impact on the effectiveness of Virkon® Aquatic as a disinfectant for fisheries equipment. However, even at exposures and concentrations well above the labeled guidelines, Virkon® Aquatic was not 100% effective killing zebra mussels and thus cannot be relied on to eliminate their spread.

Invasive species and native Salmonids in Otsego Lake, NY, USA

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Otsego Lake in eastern NYS supports the only Lake Trout (*Salvelinus namaycush*) fishery in DEC's Region 4 and historically, a unique inland fishery for Otsego Bass (Lake Whitefish, *Coregonus clupeaformis*). Over the last 45 years (1969-2014) of monitoring these native salmonids, major changes have occurred in the lake's ecology, largely the result of introduced AIS—aquatic invasive species. The once popular Otsego Bass fishery, which reportedly peaked in the mid-1800's, declined in the 1950's due in part to lake eutrophy and competition. Since 1969, Otsego Bass have continued to decline and provide no fishery, unlike Lake Trout. Alewife (*Alosa pseudoharengus*) were illegally introduced around 1986 and peaked in 2002, causing a trophic dynamic cascade while supporting an inflated Lake Trout population. Foraging Alewives reduced cladoceran size/abundance, increasing chlorophyll *a* and reducing hypolimnetic oxygen. Zebra mussels (*Dreissena polymorpha*) arrived in 2007 and synergistically altered the lake with the addition of Walleye (*Sander vitreus*, stocked since 2000) to reduce Alewife numbers. Undetectable since 2012, Alewife no longer provide deepwater forage to a threatened Lake Trout population. Otsego Lake has returned to its pre-alewife state and Otsego Bass are on the rebound as DEC and SUNY Oneonta try to assist their return.

Successful Sea Lamprey control: step one towards Salmonid restoration in Lake Champlain

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By the mid-1800s, habitat degradation and over-exploitation led to the extirpation of Atlantic salmon and lake trout from Lake Champlain. In the 1970s, USFWS, VTFWD and NYSDEC began stocking yearling lake trout and salmon to restore fisheries and reestablish natural populations. Parasitism by sea lamprey is a major limiting factor for these restoration programs with wounding rates as high as 99 wounds / 100 lake trout observed as recently as 2007. Since 2003, an integrated pest management approach to sea lamprey control has been carried out in the Lake Chaplain basin with: barriers to adult migration, targeted lampricide treatment to rivers and deltas, and trapping adults in spawning tributaries. Recent advances in the program include construction of a state-of-the-art removable barrier in Morpion Stream and a regionalized lampricide treatment schedule. Combined wounding rates of lake trout and salmon observed in 2014 were the lowest since monitoring began (13 wounds / 100 salmon and 31 wounds / 100 lake trout). These low wounding rates meet the program goal for salmon and provide increased survival of both species needed to enhance the recreational fishery and restore natural populations.

Test of various household chemicals to prevent the spread of adult zebra mussels

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The spread of zebra mussels into new bodies of water is of great concern in the United States due to their economic and ecological costs. The toxicity of five chemicals on adult zebra mussels at varying concentrations and exposure times was tested. Every chemical had at least one concentration that resulted in 100% mortality within the 96 h study period. Distilled white vinegar caused the fastest complete mortality, followed by potassium chloride, iodized table salt, sodium chloride, and sodium chloride based water softener salt. The data generated in this study suggest that areas that can retain liquids and submersible equipment can be disinfected by chemical treatment. Veliger toxicity to the same chemicals will be examined in the summer of 2015.

Determining the most suitable method for summarizing fish abundance for modeling

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Developing Neural Network (NN) models for fish abundance perform best when many, spatially dispersed data points are available. However, wide variability in site-specific habitat conditions often yields poor results. To develop effective, reliable models, catch per unit of effort and habitat variables were averaged; three different methods were compared. The first method averaged trawling events that fell within the same unique aquatic habitat area (AHA) and created a single value for that AHA. The second method used the same averaging concept but created duplicate records equal to the number of events used for the averaging. The third method averaged points within a 500 meter buffer around each trawling event and assigned the value of the average of all events within the buffer to the central event.

Habitat use of yearling Rainbow Trout in two trout streams in Central New York

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The introduction of non-native salmonids into the Great Lakes has been in process for many decades. Successful competition for preferred habitat in these new waters can be essential for a species to survive. We examined the habitat use of yearling rainbow trout during the summer and fall in Grout Brook and Orwell Brook. Rainbow trout were generally associated with fast water in both streams including deeper water in Orwell Brook and larger substrate in Grout Brook. Trout habitat use in Orwell Brook reflected a seasonal variation in available habitat. Stream flows were higher in Orwell Brook during the fall and, consequently, trout were associated with higher water velocities at that time. Trout were also associated with larger substrate in the fall which may suggest the use of substrate as a velocity barrier. Available habitat did not change in Grout Brook with no observed trout habitat shift. Water depth and velocity were the most important variables to explain trout habitat use in Orwell Brook, while water velocity and substrate size were the most important for Grout Brook. The information gained in this study will help management agencies in making optimal decisions on appropriate stocking of yearling rainbow trout in the future.

Spatio-temporal variation in fatty acid signatures of Lake Michigan fish

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To better understand the nearshore food web structure in Lake Michigan, spatio-temporal variation in fatty acid signatures (FAS) of four fish species (e.g., alewife, round goby, spottail shiner, and yellow perch) collected along the southwestern shore of Lake Michigan during spring, summer and fall 2013 were analyzed (n=300). There were three sampling sites and each differed in regard to habitat complexity; their substrates were characterized as sand (site A), rocky (site B) and coarse sand with intermittent cobble and random boulders (site C). Significant differences in FAS among fish species were detected (ANOSIM, overall R = 0.796), with alewife and round goby presenting the most distinct FAS (25.5% dissimilarity). Fatty acids responsible for the most variation among species included 16:1n-7, 18:1n-9, 20:5n-3, and 22:6n-3. Spatial and temporal variations in FAS were also observed within species. Fatty acid signatures of round goby collected at site B in spring and summer differed significantly (overall R 0.693 and 18.8% dissimilarity), which implies seasonal dietary shifts. Spatial differences in yellow perch FAS were also observed, indicating habitat driven plasticity in yellow perch diets. Although within species spatio-temporal FAS variations were observed, among species FAS differences were consistently larger.

U.S Fish and Wildlife Service and Fish Enhancement Mitigation and Research Fund (FEMRF) St. Lawrence River and Lake Ontario Tributary Assessment and Mitigation Project: Fish Barriers, Fish Habitat, and Fish Communities

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United States Fish and Wildlife Service

Since 2009-2014, the U.S. Fish and Wildlife Service has initiated efforts to evaluate major tributaries to the St. Lawrence River and Eastern Lake Ontario. These evaluations include the identification/assessment of existing fish passage barriers, as well as the collection of fisheries habitat and fish community data. These combined efforts have assisted in the identification of mitigation and restoration projects, including fish barrier removal projects, designed to improve fisheries resources with this region. Two mitigation efforts have been successfully implemented in Little Sucker Brook (2010) and Brandy Brook (2014) and there is a continuing effort to identify similar projects that could potential benefit multiple migratory and riverine species. In 2012, the Service began migratory fish sampling utilizing modified trap-nets in major tributaries in order to determine the presence and spawning migration extent of FEMRF target species. In addition, the Service has collected extensive baseline habitat and resident fish community data that coupled with existing fish barrier data will greatly aid in an effort to remove detrimental fish barriers and improve access to vital stream regions for migratory and other riverine fish species.

A recovery plan for the endangered Pugnose Shiner, help is needed!

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United States Fish and Wildlife Service

Pugnose Shiner, an endangered species in New York occurs in border waters with Ontario within two distinct regions, the St. Lawrence River and Lake Ontario. The population in a bay of Lake Ontario at Sodus is the only genetics unit of its kind, and a recovery program is underway to have them once more in two bays. Surveys in the 1990s and 2010s have shown that their abundance and habitats support this restoration approach. Extensive research and planning efforts in Canada, where the species if classified endangered, strengthens the foundation of knowledge that has led to this proposal. Pugnose Shiner in the St. Lawrence River are receiving other critical studies but are not currently at-risk because the species is expanding its range. Studies of this species' habitat relationships are just beginning in the St. Lawrence River, as well as in two Lake Ontario areas, and is a separate project to be undertaken by SUNY Brockport in collaboration with the NYSDEC and the USFWS. The poster also describes a need for help for catching Pugnose Shiners in Sodus Bay within the translocation effort. The authors are asking for field assistance for this focused seining effort in May by DEC, to collect juvenile shiners for translocation.

Toxicity of two copper-based herbicides to warmwater and coldwater fish

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Pesticides can be applied in aquatic environments as an effective tool for controlling aquatic nuisance species. Sometimes, these chemicals can also impact non-target species, causing negative impacts on the environment. Most algaecides use a form of copper as the active ingredient. Copper is toxic to fish, especially to trout species. New York State limits the concentration of ionic copper used in algae control, in order to prevent fish toxicity. Some aquatic herbicides also use copper as the active ingredient for macrophyte control. In order to be effective against target plants, the concentration of copper in a treatment needs to be 2 – 3 times greater than that for algaecide treatments. The difference between application rates for macrophyte control and concentrations shown to be toxic to fish are small, and potential fish kills could result from their use. We conducted toxicity tests on two NYS registered copper-based herbicides. The first was Captain, a chelated copper algaecide produced by SePRO Corporation. The second was Nautique, a chelated copper-based aquatic herbicide also produced by SePRO Corporation with a different formulation. While these two products are very similar, and in fact Nautique can also be used as an algaecide, we found very different toxicities to brook trout and fathead minnows. The LC50s we found for Captain were slightly greater than application rates used for algae control. Comparing those results to Nautique, used at higher application rates, we would predict toxicity problems for fish in treated ponds. But, the brook trout and fathead minnow LC50s we found for Nautique were 25 to 50 times greater than those of Captain. So Nautique has a much greater "Margin of Safety", even when applied at the higher application rates required for macrophyte control. This is encouraging, as it appears that Nautique may be quite effective against Hydrilla and other invasive plant species. Our results demonstrate the need for further study of aquatic pesticides used for macrophyte and algae control.

Leptocephali biodiversity in the Sargasso Sea: spatial and diel patterns

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The Sargasso Sea, at the center of the North Atlantic gyre, serves as a spawning location for various eel species, which play an integral part in reef ecology and global fisheries. This study evaluated patterns of morphological and molecular variation of the Bandtooth conger eel (*Ariosoma balearicum*) to determine whether there are genetically distinct and geographically separate populations in the Sargasso Sea. We collected eel larvae (leptocephali) using stacked net tows twice daily at the surface and at depth along a cruise track between Puerto Rico and New York City during Sea Education Association cruise C252 (spring 2014). Of the total leptocephali caught, 82% were *A. balearicum*, with the remaining individuals comprising 23 species and 12 families. Morphological analysis supported the presence of two populations of *A. balearicum*, however, there was no evidence of genetic divergence based on cytochrome oxidase subunit I (COI) or 16S rRNA genes. We also evaluated patterns of DNA sequence diversity to provide evidence of the demographic history of the species. The possible existence of two spawning populations of *A. balearicum* warrants further investigation and should be taken into consideration for siting marine protected areas in the Sargasso Sea.

Calcein as an alternative chemical marker for lake herring

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Restoring native Lake Herring (*Coregonus artedi*) populations in Lake Ontario is a joint effort by the New York State Department of Environmental Conservation and the U.S. Geological Survey. Restoration efforts have given rise to new culture techniques and methods for marking fish prior to release. In order to evaluate the efficacy of using hatchery supplementation to restore wild fish populations, fish need to be marked prior to release. Juvenile Lake Herring are fragile, thus mass marking techniques that reduce the handling of individual fish are required. We evaluated the usefulness of Calcein (SE-MARK) as a marker on bony structures, in particular the otolith. Juvenile Lake Herring (100 days old) were immersed in 5,000 mg/L Calcein for 4 minutes to apply the chemical marker. Observations of the chemical marker were evaluated 8 days following the treatment. All fish immersed in Calcein had strong brilliant marks on all bony structures including scales, fin rays, jaw bones, and vertebrate. The otolith was the only bony structure that did not show a brilliant marking due to the opaque nature of the structure. We suggest using Calcein to produce strong discernable marks on the bony structures of Lake Herring fingerlings.

Tracking the movement of PIT tagged trout in the Carmans River

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Beginning in March 2012, New York State Department of Environmental Conservation (NYSDEC) Region One DEC Fisheries Staff began monitoring the movement of, brown trout (*Salmo trutta*), rainbow trout (*Oncorhynchus mykiss*), and brook trout (*Salvelinus fontinalis*) in the Carmans River in Brookhaven, NY. The major goals of this portion of the study were to monitor the movement of stocked brown and rainbow trout, the movement of Brook Trout, and the effectiveness of a recently installed Alaska steep-pass fish ladder. Seven Half Duplex (HDX) PIT (Passive Integrated Transponder) Tag antenna arrays were constructed and installed in the Carmans River by NYSDEC Region One Fisheries Unit and Cornell Cooperative Extension/Stony Brook School of Marine and Atmospheric Sciences (CCE/SoMAS). Three hundred and fifty two brown, 376 rainbow, and 215 brook trout were tagged in 2012 and 2013 with 23 mm HDX tags. The two year study has shown: 60.1% of yearling brown trout remained at their stocked location while 39.9% moved downstream; 63.4% of yearling rainbow trout remained at their stocked location while 36.6% moved downstream; 19% of the tidally stocked two year old brown trout moved upstream via the fish ladder; brook trout remained close to their captured location until fall movement into spawning habitat.

Effectiveness of chemically marking Lake Herring (*coregonus artedi*) with oxytetracycline (OTC) for extended periods of time

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Restoration of native fish species into Lake Ontario is a multi-agency effort within New York State. Populations including Lake Herring (*Coregonus artedi*) over the past century have become severely reduced due to overharvesting and loss of spawning habitat. The reintroduction of Lake Herring as an alternative forage fish to non-endemic species has given a rise to new culture methods. Specific efforts for the development of new culture techniques have been made for mass marking Lake Herring prior to release. Identification of appropriate mass marking techniques is essential for species such as Lake Herring that are fragile to handle individually. We evaluated the effectiveness of using Oxytetracycline (OTC) as a marker on bony structures over a specified duration of time. Juvenile Lake Herring (100 days old) were immersed in 700 mg/L OTC for 6-h, 8-h, and 18-h to determine marking success. The survival of Lake Herring was not affected at any of the treatment durations. Effectiveness of marking bony structures was inconclusive with no distinct mark present. Further investigation into chemical composition of culture water is needed. Alternative chemical markers such as Calcein may be more useful for the facility as a result of prior marking success.

Effects of reduced turbidity and suspended sediment concentrations on macroinvertebrate populations at a restored reach on Warner Creek

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A segment of Warner Creek, a tributary to the Stony Clove Creek in the Catskill Mountains of New York, was restored in 2013to reduce concentrations of suspended sediment and turbidity caused by a localized mud boil and erosion of a large clay bank. Before restoration, impaired water-quality from fine sediments should have adversely affected intolerant macroinvertebrate species. This study plans to compare macroinvertebrate assemblages from before (2011) and after (2014) restoration to determine if the restoration reduced concentrations of suspended sediment and turbidity sufficiently to improve the health of the macroinvertebrate communities. The New York State Department of Environmental Conservation (NYSDEC) kick-sample methods were used to collect four replicate benthic invertebrate samples from Warner Creek and a reference site on the Stony Clove Creek during August of 2011 and 2014. Subsamples of 100 specimens will be identified to at least the family level. The NYSDEC Bioassessment Profile scores and selected macroinvertebrate community metrics and turbidity and suspended sediment concentrations from a USGS streamgage downstream of the restoration both pre- and post-restoration will be evaluated to test hypotheses that water quality and the health of macroinvertebrate assemblages differed post-restoration.

Overwintering survival and relative mortality of young of the year Black Sea Bass in coastal areas in the Northeast US

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Black sea bass *Centropristis striata* is a recreationally and commercially significant species that ranges from the Gulf of Maine to Florida, with two stocks separated by Cape Hatteras. In the northern stock, seasonal temperature variability elicits a seasonal offshore and southward migration that is not observed in the southern stock. At the northern edge of its range, the ability of juvenile black sea bass to survive winter depends upon the timing and extent of their seasonal migration offshore to escape cooler nearshore waters and their ability to survive cool water temperatures. Increased winter survival of juveniles has the potential to allow this species to establish populations in waters where they have previously existed at low abundances. To estimate the survivorship of black sea bass during winter months, an overwintering experiment was conducted. Young-of-the-year black sea bass collected from Great South Bay, New York between September and October 2014 (n=144) were exposed to two temperatures (3 and 5°C) and two salinities (35 and 15 ppt). A survivorship analysis was used to determine mortality rates among treatments and to identify the relative overwintering mortality in different coastal areas in the Northeast US.

Eastern Brook Trout joint venture NY overview: 2007-2015

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Brook Trout (*Salvelinus fontinalis*) are native to eastern North America. Brook Trout are in decline, often stressed by numerous environmental factors. Eastern Brook Trout Joint Venture started in 2004, goals are halt decline & restore fishable populations. NYSDEC Regions 4, 7, 8 & 9 have conducted extensive brook trout surveillance surveys since 2007. Multi-partner habitat enhancement projects were conducted on McIntosh Brook-Allegany State Park in 2008, Sevier Road-Nine Mile Creek Watershed in 2009 & Batten Kill near Eagleville in 2010. Salmonid catchment assessment and habitat patch layers were created using complex algorithms. NYSDEC regions are currently validating the algorithms output. NY Fish Atlas project data, Adirondack Lake Survey data & natural barrier data will be included in the next draft assessment output. The final product will ultimately influence the watershed priority scores used to rank project proposals for EBTJV funding. Region 3 plans to begin intensive stream sampling in 2016. Proposed 2015 multi-partner habitat enhancement projects include replacing a culvert on Horse Brook, Delaware County; riparian restoration in the Onondaga Creek Watershed & modify or replace several culverts in the Wylie Brook Watershed, Chenango County. NYSDEC will complete review of a final draft catchment assessment in 2015.

Spatial ecology and migration of adult Walleye in the eastern basin of Lake Erie

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Walleye in the Great Lakes are known to move across large geographic areas through multiple management jurisdictions. Having an understanding of movement dynamics and how they relate to fishing activity is essential when managing a complex, valuable, multijurisdictional fishery such as the Lake Erie Walleye fishery. Uncertainties surrounding Walleye life history and movement in the eastern basin of Lake Erie are an impediment to management because they prevent the implementation of a formal stock assessment for the eastern basin Walleye fishery. New York State Department of Environmental Conservation biologists, in collaboration with other Lake Erie researchers, are planning a five year study that will use acoustic telemetry to address these uncertainties. The objectives of this study are to: 1) Determine the relative contribution of western and eastern basin Walleye stocks to the eastern basin fishery, 2) Determine the timing, magnitude, demographics, spatial extent, and consistency of the western basin migrants' movement into the eastern basin, 3) Identify spawning sites and determine the spawning site fidelity of individual eastern basin Walleye spawning stocks, and 4) Determine the extent of movements of eastern basin spawning stocks out of the eastern basin. Beginning in the spring of 2015, acoustic receivers will be deployed and acoustic tags will be surgically implanted in eastern basin Walleye to address these objectives. This work is a multijurisdictional collaboration contributing to and using the Great Lakes Acoustic Telemetry Observation System (GLATOS).

Comparison of side scan sonar substrate classification methods to assess accuracy

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Accurate categorical substrate models produced using side scan sonar (SSS) imagery can be an essential tool for successful fisheries management. The accuracy at which substrate types are identified is dependent on how data is processed and classified. Researchers are able to allocate resources effectively by selecting processing and classification methods and software appropriate for their management plans. This study uses kappa statistics to compare the accuracies of 10 categorical substrate maps of one study site produced using common methods for classifying SSS imagery. The study site, Peggy's Eddy, is part of the lower Niagara River and is a hot spot for valuable Great Lakes species. Multiple substrate types and downward stepping bathymetry make up the area. These complexities are responsible for some of the typical challenges of producing substrate models in rivers, but also provide an opportunity to compare accuracies of complex seafloor imagery classifications. Methods include unsupervised and supervised classification using SonarWiz Chesapeake Technology, Triton Perspective, Erdas Imagine and ESRI ArcGIS software. When classification methods were compared, supervised and unsupervised manual classification of the SSS imagery in ESRI ArcGIS resulted in the most accurate substrate categorical map.

Improved Silver Chub species distribution model for Western Lake Erie

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Silver Chub is a native species in decline and the only known large-lake population may be in western Lake Erie. Species distribution models are valuable tools that help managers assess the location and extent of a species' appropriate habitat. A recent species distribution model showed an extensive area with the potential to support large numbers of Silver Chub, but was based on a geographically limited data set. We developed a neural network based species distribution model for the Silver Chub in western Lake Erie, improved by new data and using habitat variable that are resistant to anthropogenic activities. Ten habitat variables were sufficient to develop this model, which explained >99% of data variation. Predictions indicated that a large area of the waters approximately 2 – 9 m deep contained optimal habitat and the highest abundances should be support in a wide arc through the western end of the basin. The model indicated that optimal Silver Chub habitat was associated with relatively deep water, near coastal wetlands, where effective fetch is less than average. The model predicts a benchmark of the best potential for habitat to support Silver Chub and estimates that western Lake Erie could support ≥ 9 million Silver Chub.

Fish populations rebound in Schoharie County streams after 2011 record floods

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In September 2011, Schoharie County streams experienced record flooding when Hurricane Irene and Tropical Storm Lee devastated the area. Heavy flooding and mitigation resulted in high sedimentation and downstream degradation. To determine the impact of flooding on fish populations, standardized backpack electrofishing surveys were conducted in seven streams at established upstream and downstream sites 6, 18, and 30 months (2012-2014) post-flood and compared to pre-flood measurements (2007-2011). Record flooding resulted in significant increases in brook trout and blacknose dace populations at upstream sites, 6 and 18 months post-flood, but had no significant impact on sculpins. Record flooding of downstream sites resulted in significant decreases in slimy sculpin populations 6 and 18 months post-flood, significant increases in blacknose dace populations 18 and 30 months post-flood, but had no significant impact on brook trout populations. Fish populations in upstream sites, which were allowed to recover naturally, rebounded to pre-flood levels within 30 months. However, 30 months post-flood, blacknose dace populations were 8.1 times higher than in pre-flood surveys in the downstream sites. This indicates that the habitat in the more heavily degraded down-stream sites, which experienced more flood damage and post-flood mitigation efforts, are still recovering 30 months after Irene and Lee.

The use of an in-stream fish counter to measure absolute abundance and identify parameters influencing migration patterns of River Herring in Black Creek, a small tributary to the Hudson River

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In 2013, we conducted a pilot study using an in-stream fish counter in Black Creek, (located just south of Kingston NY), a small tributary of the Hudson River with a known river herring spawning run. The primary objective was to determine if a fish counting device was an appropriate method to collect absolute abundance data for river herring in small tributaries. Our secondary objectives were to identify when river herring migrate into tributaries and to identify parameters that may influence those migrations (i.e. moon phase, water level, water temperatures). We recorded 205,426 counts during the study. The primary peak in 2013 occurred on April 29th and a secondary peak beginning on May 16th. The peaks in migration into Black Creek appear to be highly correlated to a combination of moon luminosity and water temperature. Generally, river herring begin entering tributaries when water temperatures reach approximately 10.5C and spawning is reported to occur between 12-16C (Pardue 1983). We saw the same temporal influenced patterns in Black Creek in 2013. The peak spawning event occurred at or near the peak moon luminosity, primarily at night and when water temperatures reached approximately 14C.

1st year survival of fall fingerling Lake Sturgeon the Genesee River, NY

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Lake Sturgeon restoration programs commonly employ fingerling stocking as a tool for local supplementation as part of conservation of the Great Lakes metapopulation. A critical element of modeling supplementation strategies is 1st year survival. However, there has been very little assessment of survivorship through age 1. In October 2013, 1,047 fingerlings, 123 individually PIT or Floy tagged, were released into the Genesee River. Six capture-recapture samples were collected from June through October 2014. A total of 135 were captured with 23 recaptures. As a first population estimator we applied a modified Schnabel model. 960, 2013 year class Lake Sturgeon resided in the Genesee River, as of October 2014. Thus an estimated 93.5% of the fish stocked in October 2013 were still present in October 2014. This survivorship is higher than the minimum 40% reported in the literature and the % currently used in stocking planning models. With these results, further analysis with mark-recapture models and analysis of previously released juvenile sturgeon will allow detailed quantification of the survivorship at this life stage and the factors (habitat, size at stocking) which may influence how many Sturgeon live through their first year in restoration waters.

Habitat use of Brook Trout and Rainbow Trout in a Lake Ontario tributary

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The non-native rainbow trout have naturalized in New York waters and have developed interspecific habitat associations with brook trout where they occur sympatrically. The habitat use of subyearling and overyearling brook trout (*Salvelinus fontinalis*) and yearling and subyearling rainbow trout (*Oncorhynchus mykiss*) were examined in Hart Brook, a first order tributary to Sandy Creek in Adams, NY. A total of 570 microhabitat observations associated with each age class and species were made across three seasons (spring, summer, fall), excluding subyearling rainbow trout in spring, because they had not yet emerged. Principal Components Analysis revealed that velocity and cover were the most important variables governing habitat use. During all seasons, overyearling salmonids used pool habitat with abundant cover, whereas the subyearlings of both species were found to reside in shallower, faster water across all seasons. Habitat selection was greatest for overyearling brook trout during the fall. Both species and age classes used areas with more cover compared to what was available. Substrate did not play a major role in habitat selection for either species or year class. Direct studies of competition should consider the size advantage that earlier emerging brook trout may have over rainbow trout.

Dietary transfer of fatty acids in lake trout

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Fatty acid signature (FAS) analysis is a powerful tool to investigate foraging ecology and food web dynamics. However, the use of FAS to infer diets is influenced by lipid metabolism in predators. Therefore, we investigated how fatty acids were transferred from prey to predator and metabolized by the latter. Juvenile lake trout (average weight 6.6 g) were fed rainbow smelt for 16 weeks and were sampled prior to the beginning of the experiment and after weeks 4, 8, 12, and 16. Lake trout mass increased by 120% over the course of the experiment. During the first 8 weeks, 18:2n-6 and 22:6n-3 decreased in concentration whereas 16:1n-7 and 18:1n-9 increased significantly. No major change in lake trout FAS was observed thereafter. Our results suggest that only 8 weeks of exclusive diet of rainbow smelt was enough to change FAS in juvenile lake trout. Although lake trout FAS never matched rainbow smelt's FAS, this study provides a dietary reference point to judge wild lake trout samples against.

Five-year interval time-series modeling of abundance and distribution for the declining Slimy Sculpin in Lake Ontario

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Slimy Sculpin (*Cottus cognatus*) have shown evidence of decline since the early 2000s. Neural Networks were developed using 10 habitat variables to build a predictive species distribution model for Slimy Sculpin. Model performance was good for each time interval with R^2 values ≥ 0.99. Models performed best at predicting optimal habitat conditions for all time intervals, except for the last 5-year interval, when the highest abundance classes were not observed. The models also performed well at predicting presence-absence and moderate habitat conditions. By creating abundance and distribution models for 5-year intervals, predictions of where high abundances of Slimy Sculpin have occurred, and may still remain, in Lake Ontario were made. Examination of habitat conditions associated with high Slimy Sculpin abundances provides a better understanding of what habitat conditions remain important to Slimy Sculpin and which change over time.