54th Annual Meeting of the
New York Chapter American Fisheries Society

ABSTRACTS

Plenary Presentations

Brook trout and climate change from genes to landscapes

Nathaniel Hitt, Ph.D.

Research Fish Biologist
U.S. Geological Survey, Leetown Science Center in Kearneysville, West Virginia.

Brook trout are one of the most intensively studied fish species in eastern North America, and substantial gains have been made over recent decades to anticipate effects of climate change on this iconic species. In this presentation, I review the state of the research on this topic across a biological hierarchy from genes to metapopulations and landscapes. Key findings highlight (a) high confidence in some mechanistic pathways but not others, (b) the importance of spatial and temporal variation for stream temperature and flow predictions within small watersheds, and (c) critical uncertainties regarding local adaptation and the need for new research in this area.

Ruminating on the Future of a 47 Year old Lake Trout Restoration Program

Brian Lantry

Supervisory Research Fish Biologist
Station supervisor, USGS Lake Ontario Biological Station

Restoration of Lake trout in Lake Ontario has been particularly vexing as the current program has been going on for nearly 50 years without establishing a self-sustaining population. Our limited knowledge of the habitat and demographics of the native population does offer clues to calibrate our expectations for restoration. Previous attempts at re-stocking the lake has further helped define methods to pursue and impediments that needed to be overcome. The history of the recent restoration program has taught us much about how a reestablished stock will interact with the current invasive dominated and human altered system and about the impediments preventing full restoration. Coincident with the restoration program, management of the stocked salmonid sport-fishery has constrained restoration program expectations. The Chinook Salmon and Alewife predator-prey relation underpins the sport-fishery and has created tension with the restoration program as Lake Trout also prey heavily on alewives. As nutrient levels and preyfish populations decline, mangers must cope with a heightened tension and recalibrate fish community objectives. In this presentation, I use system and program history to frame questions currently facing managers regarding the goals and strategies for Lake Trout restoration heading into a future overshadowed by climate change.

On Thin Ice: Understanding Climate Change Threats to Lake Superior Fishes

Ashley Moerke, Ph.D.

Director, Center for Freshwater Research and Education
Professor, School of Natural Resources and Environment
Lake Superior State University

Climate change projections and recent data indicate that Lake Superior is one of the fastest warming lakes world-wide, with an increase of over 1.0^{o}C per decade. In addition, changes in ice cover extent and duration, precipitation patterns, and available nearshore habitat could lead to a myriad of threats to native coldwater fishes. Dr. Moerke's plenary will focus on the threats of changing climate to Lake Superior fishes with examples from the open lake, its connecting tributaries, and nearshore areas.

Indigenous place names: what they tell us about shared resources

Tony David

Director of the Saint Regis Mohawk Tribe (SRMT) Environment Division

Across the US and Canada, indigenous place names dot the landscape. These names serve as a reminder of the days when sovereign Indian nations governed their homelands and managed resources to support productive societies. These place names are more than remnants of indigenous history—they provide context to a tribe's relationship with important resources, natural features, neighboring communities, and sometimes all but forgotten conflict. Some place names identify resources or species that no longer exist. These names may also illuminate restoration potential. As we continue on a decade's long journey to restore, protect and restore the land, lakes, rivers and streams, understanding the perspectives of indigenous communities may aid in achieving mutual goals. Respecting tribal nations' right to self-governance and right to self-manage may bolster mutual efforts, or act as a force multiplier given the unique status of indigenous governments.

Science the Shit Out of It: Communicating Like Your Life Depends on It.

Dale Willman

Program Manager for the Resilience Science Journalism Fellowship program at the Craig Newmark Graduate School of Journalism at CUNY in New York City, and occasional NPR anchor

The science is clear – Climate Change is already affecting weather patterns, shrinking glaciers and altering fish range and habitat. Scientists are in a unique position to help educate the public, changing how Americans respond to this challenge before it's too late.

Contributed Oral Presentations

Alphabetical by first author's last name
*** denotes student presentation**

Nature-like fishpasses for aquatic connectivity to conserve and restore fish habitat

Abul B.M. Baki

Assistant Professor, Department of Civil and Environmental Engineering, Clarkson University, Potsdam, NY

River fragmentation, expressed by the number of barriers (e.g., dams, culverts, road crossing), is a major impediment to restoring many fish populations. According to the U.S. Fish & Wildlife Service, the free-flowing waterways of the Great Lakes Basin (GLB) itself has over 275,000 barriers, many of which are structures like dams and culverts. With habitat fragmentation progressing worldwide, ecohydraulics research put much effort into conservation measures for maintaining and restoring the ecological connectivity of riverine habitats. One of the recommended conservation measures to mitigate habitat connectivity is the construction of nature-like fishpasses (e.g., rock-ramp, rock-weir), mimic a small natural river, they do not only restore connectivity but also provide suitable habitats for reproduction and juvenile age classes. This talk will address the detail flow characteristics of nature-like fishpasses for different structure geometries (configurations, spacing and sizes) and channel characteristics (bed slope and flow rate). The talk will extend to focus their design optimization techniques and design procedure from an ecohydraulic perspective with some field applications. Recent recognitions of the ecological impact of barriers on fish passage in NY State, this talk will add some recommendations on further research on nature-like fishpasses for river connectivity.

Contact: abaki@clarkson.edu

Mycobacterial prevalence in striped bass of the Hudson River

Jessica E. Best[1] | Rodman G. Getchell[2]

[1]Department of Natural Resources, Cornell University, in cooperation with New York State Department of Environmental Conservation, New Paltz, NY | [2]Aquatic Animal Health Program, Department of Microbiology and Immunology, College of Veterinary Medicine, Cornell University

Mycobacteriosis is a common disease associated with chronic infections in Striped Bass *Morone saxatilis*. There is an ongoing epizootic of mycobacteriosis that was first detected in the Chesapeake Bay Striped Bass populations during the mid-1990s. At the time, the total extent to which the disease was occurring along the Eastern seaboard was unknown, but the disease was reported from Striped Bass taken from North Carolina to New York. The Hudson River is one of three major spawning grounds for Striped Bass on the east coast and little is known about the prevalence of mycobacteria in this system. This study examined the prevalence of mycobacterial infection in Striped Bass from the Hudson River by examining samples taken from 151 Striped Bass over a two month period in the spring of 2019. The samples were examined visually, tested for Ziehl Neelsen positive mycobacterial infections, and then prevalence of multiplex PCR positive mycobacterial infections. The results from this study may be useful in understanding to what degree natural mortality in the Hudson River is being affected by mycobacteria and what part this may play in the coast-wide stock, and how changing environmental conditions may accelerate these effects.

Contact: jessica.best@dec.ny.gov

White catfish and channel catfish in the Hudson River Estuary

Douglas Bishop | Rich Pendleton | Robert Adams

New York State Department of Environmental Conservation

White catfish is a native Ictalurid species of the Hudson River estuary that appears to be declining as introduced channel catfish become more abundant. Similar shifts have been documented in other estuarine rivers and while speculated in the literature, little work has been done to investigate the impacts of channel catfish invasions on white catfish. To better understand the characteristics of these populations in the Hudson River, we examine data from various long-term diadromous fisheries surveys conducted between 1986-2018. Utility-sponsored shoal trawl survey data are summarized to evaluate trends in young-of-year relative abundance over time and among sampling regions. Data collected during New York State Department of Environmental Conservation seine surveys are used to evaluate body condition and growth. The purpose of this project is to develop a better understanding of the population dynamics for each species and serve as a starting point for future analyses investigating the potential effects of channel catfish on native Hudson River fish populations. This work underscores the importance of long-term fisheries monitoring on understanding how populations respond to ecological change with respect to nonnative species.

Contact: douglas.bishop@dec.ny.gov

Freshwater mussel propagation efforts for *Leptodea fragilis*

Colby Bowman | Jay H Wilkins | Jessica L. Jock

Saint Regis Mohawk Tribe

The freshwater mussel community has been in global and national decline over the last 100- years. Factors such as overharvesting, habitat degradation, dredging and creating impoundments have all played a factor in the changing mussel populations. Currently, there is a large-scale U.S. EPA Superfund remediation project in the lower Grasse River in Massena, NY that will disrupt over 300 acres of the river bottom from dredging and capping activities. This remedy will negatively affect more than 1-million mussels representing 17- species. Therefore, recovery and propagation efforts will take place to help re-establish the native mussel community, and supplement the multi-year mussel salvage efforts lead by NYSDEC. In our initial Pilot Study, SRMT staff selected to propagate one (*Leptodea fragilis)* of the 17 affected species of freshwater mussels in order to help reintroduce this species back into their natural environment after remediation. This presentation will detail SRMT's 2019 Pilot Study results for *Leptodea fragilis* propagation using freshwater drum, inoculation techniques, and newly morphed juvenile mussel drop off. The juvenile mussel survival success was much higher than expected, which allowed SRMT to explore juvenile feeding techniques and begin planning for caged release to the lower Grasse River in 2020.

Contact: colby.bowman@srmt-nsn.gov

Drivers of broad-scale adult Atlantic sturgeon behavior in the Hudson River

Matthew Breece[1] | Dewayne Fox[2] | Amanda Higgs[3]

[1]University of Delaware | [2]Delaware State University | [3]New York Department of Environmental Conservation

The Hudson River supports the largest spawning population of Atlantic Sturgeon in the US and historic insults and planned activities pose significant threats. We examined adult Atlantic Sturgeon habitat use in response to environmental conditions. From 2010-2016 there were 63 stations recording 123 Atlantic Sturgeon. Environmental data (taken from HRECOS stations) as well as sediment, day-of-year, distance from salt front, location, daily flow and lunar phase were matched to 4,695 residences and 14,350 movements. A Generalized Additive Mixed Model revealed turbidity influenced models the most (28% importance), followed distance to salt front (27%), river kilometer (17%), and temperature (14%). Atlantic Sturgeon appear to be more resident at lowest and highest turbidity and when further upstream of the salt front. Atlantic Sturgeon seem more transient in the lower Hudson River (< RKM 100). In addition, a GAMM of residency duration found day-of-year to have the overwhelming influence with peak durations occurring in September. Given this information managers can concentrate on certain areas, stretches, and times of year that are vital to the survival and recovery of this endangered species.

Contact: mwbreece@UDEL.edu

Contemporary spatial extent and environmental drivers of larval coregonine distributions across Lake Ontario

**Taylor Brown[1] | Suresh Sethi[2] | Lars Rudstam[3] | Michael Connerton[4] | Jeremy Holden[5] | James Hoyle[5] | Marc Chalupnicki[6] | Dimitry Gorksy[7] | Curtis Karboski[7] | Thomas Evans[8] | Nicholas Sard[9] | Jesse Gardner Costa[10] | Scott Prindle[4] | Matt Sanderson[4] | Rodger Klindt[4] | Michael Todd[4] | Edward Roseman[11] | Alyssa Lau [8]| Amanda Cooper[8] | Daren Reinhart [8]| Brian Lantry[8] | Brian Weidel[8]*

[1]Cornell University | [2]New York Cooperative Fish and Wildlife Research Unit, Cornell University | [3]Cornell Biological Field Station, Cornell University | [4]New York State Department of Environmental Conservation | [5]Lake Ontario Management Unit, Ontario Ministry of Natural Resources and Forestry | [6]Tunison Laboratory of Aquatic Science, Great Lakes Science Center, US Geological Survey | [7]Lower Great Lakes Fish and Wildlife Conservation Office, US Fish and Wildlife Service | [8]Lake Ontario Biological Station, Great Lakes Science Center, US Geological Survey | [9]SUNY Oswego | [10]Fisheries and Oceans Canada | [11]Great Lakes Science Center, US Geological Survey

Coregonines (*Coregonus* spp.) were historically major components of native fish communities and fisheries in the Laurentian Great Lakes. In Lake Ontario, only remnant populations of cisco (*C. artedi*) and lake whitefish (*C. clupeaformis*) endured through the impacts of habitat degradation, overexploitation, ecosystem change, and non-native species. Management seeks to conserve and restore remnant spawning stocks; however, the spatial extent of current coregonine spawning habitat is unknown. To describe the contemporary spatial extent of coregonine spawning stocks and quantify the ecological drivers of larval coregonine distributions, a spatially-extensive ichthyoplankton assessment was conducted across contemporary and historical nursery habitats during April and May 2018 (n = 1,100 ichthyoplankton tows over 5 weeks). Coregonine larval production was observed across many of the sampled areas, including historical spawning habitats (n = 2,300 coregonine larvae collected). The sampled coregonine assemblage was dominated by cisco, with lake whitefish representing <10% of the total coregonine catch. Here, we will present distribution results and the preliminary relative importance of hypothesized biological, chemical, and physical mechanistic drivers of coregonine early life-history dynamics across stocks and species. Our research contributes to a greater understanding of contemporary cisco and lake whitefish spawning distributions and supports binational fisheries management in Lake Ontario.

Contact: tab289@cornell.edu

Informing lake trout population management in Lake Champlain with an ecosystem-based approach

Rosalie Bruel | J. Ellen Marsden | Jason D. Stockwell

Rubenstein Ecosystem Science Laboratory, University of Vermont

The Lake Champlain food web has been altered over the past 200 years as a result of landscape change and species additions and losses. For example, lake trout were extirpated from the lake by 1900, and a number of invasive species have been introduced, including alewife. Management of ecosystems in flux is challenging because management targets are often stationary (e.g., thresholds for sea lamprey mortality or salmonid stocking) while conditions change. Ecosystem-based modeling can be a powerful tool to evaluate the complexity of lake systems among direct and indirect interactions of food web components. We are developing an Ecopath food web model for Lake Champlain to evaluate food web responses to past perturbations and to project responses to possible future perturbations. In particular, we are testing how a recent surge of lake trout recruitment may impact the forage fish community. Preliminary simulations suggest a higher number of lake trout results in lower biomass of trout-perch and cisco; juvenile lake trout diet overlaps with the adult diets of these two species, suggesting strong indirect interactions. Ultimately, we are interested in whether sustained stocking rates in the presence of strong natural recruitment may lead to un-anticipated responses among food web components.

Contact: Rosalie.Bruel@uvm.edu

Building diverse partnerships to facilitate species resiliency

Julie L. Butler

US Fish & Wildlife Service

Current climate predictions for the next half century in the Northeastern United States portend increasing hurdles to coldwater fisheries recovery and persistence. One possibility for increasing species resiliency is to improve habitat quality and increase habitat accessibility by providing aquatic organism passage (AOP) for species of concern. Habitat restoration and AOP projects are heavily dependent upon collaboration among federal, state, local and non-profit entities due to potentially high project costs and challenges associated with landowner buy-in. In Vermont, the USFWS has focused on brook trout conservation, engaging at a watershed level to develop partnerships whose objectives include identifying partner interests and resources, identifying priority subwatersheds, conducting habitat and barrier assessments, and, ultimately, to identify and implement priority barrier and habitat restoration projects. Pooling both monetary and technical resources allows aquatic habitat connectivity and restoration projects to move forward where they might otherwise flounder. Improving species resiliency to climate change will require collaborative effort and will benefit all stakeholders, aquatic organisms and humans alike.

Contact: julie_butler@fws.gov

A comparison of benthic macroinvertebrate communities between the inlets and the outlet of Lake Forest and Lake Allure, NY

**Samantha R. Carey*

SUNY Oneonta/Cobleskill

A study was conducted on the benthic macroinvertebrate communities at the inlets and the outlet of Lake Forest and Lake Allure, NY. D-frame aquatic dip nets were used to survey each site 15 times. Five haphazard spaced samples were taken at multiple habitats (riffle, run and pool) at each location. Data were analyzed using non-metric multidimensional scaling (NMDS), followed by analysis of similarities (AMOSIM), and Pielou's evenness to compare family communities at each sample site. The ANOSIM model showed significant differences in macroinvertebrate communities at each site. The NMDS stress level suggests that two dimensional solutions will accurately represent family abundance within sites. Changes in water quality and habitat differences could explain the differences between sites.

Contact: careys@cobleskill.edu

Monitoring, describing and conserving of imperiled fishes in New York

Doug Carlson / Lisa Holst

Biology. Department, SUNY, Potsdam, NY / Bureau of Fisheries, NYSDEC Albany

The losses of fish species in New York are apparently just as severe as in other parts of this country, and there needs to be more monitoring and the directing of necessary programs for change regarding these species. Unfortunately, there are few groups of government workers or scientists finding funding to work on this. Cataloging collections and completing interpretative reports are the foundation of any conservation program, and these are in short supply for most of New York's imperiled inland fish. New York's rich history of fish records and an amazingly diverse set of aquatic habitats should be built upon to abet more losses of species. In the recent past there has been a few high-profile recovery efforts, but they have been with only one-species-at-a-time or with limitations of a narrowed geographic area where funds are available. Some of these prior programs will be described with recent advances. New money may be on the way in the next few years and hopefully there will be the beginning of a new era of recovery programs. When this new era begins, there would be stronger programs if discussions and planning for the imperiled fish species were by a broad base of professionals.

Contact: carlsodm@potsdam.edu

You lost that data sheet! Digital data collection and its utility in fisheries

Jacob Cochran

US Fish and Wildlife Service, Lower Great Lakes Fish and Wildlife Conservation Office, Basom, NY

How many times have you wrote down the wrong GPS coordinate or a gust of wind sent your data sheets flying? Technology is having a major impact on how we approach fisheries science. From telemetry studies to genetic barcoding, today's fisheries scientist incorporates cutting edge technology to gain a better understanding of the systems and organisms we study. However, there is a reluctance to change for the most fundamental aspect of our work – data collection. Good data is the foundation of good science. Advancements in digital data collection are now available to fisheries scientists in the form of field tablets (iPads), online data management, real-time data dashboards, and automated reporting. The Lower Great Lakes Fish and Wildlife Conservation Office is combining these with the use of ESRI applications (Survey123 and Operations Dashboard) and R markdown to improve our capabilities, standardize our data collection, expand data sharing, and provide seamless data delivery. This holistic data workflow is being used in our aquatic invasive species program to provide a more efficient and timely process. Leaving the antiquated dependency on papyrus and graphite as a means to store observations a thing of the past.

Contact: jacob_cochran@fws.gov

Habitat suitability and management options for maintaining round whitefish (*Prosopium cylindraceum*) in Adirondack ponds

Amy K. Conley / Matthew D. Schlesinger / Timothy G. Howard / Lisa Holst / Jim Daley

New York State Department of Environmental Conservation

Round whitefish (*Prosopium cylindraceum*) were once common in Adirondack waterbodies, but habitat loss, acid precipitation, competition from and predation by nonnative species, and other factors drastically reduced the number of occupied ponds. The species is listed as Endangered in New York, and the Department of Environmental Conservation raises whitefish in hatcheries and restores lakes and ponds for re-introduction. Managing for recovery of round whitefish in the Adirondacks, however, is time-consuming, expensive, and a slow process overall. The goal of this study was to 1) increase the probability of reintroduction success by modeling the suitability of ponds for reintroduction and 2) better understand the effects of different rates of pond reclamation on the overall round whitefish population in the Adirondacks. Under virtually all management scenarios, continuing pressure from competitors and climate change predicts decline in the number of round whitefish ponds over the next 100 years. However, an effort of restoring one pond every three years results in a 99% chance of round whitefish persistence in New York State.

Contact: lisa.holst@dec.ny.gov

Population trend monitoring for trout streams in NYSDEC Region Nine

Scott Cornett

New York State Department of Environmental Conservation

In 2016, NYSDEC Region 9 Fisheries initiated a program to better assess short and long-term wild trout population trends region-wide. Previously, we conducted intensive sampling on a limited number of streams, at irregular intervals. From 2016-2019, two-pass electrofishing sampling was done at 45 sites on 25 streams having previous sampling data (1-9 years) for comparison. In this presentation, we examine long-term trends for adult wild trout and reproductive success. Success of reproduction and adult trout abundance varied substantially, both regionally and temporally. Extensive fishery research has linked success of trout reproduction with winter/spring stream flows, while reproductive success has often been correlated with the strength of subsequent year classes. Consistent with projected climate change impacts, increases in high stream discharge during winter/spring trout egg incubation and fry swim-up and resulting weak year classes were observed in recent sampling years. However, we often did not observe correlations between numbers of young-of-year collected and subsequent year-class strength. We observed increases in the catch of large brown trout (>15 inches), as well as recapturing several large brown trout, from the same pools, multiple years in a row. These trout showed high site fidelity, but very little growth.

Contact: scott.cornett@dec.ny.gov

Changes in freshwater mussel communities of the Neversink River, New York, 1990-2019

**Michael deMoulpied | Andrew Gascho Landis*

Department of Fisheries, Wildlife, and Environmental Science. State University of New York, Cobleskill

Alterations of flow regimes in impounded river-systems, coupled with extreme hydrological events have caused freshwater mussel communities to decline. In these disrupted systems mussels lose reproductive cues, experience decline in host species availability, and direct displacement from floods. The Neversink River is a highly protected river-system in southeastern New York, that is home to seven species of mussels, including the federally endangered *Alasmidonta heterodon* and state threatened *Alasmidonta varicosa*. Our goal was to compare relative abundances and diversity with historical datasets from 1990, 1998, and 2007. We conducted timed-snorkel surveys during the summer of 2019 at 40 sites along the mainstem. We observed a modest drop in abundance, but large declines in diversity. The greatest drops were in the proportion of catch of periodic species (short- lived, higher reproductive output), whereas, proportion of equilibrium species (long-lived, lower reproductive output) increased. *Elliptio complanata* was the only equilibrium species and dominated our catch throughout the basin. Catastrophic flooding events have become more frequent in the Neversink over the last 15 years, and given the timing of the events, we suggest these events playing a role in the communal changes observed from 1990 to 2019.

Contact: demoulm349@cobleskill.edu

Juvenile lake sturgeon prey consumption in Cayuga Lake, NY

Dawn Dittman | Caleb Konrad | Candace Schermerhorn | Marc Chalupnicki | Tyler Field

USGS Great Lakes Science Center - Tunison Laboratory of Aquatic Science Cortland, NY

Examination of juvenile Lake Sturgeon (*Acipenser fulvescens*) diet is a critical step in the restoration of this native species as it reenters the ecosystem. We sampled the diet of stocked sturgeon and benthic prey availability in Cayuga Lake, NY. Lake Sturgeon and their prey were captured using standard methods at one site in 2018 and two sites in 2019. All available and consumed prey were identified to the lowest taxonomic level. The most abundant benthic prey available in northern Cayuga Lake were Dreissenidae (2018) and Oligochaeta (2019), with Dreissenidae predominant in the south (2019). Amphipoda and Chironomidae were the most common prey consumed in the north in 2018. The burrowing mayfly, *Hexagenia,* was the most common prey in 2019. In the south, Chironomidae were most commonly consumed. Fish were consumed by 64% of juveniles from northern Cayuga Lake in 2018 and by 33% in 2019. Almost all of the juveniles in the south ate fish (90%). This is a higher incidence of piscivory than has been reported. Dressenids and oligochaetes were avoided. Juveniles are known to consume chironomids and amphipods; *Hexagenia* has been a rarer prey. Changing food-web linkages will influence the success of Lake Sturgeon restoration in Cayuga Lake.

Contact: ddittman@usgs.gov

Restoring aquatic habitat connectivity in an upper Susquehanna sub watershed, one crossing at a time

Gian Dodici[1] / Dave Lemon[2] / Scott Prindle[2]

[1]US Fish & Wildlife Service / [2]NYS Department of Environmental Conservation

Longitudinal habitat connectivity is an important component of many fishes' life history. Fish move through riverine systems for many reasons including feeding, spawning, dispersing. Natural and man-made barriers can restrict movement within a riverine system which can lead to genetic isolation. Recolonization or genetic exchange within a population of fishes can only occur in the absence of barriers. I will discuss a collaborative effort between the U.S. Fish and Wildlife Service, the New York State Departments of Environmental Conservation and Transportation, the Chenango County Highway Department, the town of Coventry, and private landowners, to restore aquatic habitat connectivity in a headwater subwatershed in the Upper Susquehanna drainage. We implemented several strategies including replacing undersized culverts and installing grade-control structures below perched culverts.

Contact: gian_dodici@fws.gov

Predator-prey population dynamics modeling for Chinook salmon and alewife in Lake Ontario

**Kimberly B Fitzpatrick[1] / Brian C. Weidel[2] / Michael J. Connerton[3] / Jana R Lantry[4] / Jeremy P. Holden[5] / Michael J. Yuille[5] / Steven R. LaPan[3] / Lars G. Rudstam[1] / Patrick J. Sullivan1 / Travis O. Brenden[6] / Suresh A. Sethi[1] /*

[1]Department of Natural Resources, Cornell University, Ithaca, NY| [2]United States Geological Survey Great Lakes Science Center Lake Ontario Biological Station 17 Lake St, Oswego, NY | [3]New York State Department of Environmental Conservation, Cape Vincent Fisheries Station, Cape Vincent, NY| [4]New York State Department of Environmental Conservation, Watertown, NY | [5]Glenora Fisheries Station, Ontario Ministry of Natural Resources, Picton, Ontario, Canada | [6]Quantitative Fisheries Center, Department of Fisheries and Wildlife, Michigan State University, East Lansing, MI

Chinook Salmon are the hallmark Lake Ontario recreational fishery and provide important cultural and economic benefits to New York anglers and surrounding communities. However, the stability of this fishery is closely tied to the availability of the salmon's preferred prey, Alewife. Declines in the Alewife population, due to low recruitment or increased predation by wild and stocked predators, could potentially jeopardize the Chinook Salmon fishery. Building upon existing Great Lakes research, we collaborated with lake managers to develop a multispecies statistical catch at age model to examine Chinook Salmon and Alewife dynamics over the past two decades. By modeling Chinook Salmon and Alewife together we allow predator growth and prey mortality to vary based on the joint dynamics of both species. We found that recent increases in Chinook Salmon recruitment have contributed to declines in Alewife biomass. Increased understanding of the feedbacks between predator and prey dynamics may allow managers to better forecast future dynamics, including the impact of future stocking decisions on the stability of the Alewife population and ultimately the Chinook Salmon fishery.

Contact: kbf53@cornell.edu

Competition for food resources between the native lake sturgeon (*Acipenser fulvescens*) and invasive round goby (*Neogobius melanostomus*)

**Katherine Foley[1] | Susan F Cushman[2]*

[1]Hobart & William Smith Colleges | [2]Hobart & William Smith Colleges, Finger Lakes Institute

The Lake Sturgeon is the oldest, freshwater fish swimming in New York, although due to its population decline, it has been qualified as a vulnerable species. USGS and NYDEC are working to restock this native species into its natural habitat, although when these hatchery-raised juvenile Lake Sturgeon are released they will find themselves in competition with a relatively new invasive species, the Round Goby. In laboratory feeding trials, the Lake Sturgeon's consumption of *Bithynia tentaculata*, *Dreissena bugensis*, and *Gammarus fasciatus* was tested in three different competition types: no competition, interspecific competition, and intraspecific competition. Lake Sturgeon did not display a significant change in the consumption in different competitive environments and through analysis of stomach contents and remaining prey in tanks, however it was determined that both the juvenile Lake Sturgeon and Round Goby showed a prey preference towards *Gammarus fasciatus.* These feeding trial experiments opened new doors to analyzing competitive behaviors between these two fish and the possible limitation that Round Goby could place on the reestablishment of the hatchery-raised juvenile Lake Sturgeon.

Contact: katherine.foley@hws.edu

The effect of round goby on benthic macroinvertebrate lake communities

**McKenzie J. Frazier[1] | Susan F. Cushman[2] |*

[1]Hobart & William Smith Colleges | [2]Hobart & William Smith Colleges, Finger Lakes Institute

The Round Goby (*Neogobius melanostomus)* is a generalist-benthic fish from the Ponto- Caspian region and has inhabited Cayuga Lake (Finger Lakes region, NY) since 2012. They have not been documented in Seneca Lake yet but are projected to soon. We predict this fish has altered the lake benthic macroinvertebrate community in Cayuga Lake and wanted to understand the changes that might occur in Seneca Lake. In late summer 2019, benthic macroinvertebrate lake samples were collected using a mini ponar. Data from a study done by the Watershed Assessment Associates (WAA) in 2012 was compared to 2019 data to gain a better understanding the impacts of gobies in Cayuga Lake. In the lab, samples were subsampled until 300 macroinvertebrates were identified or until the entire sample was sorted. Species richness declined significantly in Cayuga Lake since 2012. Favored prey species also had significant changes in percent abundances since the WAA study. Since the invasion of the Round Goby, the benthic lake community has changed in both biotic and abiotic ways. This study has allowed us to predict the changes we will soon encounter once the Round Goby becomes established in Seneca Lake.

Contact: mckenzie.frazier@hws.edu

Lake trout in Lake Ontario: searching for the secret to spawning success

Stacy Furgal

U.S. Geological Survey

Despite years of stocking efforts, Lake Trout (*Salvelinus namaycush*) in Lake Ontario have yet to reestablish a self-sustaining population. Beginning in 2014, results of long-term bottom trawl assessments showed increased production of natural recruits from sites in western Lake Ontario, while simultaneously recording decreased production in the eastern basin. In this study, we examined several factors associated with spawning success at Stony Island Reef (SIR), a historically important reef in eastern Lake Ontario including: habitat condition, egg deposition, and adult and juvenile CPUE from assessment data. In 2019, spawning adults were also assessed at three locations around the lake. Our findings indicate that substantial changes in lake trout habitat may limit lake trout reproduction at SIR and emphasize the need to examine other spawning habitat lake-wide to determine if this is contributing to spawning success and failure at other locations.

Contact: stacyfurgal@gmail.com

Pushed to the edge: seasonal shifts in habitat use of lake trout in Lake Champlain

**Matthew Futia*

University of Vermont

Behavioral responses of cold-water fishes to seasonal changes in temperate lakes may be analogous to the response of these species to changing climate conditions. In temperate systems, increased water temperature caused by seasonal warming may force cold-water species to thermal refugia. Lake Champlain is a temperate lake that is separated into four basins by causeways that have narrow, shallow (< 6 m) openings. Therefore, cold-water species have access to these openings only during cold-water periods. In addition, two basins are relatively shallow compared to a third, deeper basin, suggesting they are less optimal for cold-water species during warmer periods. In the present study, acoustic transmitters were implanted in 93 adult lake trout to study their movement throughout Lake Champlain for up to four years. Of these 93 individuals, five were tracked moving between basins. Four of the five individuals only moved between basins during winter or isothermal conditions. In addition, three of the five individuals moved out of the shallower basins prior to thermal stratification in at least two of the recording years. These results suggest that lake trout evaluate seasonal habitat limitations and either avoid or move to more optimal habitat before changing temperatures cause thermal stress.

Contact: mfutia@uvm.edu

The potential for restoration of rocky reef spawning habitat with custodial maintenance

*Alex Gatch[1] / Edward Roseman[2] / Tomas Hook[1] /

[1]Purdue University / [2]U.S. Geological Survey

Rocky reef habitats constitute important areas for lithophilic spawning fishes and their offspring. Interstitial spaces created by the structure of rocky reefs, form micro-environments where incubating embryos and juvenile fishes are potentially protected from predators. However, if interstitial spaces are filled or blocked, the reef structure may lose these benefits. Common practices to restore reef habitat include augmentation of existing reef structures or construction of new reefs; though, these practices can be costly. We explored an alternative approach for reef restoration. In 2018, we created two benthic sled cleaning devices that used either propulsion or pressurized water jets. Devices were used to clean two natural rocky reefs in Saginaw Bay, Lake Huron. Effectiveness of cleaning devices was determined by measured changes in relative hardness pre and post-cleaning and by egg deposition via fall (lake whitefish *Coregonus clupeaformis*) and spring (walleye *Sander vitreus*) lithophilic spawners. We found that cleaning devices created positive changes in relative hardness and generally increased egg deposition in treatment plots. The practicality of cleaning devices was seemingly related to the magnitude of degradation of habitat. Our results indicate that the use of these or similar devices can potentially increase egg deposition by creating areas of higher-quality habitat.

Contact: alexander_gatch@fws.gov

Round 'slowby' – sluggish expansion of an invasive fish towards the Hudson River

Scott George[1] | Barry Baldigo[1]| Christopher Rees[2]| Meredith Bartron[2] | Dylan Winterhalter[1]

[1]U.S. Geological Survey | [2]U.S. Fish and Wildlife Service

The Round Goby (*Neogobius melanostomus*) is an invasive benthic fish indigenous to the Ponto-Caspian region of Eurasia which recently colonized all five Great Lakes and is invading eastward through New York towards the Hudson River. During 2016-2019, the U.S. Geological Survey, Mohawk River Basin Program, and the U.S. Fish and Wildlife Service conducted a collaborative study to (a) document the distribution, relative abundance, and rate of expansion of Round Goby through the Mohawk River-Barge Canal system and (b) compare the efficacy of environmental DNA (eDNA) and traditional fish sampling methods for monitoring the invasion front of this species. The presence of Round Goby was assessed using water samples (eDNA) and standard benthic trawls, bag seines, and minnow traps twice annually at 12 sites between Sylvan Beach and Albany, NY during June and August in 2016-2019. Round Goby were captured at the 3 western-most sites and have invaded waters at least as far east as Utica, NY. Environmental DNA produced consistent detections at these locations and also suggests recent expansion 10-20 km downstream from Utica. Overall, expansion towards the Hudson River is occurring slower than expected given the rapid colonization that recently occurred west of the study area.

Contact: sgeorge@usgs.gov

Mean and turbulent flow characteristics within an array of boulders with different boulder spacing

Amir Golpira | Abul Basar M.Baki

Clarkson University

Boulders are the main elements in a nature-like fish pass and understanding the flow field around them is of great importance. An experimental study was conducted to investigate the mean and turbulent characteristics of the flow in the presence of semi sphere-shape boulders with different boulder spacing and flow rates. Isolated flow regime was the main observed flow regime in most of the cases. Integral scale parameters (integral length scale and integral time scale) decreased in the presence of boulders while they did not change significantly by changing boulder spacing. A relationship was found between time-averaged streamwise velocity and turbulence intensity for each case. The results may provide a better understanding of fish swimming performance, fish habitat suitability, and sediment transport within nature-like fish habitat with different setups.

Contact: golpira@clarkson.edu

Fallback of adult landlocked Atlantic salmon (Salmo salar) transported above hydroelectric dams

Jadziah Hannon-Moonstone[1] | Theodore Castro- Santos[2] / Jonah Withers[1] / Nicholas Staats[1] / William Ardren[1]

[1]U.S. Fish and Wildlife Service / [2]U.S. Geological Survey

Behavior of spawning landlocked Atlantic salmon during recolonization of habitats is important to their restoration. The lower Winooski River (a tributary to Lake Champlain) has three hydroelectric dams that obstruct the upstream spawning migrations of salmon, preventing access to optimal spawning and nursery grounds. To address this, salmon are trapped and trucked above these dams and released into a 33.5 km section of the river. Successful restoration requires that transported salmon remain in this area, locate suitable spawning habitat, and subsequently spawn. We used radio-telemetry to estimate fallback, calculated as percentage of salmon migrating downstream over dams before spawning. In 2018, 57% (11 of 21) salmon fell back after transportation. These results prompted new management actions to reduce fallback rate including moving the release site upstream and modifications to fish handling procedures. Preliminary results indicate that fallback has been dramatically reduced. This project will continue through 2021 and will expand to document pre- and post-spawning habitat use and spawning locations, and to characterize timing and survival of outmigration post-spawning. These results will help inform restoration and fish passage operations in this and other salmon rivers impacted by hydroelectric dams.

Contact: jadziah_hannon-moonstone@fws.gov

Among family variation in survival and gene expression uncovers adaptive genetic variation in landlocked Atlantic salmon

Avril M. Harder[1] | Janna R. Willoughby[2] | William R. Ardren[3] | Mark R. Christie[4]

[1]Department of Biological Sciences, Purdue University | [2]School of Forestry and Wildlife Sciences, Auburn University | [3] U.S. Fish and Wildlife Service, Lake Champlain Fish and Wildlife Conservation Office Essex Junction, VT 05452, USA | [4]Department of Forestry and Natural Resources, Purdue University

We combined differential gene expression with formal survival analyses to investigate responses to an emerging conservation issue, thiamine (vitamin B_1) deficiency, in a threatened population of landlocked Atlantic salmon (*Salmo salar*). Thiamine is an essential vitamin that is increasingly limited in many ecosystems. In Lake Champlain, Atlantic salmon cannot acquire thiamine in sufficient quantities to support natural reproduction; fertilized eggs must be reared in hatcheries and treated with supplemental thiamine. We evaluated transcriptional responses (RNA-seq) to thiamine treatment across families and found 3,616 genes differentially expressed between control (no supplemental thiamine) and treatment individuals. Fewer genes changed expression equally across families (*i.e.*, additively) than exhibited genotype x environment interactions in response to thiamine. Differentially expressed genes were related to known physiological effects of thiamine deficiency, including oxidative stress, cardiovascular irregularities, and neurological abnormalities. Our results highlight the utility of coupling RNA-seq with formal survival analyses to identify candidate genes that underlie the among-family variation in survival required for an adaptive response to natural selection. We discuss how these results are being used to enhance restoration efforts for Atlantic salmon such as the development of a low thiamine tolerant landlocked Atlantic salmon broodstock at White River National Fish Hatchery.

Contact: william_ardren@fws.gov

Well, that didn't work: the ongoing quest to track anadromous blueback herring using otolith isotopes

**Cara Ewell Hodkin and Karin Limburg*

SUNY College of Environmental Science and Forestry

Previous studies of the blueback herring (*Alosa aestivalis*) population in the Mohawk River suggest that "textbook" anadromy in the real world is a myth, and that simple solutions will not be found for complex situations. While most Mohawk River blueback herring do indeed migrate out to sea at some point in their lifecycle, some do not, and many exhibit complex differential migratory patterns. The aim of this study is to expand upon our knowledge of this species' complex life history through the use of stable isotope microchemistry and their value as natural tags. There is a relationship between the strontium isotope ratio ($Sr^{87:86}$), salinity, and temperature. Some studies have found reliable, reasonable, and useful estimates of water temperature from fish otoliths. To do this, we performed life history transects of $Sr^{87:86}$ on otoliths collected from adult spawning blueback herring via multicollector laser ablation inductively coupled mass spectrometry (MC-LA- ICPMS). We were able to calculate the strontium isotope ratio for the last year of life, presumably spent at sea, then calculate estimates of salinity and the corresponding $\delta^{18}O$ of seawater. We then micromilled the edges of the same otoliths and analyzed this tissue for $\delta^{18}O$. The outer edge of the otolith, that most recently deposited, gives us information once again for the last year of life, and again, presumably at sea. These values were applied to form estimates of the temperature of the seawater in which our returning spawners had spent their last years of life. We found a range of values from less than $0^{o}C$ to nearly 30. While these temperatures are clearly not accurate representations of the Northwest Atlantic, this process may be useful for other species found within a narrower range of salinity, and did provide insight into the convoluted migratory patterns of blueback herring.

Contact: caraewell@gmail.com

Burbot: Oneida Lake's last coldwater species confronts climate change

James R. Jackson | Anthony J. VanDeValk | Thomas E. brooking

Cornell Biological Field Station

Oneida Lake is a large, shallow lake that exhibits homothermal conditions throughout much of the summer. The burbot is the last of two coldwater species historically reported as abundant in the lake (cisco was last captured in gill nets in 1987). Early research indicated that burbot abundance was limited by sea lamprey and marginal summer habitat. A lamprey control program initiated in 1985 did not result in increases in burbot. High occurrence of empty stomachs and reduction in energy density of livers during the summer months suggest that lack of summer habitat may limit burbot in Oneida Lake. Long-term trends in catches of burbot in multiple gears since the 1960s have exhibited significant declines. During the same period, summer water temperatures have increased significantly. Energetics models suggest that water temperatures over 22º C result in weight loss in burbot, and the average duration of this period of high summer stress has increased from three weeks in the 1970s to over two months in recent years. Continued warming of Oneida Lake may lead to further reductions of the burbot population.

Contact: jrj26@cornell.edu

Comparing the utility of morphological and genetic identifications of larval fishes

Colleen Keefer | Jacob Cochran | Aaron Maloy

U.S. Fish and Wildlife Service

Identification of larval fish can provide information on spawning habitats, reproductive success, and can aid in the early detection of invasive species. Traditionally, larval fish identification uses morphological characteristics such as pigmentation, pre-anal length, and myomere counts found within keys. However, morphology changes quickly in the early life stages of larval fish, causing overlap in merestics, and, subsequently, gaps within keys. Genetic barcoding can reduce uncertainty of morphological methods and has been proven to correctly identify larval fish species when validated genetic markers are available. The Lower Great Lakes Fish and Wildlife Conservation Office samples larval fish communities looking for aquatic invasive species. Therefore, the need for an accurate and timely methodology to identify larval fish is critical. In 2017, both morphological and genetic methods of identification were used to compare similarity. The results showed a discrepancy between the methods, with a 97% match at the family level, 60% match at the genus level, and 40% match at the species level. Differences were mostly between closely related species, such as pumpkinseed (*Lepomis gibbosus*) and bluegill (*Lepomis macrochirus)*. Continued development and use of genetic barcoding for identification could increase our ability to correctly and efficiently identify fish at the larval stage.

Contact: colleen_keefer@fws.gov

Largemouth bass populations: New York City vs. New York State

Toniann D. Keiling | Melissa K. Cohen

New York State Department of Environmental Conservation

When thinking about New York City (NYC) activities, freshwater fishing is not usually the first idea. Nevertheless, NYC has an active angling community, with largemouth bass being one popular target species. New York State Department of Environmental Conservation (NYSDEC) Region 2 Fisheries has performed boat electrofishing surveys in popular NYC water bodies since 2009. Findings are shared through NYSDEC's public website, but NYC's largemouth bass metrics have not been compared to New York State (NYS) metrics. This study compared relative abundance, condition, and size structure between NYC and state metrics, using data from the NYSDEC 2018 Black Bass and Sunfish Electrofishing Protocol Manual. NYC relative abundance was nearly twice as high as state metrics for fall surveys, but similar for spring surveys. Stock density indices were similar between NYC and NYS for fall and spring surveys. NYC largemouth bass had significantly poorer body condition than NYS across most size categories. Combined results of high CPUE and low body condition suggest that NYC largemouth bass populations may be experiencing overcrowding and/or low prey densities. Potential management implications will be discussed.

Contact: toniann.keiling@dec.ny.gov

The cisco genome assembly (*Coregonus artedi)* provides a new tool for managing coldwater fisheries in light of climate change

Trevor J. Krabbenhoft | Nathan J. C. Backenstose

University at Buffalo

The Laurentian Great Lakes are home to a diverse species flock of ciscoes (*Coregonus* spp.). While significant progress has been made in understanding morphological and ecological variation in this group, the mechanistic (functional genetic) underpinnings of this variation have proven elusive. Our understanding of the evolution of this group has been hindered by a lack of reference genome assemblies to provide the necessary genomic landscape for robust analyses. In particular, the polyploid origins of salmonids presents challenges for researchers studying genetic variation among populations or closely related species due to the duplicated nature of many loci. Here, we present a draft assembly of an adult female cisco (*C. artedi*) based on long-read sequencing and short-read polishing. We describe progress toward creating a reference quality assembly for integrating past and future genetic studies in coregonines and linking genomic variation with morphological, physiological, and life history traits. The cisco reference genome will provide another tool for management and conservation of these *"Coldwater Fisheries in Light of Climate Change."*

Conact: tkrabben@buffalo.edu

Expanding the feasibility of fish and wildlife assessments with close-kin mark-recapture

**Benjamin Marcy-Quay*

Cornell University

Close-kin mark-recapture is a powerful new method for the assessment of fish and wildlife populations. Unlike traditional mark-recapture techniques, the use of kinship as an identifying "mark" is robust to many forms of capture heterogeneity including variation in gear efficiency and tagging-based effects such as loss and differential mortality. In addition, close-kin methods can be applied to a wider range of sampling designs than traditional methods including single-occasion surveys, can provide retrospective historical abundance estimates, and can produce survival estimates from as few as two sampling occasions. Our analysis incorporated data from a three year study of lake resident brook trout (*Salvelinus fontinalis*) where individuals were both physically (PIT) tagged and genotyped for 44 *de novo* developed microsatellites with high throughput sequencing. We found that close-kin methods produced contemporary estimates of adult abundance and survival that were similar to those produced by traditional mark-recapture in both magnitude and precision. Retrospective abundance estimates corresponded with those from a separate historical Lincoln-Petersen dataset. This study provides support for the use of close-kin mark-recapture as a robust and sampling-efficient alternative to traditional mark-recapture methods of assessing population parameters.

Contact: bm455@cornell.edu

Distribution and ecology of *Ergasilus cotti* (Kellicott 1897) from mottled sculpin and rainbow darter

**Chris Marshall[1] / Joe Connolly[1] / Pat Hudson[2]*

[1]Cornell University / [2]U.S. Geological Survey, Ann Arbor, MI

Parasitic copepods are well established in natural systems and provide a unique linkage between invertebrate zooplankton and animals they parasitize. Members of the *Ergasilus* genus are often referred to as generalist or specialists in their fish host associations. One such specialist of this group is *Ergasilus cotti*, first recognized as a species from populations of mottled sculpin (*Cottus bairdi*) collected in a creek near Westerville, Ohio in 1892. *E. cotti* was last observed in Ohio within the Alum Creek watershed on rainbow darter (*Etheostoma caeruleum*) in 1940. Mottled sculpin and rainbow darter are the only fish known to harbor *E. cotti*, which has developed a burrowing mode of attachment like the gill maggot, *Salmincola*. Using archived specimens of mottled sculpin and rainbow darter, we conducted a systematic survey to determine the presence or absence of *E. cotti* from creeks in OH, PA, and NY. This report also focused on providing an explanation for the observed distribution pattern. Currently, 630 mottled sculpin and 973 rainbow darters have been examined for *E. cotti*, yielding 5% and 0.02% prevalence rates respectively, with infected fish collected as early as 1922 and as recently as 2014. In total, 165 copepods have been recovered and preserved.

Contact: ccm243@cornell.edu

A survey of parasitic crustaceans in Oneida Lake

*Christopher Marshall | James Watkins | Joseph Connolly | *Ruby Dener*

Cornell University, Department of Natural Resources

A survey of freshwater parasites on fish within Oneida Lake was conducted in the summer of 2018 and again in 2019, in order to determine the diversity and abundance of parasite species. Over each summer season, between June and September, the same 15 sites were surveyed using gill nets that soaked for 8 hours. Fish were then processed for species, length, weight, gut contents, and were looked over for parasites on the outer body. A total of 166 fish from 13 different species were sampled, and had their gills excised to be analyzed under a microscope. Results included the number of parasitized individuals, the degree of infection, as well as the opportunity for genetic barcoding of found parasites. Results indicated a correlation between fish size and parasite density, as well as that Walleye (*Sander vitreus*) were the most heavily parasitized species sampled. Results also indicated the presence of non- native parasite *Neoergasilus japonicas*, which had previously never been reported within the Lake Ontario drainage.

Contact: rsd93@cornell.edu

Seasonal responses of walleye abundance to changes in ecological flow

James E. McKenna, Jr. / Michael T. Slattery

US Geological Survey, Great Lakes Science Center, Tunison Laboratory of Aquatic Science

Alteration of natural river flow is a common type of lotic system degradation and can have serious effects on fish populations. Recent work has shown these effects for Brook and Brown Trout, based on a logistic model of cumulative abundance as a function of flow. This has not been done for Walleye in the Great Lakes nor for different seasons. We applied this method, using observed abundances of Walleyes in large warm rivers, with different August and April yields (flow/drainage area). Estimated yield ranged <1,093 – 13,666 $cm^3/s/km^2$ in August and 10,933 – 60,132 $cm^3/s/km^2$ in April. In August 84% of cumulative Walleye abundance was supported by yield of 10,933 $cm^3/s/km^2$ (1.0 cfs/mi^2) and in April 80% of cumulative Walleye abundance was supported by yield of 54,665 $cm^3/s/km^2$. A 5,466 $cm^3/s/km^2$ reduction in summer yield was associated with a 40% reduction of Walleye abundance, but a 10,933 $cm^3/s/km^2$ reduction in spring yield was associated with only a 30% reduction. In a large river system, there were seasonal differences in response of Walleye populations to changes in yield, with greater sensitivity in summer than spring. This tool may help managers interested in Walleye populations make decisions about flow diversions or dam licensing issues.

Contact: jemckenna@usgs.gov

An Adirondack case study of freshwater community ecology and shoreline organic matter

Craig Milewski

Paul Smith's College, Natural Sciences Department

Shoreline development reduces the availability of organic matter (e.g., wood, and coarse and fine particulates) and effect fish and macroinvertebrate ecology. A comparison of minimally-impacted sites and impacted sites at Lower St. Regis Lake, and reference sites at Black Pond found significantly less wood at impacted sites and significantly more fine and coarse organic matter at reference sites. Correspondingly, in Lower St. Regis Lake, fish densities were significantly higher in minimally-impacted sites than in impacted sites. Also, comparisons of stomach content revealed that small fishes (<100 mm) in near-shore areas with wood structure had a higher frequency of occurrence of macroinvertebrates and a lower frequency of occurrence of zooplankton compared to small fishes in adjacent, shallow off-shore areas. In Lower St. Regis Lake, macroinvertebrate family richness on woody structure at minimally-impacted sites was twice that found at impacted sites (18 vs 9). In Black Pond, family richness on woody structure was comparable to the impacted sites in Lower St. Regis Lake (7 vs 9). In Black Pond, macroinvertebrate family richness in organic substrates was five times that found in organic substrates in Lower St. Regis Lake (15 vs 3). These findings have implications for shoreline restoration.

Contact: cmilewski@paulsmiths.edu

Historical changes in the fish community in Lower St. Regis Lake, northern Adirondacks: what does it all mean?

Craig Milewski[1] / Corey Laxson[2] / Robert Visicaro[3]

[1] Paul Smith's College, Natural Sciences Department. / Paul Smith's College, Adirondack Watershed Institute[2] / Paul Smith's College[3]

This study had two purposes: one, to understand how shifts in fish communities in Lower St. Regis Lake fit into the historical narrative of change in recreation, eutrophication, hydrology, water quality, and non-native fishes; and two, to ask the question, can a non-native fish community be used to assess the health of a lake that has been substantially altered? Historical angler accounts, fish stocking records, and fisheries surveys reveal shifts in fish communities that conformed to changes in physical habitat and water quality. Lower St Regis Lake in 1930 supported three general assemblages: a coldwater assemblage including brook trout, a coolwater assemblage comprised of a diversity of minnows, and a few warmwater species. By the 1970's, native minnow assemblage was absent and brook trout were scarce. Today, the community is comprised mostly of non-native warmwater and coolwater species, and indicates that improvements in water quality benefited these species. This case study suggests that piecing together historical narratives can be used to demonstrate paths of recovery when non-native fish communities are likely to persist or dominate over native fish communities.

Contact: cmilewski@paulsmiths.edu

Invasive copepod infections of introduced salmonids in Lake Ontario

**Brian Mullin*

SUNY Oneonta

Salmincola californiensis (Subclass Copepoda) parasitizes the gills of salmonids of the genus *Oncorhynchus*. Three species of *Oncorhynchus* salmon native to the Pacific Northwest, *Oncorhynchus mykiss* (rainbow trout), *Oncorhynchus tshawytscha* (Chinook salmon), and *Oncorhynchus kisutch* (coho salmon) have been reported as hosts for *S. californiensis* since 1852. These three salmonids have been introduced to the Great Lakes intermittently since the mid 1800's. The introduction of these salmonids to the Great Lakes was followed, by the introduction of their parasitic gill copepod, *S. californiensis*. We chose to conduct a survey to formally document the occurrence of this invasive species. Our survey took place in 2018 and 2019 at the south-eastern side of Lake Ontario. Our survey results indicate the prevalence of *S. californiensis* to be 70% with a mean intensity of 2.71 in the 120 rainbow trout examined and a prevalence of 39% with an intensity of 1.56 in the 223 Chinook salmon examined. *S. californiensis* was found on 1 of the 200 coho salmon examined. The prevalence of 70% in rainbow trout is of great concern considering that it is nearly double that of its native range, (35%). This work constitutes the first formal documentation of *S. californiensis* in Lake Ontario.

Contact: mullbr09@oneonta.edu

Comparison of size-corrected traditional and geometric morphometrics for separating coregonine forms

Brian O'Malley

USGS Lake Ontario Biological Station

Traditional morphometrics (TM) that make use of caliper-generated measurements have historically been used to assign Great Lakes coregonine morphotypes. More recently, interest in using geometric morphometrics (GM), a newer, more statistically powerful method of discrimination, has increased for assessing intraspecific variation in morphology. GM analyses have seldom been applied to delineate Great Lakes cisco morphs, or compare sensitivity of assigning morphs from different morphometric methods on contemporary stocks when it's possible to use both techniques. This study compared the sensitivity of GM and TM on the same collections of Great Lakes ciscoes, previously discriminated and chosen to induce known potential bias in morphological analysis. Both methods were applied to a mixed-morph sample collection of ciscoes to compare the efficacy of method. Preliminary results suggest, GM is more sensitive to identifying morphology differences by capture depth that result in changes to body shape changes. The advantages and disadvantages of each technique regarding their application to coregonine morphology will be discussed along with recommendations for ongoing protocol development towards a standardized approach to Great Lakes coregonine morphology.

Contact: bomalley@usgs.gov

The threat of northern snakehead to New York waterbodies

Steven Pearson[1] / Scott Wells[1] / Heidi Himes[2]

[1]New York State Department of Environmental Conservation / [2]U.S. Fish & Wildlife Service

Aquatic invasive species present a grave threat to many fish communities and ecosystems in New York State (NYS). While aquatic plant invasions often alter available habitat for aquatic organisms, invasive fish species have the potential to disrupt fish community dynamics through predation and competition for limited resources. The northern snakehead (*Channa argus,* NSH) is a well-known invasive fish that has infested many waters in the United States. Historically, NSH introductions in NYS was managed through an extensive eradication effort and with monitoring of low-density populations. In August 2019, a credible report of NSH was made from the Hudson River near Hudson, NY. The NYSDEC and the USFWS partnered to complete rapid response surveys that included ~4 hours of electrofishing at different tides and environmental (e)DNA collections around the study area. Thirty species of fish were documented, including 3 common invasive fishes but no NSH/NSH-DNA were detected. NSH are a current threat to the inland waters of upstate NY. Only by continued education, diligent monitoring, and rapid response will we be successful in keeping NSH out of valuable aquatic ecosystems.

Contact: steven.pearson@dec.ny.gov

The Erie Canal – easy navigation for more than just boats

Rich Pendleton[1] | Gregg Kenney[1] | Stuart Findlay[2]

[1] New York State Department of Eenvironmental Conservation | [2]Cary Institute of Ecoystem Studies

Invasive species can often have significant negative ecological and socioeconomic impacts. Within the New York State Canal system and the Hudson River, the combined environmental and economic impacts of invasives are estimated to be nearly $500 million annually. This estimate is expected to increase as newly invading species continue to spread and establish throughout New York State. Asian carp, a pervasive group of invasive species now common throughout the Midwest, pose an imminent threat to the Great Lakes and other connected basins if their rapid range expansion is not addressed. Although it is difficult to predict their full impact, Asian carp have already altered food web dynamics and fish community structure in their current range. With the potential to disrupt billions of dollars of revenue generated from recreation, tourism, and fishing, multiple efforts are currently being implemented to contain their spread. All options should be considered to reduce the risk of the establishment of Asian carp and other aquatic invaders in New York State. Identifying solutions and taking preventative actions will undoubtedly outweigh the cost of mitigating and managing their negative effects if they were to invade and become established.

Contact: richard.pendleton@dec.ny.gov

Mapping the spatial distribution of native and non-native trout in the Ausable River watershed.

Carrianne Pershyn[1] | Lee Ann Sporn[2] | Brendan Wiltse[1]

[1]Ausable River Association | [2]Paul Smith's College Adirondack Watershed Institute

Brook Trout *Salvelinus fontinalis* is an iconic fish species in the Adirondack Park and a species of greatest conservation need in New York. The Eastern Brook Trout Joint Venture recognizes non-native fish (specifically Brown Trout *Salmo trutta*) as a primary threat to Brook Trout. Brown Trout are tolerant of warmer water and can be aggressive competitors for resources. Understanding spatial distribution and habitat occupancy of Brook Trout, Brown Trout, and Rainbow Trout *Oncorhynchus mykiss* is an important component to prioritizing conservation strategies to protect wild fish. Since 2017, we have used environmental-DNA to map trout distribution in tributaries to the Ausable River in the Adirondack Mountains. While Brook Trout are ubiquitous in all streams sampled to date, our results show non-native species utilizing the lower reaches of some tributaries of the Ausable River and occasionally move far from stocked locations and well into ideal habitat for native wild Brook Trout. Research across a larger spatial scale would allow for a better understanding of the extent to which stocked non-native species move into wild Brook Trout habitat in the Adirondacks.

Contact: cpershyn@ausableriver.org

Damn the dams of the Adirondacks!

Richard Redman

Lake Champlain Chapter Trout Unlimited

As a Trout Unlimited member, I would like to show a short slide show and talk about our Lake Champlain TU Chapters efforts to have the Imperial Dam on the Saranac River removed. The Saranac River historically allowed Atlantic Landlocked Salmon to have spawning runs. Dams built during Plattsburgh's the industrial growth period stopped all migration by this native species. The Imperial dam on the Saranac River is classified a Class C High hazard dam by the NYS Department of Environmental Conservation. The dam has not been used for the last 30 years and maintenance is lacking. There is no economic incentive to keep the dam. NYS DEC would like to install a fish ladder and repair the dam to meet present safety standards. Trout Unlimited would prefer the dam's removal and to restore the Saranac River using a geo-morphic natural channel design approach which will reduce ice buildup and thermal inputs, allow sediment transport, and increase the spawning waters for the Atlantic salmon.

Contact: richredmanrangeric@gmail.com

Extirpation of fish acanthocephalans at their type localities

Florian Reyda | Brian Mullin

SUNY Oneonta

This presentation focuses on unanticipated discoveries during recent field collecting trips taken to obtain species of the acanthocephalan (thorny-headed worm) genus *Neoechinorhynchus*. This is part of a systematic study of species of *Neoechinorhynchus*, a highly diverse genus of ~120 species. Members of the genus have been found on six different continents, but our focus is on North America where 33 species have been described, including many from catostomids. Our recent fieldwork has focused on obtaining specimens to subject to modern taxonomic analytical tools—tools not available during the early days of research on *Neoechinorhynchus*—such as scanning electron microscopy and DNA sequencing. We targeted nine different type localities, locations where species were originally discovered, to use for comparative work. We were successful, however, in only 5 of the 9 type localities. In spite of repeated efforts and visits we did not encounter *Neoechinorhynchus* species at three type localities in northern Mississippi and in Tennessee. Our survey data suggest that the species of *Neoechinorhynchus* that were described at those locations in the early to mid-1900s have since been extirpated. We provide possible explanations for the disappearance of these parasites.

Contact: florian.reyda@oneonta.edu

Morphological variation of extant bowfins (Amiidae: *Amia*) in the Mississippi River Basin: taxonomic and conservation implications

**Daniel Sinopoli*

SUNY-Environmental School of Forestry

The Bowfin genus *Amia* has been considered monotypic since 1896, when 12 nominal species were synonymized with *Amia calva* with no scientific analysis or rationale. In the 123 years since, only five studies have examined morphological or genetic variation within the genus, all of which did find some separation among populations. To test the 1896 monotypy hypothesis for the Mississippi River basin, we analyzed morphological variation in newly collected and museum archived Bowfins from Louisiana (LA: type localities of *A. marmorata, A. viridis,* and *A. subcoerulea*) and Illinois (IL: type localities of *A. reticulata* and *A. piquotii).* Our analysis was based on 40 morphometric measurements and eight meristic counts, using standard multivariate and univariate statistics (e.g., PCA, ANCOVA, etc). There appear to be multiple morphotypes in both IL and LA waters of the Mississippi drainage and nearby Lake Pontchartrain system. We infer that there may be multiple taxa (or 'evolutionarily significant units') in the Mississippi basin. Additionally, two localities in Louisiana each appear to have two sympatric morphotypes. Therefore, we reject the 123- year-old monotypy hypothesis. The discovery of multiple Bowfin morphotypes (species?) has significant management and conservation implications.

Contact: dsinopol@esf.edu

Does New York have an endemic fish? A 133 year mystery

*Carl St. John [1] | N. Lou[1] | N. Therkildsen[1] | P. McIntyre [1,2]

[1]Department of Natural Resources, Cornell University | [2]Department of Ecology and Evolutionary Biology, Cornell University

After the Summer Sucker was first separated from the White Sucker by Fred Mather in 1886, its status as species has been both affirmed and rejected, often by studies whose primary goal was not the description of the Summer Sucker itself. Most recently, Morse and Daniels (2009) elevated the Summer Sucker to species based on morphology and phenology; however, preliminary genetic investigations have once again called into question its validity. I plan to combine genomic techniques with robust sampling design to clearly delineate the Summer Sucker from the White Sucker and to develop tools for NYDEC to assess its conservation status.

Contact: cas399@cornell.edu

Capacity of zooplankton prey for supporting coregonid restoration efforts

James Watkins | Taylor Brown

Cornell University

Crustacean zooplankton represent a key food source for planktivorous fish in Lake Ontario including alewife and coregonids such as lake whitefish, cisco, and bloater. Long-term zooplankton monitoring in the nearshore and offshore have detected clear declines in zooplankton biomass and dramatic shifts in species and size distributions. Vertical distribution and nearshore/offshore gradients in distribution as well as seasonal succession bode importance to the successful recruitment of planktivorous fish. We explore the current spatial and temporal overlap of fish life stage development with zooplankton prey with consideration of thermal habitat to assess successful growth of several planktivorous fish. We contrast that with historical zooplankton data to evaluate implications for sustained alewife and restored coregonid populations.

Contact: jmw237@cornell.edu

Recruitment impediments in Lake Ontario coregonines: contrasting mechanisms and the potential roles of habitat and climate

Brian Weidel

U.S.Geological Survey

A myriad of potential competing and interacting factors have been proposed that impede Cisco (*Coregonus artedi*) and Lake Whitefish (*Coregonus clupeaformis*) recruitment. Observations where coregonine populations have generally declined since the 1800s, like those in Lake Ontario, implies historical ecosystem changes may have caused recruitment impediments that continue today. Herein we propose different mechanisms for how land use changes, species introductions, and climate may influence reproductive success and ultimately the trajectory of Lake Ontario fish community. We identify critical periods where year-class failure may occur and contrast the evidence supporting these different critical periods. We also describe ecosystem experiments that may quantify relative role of physical habitat relative to other possible drivers of recruitment. The goal of this idea-based presentation is to spur audience discussion to critique ideas, discuss similar observations, or develop contrasting hypotheses.

Contact: bweidel@usgs.gov

Seasonal depth distribution of wild and stocked juvenile lake trout in Lake Champlain

Pascal D. Wilkins

University of Vermont

Sustained recruitment of wild lake trout has been documented in Lake Champlain since 2015 using intensive (every 2-4 weeks) bottom trawl from 30 to 55 m throughout the ice- free season. We used catch-per-unit-effort data on the seasonal depth distribution of wild and stocked age-0 to age-3 fish to develop a long-term assessment protocol to evaluate annual recruitment. CPUE of wild and stocked lake trout was compared by depth and temperature using general linear models. Differences were most pronounced during thermal stratification, when wild lake trout were significantly more abundant in warm (6.5-8.5ºC), shallow (30-40 m) depths and stocked lake trout were more abundant in cold (4.5-5.5ºC), deep (45-55 m) areas. There was no difference in the distribution of wild and stocked juveniles prior to thermal stratification in spring. Wild juveniles were more abundant than stocked juveniles at intermediate depths (35-45 m) and colder temperatures (7.5-9.5°C) after the thermocline broke down in fall. An optimal assessment plan could involve sampling in spring at any depth to obtain unbiased samples of wild and stocked fish, including newly- recruited age-1 wild juveniles.

Contact: pascal.wilkins@uvm.edu

Evaluation of landlocked Atlanticsalmon recolonization in the Boquet River

Jonah LawrenceWithers[1] / NicoleBalk[2] / LukasMcNally[3] / WilliamArdren[1]

[1]USFishandWildlifeService/ [2]NewYorkStateDepartmentofEnvironmental Conservation/ [3]TheNatureConservancy

Since the 1960s, managers have stocked landlocked Atlantic salmon *Salmo salar* in Lake Champlain and its tributaries to provide fishing opportunities and reestablish naturally reproducing populations. In 2015, the removal of the Willsboro Dam provided salmon with open access to historic spawning grounds in the Boquet River. Since the removal of the dam, we have documented successful spawning and recruitment to the young-of-year life stage, via fall redd surveys and spring-summer snorkel surveys. Despite consistent detection of redds up-, and down-, river of the former dam site, redd density has varied spatiotemporally; ranging from 4 to 200. Young-of-year salmon have been detected in areas near historic spawning grounds but not below the former dam site. These surveys have been critical for documenting salmon recolonizing the Boquet River. In addition, data on redd locations are being used to prioritize habitat restoration projects in the watershed and will be used as an indicator of spawner abundance. Finally, we discuss how climate change impacts, such as increased number of high flow events, have impacted these monitoring efforts and salmon recolonization.

Contact: jonah_withers@fws.gov

Cayuga Lake lake sturgeon recovery

Emily Zollweg-Horan

New York State Department of Environmental Conservation, Inland Fisheries- Cortland

Cayuga Lake, one of the largest Finger Lakes and a headwater of the Oswego River, has been stocked with Lake Sturgeon periodically since 1995, and consistently since 2013. As the first stocked fish are now mature, we are attempting a mark recapture population estimate of the spawning adults, sampling to identify spawning areas, and looking for evidence of natural reproduction. In order to qualify for delisting, there must be at least 750 spawning adults in the Oswego watershed, and three years of verified natural reproduction out of the previous five years. The Cayuga Lake spawning population of lake sturgeon has not yet reached 750 individuals, and there are some species specific challenges to obtaining a reasonable estimate. However, we can document reproduction and survival of both stocked and wild reproduced fish. In addition, one spawning area has been verified, and other appropriate locations have been identified.

Contact: emily.zollweg-horan@dec.ny.gov

Contributed Poster Presentations

Alphabetical by first author's last name
*** denotes student presentation**

New laboratory introduction: movement variability and ecological resilience (MOVER)

Matthew Altenritter

SUNY Brockport

The growing use of applied (e.g. telemetric) and natural intrinsic (e.g. hard-part microchemistry) tags is helping to reveal diverse, but previously unknown movement behaviors in fishes inhabiting the Laurentian Great Lakes. Within species, this diversity or "portfolio" of behaviors underpins resilient fisheries. As a new faculty at SUNY Brockport, I am interested in elucidating diverse movement behaviors and their management implications. My lab employs telemetry and hard-part microchemical techniques to characterize fish movements at multiple spatial and temporal scales. Current work in the lab includes research on yellow perch (*Perca flavescens*) and juvenile lake sturgeon (*Acipenser fulvescens*) movements among Lake Ontario and coastal waterbodies (i.e. tributaries and wetlands). I have additional interests in the sublethal effects of hypoxia exposure on fish and dispersal outcomes of invasive species movement in lotic ecosystems.

Contact: maltenritter@brockport.edu

Change is coming, but what does that mean for crayfish?

Rebecca Aubrey

U.S. Fish & Wildlife Service

Native crayfish play important community roles in freshwater ecosystems. The introduction of nonnative crayfish can cause drastic changes in aquatic food webs. Changing climate conditions can affect the spread and distribution of nonnative species by either limiting available habitat or by opening new areas. Understanding how climate change may impact suitable areas for a species has implications for invasive species watch lists and early detection programs as well as conservation efforts for native species. To explore this issue we looked at how different climate change scenarios affect suitable areas for native and nonnative crayfish species. The U.S. Fish and Wildlife Service's climate matching program, RAMP (Risk Assessment Mapping Program), was used to model the geographic range with suitable climate conditions for the present and for the year 2050. RAMP compares the values of 16 climate variables based on temperature and precipitation from source locations where the species is established to the target area of interest. The model results allow managers to refine watch lists for their areas and prioritize conservation efforts.

Contact: rebecca_aubrey@fws.gov

Age structure and genetic markers of semelparous vs. iteroparous american shad (*Alosa sapidissima*) in the Delaware River.

**Matthew Best | Dan Stitch*

Biology Department, State University of New York at Oneonta

American Shad (*Alosa sapidissima*) display a continuum of spawning strategies ranging from short-lived semelparous populations in the southern extent of their range to long-lived iteroparous populations in the north. The degree to which this varies within populations is poorly understood. Recent work has shown that downstream passage of iteroparous spawners through hydropower dams is a major driver of population abundance and propensity for repeat spawning. An apparently high incidence of post-spawning mortality in upstream reaches of coastal rivers has caused biologists and managers to question whether long-distance migrants within a population might be more predisposed to a semelparous spawning strategy than short-distance migrants. However, the prevalence of dams in the main-stems of most coastal rivers, coupled with poor upstream passage rates for American Shad at those dams, makes this difficult to study in practice. A project is being initiated to understand relations between migration distance and changes in age structures, life-time spawning histories, and genetic markers associated with iteroparity in the Delaware River, USA. The goal of this study is to determine to what degree semelparous and iteroparous life-histories co-exist in this system and whether life-history strategy can be related to migration distance in an un-impounded river system

Contact: bestm243@gmail.com

Cazenovia Lake fish community and four years of walleye stocking

**Kiernan J. Blouin | Ciara L. Gunderson | Jack G. Layland | Cassidy L. Rattray | Claudia M. Waltz | Thad E. Yorks*

Environmental Biology Program, Cazenovia College

Cazenovia Lake (Madison County, NY) was stocked with 22,000 walleye fry in 2015, 2017, 2018 and 2019. The fish community was sampled by trap-netting to assess the Walleye stocking program, fish condition as indicated by relative weights (Wr), and population structure by way of Proportional Size Distribution (PSD). Two sites were sampled in both summer and fall of 2019 (total of 26 trap-nights) with a total capture of 1,322 fish. The average catch per trap-night was 92.5 (summer) and 109.6 (fall). Despite stocking efforts, only one Walleye was captured in 2019, and it was too large (682 mm TL, 3420g) to be from recent stocking. With only occasional large Walleye observed during our surveys and surveys by the NYSDEC, we do not have evidence of stocking program success. The most abundant species in both summer and fall were Bluegill and Pumpkinseed. The mean Wr was ≥ 89 for all species indicating good condition, except Yellow Perch (mean Wr = 79) which may have exhibited stunted growth. PSD-Q values were >50 for nearly all species and 100 for many species in both summer and fall, indicating a high-quality fishery and/or low levels of exploitation.

Contact: kjblouin@cazenovia.edu

Current status of the Chautauqua Lake fishery

Justin Brewer | James Zanett | Logan Stratton

New York State Dept. of Environmental Conservation, Region 9

Chautauqua Lake, a diverse 13,156 acre multi basin lake in Western NY, is currently a premier destination to fish for walleye, muskellunge, and black bass. The lake is currently managed as a high quality multi-species fishery with these three species being the primary predators. Walleye, arguably the most popular target among anglers on Chautauqua Lake, experienced a dramatic decline in the early 2000s but have made a remarkable recovery over the last decade. The trophy muskellunge fishery is supplemented by an annual stocking of muskellunge fingerlings produced from pure strain Chautauqua Lake broodstock collected during the spring muskellunge egg take and population survey. NYSDEC survey data has shown that the walleye and muskellunge fisheries in the lake are thriving and providing some of the best fishing in decades. Largemouth bass populations have only been moderately abundant in the recent past but the large year class found in 2019 is an encouraging sign for the future. The unique diversity of habitat combined with an overly abundant forage base fueled by consistent thriving year classes of yellow perch is currently providing exceptional warmwater fishing opportunities in Chautauqua Lake.

Contact: justin.brewer@dec.ny.gov

Effects of round goby on fish diets and benthic community in Oneida Lake, NY

Thomas Brooking | Kristen T. Holeck | James R. Jackson | Anthony J. VanDeValk

Cornell University Biological Field Station

Round goby became established in Oneida Lake, NY beginning around 2014. Data from an established long-term monitoring program allowed us to document the goby expansion through time. Shoreline seining, fyke netting, bottom trawling, and diets of gillnetted fish were used to index goby abundance. Concurrent long-term benthic invertebrate sampling allowed us to assess the impacts of round gobies on several taxa of benthic invertebrates and fish diets. Goby abundance peaked in 2016. Despite decreases in 2017-2018, they remained abundant through 2019. Amphipods, once an important component of fish diets, declined in benthic samples and in fish diets after goby arrival. Impacts were also observed on zebra/quagga mussels, including reduced density and changes in size structure. Changes in other benthic invertebrates such as snails, ostracods, etc. were also observed. Data show that round gobies had an extensive impact on both benthic invertebrate abundance and subsequent consumption by fish.

Contact: teb1@cornell.edu

Diet composition of adult and juvenile blueback herring in the Hudson River

**Julian Canavan, Charles Cotton, and Andrew Gascho Landis |*

SUNY Cobleskill

Competition from invasive zebra mussels decreases food for zooplankton which in turn can negatively affect success of blueback herring. A study was conducted on the Hudson River to assess the percentage of prey items in both juvenile and adult Blueback Herring (*Alosa aestivalis*) diets. We sampled three sites historically known for large numbers of herring (Hudson River below the Troy Dam, Lock C1 in the Champlain Canal and Lock E2 in the Lower Mohawk River in Waterford). Herring were sampled once in the spring then once in the late summer via electrofishing, each fish had its stomach removed and its contents identified and counted. We found a significant increase in the number of zebra mussel veligers *(Dressenia polymorpha*) in the Hudson river Estuary and Lower Mohawk River samples from fall to spring. We also found a significant increase in the number of zebra mussel veligers *(Dressenia polymorpha*) in the Hudson River Estuary and Lock E2 diet samples from fall to spring, such that numerically veligers made up the largest percentage of their diets. Although veligers are strongly represented in the diet it is still unclear if they make an important energetic contribution to herring.

Contact: teb1@cornell.edu

Another imperiled species in need of conservation: longnose sucker

Doug Carlson

Biol. Dept, SUNY, Potsdam, NY

The recent losses to several native fish species in New York are severe. These have been most often caused by changes in habitat and addition of non-native species. Alternatively, there are instances where habitat for some of the imperiled species is still suitable but populations were eliminated during earlier periods. It is important for imperiled species to be classified as Endangered and Threatened if they are to receive recovery efforts and there will soon be additions to New York's list. Longnose Sucker will likely to be among them. They live in colder streams and lakes and particularly in the Adirondacks. This area could be a refugia for the species because of its abundance of colder waters and protective land uses. Declines are charted from being found in 65 Adirondack waters in 1929-33, 28 waters since 1983 and only 11 waters since 2000. Declines were perhaps caused by lower pH's in the 1960s, trends toward warmer waters and possibly from invasive species. Longnose Suckers here need to be better inventoried and better understood as to where they coexist with some of these limiting conditions. Stocking as part of a recovery plan is also a possibility.

Contact: carlsodm@potsdam.edu

VHSV prevalence dynamics in round gobies of the upper St. Lawrence River

*Anna L Conklyn[1] | Rodman G. Getchell[2] | John M. Farrell[1]

[1]SUNY College of Environmental Science and Forestry | [2]Cornell University College of Veterinary Medicine

The round goby (*Neogobius melanostomus)* has had a dramatic impact on ecological functioning in the Great Lakes- St. Lawrence River system since their introduction in the 1990s. Round gobies present many life history traits typical of invasive species, and are highly susceptible to the generalist pathogen Viral Hemorrhagic Septicemia Virus in this environment. This project aims to investigate the relationship between epidemiologic host- environmental factors and disease dynamics, relating changing physiology and temperature to seasonal VHSV prevalence and viral load. Round gobies were collected from the Thousand Islands region of the St. Lawrence River during spring, summer, and fall of 2018-19. Sacrificed individuals were examined for sex, age, organosomatic condition, clinical disease symptoms, and a subsample for VHSV diagnosis and quantification by qRT- PCR. VHSV was detected in round gobies at high prevalence, and differences were observed between sexes and seasons. Investigating the population-level factors that may lead to high VHSV prevalence in round gobies should allow us to better understand mechanisms of transmission to native sport fish, more efficiently test relevant demographics to gain local prevalence estimates and advance a larger image regarding the importance of the round goby for the maintenance of VHSV in the St. Lawrence River.

Contact: alconkly@syr.edu

Eastern pearlshell (*Margaritifera margaritifera*) dominates the unionid mussel population in Scriba Creek, NY

John Cooper

Cooper Environmental Research

Eleven species of freshwater mussels (Unionidae) were extirpated from Oneida Lake, NY, after the introduction of invasive zebra mussels in 1995 and quagga mussels in 2003. Scriba Creek flows into Oneida Lake on the north shore near the village of Constantia. Adult mussels were surveyed in Scriba Creek at nine sites located from 0.1 km to 13 km from Oneida Lake using visual and tactile search methods. Transects were paralellel to stream flow covering an average search area of 9 m^2. Three species of mussels were collected: Eastern pearlshell, Eastern elliptio (*Elliptio complanata*), and Creeper (*Strophitus undulatus*). Eastern pearlshell was most abundant at six sites (85% of living mussels collected), Eastern elliptio was most abundant at one site (83%), and two sites had no mussels. Mussel density declined in a downstream direction from an average of 4 mussels/m^2 at the upper seven sites to 0.2 mussels/m^2 at the lower two sites. Muskrat predation was primarily on Eastern pearlshell. Unionid mussels survive in the tributaries of Oneida Lake because zebra and quagga mussels cannot persist in a unidirectional flow without recruitment from upstream, which is lacking in Scriba Creek.

Contact: cooperesearch@twc.com

Physical habitat associated with Cisco (*Coregonus artedi*) egg deposition in eastern Lake Ontario

Cameron Davis

U.S. Geological Survey Student Contractor

Spawning habitat may influence of Cisco (*Coregonus artedi*) reproduction success in eastern Lake Ontario, however, our understanding of substrate types and depths where Cisco deposit eggs is lacking. To understand how physical habitat (depth, substrate, slope) influences Cisco egg deposition we deployed 133 egg traps in Chaumont Bay and other areas during the fall of 2019. Digital video was used to categorize the substrate type where each trap was deployed. Different substrate classification schemes were compared including general categories (rock, sand, silt, or mussel) and more specific categories defined in Coastal and Marine Ecological Classification Standard (CMECS). Contents of the egg traps were expressed as number of eggs per meter squared. Eggs were found to from 0.9 m to 9.0 m, but were most abundant from 2.0 to 5.0 m. The highest density of eggs was estimated to be 426,474 egg/m2, found on a shallow, rocky shoal habitat, although eggs were found in near-shore habitats as well. This information will inform management efforts to restore Lake Ontario Cisco populations.

Contact: ccdavis@contractor.usgs.gov

Interaction between dietary thiamine and lipid on juvenile steelhead trout.

**Lillian Denecke | Dr. Jacques Rinchard*

SUNY Brockport

Thiamine (vitamin B1) deficiency has been negatively affecting salmonines in the Great Lakes region. This project investigated the hypothesis that thiamine deficiency in steelhead trout is a result of a high lipid diet due to thiamine being used up as an antioxidant to prevent lipid peroxidation. Juvenile steelhead trout were fed four diets (high lipid/thiamine, high lipid/no thiamine, low lipid/thiamine, and low lipid/no thiamine) in triplicate aquaria over a six-week period. Fish were sampled every two weeks to assess survival and growth, and samples were preserved for biochemical analysis. At week six, weight and lipid content of fish fed low lipid diets differed significantly from fish fed high lipid diets regardless of the presence or absence of dietary thiamine ($P<0.05$). Thiamine concentrations in fish fed the thiamine-containing diets were significantly higher than those fed thiamine deplete diet ($P<0.05$). Mortality was the highest in fish fed low lipid/no thiamine diet, followed by fish fed the low lipid/thiamine, high lipid/no thiamine, and then high lipid/thiamine diets. Finally, fish fed the low lipid/no thiamine diet began to exhibit symptoms of thiamine deficiency during week 4 of the experiment and dietary thiamine concentration seems to have a significant impact on mortality.

Contact: ldene1@brockport.edu

Feed size comparison, with brown trout, at the Randolph Fish Hatchery

Jonathan Draves

New York State Department of Environmental Conservation

The Randolph Fish Hatchery is doing a side by side comparison of brown trout growth by feeding different feed sizes. One lot of fish is being fed 3mm Bio-Oregon and the other is being fed 4mm Bio-Oregon fish food. The purpose is to see if there is any difference in growth rate, and if it takes the same amount of food to reach the same fish size. This could be important for facilities if their fish were not to size, or if there was a monetary advantage to growing a larger fish with less amount of feed. Final results will not be available until after this year's AFS meeting, and I will be doing a follow up next year with final review of the study.

Contact: jonathan.draves@dec.ny.gov

Assessing adult muskellunge movements in Buffalo Harbor, Lake Erie, and the Niagara River

Christopher Driscoll[1] | Justin Brewer[2] | Michael Clancy[2]

[1]New York State Department of Environmental Conservation, Buffalo, NY | [2]New York State Department of Environmental Conservation, Allegany, NY

Eastern Lake Erie, including the upper Niagara River and Buffalo Harbor, support one of the few self-sustaining muskellunge (*Esox masquinongy*) populations in New York State. Historically, this area has supported an excellent muskellunge fishery, yet angler catch rates have decreased considerably since the early 1990's. Furthermore, recent declines in catch rates of young-of-the-year muskellunge during electrofishing and seining surveys have increased the concern about this muskellunge population. Several ecosystem changes have occurred over the past few decades, which have likely contributed to this apparent reduction of muskellunge in the upper Niagara River and Buffalo Harbor. Unfortunately, the effects of these changes are not easily quantified. Regardless, recent studies have highlighted the need for habitat restoration in these areas, especially in the Buffalo Harbor, where habitat for nearshore fishes appears to be particularly poor. In 2017, the New York State Department of Environmental Conservation (NYSDEC) and the Niagara Musky Association (NMA) initiated an acoustic telemetry study to bolster muskellunge research and restoration efforts in the Buffalo Harbor. Results from this study will be used to inform muskellunge management and habitat restoration projects within the Buffalo Harbor and surrounding areas.

Contact: Christopher.Driscoll@dec.ny.gov

Evolution of visual pigment genes underlies adaptation across a depth gradient in Great Lakes ciscoes (*Coregonus* spp.)

**Katherine Eaton | Moises Bernal | Nathan Backenstose | Trevor Krabbenhoft*

Department of Biological Sciences, University at Buffalo

Ciscoes of the Laurentian Great Lakes, *Coregonus* spp., are economically and ecologically important native fishes that have been historically threatened by anthropogenic pressures. Successful restoration and fisheries management requires knowledge of the genetic and environmental factors that shape phenotypic and ecological variation. These species possess low levels of genetic divergence overall, yet show marked zonation by depth and occupy distinct ecological niches. Based on their depth distributions, natural selection under low- light conditions could lead to divergence in visual pigment genes from shallow-water ancestors. This may allow for the evolution of a visual repertoire fine-tuned to the wavelengths available at species' preferred depths. Here, we assessed whether four extant cisco species in Lake Superior exhibit differences in opsin genes that are consistent with their depth preferences. Our results indicate that several genetic variants (SNPs) in opsin genes are associated with depth preferences among species, contributing to adaptation across a depth gradient in Great Lakes ciscoes. In doing so, we demonstrate the utility of the newly developed Oxford Nanopore Flongle platform for amplicon sequencing, which can be rapidly deployed in the field. This study contributes to our understanding of the evolution of Great Lakes coregonines and provides another tool for fisheries management.

Contact: kmeaton@buffalo.edu

Empirical evidence of Atlantic sturgeon spawning in the Hudson River

Dewayne A Fox[1] | Amanda L. Higgs[2] | John A. Madsen[3] | David C. Kazyak[4] | Matthew W. Breece[3]

[1]Delaware State University | [2]NYSDEC-Cornell University | [3]University of Delaware | [4] USGS Leetown Scinece Center

Reaching a maximum size in excess of 400 kg and once supporting lucrative fisheries producing caviar and smoked flesh known colloquially as "Albany Beef", the Atlantic Sturgeon has a long history of exploitation and study in the Hudson River. As a result of the 2012 ESA listing and the designation of critical habitat there has been a renewed interest in the life history of this species. Using acoustic telemetry and hydroacoustics, we identified presumptive spawning sites which were subsequently targeted for the collection of fertilized eggs during 2018 and 2019. We confirmed Atlantic Sturgeon spawning events on two dates (June 20 and 29) in 2018 at water temperatures ranging from 22.2 to 23.0°C and over seven dates between June 6 and 17 in 2019 at temperatures ranging from 19.6-20.9°C. Eggs were collected at depths ranging between 9-26 m over rocky outcroppings. Published studies of Atlantic Sturgeon spawning in the Hudson River were based on small-scale tracking studies and or targeted commercial fisheries. Present-day spawning habitats may be much more limited and likely represent optimal habitats given population contraction from historic levels. Our findings underscore the importance of directed studies on this once iconic species as we work towards recovery.

Contact: dfox@desu.edu

Developing a new methodology to estimate alewife abundance in Hudson River tributaries

Adam M. Haines | William W. Eakin

Department of Natural Resources, Cornell University in cooperation with NYSDEC, New Paltz, NY

Since 2013, a SR-1601® Smith Root in-stream fish counter has been used to assess Alewife (*Alosa pseudoharengus*) spawning dynamics in Black Creek, a small tributary of the Hudson River. While an in-stream application of a fish counter has proven a reliable method for obtaining absolute abundance, operating and maintaining an in-stream fish counter requires copious amounts of time and effort. The primary objective of this study was to determine if the use of egg mats were an appropriate method to derive an Alewife standing egg crop in Black Creek. The secondary objective was to determine if a relationship between standing egg crop, electronic counts and in-season fecundity estimates could be used to quantify Alewife abundance in lieu of an in-stream fish counter. The results of this study indicate egg mats are an appropriate method for calculating standing egg crop. Additionally, egg mat surveys in small tributaries may provide an alternative sampling regime to an in-stream fish counter to estimate Alewife abundance.

Contact: adam.haines@dec.ny.gov

Large woody debris stream enhancement: a model for creating critical brook trout habitat in first and second order streams

**Brian Hefferon[1] | Andrew Gascho Landis[1] | Steven Swenson[2]*

[1]SUNY Cobleskill, Department of Fisheries, Wildlife and Environmental Science, Cobleskill, NY | [2]New York State Department of Environmental Conservation, Division of Fish and Wildlife, Region 4, Stanford, NY

Instream wood plays an essential role in lotic ecosystems in the northeastern United States from informing fluvial geomorphology to providing critical habitat. Largely due to human interference the quantity of instream wood is often below historical levels. New York State is no exception to the decline of instream wood, yet stream restoration involving large woody debris does not appear to be frequently used. To provide a model of large wood for stream enhancement we installed 5 instream wood structures on a 500 ft. stretch of stream on Panther Creek, Schoharie County, New York. The structures utilized felled mature trees (>18" dbh) anchored in place using live riparian trees. Physical and biological parameters were measured before and after the addition of the large wood structures. Our initial results showed a 108% increase in brook trout (*Salvelinus fontinalis*). We also observed a decrease in stream velocity, a change in substrate composition, an increase in width to depth ratio, and a plunge pool created below one of the structures. Overall, we have found this to be a very effective form of stream enhancement by increasing habitat heterogeneity and improving stream morphology while only requiring a few people with hand tools for installing structures.

Contact: briheff4@gmail.com

Lake-wide comparison of chinook salmon condition after pen-rearing in Lake Ontario.

**Aaron Heisey[1] | Lillian Denecke[1] | Matt Sanderson[2] | Scott Prindle[2] | Michael Todd | Colin Lake[3] | Michael Yuille[3] | Jacques Rinchard[4]*

[1]SUNY Brockport | [2]New York State Department of Environmental Conservation | [3]Ontario Ministry of Natural Resources and Forestry | [4]SUNY Brockport

Chinook salmon support a multi-million dollar sport fishery and are considered a top predator in Lake Ontario. In order to maintain this fishery, New York Department of Environmental Conservation and the Ontario Ministry of Natural Resources and Forestry stock roughly 2 million Chinook across various locations in Lake Ontario. Net pens act as an intermediate step in stocking, increasing imprinting, and juvenile survival. The objectives of this study were to compare growth, condition, and lipid content of Chinook after pen-rearing around Lake Ontario. Between April and May of 2019, pen rearing was conducted by volunteers across 6 sites in Canadian waters, and 10 sites in US waters. Results showed a significant difference in weight gain among sites in the US and Canada. This can be attributed to a longer average duration of pen rearing at the Canadian sites (35.5 days) compared to the US sites (24.3 days). The growth rate did not significantly differ. The lipid content increased significantly from the initial stocking to the final sampling before release at all US sites and all but one Canadian site.

Contact: aheis1@brockport.edu

Use of maxillae to improve estimation of lake trout ages in Lake Champlain

*Grace L. Hemmelgarn[1]| Pascal D. Wilkins[2] | J. Ellen Marsden[2]

[1]Allegheny College | [2]University of Vermont

Estimation of fish ages is an important tool for examining the growth and condition of fishes and developing population and growth models. When wild lake trout in Lake Champlain reach about 350 mm total length, it is no longer possible to determine their age based on length-frequency histograms. Use of otoliths to estimate age is time consuming and always lethal. We examined the use of maxillary bones as age estimation structures in Lake Champlain lake trout. The maxillae of 434 stocked and 379 wild lake trout were cross- sectioned, and annuli were counted by two readers to determine accuracy and precision. The results showed a precision of 94% agreement within one year between readers and an accuracy of 95% agreement within one year of age based on fin clips (stocked fish) or length (wild fish). The oldest lake trout previously aged using otoliths was 19, whereas we identified an age 30 lake trout using the maxillary bone. Maxillary bones were straightforward to excise and slice, and may be sampled non-lethally. This study highlights the ease and usefulness of maxillae for age estimation of lake trout.

Contact: hemmelgarng@allegheny.edu

Just how many shortnose sturgeon are out there; a non-traditional approach to estimating sturgeon in a large river system

Amanda Higgs[1] / Richard Pendleton[1] / Dewayne Fox[2] / John Madsen[3] / David Kazyak[4] / Patrick Sullivan[5]

[1]NYSDEC/Cornell / [2]Delaware State University / [3]University of Delaware / [4]U.S. Geological Survay / [5]Cornell University

Previous studies of shortnose sturgeon (*Acipenser brevirostrum*) in the Hudson River indicated a substantial increase in the spawning population from the 1970's to the 1990's. Newer technologies can provide enhanced population estimates. However, the minimal body size for a positive side-scan detection of an individual fish in a field setting is largely unknown. To better understand the feasibility of using side scan sonar in the Hudson River, wooden silhouettes of different sizes were lowered to the bottom and were imaged with a high-resolution side-scan system. In 2020 we will implement a project to estimate shortnose sturgeon abundance using side scan sonar and acoustic telemetry. Using the methodology developed by Kazyak et al. (*in review*), side-scan derived counts of shortnose sturgeon abundance will be related to the number of acoustic transmitters detected within the survey area. By combining the total number of individuals released into the river with transmitters and our estimate of the proportion of individuals fitted with transmitters, an estimate of the overall Hudson River shortnose sturgeon adult population will be generated.

Contact: amanda.higgs@dec.ny.gov

Potential re-establishment of brook trout in Butternut Creek tributaries

**Olivia S. Hoy | Hunter D. Broadbent | Paige L. Losee | Madison M. Riley | Thad E. Yorks*

Environmental Biology Program, Cazenovia College

Butternut Creek (Onondaga County, NY) is a trout stream inhabited by both wild and stocked fish species. The main stem of the creek is stocked annually with rainbow, brown, and brook trout, but our objective was to evaluate the stream's unstocked smaller tributaries to determine possible new habitats for brook trout re-establishment. We visited 20 sites that topographic maps and satellite imagery indicated were likely to have perennial streamflow. At eight sites that had perennial flow, we used a backpack electrofisher to sample the fish community and the Izaak Walton League of America's Save Our Streams protocol to evaluate the macroinvertebrate community. Twelve sites with apparently only ephemeral or intermittent flow were left unsampled. Based on fish and macroinvertebrate data, two sites appeared highly suitable for brook trout re-establishment, as indicated by an absence of potentially predatory fish, presence of smaller fish species typical of trout waters (e.g., blacknose dace), and a diverse community of pollution-sensitive macroinvertebrates. Four additional sites were potentially suitable, and two sites were deemed unsuitable.

Contact: oshoy@cazenovia.edu

Expanding genetic tools available for aquatic invasive species identification

RJ Johnson | S Keppner | M Bartron | A Maloy | C Rees | C Osborne

US Fish & Wildlife Service

Early detection monitoring of aquatic invasive species is contingent on accurate community surveys. However, accuracy is dependent on the surveyor's familiarity of both native and invasive species. Many taxonomic keys are available for native fauna whereas invasive species are frequently underrepresented in those resources. Application of genetic tools such as environmental DNA sampling could greatly streamline survey efforts, but is currently limited by the available reference library of genetic barcodes. This project aims to enhance the U.S. Fish and Wildlife Service's genetic tool set by creating and validating genetic markers for high-risk aquatic invasive species. We generated a priority list of 13 high-risk fish and invertebrate species. The list includes species not yet reported in the United States (including demon shrimp, bleak and marbled crayfish) as well as species at risk for range expansion (such as ruffe and Asian swamp eel). To date, we've established communication with researchers from 12 countries interested in collaboration. Partners have shipped tissue and voucher specimens of seven different species to our laboratory for marker creation. Expanding our genetic reference library will improve tissue and eDNA testing accuracy thereby streamlining early detection monitoring of aquatic invasive species.

Contact: rebecca_johnson@fws.gov

Use of a small grader (post hatch) for waste removal from egg incubator trays

Peter Kinney | Joe Hentges

New York State Department of Environmental Conservation

A small bar grader was used to reduce the amount of time and handling needed to remove unwanted waste from incubation trays directly after hatching. Egg shells, dead fry, chunks of egg yolk and nonviable eggs remain in egg trays after viable eggs have hatched. Removal of this waste can be problematic in large incubation operations. Traditionally, post hatch debris has been removed by hand with a variety of tools such as siphons, and small skimming implements or suction bulbs. This manual method can prove to be a very labor- intensive process and can expose hatching eggs and fragile sac fry to repeated contact during a period when they are extremely fragile. A quick, one-time grade effectively removes most nonviable eggs and other hatching debris and reduces repeated handling of recently hatched fish to a few post grade disturbances. The small grader allows sac fry to pass through as the contents of an egg tray are gently poured through it, leaving unviable eggs and other detritus behind. This allows for a quick one step cleaning process that is more thorough than manual methods.

Contact: peter.kinney@dec.ny.gov

Early evaluation of lake-wide lake sturgeon (*Acipenser fulvescens*) movements in the context of Lake Ontario management units

Gregory Kronisch[1] | Dimitry Gorsky[1]| Zy Biesinger[1]| Dawn Dittman[2] | Marc Chalupnicki[2]| Roger Klindt[3]| Tom Brooking[4] | Randy Jackson[4]| Tony Van De Valk[4] | Scott Schlueter[5] | Neil Ringler[6]| Emily Zollweg-Horan[7]|

[1]US Fish and Wildlife Service Lower Great Lakes Fish and Wildlife Conservation Office, Basom, NY | [2]US Geological Survey Tunison Laboratory of Aquatic Science, Cortland, NY | [3]New York State Department of Environmental Conservation Region 6, Watertown, NY | [4]Cornell Biological Field Station at Shackelton Point, Bridgeport, NY | [5]US Fish and Wildlife Service New York Field Office, Cortland, NY | [6]SUNY College of Environmental Science and Forestry, Syracuse, NY | [7]New York State Department of Environmental Conservation Region 7, Cortland, NY

Lake Sturgeon (*Acipenser fulvescens*) were commercially exploited throughout the Great Lakes and are still considered threatened within the Lake Ontario watershed. Restoration initiatives throughout New York State have included hatchery rearing and stocking, construction of spawning habitat, dam removal, and has ultimately led to the development of a cohesive recovery plan led by the NYS Department of Environmental Conservation. Multiple federal agencies and universities are actively assisting the NYSDEC to monitor and implement these restoration projects throughout six management units of the Lake Ontario watershed as well as Lake Champlain. Individual fish and sub-populations are currently tracked by these agencies via unique external tags and implanted passive integrated transponders; however, Lake Sturgeon migration between management units is not yet well defined. The current scope of this project is to summarize existing recapture information from partners lake-wide. We aim to eventually evaluate overall dynamics of Lake Ontario populations to further inform management decisions and concentrate restoration effort.

Contact: gregory_kronisch@fws.gov

Rapid fin regeneration of age-0 northern pike and implications of fin-clips as a marking protocol

John Paul Leblanc | Anna Conklyn | John M. Farrell

Department of Environmental and Forestry Biology State University of New York College of Environmental Science and Forestry, Syracuse NY

To better understand the effectiveness of fin clipping to identify the origin of wild spawned Northern Pike (*Esox lucius*), we experimentally evaluated fin regeneration following complete excision of a pelvic fin at multiple time-periods over 98-days. Northern Pike were also marked with a unique visible implant elastomer tag for repeated measures of individuals for growth, survival and fin regeneration among two treatments (n=17 each) that may influence the quality of fin-clips (i.e., if fish were anesthetized or not) and a control group (n=10). No difference in survival and growth were detected among the three treatment groups. Fin regeneration rates were rapid for both fin-clipped groups. At 46-days regenerated fins were approximately 80% the length of the unclipped pelvic fins, and by the end of the 98-day period, clipped fins were nearly indistinguishable from the unclipped pelvic fin of the same fish. Results from this study demonstrated that marking age-0 Northern Pike with pelvic fin-clips are likely inappropriate for mark-recapture studies that span longer than 3-months, and reliable identification of fin-clips should be restricted to shorter-term studies.

Contact: johnpaul.leblanc@gmail.com

Trends in population dynamics of introduced black crappie in Lower St. Regis Lake, northern Adirondacks

Craig Milewski

Paul Smith's College, Natural Sciences Department

Black Crappie were first sampled in Lower St. Regis Lake in fall of 2012 and continues the historical trend of changes in the fish community. The source of their introduction into the lake is unknown, but their presence provides an occasion to monitor trends in population dynamics with potential implications on fish community dynamics. Based on trap net catch rates (mean #/net), the black crappie population density appears to follow a typical population growth curve with rapid increase over the first few years. The most recent survey indicates that annual recruitment is consistent based on age structure, and that growth rate of individuals is comparable to regional averages with an asymptotic maximum length (L∞) of 333 mm. However, anglers are catching larger black crappie, but these individual fish may be much older and represent cohorts born prior to density-dependent population growth. Body condition, indexed using relative weight (Wr), indicate healthy individuals with no indications of decline with increases in density. An annual comparison of length-frequency histograms and proportion size distribution indicate a notable truncation in sizes greater than the size limit (229 mm) in recent years suggesting that anglers have discovered the black crappie fisheries in Lower St. Regis Lake.

Contact: cmilewski@paulsmiths.edu

Spawning site fidelity of white sucker in Otsego Lake, NY

**Raymond Nellis*

SUNY Cobleskill

Beginning in 2017, spring spawning runs of white sucker (*Catostomus commersoni*) were monitored in five tributaries of Otsego Lake, NY. Each tributary was sampled for about 100 meters using a Halltech backpack electrofisher. The fish were scanned for PIT tags, tagged if they were new fish, total length was recorded, scale samples were taken, and the fish were then released. In the spring of 2019, 378 suckers were collected in the five tributaries. Of these, 69 were recaptures and 309 were given new PIT tags. Recapture data were analyzed to determine fish movements and site fidelity of suckers during the spawning run. Results indicated that one of the five tributaries monitored is not a typical spawning location of white suckers, compared to the four other tributaries in which 97% of spawning suckers exhibited interannual site fidelity. Additional sampling of spring spawning white suckers will be continued in years to come.

Contact: nellisr680@cobleskill.edu

Going cray for invasives: Early detection in the lower Great Lakes

Mandi Ohar

U.S. Fish and Wildlife Service

Invasive crayfish can pose a significant threat to aquatic ecosystems within the Great Lakes region due to their ability to reduce habitat quality, compete with native species, and dramatically alter aquatic food webs. The lack of recent native and nonnative crayfish distribution data is an increasing concern as changes in climate will likely affect distribution. Without accurate distribution information it is difficult to manage and study the impacts of nonnative crayfish in the ecosystem. The Lower Great Lakes Fish and Wildlife Conservation Office has made early detection and monitoring of invasive crayfish a priority and over the past 3 years has collected over 600 crayfish representing six species. Range expansion of the rusty crayfish was documented in New York waters.

Contact: mandi_ohar@fws.gov

Survival of encysted glochidia after antibiotic treatment

**KyleOlivencia | Dr.AndrewGaschoLandis*

State University of New York at Cobleskill

Major conservation efforts are underway to restore declining freshwater mussel populations using hatchery propagation. Mussels have a parasitic larval stage called glochidia, that attach to a fish host to complete transformation to the juvenile stage. In hatchery environments host fish are subjected to unnatural, stressful environments making them susceptible to diseases. Antibiotics may be used to combat infections, however, it is unknown if treatments effect encysted glochidia. Our study aimed to determine the influence of Oxytetracycline on Eastern lampmussel (*Lampsilis radiata*) juvenile transformation. Ten Largemouth bass (*Micropterus salmoides*) received medicated feed for 14 days prior to inoculation, 10 were placed in an antibiotic bath after inoculation, and 10 received no treatment. A Tukey's test showed that a significantly higher number ($P < 0.05$) of glochidia sloughed off (dead) control fish, compared to both antibiotic treatments. Very few juveniles were produced in this study and there were no trends across treatment groups. We hypothesize that juveniles were produced but died in our system before they could be counted. Our preliminary results are intriguing and warrant future study before using oxytetracycline on host fish encysted with glochidia.

Contact: Olivenk693@gmail.com

Where the wild trout are: the state of lake trout reproduction in Lake Ontario

Christopher Osborne[1] | Dimitry Gorsky[1] | Meredith Bartron[2] | Brian Lantry[3] | Brian Weidel[3] | Stacy Furgal[3]| Michael Connerton[4] |

[1]US Fish and Wildlife Service, Lower Great Lakes Fish and Wildlife Conservation Office, Basom, NY | [2]U.S. Fish and Wildlife Service, Northeast Fishery Center, Lamar, Pennsylvania | [3]U.S. Geological Survey, Lake Ontario Biological Station, Oswego, NY | [4]New York State Department of Environmental Conservation, Cape Vincent Fisheries Research Station, Cape Vincent, New York

Restoration stocking of Lake Trout in Lake Ontario began in the 1970's. Although mangers have met most of the major restoration goals, the ultimate goal of establishing a self- sustaining population has remained elusive. Scientists have reported evidence of spawning in Lake Ontario as far back as the 1980's, and naturally produced juvenile Lake Trout have been collected in 24 of the last 25 years, albeit at disconcertingly low levels. In recent years, the juvenile Lake Trout survey has observed a sizable increase in naturally reproduced Lake trout, many of the collections occurring near the Niagara River in western Lake Ontario. Understanding more about the status of wild reproduction is vital to the continued success of Lake Trout rehabilitation, in Lake Ontario. Here we present historic and contemporary trends in Lake Trout reproduction, in Lake Ontario. Additionally, we present preliminary result of a genetic assessment of the stain of origin of the wild fish caught in 2014.

Contact: christopher_osborne@fws.gov

Diet overlap between round gobies and tubenose gobies in the St. Lawrence River

**Iman Pakzad | Roxanne Razavi | John Farrell*

State University of New York College of Environmental Science and Forestry

An important determinant of species coexistence is the degree of diet overlap among them. The diets of the Round Goby (*Neogobius melanostomus*) and Tubenose Goby (*Proterorhinus semilunaris*) in the St. Lawrence River were compared, in order to estimate differences in bioaccumulation and biomagnification of mercury between the two goby species. The objective of this study is to evaluate which prey item(s) will be the biggest contributor to any differences in mercury concentration observed between the two invasive gobies. Preliminary diet analysis showed that no invertebrates are consumed exclusively by the Tubenose Goby. Zebra mussels (*Dressenia polymorpha*), two snail species (*Bithynia tentaculate* and *Valvata spp*), caddisflies (*Trichptera*), and mayflies (*Ephemoptera*) are exclusive to the Round Goby. Additionally, the Tubenose Gobies diet is dominated by zooplankton, while small (<130 mm) Round Gobies have a more diverse diet that becomes mussel and snail dominated once they grow. Based on these results I predict that there will be a significant difference in the bioaccumulation of mercury between the two goby species, and that zebra mussel consumption will largely account for this difference.

Contact: ipakzad@syr.edu

Variation in respiration for male and female lake trout (*Salvelinus namaycush)* bioenergetics.

Sydney Phillips[1] / Chuck Madenjian[2] / Kevin Keeler[1] /

[1]Lynxnet LLC / [2]U.S. Geological Survey – Great Lakes Science Center

Lake Trout (*Salvelinus namaycush*) are native apex piscivores in the Great Lakes. Populations of the once imperiled species have slowly rebounded following sea lamprey (*Petromyzon marinus*) control, spawning refuges, and stocking programs. Continued population success of the species can be attributed to sustained management of these programs, but also by obtaining new information about individual growth. There is currently no sex-specific bioenergetics model for Lake Trout. Herein, we performed respiration trials with adult (age 11+) Lake Trout at the U.S. Geological Survey – Great Lakes Science Center aquatic research laboratory. Sexed fish were added to a sealed swim chamber for measuring oxygen consumption. Each set of trials was completed with a fish swimming at a resting (10 cm/s) rate and three speeds (20-40 cm/s) along with a control trial. In total, 33 trials were completed for males and females at a range of temperatures between 8 – 12 °C. Results from the trials indicate higher oxygen consumption at faster speeds for males. Additionally, results of these trials will be used to develop a sex-specific respiration coefficient (RA and RB) updating that of Stewart et al. (1983).

Contact: phillipssydney063@gmail.com

Status of returning Atlantic salmon to the Salmon River, New York

P. Rawinski[1] | M. Chalupnicki[1] | J. E. McKenna[1] | R. Chiavalli[1] | R. Greil[2]

[1]USGS Tunison Laboratory of Aquatic Science
[2]Lake Superior State University

Since 2009, the USGS Tunison Laboratory of Aquatic Science in cooperation with the NYS Department of Environmental Conservation has been actively reintroducing Atlantic Salmon (*Salmo salar*) into the Salmon River in Oswego County, New York. This effort is designed to test the feasibility of reestablishing the extirpated population in Lake Ontario. To date, 719,532 (89,000 annually) fall fingerlings and 151,379 (20,000 annually) spring smolts have been stocked into the Salmon River. Since 2014, returning adult Atlantic Salmon have been successfully captured (n = 133) from the Salmon River at the NYSDEC Salmon River Hatchery, 24.73 river km upstream from Lake Ontario. Eggs from these fish supplement the annually acquired eggs from the NYSDEC Adirondack Fish Hatchery. Growth, determined from standard length and weight, at age (age 3 $\bar{x}$ = 572.6 mm, 1374.2 g; age 4 $\bar{x}$ = 623.6 mm, 2198.2 g) was significantly different from adult returning populations in Lake Michigan (R. Greil data). The condition of these fish represents a positive milestone in the reestablishment of an Atlantic salmon population and demonstrates progress toward meeting management objectives for Atlantic Salmon in New York State.

Contact: ptrawins@esf.edu

Change in gill Na^+/K^+ ATPase activity in Chinook salmon juveniles

Jacques Rinchard[1] / Lillian Denecke[1] / Randal Snyder[2] / Mike Connerton[3]

[1]SUNY Brockport / [2]SUNY Buffalo State / [3]NYS-Department of Environmental Conservation

Elevated gill Na^+/K^+ ATPase activity is a powerful tool in assessing smolt development and serves as an indirect indicator of osmoregulatory competence. In this study, we examine changes in gill Na^+/K^+-ATPase activity in Chinook salmon juveniles prior to stocking in Lake Ontario. Chinook from the NYSDEC-SRFH were transferred to Brockport in March 2019 and raised in a flow-through system. Gills were collected every 2 weeks from May to July. Gills were also collected weekly from Chinook raised in net pens in Sandy Creek from late March to the end of April. Gill Na^+/K^+ ATPase activity, measured by the breakdown of ATP in the presence and absence of ouabain, ranged from 0.0 to 9.92 mmol ADP per mg protein per hour. We did not find any significant relationship between length (55 to 145 mm) and gill Na^+/K^+ATPase activity. However, Na^+/K^+ATPase activity of fish raised in net pens decreased weekly from March to April from 2.22 to 0.89 mmol ADP. This reduction of gill Na^+/K^+ATPase could lead to reduced energy expenditures and higher growth rate as demonstrated in other species.

Contact: jrinchar@brockport.edu

Upper and Lower Leland Ponds fish communities and results of brown trout and tiger muskellunge stocking

**Asia L. Rose | Alyssa L. Beck | Cylan S. Blouin | Noah M. Czudak | Breanna R. Kern | Thad E. Yorks*

Environmental Biology Program, Cazenovia College

The Upper and Lower Leland Pond system (Madison County, NY) is stocked annually with brown trout and tiger muskie. We trap-netted both ponds in November 2019 with objectives to assess fish condition (relative weights; Wr), population structure (Proportional Size Distribution; PSD), and if the stocking program has resulted in any "hold-over" fish. Over 300 fish were observed with the most abundant species being bluegill and yellow perch. Mean Wr ranged from 85 to 100 for nearly all species indicating average condition. Yellow perch and common carp were of below-average and above-average condition with mean Wr of 74 and 140, respectively. PSD-Q values for panfish species ranged from 42-66, indicating "balanced" populations, and most panfish species had at least some "Preferred" length fish. Data indicated the presence of at least some hold-over stocked fish with one brown trout measuring 510mm TL with a weight of 1,710g and the only tiger muskie captured measuring 1,065mm TL and weighing 9,200g. Though both species are stocked every year, apparently very few individuals remain for more than one or a few years.

Contact: alrose@cazenovia.edu

Tracking winter outdoor coho salmon growth at NYSDEC Salmon River Fish Hatchery

Corey Roth | Katie Williams

New York State Department of Environmental Conservation

Coho Salmon (*Oncorhynchus kisutch*) have historically been raised in the hatchery's large outside smolt release pond. Traditionally, this pond housed multiple species during the winter months. The size and configuration of the pond, mixing of multiple species, and poor-quality water created numerous obstacles for fish rearing. Due to upcoming hatchery construction, the smolt release pond will not be useable for the 2019-2020 season. In 2019, all Coho salmon have been placed into two traditional outside raceways and will be closely monitored this winter to track growth. This data was previously unknown and unavailable to collect. Better water, cleaner rearing space and reliable sampling may allow for a higher growth rate and healthier product. Regardless of actual growth rate, this data is useful information to support continued successful Coho salmon production for New York State.

Contact: corey.roth@dec.ny.gov

How did rainbow smelt invade the Great Lakes? - Testing Bergstedt's 1983 multiple introduction hypothesis and its potential role in rapid adaptation

Nicholas Sard[1] | Yue Shi[2] | Brian Weidel[3]| Wes Larson[2]

[1]SUNY Oswego | [2]University of Wisconsin - Stevens Point | [3]United States Geological Survey

Some invasive species rapidly adapt to novel environments despite the associated founder effects during the initial colonization phase. Such adaptation is possible if sufficient genetic variation is generated (e.g., via multiple introductions). In the Great Lakes, Rainbow Smelt (*Osmerus mordax*) originally invaded Lake Michigan following unintended migration from a stocked population in Crystal Lake. The remaining Great Lakes were subsequently colonized in a relatively sequential order; however, Lake Ontario may have been established by an anadromous strain originally stocked into the Finger Lakes. This invasion provides a natural experiment to test if multiple introductions occurred and if so, to investigate the potential evolution of different ecotypes. Here, we genotyped Rainbow Smelt from Lake Superior (n=18), Lake Michigan (n=24), Lake Huron (n=21), Lake Erie (n=24), and Lake Ontario (n=43) at 13,486 loci. Preliminary results suggest that both Lake Erie and Lake Ontario were from a second, independent introduction given that pairwise F_{st} estimates to the three remaining Great Lakes ranged 0.05 to 0.06. Future work will focus on identifying outlier loci to better characterize hybridization between the two introductions.

Contact: nicksard@gmail.com

Fate of microplastics in coho salmon (*Oncorhyncus kisutch*) and round goby (*Neogobius melanostomus*)

**Cameron J Snell | Nicholas Christ | Jacques Rinchard*

The College at Brockport

Microplastics (< 5 mm) are of particular concern in the Great Lakes as they have been found in various aquatic organisms. The purpose of this study was to assess the potential accumulation of microplastics in digestive tract and liver of coho salmon *Oncorhynchus kisutch*, a pelagic species, and round goby *Neogobius melanostomus*, a benthic species. Both species were fed a diet containing 0, 2, and 4% of microplastics for six weeks. Every two weeks, fish were sampled and their digestive tract and liver were collected. To extract the microplastics, tissues were placed in a solution of potassium hydroxide (4N) and hydrogen peroxide (30%) for 24 h. Then, the samples were vacuum filtered and the microplastics were collected on a filter paper and weighed. After one week, all the coho salmon and several round goby fed the 4% diet died. Our results showed that only the digestive tracts of coho salmon fed the 2% diet contained microplastics. Thus, it appears that the retention of microplastics in the tissues of both species was minimal and effective elimination occurred. However, we still need to investigate why mortality occurred in fish fed 4% microplastics.

Contact: csnel3@brockport.edu

Understanding oxythermal sensitivity of Adirondack lakes: implications of climate change and browning for cold-water fishes

**Jonathan T. Stetler | Kevin C. Rose*

Department of Biological Sciences, Rensselaer Polytechnic Institute, Troy, New York

Lakes in the northeastern United States and elsewhere are under pressure from many concurrent environmental changes. Lake surface temperatures are warming across the northeast in response to climatic warming. Warming may reduce optimal summertime thermal habitat for cold-water fishes. Simultaneously, lakes in the Adirondacks are recovering from decades of past acidic deposition. Subsequently, dissolved organic carbon (DOC) concentrations are increasing in many lakes, which reduces water transparency and turns the water brown. When lakes "brown" more heat becomes trapped in surface waters, amplifying surface warming while maintaining cool deep-water temperatures. Therefore, lake browning may maintain cool deep-water habitat. However, both climatic warming and lake browning simultaneously strengthen summertime stratification, which may reduce deep-water oxygen concentrations. We estimated the independent and interactive effects of climatic warming and lake browning on summertime deep-water oxythermal habitat. We applied a 1-dimensional hydrodynamic model and dissolved oxygen model to estimate trends in deep-water oxygen concentrations and stratification characteristics across a 25-year period in lakes that range in size, DOC concentration, and rates of warming. Our results demonstrate that although browning helps maintain deep-water thermal habitat, deep-water dissolved oxygen concentrations are predicted to decrease in browning lakes, thereby reducing summertime oxythermal habitat for cold-water fishes.

Contact: stetlj@rpi.edu

2019 lake sturgeon culture at NYS DEC Oneida Fish Hatchery

Erika Stoddard & David Domachowske

NYS Department of Environmental Conservation

During the production seasons the few years prior to 2019, lake sturgeon culture at the Oneida Fish Hatchery had been suffering from inconsistent fish health and growth, leading to increased disease and mortality. To remedy this, hatchery staff exclusively followed the feeding regimen of the Genoa National Fish Hatchery for 2019 production with expectations to increase fish health and survival. Changes in egg incubation and water treatment were also established to meet those expectations. Constant sampling for weight supported predictable growth under the Genoa NFH diet guidelines. Ultra violet water sterilization and chemical treatments kept disease symptoms low and controllable. As a result, survival and growth were exceptional and all stocking needs were met with additional surplus.

Contact: erika.stoddard@dec.ny.gov

Utilizing pass through and pass over radio frequency identification HDX single antenna systems to evaluate the passability of a culvert pre and post baffle installation

Steven Swenson

New York State Department of Environmental Conservation

The New York State Department of Environmental Conservation Region 4 Ecosystem Health unit is currently partnered with Trout Unlimited and conducting a study of the passability of a perched culvert within the Beaver Kill drainage in Delaware County. There are two objectives to this project, to assess the passibility of the concrete box culvert pre and post baffle installation and to assess two different types of radio frequency identification units (RFID). To determine culvert passability, 55 trout were surgically tagged with 12mm passive integrated transponders, returned to the downstream culvert pool and will be detected using three RFID units. Two RFID units are pass over units that were fabricated in house at a cost of $540.00. The third unit is a pass through single antenna unit which was purchased from Oregon RFID at a cost of $1855.00. This three-year study has thus far assessed two years of culvert passability pre-baffle installation. Seven routor-moulded flexible plastic baffles have been purchased from ATS Environmental and will be installed in the spring of 2020. These baffles are affordable, and installation is simple. If effective in improving passability, grant money will be sought to install the ATS baffles on a broader-scale.

Contact: steven.swenson@dec.ny.gov

An evaluation of physical and thermal habitat limitations on trout in the upper East Branch of the Delaware River

Steven Swenson[1] | Caroline Shafer[2] | Tracy Brown[2]

[1]New York State Department of Environmental Conservation | [2]Trout Unlimited

Trout Unlimited (TU) and the New York State Department of Environmental Conservation (NYSDEC) are currently partnered on an expansive habitat improvement project on the East Branch of the Delaware River in Delaware County. The objectives of the project are to study and identify physical barriers to trout, thermal stressors of trout, and locate trout thermal refugia. A total of 1678 trout were tagged with passive integrated transponders and returned to the river and its tributaries. To detect the movements of tagged trout, eight radio frequency identification (RFID) units were installed for two tracking seasons. Coupled with the tracking of tagged trout, a complete initial review of road stream crossings and a barrier replacement strategy was conducted and formulated. In addition to the evaluation of physical barriers to trout, temperature monitoring was conducted for a total of four years throughout the study area. Understanding the big picture of what barriers exist and what thermal influences are problematic, will help resource and municipal managers with future planning as well as give organizations like TU opportunities to raise funds to support projects that will improve the East Branch Delaware River System.

Contact: steven.swenson@dec.ny.gov

Restoring habitat for brook trout

Elizabeth Trometer | Thomas Hoffman

U.S. Fish & Wildlife Service, Lower Great Lakes Fish & Wildlife Conservation Office

The Lower Great Lakes Fish and Wildlife Conservation Office (LGLFWCO) supports habitat enhancement and fish passage projects that benefit brook trout populations in New York through several funding opportunities. Since 2008, the LGLFWCO and our partners completed 16 fish passage projects that opened approximately 50 miles of stream and 4 habitat enhancement projects that improved approximately 4.5 miles of stream, restoring brook trout access to coldwater habitat. Funding for these projects came from several sources, including Great Lakes Restoration Initiative, National Fish Passage Program, Eastern Brook Trout Joint Venture, and the Great Lakes Basin Fish Habitat Partnership. The LGLFWCO is the Fish and Wildlife Service sponsor office for these annual funding programs.

Contact: betsy_trometer@fws.gov

A comparison of Oneida Lake predator diets before and after round goby arrival

Anthony VanDeValk | Randy Jackson | Tom Brooking

Cornell Biological Field Station

Oneida Lake predator diets were compared using diet studies conducted prior to and after the arrival of the round goby (*Neogobius melanostomus*) in 2014. Diets were assessed from May through October in 2007-2009 and 2016-2018 using electrofishing and trawl surveys. Double-crested cormorants (*Phalacrocorax auritus*) were collected weekly by New York State Department of Environmental Conservation personnel for dissection and analysis. Fish diets for both time periods followed a general seasonal pattern of consuming age>0 yellow perch (*Perca flavescens*) in spring and transitioning to age-0 yellow perch in summer to age-0 gizzard shad (*Dorosoma cepedianum*) in fall. Patterns in consumption by cormorants were similar except that age-0 yellow perch appeared in stomachs only in the fall and accounted for a relatively low proportion of the cormorant's diet. Gobies contributed to the diets of all predator species examined and at times were the most abundant species identified in stomachs. Because no increases in predator growth were detected, the round goby likely acts as a buffer for other prey species rather than being consumed in addition to other prey species.

Contact: ajv6@cornell.edu

New insights into Atlantic sturgeon spawning in the Hudson River; sex- specific estimates of habitat-use and residency in the Hyde Park Reach

Angelina N. Watts[1] / Amanda L. Higgs[2] / John A. Madsen3 / David C. Kazyak[4] / Mathew W. Breece[3] / Dewayne A. Fox[1] /

[1]Delaware State University / [2]NYSDEC-Cornell University / [3]University of Delaware / [4]USGS- Leetown Science Center /

The Hudson River historically supported one of the largest Atlantic Sturgeon populations in North America. Despite dramatic population declines, the Hudson River still contains the largest U.S. population. Under a 1998 fisheries moratorium and a 2012 ESA listing, resource managers require updated information to conserve and recover this iconic species. Building on broad-scale collaborative telemetry efforts, we deployed an array of VEMCO Ltd. passive acoustic receivers in the Hyde Park Reach during the putative spawning seasons in 2018 and 2019 to examine sex-specific timing and habitat use of telemetered adult Atlantic Sturgeon. Our findings suggest the presence of spatially distinct staging and spawning areas with individuals moving between these sites regularly, underscoring the need for an improved understanding of the behavior of spawning adults and the habitats they use. As spawning and staging areas are critical habitat features for sturgeon, identification of these locations is a needed step to support management in this heavily utilized reach of the river. Our insights emphasize the need for a more detailed examination of habitat, behavior and threat identification to this iconic Hudson River species. Ultimately, our findings may shed light on the reproductive behaviors and essential habitats of this species throughout its range.

Contact: lwatts730@gmail.com

Monitoring muskellunge in the St. Lawrence River with environmental DNA

Maxwell Wilder | Hyatt Green | John Farrell |

SUNY Environmental Sschool of Forestry

The detection of environmental DNA (eDNA) provides a non-invasive and often times cost effective means for population assessment which is becoming increasingly common in fisheries. The development and application of such techniques is especially desirable for low density and/or cryptic species that are challenging to monitor using traditional methodologies. For eDNA data to be accurately interpreted and effectively applied, it is necessary to understand the rate at which genetic material is released for the species of interest and the extent of its persistence in the environment. Through a series of controlled aquaria experiments, shedding and decay rates of eDNA were determined for muskellunge (*Esox masquinongy*) at different developmental stages and the effect of biomass on shedding and decay was examined. These metrics will provide a critical information base by which quantitative estimates and models can be developed for accurate assessments of this species with eDNA tools. Additionally, detection of muskellunge eDNA from water samples collected in the St. Lawrence River indicate that this species can be detected at low density with relative reliability. Assessing these data in the context of long-term regional monitoring programs for the species provides insight as to where eDNA can be most usefully applied to management.

Contact: mwilde01@syr.edu

Movement and life history diversity of Lake Ontario yellow perch (*Perca flavescens*)

**Kylee Wilson | Matthew Altenritter*

The College at Brockport, SUNY

Yellow perch (*Perca flavescens*) are an important species for commercial fishing and a popular target for recreational anglers in the Great Lakes. Some utilize both open Great Lakes and coastal wetland habitats during their lifetime, though relatively little is known about the duration and frequency of wetland use. Elucidating these aspects could inform the susceptibility of yellow perch to recreational harvest in waters more accessible than an open Great Lake. This knowledge gap allowed us to formulate the following four questions: 1. Do multiple movement life history types occur in Lake Ontario coastal wetland habitats? 2. Do adult migratory yellow perch use coastal wetland habitats for different amounts of time? 3. Does growth and fecundity differ based on movement life history? 4. Are there morphometric differences that correspond to different movement life histories? To answer these questions, we will collect otoliths, tissue samples, and morphometrics from yellow perch collected in Lake Ontario, and two Lake Ontario coastal wetland habitats (Long Pond and Cranberry Pond). We anticipate that multiple movement life history types exist, and that this diversity has both ecological (e.g. population resilience) and managerial (e.g. susceptibility to recreational harvest) implications.

Contact: kwils11@brockport.edu

Cisco *(Coregonus artedi)* culture at the NYSDEC Bath Fish Hatchery

Charles Wlasniewski | Aaron Day | Adam Haley | Ken Osika | Kevin Healy

NYS DEC

Experimental cisco (*C. artedi)* culture at the Bath State Fish Hatchery began in December 2017 with the purpose of reintroducing cisco into Keuka Lake as a more suitable forage. Multiple agencies assisted in all aspects from brood capture to stocking. This poster highlights the challenges, success and future of cisco production at this facility.

Contact: charles.wlasniewski@dec.ny.gov