



AMERICAN FISHERIES SOCIETY
ONTARIO CHAPTER
ANNUAL GENERAL MEETING

February 28 – March 2, 2019
Geneva Park, Orillia, ON

*“Sustainable Development and
Fisheries, can the two co-exist?”*

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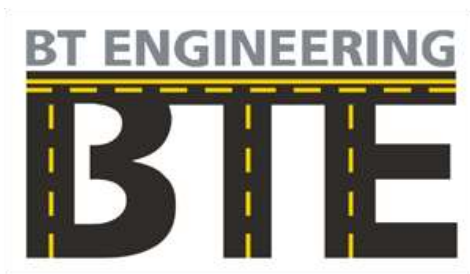
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“Sustainable Development and Fisheries, can the two co-exist?”

Thursday February 28th

5:30-on Arrival, Registration (Front Desk)

7:00-10:00 Opening Mixer (Lodge Lounge Hospitality Suite)

Friday March 1st

7:30 BREAKFAST (*Geneva Court*)

08:30 GREETING AND CONFERENCE OUTLINE (Auditorium)
Jan Moryk, AFS-OC President

08:40 *Keynote Talk: Algonquin Park as an Aquatic Conservation Area: History, Ecology and a Modern View of an Iconic Landscape and Waterscape.* **Mark Ridgway**

Session 1

09:20 *Talk 1: Emerging threats and persistent conservation challenges for freshwater biodiversity.* **Andrea Reid**

09:40 *Talk 2: Recreational fishing and species restoration: a case study.* **Kathryn Peiman**

10:00 COFFEE, TRADE SHOW, POSTER SESSION (Auditorium and Lobby)

Session 2

10:20 *Talk 3: The Great Lakes Fishery Commission: Cooperative Management of the Great Lakes.* **Ted Lawrence**

10:40 *Talk 4: Understanding Stream Temperatures and Thermal Class and their Use by Fish.*
Nick Jones

11:00 *Talk 5: 2018 Fish Consumption Survey.* **Don Little**

- 11:20 *Talk 6: Identifying early life stages of Great Lakes fish species using metagenomics.* **Kavishka Gallage**
- 11:40 *Talk 7: Where have all the little fish gone? Investigating overwinter habitat for minnow and related species populations within the Golden Horseshoe.* **Jaclyn Cockburn**
- 12:00 **LUNCH (Dining Hall), TRADE SHOW (Lobby) & POSTER SESSION (Auditorium)**

Session 3

- 1:00 *Talk 8: Emerging threats in an ancient context: Indigenous Elder knowledge and perspectives on Pacific salmon stewardship.* **Andrea Reid**
- 1:20 *Talk 9: Correlates of White Sucker spawning migration.* **Kathryn Peiman**
- 1:40 *Talk 10: Stream Restoration Project Successes.* **Heather Amirault and Sean Stuart**
- 2:00 *Talk 11: KISTERS Biology Module - An Overview of International & Local Applications.* **Stephen Elgie**
- 2:20 *Talk 12: The metabolic cost of chronic social stress in Rainbow Trout.* **Katie Gilmour**
- 2:40 *Talk 13: Fish community interactions with very low head hydroelectric turbine technology.* **Erik Tuononen**
- 3:00 **COFFEE, TRADE SHOW, POSTER SESSION (Auditorium and Lobby)**

Session 4

- 3:20 *Talk 14: Quantifying multiple pressure interactions affecting populations of a recreationally and commercially important freshwater fish.* **Lee Gutowsky**
- 3:40 *Talk 15: Parental and Environmental Mechanisms Influencing Body Shape in Lake Superior Brook Trout (*Salvelinus fontinalis*).* **Camille Jodouin**
- 4:00 *Talk 16: Asian Carps & Other Costly Invasive Species.* **Colin Cassin**
- 4:20 *Talk 17: Fish Communities of the Toronto and Region Waterfront: Summary and Assessment, 1989-2016.* **Kaylin Liznick**
- 4:40 *Talk 18: The role of ontogenetic flexibility in shaping diversity and response to a changing environment.* **Sarah Steele**
- 5:00 *Talk 19: Seasonal Variation in Critical Thermal Maximum of Redside Dace at the Northern Edge of Its Range.* **Alexandra Leclair**
- 5:20 **TRADE SHOW, POSTER SESSION (Auditorium and Lobby)**

- 6:00 **DINNER (Dining Room)**
- 7:00 **ANNUAL BUSINESS MEETING (Geneva Court Lounge)**
- 7:30-11:00 **MENTORING, STUDENT RAFFLE, SOCIAL (Geneva Court Lounge)**

Saturday March 2nd

- 7:30 **BREAKFAST (Dining Room)**

Session 5:

- 8:30 *Talk 20: Restoring an Urban Creek using Natural Channel Design.* **Ryan Bolton**
- 8:50 *Talk 21: Alfred Kuehne BLVD Aquatic Restoration Project.* **Elizabeth Petrov**
- 9:10 *Talk 22: Approaching Africa's Future Fresh Water Challenges through Capacity Building and Collaboration.* **Ted Lawrence**
- 9:30 *Talk 23: The effects of catch and release on American Eel, an endangered species in Ontario.* **Aline Litt**
- 9:50 *Talk 24: What's in a trap? How differences within trapping methods may influence catch rates.* **Caitlyn Synyshyn**
- 10:10 **COFFEE & POSTER SESSION (Auditorium and Lobby)**

Session 6:

- 10:30 *Talk 25: Assessing the effectiveness of a passive size-based selective fish passage for managing Sea Lamprey (*Petromyzon marinus*).* **McLean Smith**
- 10:50 *Talk 26: The role of behaviour in the Round Goby invasion of the Laurentian Great Lakes.* **Sigal Balshine**
- 11:10 *Talk 27: Status of reintroduction efforts for SARA-listed fishes in Canada.* **Karl Lamothe**
- 11:30 *Talk 28: Sustainable landuse planning and the Lotic Environment of the Carruthers Creek Watershed.* **Jan Moryk**
- 11:50 **PRESENTATION OF STUDENT AWARDS & CONFERENCE WRAP (Auditorium)**
- 12:00 **LUNCH (Dining Room)**
- 1:00-5:00 **WORKSHOP: Maamwi naakii dad. - Means working together, how does the modern day settler learn from mistakes of the past.** **Gary Pritchard**



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“Sustainable Development and Fisheries, can the two co-exist?”

Message from the President

First and foremost I want to say thank you to everyone that has registered to attend our 2019 American Fisheries Society Ontario Chapter (AFS-OC) Annual Meeting and Conference (AGM). I am excited to meet you and honored that you choose to attend our humble gathering here at Geneva Park in Orillia. I would like to also thank all the chapter members as well as all of the sponsors who have made generous donations over the years. These donations go a long way to help support our student subunit. Thank you also to the Geneva Park staff who have hosted us for the last several years and made this AGM experience comfortable and pleasurable. I also extend my gratitude to Bill Glass (Past President), Dan Moore (President-elect) and the rest of the Executive Committee (Phil Bird, Katie Easterling, Zach Wells, Bill Gardner, Ann Rocchi, Megan Lloyst, Kelly McLean, Robin Gaspardy, Brian Morrison, Kim LeBrun, Soibhan Ewert, Rob Eakins, and Jacqueline Chapman) for their continuing advice, patience, and guidance throughout my presidential term as well as years of dedication and time that they have sacrificed to keep the AFS-OC and the AGM running as an active chapter of the American Fisheries Society. This AGM would not be possible without your hard work and continuous support.

The Green Belt plan, Oak Ridges Moraine Conservation Plan, the Niagara Escarpment Plan, and the Growth Plan for the Greater Golden Horseshoe have all been revised in 2017 and some are now up for review with further changes proposed. The theme of our conference this year is “Sustainable Development and Fisheries, can the two co-exist?” I think this theme is well suited to the ever-changing legislative environment and the challenges as well as opportunities that they offer. It can be argued that historically the words sustainable and development were incompatible and contradictory to each other’s meaning. However, through the advancement of scientific knowledge, and the application of that knowledge to policy, guidelines, legislation, and changing land development practices the health of our environment is being enhanced and safeguarded for future generations. When once on two separate river banks there is now a bridge between the environment and the decision making process of land-use

change. There is recognition that if we want to continue to enjoy our surrounding terrestrial and aquatic natural heritage features we need to make long-term sustainable decisions regarding its development so that future generations can appreciate and benefit from the many fundamental services the environment provides. Although we still have a long way to go and perhaps we may stumble on the way, I feel we are making strides in the right direction. Today the idea of sustainable development is not just two contradictory words but a real and achievable goal which is integrated into our social, cultural, and economic growth.

Ontario fisheries have always been a hot topic of debate, especially when placed in the context of development and land-use change. Our fisheries are important for the wellbeing of our economy, they are also interwoven into Ontario's diverse social and cultural mosaic. Sustainable development aims to achieve an equilibrium between the anthropogenic use of the environment without undermining the stability of the natural system and the flora/fauna it supports. Personally, I feel sustainable development and fisheries can co-exist, but the nature of this co-existence and the desired state of our fisheries is entirely up to us and is dependent on the decisions we make regarding our terrestrial and aquatic habitats.

I hope all of you enjoy this year's AGM and I look forward to all of the presentations and posters.

With optimism,

A handwritten signature in blue ink, appearing to read 'Jan Moryk', with a large, sweeping underline.

Jan Moryk, M.Sc.
President of the American Fisheries Society Ontario Chapter



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“Sustainable Development and Fisheries, can the two co-exist?”

Poster Presentation Abstracts

Characterizing phosphate solubilizing bacteria within from two locations in Lake Simcoe, ON

Crawford, K.¹ and Kurissery, S.^{1,2}

¹Department of Biology, Lakehead University, Thunder Bay, ON, Canada

²Department of Sustainability Sciences, Lakehead University, Orillia, ON, Canada

It has been well documented that phosphorus pollution is one of the most significant factors impeding lake health on Lake Simcoe. Actions such as enforcing greater fines on those caught contributing to phosphorus pollution are commonly undertaken as methods for dealing with nutrient pollution. These methods do not apply to internal phosphorus loading which is a known problem for Lake Simcoe. Often, it is said that temperature, redox reactions, and microbial processes contribute to internal phosphorus loading. This study aims to investigate phosphate solubilizing bacteria, the group of microorganisms thought to contribute to the microbial processes that lead to internal phosphorus loading. In September 2017, sediment and water samples were collected from nearshore sites around Cook’s Bay and along the northwestern shore of Lake Simcoe where the City of Orillia is located. Other necessary water quality data (dissolved oxygen, total suspended solids, total phosphorus, water temperature, chlorophyll a, pH, and conductivity) were also collected at the same time. The phosphate solubilizing bacteria were isolated from these sediment samples and plated on Pikovskaya’s agar in order to estimate the phosphate solubilizing capabilities of the organisms that were collected. A single factor ANOVA was conducted to compare the phosphate solubilizing bacteria abundances that were collected from Cook’s Bay and the northwestern shore of Lake Simcoe. It was found that statistically significant differences between the phosphate solubilizing bacteria abundances in Cook’s Bay and the northern part of Lake Simcoe did exist ($F_{1,16}=19.12$, $p=0.000473$). However, there was not a significant correlation found between the abundance of phosphate solubilizing bacteria and total phosphorus ($r = 0.053$, $t_{34}= 0.312$, $p= 0.75$) and the concentrations of total phosphorus were reasonably consistent between both parts of the Lake. This study

suggests that factors other than the amount of total phosphorus available in the water column contribute to the abundance of phosphate solubilizing bacteria.

Habitat associations of fishes in the Kivalliq region of Nunavut, Canada

Hancock, H.¹, Kanavillil, N.¹, Rennie, M.², Doka, S.³

¹ Lakehead University, 500 University Avenue, Orillia, ON, L3V 0B9;

² Lakehead University, 955 Oliver Road, Thunder Bay, ON, P7B 5E1;

³ Fisheries and Oceans Canada, 867 Lakeshore Road, Burlington, ON L7S 1A1

The Canadian Arctic and Subarctic (north of 60° latitude) support unique aquatic environments governed by the natural geomorphology of rivers and lakes. Historically fish distribution and habitat associations impacted by development activities in this region have been assessed using literature derived from southern populations. In this study, quantitative modelling tools will be tested to determine the accuracy of habitat suitability index scores among nine species in the Kivalliq region of Nunavut. Data will be sourced from white and gray literature north of 60° collected since Richardson et al. (2001). Preliminary results indicate that seven of nine species are currently assessed using 50-90% of geographically invalid data. Furthermore, field sampling at a Nunavut gold mine in August of 2018 will be used to contribute to the overall understanding of fish habitat associations using northern data. The aim of this research is to: 1) provide an assessment of freshwater habitat associations in the Kivalliq region, 2) develop and standardize habitat suitability indices and tools for impact assessments and, 3) contribute to new protocols for the collection of fish community and habitat information in remote areas. The results will all aid in the evaluation and assessment of development impacts in Canada's north.

Investigating the spawn timing of Silver Shiner (*Notropis photogenis*) within Canada

Burbank J., Drake D.A.R., Power M.

Silver Shiner (*Notropis photogenis*) is a small freshwater fish that has a limited distribution within Canada. The species is currently listed as "Special Concern" under the *Species at Risk Act* (SARA) and as "Threatened" by the Committee on the Status of Wildlife in Canada (COSEWIC), largely as a result of their limited distribution and perceived vulnerability to habitat destruction. A paucity of information exists on the reproductive biology of Silver Shiner, specifically, spawning has never been witnessed and current estimations of spawn timing are relatively coarse and based on point temperature estimates. Our goal is to determine the spawn timing of Silver Shiner in relation to environmental factors (i.e. Degree Days and Mean Daily Discharge) in order to gain a better understanding of the species reproductive biology within Canada. The initiation and cessation of spawning was identified in Sixteen Mile Creek through weekly estimations of the average Gonadal Somatic Index (GSI) during spring 2018. Additionally, spawn timing will be determined by employing identical techniques in spring 2019. As the investigation is currently ongoing, I will share preliminary results from spring 2018 and lay out the plans for future sampling and analysis. Developing an understanding of spawn timing in relation to environmental factors will provide insight into how Silver Shiner may respond to potential alteration in flow and thermal regimes resulting from increased anthropogenic activity within their range.

Seasonal variation in the critical thermal maxima and the critical oxygen tolerance of the threatened Eastern Sand Darter (*Ammocrypta pellucida*)

Firth, B., Drake D.A.R., Power M.

The Eastern Sand Darter (*Ammocrypta pellucida*) is listed as threatened under the Canadian *Species at Risk Act*. Under the act, threats to the survival of the species must be identified. There has been little research conducted addressing the threats to the survival of the eastern sand darter other than habitat loss. A threat that has been identified to affect all freshwater fish species is climate change. Climate change will increase water temperatures which in turn increases the prevalence of hypoxia. The objectives of this study are to determine the critical thermal maxima (CTMax) and the critical oxygen tolerance (Pcrit) of the Eastern Sand Darter in field based trials across the seasons. Identifying these tolerances will help fisheries managers to define the critical habitat for this species. This knowledge will allow fisheries managers to make more informed conservation management decisions affecting the survival and repatriation of the species as well as assessing the effects of climate change using predictive models. This research is in progress, however, we predict that as seasonal temperatures increase, fish will show an increase in CTMax and a decrease in Pcrit (hypoxia tolerance increases).

Application of the sediment intrusion dissolved oxygen (SIDO) model to critical trout spawning habitat in Eastern Rocky Mountains

Decent, Q.¹, Stone, M.¹, Krishnappan, B.², Silins, U.³

¹ Department of Geography and Environmental Management, University of Waterloo

² Professor Emeritus, Environment Canada

³ Department of Renewable Resources, University of Alberta

Significant development and natural disturbance pressures on the eastern slopes of the Rocky Mountains in southern Alberta have increased sediment flux to receiving streams. These fine grained materials accumulate in spawning gravels and reduce survival rates of salmonid eggs due to reduced intragravel flow velocities and decreased dissolved oxygen levels. To date no research has been conducted in gravel-bed rivers in the eastern slopes of the Rockies to rigorously quantify and model the gradient of sediment pressures from landscape disturbances, and their impacts on dissolved oxygen in spawning gravels. The goal of this study is to test a physically based model that explicitly quantifies processes that control dissolved oxygen dynamics in spawning gravel. A rigorous field program was conducted in the Crowsnest River, AL to provide field data to parameterize, validate and calibrate the Sediment Intrusion and Dissolved Oxygen (SIDO) model. Preliminary results comparing field observations to model predictions are presented.

A review of disease transfer to wild populations from aquaculture

Ritchie, E.

Department of Department of Environmental Science, Carleton University

Global fish production has doubled in the past 15 years, and it doesn't show signs of stopping. Many diseases and infections have now affected the aquaculture industry due to the densely populated open-net pens of native and non-native fish, which can then transfer these diseases to wild individuals through various mechanisms. Disease has

always been present in fish and is important for controlling population levels, but aquaculture creates an unnatural environment that prevents limiting factors that wild populations experience such as predation, competition, and migration. This review assesses the factors associated with disease transfer from aquaculture facilities to wild animals, using salmon aquaculture facilities as a case study, and presents potential solutions to this ongoing and critically important issue.



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Oral Presentation Abstracts

Friday March 1, 08:40

Keynote: Algonquin Park as an Aquatic Conservation Area: History, Ecology and a Modern View of an Iconic Landscape and Waterscape

Mark Ridgway

Research Scientist & Director Harkness Laboratory of Fisheries Research, Aquatic Research and Monitoring Section, Ontario Ministry of Natural Resources & Forestry

Algonquin Park is a special place in the minds and hearts of many people in Ontario and around the world. While most of us have visited the park on canoe trips, the glacial history and aquatic ecology of this iconic place presents a new view of Algonquin Park – one that has largely been unappreciated. In this talk, I will present our recent work on reconstructing the glacial history and zoogeography of fishes, and how this all relates to the recognition of Algonquin Park's important aquatic conservation status. The park retains much of its post-glacial features including many unique food webs, evolved species forms and native species assemblages. Together, the evidence is convincing that a showcase for aquatic conservation planning is right on our doorstep.

Friday March 1, 9:20

Talk 1: Emerging threats and persistent conservation challenges for freshwater biodiversity

Andrea Reid; Carleton University,

In the 12 years since Dudgeon et al. (2006) reviewed major pressures on freshwater ecosystems, the biodiversity crisis in the world's lakes, reservoirs, rivers, streams and wetlands has deepened. While lakes, reservoirs and rivers cover only 2.3% of the Earth's surface, these ecosystems host at least 9.5% of the Earth's described animal species. Furthermore, using the World Wide Fund for Nature's Living Planet Index, freshwater population declines (83% between 1970 and 2014) continue to outpace contemporaneous declines in marine or terrestrial systems. The Anthropocene has brought multiple new and varied threats that disproportionately impact freshwater systems. We document 12

emerging threats to freshwater biodiversity that are either entirely new since 2006 or have since intensified: (i) changing climates; (ii) e-commerce and invasions; (iii) infectious diseases; (iv) harmful algal blooms; (v) expanding hydropower; (vi) emerging contaminants; (vii) engineered nanomaterials; (viii) microplastic pollution; (ix) light and noise; (x) freshwater salinisation; (xi) declining calcium; and (xii) cumulative stressors. Effects are evidenced for amphibians, fishes, invertebrates, microbes, plants, turtles and waterbirds, with potential for ecosystem-level changes through bottom-up and top-down processes. In our highly uncertain future, the net effects of these threats raise serious concerns for freshwater ecosystems. However, we also highlight opportunities for conservation gains as a result of novel management tools (e.g. environmental flows, environmental DNA) and specific conservation-oriented actions (e.g. dam removal, habitat protection policies, managed relocation of species) that have been met with varying levels of success. Moving forward, we advocate hybrid approaches that manage fresh waters as crucial ecosystems for human life support as well as essential hotspots of biodiversity and ecological function. Efforts to reverse global trends in freshwater degradation now depend on bridging an immense gap between the aspirations of conservation biologists and the accelerating rate of species endangerment.

Friday March 1, 9:40

Talk 2: Recreational fishing and species restoration: a case study

Kathryn Peiman; Ontario Federation of Anglers and Hunters,

Atlantic Salmon (*Salmo salar*) were extirpated from Lake Ontario in 1896. The Lake Ontario Atlantic Salmon Restoration Program was established in 2006 to restore naturally-produced populations of Atlantic Salmon to levels supporting sustainable recreational fisheries in the lake and selected tributaries. The reintroduction of native Atlantic Salmon into an ecosystem with a number of non-native and in some cases similar-looking recreationally-important salmon and trout species has meant that public and angler awareness is important to restoration success. Here I explore some of the challenges the program has experienced, including how to attract and engage with new anglers; how to effectively communicate regulations; social sanctioning of behaviours among anglers; volunteer-based awareness initiatives; and working with various stakeholders.

Friday March 1, 10:20

Talk 3: The Great Lakes Fishery Commission: Cooperative Management of the Great Lakes

Ted Lawrence and Marc Gaden; Great Lakes Fishery Commission,

The Great Lakes are a valuable resource shared by Canada and the United States. More than 40 million people depend on the Great Lakes for food, drinking water, and recreation. The fishery alone generates up to \$7 billion for the region annually, offering recreational angling opportunities for five million people and providing 75,000 jobs. The health of the Great Lakes fishery, however, is under constant threat from habitat loss, pollution, and invasive species including Sea Lamprey (*Petromyzon marinus*). Because

these valuable resources are multi-jurisdictional, they require a comprehensive collaborative effort to address the issues that threaten them.

To tackle the biggest issues, including management and sea lamprey control, the Great Lakes Fishery Commission (commission) was established in 1955 by the Canadian/U.S. Convention on Great Lakes Fisheries. The commission coordinates fisheries research, controls the invasive Sea Lamprey, and facilitates cooperative fishery management among the state, provincial, tribal, and federal management agencies. The commission works with numerous partners, including the United States Fish and Wildlife Service, United States Geological Survey, and Fisheries and Oceans Canada. Additionally, the commission facilitates an extensive research program.

Friday March 1, 10:40

Talk 4: Understanding Stream Temperatures and Thermal Class and their Use by Fish

Nick Jones; River and Stream Ecology Lab, Aquatic Research and Monitoring Section, OMNRF

Water temperature has been described as the abiotic master factor for fishes and influences the distribution and abundance of species, water quality, nutrient and ice dynamics, and the metabolic activity, growth, timing of migration, and spawning events of fishes. In turn, it is necessary to have a good understanding of the thermal regime of streams for effective fisheries management. However, there is a general lack of understanding and considerable confusion about stream temperature. In this talk I will discuss and provide examples explaining the spatial and temporal temperature dynamics, species thermal preferences and tolerances, thermal classification, and predictive temperature models. Emphasis will be placed on the uncertainty in the classification of stream temperature.

Friday March 1, 11:00

Talk 5: 2018 Fish Consumption Survey

Don Little; Toronto and Region Conservation Authority

The Toronto and Region is one of 43 Areas of Concern (AOCs) recognized by the governments of Canada and the United States in the 1987 amendments to the Great Lakes Water Quality Agreement. The environmental status of these AOCs is assessed against fourteen Beneficial Use Impairments (BUIs) each of which describes a human or ecological use of the ecosystem that has been lost. Among the impaired BUIs for the Toronto and Region AOC are restrictions on fish and wildlife consumption. In 2018, the Toronto and Region Conservation Authority (TRCA) with the help of the Toronto Remedial Action Plan (RAP) team, Ministry of Environment, Conservation and Parks and the Ministry of Natural Resources and Forestry implemented a survey to evaluate the fish consumption BUI by engaging the local angling community and collecting information on fish consumption habits. The questions asked during the survey were designed to inform the RAP team on if captured fish were being consumed, the species and amount being consumed, preparation and cooking methods, and, if applicable, why

fish are not being consumed. The survey targeted sixteen locations along the TRCA waterfront which included a mix of boat launches, fishing nodes, river mouths, and other areas used by anglers. Surveys were broken up into four two week blocks and implemented at times of the year when anglers are known to be active (i.e. opening seasons of fish species, salmon derbies, etc.). Over the course of the four surveys the TRCA conducted over 200 interviews - the results of which will be shared in this presentation.

Friday March 1, 11:20

Talk 6: Identifying early life stages of Great Lakes fish species using metagenomics

Kavishka Gallage, Nick Mandrak, Nate Lovejoy; University of Toronto, Scarborough

The ability to accurately detect and estimate the abundance of at-risk and aquatic invasive species is critical for management these populations. Current methods to identify and quantify fish populations are costly, particularly at their egg and juvenile life-stages. Molecular approaches to classifying freshwater fishes at these life stages may be more cost-effective and provide higher taxonomic resolution than the existing morphological approaches. The purpose of our study is to develop a universal molecular tool to identify a wide variety of fish species across the Great Lakes and its tributaries. We've created a set of primers targeting the COI gene sequence of approximately 148 species with emphasis on at-risk species and invasive fish species. Currently, our set of primers are able to amplify 80% of the species tested, and our sequencing data has resulted in >98% match-identification. Our tool will be used to identify and quantify ~1300 samples of unidentified juveniles and eggs collected Great Lakes sites thought to contain at-risk and invasive fishes. This metagenomic study will be used to establish the effectiveness of a molecular approach. If successful, this method will effectively reduce the time required for fish identification, reduce the number of misidentifications, and increase early detection of aquatic invasive species.

Friday March 1, 11:40

Talk 7: Where have all the little fish gone? Investigating overwinter habitat for minnow and related species populations within the Golden Horseshoe.

J. Cockburn¹, L. Davis², A. Scott³, P. Villard²

¹ Department of Geography, Environment and Geomatics, University of Guelph, Guelph ON, Canada

² GEO Morphix Ltd, Milton ON, Canada

³ Department of Geography, Environment and Geomatics, University of Guelph, Guelph ON, Canada

Redside Dace (*Clinostomus elongatus*) were listed as an endangered species by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) in April 2007, and the Committee on the Status of Species at Risk in Ontario (COSSARO) added Redside Dace to the Species at Risk in Ontario List, February 18, 2009. The majority of the Canadian population is located within the Golden Horseshoe surrounding the Greater Toronto Area (GTA). There is on-going concern that the remaining of the endangered population is at risk to increasing urbanization. Furthermore, the winter season often introduces additional stressors to fish populations (e.g., low water levels, fragmented habitat, increased predation, limited food supply). This presentation

summarizes the findings of two separate field campaigns through winter 2014-15, and winter 2015-16 that were aimed at evaluating Redside Dace, and related small fish, within major watersheds of the Golden Horseshoe, including the Don River (Patterson Creek), the Humber River (West Humber River), and the Credit River (Fletcher's Creek in Brampton, Fletcher's Creek in Mississauga; Springbrook Creek, and Silver Creek). In the six sites, all but two sites had positive observations of Redside Dace during at least one site visit (including non-winter visits). The two exceptions were Patterson Creek in east Toronto, and Springbrook Creek in Brampton. Winter observations (presence of ice, and/or air temperatures below 0°C) suggest that Redside Dace habitat is extremely limited in these study reaches, as the minnows were only observed at the West Humber River site in winter 2015. In addition, water quality measurements and conservation authority water quality summaries indicate that dissolved load is high and thus water quality is poor. This is especially troubling given that the Redside Dace is known to be sensitive to high dissolved load concentrations. Assessments of the habitat conditions (in-stream vegetation, woody debris) indicate no correlation between habitat type and winter observations, but spring observations show a high coincidence with woody debris. It is important to maintain woody debris and wood recruitment at these sites. The presence of other baitfish and juvenile salmonids at most of the sites suggests hydraulic and nutrient conditions are sufficient to support a diverse aquatic community, the lack of Redside Dace may suggest a struggling population and possibly extirpation from these sites. Future work, might consider employing environmental DNA (eDNA), as a method that may be less impacted by observations disturbance. In addition, water quality monitoring, in particular dissolved load concentrations, is absolutely necessary in order to further our understanding of the pressures placed on this endangered population.

Friday March 1, 1:00

Talk 8: Emerging threats in an ancient context: Indigenous Elder knowledge and perspectives on Pacific salmon stewardship

Andrea Reid; Carleton University

Pacific salmon (*Oncorhynchus* spp.), and the nutritional, social, cultural, and commercial values they underpin, face growing threats. Increasingly, unconventional data sources are being used to inform fisheries research and management as traditional approaches alone fail to arrest declines.

In this study, Indigenous Elders across British Columbia, Canada, were interviewed about observed changes in the status of Pacific salmon over the last ~70 years, the factors driving these changes, and consequent shifts in Indigenous consumptive and cultural practices. Eighteen communities belonging to nine First Nations across the Fraser, Skeena, and Nass watersheds were visited, and local protocols for obtaining research permission were followed in each.

Semi-directed interviews were conducted with 48 Indigenous Elders (65% male (n=31); 35% female (n=17); mean age = 70 years), with each dialogue audio-recorded for subsequent transcription, coding, and analysis. Recordings and transcriptions are shared

with participating First Nations to be stored in cultural archives where available, with Elders' permission.

All but one respondent reported a substantial decrease in the abundance and health of Pacific salmon since the 1950s. Six factors were identified as leading drivers of Pacific salmon decline, each with nearly equal weighted scores based on their assigned ranks and frequency listed: aquaculture (0.151); mining and development (0.149); climate change (0.139); water pollution (0.135); predation (0.116); and infectious disease (0.104). Factors relating to the fishing industry (commercial fishing; recreational fishing; fisheries bycatch; poaching; and First Nations fishing) when pooled together represented less than one-quarter of the total weight (0.205).

Respondents connected salmon declines with associated losses in specific fishing practices and related knowledge, particularly among community youth. Other themes emerging from this work include: waste and greed avoidance principles; marine and river tenure systems and stewardship; and vast interconnectedness between environments, organisms, and people.

Friday March 1, 1:20

Talk 9: Correlates of White Sucker spawning migration

Kathryn Peiman and Steven Cooke; Carleton University

Spawning migration in White Suckers (*Catostomus commersonii*) occurs over a period of weeks, but little is known about differences among individuals that migrate early, peak, or late during the run. To evaluate how individual variation in morphology, diet, behaviour, and physiology interacts with within-year variation in timing in wild fishes, I sampled White Suckers over seven weeks during their spring spawning migration in Cobourg Brook. This is one of the few studies that measures multiple metrics on the same individuals in the wild, and it will elucidate how these metrics link to a task such as migration timing that has implications for successful reproduction.

Friday March 1, 1:40

Talk 10: Stream Restoration Project Successes

Heather Amirault and Sean Stuart; Stantec

Stream restoration is a continuously evolving practice that is both a science and an art. New innovations are introduced, tested, and modified on a regular basis. Stantec has been learning from other geographic regions and applying a selection of restoration techniques and practices from other jurisdictions into projects in Ontario. These practices are applied to the design and construction of instream structures for hydraulic, geomorphic, and biological functions. Our team of stream restoration engineers works closely with our team of aquatic biologists to select features that benefit the overall ecosystem while focusing on a specific species, such as Redside Dace (*Clinostomus elongatus*), depending on the management priorities of the watershed.

This presentation will explore some of our recent projects that included various instream structures, designed for fish habitat. We will share results of post-construction monitoring programs where we observed benefits to the fish community and explore areas where improvements can be made. The overall intent of the presentation will be to highlight how biologists and engineers work together to develop restoration plans that can successfully benefit the ecosystem as a whole.

Friday March 1, 2:00

Talk 11: KISTERS Biology Module - An Overview of International & Local Applications

Stephen Elgie; Kisters North American

This presentation will cover the use and development of the KISTERS KiECO software, a module of the WISKI system, in two different implementations: a national solution at Natural Resource Wales (UK) and the use of this system by the Ontario Conservation Authorities. I will present an overview of both systems, perceived barriers to implementation and use, the solutions to these challenges, and a few unexpected benefits that were identified throughout this process. Specific focus will be put on the standardization of taxonomies, collection/reporting methods, and calculations relevant to biological data. Finally, the method(s) of connecting biology experts with WISKI experts will be explored.

Friday March 1, 2:20

Talk 12: The metabolic cost of chronic social stress in Rainbow Trout

Katie Gilmour; University of Ottawa

Juvenile Rainbow Trout (*Oncorhynchus mykiss*) confined in pairs form social hierarchies, with subordinate fish showing prolonged elevation of the stress hormone cortisol indicative of chronic social stress. Thus, subordinate social status provides a useful system for studying the effects of chronic stress on metabolism and growth. Whereas dominant fish monopolize food resources, allowing them to accumulate energy reserves such as liver glycogen and favouring *de novo* synthesis of triglycerides, subordinate fish enter a catabolic state. Feeding is inhibited, likely at least in part owing to the appetite-suppressing effects of leptin, because subordinate fish show elevated leptin- $\alpha 1$ transcript abundance. Liver glycogen levels are reduced in these fish, and they tap into lipid reserves as evidenced by elevated circulating levels of free fatty acids. In white muscle, subordinate fish show elevated expression of markers for protein breakdown and reduced rates of protein synthesis. Collectively, these metabolic effects reduce growth rates in subordinate fish, illustrating the metabolic cost of chronic stress.

Friday March 1, 2:40

Talk 13: Fish community interactions with very low head hydroelectric turbine technology

Erik Tuononen, E.J.I. Lédée, K.E. Smokorowski, E.R. Timusk, S.J. Cooke; Careleton University

Very low head (VLH) turbines are a relatively new technology for hydropower generation and are often touted as being “fish friendly” for entrained fish. With growing interest in deploying such technology in Canada, there is a need for biological assessments to understand how fish interact with VLH turbines. We initiated a study to assess the potential biological consequences of VLH turbines on fish, at the only VLH turbines operating in Canada located on the Severn River, Ontario. Here we assess risk based on the potential for fish to become entrained through movement around the turbines, and the specific injury and mortality rates resulting from entrainment. To determine the risk of entrainment we tagged 138 fish with acoustic telemetry transmitters to track movements around the turbines, enabling us to determine which species and size classes are most likely to become entrained, and their subsequent fate. To determine turbine specific injury and mortality rates, we experimentally introduced fish into the turbines and then subsequently recaptured fish downstream. Using before and after entrainment assessments we can determine injury and mortality rates. These results will provide evidence towards the ‘fish friendly’ nature of the turbines, and the management implications of their potential installation across Canada.

Friday March 1, 3:20

Talk 14: Quantifying multiple pressure interactions affecting populations of a recreationally and commercially important freshwater fish

Gutowsky LFG^{1*}, Giacomini HC¹, de Kerckhove DT¹, Mackereth R², McCormick D², Chu C¹

¹ Aquatic Resource and Monitoring Section, Ontario Ministry of Natural Resources and Forestry, Peterborough, ON, Canada, K9L 1Z8

² Centre for Northern Forest Ecosystem Research, Ontario Ministry of Natural Resources and Forestry, Thunder Bay, ON, Canada, P7E 2V6

The expanding human global footprint and growing demand for fresh water have placed tremendous stress on inland aquatic ecosystems. Aichi Target 10 of the Convention on Biological Diversity aims to minimize anthropogenic pressures affecting vulnerable ecosystems, and pressure interactions are increasingly being incorporated into environmental management and climate change adaptation strategies. In this study, we explore how climate change, overfishing, surrounding land development, and invasive species pressures interact to affect inland lake Walleye (*Sander vitreus*) populations. Walleye support subsistence, recreational, and commercial fisheries and are one of most sought-after freshwater fish species in North America. Using data from 444 lakes situated across an area of 475,000 km² in Ontario, Canada, we apply a novel statistical tool, R-INLA, to determine how Walleye biomass deficit (carrying capacity – observed biomass) is impacted by multiple pressures. Individually, angling activity and the presence of invasive Dreissenid mussels were positively related to biomass deficits. In combination, Dreissenid mussel presence interacted antagonistically with angling

activity and percentage decrease in watershed forest cover, affecting biomass deficit in complex ways. Velocity of climate change (VoCC) in growing degree days above 5 °C and decrease in forest cover interacted to negatively affect walleye populations. VoCC in mean annual precipitation did not have noticeable effects. Our study demonstrates how multiple pressure evaluations can be conducted for hundreds of populations to identify influential pressures and vulnerable ecosystems. Understanding pressure interactions is necessary to guide management and climate change adaptation strategies, and achieve global biodiversity targets.

Friday March 1, 3:40

*Talk 15: Parental and Environmental Mechanisms Influencing Body Shape in Lake Superior Brook Trout (*Salvelinus fontinalis*)*

Camille Jodouin; University of Guelph

Understanding the proximate mechanisms influencing trait variation in animal populations remains an important challenge. To increase our knowledge of this topic, this study tested the role of parental and environmental mechanisms in determining body shape in a polymorphic population. Our study system, the Lake Superior Brook Trout (*Salvelinus fontinalis*) population, displays two morphs: a larger migratory morph that originates in tributaries, migrates to the lake, and returns to tributaries to spawn, and a smaller resident morph that completes its lifecycle in its natal tributary. We reared offspring from crosses of migrant parents (n = 12) and hybrid migrant-resident parents (n = 12) for four months, distributing them between two environmental treatments designed to alter body shape through foraging behaviour. Individuals in the first treatment were forced to actively search for floating food pellets, whereas those in the second treatment had to wait for sinking pellets to reach the bottom of the tank before searching for them. Gape width and morphological landmarks were then quantified to characterize the individuals' body shape.

Analyses indicated that gape width and body shape differed between families and less so between treatments. These findings suggest that morphology in Lake Superior Brook Trout is mainly determined by parental effects, and could be incorporated in the design of restoration programs for the endangered migrant morph.

Friday March 1, 4:00

Talk 16: Asian Carps and Other Costly Invasive Species

Colin Cassin and Rebecca Schroeder, Invasive Species Centre

Established and encroaching invasive species pose great ecological risk to the Great Lakes region, yet their collective direct economic impacts to Ontario's tax payers are understudied. In recent years the Invasive Species Centre has worked with many of Ontario's municipalities and Conservation Authorities to assess the economic realities imposed by invasive species in Ontario. In this presentation we will also explore the unique economic and ecological threats posed to the Great Lakes by 4 species of Asian

carps, and what actions are being taken to prevent their establishment in Canadian fresh waters.

Friday March 1, 4:20

Talk 17: Fish Communities of the Toronto and Region Waterfront: Summary and Assessment, 1989-2016

Kaylin Liznick; Toronto and Region Conservation Authority

Fish community data collected over the 1989-2016 period throughout the Toronto regional waterfront using standardized electrofishing methods were examined in the context of multiple indicators of fish community health. An increase in species richness and diversity scores in the open coast and a decrease in tolerant species abundance are indicators of improving fish community health. A decline in overall catch and biomass values was observed in the 1990's, however; this was followed by nearly two decades of stable catch and biomass values, indicating the decline is likely a lake-wide trend. Inconclusive observations concerning the trophic and thermal group dynamics need to be investigated further. Increase in invasive Round Goby (*Neogobius melanostomus*), while a marker of declining fish community health, is a reflection of a lake-wide trend. Collectively, the results do not indicate an overall positive direction in terms of the fish community health. However, there were more positive or neutral trends than negative. It's also worth noting that a number of substantial changes detected took place in the late 1990's-early 2000's. These results contribute information towards the Toronto and Region Remedial Action Plan actions and the ongoing waterfront aquatic habitat management and monitoring activities carried out by the Toronto and Region Conservation Authority and our partners.

Friday March 1, 4:40

Talk 18: The role of ontogenetic flexibility in shaping diversity and response to a changing environment

Sarah Steele and Arnar Pálsson; University of Iceland

Arctic Char (*Salvelinus alpinus*) is a widespread, highly plastic, and polymorphic organism displaying significant diversity in body size, morphology, diet, life history, and behaviour throughout its range. Following the arrival of Arctic Char in Iceland from Northern Europe approximately 10,000 years ago, the anadromous char morph has radiated into a variety of morphological forms, ecological roles, and habitats across the island. Strong divergence across a gradient of prey preference and feeding ecology characterizes well-studied populations of Icelandic Arctic Char. Unlike most radiations, the presence of both ancestral and derived conditions in Iceland allows for direct study of how exceptional levels of diversity may originate. One hypothesis is that this diversity can be explained by developmental plasticity in Arctic Char, enabling rapid evolution in response to environmental change. Morphological divergence through development in response to prey availability can be experimentally induced, allowing the study of plasticity within and across morphs in response to environmental stimuli. Despite this, little is known about the developmental flexibility of anadromous

populations of Arctic Char or their ability to respond to anthropogenic changes to the landscape. Furthermore, the effects of hybridization among morphs on responses to environmental change and survival are poorly understood. Using a common-garden rearing experiment, morphological response to differing diet treatments within and across morphs and their hybrids will be measured. Results from this study can be used to understand sensitivity of certain life stages, populations, or morphs to variation in food types and availability. This study will also provide further knowledge, particularly when compared to natural variation in the wild, of how developmental flexibility in anadromous and land-locked populations of Arctic char may allow these and other organisms to respond to direct, rapid modifications of environment (e.g. dam construction, pollution, shift in prey type or availability) or indirect modifications through climate change. This presentation will highlight the challenges and excitement of this broad research program through field and lab photos.

Friday March 1, 5:00

Talk 19: The role of ontogenetic flexibility in shaping diversity and response to a changing environment

Alexandra Leclair, Nicholas Mandrak and Andrew Drake

Climate change is a current threat to the diversity of life. Impending thermal regime shifts are projected to decrease available favourable thermal habitat of various cold water poikilothermic species and increase annual freshwater thermal averages. Several studies conclude that sudden and drastic changes in water temperature negatively affect development and migration of cold water polikilotherms. To best project the fate of polikilotherms, it is necessary to understand the thermal threshold of individual species and identify their critical thermal maxima (CTmax). In this study, we aim to understand the thermal threshold of the Redside Dace (*Clinostomus elongatus*), an endangered freshwater species in southern Ontario and the northeastern American states, and investigate its capacity to adjust its CTmax as an acclimation response to seasonal variation in water temperature. We conducted streamside trials once a month on a northern population of Redside Dace in Two Tree River to assess changes in its thermal window during the summer and autumn months. Redside Dace were seined from Two Tree River and individually added to a streamside tank filled with the river's water. An immersion circulator attached to the tank increased the tank's water temperature one degree per three minutes while fish were observed until their equilibrium was reached, that is, the inability to remain upright and mobile. Preliminary results reveal that ambient water temperature significantly affects the CTmax of Redside Dace. Redside Dace demonstrate the greatest CTmax of 35.94OC during the warmest ambient water temperatures and the lowest CTmax of 25.81OC during the coolest ambient water temperatures. Preliminary results also reveal that ambient water temperature and total length may jointly affect an individual's CTmax. To strengthen our results, we plan both to continue to assess CTmax seasonal variations in the Two Tree River population and extend our study to southern populations of Redside Dace.

Saturday March 2, 8:30

Talk 20: Restoring an Urban Creek using Natural Channel Design

Ryan Bolton and John DiRocco, Toronto and Region Conservation Authority

Toronto and Region Conservation Authority (TRCA) are a global leader in ecological restoration making us one of the leaders in habitat restoration in The Greater Toronto Area. As such, there have been many successes and lessons learned regarding natural channel design and construction. Over time, restoration practices have evolved to reflect a more integrated approach where multiple techniques are utilized to achieve greater gains in overall natural system health. Current restoration objectives are rooted in improving ecological function, increasing natural cover and providing new habitat opportunities for fish and wildlife. Previous restoration practices often focused on rehabilitating isolated features to solve a singular issue with little consideration for associated cover types or features within surrounding areas. For example, a stream erosion project might have focused only on hard stabilization treatments to protect against severe erosion without including the benefits of associated habitat features or including flood mitigation through floodplain restoration. A more holistic approach to natural channel design is critical to achieving strengthened natural system resiliency especially in urban and near urban land-uses. A reach based approach to restoration includes design and implementation considerations that include a more natural stream alignment accounting for varying flow regimes, bank stabilization, natural channel migration, storm water management, wildlife habitat structures, riparian planting and public use. This presentation will look at TRCA's approach to natural channel design and implementation by providing an overview of current design considerations and construction practices. Examples will include a look at completed projects of channel re-naturalization and valley restoration to demonstrate how different techniques are applied in overall design and construction to achieve successful project outcomes.

Saturday March 2, 8:50

Talk 21: Alfred Kuehne BLVD Aquatic Restoration Project

Elizabeth Petrov; Toronto and Region Conservation Authority

The Alfred Kuehne Aquatic Restoration Project is situated in Etobicoke Creek, in the City of Brampton. Urbanization of the creek resulted in extensive stream channelization (concrete channel), draining of wetlands, installation of flood control structures, removal of large areas of forest and riparian vegetation, which resulted in the loss of many fish and wildlife species. The Toronto and Region Conservation Authority (TRCA) undertook restoration of the site following the Natural Channel Design (NCD) approach. Pre- and post-monitoring of the site was done over a 6 year span in order to gauge the aquatic habitat and community response to the restoration efforts. Data regarding this presentation speaks towards the monitoring activities and data results as well as lessons learned.

Saturday March 2, 9:10

Talk 22: Approaching Africa's Future Fresh Water Challenges through Capacity Building and Collaboration

Ted Lawrence¹ and Jess Ives²

¹ African Center for Aquatic Research and Education

² University of Windsor

The African Great Lakes support millions of people with protein, clean water, and transportation, but also face notable challenges, including climate change, agricultural runoff, deforestation, and overharvest of fish. Attempts to address the challenges facing freshwater resources often fall short due, in part, to the underinvestment in universities and research institutions and harmonized and disparate approaches to research. Environmental problems are often addressed by international agencies targeting short-term objectives, resulting in piecemeal results. It is necessary to strengthen research capacity in developing countries to bolster long-term, strategic commitments, stable funding, and address ecosystem approaches to resource development and management. This talk focuses on a call from the international community to create Centers of Excellence to address African freshwater issues, and specifically, to enhance the capacity of riparian nations to conduct ecosystem research and monitoring to support sustainable basin development around the African Great Lakes. The newly formed African Center for Aquatic Research and Education (ACARE) is using some of the lessons learned in the North American Great Lakes to form institutional arrangements, partners, funding options, and potential African and global water initiatives that can help address the challenges on these freshwater resources.

Saturday March 2, 9:30

Talk 23: The effects of catch and release on American Eel, an endangered species in Ontario.

Aline Litt, Lee Gutowsky, Nicolas Lapointe, Steven Cooke; Carleton University

Resilience to catch-and-release fishing is highly variable among species and current catch-and-release studies tend to focus on popular game fish, while less popular and imperiled species remain under-researched. The American Eel (*Anguilla rostrata*) is an example of a species currently lacking catch-and-release guidelines. This species is listed as endangered in Ontario and fishing for it is prohibited. Any incidentally-captured eel must be released. Anecdotal reports suggest that some anglers are uncomfortable handling eels, therefore choosing to cut the line instead of removing the hook. The effects of catch and release, and specifically cutting the line versus removing the hook, are unknown for American Eel. Here, we use a biological experiment to quantify injury and mortality of eel following catch and release. Eels (n=207) were randomly assigned to control, sham, line-cut and hook-removal groups. All groups except the control were anaesthetized and anchor tagged. Line-cut and hook-removal groups were hooked (shallowly or deeply) and then allowed to fully recover prior to the simulated angling scenarios, in which the line was cut or the hook was removed. All eels were monitored for seven days post angling event. No mortalities occurred in any of the treatments. Eel necropsies revealed mild to moderate injuries overall and a high degree of hook

shedding in the line-cut group. Our results suggest that eel are resilient to catch and release, however future studies to validate this work in the field are recommended.

Saturday March 2, 10:10

Talk 24: What's in a trap? How differences within trapping methods may influence catch rates

Caitlyn Synyshyn; McMaster University

Different fish capture methods can have biases in terms of catch rates, species caught, and even the sex, sizes and behaviour of individuals caught. Biases caused by variation within a single gear type may also occur, however the implications of this variation on population estimates is generally not considered. Minnow traps are a gear type that come in slightly different sizes and can be made of different materials such as exposed galvanized metal traps (silver traps) and black plastic-coated metal traps (black traps). It is unknown for most species whether the silver or black colouration of a minnow trap influences the catch rate. This study aims to compare the effectiveness of black traps to silver traps for catching the Round Goby (*Neogobius melanostomus*), a prolific invasive species in the Laurentian Great Lakes and Western Europe. We compare the fish capture rates of the two types of traps in terms of abundance, sex, reproductive status, and body size of Round Goby. Finally, using a multi-year study on Round Goby in Hamilton Harbour, we examine the difference in catch rates between baited and unbaited minnow traps. Our preliminary results suggest that silver traps capture more Round Goby compared to black traps and that baited minnow traps have higher Round Goby catch. These results are important when comparing abundance and range expansion results across studies and laboratories and need to be considered by managers and conservation agencies when comparing the current invasion of Round Goby in Western Europe to the invasion that took place almost 30 years ago in the Laurentian Great Lakes.

Saturday March 2, 10:30

*Talk 25: Assessing the effectiveness of a passive size-based selective fish passage for managing Sea Lamprey (*Petromyzon marinus*)*

McLean Smith and Rob McLaughlin; University of Guelph

Habitat fragmentation is often a significant detriment to population stability. Anthropogenic barriers often fragment aquatic habitat by limiting fish movement within stream systems. In particular, habitat fragmented between foraging and spawning sites could decrease the productivity of fishes within the system. This raises the possibility that selective habitat fragmentation could be used to control undesirable species. We evaluate the applicability of this technique for the management of invasive Sea Lamprey (*Petromyzon marinus*) in the Laurentian Great Lakes. We estimated the effectiveness of size-based passive sorting relative to current manual trap-and-sort techniques in current fishways in Lake Ontario, Erie, and Superior. We found that across all three fishway sites there was a positive correlation, however, the relationship indicates the potential passage of non-Sea Lamprey fishes caught within the fishway is significantly lower than the current manual trap-and-sort technique and highly variable (between 10% and 75%). The variability in success is due, in part, to the success of passively separating Sea Lamprey from desirable fishes. The effectiveness of size-based passive sorting is a

promising method for selective fragmentation; however the variability within the effectiveness of different fishways demonstrates the need for further research into the causes of that variability.

Saturday March 2, 10:50

Talk 26: The role of behaviour in the Round Goby invasion of the Laurentian Great Lakes

Sigal Balshine; McMaster University

Invasion biology has a long history, but rarely has the role of behaviour been directly addressed. I will describe the role of behaviour in the invasion of the Laurentian Great Lakes by the Round Goby (*Neogobius melanostomus*). This small, benthic fish - native to the Black and Caspian Seas of Europe - was introduced to the Great Lakes of North America via ship ballast water discharge in the early 1990s, spreading more rapidly than any previous aquatic invader. As a multiple spawner with a long breeding season (~ 4 months), round goby spread quickly and widely throughout all five Great Lakes. I will highlight why a number of Round Goby behavioural characteristics (in addition to their reproductive habits and tolerance to contaminants) have contributed to the success of their invasion, and the resultant concern for the environments they have invaded. More specifically, Round Goby foraging, parental defense and social behaviours have impacted invasion success. Using my own work as a case study, I will explain how behaviour has influenced invasion dynamics and species persistence in a highly contaminated ecosystem, Hamilton Harbour. I will also discuss how behaviour can be used as an effective management option to reduce the risk of future invasions and range expansion.

Saturday March 2, 11:10

Talk 27: Status of reintroduction efforts for SARA-listed fishes in Canada

Karl Lamothe and Andrew Drake; Fisheries and Oceans Canada

Fishes are among the most threatened taxa in Canada with over 70 species, subspecies, and/or Designatable Units presently listed for protection under the *Species at Risk Act* (SARA). Protecting these species requires a diverse set of strategies based on the best-available data and information. One strategy identified in Canadian federal recovery strategies for improving the status of SARA-listed fishes is species reintroduction, which involves the release of individuals into areas from which they have been extirpated with the goal of re-establishing self-sustaining populations. In this presentation, I will describe the state of reintroduction science for the 14 SARA-listed fishes identified as candidates for reintroduction in federal recovery strategies and highlight five important ecological themes to consider when evaluating reintroduction potential of freshwater fishes: habitat characteristics, species characteristics, biotic interactions, stocking approaches, and monitoring. I will conclude by emphasizing that due to the tremendous amount of research performed by Canadian aquatic scientists since SARA was enacted in 2002, now is the time to undertake active, experimental approaches to reintroduction to advance recovery efforts for SARA-listed fishes.

Saturday March 2, 11:30

Talk 28: Sustainable landuse planning and the Lotic Environment of the Carruthers Creek Watershed

Jan Moryk; Toronto and Region Conservation Authority

Sustainability starts at the planning stage and watershed planning and management, particularly in urban and near urban areas, requires a thorough knowledge of aquatic systems. Most in-stream monitoring is focused on permanently flowing streams leaving a knowledge gap for aquatic resource managers with respect to headwater drainage features (HDFs). The Carruthers Creek watershed (located in Durham Region) is going through an extensive watershed planning process to help guide management decisions, including the possibility of future land use changes. The first phase of this project included characterization of the existing conditions of the watershed including the fish community, aquatic habitat, and an assessment of HDFs. This presentation discusses the results of the large scale HDF assessment along with the fish community and aquatic habitat that these HDF help support downstream within the watershed.