April 2021
Volume 19, Issue 1

Contents:

Message from the President

It is difficult to compose this message without first taking a moment to acknowledge the truly devastating impact a virus, born through the insidious exploitation and mistreatment of our wildlife, has had on all reaches of human life. It is another prominent reminder of how intricately woven our well-being and existence is to the natural world. As we move swiftly through the early months of 2021 and begin to benefit from the rapid and remarkable vaccine research conducted by the scientific community, we can slowly but surely, start to resume a more familiar life.

This year saw a very different AGM. Like many professional societies across the globe, the AFS-OC hosted its first conference in the virtual realm. Although many begin to falter due to fatigue, caused by what feels like a year-long zoom meeting, attendance was strong. It is truly remarkable and reassuring to see how rapidly the fisheries and aquatic community adapted and pressed on in the pursuit of research and conservation from the home office or the coffee table. Replicating the sense of community and positive interaction experienced at in-person events in the virtual world can be trying, yet from conversations with several attendees, that sense of community was not lost.

As President, one of my integral goals is to look at the Ontario Chapter through the lens of inclusivity & diversity and challenge us all on how we can do better. This requires a collective effort to firstly identify and acknowledge the barriers and prejudices that exist and secondly, take active steps to address them. Standing idle is simply not enough, this requires a collective and continuous direction of effort. AFS-OC will be hosting a webinar series, creating a safe space for anyone to come forward and share the challenges they may have faced. This is the first step of many.

In concluding this message I leave you with a challenge. Communicating the importance of the natural world, especially our freshwater ecosystems has never been more significant. As researchers, biologists, ecologists, technicians and students it is our job to not only conserve and protect, we must act as conduits, sharing and educating our communities. So get out there and share your insight, enlighten and foster meaningful and lasting change.

Craig Paterson, AFS-OC President
president@afs-oc.org

AFS-OC Annual General Meetings

2020

On February 20th to 22nd, the AFS-OC hosted their 2020 Annual General Meeting at YMCA—Geneva Park in Orillia, Ontario. We had 61 people join us for this event.

The conference theme was "What's the cost of doing nothing". The agenda was full of excellent oral and poster presentations, a workshop, and our very popular mentoring and evening social session. This made for a very difficult decision for the judging committee to determine the winners of our annual awards. The President's Award, given to the best poster presentation, was awarded to Jacob Burbank for his work on "Consumption of terrestrial food resources by a small-bodied stream fish: Silver Shiner in an urban drainage". The E.J. Crossman Award, given to the best verbal presentation, was awarded to Jordanna Bergman for her work on "Spatial ecology of invasive Round Goby in the Rideau Canal Waterway: Understanding fish behaviour at the invasion front". The Outstanding Mentor award was given to Krystal Athanassiou, Project Biology and Field Supervisor from Ontario Streams. Congratulations to the awards winners and thank you to all for your presentations, nominations, and to the judges for making these difficult decisions!

President-Elect Craig Paterson (left) presents the E. J. Crossman Award to Jordanna Bergman (right).

President-Elect Craig Paterson (left) presents the President's award to Jacob Burbank (right).

Our Keynote speaker was Dr. Brad Bass from Environment Canada and Climate Change Canada. Dr. Bass gave an excellent talk about the socio-economic cost of algal blooms on Lake Ontario. He analyzed two scenarios over 30 years, the cost of doing nothing and a policy intervention scenario. Dr. Bass made an excellent argument for why adaptive policy intervention and active restoration are so important for our economic welfare and environmental health. This topic is becoming increasingly important to communicate to our communities in our to preserve our environment and make it more resilient to the impacts of climate change.

Krystal Athanassiou (left) was presented with the Outstanding Mentor Award by Student Subunit Kawartha Regional Representative, Ashley Smith (right).

2020 AFS-OC AGM — *cont.*

The workshop for 2020 was hosted by Pete Davis from Lotek Wireless Fish and Wildlife Monitoring on a *Beginners Guide to Freshwater Telemetry*. In an action-packed hour, Pete's comprehensive overview took beginners and experienced biologists through the ins and outs of this technology leading to excellent discussions and knowledge sharing. Thank you to Pete for hosting this free workshop that gave us all a better understanding of this technology and how to utilize it in our work.

On Friday evening, a mentoring session and social was held that included a raffle to support the student subunit. As usual, this was a big success and allowed students and professionals, young and old, to share experiences and network. Thanks to all who contributed to this being a great evening.

Keynote speaker Dr. Brad Bass

AFS-OC Annual General Meetings

2021

On March 19th and 20th, we hosted our 2021 Annual General Meeting. For the first time, the pandemic situation required the establishment of a virtual platform to host the meeting and it was a great success. This year's conference theme was "Resilience: The importance of past, continuing and future explorations in Fisheries Science" and our great lineup of oral and poster presentations hit upon historical and contemporary, direct and indirect anthropogenic impacts on fisheries resources. In addition, we invited two Keynote speakers, as well as two speakers to discuss applied approaches in fisheries resource management.

Our Keynote speaker on day one was Dr. John M. Farrell, Professor and Director of Thousand Island Biological Station, SUNY College of Environmental Science and Forestry. Dr. Farrell's talk entitled "The Fish Ecology of Place on the St. Lawrence River: What Does Long-Term Research Say About Responses to a Changing Environment?" highlighted the importance of long-term monitoring programs for local biodiversity using the TIBS field station and targeted sampling indices to understand 'ecology of place'.

Our Keynote speaker on day two was Dr. Christina Semeniuk, Associate Professor at Great Lakes Institute for Environmental Research, University of Windsor. Dr. Semeniuk outlined an exciting new program to assist fisheries students in gaining valuable research and applied skills to complement academic research experience. Her talk "Introducing FishCAST: New NSERC CREATE-funded career-training program for students and postdoctoral fellows in fisheries management and conservation" led to a fruitful discussion, co-presented with Catherine Febria, Associate Professor at Great Lakes Institute for Environmental Research, University of Windsor. Topics of discussion surrounding the barriers students face transitioning between academic and industry career paths, support from fisheries community professionals, and even some potential project ideas and collaborations for future students.

Our Applied Talk speaker on day one was Christopher Pfohl, Senior Aquatic Ecologist with R.J. Burnside & Associates Limited who provided an overview of the Barefoot Box Culvert™ technology for stream restoration and some exciting results from a pilot study on thermal stability and critical habitat for Brook Trout.

Barb Elliot was awarded Outstanding Mentor.

Our Applied Talk speaker on day two was Justin Chan, A/Technical Development Coordinator for Fish Culture with Ontario Ministry of Natural Resources and Forestry who provdied a fascinating overview of the Normandale Fish Hatchery and associated stocking projects.

Finally, we attempted to recreate our mentorship event through a discussion among professionals and students, a component of the in-person AGM that could not be overlooked. Thanks to the generous donation from the Royal Ontario Museum, we

2021 AFS-OC AGM — *cont.*

Lindsay Potts (bottom) received the E.J. Crossman Award virtually from President-Elect Sarah Steele (top left) and President Craig Paterson (top right).

able to raffle three seats in the ROM Fish ID Workshop series to support students and early career professionals throughout the AGM.

The E.J. Crossman Award winner for best student presentation was Lindsay Potts (McGill University) for her talk entitled "Exploring the effects of elevated water temperature on the imperilled Pugnose Shiner". The President's Award winner for best student poster was Christian Therrien (University of Waterloo) for his poster entitled "Investigating the effects of Rainbow Smelt invasion on Lake Trout restoration in the Sudbury Basin". Congratulations to both Lindsay and Christian on your excellent presentations. Oral presentation abstracts are available in the 2021 AGM Program. Posters presented at the meeting are attached on following pages 7 to 9. The Student Mentor Award, presented by the American Fisheries Society Ontario Chapter Student Subunit, was awarded to Barbara Elliot (Fleming College) for her outstanding mentorship and support of students in fisheries science. Congratulations Barb and thank you for all your contributions to student success.

Christian Therrien (bottom) received the President's Award virtually from President-Elect Sarah Steele (top left) and President Craig Paterson (top right).

The virtual AGM was a huge success, and we thank all speakers and contributors that made this such a great event. Thank you to all who joined us, we worked hard to ensure the online platform was as smooth as possible and thank you for your patience as we corrected issues. Participation peaked at around 80 participants, and we also noted that approximately half of the registrants were non-members. Hopefully many will decide to become members after the event. If you missed the meeting, content will be available online shortly.

While we don't know what the future holds, we look forward to seeing you in person at next year's AGM; however we are confident we can host an even better virtual meeting if necessary. The Executive Committee looks forward to seeing you in February/March 2022!

2021 AFS-OC AGM — *Posters*

The Human Dimensions of the Shore-Based Shark Fishery in Florida, USA

Jessika D. Guay, Jill L. Brooks, Jacqueline M. Chapman, Hannah Medd, Steven J. Cooke, Vivian M. Nguyen
Carleton University | American Shark Conservancy

What is shore-based shark fishing (SBSF)?

SBSF is a relatively easily accessible and low-cost mode of recreational shark angling which may occur from beaches, piers, or bridges. Participation in this sport is observed in many countries (Australia, South Africa, Argentina, etc.) and seems to be increasing in popularity.

In Florida, anglers are required to obtain a shore-based shark fishing permit to participate, which is available to anyone over the age of 16 and requires the completion of an online course on best practices for shark fishing.

Significance of This Research

The characteristics of the shore-based shark fishery in Florida remain largely unknown due to a lack of research attention. With seemingly increased participation in recreational shark fishing, as well as the lack of research on the impacts of recreational fishing on coastal shark populations, understanding the angler characteristics can help inform the management of this fishery. Our study presents the first comprehensive profile of this fishery.

Methods

Survey Design

We designed a 40-question survey in Qualtrics XM investigating:

- Socio-demographics
- Fishing specialization
- Fishing preferences
- Fishing motivations
- Perceptions of shark conservation and management

Survey Target Sample and Timeline

The survey was sent via email to 10,990 anglers who held a shore-based shark fishing (SBSF) permit with the Florida Fish and Wildlife Commission (FWC).

- First contact: March 13th, 2020
- Second contact (reminder): April 2nd, 2020
- Survey close date: April 17th, 2020

Data Analysis

We performed an exploratory two-step cluster analysis in SPSS with nine fishing specialization variables to find distinct angler types among a continuum of fishing specialization.

Following this, we then compared the cluster variable to other variables in contingency tables, using a chi-square analysis to test for significant associations between angler profiles and socio-demographics, fishing preferences, motivations, and perceptions of shark conservation and management.

Survey Response Rate

Surveys received: 1895
Response rate: 17.2%
Active SBSF anglers (sample size) = 856

Specialization Variables Included in Cluster Analysis

1. Number of years spent fishing for any species
2. Number of years spent shark fishing
3. Number of days spent fishing for any species
4. Number of days spent shark fishing
5. Self-assessed skill level
6. Hours spent watching fishing videos (centrality to lifestyle)
7. Number of fishing club memberships (centrality to lifestyle
8. Shore-based shark fishing equipment expenses in one year
9. Number of sharks caught in one year

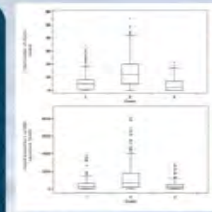
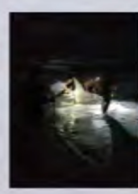


Figure 1: Representation of the differences in number of sharks caught and equipment expenses across the three angler profiles (Clusters: 1 = EIA, 2 = SFA, 3 = NIA)

Angler Typology

Novice Infrequent Anglers	Experienced Infrequent Anglers	Skilled Frequent Anglers
198 Anglers	271 Anglers	312 Anglers
Years targeting sharks: Less than 5 years	*Years targeting sharks:* 10 - 20+ years	*Years targeting sharks:* 1 - 20+ years
Frequency of SBSF: Less than once/month	*Frequency of SBSF:* Less than once/month	*Frequency of SBSF:* Daily to biweekly
Fishing skill level: Beginner/Intermediate	*Fishing skill level:* Intermediate/Advanced	*Fishing skill level:* Advanced/Professional
SBSF equipment expenses: $405.29 USD (+/- $565.03)	*SBSF equipment expenses:* $452.38 USD (+/- $647.23)	*SBSF equipment expenses:* $1305.24 USD (+/- 1643.34)
Number of sharks caught: 4 sharks (+/- 5)	*Number of sharks caught:* 7 sharks (+/- 8)	*Number of sharks caught:* 18 sharks (+/- 16)



Description of the Sample Population

Socio-demographics

- 94% Male
- 65% Florida residents
- Even distribution of anglers between the ages of 21 - 60 years.
- 41% hold a bachelor's or college degree
- 70% are employed full-time

Fishing Habits and Specialization

Most anglers...

- Began SBSF 1 - 5 years ago (40%)
- Ranked their fishing skill as intermediate or advanced (87%)
- Participate in SBSF only a few times a year (63%)
- Participate in SBSF in the evenings (48%)
- Participate in SBSF for 4 - 7 hours at a time (69%)

Economic Evaluation of the Fishery

- Total of $523,706.50 USD spent on SBSF equipment in 1 year (rod and tackle gear, fishing clothing, other) ($\bar{x}$ = $766.77)
  - Extrapolated to the full permit list = $7.8M USD
- Total of $305,391.75 USD spent on their last fishing trip of 21 days or less ($\bar{x}$ = $496.57)
  - Extrapolated to the full permit list = $34.4M USD

Top Motivators for SBSF

1) To be outside and by water (92%)
2) For the thrill of the catch (84%)
3) To relax (82%)

Preferred Target Species

1) Blacktip shark (*Carcharhinus limbatus*)
2) Bull Shark (*Carcharhinus leucas*)

Shark Conservation and Management

- 89% wish to learn more about shark survival post-release.
- 88% would change their fishing habits to help shark survival
- 60% do not believe more regulations are required.
- 85% believe commercial fishing negatively impacts shark populations.
- Only 25% believe recreational fishing negatively impacts shark populations

Shark Catches

Total of 9617 sharks caught in 1 year ($\bar{x}$= 11 sharks per angler)

Investigating the effects of rainbow smelt (*Osmerus mordax*) invasion on lake trout (*Salvelinus namaycush*) restoration in the Sudbury Basin

Christian Therrien[1], Heidi Swanson[1] & Bryan Neff[2]
[1]Department of Biology, University of Waterloo, Waterloo, ON, c3therrien@uwaterloo.ca
[2]Department of Biology, Western University, London, ON

Western University · Canada
University of Waterloo Department of Biology

Introduction

- Only ~30% of lake trout reintroduction programs have resulted in self-sustaining populations[1]
- Replacement of native forage base with rainbow smelt may affect reintroduction success[2]
- Smelt contain higher levels of dietary thiaminase (up to 100x) than native prey fishes[3] and consumption of smelt has been associated with thiamine deficiency complex (TDC)[3,4]

Figure 1. Sudbury angler with a net full of exotic rainbow smelt

- TDC may hinder reintroduction efforts for lake trout in smelt-invaded lakes, but current data are insufficient to assess this[2,4]
- The restoration of lake trout in acid-affected lakes in the Sudbury Basin provides an opportunity to assess the effects of smelt on lake trout restoration

Rainbow smelt, Edmonson and Crisp

Objectives and Hypotheses

O1. Compare prevalence of TDC in lake trout between lakes that do and do not contain smelt

O2. Determine if individual and population metrics differ between lakes that do and no not contain smelt

O3. Determine the relationship between dietary niche and tissue thiamine levels

H1. Prevalence of TDC will be greater in lakes with rainbow smelt

H2. Individual and population metrics will differ between lakes with and without smelt

H3. Lake trout dietary niche will influence tissue thiamine levels

Table 1. Individual performance and population metrics to be compared between lakes with and without smelt

Individual metrics	Population metrics
Condition	Length-at-age
Colouration	Catch per unit effort
Morphology	Mortality rate
Tissue thiamine concentration	Growth rate

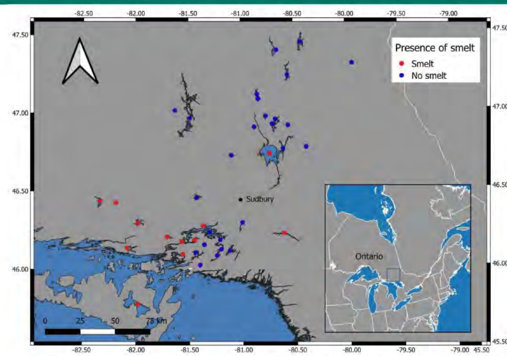


Figure 2. Study lakes with either smelt (red) or no smelt (blue) in the Sudbury Basin

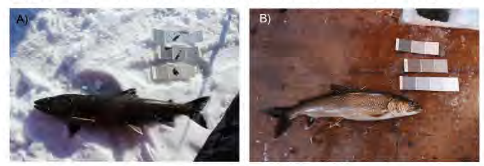


Figure 3. Lake trout captured from A) Wanapitei Lake (smelt) and B) Panache lake (no smelt)

Methods

- Broadscale monitoring survey data were collected from 2009–2019 for lake trout lakes with smelt (n = 12) and without smelt (n = 27)
- Population metrics, such as length-at-age and catch per unit effort, will be compared between lakes with and without smelt
- In summer 2021, n = 20 lake trout and prey items will be collected from a sample of lakes with (n = 6) and without (n = 6) smelt using summer profundal index sampling[5] and angling.
- Individual metrics will be collected for each lake trout
- Thiaminase activity will be measured for captured prey fishes[6] and compared between prey fishes within and between lakes
- Fatty acid signature analyses and stable isotope ($\delta^{13}C$ and $\delta^{15}N$) analyses will be used to elucidate prey contributions to diet and to quantify dietary niches[7,8]
- Liver and muscle total thiamine concentration will be determined using High Performance Liquid Chromatography[9]. Fish are considered to have TDC if thiamine levels are below ≤0.65 nmol • g^{-1}[10]. Prevalence of TDC will be measured as a proportion.
- Using glmms, individual metrics, population metrics, and prevalence of TDC will be compared between lakes with and without smelt
- The relationship between dietary niches and tissue thiamine levels of individual lake trout will be quantified using regression analyses

Significance

- Thiamine deficiency is identified as a factor causing population declines in several species[11]
- Lake trout are currently the focus of multiple multi-million dollar reintroduction programs[12]
- Results will contribute to the knowledge of best practices for species reintroductions and may identify factors influencing success of reintroduction programs for lake trout
- Findings will provide information for more effective and efficient restoration, management, and conservation.

Acknowledgements

- Tom Johnston and the OMNRF
- John Gunn and Laurentian U
- Swanson and Neff Labs
- Mike Thorn

Ontario NSERC CRSNG

More information available at

Christian Therrien @ciscokidoutdoors

References

1. Evans and Olver. 1995. J. Gt. Lakes. Res. 21:30–53.
2. Evans and Loftus. 1987. Can. J. Fish. Aquat. Sci. 44:249–266.
3. Tillit et al. 2005. J. Aquat. Anim. Health. 17:13–25
4. Futia et al. 2019. J. Gt. Lakes. Res. 45:934-948
5. Sandstrom and Lester. 2009. OMNRF Ver. 2009.1.22
6. Zajicek et al. 2005. J. Aquat. Anim. Health. 17:82–94
7. Mumby et al. 2018. J. Gt. Lakes. Res. 44: 1383–1392
8. Happel et al. 2020. Can. J. Fish. Aquat. Sci. 75: 95–105
9. Futia et al. 2019. J. Gt. Lakes. Res. 45: 811–820.
10. Vuorinen et al. 2002. ICES J. Mar. Sci. 58:480–496
11. Gilbert. 2018. PNAS 115:
12. Keller et al. 2018. Environ. Rev. doi:10.1139/er-2018-0018

2021 AFS-OC AGM — *Posters*

Diversity of Chars (*Salvelinus* spp.) in the Central Canadian Arctic

Spencer Y. Weinstein[1] ❖ Matthew C. Hale[2] ❖ Tracey N. Loewen[3] ❖ Heidi K. Swanson[1]
[1]*Department of Biology, University of Waterloo* ❖ [2]*Department of Biology, Texas Christian University* ❖ [3]*Fisheries and Oceans Canada*

Introduction

- Canadian Arctic is warming at ~3x global rate [1].
- *Salvelinus* fishes represent a critical subsistence food source in remote northern communities, and are especially vulnerable to climate-induced changes due to their life stage-specific use of multiple habitats [2,3].
- Mackenzie River is believed to be a boundary between Arctic char (ARCH) and Dolly Varden (DVCH; Figure 1; [4]). However, community reports and anecdotal scientific data suggest that Dolly Varden may be present in the Coppermine and Tree rivers, hundreds of kilometers east of their purported range [5].
- Project developed in response to community concerns: Coppermine River supports a subsistence Arctic char fishery – understanding the diversity of chars will help inform habitat restoration and management plans.

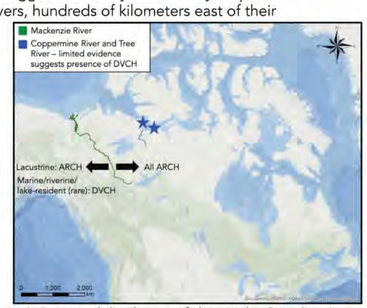


Figure 1: Purported distribution of chars in the Canadian Arctic.

Objectives

- To determine the species composition of *Salvelinus* fishes in the Coppermine and Tree rivers.
- To establish the extent of species introgression and hybridization in the Coppermine River.

Methods

Figure 2: Samples collected from:

- *Reference DVCH: Sashin Creek, AK, Stella Lake & Unnamed Creek, YT*
- *ARCH, DVCH, potential hybrids: Coppermine River, NU*
- *Purported DVCH: Tree River, NU*
- *Reference ARCH: Nauyuk Lake, Hope Bay, Sylvia Grinnell River, NU*

- 289 samples from across the Arctic (Figure 2) genotyped using 87K Arctic char SNP genotyping assay [6].
- Plink and STRUCTURE used to perform PCA and examine population structure and presence of hybrid individuals.

Results and Discussion

- 69,949 SNPs were retained for analysis after filtering for missing genotypes and minor allele frequency.
- Fish in the Tree River are distinct from both the reference Arctic char and Dolly Varden populations (Figure 3), and may be genetically similar to northern form Dolly Varden. Reference Dolly Varden populations shown here are all southern form (*S. m. lordi*), and future work includes genotyping northern form (*S. m. malma*) individuals.
- The Coppermine River appears to support Arctic char, Dolly Varden, and probable hybrid individuals (Figure 3). Future work will assess whether this variation is associated with differences in spawning and/or overwintering habitat. These data, as well as the Tree River data, suggest that the Mackenzie River is not as definitive a boundary as has long been believed.
- Preliminary analyses suggest that Arctic char in the Coppermine River have a similar population structure to the reference Arctic char populations (Figure 4, shown in green). While Coppermine River probable-Dolly Varden share some genetic similarities with the purported Tree River Dolly Varden, both groups also have genetic influence from elsewhere (Figure 4). This may, again, reflect similarity with northern form Dolly Varden.

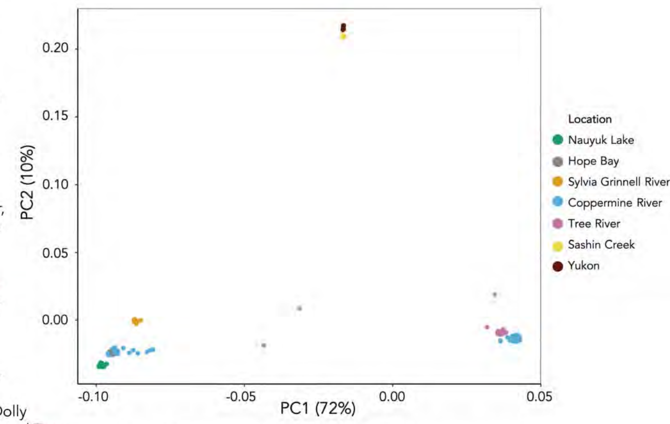


Figure 3: Principal Component Analysis of 289 Arctic char and Dolly Varden from across the Arctic. PC1 separates individuals by species or sub-species, while PC2 differentiates between glacial refugia.

- These data will contribute to the understanding of char diversity in the Canadian Arctic and will be used to inform a habitat management plan. Continued work will combine genomic data, morphometric and meristic analyses, and Traditional Knowledge to increase our understanding of the effects of climate change on a critical subsistence fishery.

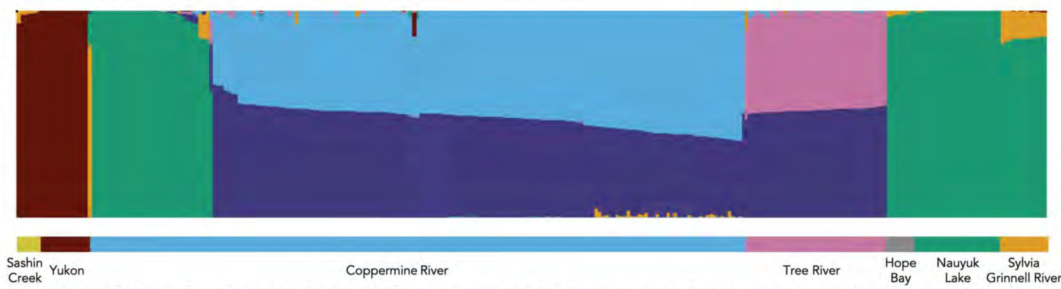


Figure 4: Preliminary Structure results for K = 6 for the 289 genotyped samples. Samples are grouped by location, moving geographically from west to east.

Acknowledgments

- Thank you to the Kugluktuk Hunters and Trappers Organization, especially Amanda Dumond, community members in Kugluktuk, and Rosie Smith and Kent Kristensen. Funding provided by: Vanier Canada Graduate Scholarship, Fisheries and Oceans Canada Coastal Restoration Fund, Indigenous Guardians Program, NSERC Northern Research Supplement.

References

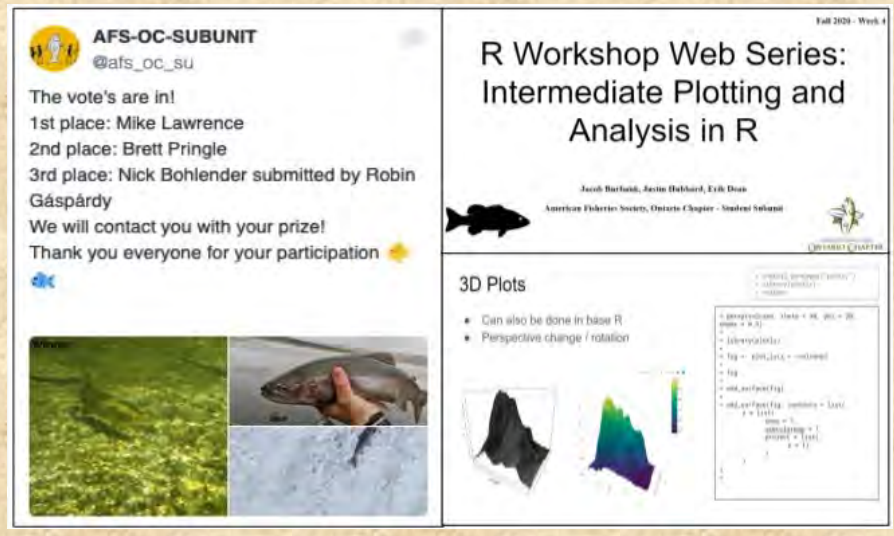
[1] Bush, E. and Lemmen, D.S., editors (2019): Canada's Changing Climate Report; Government of Canada, Ottawa, ON.
[2] Prno, J., B. Bradshaw, J. Wandel, T. Pearce, B. Smit, and L. Tozer. 2011. Community vulnerability to climate change in the context of other exposure-sensitivities in Kugluktuk, Nunavut. Polar Research 30(1):7363.
[3] Reist, J.D., F.J. Wrona, T.D. Prowse, M. Power, J.B. Dempson, R.J. Beamish, J.R. King, T.J. Carmichael, and C.D. Sawatzky. 2006. General effects of climate change on Arctic fishes and fish populations. Ambio: A Journal of the Human Environment 35(7):370-381.
[4] Reist, J. 1989. Genetic structuring of allopatric populations and sympatric life history types of charr, *Salvelinus alpinus/malma*, in the western Arctic, Canada. Physiology and Ecology Japan, Special 1:405-420.
[5] Reist J.D., Sawatzky C.D. 2010. Diversity and distribution of chars, genus Salvelinus, in northwestern North America in the context of northern Dolly Varden (Salvelinus malma malma (Walbaum 1792)). Fisheries and Oceans Canada, Science.
[6] Nugent, C.M., J.S. Leong, K.A. Christensen, E.B. Rondeau, M.K. Brachmann, A.A. Easton, C.L. Ouellet-Fagg, M.T. Crown, W.S. Davidson, and B.F. Koop. 2019. Design and characterization of an 87K SNP genotyping array for Arctic charr (*Salvelinus alpinus*). PloS One 14(4):e0215008.

AFS-OC Student Subunit

Looking back, from our current position in a virtual world, we can reflect on our 2020 AGM with gratefulness since we had the opportunity to gather in-person for such an enriching event!

A big shout out to the current acting members of the student subunit, Jacob Burbank, Britney Firth, Ashley Smith, and Peter Holder for their commitment to reworking subunit plans through the ebbs and flows of a global pandemic.

Keeping our focus of community in mind, the subunit hosted an entertaining fish themed photo contest on our Twitter and Instagram accounts (@afs_oc_su) to bring more feesh to our feeds. Next up was our 4th annual fall Student Success Workshop. This year our event went online through a zoom weekly web series in R. Hosts Jacob Burbank, Justin Hubbard, and Erik Dean, led 63 participants through provided code that illustrates introductory data analysis and plotting in R. Each weekly event wrapped up with post-session discussions and offered participants a space to connect.



Each year the student subunit sponsors an award for mentoring a student or early career professional who is a member of the Ontario Chapter. This award recognizes those that go above and beyond student mentorship, and acknowledges the support provided to facilitate continuing education. At this year's 2021 virtual AGM, we were delighted to recognize Barbara Elliot, Professor, Ecosystems Management Program, Fleming College, as the recipient of the 2021 Outstanding Mentor Award. Barb is recognized for going above and beyond to mentor hundreds of students, who have all benefited from her guidance, positivity, and passion. On behalf of those students, thank you!

AFS-OC Subunit — *cont.*

The student subunit is currently planning a tech bursary intended for underrepresented individuals. Although visual representation does not address systemic issues, the subunit is committed to highlighting the work of underrepresented individuals. This bursary will provide individuals with funds intended for photography equipment or editing software. The recipient(s) of this bursary will be asked to provide photos or a short video highlighting their research and experiences for our social media accounts.

Make sure to follow @afs_oc_su on Twitter and Instagram where we will keep you up to date on our planned bursary and events including virtual trivia, logo design competition, and a summer catch-and-release event!

Alice Abrams

President AFS-OC Student Subunit

afsocsu@gmail.com

AFS-OC Film Screening

On April 28th at 7 p.m. (EDT) join us for a screening of the film Hidden Rivers.

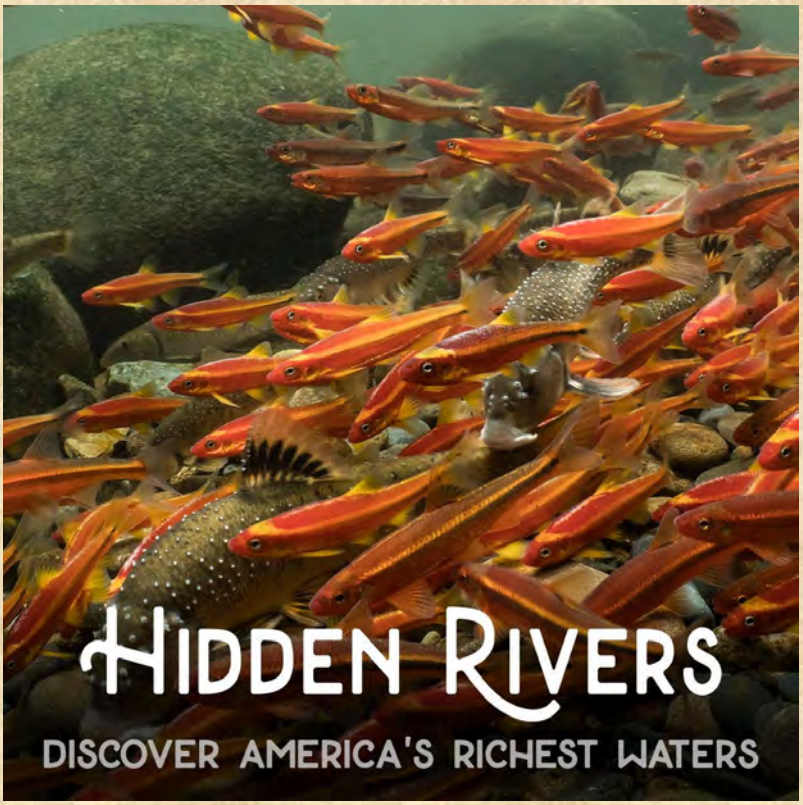
Hidden Rivers is a 1-hour film that explores the rivers and streams of the Southern Appalachian region, North America's most biologically rich waters. The film follows the work of conservation biologists and explorers throughout the region - revealing both the beauty and vulnerability of this aquatic life - and how many people are finding ways to protect these ecosystems.

Film trailer:

https://vimeo.com/66103145

Website: www.hiddenrivers.org

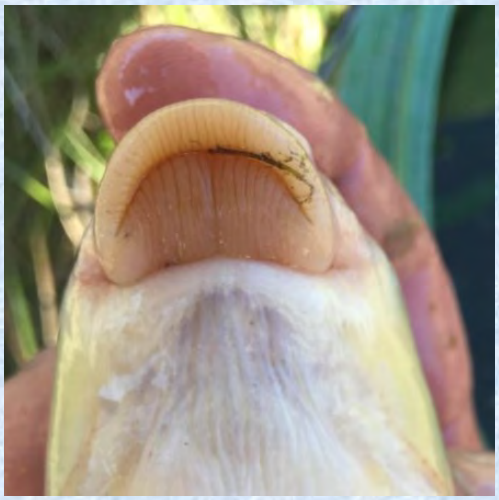
This event is free for members and $10 for non-members. Register at the Online Store.



Fish Focus: GOLDEN REDHORSE *(Moxostoma erythrurum)*

By Siobhan Ewert

The Golden Redhorse is a *Moxostoma* (redhorse) species in the Catostomidae (sucker) family. The Golden Redhorse has populations throughout Ontario and Manitoba in Canada, and the mid-western, southern, and eastern United States. They prefer bottoms of warm streams with moderate flow and their diet consists of mollusks, aquatic insects, detritus, and aquatic plants.



Golden Redhorses spawn in late spring when the water temperature reaches 15°C. This temperature is later than some of the other Redhorse species, but earlier than the River Redhorse, that spawns at 18°C. Spawning males develop nuptial tubercles on the head, fins, and body. The most prominent tubercles occur on the head, anal fin, and lower lobe of the caudal fin. Female Golden Redhorses may develop tiny nuptial tubercles.

Similar species include all members of the sucker family, more specifically the Redhorse suckers (Black Redhorse, Greater Redhorse, River Redhorse, Shorthead Redhorse and Silver Redhorse).

Key identification features of the Golden Redhorse include:

- Ridges of the lips are not usually broken by transverse grooves.
- Angle of the posterior edge of the lower lip is considerably greater than 90 degrees when the mouth is closed.
- Large scales (37-42 lateral line scales).
- The edge of the dorsal fin is concave.
- There are 12-13 scales around the narrowest part of the caudal peduncle.

April 2021
Volume 19, Issue 1
American Fisheries Society—Ontario Chapter

Anishinabek News

the LATERAL line

The secrets of the Mnjikaning Fish Weirs

By Laurie LeClair

Previously published in anishinabeknews.ca

Methods of fishing practised by the Indians—After De Bry.

Taken from a 17th Century lithograph from the 29th Annual Archaeological Report, Appendix to the Report of the Minister of Education. Toronto: King's Printer, 1917.

Mii dash geget Nenabozhoo maajitaad ozhi'aad biinjiboonaaganan, gichi-mitigoon odayaawaajinigaanaan, waasa gaye odoondaawanaan, wii-zoongitood obiinjiboonaaganan. Mii dash gaa-giizhi'aad wi-indamawaad ookomisan, mii dash e-naad, "Mii nookomis, gii-giizhi'ag biinjiboonaagan, mii dash giigoonh ji-amwad," odinaan ook-omisan.

"Eye," ikido mindimooye.

And then truly did Nenabozhoo begin making his fish-traps, huge logs he carried on his shoulders, and from afar he carried them on his back, (for) he wanted to make his traps strong. And then after he had finished them he notified his grandmother, and this he said to her: "There, my grandmother, have I finished the fish-traps, and now some fish will you eat," he (thus) said to his grandmother.

"Ay," said the old woman.

From Nenabozhoo and the Fish Trap (William Jones, 1917, Ojib-wa Texts, E.J. Brill, Ltd, Publish-ers and Printers Leyden, NY, p. 436 – 445, this story and all An-ishinaabemowin words courtesy of Alan Corbiere, M'Chigeeng First Nation).

One fall day, two thousand years ago a young family left their home at Cahiagué near modern day Orillia to go to their ancestral fish-ing camp. This was a special place for them be-cause they would meet up with their extended family and friends, many of whom they had not seen since the springtime. Once reunited, the men would travel the short dis-tance to Mitche-kun-ing, the an-cient fishing weir at the narrows where lakes Oentaron and Couchiching meet. The fishery was special too. It had always been there. The fish were called there, and if treated with respect, would offer themselves up to the nets. The women and the children would stay behind. Beginning with the first catch, the little ones amused themselves making toys and throwing bits of clay into the cool water as their mothers chat-ted and worked at cleaning and smoking the fish, or repairing the nets and generally preparing for the long winter ahead. Through-out all their activities they were careful not to throw any fish bones onto the fire as such an action was disrespectful and could jeopardize their next catch.

Moving 1600 years forward to an-other fall day, Samuel de Cham-plain visited Cahiagué, now the biggest of all the villages in the area, containing two hundred large lodges and surrounded by a wooden palisade. It is here, on September 1, 1615 that he and his entourage travelled to Mitche-kun-ing. Champlain recorded the fishing place in his diary and this disappointingly brief entry remains the earliest written account of the ancient weirs:

When the most part of our people were assembled, we set out from the village on the first day of Sep-tember and passed along the shore of a small lake [Couchiching] distant from the said village three leagues, where they make great catches of fish which they preserve for the win-ter. There is another lake immedi-ately adjoining [Lake Simcoe] which is twenty-six leagues in cir-cumference, draining into the small one by a strait [the Narrows] where the great catch of fish takes place by means of a num-ber of weirs which almost close the strait, leaving only small open-ings where they set their nets into the Freshwater Sea [Lake Huron]. Although it escaped Champlain's description, the French explorer would have noticed that bits of

brush, twigs and wattle were woven between the stakes to create an impregnable fence. At the time of contact with Europeans, weirs and fish traps were the commonest forms of communal fisheries and when Champlain witnessed the one at Mitche-kun-ing, weirs had become the most efficient technique in indigenous fisheries. Here the fish were so plentiful that Champlain, with the help of the community was able to gather enough shigan [bass], kewis [herring] and maazhginoozhe [musky] within a little over a week to sustain an estimated 2,200 warriors for a planned raid into the interior against the Iroquois. When the people of Cahiagué welcomed a wounded Champlain back in December 1615 no one would have anticipated that within a generation their thriving village would be disrupted by the trade wars with the Iroquois that swept across the lower Great Lakes area.

Following the Great Peace of 1701 held between the Anishinaabeg and the Haudenosaunee these ancient and rich fishing grounds were reinhabited by the former, who reestablished communities along ancient Lake Shining, called by the French Lac La Clie, (lake of the Hurdles or lake of the Fences)-and later by the English name Lake Simcoe. In 1917, Rama Elders recounting what they had been told about Mitche-kun-ing, or place of the fish fence, believed the site was ancient and it was their responsibility to maintain it. In fact, according to a recent oral history, Anishinaabe had learned about the weirs prior to the Beaver Wars. One Elder told Mark Douglas, a citizen of Chippewas of Rama First Nation:

As our people journeyed outward from the Great Falls, we discovered the Huron Nation fishing at the narrows. We spent considerable time with the Hurons learning all the techniques. We stayed long enough to gain the Huron's trust and we were given gifts symbolizing our new relations…. [After several winters] the Anishinabek decided that we should continue to move westward seeking the place where the food grew on top of the water [wild rice].

In order to initiate the improvements necessary for the Trent Severn Waterway, a second channel running north of the original channel at the Narrows was dredged out in 1857. The best preserved of the ancient weirs can be found in the original channel which only has a depth of about two to three meters. Improvements to the marina and docks and an increased use of the area by sport fishermen led to further destruction.

Ironically, the threat of the weirs' impending ruin sparked curiosity and interested parties were compelled to both undertake studies and to lobby for preservation. Archaeologist Walter Kenyon from the Royal Ontario Museum led the first archaeological investigation in 1966. Using SCUBA divers he attempted to plot out the stakes, which at the time appeared numerous. Unfortunately, his survey was discontinued and the project itself of limited use, but it did raise awareness of the site among non-Anishinaabeg communities. In 1973, two archaeologists from Trent University, Richard B. Johnston and Kenneth A. Cassavoy conducted an underwater study of the remnants of the weirs, by now appearing as stubs sticking about an inch or two above the silty river bottom. They sent samples of a few of the stakes for radiocarbon testing. Cassaway hoped that the results would be old enough to link this site with the Champlain visit. He was unprepared for the news he received that one of the stakes dated back to 2610 BC, or roughly the same time that the Great Sphinx and the Great Pyramids at Giza were built.

Johnston and Cassavoy were also able to map out the remaining stakes and determine a rough pattern to their design. Ancient engineers planned the structure at a narrower, deeper section where the water was faster, located just outside of the bend of the original channel. At the bottom of the weirs they designed a rock path about 15 feet wide to stand on to enable the fishermen to place traps and nets across the weirs' outlet at its north end without sinking into the mud. Studying the placement of the stakes the archeologists determined that one set of stakes was designed to catch fish swimming with the current towards warm and shallow Lake Couchiching while another set orientated on a diagonal in a northwest-southwest direction caught the fish which swam upstream toward colder and deeper Lake Simcoe. Radiocarbon dating confirmed that the two weirs were built at the same time and repaired over the centuries, usually in the spring and fall. Tests also

Anishinabek News — *cont.*

showed that the stakes were made from wood species including:

Wiigwaas [Paper birch]
Azhawemizh [Beech]
Niib [Elm]
Ninaatig [Maple]
Giizhig [White cedar]
Bwaayaak [White Ash]
Ookweminaatig [Black Cherry]
Maan'noons [Ironwood]

Johnston and Cassaway were able to map out a total of 535 stakes ranging in size from 1.5 to 3 inches in diameter, most being about 1.5 inches.

In 1982 the Mnjikaning Fish Weirs became a National Historic Site because of its unique historical and spiritual significance. These structures form the largest and best-preserved wooden fishing weirs known in Canada. Also, the site honours an ancient stewardship beginning thousands of years before the Huron-Wendat assumed the role, and continues on today with the Anishinaabeg. Moreover, it is considered a sacred place representing an ancient yet present spiritual bond between the Creator and all living things. But in 1990's the weirs came under a new threat. Increased motor traffic enroute to Casino Rama and further north into cottage country called for an expanded bridge along Highway 12. Mitigation archaeology was necessary because a large percentage of the better-preserved stakes could be found under this bridge and were therefore threatened. Led by Parks Canada archaeologists, an in situ examination was completed and then 137 stakes were removed for conservation and study. The controversial nature of this action together with the need for inter-community engagement led to the founding of the Mnjikaning Fish Fence Circle in 1993. Incorporated in 1996, the MFFC has a three-part mandate focusing on preservation, protection and education.

The Parks Canada excavation confirmed much of the findings and theories set out by Johnston and Cassavoy. It also arrived at an interesting discovery. Eleven of the sample stakes appeared to have been sharpened with an axe or some sort of modern metal tool. When submitted to radiocarbon testing these stakes were given a series of dates ranging from AD 1450 to 1615. In the words of a marine archeologist who worked on the site:

The dates present a problem when considered with the method used to sharpen the stakes. Although fitting within the Huron period, most of the dates are far too early to correspond to what is known about the introduction of metal tools in this area. It appears that, through some unknown phenomenon, the structure is dating to somewhat older than it should actually be.

After 4,000 years the Mnjikaning Fish Weirs still hasn't given up all of its secrets.

Laurie LeClair has worked as an archaeologist, historian and technical writer for over 25 years. Since 2007 she has been a treaty researcher for Union of Ontario Indians and is also a regular contributor to Anishinabek News. She lives with her husband and son in Toronto. .

We're Social!

Want to keep up-to-date on the latest news and goings-on from your chapter members? Follow us on Facebook, Twitter (@afs_oc) and Instagram (@afs_ontariochapter). You can tag the group and we'll reshare the story on the chapter account. Or, you can also send pictures and descriptions of your activities, and we'll post directly (email: social-media@afs-oc.org). This is a great way to share fun and educational tidbits so that we can learn more from each other.

Did you know that many useful resources are available online? Check out the AFS-OC Links page to peruse fishes archives and information, government links, online books/journals/publications, organizations/associations, software/apps, and AFS social networks.

April 2021
Volume 19, Issue 1
American Fisheries Society—Ontario Chapter

Series: Fish Species Complexity — Highlighting Diversity in Ontario

A Tale of Two Rivers: it was the age of wisdom, it was the age of foolishness

Brian Morrison (brianmorrison@trentu.ca) | Fisheries Biologist

When examining how fisheries are managed within Ontario, there is a clear contrast in philosophies. One helps facilitate a faith in nature, which allows processes to unfold naturally. In this instance, it is allowing Chinook Salmon and Coho Salmon to migrate upstream and spawn naturally, facilitating naturalized (wild) populations. The other approach is technology-driven, built upon a belief that humans can improve on nature. The technological driver is fish culture (hatcheries). The latter posits that we can create more fish than nature can. Superficially, this belief seems sound. High natural mortality is circumvented, allowing more fish to survive and contribute to the fishery. However, this practice has largely failed to live up to its expectations since the initial concept surfaced over 150 years ago. Additionally, there are no benchmarks for success within any fish hatchery program in Ontario.The only indicator of success is the total number of fish stocked, which is analogous to only quantifying how much money one invests, without measuring the return on investment.

A local example of this can be observed comparing two Lake Ontario watersheds, the Ganaraska River and the Credit River (Figure 1). The Ganaraska River is a 278 km^2 watershed that allows for natural movement and reproduction of both Chinook and Coho Salmon; no stocking of either species occurs. Abundances of each species have been collected at Corbett's Dam since 2017, thanks to the Lake Ontario Management Unit and their Riverwatcher camera. Salmon that are able to pass upstream of Corbett's Dam only have access to approximately half the watershed due to existing dams and culverts that do not facilitate upstream fish passage. The Credit River watershed is over three times larger, at 871 km^2. The Credit River has largely been managed for hatchery production, with Chinook and Coho typically being stopped at the first dam (Streetsville Dam). The exceptions were in 2018 when partial upstream passage through the Streetsville fishway was allowed, and in 2019 when both species were fully allowed to pass upstream (though they are always blocked at Norval Dam). Streetsville Dam also had a Riverwatcher camera installed which was operational for part of 2018 and all of 2019 migration. This allows us to compare runs sizes of a fully wild river with a hatchery-dominated river, where in both cases these species have to pass by a camera in a fishway to access spawning habitat. When contrasting these two watersheds, we can see significant differences in run sizes between them, with the Ganaraska River consistently having larger runs of both species (Figures 2, 3).

Figure 1. Credit River and Ganaraska River watersheds.

The Credit River has received an annual stocking average of 44,075 Coho Salmon fall fingerlings (range 36,000 – 50,000) between 2015-2018[1]. Adult Coho Salmon returns past the

A tale of Two Rivers — *cont.*

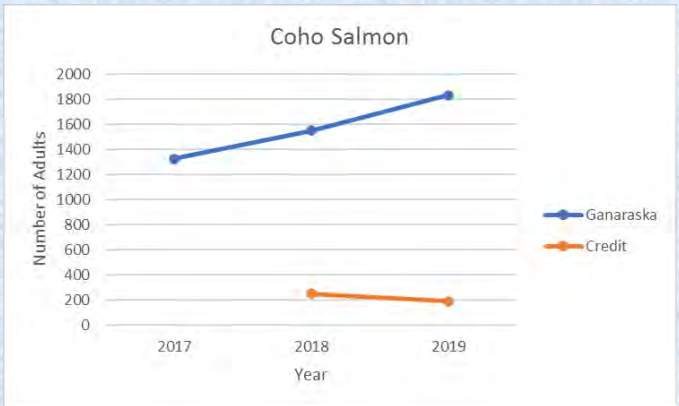


Figure 2. Run sizes for Coho Salmon in the Ganaraska River (wild) and the Credit River (hatchery).

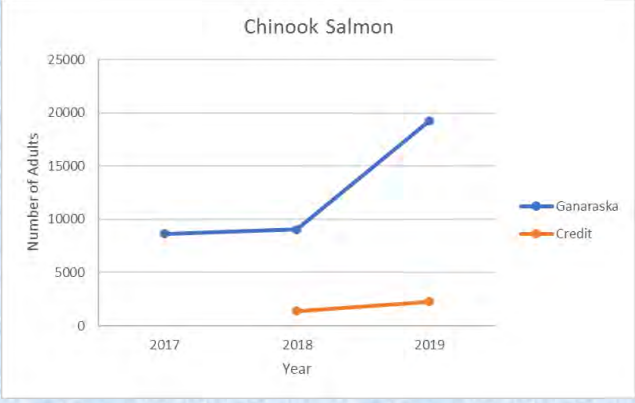


Figure 3. Run sizes for Chinook Salmon in the Ganaraska River (wild) and the Credit River (hatchery).

Streetsville camera revealed an average of 222 hatchery and wild adults returning (253 in 2018, 190 in 2019)[1]. The estimated survival of stocked fish was therefore 0.5% and 0.19% for 2018 and 2019, respectively based on adipose clipped adults (indicating hatchery origin). Despite management actions not supporting wild reproduction in the Credit River, 5% and 2% of adult returns in 2018 and 2019 respectively were of wild origin. Based upon fish community sampling by Credit Valley Conservation, wild juvenile Coho Salmon are found in numerous locations (e.g. Huttonville Creek, Credit River trib #4) when adults bypass Streetsville Dam on their own, indicating the habitat is capable of supporting natural reproduction (in one instance, 174 juveniles were found at just one 66 meter long site in 2007)[2]. In contrast, wild Coho Salmon returns on the Ganaraska River averaged 1,570 adults (range 1,325 – 1,834) between 2017-2019[1]. The Ganaraska saw on average 7 -fold more adults returning than the Credit, despite it being a watershed that is 3-fold smaller, because these fish had access to some quality spawning and juvenile rearing habitat.

An average of 139,939 (range 95,037 – 165,663) Chinook Salmon spring fingerlings were stocked into the Credit River (and its mouth at Port Credit) between 2015-2019 that resulted from eggs collected from adults in the Credit River and the Ganaraska River[1]. The latter required collecting (mining) gametes from the wild Ganaraska population to stock them in the Credit River (the idea was to diversify the fishery, as the Ganaraska wild adults return earlier than the Credit hatchery adults). The Credit River had an average of 1,841 hatchery and wild adults return (1,390 in 2018, 2,291 in 2019) [1]. Combined estimates of survival for both strains of stocked fingerling to adult returns were 1.46% and 1.45% for 2018 and 2019, respectively. When looking just at the Ganaraska strain, the return was 0.34% in 2019, showing poor performance. It was not possible to know how many wild Chinook Salmon returned because not all hatchery origin fish had an adipose fin clip. The author has observed wild young-of-the-year Chinook Salmon in both the mainstem below and above Streetsville Dam, as well as in several tributaries indicating the watershed can support wild reproduction. Wild Chinook Salmon returns on the Ganaraska River averaged 12,320 adults (range 8,646 – 19,247) between 2017-2019. The Ganaraska River had on average almost a 7-fold increase in adults returning when compared to the Credit. As an additional contrast, the Salmon River, NY, which is similar in watershed size to the Credit River may have tens of millions of wild Chinook Salmon juveniles produced in a year and have 80,000 to 100,000 wild Chinook Salmon return as adults[3]. There is little reason to believe, if given access to suitable spawning and juvenile habitats, the Credit River wouldn't significantly improve the wild portion of adults that return to the river.

The idea that hatchery production

A Tale of Two RIvers — *cont.*

is necessary to create a fishery is not borne out in the available data. What is necessary is that the fish have access to spawning habitat. When one also considers the financial cost of these hatchery programs (both public and private funding, and significant volunteer in-kind contributions), it seems a prudent management action would be to work to develop naturalized (wild) populations within the Credit River. The costs per returning adult for hatchery programs when assessed is often strikingly high. For example, one hatchery in Minnesota supporting Rainbow Trout/steelhead ranged from $60 to almost $400 per returning steelhead to the fishery[4]. These costs to maintain fisheries are hardly sustainable, and at the high end of the spectrum equate to the cost of over 10 annual sports fishing licenses for one returning fish to the fishery. The MNRF has largely ignored the management and support of natural reproduction of these two species, as outlined in both the Fish Community Objectives for Lake Ontario 2017 and Stocking Strategy for the Canadian Waters of Lake Ontario 2015. Placing greater emphasis on wild reproduction would enhance the fishery within the Credit River, as well as the Ontario portion of Lake Ontario's popular recreational salmonid fishery.

References

1. Lake Ontario Unit Annual Reports (http://www.glfc.org/loc_mgmt_unit/)

2. Credit Valley Conservation – Integrated Watershed Monitoring Program – unpublished data

3. NYDEC – Lake Ontario Fisheries Unit Reports (https://www.dec.ny.gov/outdoor/27068.html)

4. Schreiner, D.R., and T.S. Jones. 1997. Steelhead management in Minnesota: what path do we take, in Fish: to stock or not to stock. NWST Workshop Proceedings. MNR.

Walleye Technical Committee

William Gardner attended the Joint Winter Business Meeting of the Centrarchid (CTC), Esocid (ETC), and Walleye (WTC) Technical Committees on Monday, Feb. 1, 2021 at 10:45 AM – 12:30 PM Central. This meeting was held virtually as part of the 2021 Midwest Fish and Wildlife Conference. After initial introductions of the 3 Chairs of the committees: CTC, ETC and WTC, the discussion focused on adopting the minutes from the summer 2020 joint virtual meeting of the 3 committees and the planning for the live 2021 joint meeting of the 3 committees. Gardner did not attend the Summer 2020 meeting as he was conducting field work on the day in question. We then separated into 3 breakout rooms, 1 for each committee, and the WTC committee began the meeting with a presentation from the Treasurer. A discussion then began about the upcoming North American Journal of Fisheries Management special publication on Percids. This discussion occupied most of the time. A number of AFS chapters have made donations to the WTC towards this publication. We then discussed the recent publication of John Bruner's research on the inappropriate use of *Sander* as the genus for Walleye. His contention is that the name should still be *Stizostedium*. The names of Fishes committee of the AFS/American Society of Ichthyologists and Herptologists (ASIH) will have to review his finding and if they agree it will be adopted with the next edition of Names of Fishes. The meeting ended at 11:45 AM (Central time).

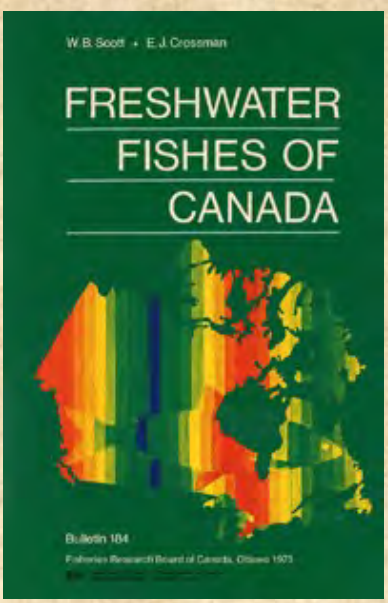
The E.J. Crossman Award: Looking Back and Reconnecting with Awardees

By Warren Dunlop

It's been more than fifteen years since the inaugural E.J. Crossman Award was presented in 2004, and it seems like a good time to take another look back. When Dr. Edwin J. Crossman passed away suddenly in December of 2003, it shocked and saddened fisheries people across Canada. In remembrance of Dr. Crossman (pictured to the right), the Ontario Chapter of the American Fisheries Society (AFS-OC) created the E.J. Crossman Award for the Best Student Oral Presentation at the Ontario Chapter Annual General Meeting (AGM).

The award is intended to encourage participation at an American Fisheries Society (AFS) event. Eligibility for the award is open to graduate or undergraduate students enrolled at a university or college. The award includes financial travel support to attend a scientific meeting, a one-year student membership to the AFS and the AFS-OC, and a copy of Scott and Crossman's Freshwater Fishes of Canada.

The Award has been presented sixteen times over the years, usually at the AFS-OC AGM. In 2008, the year that Ontario hosted the American Fisheries Society meeting in Ottawa, the award was presented at a special E.J. Crossman Award Symposium. No award was presented in 2009, when the AFS-OC held a joint annual meeting with the Wisconsin and Minnesota Chapters in Duluth, Minnesota. Likewise, there was no award in 2014 when the AFS-OC AGM was held in conjunction with the AFS meeting in Quebec City. This year, due to the global COVID-19 pandemic, the award was presented virtually during AFS-OC's first online AGM.



As someone who has been recruited to help judge student posters and oral presentations at the AFS-OC Annual Meetings, I can attest to the high quality of the presentations and enthusiasm of the presenters. The final decision is never an easy one.

I thought it would be interesting to try to reconnect with awardees to find out where they are now, what they are up to, and what motivates them. I also wanted to hear their perspectives on the AFS-OC, the E.J. Crossman Award, and any lessons they've learned as they've navigated their career paths. I hope you will find their stories interesting and informative (I certainly have!); and I hope current students and early career professionals will perhaps find some guidance as they figure out their own paths.

This is the second article that profiles the E.J. Crossman Award winners. I hope to connect with more recipients for the next issue.

Dr. Lee Gutowsky – E.J. Crossman Award Winner 2013

Lee was in the midst of his PhD studies in the Cooke Lab at Carleton University when he presented his talk entitled "Smartphones and digital tablets: Emerging tools for data collection and education in fisheries" at the 2013 AFS-OC AGM. He marvels just how far smartphone and other tablet technology has evolved since then. For instance, many devices today are equipped with Lidar, which makes it possible to accurately take measurements in the field.

Lee undertook a research assistant/post-doc placement for about one year after winning the E.J. Crossman Award. During that period, Lee was also Student Subunit President (2011-14) and continued serving the Chapter on the ExComm, including as AFS-OC President from 2015-16. Lee feels that the AFS-OC AGM is a terrific outlet which attracts a variety of professionals and students. It's a small venue where it can be rewarding to present to a relatively broad-audience. Lee says, "Engagement at the AFS-OC AGM tends to be second-to-none."

Of the award, Lee feels it's important to recognize achievements, though not necessarily just for the one being recognized. Recognizing an outstanding talk helps others see what it takes. Because the AFS-OC Crossman Award is presented at the AGM, the small venue means that most students will see all the talks, including the winner's. His advice for attending the AGM: "be prepared to meet lots of people. If you present, be sure to practice your talk, include lots of pictures, make sure the message is clear, and leave time for questions."

Lee brings both strong technical and academic backgrounds to his current position as an Aquatic Research Biologist with the Ontario Ministry of Natural Resources and Forestry in Peterborough. He completed diplomas in the Aquaculture Technician and Ecosystem Management Technician/Technologist programs at Fleming College where hands-on learning was key. After that, he completed a BSc. and MSc. in the Biology Department at Trent University where he learned the importance of applying the scientific method. Lee indicates that his job involves "wearing a number of hats" but most often he's analysing fisheries data. He stays engaged by working on a variety of fisheries research projects both directly and indirectly, and he continues to collaborate with former colleagues from Carleton and Trent.

Teaching has also been a big part of Lee's career development. In addition to teaching assistantship duties during graduate school, Lee has been an instructor for seminar, lab, statistics, and field courses at Fleming College, and Carleton and Trent Universities. He has tried to bring the same philosophy to teaching and mentorship that he learned during his own education. Lee currently holds Adjunct Professor status at Trent where he mentors undergraduate and graduate students.

He observes that, "Mentors certainly have a role in career success. In my experience a good mentor is one who leads by example, opens doors but doesn't push you through them, is willing to be real with you, and shows you how to think independently." He notes that mentors don't necessarily have to be older than you. "I've had many good mentors, some much older and some my own age."

Although his path to his current position was relatively direct, it was not without the stress that many young professionals face as they begin their careers. "Learning the arts of patience and perseverance are two of the most important lessons that I've learned to-date," says Lee. And, perhaps as a way of dealing with stress, he enjoys getting out onto the water whenever there's time to spare!

Connect with Lee via email or Twitter, or visit his ResearchGate page.

Dr. Paul Venturelli - E.J. Crossman Award Winner 2008

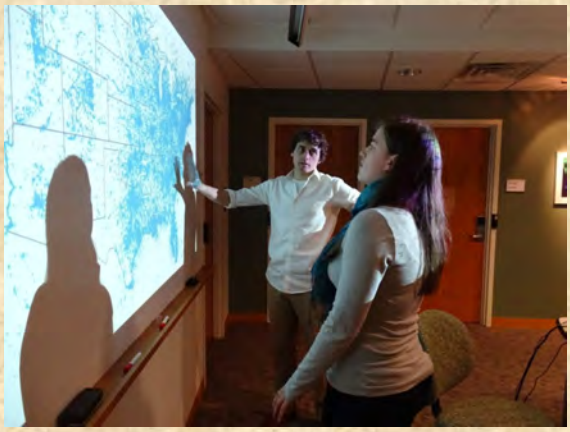
Paul Venturelli can't quite remember what motivated him to join AFS-OC and present at the AGM, although he thinks he was "probably encouraged by a mentor". He must have received positive encouragement, because he kept coming back after a disappointing inaugural visit in 2005, when he was "a little offended" that a reviewer questioned the need for his research. His reviews were more positive in 2006, and he was finally successful amid stiff competition in 2008 when he presented "Maternal quality and the sustainability of exploited fish stocks".

The copy of Scott and Crossman that was included as part of the award is getting a lot of use these days by the undergraduate and graduate students in his research seminar course. That course is offered by the Department of Biology at Ball State University in Muncie, Indiana, where Paul is an Associate Professor of Fisheries Science, and Director of the Environmental Sciences PhD program. Students are working with a sister team in Europe to extend a database of the early life history of fishes (and eventually integrate it with FishBase). He has been engaged in teaching (Biostatistics, Ecology, Fisheries Management, and Limnology - depending on the year/semester) and (mostly) inland recreational fisheries research since arriving at Ball State in August 2017.

After completing his PhD at the University of Toronto, and prior to joining the faculty at Ball State, Paul worked as a modeller for Fisheries and Oceans Canada, and completed a two-year post-doc with Kenny Rose at Louisiana State University (now at the University of Maryland) focused on individual-based modeling of coastal wetland food webs. He then joined the Department of Fisheries, Wildlife, and Conservation Biology at the University of Minnesota (UMN).

Paul was Assistant and then Associate professor at UMN for 6 years before transitioning to Ball State to support his wife's career. They are both academics, but struggled to find something for her in the Twin Cities. Fortunately, Ball State's biology department advertised two, tenure-line positions in their respective sub-disciplines. "What are the chances?" says Paul. They applied separately, identified each other in their cover letters, and were both offered the positions. Jessica Ward is now an Assistant Professor of Animal Behaviour in Ball State's biology department. "I can't tell you how great it is to work in a department and at an institution that values couples", he enthused.

Paul places a high importance on mentorship. He was fortunate to have excellent mentors at each step of his studies, and he tries to model their collective behaviour in his lab. His experience is that most prospective graduate students underestimate the role that a mentor plays in shaping their graduate experience and eventual careers, in the same way that casual observers of team sports often underestimate the role of a coach. "The school or program matter less than you think", he says. "Put in the time to find a mentor who can offer a project that you will both be passionate about, has a style and personality that brings out the best in you, and will prepare you for the next step of your career." He also suggests that students visit prospective mentors if they can, and obtain a decent sample of opinions from current and past students.



As a mid-career researcher, Paul has learned a few things along the way. Paradoxically, he feels he has one of the best but hardest jobs. On the one hand, he can let his curiosity

get the better of him every day, generate new knowledge, and share his passion with students who are going on to do amazing things. Research and teaching are creative outlets that allow him to meet many amazing people in many amazing places. On the other hand, it is also one of the hardest jobs. The combination of things that he has to do, things that he wants to do, and flexible work hours can lead to stress and burnout. “Work-life balance is essential,” says Paul “so is knowing what you want to do with your work time.” Paul reminds us to “know when to say no (unless it involves AFS-OC!), give yourself time (everything takes longer than you think), don't sweat the small stuff, and prioritize your mental health and relationships.” Excellent advice, and particularly relevant when coping with a global pandemic.

When not in the lab or lecture hall, Paul is often on a bike. “Family comes first, and I fish a little, but I am most passionate about endurance cycling. Which is ridiculous because I have precious little time to train or compete. I try to bundle - for example, by riding an imperial century (162 km) in each country that I visit for work.” He started in 2018, and had 6 countries under his belt before the pandemic hit. “Getting out there and off of the beaten path is a great way to see a place and its people.”

You can connect with Paul at his email address, follow him on Twitter, or check out his Lab on ResearchGate.

NCD Technical Committees

Are you looking for a way to get involved in AFS and to network with fisheries professionals throughout Canada and the United States? The North Central Division (NCD) Technical Committee Representative position might be a great fit for you! AFS-OC is currently recruiting individuals to represent our chapter on several of these committees. Technical committees promote resource conservation and enhancement within the division and serve as the focal point for the collection and dissemination of information concerning important resource issues. There are currently seven technical committees that are set up to address issues relating to taxonomic, habitat, or technical orientation.

Technical committees typically meet twice per year. Each chapter within the NCD has a representative at these meetings to share unique challenges, solutions, and research to progress the science within each discipline. It provides an excellent opportunity to share science, network, gain experience, and meet some great people. The NCD Technical Committee Representatives report back to the AFS-OC executive committee on the highlights and actions. These positions are on a volunteer basis. If you would like more information please contact president@afs-oc.org.

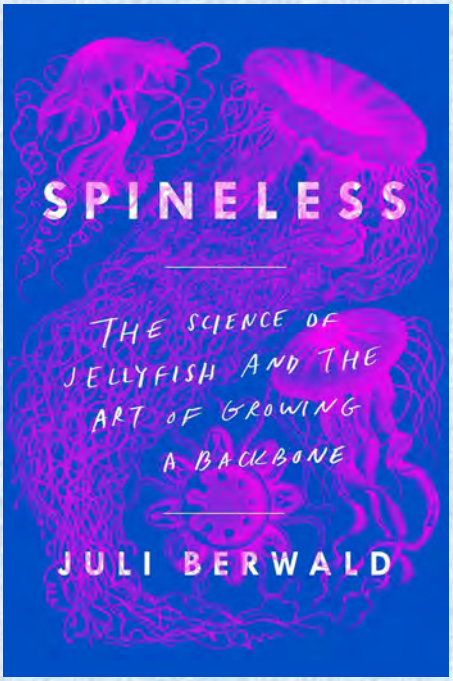
NCD Technical Committee	AFS-OC Representative
Centrarchid	Vacant
Esocid	Vacant
Ictalurid	Vacant
Rivers and Streams	Nicholas Jones
Salmonid	Brian Morrison
Walleye	Bill Gardner
Urban/Community	Vacant

Book Review

By Heather Cray

Spineless: The Science of Jellyfish and the Art of Growing a Backbone by Juli Berwald. 2018. Riverhead Books. 352 pages, 16.00 CAD, Paper .

Reproduced with permission of the Ottawa Field-Naturalists' Club. This review was originally published as: Cray, H. 2018. "Spineless: The Science of Jellyfish and the Art of Growing a Backbone" by Juli Berwald, 2018 (Book Review). The Canadian Field-Naturalist, 132(3), 304. DOI: https://doi.org/10.22621/cfn.v132i3.2257



Spineless is primarily a popular science book, with a dash of memoir thrown in for good measure. The two-part subtitle—The Science of Jellyfish and the Art of Growing a Backbone —reflects both elements of the writing. The Science of Jellyfish accounts for most of the book, and what you would expect from a well-written, well researched non-fiction science book. The second part, the Art of Growing a Backbone, unfolds haltingly throughout the book, culminating in the final page of the last chapter. The memoir component is the personal story and thesis of the author, her journey to jellyfish science and speaking up for ocean health.

The author holds a Ph.D. in ocean sciences, and her interest in jellyfish stems from formative experiences during her undergraduate and graduate programs. Not a jellyfish researcher herself, the somewhat winding narrative element describes an intellectually bored writer, editor, scientist, and mother developing a burning interest in jellyfish at an age when her family vacation time could be planned to coincide with researcher interviews and fieldwork adventures. Although it can be a bit disjointed at times, the personal story of the author and the process of her enmeshment in the world of jellyfish science come together well in the last third of the book. This mix, science fact punctuated by personal moments of the author's life and experience, sets this book apart from many popular science works. Whether or not you enjoy the threads of personal narrative will likely depend on your own experiences and perspectives, but they are by no means the dominant element of the work.

Spineless is a book to suit a broad audience. It certainly has enough fascinating information, new research, and unanswered questions to satisfy interested readers. The book probes and highlights the many unknowns of jellyfish: where they grow, what they eat, and what eats them. Topics explored include jellyfish biology, ocean acidification, commercial fishing, and invasive species. Compared with other popular science works, this is a longer book, not the average short romp through a subject, and the print is small, making it longer than it looks. This allows space for interviews and research conducted over many years, all of which is meticulously cited in the "Notes" section at the end of the book.

Ostensibly organized into parts of the jellyfish life cycle—Planula, Polyp, Strobila, Ephyra, and Medusa—the writing doesn't seem to closely follow this logic, except for the last section which links to the previous pages in the author's jellyfish journey. Although a few gorgeous drawings of jellyfish life stages are included, the book would have benefitted from some additional illustration, particularly depicting the main species discussed. As it is, image-oriented readers may find themselves switching intermittently to a web browser or making notes for later. The writing quality is very good throughout. Although the feel of the writing changes in the last third or so of the book where the author includes her own and her family's personal experiences with jellyfish science and expeditions, the author's prose is easy to follow and usually descriptive enough to make up for the lack of images.

Exploring jellyfish research through the lens of a devoted hobbyist and interviewer turned collaborator, this book reveals the remarkable knowns and surprising unknowns of jellyfish and their role in the future of our oceans. It is well worth a look.

Heather A. Cray, Waterloo, ON

Fish Photography

Craig Paterson | Conservation Biologist, SCRCA

Kyle Swanson | Watershed Monitoring Technician, CVC

Everyone in the fisheries community can tell you that once the field-season hits, spring and summer pass by in a manic blur, filled with countless bug bites, leaky waders, a mountain of data and all too often, several SD cards crammed with blurry pictures of fish in viewers. It is often difficult, during the chaos, to take a moment to truly appreciate and capture the beauty of the countless fish species you have spent so much intimate time with during the snow free months.

Taking the time to capture this beauty was something that Kyle Swanson of Credit Valley Conservation Authority and I set out to do. I should begin with some honesty, my role was rather simple, locate the appropriate habitat, identify the fish and squeeze in a spot of streamside birding. Kyle on the other hand, would spend a significant amount of time beneath a hot dark towel with a flashlight, camera and a fish that all too often outright refused to remain still. There is however a moment where a fish will remain perfectly still and raise all its fins in synchronized glory for that all so elusive, perfect shot.

Photographing the brilliance of fish is one of the simplest forms of science communication, capturing and showcasing the endless array of patterns, colours, shapes, sizes and behaviors is a lifelong challenge, it's not just the birders who have life lists. Check out these images of several species captured in the Sydenham and Credit River watersheds.

FishCAST

the LATERAL line

By Craig Patterson

Many of those who attended the virtual AGM will now be familiar with what FishCAST is and what it can offer graduate students. For those who could not attend, AFS-OC in partner with FishCAST composed this article to further share what this unique and powerful program can offer.

> **"Diversity is critical to achieving personal, academic, and research excellence that fosters leadership and societal change."**
>
> **- FishCAST**

What is FishCAST?

FishCAST stands for Fisheries Management and Conservation Careers in Science and Technology, a 6-year NSERC CREATE training program for student trainees to engage in research and professional skills training as part of their degree program. The FishCAST grant was awarded to Dr. Christina Semeniuk & 11 Principal Investigators in institutions across Canada to deliver this unique training program. It launched in September 2020 and will continue until 2026. FishCAST is committed to providing equitable, high-value training to prepare individuals with the skills to pursue jobs in fisheries and aquatic science management and conservation.

FishCAST is designed to train graduate students in the fisheries and aquatic sciences. Our goal is to complement degree programs and provide students with the hands-on experience and connections necessary to succeed in their fields after graduation. As part of a CREATE grant, FishCAST will provide training in four areas:

1. technical expertise in fisheries and fish conservation research methodology and practice;
2. focused professional and transferable workplace skills;
3. relevant employment and hands-on experience;
4. familiarity with the different perspectives and disciplines that contribute to the complex social, economic, and ethical issues facing fish research, conservation, and management.

FishCAST and JEDI

FishCAST recognizes that research impact and excellence is multidimensional and recognize historical biases associated with notions of excellence. We are committed to engaging in this debate through a multidimensional, intersectional lens of justice, equity, access, inclusion and Indigeneity.

Head to the website to see the eligibility requirements, the powerful message behind the logo and how fishCAST can help you obtain the vital skills needed to make a splash in this field. https://fishcast.ca/

People in the Field

Above: Tom Pratt releases a Lake Sturgeon

Above: Gabrielle Perugini, a DFO student, photographs a site on the Batchawana River.

Above: Bill Gardner poses with a Silver Lamprey near Cornwall, Ontario. .

Above: Lisa O'Connor and Gabrielle Perugini retrieve a Vemco receiver from Batchawana Bay, ON

"On the Hook!"

the LATERAL line

DFO is currently engaging Canadians on efforts to implement new fish and fish habitat protection provisions . You can post comments until June 30, 2021.

https://talkfishhabitat.ca/

Third L.C., D.R. Browne and N.W.R. Lapointe. 2021. Project Review Under Canada's 2012 *Fisheries Act*: Risky Business for Fisheries Protection. Fisheries. https://doi.org/10.1002/fsh.10594

The Invasive Fish Species: A Quick Reference Guide was compiled and written by the Ontario Federation of Anglers and Hunters Invading Species Awareness Program. Support for the development of this guide was provided by the Ontario Ministry of Natural Resources and Forestry. This publication is available for download in PDF format.

Dr. Karen Murchie collects data on sucker migration. Credit: Shedd Aquarium .

A ubiquitous tire rubber–derived chemical induces acute mortality in Coho Salmon. https://science.sciencemag.org/content/371/6525/185.abstract

Tracking the Sucker Run: How a Great Lakes Fish Sustains Food Webs https://ijc.org/en/tracking-sucker-run-how-great-lakes-fish-sustains-food-webs

Dr Jack Stanford talks about habitat complexity: https://theop.barbless.co/wild-salmon-and-rivers-jack-stanford/