



Message from the President



To the membership, I would like to thank you for the opportunity to represent the Ontario Chapter of the American Fisheries Society; a chapter which continues to grow and continues to be amongst the most active in North America. My involvement with the Chapter began in 2016 as a student presenter at the Annual General Meeting where I found a welcoming group of professionals with a passion for fisheries and community-building. Although I wasn't based in Ontario at the time, the AGM experience solidified my desire to join the Ontario fisheries community. I would like to specifically thank Ann Rocchi and Kim LeBrun for welcoming me so warmly and encouraging me to volunteer with this hard-working group. To Kim, I would also say thank you for helping me find my first job in consulting.

I have not envied the past two Presidents of the Ontario Chapter of the American Fisheries Society. While the Chapter's Executive Committee and volunteers function as a remarkably well-oiled machine, two years of limited in-person activities and planning for virtual Annual General Meetings has been difficult even for this dedicated group. Thank you, Sarah Steele, Craig Paterson and all those who have helped make the past two years a smoother endeavor than they otherwise might have been.

My appreciation and admiration for our volunteers and membership aside, I would like you all to know how excited we are as we plan for our upcoming AGM – the first in-person meeting we've been able to hold in three years. Not only will we be able to sit face to face again as we discuss the fisheries landscape in our province, country and abroad, but we are to be joined by AFS 2nd Vice President, Gary Whelan. We are fortunate to welcome Gary to our new-to-us venue, the Bayview Wildwood Resort, in picturesque Severn Bridge. We hope to gain insights into how the broader AFS landscape is looking, brainstorm how our Chapter can continue to grow, and we hope to provide Gary with some great Ontario fisheries knowledge (and pictures). We look forward to seeing you all March 10-12; expect to see a call for abstracts coming out, soon!

Zachery Wells, AFS-OC President (president@afs-oc.org)

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Ontario Freshwater Fishes Life History Database

OFFLHD Celebrating 20 Years as the Online Resource for Ontario's Fisheries Professionals

In 2022, the Ontario Freshwater Fishes Life History Database celebrates its twentieth anniversary. The database has been a valuable online resource for Ontario's fisheries professionals since 2002 and receives nearly 1,000 visitors a month. As might be expected, most users are situated in Canada and the United States, but visitors from Europe, Asia, Australia and South America also access the site regularly.



The website came about as a result of an initiative which began more than 2 decades ago. In early 1999, I began to compile some basic life history information for Ontario's freshwater fishes into a database, which would facilitate easier access to pertinent information not otherwise available in a single source. A decision to share this information via the Internet led to the creation of The Ontario Freshwater Fishes Life History Database in late 1999. That early version was published using Microsoft DBWeb, which provided a basic web interface. In early 2002, version 2.0 was published using MySQL and PHP. This edition included significant additional life history information and provided a much more aesthetic presentation. In 2007, version number 3.0 was assigned due to the large number of new references and material added since 2002. In 2009, capitalization of the first letter of common names, AFS status and the Nipigon Cisco (*Coregonus nipigon*) were incorporated into the database. In 2010, two addi-

Welcome to the Ontario Freshwater Fishes Life History Database

A fully searchable database for all Ontario and adjacent Great Lakes freshwater fishes including introduced, extirpated and extinct species.

Contains current information pertaining to life history, habitat, size and age, distribution, conservation status, ecological value, reproduction and nomenclature for 155 species, 3 subspecies and 2 established hybrids.

Includes photographs, range maps, notes, Ontario record lengths and weights, length-weight regression coefficients, information sources, glossary of terms and related web links.

Search by:

Name or Code: Common, French or Scientific name, Authority, Family, Taxonomic Serial Number or OMNRF species code

Conservation Status: GRank, NRank, SRank, COSEWIC, SARO, AFS

Ecological Value: origin, general abundance, tolerance and/or economic importance

Habitat and Feeding: general habitat, environment, thermal regime and/or trophic class

Reproduction: reproductive guild, spawning habitat, spawning season and/or nursery habitat

Search

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Ontario Freshwater Fishes Life History Database — *cont.*

tional species, Smallmouth Buffalo (*Ictiobus bubalus*) and Chain Pickerel (*Esox niger*), were added due to recent occurrences within Ontario waters. In 2011, version 4.0 was published following a redesign of the species detail page and the inclusion of the River Shiner (*Notropis blennius*). Version 5.0 was published in 2020 which included the addition of Tench (*Tinca tinca*), a revision of the Family Cyprinidae and the inclusion of length-weight regression coefficients for most species. To date, information has been compiled from more than 210 sources, including books, peer-reviewed scientific papers, and reputable on-line resources, as well as some unpublished data collected over the course of my professional career. The database is frequently updated as new information becomes available. The Ontario Freshwater Fishes Life History Database can be accessed at www.ontariofishes.ca.

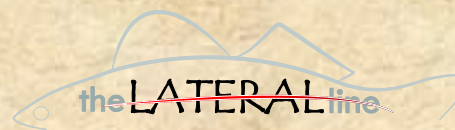
The OFFLHD is a fully searchable database for all Ontario and adjacent Great Lakes freshwater fishes including introduced, extirpated and extinct species. It contains current information pertaining to life history, habitat, size and age, distribution, conservation status, ecological value, reproduction and nomenclature for 155 species, 3 subspecies and 2 established hybrids. Specimen photographs, range maps, notes, Ontario record lengths and weights, length-weight regression coefficients, information sources, glossary of terms and related web links are also provided. Wherever possible, information specific to Ontario and/or Great Lakes populations has been incorporated.

This resource will be of value to professional biologists, fisheries managers, students, naturalists, anglers, as well as anyone with an interest in Ontario's freshwater fish fauna, which includes four of the five Great Lakes. Those who use or develop Indices of Biotic Integrity (IBI) to assess aquatic ecosystem health using fish community assemblage will appreciate the classification of each species according to many of the commonly used metrics. Since the majority of Ontario's fish species have a larger range throughout North America, the website will also be of wider interest.

Ontario's freshwater fish fauna is changing. Introduction of exotic species, bait-bucket transfer, habitat alteration and climate change, all have the potential to affect the distribution of freshwater fish species in Ontario. Many changes have already taken place, including species that have expanded their range, whereas others have become extirpated or extinct. These changes will continue and additional life history information will be learned that will supplement existing data. I welcome any such information and would encourage people to contact me at fishdb@ontariofishes.ca.

Robert J. Eakins
Ontario Freshwater Fishes Life History Database
www.ontariofishes.ca

AFS-OC Student Subunit



→ **AGM 2023**

Each year, the Student Subunit actively participates in the development of AFS-OC's Annual General Meeting. We coordinate the nominations for and presentation of the annual Outstanding Mentor Award, and host a raffle at the AGM with prizes that include fishing gear and tackle, outdoor clothing, and gift cards. We also work with the Executive Committee to assist with any other matters as the need arises.

→ **R/RStudio Workshops**

One of our goals this year is to continue previous years' efforts to implement interactive workshops on statistical analyses in R/RStudio. With presentations and exercises devised by previous members of the Student Subunit, we are hoping to provide a suite of online tutorials accessible at any time on our website, as well as a live, in-person workshop sometime in the new year. Whether you are totally new to R or just want to brush up on some skills, stay tuned for more information!

→ **Educational Visits and Social Events**

We are exploring opportunities to revitalise the Student Subunit's historical capacity for organising a range of social and educational opportunities for students and early-career professionals in Ontario. Expect to hear from us soon for details on potential site visits to museums and hatcheries! We will also work on hosting mentor mixer events where students, academics, and fisheries professionals can meet and talk in a relaxed setting.

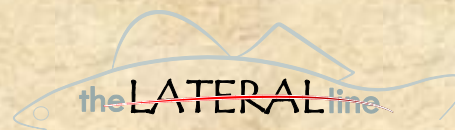
→ **Expanded Social Media and Outreach**

Our social media team is finding more creative ways to connect with our community, and we're looking to hear from you! If you are working in Ontario or at an Ontario university and have research that you want to share with the broader community, please share it with us at jordannan-bergman@gmail.com or alyssagoodenough@cmail.carleton.ca. We will be announcing events and opportunities through our Twitter and Instagram pages, as well as our website. Be sure to follow us on Twitter and Instagram (@afs_oc_su)!

→ **Feedback**

Have any questions or comments for us? Feel free to reach us by email at afsocsu@gmail.com.

AFS-OC Student Subunit



President: Connor Reid, Carleton University

connorreid@cmail.carleton.ca

I am a Ph.D. candidate in Dr. Steven Cooke's lab at Carleton University, studying the welfare implications of using electrical immobilisation and chemical anaesthesia on fish. I have been conducting field research and interacting with the Ontario fisheries science community since 2015. My research varies broadly, employing behavioural and physiological tools to help inform best practices in fisheries research involving extensive handling and invasive procedures. Outside of academia, I am keenly interested in curatorial work and bridging the gaps between scientific knowledge and public discourse through engaging and evidence-based exhibition creation.



Vice-President: Tim Fernandes, University of Toronto Mississauga

tim.fernandes@mail.utoronto.ca

Hello! My name is Tim and I am a fourth year PhD candidate at the University of Toronto in Dr. Bailey McMeans' lab. My doctoral work focuses on bridging the gaps between fish ecology and physiology across biological and temporal scales, with a particular focus on fish reproduction. I have been involved with fisheries research for over 7 years and have worked with NGO's, consulting firms, government, and academia to that end. Outside of research, I enjoy casting a line, swimming in cold lakes, and sleeping in small tents!

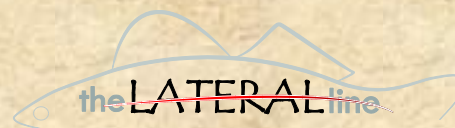
Secretary-Treasurer: Jordanna N. Bergman, Carleton University

jordannanbergman@gmail.com

Hi! My name is Jordanna and I'm a dual Canadian-American conservation scientist and aquatic ecologist based out of eastern Ontario, Canada. I'm currently in the fourth year of my PhD at Carleton University, supervised by Dr. Steven Cooke and Dr. Joseph Bennett. Although my previous research experiences focused mainly on marine ecosystems, for my PhD I've turned my attention to freshwater systems (which need our help now more than ever!). My thesis research investigates the ecological connectivity of Canada's historic Rideau Canal Waterway as experienced by both native and invasive fish species. Our goal is to work collaboratively with social scientists, Parks Canada (the primary stewards of the waterway), and hydraulic engineers to develop multidisciplinary and integrative approaches to developing management strategies and conserving Ontario's economically important, and beautiful, freshwater ecosystems. This is my second year with AFS-OC, and I'm looking forward to contributing to the organization as its secretary-treasurer.



Student Subunit — *cont.*



Science Communication and Education Coordinator: Alyssa Goodenough, Carleton University

alyssagoodenough@cmail.carleton.ca

I am a first-year Master's student in Dr. Steven Cooke's Fish Ecology and Conservation Physiology Lab at Carleton University. I am studying the effects of catch-and-release fishing on trophy Northern Pike in hopes of one day developing a protocol for effective and efficient catch-and-release practices. In addition, I am also studying gender discrimination within the Ontario recreational fishing community. Outside of academia, I am a professional fly-in trophy pike and lake trout fishing guide in Northern Manitoba, registered veterinary technician, and the owner of Northern Predator with which I seek to bridge the gap between the scientific and fishing communities to ensure the longevity of our waters and the fish that connect us all.



Eastern Ontario Regional Representative: Laura Haniford, Carleton University

laurahaniford@cmail.carleton.ca

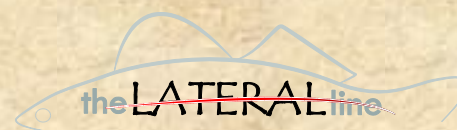
I am an MSc candidate with Dr. Steven Cooke at Carleton University. My research focuses on assessing the impact of non-lethal sampling on behaviour and survival in freshwater fishes, and pairing non-lethal sampling to telemetry to try and link fish condition with movement. I have been doing field work in the Ottawa area for over 5 years with the federal government and local conservation authorities. Outside of academia, I am passionate about ecosystem restoration and conservation of our wetlands.

Southern Ontario Regional Representative: Peter Baker, Western University

pbaker26@uwo.ca

I'm an MSc candidate at Western University in Dr. Bryan Neff's lab, and I study the cardiorespiratory impairments associated with thiamine deficiency in salmonids from the Great Lakes. In general, my research interests lie within the realm of aquatic ecology and fisheries conservation. Growing up as an avid angler I have always been interested in Ontario's fisheries, and I began pursuing this interest academically in 2018. In academia, I have been involved in a variety of fisheries research projects throughout Ontario, spanning from work with Atlantic salmon to bluegill sunfish. Outside academia I have a broad interest in biodiversity and conservation science and am involved in several conservation initiatives including the Western Biodiversity Inventory. I also sit on the Ecological Community Advisory Committee for the City of London.





Student Subunit — *cont.*

GTA Regional Representative: Markelle Morphet, University of Toronto Scarborough

m.morphet@mail.utoronto.ca

I am a PhD candidate in Dr. Nick Mandrak's lab at UTSC. My current research is focused in Lake Huron and Georgian Bay where I work with the Saugeen Ojibway Nation to compare eDNA sampling with conventional nearshore fish community survey methods and assess ecosystem health. I am expanding my research to target offshore communities and hope to examine fish population structures using eDNA, broadening its use as a conservation tool. Otherwise, I enjoy spending my time volunteering for science literacy programs such as the U of T Trash Team, Let's Talk Science and United for Literacy tutoring.



People in the Field



Emma Laqua, a DFO summer student, releases an acoustically tagged Lake Sturgeon back into the river to continue its journey.



A gillnet gets pulled by a net lifter from the depths of Lake Superior.

OE3C

AFS-OC supported the Ontario Ecology, Ethology, and Evolution Conference (OE3C) by providing funding and two members staffed our booth.

Check out conference presentations from previous years at <https://www.youtube.com/@ontarioecologyethologyande6140/featured>



ROM Requests and Announcements

By Sarah Steele

The Ichthyology (Fishes) staff at the Royal Ontario Museum (ROM) have been important supporters of AFS-OC students and young professionals for many years, directly and indirectly. From providing members with expert advice and assistance, to tours of the ROM facilities, to donating spots in the ROM Fish ID Workshops and field guides for the Student Subunit raffle, the ROM is an integral part of many of our professional and personal lives. Thank you on behalf of the ExComm and membership for the continued support of and connection with the Chapter.

Announcement of the **2023 ROM Ontario Fish Identification** workshops is imminent. If you are a fisheries biologist or a student registered in a fisheries biology program, the Royal Ontario Museum (ROM), Department of Natural History, is providing an opportunity to improve your fish identification skills. The workshops are designed primarily for professionals, technicians, field biologists, and environmental consultants -- but other interested individuals, including university and college students, are welcome. Power-Point presentations and hands-on exercises will familiarize you with the characteristics that are used in distinguishing families, genera, and species. Exercises will develop your skills of counting, measuring, and examining the pertinent anatomical structures that are necessary to use identification keys to Ontario's fishes. Workshops will be held at The University of Guelph, and experienced staff from both the ROM and Fisheries and Oceans Canada will be on hand to assist you with exercises, provide advice, and access the specimens housed in the reference collection brought from the ROM. Registration details will be posted on the ROM website (<https://www.rom.on.ca/en/collections-research/research>) next week and reminders will be posted via AFS-OC communication channels.

- Introductory Workshop (3 day) April 18-20
- Introductory Workshop (4 day) April 18-21
- Introductory Workshop (3 day) May 1-3
- Species at Risk Workshop May 4-5**
- Minnows Workshop April 25-27**

****Please note that the regular 3-day workshop is a prerequisite for the Species at Risk workshop and is strongly recommended for the Minnows workshop.**

Many of the fish specimens in the Fish ID Workshops have been in service for decades. ROM staff are requesting new materials to be donated for use in the workshops, with several species in desperate need of replacement materials. If you conduct fieldwork or labwork and have ability to collect some specimens

please be in touch (DISCLAIMER: Please follow permit protocols, do not collect specimens without appropriate permits).

For a full list of requested species, inquiries, or offers please contact Sarah Steele (ssteele@rom.on.ca). Frozen or formalin fixed specimens (with or without transfer to ethanol) are preferred.

Scientific Name	Common Name	Size requested	Priority
<i>Alosa pseudoharengus</i>	Alewife	7-12cm TL	desperate
<i>Cyprinus carpio</i>	Common Carp	6-12cm TL	desperate
<i>Hybognathus hankinsoni</i>	Brassy Minnow	>5cm TL	desperate
<i>Scardinus erythrophthalmus</i>	Rudd	5-12cm TL	desperate
<i>Carpionodes cyprinus</i>	Quillback	7-12cm TL	desperate
<i>Salmo trutta</i>	Brown Trout	5-12cm TL	desperate
<i>Coregonus clupeaformis</i>	Lake Whitefish	7-12cm TL	desperate
<i>Coregonus artedii</i>	Lake Herring/Cisco	7-12cm TL	desperate
<i>Prosopium cylindraceum</i>	Round Whitefish	7-12cm TL	desperate
<i>Gymnocephalus cernuus</i>	Ruffe	7-12cm TL	desperate
<i>Aplodinotus grunniens</i>	Freshwater Drum	7-15cm TL	desperate

Series: Fish Species Complexity — Highlighting Diversity in Ontario

A field-scale assessment of light as a behavioural guidance mechanism for out-migrating American eel, *Anguilla rostrata*, on the St. Lawrence River

M. E. Cole MacLeod, Chris K. Elvidge, Steven J. Cooke (and many collaborators from the EPRC)

Background

Anguillid eels are an iconic family of fishes with a complex life history. They are a panmictic, facultatively catadromous species, such that they spend the majority of their lives in freshwater, though their life cycle begins and ends in cryptic marine habitats. In Canada, American eel, *Anguilla rostrata*, range as far inland as Lake Ontario. Sex ratios and size vary latitudinally, and individuals in Lake Ontario are some of the largest of the species and are predominantly female. Given the relationship between body size and fecundity in female fish, and the panmictic nature of eel reproduction, it can be understood that Lake Ontario eel likely have a disproportionately

large influence on the species' abundance throughout its range. Historically, American eel were a staple food for Indigenous peoples in the east and remained so into the mid 20th century. Currently, live elvers sell for over \$5,000 per kilogram.

At the Moses-Saunders Hydroelectric Dam, the number of eels observed migrating up the St. Lawrence River into Lake Ontario has declined 95-99% since the 1970s. Eels in watersheds with hydroelectric dams and other anthropogenic obstructions generally must pass these barriers twice in their lives; first as juvenile elvers migrating to their rearing grounds, and later as silver eels returning to their spawning ground. Eel ladders work reasonably well to pass juvenile fish upriver, but cumulative anthropogenic mortality while migrating out of Lake Ontario and down the St. Lawrence has been estimated at 53%, three quarters of which is due to hydroelectric dams. Such a dramatic decline in population size has led to the species' designation as Endangered in the province of Ontario. Given that the



Figure 1: Photo of the light array outside Iroquois Water Control Dam, September 2022



Figure 2: An eel ready for tagging, pictured are Cole MacLeod (left) and David Stanley (right) (John Sanna 2022).

Highlighting Fish Complexity: Eels— *cont.*

size of the St. Lawrence renders traditional downstream passage solutions impractical or impossible, and that eels are now so imperiled, there is a need for innovation to develop new mechanisms to reduce turbine mortality².

EPRC & Light Guidance Study

The Eel Passage Research Centre (EPRC), established by the Electric Power Research Institute (EPRI) in 2013, is comprised of an international group of scientists from EPRI, Fisheries and Oceans Canada, Hydro Quebec, New York Power Authority, Ontario Ministry of Natural Resources (OMNRF), US Fish and Wildlife Service (USFWS), Quebec Ministry of Forests, Wildlife, and Parks, New



Figure 3: An acoustic tag being inserted in the coelom of an eel (John Sanna 2022).

Currently, sexually mature Lake Ontario eels are transported via truck, past Moses-Saunders and the Beauharnois Generating Sta-

tion in Quebec (another hydroelectric facility). Rather than relying on a nearby commercial fishery to capture eels, as is current practice, they could instead be captured at the Iroquois Water Control Dam (IWCD). The EPRC commissioned numerous laboratory studies and literature reviews over the span of almost a decade, investigating potential guidance methods including sound, electricity, and flow manipulation, and found that light had the most promising evidence base for diverting eel². Yet, there have been no management scale

evaluations of light for behavioural guidance.

A 216 m, \$1.6 M light array was constructed upriver of IWCD on the St. Lawrence River for the purposes of this study (Figure 1). In May-June and September 2022, 400 eels, captured as part of OPG's Trap and Transport program, were supplied to researchers from Carleton University and DFO by staff from the Lake Ontario Management Unit of OMNRF in Glenora, Ontario. Each eel was surgically implanted with Innovasea V9P-2x-180kHz HR tags fitted with depth sensors, which transmit a signal every 2.8 to 3.2 seconds (Figure 2; 3; 4). These tags will be detected by an array of 27 Innovasea 180kHz HR2 receivers deployed by USFWS outside IWCD, beneath the light array (Figure 5). This array will allow tracking of the three-dimensional movement of eels as they approach IWCD, to a resolution of 0.5 m. The objective of this study is to determine whether



Figure 4: An Innovasea V9P-2x-180kHz HR acoustic tag with depth sensing capability up to 30 m. Tags transmit a signal every ~3 seconds (John Sanna 2022).

York Department of Environmental Conservation, and Ontario Power Generation (OPG). The EPRC was established to improve the efficiency and efficacy of OPG's Trap and Transport program².

guidance methods including sound, electricity, and flow manipulation, and found that light had the most promising evidence base for diverting eel². Yet, there have been no management scale

Highlighting Fish Complexity: Eels— *cont.*

eels respond behaviourally to the active light array, and if so, describe any trends in this response. The hypothesized effect is that eels approaching IWCD which encounter the active light array will be diverted away from the platform, and that eels which encounter the light array while it is turned off (control phase) will maintain their path. Mature eels will migrate out of Lake Ontario between October and November². In early December, scientists from USFWS will haul the receivers at IWCD, download their data, and provide it to the Cooke Lab at Carleton. If eel are successfully guided by the light array it could result in considerable and immediate conservation gains for a culturally and economically significant, provincially endangered, and federally threatened species by increasing the likelihood of sur-

vival of out-migrators^{4,5}. Successful reproduction by these disproportionately fecund individuals could also create gains for the panmictic species' abundance throughout its range³. Future implementation of this technology could involve directly diverting eels away from hazards and obstructions.

References

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3. Beldade, R., S. J. Holbrook, R. J. Schmitt, S. Planes, D. Malone, and G. Bernardi. 2012. Larger female fish contribute
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5. Withers, P. 2022. Fate of baby eels worth \$90K seized in Halifax unknown. Canadian Broadcasting Corporation.
6. Verreault, G., and P. Dumont. 2003. An Estimation of Eel Escapement from the Upper St. Lawrence River and Lake Ontario in 1996 and 1997. *American Fisheries Society Symposium* 33:243–251.

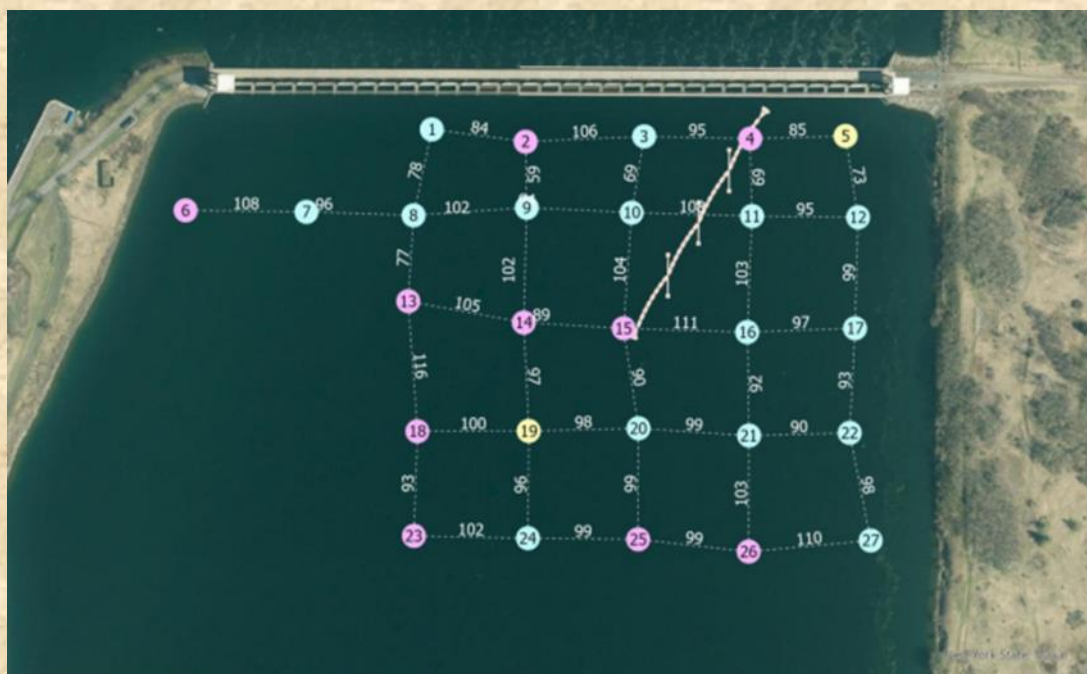


Figure 5: Position of 27 Innovasea 180kHz HR2 receivers deployed outside Iroquois Water Control Dam (Scott Schlueter and Justin Egret 2022).

AFS-OC's Submission on Bill 23

17 November 2022

Hon. Steve Clark
Minister, Municipal Affairs and Housing
17th Floor
777 Bay St.
Toronto, Ontario M7A 2J3



Dear Minister Clark:

With warranted concern, we write you today on behalf of the Ontario Chapter of the American Fisheries Society to convey our concerns regarding the proposed environmental legislation changes within *Bill 23, More Homes Built Faster Act, 2022*. The American Fisheries Society is the world's oldest and largest organization dedicated to strengthening the fisheries profession, advancing fisheries science, and conserving fisheries resources representing over 8,000 freshwater scientists and fisheries professionals focused on aquatic ecosystem health as well as fish habitat and fish management matters, with over 160 individuals and 1500 followers in the Ontario Chapter. This society includes representatives of the private sector, academia, not-for-profit organizations, Conservation Authorities, and provincial and federal governments. We include many aquatic science professionals in Ontario within our society, and contemporaneously share our wealth of experience with all sectors and offer formal training to all members. We also maintain professional interactions with scientists around the world regarding all aspects of aquatic and fisheries ecology and management.

We are concerned, however, that some changes proposed in Bill 23 will:

- Place new responsibilities on municipalities for natural hazards and natural resources that will lead to inefficiencies, uncertainties, and delays in the development review process.
- Weaken the ability of Conservation Authorities to protect people and property from erosion, pollution, flooding, and natural hazards.
- Reduce critical natural infrastructure and ecological health of wetlands, watercourses, and greenspaces that currently serve to reduce flooding, improve water quality and quantity, maintain important recreational activities such as fishing, support ESA listed species, and buffer against current and future effects of climate change.
- Negatively influence the assessment of Provincially Significant Wetlands (PSWs) by reducing the qualifying components.

We feel that municipalities should retain the ability to enter into agreements with Conservation Authorities to ensure appropriate technical expertise for review and comment on development applications such as natural heritage, water resources, pollution, and natural hazard reviews.

AFS-OC's Submission on Bill 23 — *cont.*

Previous legislative amendments by your government require agreements prior to Conservation Authorities undertaking this work. Recent regulations define requirements to be included in these voluntary agreements. Through these agreements, Conservation Authorities currently provide comments to municipalities in a cost-effective and timely manner, and these comments encompass a more holistic watershed approach that spans the single geographic jurisdictions of municipalities, since many of the components of these reviews span multiple municipalities. In 2020, through amendments to the *Conservation Authorities Act*, Conservation Authorities are already prevented from commenting beyond mandatory programs and services, such as natural heritage, without a municipal agreement.

Development subject to *Planning Act* authorizations should not be exempt from requiring Conservation Authority permits and Conservation Authority regulations should not be delegated to municipalities. The municipal planning process is insufficient to ensure natural hazard, water resource, and natural heritage concerns are addressed through design and construction alone. This places additional pressure, responsibility, and liability on municipalities and could result, for example, in building permits being issued in error for areas susceptible to natural hazards. Working beyond political boundaries is essential in the permitting role to consider impacts on upstream and downstream communities. Natural hazards, water resources, and natural heritage must be considered at both site-specific and watershed levels to ensure public safety, prevent loss of infrastructure, and maintain ecological integrity of watersheds.

Our specific concerns are:

- Changing the definition of a watercourse within the Provincial Policy Statement (PPS), which would result in the loss of protection for headwater drainage features. The loss of these features would result in a significant loss of linear stream length, increase the risk and severity of flooding effects, and contribute to cumulative or 'death by a thousand cuts' effects on watershed health.
- The proposed one-time placement of fill not exceeding 10 cubic meters that is not placed within hazardous land or a watercourse or wetland. There are existing regulations within Conservation Authorities that speak to this, plus provide some boundaries about where fill may be placed, the type of fill, and the volume, which provide oversight to ensure contamination of floodplains and cumulative cut/fill related flood risk issues do not arise. For example, within the Lake Simcoe Region Conservation Authority's 2021 *Ontario Regulation 179/06 Implementation Guidelines*, one may without written permission, place minor fill "for landscaping or resurfacing of existing driveways provided the fill does not obstruct flood flows, the volume does not exceed 7 cubic meters and that it is not placed within 15 meters of a watercourse, wetland or shoreline".
- The evaluation of CA owned lands for the potential to identify areas eligible for development. Conservation Authorities own many properties that support high levels of aquatic biodiversity across southern Ontario, and the loss of these critical habitat anchors can further imperil many species, undermining efforts to conserve and support aquatic biodiversity, including

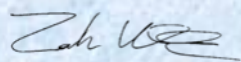
AFS-OC's Submission on Bill 23 — *cont.*

species listed under Ontario's *Endangered Species Act*. Additionally, many of these lands also reduce flood risk, offer carbon sequestration to mitigate climate change effects, and provide important areas for people to recreate.

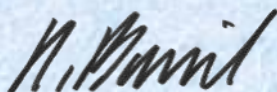
- The proposed removal of MNRF staff from the assessment and classification of wetlands in Ontario and downloading this responsibility to municipalities. We have concerns that this would result in a loss of technical expertise and the existing knowledge from MNRF district staff, and be reliant on municipal staff who are not trained or have the relevant experience, thus being an inefficient use of human resources and a net loss of knowledge.
- Removal of the ability to have complex wetlands have additive scoring to qualify for PSW status. This would force assessors to solely assess each wetland unit separately and not based on the cumulative wetland function and connectivity, thereby setting a higher benchmark for each wetland unit ultimately ensuring fewer wetlands would qualify for PSW status.
- Coupled with above, the proposal that existing PSWs can be reassessed by decoupling aggregate wetland scoring and assessing them individually, resulting in fewer PSWs.
- Species at risk elements of scoring would no longer apply. This means that species-at-risk habitat will no longer factor into decisions about which wetlands should be protected, severely undermining ESA protection of listed species.
- The proposal that "an ecological offsetting regime" would result in a no-net-loss approach to wetlands in Ontario. We are not aware of any existing peer-reviewed science that supports a no-net-loss of function, productivity, and aquatic biodiversity that would support the proposed approach.

We call on your government to remove revisions to the proposed legislation from Bill 23, and to begin a meaningful process of consultation with Indigenous Peoples and the public through well-established processes. The perspectives and concerns outlined in this letter are representative of our membership as a collective, and do not represent those of employers of AFSOC membership. Our organization has a wealth of expertise and years of experience, and we stand ready to provide the best available science to inform any necessary changes.

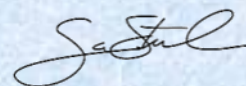
Sincerely,



Zachery Wells, M.Sc.
President, AFS-OC



Andre-Marcel Baril, M.Sc.
Vice-President, AFS-OC



Sarah Steele, PhD
Past President, AFS-OC

cc: Hon. Graydon Smith, Ministry of Natural Resources and Forestry
Hon. David Piccini, Ministry of Environment, Conservation and Parks
Hon. Doug Ford, Premier of Ontario

Invasive Carp Information

BLACK CARP

Known for their strong pharyngeal teeth that crush shells while feeding. Threat to native mussel populations.



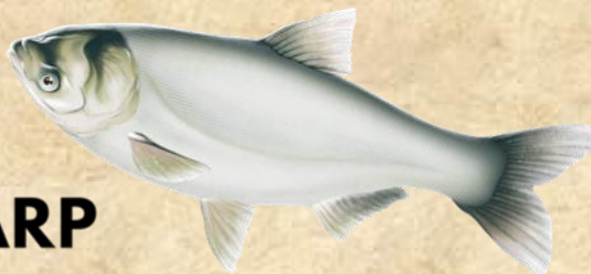
BIGHEAD CARP

Cows may have four stomachs but Bighead Carp are down to... none! Their lack of a true stomach means they feed constantly on zooplankton, detritus, and small invertebrates.



SILVER CARP

Also lack a true stomach and feed continuously, with specialized gill rakers increasing their efficiency in filtering phytoplankton. Causes heavy concern for the angler and boating industry as schools of Silver Carp, upon being startled by boat motors, can leap above the water's surface up to 3 meters in fear – causing harm to those inside of their path.



GRASS CARP

Consumes 40% of their body weight in aquatic vegetation daily. Most of what they eat enters back into the water column as waste, contributing to dangerous algal blooms. Species of most concern in Canada as it has been found on several occasions in Ontario waters.



For more information about invasive carps, check out <https://www.rom.on.ca/en/collections-research/magazine/great-lakes-great-invaders>. Carp illustrations © Invasive Species Centre

ROM Science Communication



By Claire Marshall

Joining ROM from University of Toronto's Master of Environmental Science program, Marshall spent this summer visiting teams out on the water patrolling for invasive species.

Marshall had the chance to interview invasive species biologists from the Department of Fisheries and Oceans out in Long Point, where they are performing surveys in aquatic habitats suitable for Grass, Black, Bighead, and Silver carps.



Sofia Mendoza, Marshall observing fish data collection

Sofia Mendoza, DFO Asian Carp Monitoring

Each year DFO carries out these surveys in hopes of not coming into contact with one of these target fishes - though they are not too far behind and have been found in various locations surrounding the Great Lakes in previous years.



Ryan Hagerty/USFWS, Adult Grass Carp

ROM Science Communication — *cont.*



Claire Marshall, Round Goby caught during TRCA fish population monitoring off Toronto Islands

With this footage Marshall and Environmental Visual Communications student Sofia Mendoza will create a film titled *Great Lakes, Great Invaders* - a story on Grass Carp and other related species threatening the Great Lakes.

Dr. Paul Bzonkey, Auditory barrier installed for invasive species study at Royal Botanical Gardens Fishway lit up at night

Marshall also joined Toronto Region Conservation Authority who follows the same DFO monitoring protocols in Lake Ontario and its tributaries within the GTA. Thankfully their catch yielded no invasive carps - but to Marshall, put into perspective how invasive species like Round Gobies can dominate biodiversity surveys.

Marshall also interviewed fisheries biologists from University of Toronto about their research on invasive species, including Dr. Paul Bzonek at his research site in Royal Botanical Gardens Fishway. There, Dr. Bzonek studied how auditory barriers influence non-native species from entering a conservation wetland.

Finally, Marshall interviewed members of the ROM Fishes team - from curators to technicians - to find out how organizations like ROM play an important part of conservation efforts to protect native species.



ROM Science Communication — *cont.*

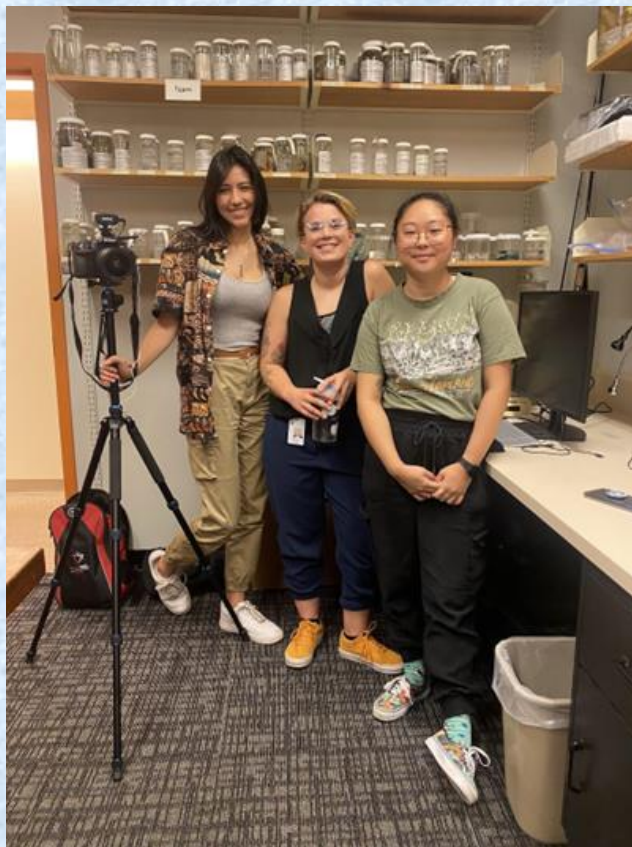


But the work didn't stop there - Marshall also worked on various social media posts and was featured in this [National Fishing Day Post](#) about native and non-native fishes in the Great Lakes. They were also featured on an International Kissing Day Post, where they showed [Kissing gourami's unique "kissing" behavior](#) - likely just a way this species established territory.

Marshall, an advocate for not only fishes, but people - got to share their passion for building equitable environments and publishing a story on ROM Magazine about the inclusivity of diverse sexes found in the world of fishes- check it out here - [Think Nature Isn't Queer? Go fish.](#)



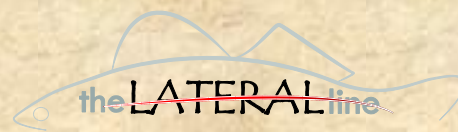
Claire Marshall, Posing with Black Crappie caught during DFO Asian Carp Monitoring



Claire Marshall, Marshall, pictured centre, surrounded by ROM Fishes Team Sofia Mendoza from the EVC program (pictured left) and Kathy Wang from Fleming College, working with ROM summer 2022 as a Young Canada Works Student (pictured right)

Marshall came to ROM in May not knowing a Largemouth Bass from a Lake Trout. They grew up on the bayou - catching fishes on cane pools with crickets they dug up from the yard. After taking ROM's Ontario Fish Identification course, and ROM's Minnows Course they are feeling more connected to aquatic habitats than ever - and friends even send them photos to ID their fish - showing the power of education and outreach when it comes to connecting communities to their backyard aquatic habitats.

ROM Sampling Trip



By Nathan Lujan, Curator of Fishes, Royal Ontario Museum

The ROM Fish Division inaugurated a long-term effort to expand our fish tissue holdings from throughout eastern North America this past spring with an expedition to Middle Tennessee, one of the most biodiverse freshwater regions in the temperate world. Highlights included a brilliant red aggregation of Tennessee Shiners (*Notropis leuciodus*), an enthusiastic group of spawning Longnose Gar (*Lepisosteus osseus*), and remarkably colorful darters that few of us had seen before, such as the Gilt Darter (*Percina evides*), Bison Darter (*Etheostoma bison*), and a distinct regional color morph of our



From left to right: Don Stacey, Brenna Wells, Sarah Steele, Erling Holm, Nathan Lujan. Photo taken by Mary Burridge. All fish photos taken by Nathan in the field.



Largescale Stoneroller (*Campostoma oligolepis*)



Scarlet Shiner (*Lythrurus fasciolaris*)

team had to return to Toronto after only three days of collecting in Tennessee. If you would like to support the expansion of ROM's fish tissue collection effort with samples legally collected from anywhere in Canada, the Fish Division can provide you with tissue tubes and matching voucher tags. Please contact either Nathan Lujan nlujan@rom.on.ca or Mary Burridge maryb@rom.on.ca.

very own Rainbow Darter (*Etheostoma caeruleum*). In total, over 240 tissues from 30 species were collected. The ultimate goal of this work is to densely sample habitats extending from the Great Lakes to Pleistocene glacial refugia in southeastern North America so that modern population genomics and phylogenomics tools can be used to better understand the post-glacial biogeographical origins of the Great Lakes fish fauna and historical influences on contemporary freshwater fish population structure in eastern Canada. Unfortunately,

COVID-19 swept through our expedition and most of the



Northern Studfish (*Fundulus catenatus*)

Book Review



By Tony Gaston

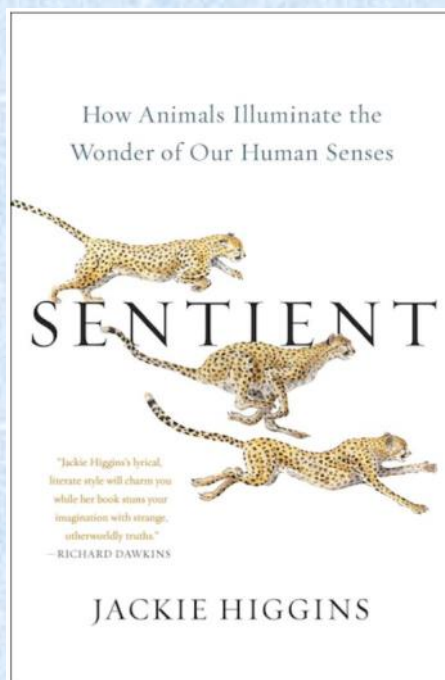
Sentient: How Animals Illuminate the Wonder of Our Human Senses. By Jackie Higgins. 2021. Atria Books. 320 pages and 13 black and white illustrations, 37.00 CAD, Hardcover, 17.99 CAD, E-book.

Reproduced under the [Creative Commons Attribution 4.0 International License](https://creativecommons.org/licenses/by/4.0/). This review was originally published as: Gaston, T. 2022. "Sentient: How Animals Illuminate the Wonder of Our Human Senses" by Jackie Higgins, 2021 [book review] *The Canadian Field Naturalist* 136 (2):178-179. DOI: <https://doi.org/10.22621/cfn.v136i2.3085>

This book is about sentience and the senses that comprise it. The author, Jackie Higgins, spins a wonderful tapestry of all the senses you have heard of and several more that you may not have thought about. Each sense, of the twelve listed, is expounded in a chapter that uses as its gateway the sentience of a particular species. Perhaps unsurprisingly, owls exemplify hearing and bloodhounds smell, while a sense of direction (ability to navigate) is demonstrated by Bar-tailed Godwit (*Limosa lapponica*), the amazing endurance of which allows it to navigate non-stop from Alaska to New Zealand. Others, however, are much less obvious: sense of colour is exemplified not by the peacock but by Peacock Mantis Shrimp (*Odontodactylus scyllarus*), an animal that I had not even heard of until Higgins brought it to my attention, but which I recently encountered on a coral reef off Sulawesi, Indonesia, much to my delight. Apart from an amazing colour perception,

based on not three (as in humans) but 12 different colour receptors, the mantis shrimp also has the distinction of having the fastest strike of any animal (according to *Guinness World Records 2020*; 2019, Guinness World Records Limited), and they are known to smash the glass of their aquaria on occasion. I kept a respectful distance from the one I found in Indonesia.

Another mind-jolting exemplar, in this case for "pleasure and pain", is Common Vampire Bat (*Desmodus rotundus*)—hardly a species that you would associate with pleasure. But vampire bats will gladly share a blood meal among adults in exchange for the comfort of another's touch. This touch comes in the form of allogrooming, the licking, nibbling, and nuzzling that one bat performs on another. In addition to describing this fact of nature, Higgins uses it as a springboard for discussion of the importance of touch to humans, noting that we use the phrase



"it touched me" to denote the arousal of any emotion, and highlighting the importance of touch among our array of senses—something that became excruciatingly clear during the distancing phase of the recent COVID-19 pandemic.

Other species used as exemplars are the four-eyed Brownsnout Spookfish (*Dolichopteryx longipes*) for 'dark vision', Star-nosed Mole (*Condylura cristata*) for 'touch',

Book Review — cont.



goliath catfishes for 'taste', researchers she writes about Giant Pea-cock Moth (*Saturnia pyri*) for 'desire', Cheetah (*Acinonyx jubatus*) for animals concerned, but also 'balance', trashline orb-weaver spiders (*Cyclosa* spp.) for 'time', and Common Octopus (*Octopus vulgaris*) for 'body'. The book incorporates a strong human element by telling the story of each example species through the history of its discovery and the research conducted on its senses. Higgins has interviewed many of the

This is possibly the best popular science book I have read since David Quammen's *The Song of the Dodo* (1997, Touchstone)—and I read plenty of popular science! It is beautifully written, contains a plethora of information on every aspect of sentience, and is bang up-to-date in terms of the scholarship on show. It is hard to see where popular science can go to improve on this.

Tony Gaston, Ottawa, ON

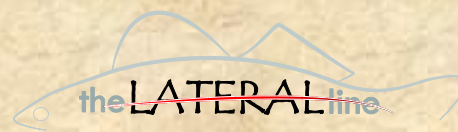
We're Social!

Want to keep up-to-date on the latest activities from your fellow chapter members? Follow us on [Facebook](#), Twitter ([@afs_oc](#)) and Instagram ([@afs_ontariochapter](#)). You can tag the group and we'll reshare the story, or you can 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 resources are available online? Check out the [AFS-OC Links](#) page to peruse fishes information, government links, online books/journals/publications, organizations/associations, software/apps, and AFS social networks.



AFS-OC In-Stream Workday



By Sarah Steele, AFS-OC Past President

On September 11, 2022, AFS-OC Past-President Sarah Steele and AFS-OC members Spencer Weinstein, Gabby Carew, and Katrina Gaibisels joined Mike Heyming, acting Restoration Project Technician at Conservation Halton, for an in-stream workday on Grindstone Creek in Waterdown. Sediment traps were installed to narrow the channel, within Joe Sam's Leisure Park, which historically had been impacted by an online pond. The pond was taken offline in 2021 and recovery of the system is steady. Native freshwater



From left to right: Gabby Carew, Sarah Steele, Katrina Gaibisels, Spencer Weinstein; Behind: Mike Heyming.



mus-

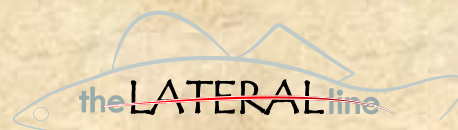
sels had been identified previously at the site, so before the work began, and after some tasty snacks, the channel parameters were measured and all was clear to dig up and relocate the mussels to a safe site downstream. Crew members not experienced in working with mussels were enthusiastically shown the ropes, and knowledge shar-

ing of sampling techniques, mussel identification, biology, distribution, and fun facts was a huge highlight of the event. By the end of 'raccooning' everyone had at least one chance to dig up a mussel themselves! Giant Floaters (*Pyganodon grandis*) were the only stars of the show, though one suspect specimen was thoroughly photographed and passed on to experts for additional opinions.

After the mussels were safely translocated, the crew got to work installing Christmas trees into the streambank, which we all discovered was very hard work made slightly easier by the deep silt that had accumulated over time. In record time, our stream team of five installed 20 trees! While AFS-OC members got to learn how to tie and secure the mats, Sarah and Mike set their eyes on a submerged log inconveniently located in the ideal location of the thalweg. We



AFS-OC In-Stream Workday — *cont.*



got to work digging the sediment by hand around and under the log. As the mat tying wrapped up (pun intended), one by one more diggers joined the cause. After some persistent digging, we were able to lift and relocate the log to the outer margins of our sediment mats, providing critical protection for the structure against high waters. We celebrated the success with a silly photoshoot, including “shellfies” and “mussel shots” to show our passion and strength. A huge thank you to our photographer and videographer Michael Swift, Sarah’s partner and fly-fisher turned restoration enthusiast! A video docu-



menting the work will be available shortly on the AFS-OC YouTube channel.



A pizza party in the park followed our hard work. We chatted about field adventures, our favourite nature stories, environmental awareness in the age of social media, and finally to networking, job applications, qualifications, and handling the interview process. We hit on a very important theme of women in fisheries lacking confidence in their qualifications, and missing out on opportunities due to insecurity, a topic AFS-OC Ex-

Comm is planning to address in some networking events this year and extend to other groups that may have difficulties finding and securing positions of interest in fisheries.

Finally, this event was a huge success! All participants are very excited to participate in future events. If you may have an opportunity for AFS-OC members to participate in field work or other fisheries activities to gain knowledge, experience, and skills please reach out to past-president@afs-oc.org.



Fish Focus: **NORTHERN HOG SUCKER** (*Hypentelium nigricans*)

By Siobhan Ewert

Hypentelium: *hypo* = under, *pent* = five, *elium* = lobes which inaccurately refers to the shape of the lower lip

nigricans = blackish

Features: The Northern Hog Sucker is a medium sized sucker, with a deep body and a long snout. Lips are highly protrusible with fleshy bumps, like those found on many sucker species. They have a large flat head, that is concave between the eyes. Hog Sucker eyes are higher on the head and much closer to the rear edge of the gill cover than to the tip of the snout. There are 44-54 lateral line scales, and the back of the fish can be brown, grey,

or olive coloured with light brown/yellow sides and a brassy sheen. The stomachs are usually white or silver and they have a forked caudal tail. Two to five diagonal bars can be found on the backs and sides when individuals are larger than 30 cm.

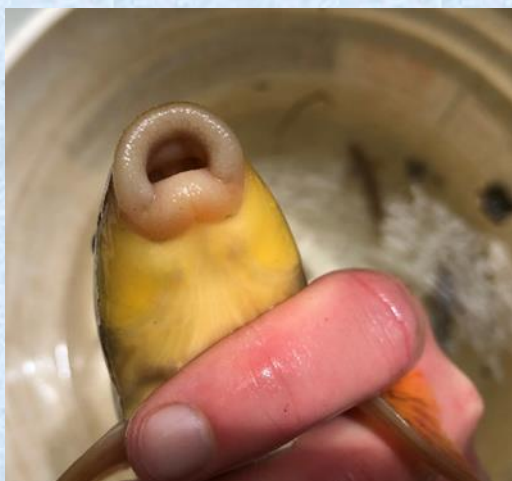
Similar Species: White and Longnose Suckers have larger scales than Northern Hog Suckers and Redhorse Suckers usually have lips with ridges instead of fleshy bumps.

Diet: Algae, aquatic insects, molluscs, detritus, and crustaceans.

Reproduction: Spawning occurs when water temperatures reach 15-16°C in riffles of shallow streams with fine gravel. Male Hog Suckers crowd a female and eggs are sperm are

released with no adult care given to the non-adhesive fertilized eggs. Males can reach sexual maturity in their second season, whereas females usually reach sexual maturity in their third year.

Habitat: Northern Hog suckers are found in southern Canada, and much of the eastern and southern United States. They prefer the bottoms of warm shallow streams and are rarely found in lakes. The Northern Hog Sucker has been extirpated from some areas of the United States, mostly due to habitat disturbance such as channelization, sedimentation, pollution, and dam construction.



"On the Hook!"



Am I helping? A biologist's search for self-worth in a world on fire.

<https://www.nationalobserver.com/2022/10/27/opinion/am-i-helping-biologists-search-self-worth-world-fire>



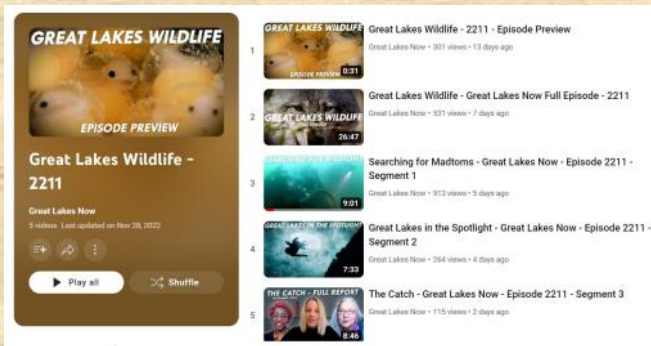
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The world's oldest winged insect is in trouble. How frightened should we be?

<https://www.washingtonpost.com/magazine/2022/09/19/mayfly-decline/>

As Robin Wall Kimmerer harvests serviceberries alongside the birds, she considers the ethic of reciprocity that lies at the heart of the gift economy. How, she asks, can we learn from Indigenous wisdom and ecological systems to reimagine currencies of exchange?

The Serviceberry: An Economy of Abundance, by Robin Wall Kimmerer. <https://emergencemagazine.org/essay/the-serviceberry/>



Monthly shows available to watch about different aspects of the Great Lakes: <https://www.youtube.com/@GreatLakesNow>



Mishiikenh Kwe, an Anishinaabe artist from the caribou clan—Magnetawan First Nation—made these translations for those wishing to learn. Google how to pronounce Ojibwe words to get the correct pronunciation.



© Kondratuk Aleksei

Where have all the snow crabs gone? Eleven billion crabs vanished. Is climate change really to blame?

<https://nautil.us/where-have-all-the-snow-crabs-gone-248247/>