AMERICAN FISHERIES SOCIETY

ONTARIO CHAPTER

ANNUAL GENERAL MEETING

February 27th - March 1st, 2013
Geneva Park, Orillia, Ontario

"Fisheries Management in the Age of Austerity"

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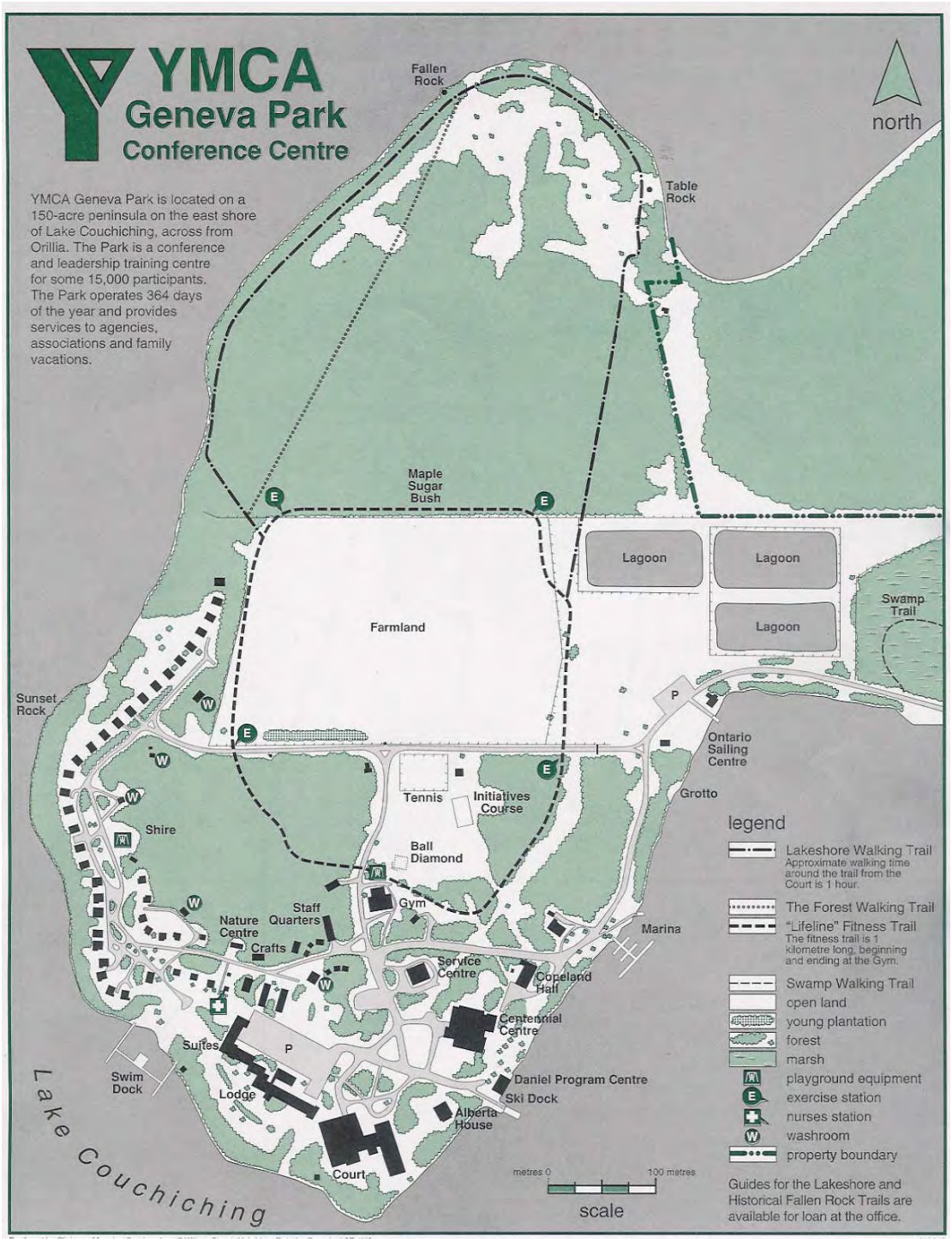
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Court
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AMERICAN FISHERIES SOCIETY

ONTARIO CHAPTER

2013 AFS-OC ANNUAL MEETING

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"Fisheries Management in the Age of Austerity"

Wednesday February 27th
5:30-on **Arrival, Registration (Front Desk)**

8:00-10:00 **Mixer (Geneva Court Building)**

Thursday February 28th
7:30-8:30 **BREAKFAST (Geneva Court Building)**

08:30 **GREETING AND CONFERENCE OUTLINE (Centennial Court)**

08:40 ***Keynote Address:*** *The future of fisheries and aquatic ecosystems in Canada: roles of human capital, public engagement and scientific evidence.* **Dr. Steve Cooke***

Session 1: Fisheries Management in Lake Systems

09:10 ***Talk 1:*** *Conservation Implications of Genetic Structure among Core and Northern Edge Populations of Spotted Gar (Lepisosteus oculatus), based on microsatellite analysis.* **William R. Glass*,** Ryan P. Walter, Daniel D. Heath, Nicholas E. Mandrak and Lynda D. Corkum

09:30 ***Talk 2:*** *Gear Selectivity and Maturation Schedules of Lake Huron Lake Whitefish.* **Gobin, J.***, Fox, M.G., Dunlop, E.S.

09:50 ***Talk 3:*** *S Bayesian Decision Networks: A Framework For the Scientific Management of Fisheries Assessment and Research Resources*
Reid. K.*, Nudds, T, and D. Dupliesea.

10:10 **COFFEE, TRADE SHOW, POSTER SESSION (Foyer)**

Session 2: Science and Fisheries Management 1

10:30 ***Talk 4:*** *Koi Herpesvirus and subsequent mass die-offs of Cyprinus carpio carpio* L. *in Lake Simcoe: A case study examining fish disposal and potential for land contamination.* **Kira Jade Cooper*,** Stephen Murphy, Leonard Tsuji, and Ken Oakes

10:50 ***Talk 5:*** *Tracking Ghosts: using environmental DNA detection to find invasive and endangered species.* **Chris Wilson***

11:10 ***Talk 6:*** *Exploring food sources supporting the diet of Hemimysis anomala, the latest invader of the Great Lakes.* **Jérôme Marty*,** Jessica Ives, Yves de Lafontaine, Tim Johnson, Marten Koops and Michael Power

11:30 ***Talk 7:*** *Systemic Review of the Effects of Siltation on Freshwater Fish and the Efficiency of Siltation Control Devices.* **Jacqueline M. Chapman***, Shireen M. Bliss, Maxime Veilleux, Caroline Levert, Marie-Ève André, Catherine Proulx, Steven J. Cooke and Nicholas W.R. Lapointe

12:00 **LUNCH (Dining Room), TRADE SHOW (Foyer) & POSTER SESSION**

Session 3: Science and Fisheries Management 2

1:00 ***Talk 8:*** *Monitoring Fisheries in the Age of Austerity: Innovative Approaches to Data Capture*. Helen Ball, Bob Bergmann, Kevin Collins, **Warren Dunlop***, and Matt Garvin

1:20 ***Talk 9:*** *Evaluating fish movement through the Welland canal using acoustic telemetry*. **Marson, David*,** Jaewoo Kim, and N.E. Mandrak

1:40 ***Talk 10:*** *Smartphones and digital tablets: Emerging tools for data collection and education in fisheries.* **Lee F.G. Gutowsky***, Jenilee Gobin, Nicholas J. Burnett, Jacqueline M. Chapman, Lauren J. Stoot, and Shireen Bliss

2:00 ***Talk 11:*** *Stock assessment and management of Lake Nipigon lake whitefish (Coregonus Clupeaformis): A Value of Information Approach.* **Reid. K.***, Jiao, Y., Tsiplova, K., Nudds, T. and E. Desson

2:20 ***Talk 12:*** *Far North Aquatic Science Projects: MNR/NESI preliminary investigations under the Far North Information and Knowledge Management (FN-IKM) initiative.* **Steve McGovern***

2:40 **ANNUAL BUSINESS MEETING**

3:10 **COFFEE, TRADE SHOW & POSTER SESSION (Foyer)**

3:30-6:30 **TRADE SHOW, POSTER SESSION, ICE FISHING**

6:30-10:00 **SUPPER AND SOCIAL (Geneva Court Building)**

AMERICAN FISHERIES SOCIETY
ONTARIO CHAPTER

ANNUAL GENERAL MEETING

February 27th - March 1st, 2013
Geneva Park, Orillia, Ontario

"Fisheries Management in the Age of Austerity"

Friday March 1st

7:30-8:30 **BREAKFAST**

Session 4: Fisheries Past, Present and Future

09:00 ***Talk 13:*** *Canadian Recreational Fisheries: 35 Years of Biological, Social and Economic Data.* **Jacob W. Brownscombe*** William Bowden, Shannon Bower, Liane Nowell, Jonathan D. Midwood, Steven J. Cooke, and Neville Johnson

09:20 ***Talk 14:*** *To Re-Channelize or Naturalize: The Legacy of Urban Streams Comes to Bear* **Christine Tu-Parker*** and Ryan Ness

09:40 ***Talk 15:*** *The Fraser River Salmon Fishery: A Socio-Ecological Case Study Relevant to Fisheries Management and Conservation.* **Nguyen, V.M.***, Rudd, M.A, Hinch, S.G., Cooke, S.J.

10:00 **COFFEE & POSTER SESSION (Foyer)**

Session 5: Fisheries Past, Present and Future 2

10:20 ***Talk 16:*** *The Status of Brook Trout in the Credit River Watershed*
Phil Bird*, Credit Valley Conservation

10:40 ***Talk 17:*** *The Aquatic Renewal Training Partnership: Building Capacity to Rehabilitate Aquatic Systems.* **Larry Halyk***

11:00 ***Talk 18*** *Recreational Fisheries Conservation and the Amendments to the Fisheries Act: Key Concepts and Concerns.* **David Browne***

11:20 **PRESENTATION OF STUDENT AWARDS**

11:30 **CONFERENCE WRAP AND CLOSING REMARKS**

12:00 **LUNCH**

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"Fisheries Management in the Age of Austerity"
Oral Presentation Abstracts

Thursday, February 28th, 8:40 am – Keynote Address

The future of fisheries and aquatic ecosystems in Canada: roles of human capital, public engagement and scientific evidence

Steven J. Cooke* Fish Ecology and Conservation Physiology Laboratory, Department of Biology and Institute of Environmental Science, Carleton University, 1125 Colonel By Dr., Ottawa, ON, K1S 5B6, Canada

The Canadian landscape is defined by three oceans, vast networks of rivers and streams, and countless lakes and wetlands that are home to diverse and productive fisheries from coast to coast to coast and deliver a myriad of ecosystem services. Given the abundance of aquatic resources, it is not surprising that Canada has a long history as a leader in fisheries science, management, and policy, albeit not without some colossal failures. Though reflecting on the past is informative, thinking about the future is particularly prudent given the ever-changing geo-political, ecological and socio-cultural world in which we live. Here I consider the future of fisheries and aquatic resources in Canada with a focus on our human capital in terms of trainees (current and future), fisheries stakeholders and the broader society, and the fisheries science and management community. Questions addressed include: how do we recruit, prepare, and inspire the next generation of fisheries professionals; how do we engage the public in fisheries issues such that fisheries and healthy aquatic systems are valued and protected; and how do we ensure that decision-makers rely on credible scientific evidence rather than "faith-based" science or none at all? Aquatic resources in Canada and elsewhere face many threats and there is evidence of dramatic changes in some aquatic ecosystems including fish populations. Understanding and solving complex problems facing fisheries and aquatic resources will require immense intellectual capacity and creativity, an engaged

and environmentally-literate populace, and transparent evidence-based governance and management processes. Although in Canada our fisheries resources are rich, the way to protect those riches in perpetuity is through investing in people, and developing processes that enable those people to contribute meaningfully. Rethinking the role of our human capital and equipping fisheries professionals and stakeholders with the skills, capacity and motivation to take on this critical task would seem to me to be the only way to ensure that the future of fisheries and aquatic ecosystems in Canada is one that is healthy, productive and sustainable, and the envy of and a model for the rest of the world. Failure to do so has the potential to have dire long-term ecological and socio-economic consequences.

Steven Cooke • Carleton University • steven_cooke@carleton.ca

Thursday, February 28th, 9:10 am

Conservation Implications of Genetic Structure among Core and Northern Edge Populations of Spotted Gar (Lepisosteus oculatus), based on microsatellite analysis

William R. Glass[1]*, Ryan P. Walter[2], Daniel D. Heath[2], Nicholas E. Mandrak[3] and Lynda D. Corkum[1] [1]Department of Biology, University of Windsor, Windsor ON. N9B 3P4 [2]Great Lakes Institute for Environmental Research, University of Windsor, Windsor ON. N9B 3P4 [3]Great Lakes Laboratory for Fisheries and Aquatic Sciences, Fisheries and Oceans Canada, Burlington ON. L7R 4A6

Conservation of the range-wide genetic diversity of a species is important for the long-term survival of the species, especially in the face of a changing climate. Populations at the edge of a species' range may evolve more rapidly than populations at the core of the species' range due to being small and isolated under harsher environmental conditions. In this study, we investigate the population genetic structure of the Spotted Gar (*Lepisosteus oculatus*) in North America using microsatellites. The population genetic structure of the Spotted Gar showed a distinct clustering of the populations in the southern core of the species' range separate from populations at the northern edge of the range. Within the northern group, Michigan and Point Pelee populations were distinct from each other while Rondeau Bay had genotypes belonging to both. The temporal stability of the genetic structure at the Rondeau Bay site was investigated and it was found to be temporally stable. Conservation of the northern edge populations of Spotted Gar, particularly the population at Rondeau Bay, will be important for maintaining the genetic diversity within the species.

William Glass • University of Windsor • williamrglass@gmail.com

Thursday, February 28th, 9:30 am

Gear Selectivity and Maturation Schedules of Lake Huron Lake Whitefish

Jenilee Gobin* (Trent University), Michael G. Fox (Trent University) and Erin S. Dunlop (Ontario Ministry of Natural Resources)

Lake whitefish support the largest commercial fishery in the Great Lakes; and in Lake Huron which supplies the majority of these fish, they comprise up to 80% of the annual commercial catch. In recent years, lake whitefish yields alone have consistently met or exceeded the 3.8 million kg/year objective set for all coregonines combined. As such, these populations are subject to high rates of fishing mortality. High mortality alone has been linked to maturation at younger ages and smaller sizes, which could negatively affect stock productivity. Because of the inherent link between life history traits and body size, size-selective fishing gear can also select for certain types of history traits; driving evolution either in similar or opposing directions to existing selective pressures that determine natural rates of mortality. Because different types of fishing gear exhibit different selectivities, effects on life history traits are also likely to differ. Lake Huron's lake whitefish fishery employs two main gear types: trap nets, which tend to capture all fish above a minimum size, and gillnets that capture mid-sized fish and exclude those smaller or larger than a certain size range. Using an individual based model our study examines the effects of these two gear types on maturation schedules of Lake Huron lake whitefish; information that could be incorporated into the development of management strategies aimed at minimizing the potential for fisheries induced evolution.

Jenilee Gobin • Trent University • JenileeGobin@trentu.ca

Thursday, February 28th, 9:50 am

Bayesian Decision Networks: A Framework for the Scientific Management of Fisheries Assessment and Research

Kevin Reid*[1, 2], Tom Nudds[1] and Daniel Duplisea[3]
[1]Department of Integrative Biology, University of Guelph, [2]Ontario Commercial Fisheries' Association, Maurice Lamontagne Institiute, Department of Fisheries and Oceans

This talk will describe a research proposal to use the Lake Erie walleye stock assessment system to provide a rare "worked example" of the use of Bayesian Decision Networks (BDN) and Value of Information (VoI) analysis to aid decision making about allocation of funding for stock assessment and research. Assessment and management capacities of fisheries management agencies are increasingly challenged by "austerity" budgets imposed by various levels of government, and by sophisticated and demanding stakeholders with often conflicting objectives. Attribution and recovery of the costs of fisheries assessment, research and management is an on-going issue in many of the world's commercial fisheries; consequently, sound decisions about stock assessment programs and related research are needed to ensure the sustainability of fish stocks and fishing industries. A framework for decision analysis of fisheries assessment programs and research proposals is needed to help decision makers optimize the allocation of scarce assessment and research resources in a defensible, transparent way. Such a framework will also facilitate understanding and ranking of the assessment and research priorities and will be increasingly useful as governments seek

to recover the costs of assessment directly from industry and industry seeks to ensure that stock assessment and research are efficient.

Kevin Reid • University of Guelph • kevin.reid@uoguelph.ca

Thursday, February 28th, 10:30 am

Koi Herpesvirus and subsequent mass die-offs of Cyprinus carpio carpio L. *in Lake Simcoe: A case study examining fish disposal and potential for land contamination*

Kira Jade Cooper*, Stephen Murphy, Leonard Tsuji, Ken Oakes
(University of Waterloo)

Koi Herpesvirus (KHV), a species-specific DNA virus (family herpesviridae), is responsible for episodic mass mortalities of *Cyprinus carpio carpio* L., (common carp) throughout the world. KHV's broad geographical distribution and extremely high mortality rate among infected fish, creates significant disposal issues when mass die-offs occur. Carp within the Great Lakes and much of the world are known to bioaccumulate significant amounts of hazardous toxins such as polychlorinated biphenyls (PCBs), dichlorodiphenyltrichloroethane (DDT), mercury and pesticides, which have been associated with numerous adverse human and environmental health effects. Although suites of histopathological and water quality assessments are frequently conducted during large fish-kills, standardized evaluations quantifying the relative contaminant burdens within carcasses to safely and effectively determine appropriate methods of disposal are rarely performed. A case study conducted on Snake Island, Lake Simcoe some years after the 2008 KHV outbreak and subsequent carp die-off in southern Ontario evaluated contaminant concentrations in soil and worm samples taken from disposal pits on the island and compared to control sites. While detectable concentrations of pesticides, mercury and PCBs were detected in soil and worms adjacent burial pits, legacy contamination at sites presumed to be controls precluded meaningful comparisons.

Kira Jade Cooper • University of Waterloo • kcooper@uwaterloo.ca

Thursday, February 28th, 10:50 am

Tracking Ghosts: using environmental DNA detection to find invasive and endangered species.

Chris Wilson* (Ontario Ministry of Natural Resources, Trent University)

Effective management of both endangered and invasive species requires sensitive detection of species occurrences, often at low abundances. In aquatic environments, detection of rare species such as endangered taxa or early-stage invasive species can be further confounded by site accessibility, sampling gear, and capture efficiency, with direct observation being difficult at best. Discriminating between detection failure (null) versus true absence (zero) can be problematic, but has significant consequences for species and habitat management. Experimental trials using environmental DNA (eDNA)

in a controlled environment to determine species occurrence have confirmed the taxonomic specificity and spatial, temporal, and quantitative sensitivity of eDNA detection. As a result, eDNA surveillance is currently being used to determine the presence or absence of aquatic Species At Risk (spotted gar and redside dace) in natural habitats, as well as to survey Ontario waters of Lake Erie for the potential occurrence of Asian carps (bighead and silver carp). Our results indicate that environmental DNA is a reliable method for species detection in freshwater systems, and can be used as an effective sampling technique for detecting both invasive and endangered freshwater species.

Chris Wilson • OMNR • chris.wilson@ontario.ca

Thursday, February 28th, 11:10 am

Exploring food sources supporting the diet of Hemimysis anomala, the latest invader of the Great Lakes.

Jérôme Marty* (Genivar)**,** Jessica Ives (U. of Waterloo), Yves de Lafontaine (Environment Canada), Tim Johnson (Ontario Ministry of Natural Resources), Marten Koops (Fisheries and Oceans Canada) and Michael Power (U. Of Waterloo)

Invasive species are a known stressor on aquatic ecosystems, particularly in the waters of the Great Lakes basin. The most recent invader, *Hemimysis anomala*, has had significant impacts on the food webs of Europe, where it invaded previous to its spread to North America. This study used carbon and nitrogen stable isotopes to characterize and compare the diet of *Hemimysis* from 15 sites in the Great Lakes basin. Results indicated that: 1) *Hemimysis* relied predominantly on pelagic carbon sources at the majority of sites, and isotopic differences between life-stages existed at two of the 15 sites examined, 2) the trophic position and reliance on pelagic food sources did not differ significantly between lotic and lentic sites, and 3) the isotopic niche width of *Hemimysis* was spatially heterogeneous, varying by an order of magnitude among sites, but was unrelated to the degree of isotopic variation in the basal food web at each site. Observed ranges in trophic offset and the pelagic fraction of dietary carbon indicate that *Hemimysis* derives carbon from both benthic and water column sources, as well as at multiple trophic levels. Our results support the notion that *Hemimysis* is a generalist consumer with pronounced dietary flexibility.

Jérôme Marty, Genivar, 2611 Queensview Drive, Ottawa, ON, K2B 8K2
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Thursday, February 28th, 11:30 am

Systemic Review of the Effects of Siltation on Freshwater Fish and the Efficiency of Siltation Control Devices

Jacqueline M. Chapman[1]*, Shireen M. Bliss[1], Maxime Veilleux[1], Caroline Levert[2], Marie-Ève André[2], Catherine Proulx[2], Steven J. Cooke[1] and Nicholas W.R. Lapointe[1]

[1]Fish Ecology and Conservation Physiology Laboratory, Department of Biology and Institute of Environmental Science, Carleton University, Ottawa, ON [2]Fish Ecology and Conservation Laboratory, Department of Biology, University of Ottawa, Ottawa, ON

Siltation is well recognized as a contributor to habitat degradation, particularly in freshwater ecosystems. Suspended sediments decrease primary production, alter aquatic plant species composition and homogenize invertebrate communities. Changes in fish abundance, species diversity, feeding behaviour and spawning success have been attributed to increased sediment levels. Though a large body of research has addressed varying parameters surrounding this issue, current syntheses are qualitative and do not include detailed meta-analyses. For this study we conducted a meta-analysis on the effects of siltation on fish: i) abundance and diversity; ii) feeding; and, iii) spawning success. To mitigate the effects of siltation, control devices are used to reduce point-source sedimentation that occurs during riparian development, including silt fences and sediment traps. We further investigated the efficiency of siltation-control devices, including: iv) silt fences; and, v) sediment traps. This research will clarify the effects of silt on freshwater fishes, assess the effectiveness of commonly used siltation control measures, and identify points of weakness in our current understanding of sedimentation.

Jacqueline Chapman • Carleton University • jacqchapman@gmail.com

Thursday, February 28th, 1:00 pm

Monitoring Fisheries in the Age of Austerity: Innovative Approaches to Data Capture

Helen Ball[1], Bob Bergmann[2], Kevin Collins[1], **Warren Dunlop[1*]**, Matt Garvin[1]
[1]Ministry of Natural Resources, Fisheries Policy Section [2]Ministry of Natural Resources, Southern Region Planning Unit

Successful management of fisheries, fish communities and their supporting ecosystems requires clear, specific and measurable objectives. In order to determine if fisheries management actions and policies are achieving the desired objectives, monitoring at appropriate spatial and temporal scales is required. Monitoring and assessment are, therefore, key components of an effective fisheries management framework. As budgets shrink and costs increase, however, maintaining traditional long term monitoring programs becomes more difficult and fisheries managers are challenged to find innovative ways to collect data. We discuss several new approaches that MNR is taking to monitor fisheries in the Age of Austerity: the Inland Lakes Broad-Scale Monitoring Program; the Survey of Recreational Fishing in Canada; the Licence to Collect Fish for Scientific Purposes; and Fish ON-Line.

Warren Dunlop • OMNR • Warren. I. Dunlop@ontario.ca

Thursday, February 28th, 1:20 pm

Evaluating fish movement through the Welland canal using acoustic telemetry.

Marson, David*, Jaewoo Kim, and N.E. Mandrak (Fisheries and Oceans Canada)

Historically, fish movement through the Great Lakes basin has been limited by biogeographical barriers. Natural barriers to migration, such as Niagara Falls, have prevented fish movement from Lake Ontario to the upper Great Lakes basin. A number of human mediated pathways have now enabled fish to breach these barriers: the construction of the Welland canal, for example, provides fishes with the opportunity to circumvent natural barriers and move into the upper Great Lakes basin. A study by Fisheries and Oceans Canada, in collaboration with the St. Lawrence Seaway Commission, has been undertaken to track the movement of fishes in the Welland canal system. Given that it is a potential pathway for the movement of invasive fishes between Lake Ontario and Lake Erie, it is important to both demonstrate and quantify fish movement through the Welland canal system. Acoustic telemetry equipment has been deployed to monitor the activity of tagged native fishes. A total of 21 receivers are currently deployed throughout the Welland Canal system, along with 79 acoustically tagged fishes. Preliminary analyses of telemetry data indicate that tagged fish movements are limited within the Welland Canal system; however, tracking will continue throughout the next two years to determine relevant variables and the seasonal potential for movement.

David Marson • DFO • *david.marson@dfo-mpo.gc.a*

Thursday, February 28th, 1:40 pm

Smartphones and digital tablets: Emerging tools for data collection and education in fisheries

Lee F. G. Gutowsky*, Jenilee Gobin[2], Nicholas J. Burnett[1], Jacqueline M. Chapman[1], Lauren J. Stoot[1], and Shireen Bliss[1]

[1]Fish Ecology and Conservation Physiology Laboratory, Department of Biology, 1125 Colonel By Drive, Carleton University, Ottawa, ON, Canada, K1S 5B6 [2]Environmental and Life Sciences Graduate Program, Trent University, 1600 West Bank Drive, Peterborough, ON, Canada, K9J 7B8

Smartphones and digital tablets have become widespread and now offer a variety of hardware and software applications designed to improve work efficiency. With new waterproofing technology, cases, and peripheral adapters, smartphones and digital tablets are continually becoming more relevant for data collection and education in fisheries. Here, we synthesize some of the available information on smartphone and tablet use for data collection and education, and explore the current uses and future opportunities for these devices in fisheries. Smartphones and tablets are used extensively to collect data for

agricultural, geographical, and medical purposes, often with the device's multiple hardware accessories (e.g., camera, GPS, accelerometer) and software applications (apps). To enhance student learning, some educators are integrating tablets into curriculums for both indoor and outdoor course work. In fisheries, smartphones and tablets are used for data collection and public outreach and awareness. We conclude by discussing future opportunities for these technologies for fisheries professionals. Overall, the objective of this mini review is to demonstrate that smartphones and digital tablets are useful tools for fisheries professionals, including technicians, managers, and educators.

Lee Gutowsky • Carleton University • leegutowsky@gmail.com

Thursday, February 28th, 2:00 pm

Stock assessment and management of Lake Nipigon lake whitefish (Coregonus Clupeaformis): A Value of Information Approach

Reid. K.[1,2]*, Jiao, Y[3]., Tsiplova, K[2]., Nudds, T.[1] and E. Desson[4].

[1]Department of Integrative Biology, University of Guelph, Guelph, ON, [2]Ontario Commercial Fisheries' Association, Blenheim, ON, [3]Department of Fisheries and Wildlife Sciences, Virginia Polytechnic Institute and State University, Blacksburg, VA, U.S.A., [4]Anishinabek/Ontario Fisheries Resource Centre, North Bay, ON .

A series of alternative hierarchical and uniform Bayesian surplus production models were used to estimate biological reference points, i.e., F_{MSY} and B_{MSY} and their uncertainty. We estimated the historic and current status of the Lake Nipigon lake whitefish fishery and showed that both the reference point estimates and stock status were highly uncertain. The results were highly sensitive to the priors and the catch and CUE time series used for parameter estimation. Using data from 1999-2010 resulted in much higher estimates for r and smaller estimates for K than when data from 1917-2010 was used, but the 1999-2010 times series generated bimodal posterior estimates of r and K, and depletion. DIC was used to rank the models. According to the best model, the probability of overfishing in 2010, i.e., $P(F_{2010}>F_{MSY})$, was very low at 0.005, while the probability that the population was overfished in 2010, i.e., $P(B_{2010}<B_{MSY})$ was 0.544 due to high uncertainty about both B_{2010} and B_{MSY}. A Bayesian decision network model of the fishery was used to determine and rank the value of information associated with r, K, catchability, biomass and BRPs. The implications of the VOI analysis for decisions about assessment, harvest policy, and options to reduce stock status uncertainty to more acceptable levels, are discussed.

Kevin Reid • University of Guelph • kevin.reid@uoguelph.ca

Thursday, February 28th, 2:20 pm

Far North Aquatic Science Projects: MNR/NESI preliminary investigations under the Far North Information and Knowledge Management (FN-IKM) initiative.

Steve McGovern* Ontario Ministry of Natural Resources
Northeast Science and Information (NESI) Aquatic Ecosystems Science Team

The Far North Information and Knowledge Management (FN-IKM) program is a proactive effort to provide and improve our best and most current information and knowledge in support of community and broad-based planning in Ontario's Far North area. The information acquired is intended to inform First Nations communities and resource planners interested in both resource management opportunities as well as protection measures. Knowledge and information pertaining to the aquatic ecosystems within the Far North watersheds is sparse. Most accounts focus on some very specific nodes of interest with the more expansive remaining waterscape relatively unexplored. Our knowledge, for example, on the location, distribution and status of many sensitive species (e.g. Lake Sturgeon) and status on the populations of species important for subsistence use is very poor.

This presentation provides an overview of our preliminary studies and investigations of Far North rivers, aquatic ecosystems and resources particularly important to the resident First Nations communities. We highlight some outcomes of our discussions with First Nations community members and their Tribal Council and their articulation and perceptions of the water, land and pending resource interests. These discussions largely informed and determined the priority for study type and location. We also provide some examples of our investigations progress to date including: fish community and habitat reconnaissance work in the Albany River, in concert with the Mushkegowuk Environmental Research Center (MERC); developing a GIS-based tool for characterizing river morphology as well as many other physical attributes using remote methods; approaches for acquiring Traditional Ecological Knowledge on Lake Sturgeon (Peawanuck); and finally, a status and trends report which suggests knowledge gap areas to attend to for improved resource protection and planning decisions.

Steve McGovern • OMNR • steve.mcgovern@ontario.ca

Friday, March 1st, 09:00 am

Canadian Recreational Fisheries: 35 Years of Biological, Social and Economic Data

Jacob W. Brownscombe[1]* William Bowden[1], Shannon Bower[1], Liane Nowell[1], Jonathan D. Midwood[1], Steven J. Cooke[1], and Neville Johnson[2]

[1]Fish Ecology and Conservation Physiology Laboratory, Department of Biology, Carleton University, 1125 Colonel By Dr., Ottawa, ON K1S 5B6 Canada
[2]Statistical Services, Fisheries and Oceans Canada, 200 Kent St., Ottawa, ON Canada

Recreational angling is a highly popular activity worldwide that accounts for an estimated 12% of global fish harvest and contributes hundreds of billions of dollars to the global economy. Unfortunately, the aforementioned statistics are actually guestimates or gross

extrapolations. Quite simply, little is known about the global state of recreational fisheries - an information gap that needs to be addressed to develop effective management and conservation strategies. Canadian recreational fisheries provide an ideal platform on which to build such a global recreational fisheries assessment framework. Home to over 2 million lakes and rivers that support popular recreational fisheries, Canada is unique in that there is an extensive long-term dataset on the biological, social, and economic dynamics of these fisheries. Starting in 1975, the Department of Fisheries and Oceans (DFO) has collected these data through mail surveys to recreational anglers at five-year intervals. Longitudinal trends in biological (i.e. catch and harvest by species), social (number of anglers, demographics, and effort), and economic (expenditures and major purchases) dynamics of Canadian fisheries will be discussed, along with the utility of these data for understanding and managing recreational fisheries. This multifaceted approach may serve as a model for research and analysis that can be used to guide national and international fisheries management in the future.

Jake Brownscombe • Carleton University • jakebrownscombe@gmail.com

Friday, March 1st, 09:20 am

To Re-Channelize or Naturalize: The Legacy of Urban Streams Comes to Bear

Christine Tu-Parker*, Ryan Ness (Toronto and Region Conservation Authority)

Decades ago, many sections of urban watercourses within the Toronto and Region Conservation Authority (TRCA) jurisdiction have been channelized with concrete lining or other hard bed and bank treatments. While this past practice was intended to improve the conveyance capacity of the channel and reduce flooding, current knowledge on urban hydrology and fluvial geomorphic processes show that this approach is detrimental to the overall health of the stream and can lead to extreme erosion problems at the site or downstream of the channelization. With the end of the design life approaching for many of these channels (approximately 50 years), failures in structural integrity and bed/bank erosion are already occurring in some urban areas. More intense weather systems are predicted for Southern Ontario, linked to a changing climate, and may accelerate the rate of infrastructure failure. Municipalities responsible for channel maintenance or have buried infrastructure to protect are faced with deciding what management action to take: do nothing until a crisis condition, replace/repair damaged concrete with new concrete or consider the options within the evolving practice of natural channel design. The TRCA, together with partner municipalities, have proposed a methodology to evaluate the risks and potential benefits of naturalizing these channels, including ecosystem services and cost savings. Hydrologic modeling (HEC-RAS) was employed to identify eleven areas where additional flood risk (regional storm event) would not occur due to naturalization. A wide range of technical and social variables were identified and used to rank these candidate areas and then a weighting exercise determined the priority locations for naturalization. Broader stakeholder input is currently being sought regarding the proposed weighting scheme (it's a little surprising) and the need to plan for system resiliency rather than immediacy or "permanency".

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Friday, March 1st, 09:20 am

The Fraser River Salmon Fishery: A Socio-Ecological Case Study Relevant to Fisheries Management and Conservation.

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Fisheries management is complex. Managers deal with science-based information (and its uncertainties) as well as a variety of external pressures from stakeholders. There is increasing recognition that social sciences (also known as human dimensions) can be used to inform management on stakeholders' perspectives, preferences and other psychometric aspects on management and conservation initiatives. Additionally, bridging the gap between biological and social sciences can prove to be a valuable approach to fisheries science and management. We use the British Columbian lower Fraser River sockeye salmon fishery as a case-study to explore how socio-ecological information can help management in decision making and improving conservation strategies.

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Friday, March 1st, 10:20 am

The Status of Brook Trout in the Credit River Watershed

Phil Bird*, Credit Valley Conservation

The brook trout (*Salvelinus fontinalis*) is a sensitive indicator species of coldwater habitats and can be used as an integrated measure of watershed health. This native species was once much more widespread throughout southern Ontario. The Credit River and its tributaries contain increasingly important brook trout habitat in a watershed which is subject to development and other environmental stresses. The current status of brook trout in the Credit River watershed was investigated based on 13 years of fisheries monitoring by Credit Valley Conservation. At total of 22 monitoring sites were analyzed for overall generalized trends, and 18 of these sites were specifically analyzed for temporal trends in brook trout biomass and density. Significant declines were observed at both main river and tributary sites. Stream temperature and water quality have been identified as potential factors in some cases of observed decline. Barriers are also a critical impediment to brook trout restoration. Some modest improvement may be occurring at a very limited number of brook trout sites. This species is in decline in the Credit River watershed.

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Friday, March 1st, 10:40 am

The Aquatic Renewal Training Partnership: Building Capacity to Rehabilitate Aquatic Systems

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The Grand River Fisheries Management Plan originally used the term "Aquatic Renewal" to describe grassroots initiatives to rehabilitate degraded streams in that watershed to a more functional state. A key element of the aquatic renewal program is community partners who have the knowledge and capacity to lead rehabilitation efforts on their home waters. The first series of three aquatic renewal training sessions was led by MNR Stewardship Coordinators at the Guelph District in 2008 and targeted community volunteers. This pilot program was very well received by participants, and laid the groundwork for a more comprehensive training program involving partners from MNR, Trout Unlimited Canada, and the University of Guelph. With the second suite of sessions, the target audience was broadened to include entry level professionals from the wide array of disciplines involved in aquatic rehabilitation. A key message stressed during the sessions is that without an understanding of the physical and biological components of an aquatic system and how they interact to influence function or dysfunction, you will not solve the problems that are degrading the system and in fact you could make things worse. The third suite of three preliminary training sessions (workshops 1 – 3) is currently taking place in the winter of 2013. Advanced level training sessions (workshops 4 – 6) require the preliminary sessions as a pre-requisite and will take place in the fall of 2013.

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Friday, March 1st, 11:00 am

Recreational Fisheries Conservation and the Amendments to the Fisheries Act: Key Concepts and Concerns.

David Browne*, Canadian Wildlife Federation

On June 18, 2012, the federal government passed Bill C-38 which included substantial amendments to the Fisheries Act including changes to the prohibition on the destruction of fish habitat. In August and again in October, 2012 we brought together eighteen recreational fish conservation organizations from across Canada to examine the changes to the Act and explore the implications for the protection of recreational fisheries. Policy concerns and recommendations from these two workshops will be presented for discussion. The presentation will focus on key concepts including what is a recreational fishery, serious harm, permanent harm, fish that support a fishery, fish habitat, and

ongoing productivity. From a fisheries science perspective, the amendments to the Fisheries Act raise a number of challenges such as how to use fisheries production as the basis for regulation, defining serious harm to fish, and differentiating fish that support a fishery from those that do not. Conservation of freshwater fish in Canada under the amended Fisheries Act will require clarity around these key concepts and extensive input from fisheries scientists and managers.

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ANNUAL GENERAL MEETING
February 28th March 1st, 2013
Geneva Park, Orillia, Ontario

"Fisheries Management in the Age of Austerity"
Poster Presentation Abstracts

The fate of dead fish in an urban stream: insights for tracking studies and fish kill investigations

Muhametsafina, A.* (Institute of Environmental Science, Carleton University), J.D. Midwood (Department of Biology, Carleton University), S. Bliss (Department of Biology, Carleton University), K. Stamplecoskie (Department of Biology, Carleton University), S.J. Cooke (Institute of Environmental Science and Department of Biology, Carleton University).

Mortality is a key factor in understanding the population dynamics of fish. For studies using biotelemetry, missing individuals pose a challenge since the ultimate fate of both the animal and the tag are unknown. While there have been many studies on the mortality of fish associated with fisheries interactions and migration, there has been little research on the fate of fish that die. Furthermore, even though fish may be subject to high mortality rates, rarely are dead fish evident in the field except following a major fish kill. In lotic systems, there is the potential for carcasses to be dispersed great distances before decomposing. In contrast, during low water conditions or extreme drought, dead fish may end up on shore, where they are subject to scavengers and decomposition. In this study, we document a simulated small-scale fish kill of PIT- and radio-tagged fish to determine both the fate of deceased fish in a small stream and the radio and PIT tags with which they were tagged. In addition, we contrast the decomposition rates of deceased fish in-stream with those on the riverbank. By examining the role of scavengers, dispersal and decomposition, it is possible to understand the fate of dead fish in order to improve our understanding of fish kills and the impact of mortality in tagging experiments.

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The effect of Dreissenids on Density-Dependent Growth and Recruitment of Lake Huron Lake Whitefish

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Supporting its largest and most valuable commercial fishery, lake whitefish are an important resource in the Laurentian Great Lakes. Lake Huron supplies most of these fish and yields have been high since the mid 1990's. However at the same time, lake whitefish growth and condition have declined dramatically in several of the Great Lakes, including Lake Huron; mainly due to diet shifts following the establishment of dreissenid mussels. Given the substantial effect that changes in food resources have had on the growth and condition of lake whitefish, we hypothesized that density-dependent growth and stock-recruitment relationships could have also been affected by dreissenid mussel establishment. We used 25 years of lake whitefish data from the Ontario Ministry of Natural Resources Offshore Monitoring Program and the statistical catch-at-age stock assessment model for lake whitefish from southern lake Huron to evaluate whether density-dependent relationships have changed with dreissenid establishment, and identify drivers of any such change, as well as the implications for the fishery. Growth no longer appeared to depend on density after dreissenids established, and the stock-recruitment relationship also exhibited changes that coincided with dreissenid establishment in the early 1990s and the loss of *Diporeia* in the early 2000s. Trends in growth and its lack of dependence on density after dreissenid establishment could suggest that ecosystem change has reduced the carrying capacity for these populations. Low recruitment in recent years appear to be driven by an increase in the importance of factors other than density (e.g. temperature), and could also be due in part to changes in the characteristics of the spawning stock associated with delays in maturation and changes in the age-specific selectivity of the fishery.

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Investigation of Threats to Species at Risk Fishes in Grand Bend, Ontario

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The Grand Bend, Ontario, area supports three species at risk (SAR) fishes: the Pugnose Shiner (Endangered), Lake Chubsucker (Threatened), and Grass Pickerel (Special Concern). Recent fish monitoring by Fisheries and Oceans Canada (DFO) and the Ausable Bayfield Conservation Authority (ABCA) has shown that these SAR fishes live in three water bodies: the Old Ausable Channel (OAC), L Lake, and Old Mouth Lake (OML). These water bodies have still, clear water and abundant aquatic vegetation, providing unique fish habitat.

Three current issues in the OAC may represent threats to SAR fishes and their habitat. Nutrient inputs from adjacent subdivisions may be resulting in a rapid succession of the pond-like ecosystem to a more terrestrial ecosystem. The additional nutrients may also have contributed to recent winter kills. Finally, fluctuating water levels in the OAC may be affecting available habitat. A comparison of the trophic status and aquatic vegetation and fish communities in the OAC, L Lake, and OML will help to better manage the SAR fish habitat. Relationships between SAR fish abundance, aquatic vegetation, and water quality in the three systems, and an evaluation of the impacts of recent water level changes in the OAC on SAR fish abundance, will be presented.

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Oxidative Stress and Senescence throughout Migration of Pink Salmon (Oncorhynchus Gorbuscha)

Wilson, S.M., **Taylor, J.J.***, Mackie, T., Patterson, D.A., Willmore, W.G., Cooke, S.J.

A previously unidentified cost of migration in Pacific salmon (*Oncorhynchus* spp.) may be oxidative stress. Oxidative stress is caused by an imbalance between free radical production and absorption, leading to irreparable cellular damage that accumulates over time and contributes to senescence. The objective of this study was to determine if oxidative stress represents a significant cost of migration between river entrance and spawning of maturing pink salmon (*Oncorhynchus gorbuscha)*. Pink salmon tissues (plasma, heart, brain, red and white muscle, and liver) were collected from individuals at different stages of migration in the British Columbia Fraser river watershed. Each tissue was assayed for resistance to oxidative stress using the oxygen radical absorbing capacity (ORAC) assay, as well as for oxidative DNA damage using an 8-hydroxy-2-deoxy Guanosine (8-OH-dG) EIA kit. Results demonstrate that oxidative stress may be experienced differentially between tissues and may be dependent on antioxidant availability and mobility. A decrease in resistance to oxidative stress occurs across migration indicating oxidative stress may correlate with the rapid senescence associated with a semelparous reproductive strategy.

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The Need for Calibration of Depth Sensor on Telemetry Transmitters

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Acoustic transmitters are widely used to gain information on fish habitat use. Some transmitters contain pressure sensors, which are factory-calibrated before being sold; however, the values obtained from these sensors have a certain range of error. Our goal is to assess the accuracy of these pressure sensors and to evaluate the need for additional

calibrations. To evaluate error, we conducted calibrations on acoustic transmitters with pressure sensors from VEMCO either in lab (air-pressure-based calibrators) or the field (water calibrations). The slopes and intercepts of calibrated sensors were compared to the factory-calibrated slopes and intercepts to compare calibration methods and identify directional biases. In addition, we evaluated the relevance to ecological data of using researcher- versus factory-calibrated pressure sensors. Using the two forms of calibrated data from the same transmitters, we compared basic summaries of depth selection (e.g., diel patterns, small vs. large fish) for tagged fishes. Finally, we evaluated external effects (e.g., time, temperature, salinity, altitude) on sensor output. To estimate changes in sensor output over time, we re-calibrated sensors from transmitters returned to Great Lakes Fishery Commission after being deployed in Lake Trout (*Salvelinus namaycush*) for 1-2 years, and compared the slopes and intercepts obtained to values from the original calibrations. To determine the effects of temperature, we calibrated the same sensors at varying temperatures and compared slopes and intercepts. These results will guide researchers on the necessity of undertaking independent calibrations.

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Lake Ontario Coastal Wetlands and Native Freshwater Mussels: Refugia from Invasive Dressenid Mussels?

Brumpton[1], **S. Reid[2*]**, S. Hogg[2]*, and T. Morris[3];

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Over the past twenty years, the invasion of zebra mussels (*Dreissena polymorpha*) has resulted in a catastrophic decline of Great Lakes native mussels. However, refuge sites for native mussels have been found in nearshore wetland habitats of Lake St Clair and Lake Erie where fewer zebra mussels are present. Identifying the importance of coastal wetlands in other Great Lakes is critical for maintaining native mussel diversity and the recovery of mussel species at risk. During 2011 and 2012, we intensively sampled 24 Lake Ontario coastal wetlands for freshwater mussels and compared the effectiveness of two sampling methods (tactile and clam rake) to detect mussel species. As many as 12 different species were identified from live individuals collected at different wetlands; with Giant Floater (*Pyganodon grandis*) being present at 22 of the 24 wetlands. Tactile searches resulted in the collection of twice as many live individuals and species than clam rake searches. Live dreissenids were found in 11 of the 24 sites. Although suspected to have been extirpated from Lake Ontario, populations of the federally endangered Eastern Pondmussel (*Ligumia nasuta*) were discovered at six wetlands. Surveys also found Lilliput (*Toxolasma parvum*) populations in both Hamilton Harbour and Jordan Station, with Jordan Station also carrying a population of the federally threatened Mapleleaf (*Quadrula quadrula*). Although occurring at low densities, our research indicates that Lake Ontario coastal wetlands provide a refuge for native freshwater mussel species from the catastrophic effects of zebra mussel invasions.

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Impacts of Electromagnetic Fields from Wolfe Island Submarine Cable on Nearshore Fish Diversity and Distribution.

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A recent review of the impacts of offshore wind power projects to Great Lakes fishes and their habitats identified that effects related to electromagnetic fields represent one of the most significant knowledge gaps. The limited amount of research undertaken to date indicates that electromagnetic fields may alter migratory behaviour and habitat use by fishes, and in particular electromagnetic-sensitive fishes such as American Eel, Lake Sturgeon, and salmonids. We assessed the impacts of an 8 km high-voltage (245 kV) transmission cable that runs across the lake-bed of eastern Lake Ontario between Wolfe Island and Kingston, Ontario. The objective of our study was to determine whether the spatial pattern and composition of nearshore fishes is influence by proximity to the cable and its associated electromagnetic fields. Spatially intensive point electrofishing surveys were used to characterize patterns of nearshore fish communities relative to the location of the transmission cable. We compared number of fish and species richness between study and reference transects, determined the influence of habitat and proximity to cable on fish community structure and completed analysis to detect boundaries in fish assemblage composition. There was no significant difference in the structure of nearshore communities between the communities in close proximity to the cable and the reference transects. Fish community composition was found to be strongly correlated with water depth, substrate size, amount of complex aquatic vegetation but not with distance from transmission cable.

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