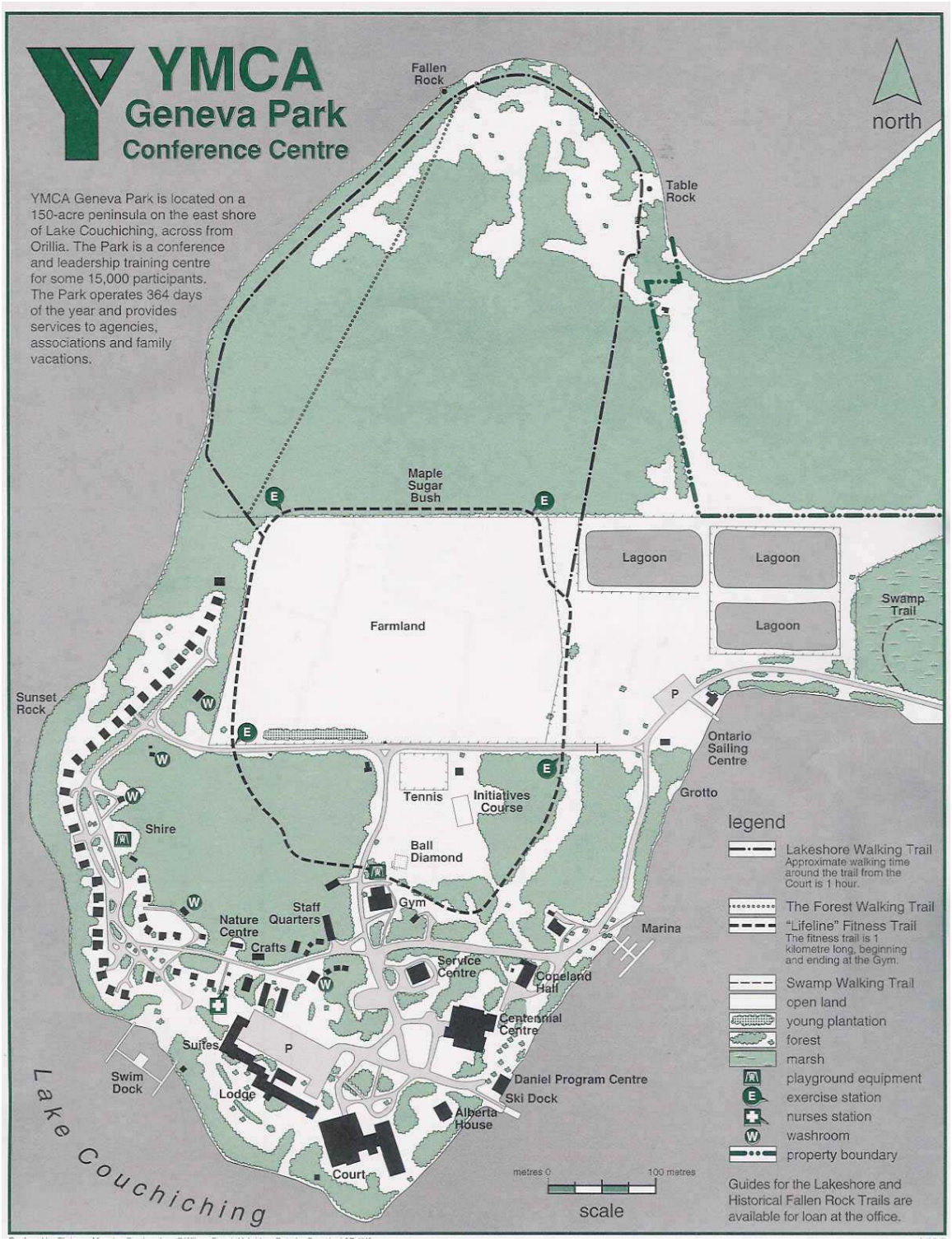
AMERICAN FISHERIES SOCIETY

ONTARIO CHAPTER

ANNUAL GENERAL MEETING

March 4th-6th, 2005
Geneva Park, Orillia

"Fisheries Connections"



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AMERICAN FISHERIES SOCIETY
ONTARIO CHAPTER

ANNUAL GENERAL MEETING

March 4th-6th, 2005
Geneva Park, Orillia

"Fisheries Connections"

Friday March 4th

Evening **Arrival, Registration & Opening Mixer (Geneva Lodge Lounge)**

Saturday March 5th

07:30 **BREAKFAST (Geneva Court)**

08:20 **Greeting and Conference Outline (Centennial Centre Room 15)**

08:30 ***A new framework for recreational fisheries management in Ontario. - D. Maraldo, OMNR***

09:00 ***The role of engagement and good science in environmental management. – J. Imhof, Trout Unlimited Canada***

09:30 ***Credit River Fisheries Monitoring Program – Connections With Other Disciplines and Watershed Communities. - B. Morris, Credit Valley C.A.***

10:00 ***Connecting the dots and fixing a broken river. – C. Bunt, Biotactic Ltd***

10:30 **Coffee & Poster Session (Room 15 Lounge)**

11:00 ***History of fishing agreements and fisheries management within Saugeen First Nation # 29 – T. Morais, Saugeen First Nation***

11:30 ***Connecting community with data and resources to facilitate participation in protection of water resources. - S. Rosolen, Centre for Sustainable Watersheds***

12:00 ***A model for collaborative assessment and building fisheries management capacity in First Nation communities. – M. Peltier, Anishinabek/Ontario Fisheries Resource Centre***

12:30 **LUNCH (Geneva Court)**

Student presenters are eligible for the E.J. Crossman Award for Best Student Paper/Poster.

13:30 *Watershed based fisheries management plan guidelines. – B. Koenig, OMNR*

Student Session

14:00 *Epidemiological issues in a conservation hatchery program: British Columbia's Living Gene Bank – C. Halpenny, U of Toronto*

14:20 *Decreased early growth of lake whitefish (Coregonus clupeaformis) in Lakes Erie and Ontario – C. Lumb, U. of Windsor*

14:40 *Fish-habitat associations in shallow Canadian waters of the Detroit River – N. Lapointe, U. of Windsor*

15:00 **Coffee & Poster Session (Room 15 Lounge)**

15:30 *Evolutionary changes in harvested populations. E. Dunlop, U of Toronto*

15:50 *Towards accurate estimates of optimal yield of walleye (Sander vitreus) using historical, empirical, and theoretical patterns of recruitment. - P. Venturelli, U of Toronto*

16:10 *Conservation Value of Alternative Life History Tactics in a Living Gene Bank - J. Walters, U of Toronto*

16:30 *Testing a Fish Index of Biotic Integrity for Great Lakes Coastal Wetlands: Stratification by Plant Zones – Y. Bhagat, U of Windsor*

18:00 *Saturday Evening Poster Session, Annual Business Meeting*

18:30 **BBQ SUPPER (Centennial Centre Auditorium)**

20:00 *Social featuring "The Painted Dogs"*

Sunday March 6th

07:30 **BREAKFAST (Geneva Court)**

08:30 *Aquatic invasive species in Ontario. – C. Ali, OMNR*

09:00 *Risk assessment of Asian carps in Canada. – B. Cudmore, DFO*

09:30 *Difficulties describing the nutrient status of some Ontario Lakes. – B. Clark, MoE*

10:00 *Canada's imperiled freshwater mussel fauna: Research and recovery. – T. Morris, DFO*

Student presenters are eligible for the E.J. Crossman Award for Best Student Paper/Poster.

10:30 **COFFEE (Room 15 Lounge)**

11:00 ***A science-based framework for approaching single-species, multi-species, or ecosystem-based recovery plans. – M. Poos, U of T***

11:30 ***How much sampling effort is required to detect freshwater fish species at risk? - J. Barnucz, DFO***

12:00 ***Vulnerability of trophy brook trout to angling in a small shield lake. - J. Parks, Damsa Integrated Resource Management Inc.***

12:30 **LUNCH (Geneva Court)**

Workshop: **Biotelemetry Systems - Theoretical & Practical Considerations**
- M. Sisak, Applied Biometrics Inc.

13:15 ***Workshop Outline:***
1) Review of Basic Physical Principles
2) Basic Terms Employed in Biotelemetry
3) Major Factors in a Biotelemetry System
4) Calculating Overall Biotelemetry System Performance
5) Typical System Performance Calculations
6) Similarities / Differences with Between Radio and Acoustic Systems
7) Telemetry Case Studies

15:45 ***Closing Remarks***

Posters:

Do agricultural drains provide fish habitat? - Stammler, K.L.*, Mandrak, N., McLaughlin, R., U. of Guelph

Dyking as a means of maintaining fish habitat in coastal wetlands in the face of climate change. – L. Bouvier, U of Guelph

Application of GIS to a risk assessment of the introduction and establishment of non-native fish species in the Great Lakes basin. - C. Rae*, C. Bakelaar, N. E. Mandrak, B. Cudmore, DFO

Changes in fish assemblages of three areas of concern in the lower Great Lakes. - Amy Edwards, Matthew Parslow and Ed Torenvliet, DFO

Web mapping tool for species at risk in Ontario – A. Doolittle*, DFO

Student presenters are eligible for the E.J. Crossman Award for Best Student Paper/Poster.

Oral Presentation Abstracts

Ali, C. (christine.ali@mnr.gov.on.ca)
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Aquatic Invasive Species in Ontario, Impacts and Actions

The second highest threat to the biological diversity of our Great Lakes is invading species. At least 160 invading species are now established in the Great Lakes. Originating from other parts of the globe, and without natural predators or controls, these invading species harm the ecological and economic health of our Great Lakes basin. Invading species such as the sea lamprey, zebra mussel and round goby out-compete native fish populations and species-at-risk for food and habitat; upset the balance of delicate aquatic food webs; spoil sport and commercial fishing opportunities; and cost industries and communities millions of dollars to control each year.

It is essential to try and prevent new introductions before they occur. Species are introduced by a variety of pathways and MNR is working on reducing the risks of introduction. Ballast water is perhaps the best known pathway, but there are many others including intentional introductions, live bait, live food fish, aquaculture, canals and the aquarium, water garden and pet trade.Ontario's program to help prevent the introduction and spread of invading species includes education and awareness, monitoring, control, and partnering with other jurisdictions and agencies to study invading species. MNR and the Ontario Federation of Anglers and Hunters (OFAH) have been partners in the fight against invasive species since the 1992 launch of the *Invading Species Awareness Program*.

Mandrak, N.E., **J. Barnucz,*** (barnuczj@dfo-mpo.gc.ca) M. Poos, and H. Surette
Great Lakes Laboratory for Fisheries and Aquatic Sciences, Fisheries and Oceans Canada, Burlington, Ontario

How much sampling effort is required to detect freshwater fish species at risk?

There are 31 fish species at risk (SAR) present in the Great Lakes basin. They are found in a wide variety of habitats from small, headwater streams to the hypolimnion of the Great Lakes proper. It is important to conduct ongoing assessments of the distribution and abundance of fish SAR to accurately determine conservation status, identify threats, and evaluate recovery actions. However, by their very nature, fish SAR are often difficult to capture and even more challenging to enumerate. We are currently developing species-specific sampling protocols for the ongoing, standardized monitoring of fish SAR. Preliminary sampling studies have allowed us to identify the most efficient gear to detect specific species at risk in both wadeable and nonwadeable systems. We are now interested in determining how much effort is required to determine fish community composition, and to detect fish SAR, using these gears at regional and local scales. To determine the sampling effort required at the regional scale, data for the multiple sites sampled within the Sydenham River watershed were used to construct species accumulation curves. To determine sampling effort required at the local scale, data for multiple sites or transects sampled within Point Pelee (sites), Old Ausable Channel (sites), Sydenham River (transects) were used to construct species accumulation curves. The results of these analyses will allow researchers to determine the gear and amount of effort required to detect fish SAR prior to conducting field activities.

Bhagat, Y.,* (bhagaty@yahoo.ca) Ciborowski, J.J.H., Brady, V.J., Johnson, L.B., Breneman, D., Schuldt, J., Hrabik, T., Richards, C.
Department of Biological Sciences, University of Windsor, Windsor, Ontario

Testing a Fish Index of Biotic Integrity for Great Lakes Coastal Wetlands: Stratification by Plant Zones

Fish community composition is often segregated along ecoregions, lakes or hydrogeomorphic types. However, attempts to develop an Index of Biotic Integrity (IBI) for environmentally homogeneous sites of the Great Lakes have had only limited success. Recently, Uzarski et al. (in press) used correspondence analysis to determine that the primary driver in coastal wetland fish community composition is emergent plant zonation. Consequently, they developed an IBI for sites dominated by (>50% cover) *Typha* (cattail) vegetation and a separate IBI for sites dominated by *Scirpus* (bulrush). We tested the IBIs developed by Uzarski et al. (in press) by applying their metrics to data collected as part of a multi-species indicator development project (Great Lakes Environmental Indicators, US EPA funded). We calculated Uzarski et al. IBI scores for 20 and 13 Great Lakes wetland sites with dominant *Typha* and *Scirpus* vegetation, respectively, that we had sampled in 2001-2003 using overnight sets of fyke nets. The sites had been selected to fall across gradients of population density, road density, urban development, point source pollution, and agriculture measured using a GIS-based analysis of land use. Sites with low levels of disturbance (reference condition sites) had high IBI scores. The *Typha*-specific IBI was most highly negatively correlated with a disturbance variable that combined population density, road density and urban development, whereas the *Scirpus*-specific IBI negatively correlated most strongly with agricultural intensity. The Uzarski IBI appears to be an effective indicator of some but not all classes of anthropogenic disturbance at Great Lakes coastal margins.

Bunt C. (cbunt@biotactic.com)
Biotactic, 691 Hidden Valley Rd., Kitchener, Ontario, N2C2S4, Canada

Connecting the dots and fixing a broken river.

Radio-tagged northern pike (472 - 752 mm TL) were released downstream from the Port Davidson Weir (Welland River) and both upstream and downstream from the Canborough Weir (Oswego Creek) to test bi-directional passage through two new natural fish bypass channels. Fish locations (n=888) revealed critical spawning habitat and the distribution of discharge-dependent barriers to fish movement. Movement patterns through the bypass channels indicated that upstream and downstream movement was possible over a specific range of flows, and fish did not become stranded by low water levels, and were not displaced by high discharge. Passage rate was 80 % for upstream migrating fish (Q = 0.7 - 15.2 m^3/s, n = 14), and 50 % for downstream migrating fish (Q = 0.8 – 6.4 m^3/s, n = 7) at the Port Davidson Weir. At the Canborough Weir, the initial upstream passage rate was 100 %, and the downstream passage rate was 89 %. Ten upstream movements occurred (Q = 0.4 – 7.6 m^3/s), and eleven downstream movements were recorded (Q = 0.2 – 3.7 m^3/s). Most upstream and downstream passage occurred while discharge in Oswego Creek was 1.2 m^3/s and maximum subsurface water velocity in the bypass channel during upstream passage was 1.1 m/s. Remediation of fish passage at these sites involved careful design, construction and monitoring of fish bypass channels that has resulting in restoration of river connectivity for the first time in decades.

Clark, B.J.* (bev.clark@ene.gov.on.ca) and A. M. Paterson
Ontario Ministry of the Environment, Dorset Environmental Sciences Centre

Difficulties with describing the nutrient status of some Ontario Lakes - the effect of large, seasonal differences in total phosphorus concentrations.

Late-summer, blue-green algal blooms in several lakes throughout Ontario have generated increased interest in describing both seasonal and between-year differences in the total phosphorus concentrations throughout these lakes. The focus of several ongoing studies is to describe whether or not there have been historical changes in the total phosphorus concentrations which could account for the perception that there have been recent increases in the severity of these blooms. Monthly sampling of total phosphorus at many locations by Lake Partner Program volunteers and others has shown large seasonal differences in total phosphorus concentrations. The magnitude of these changes and the observed differences in the seasonal phenologies between locations make it difficult to describe the nutrient status of these "multi-trophic" lakes. Traditional methods of tracking changes in total phosphorus, i.e. using spring turnover concentrations or ice-free means, may not be adequate if algal community responses are linked to large observed seasonal changes. It may therefore be necessary to adopt a novel approach to describing the total phosphorus climate in these lakes.

Cudmore, B.* (cudmoreb@dfo-mpo.gc.ca) and N. E. Mandrak
Fisheries and Oceans Canada, Great Lakes Laboratory for Fisheries and Aquatic Sciences, Burlington ON L7R 4A6

Risk Assessment of Asian Carps in Canada

Four species of Asian carps (bighead carp, black carp, grass carp and silver carp) have been introduced worldwide for aquaculture purposes. Subsequent to introduction into the southern United States, all four species have become established in the wild. Two species, bighead and silver carps, have been dispersing rapidly up the Mississippi River, wreaking ecological havoc along the way. As there are numerous connections between the Mississippi basin and Canadian watersheds, including the Great Lakes, there is considerable concern about their potential ecological impacts if established in Canada. In addition to natural dispersal, these species may also be introduced into the Canadian wild through the live food fish trade. Canada represents over 50% of the market for bighead and grass carp cultured in the United States. The Canadian government conducted a risk assessment to determine the ecological risk of Asian carps in Canada. This assessment included evaluating the risk of introduction, survival, reproduction, spread and fellow travelers (e.g. parasites, diseases, other invasive species). These components were assessed in an experts workshop using best available information on their biology, potential vectors of introduction, and impacts in both native and introduced ranges. The assessment concluded that the risk was high in, at least, some parts of Canada including the southern Great Lakes basin.

Dunlop E. S*.,(dunlop@zoo.utoronto.ca) B. J. Shuter, and U. Dieckmann
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Evolution in harvested populations

Recent research has suggested that due to its highly size-selective nature, commercial fishing can cause evolution towards smaller sizes and younger ages at maturation. Maturation earlier in life at smaller sizes will cause reduced yield and a poorer-quality fishery. Furthermore, these types

of evolutionary responses can occur relatively quickly but can take a long time to reverse, which might explain the poor recovery of many exploited marine stocks. Surprisingly, no study to date has considered that recreational fisheries may also pose a similar threat. For these reasons, we chose to study the potential for size-selective harvest by anglers to cause evolution of maturation in the smallmouth bass (*Micropterus dolomieu*), a highly targeted sport fish. We used an individual-based model, parameterized with data from two well-studied Ontario smallmouth bass populations (from Provoking and Opeongo lakes in Algonquin Provincial Park). The results indicate that harvest of individuals above a minimum size limit (25 cm) causes evolution of younger ages and smaller sizes at maturation. Increasing the minimum size limit still causes evolution but to a lesser degree. Encouragingly, imposing a protective slot limit or combined minimum and maximum size limits, significantly reduces the speed of evolution. Therefore, managers need to consider the use of strategies that reduce or slow the possible evolutionary impacts of fishing.

Halpenny, C (carli.halpenny@gmail.com)
Dept. of Zoology, University of Toronto, 25 Harbord St., Toronto, On, M5S 3G5

Epidemiological issues in a conservation hatchery program: British Columbia's Living Gene Bank

Survival from the smolt to adult life stage for the Keogh River steelhead trout (*Oncorhynchus mykiss*) of Northeastern Vancouver Island has dropped from a historic average of 15% (1976-1989) to below 1% currently omit all references from abstract. In an attempt to recover steelhead, the "Steelhead Recovery Plan" was initiated by the BC government in 1998, which combines watershed restoration, reduced fishing pressure and a Living Gene Bank (LGB) program (Wightman et al 1998). The LGB program was designed to use hatcheries as a conservation tool to raise smolts to adulthood, spawn them under a genetic protocol, and raise the fry and juveniles for release to migrate with the wild population. (Wightman et al 1998).

Disease has been recognized as an important factor in the reduction of both culture and wild populations (Hedrick, 1998). The expression and severity of disease relies on the complex interactions of variables associated with host, environment and pathogen (Hedrick 1998). Quantification of these variables is a difficult task; our project does not aim to provide conclusive cause-effect relationships but a quantitative survey that begins to quantify aspects of these variables, and examines how they correlate with the presence of infection. Specifically, we will examine: 1) variables related to host, pathogen and environment; 2) pathogenic presence in different age cohorts of wild and LGB steelhead and 3) differences between the wild and culture fish with respect to these variables and infection. This information will be synthesized in order to help highlight the epidemiological issues of an LGB program, begin an understanding of the implications for both the LGB and wild populations and begin to contribute to the understanding of the principal components of aquatic disease epidemiology

Imhof, J (jimhof@tucanada.org)
Trout Unlimited Canada

The Role of Engagement and Good Science in Environmental Management

This presentation will examine the need to develop habitat programs that are both technically sound, contextual and watershed-based AND linked to the concerns and interests to the local communities that live on or near these waters. The quality of habitat work and its perpetuation will only be as good as the engagement and commitment of the people most affected by it. We

need to develop better ways to link sound science to the people that care for the areas of interest so that we create long-term solutions that go beyond moving a few rocks and boulders to ensuring that local people look after their own waters. The role of agencies and NGO's is to help with the provision of good science and process and to assist with the facilitation of local solutions.

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Watershed-based Fisheries Management Plan (WBFiMP) Guideline

Several agencies and organizations in southern Ontario have recently initiated or completed fisheries management plans. Many of these plans have used a watershed-based (ecologically-defined boundary) approach in their development. A watershed-based approach to the development of fisheries management plans accommodates management tactics that target fish communities/habitats (as opposed to single species management), actively involves all agencies that have vested interests in fisheries management, and promotes public involvement and a partnership-based approach to fisheries management plan development and implementation. The Ontario Ministry of Natural Resources, Department of Fisheries and Oceans and conservation authorities recognize the need for a guideline to assist in the development and implementation of WBFiMPs. The guideline will promote consistency, continuity, provide support, and identify key data sources, tools, protocols and a network of experts.

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Fish-Habitat associations in shallow Canadian Waters of the Detroit River.

There are few quantitative studies on habitat requirements of fishes in large rivers because of the challenges of sampling these systems. In 2004, fishes were sampled at 60 randomly selected sites (30 inshore, 30 offshore) representing upstream, middle, and downstream segments of the Detroit River in May, July and September. We sampled using boat seining and electrofishing. Lengths of up to 30 individuals of each species were measured at each site. Shoreline features were recorded for onshore sites and microhabitat features were measured at all sites. Species of note include previously unrecorded Longear Sunfish (*Lepomis megalotis)* and Pugnose Minnow (*Opsopoeodus emiliae)* a species at risk. Range maps were produced for each species, showing four general distribution types; sparse, moderate, dense, and dense but absent from upstream sites. Length-frequency distributions were plotted for the most abundant species for each season to determine age-classes for habitat associations. Associations between fish species and environmental variables were analysed using CCA. Centrarchids were found in areas of high macrophyte density; Spotfin Shiner (*Cyprinella spiloptera)* were found in shallow waters with low turbidity; and Johnny Darter (*Etheostoma nigrum)* were found in shallow areas.

Lumb C.,* (lumb@uwindsor.ca) T. B. Johnson, A. Cook, and J. A. Hoyle,
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Decreased early growth of lake whitefish (*Coregonus clupeaformis*) in Lakes Erie and Ontario.

Lake whitefish (*Coregonus clupeaformis*) are a cold-water, benthic feeding fish native to the Great Lakes basin. Trends in lake whitefish abundance were similar in Lake Erie and Lake Ontario from

the 1950s until 1990, when abundance began to decline in Lake Ontario while remaining constant in Lake Erie. Although both lakes have undergone similar environmental changes, from decreasing phosphorous loading to invasion by dreissenid mussels, declining growth and condition were more pronounced in Lake Ontario. Reduced size-at-age was evident in Lake Ontario, but remained relatively constant in Lake Erie until the late 1990s. Limited size-at-age data are available for earlier time periods in both lakes to evaluate growth responses to ecosystem change. We used archived scales to measure annual increment width and back-calculated length-at-age of lake whitefish during three distinct time periods: 1) pre-phosphorous abatement, 2) post-phosphorous abatement but pre-dreissenid invasion, and 3) post-dreissenid colonization. Growth was significantly reduced in the first two years of life in Lakes Erie and Ontario in the 1990s compared to the 1980s. No change in growth was detected in the third or fourth years of life. It is possible that changes in whitefish growth are related to changes near the base of the food web because young whitefish consume primarily zooplankton.

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New Ecological Framework for Recreational Fisheries Management in Ontario.

Ontario is developing a new framework for fisheries management focusing on new Fisheries Management Zones (FMZs), managing and monitoring at the broad landscape level as opposed to individual lake management, and enhanced stewardship. This initiative will also rationalize fishing regulations to make them more standardized across the province and easier to understand. New FMZ boundaries will be based on ecological factors and angler use patterns such as the province's climate zones, watersheds, fishing pressure, and road networks. The total number of FMZs (formerly Fishing Divisions) has been reduced to 20 from 37. The new FMZs are scheduled to be in place for January 2007. The FMZs will become the unit of management for the majority of lakes so that fish populations are monitored, assessed and regulated at the zone level. The state of the fisheries resource will be monitored periodically, using standardized assessment protocols, and evaluated against selected criteria for species abundance, angling effort and basic habitat parameters. Enhanced stewardship at the FMZ level will provide increased public involvement in all areas of recreational fisheries management.

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History of Fishing Agreements and Fisheries Management within Saugeen First Nation # 29

From time immemorial the people of Saugeen First Nation # 29 have fished the waters of Lake Huron surrounding the Saugeen (Bruce) Peninsula. Historical references document the importance of hunting and fishing to the people of Saugeen's way of life and the establishment of a sustainable and productive fishery under Aboriginal stewardship. As early as 1834, Saugeen was entering into fishing agreements with the hopes of regulating the fishing activities occurring within their traditional waters. This agreement and subsequent others collapsed under the pressure of a growing non-Aboriginal commercial fish industry and the once plentiful fish stocks in Lake Huron were becoming severely depleted. Throughout the years, Saugeen First Nation # 29 continued to petition the government to protect their fisheries and fishing rights. Today, Saugeen First Nation # 29 has entered into fishing agreements with provincial and federal levels of government. They are involved in the co-management of the largest native commercial

fishery in the Great Lakes, where both traditional knowledge as well as modern procedures are used.

Morris, B (BMorris@creditvalleycons.com)
Credit Valley Conservation, 1255 Old Derry Rd., Mississauga, Ontario, L5N 6R4

Credit River Fisheries Monitoring Program – *Connections* with other disciplines and the public.

Credit Valley Conservation has developed an Integrated Watershed Monitoring Program to measure the effectiveness of programs for the protection and improvement of water quantity and quality together with biological diversity and productivity in terrestrial and aquatic ecosystems. Close to 10 specialized disciplines including hydrology, water quality, geomorphology and terrestrial ecology take measurements annually at over 40 sites. Fish are considered the overall indicators of watershed health. An Index of Biological Integrity was developed using biomass and species "sensitivity scores" for the wide range of fish communities found across 3 different physiographic regions on the Credit. Their response to cumulative stresses associated with urbanization, agriculture, aggregate extraction, water takings and restoration efforts are considered both spatially across the watershed and over a 5 year time span to date. Statistical analyses can also be done with other disciplines that represent habitat variables. Results are intended to provide feedback to decision makers as part of an Adaptive Environmental Management approach. Peer input and review is being encouraged. It is the public, however, that benefit and must become more aware and involved in such programs.

Morris, T.J. (morrist@dfo-mpo.gc.ca)
Great Lakes Laboratory for Fisheries and Aquatic Sciences, Fisheries and Oceans Canada, Burlington, Ontario

Canada's imperiled freshwater mussel fauna: Research and recovery.

The recent general status assessment of Canadian fauna concluded that 65% of freshwater mussel species are in need of conservation making this group the most imperiled group in Canada. Eleven of the 55 species which occur here have already been assessed by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) as being at risk (1 Extirpated, 8 Endangered, 1 Threatened, 1 Special Concern) with additional listings imminent. Southern Ontario is the hot spot of mussel diversity in Canada and home to 41 species including all 8 of the species listed as Endangered. The Thames, Grand and Sydenham rivers of the Lake Erie/Lake St. Clair drainage are the most diverse mussel rivers in Canada, however serious declines have been observed during the last two decades. Agricultural activity, expanding urbanization, impoundments and the introduction of non-native species have all been implicated in the local declines of these species. The Ontario Freshwater Mussel Recovery Team was formed in 2003 to address these declines, assess knowledge gaps and develop science-based Recovery Strategies for these species in accordance with the federal *Species at Risk Act*.

Parks J. W*., (john.parks@damsa.ca) and D. J. Parks
Damsa Integrated Resources Management Inc., 351 Algoma Street N., Thunder Bay, ON, P7A 5B4

Vulnerability of trophy brook trout to angling in a small shield lake.

Fly angling with a single rod was employed to remove trophy brook trout from an 8 ha Shield Lake in the spring of 2003. After five weeks of intermittent recreational angling, residual fish

were gill netted. The lake, initially devoid of sport fish was stocked with Lake Nipigon strain trout as part of an initiative to develop trophy brook trout fisheries for potential tourism applications. The lake was designated as a provincial sanctuary during the study. Angling removed 70 % of the total number of fish captured. Over half (71) of the 122 trout removed were angled in less than 10 rod hours indicating large brook trout (average = 1.1 kg (2.4 pounds) were very vulnerable to angling. The standing stock at the beginning of the removal exercise was calculated to be 16.6 kg/ha, almost identical to the average standing stock (16.3 kg/ha) observed in nine other small brook trout lakes in northeastern Ontario that had been placed under sanctuary status (Armstrong and Davis 1995).

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A model for collaborative assessment and building fisheries management capacity in First Nation communities.

The A/OFRC was created in 1996 through an agreement between the Anishinabek Nation and the Province of Ontario. The Centre acts as an objective broker of fisheries information to both First Nations and stakeholders. The Centre blends state-of-the-art fisheries science and assessment with local/traditional views of aquatic ecosystems and builds fisheries management capacity within First Nation communities. Since its inception, the centre has successfully completed 185 fisheries assessment projects and workshops with 30 different First Nation communities. Many of these initiatives have involved partners from non-aboriginal government agencies and stakeholder organizations. This presentation will highlight the Centre's operations and successes over the past nine years.

Poos, M.(markpoos@zoo.utoronto.ca)
Dept. of Zoology, University of Toronto, 25 Harbord Street, Toronto, ON, M5S 3G5

A science-based framework for approaching single-species, multi-species, or ecosystem-based recovery plans

Science-based approaches for developing recovery plans are needed to address the growing number of imperiled species. This study developed a framework for selecting between single-species, multi-species or ecosystem-based recovery plans. The proposed framework used habitat variables predicted to influence fish species at risk in the Sydenham River and tested if they were adequate predictors of the actual species at risk distributions by comparing two redundancy analysis models. The two redundancy analysis models developed compared the predicted habitat variables to a large suite of variables believed to influence stream fish communities. Three hypotheses of the response of species at risk communities to habitat gradients were used to fit the resulting models to an appropriate recovery plan. For fish species at risk in the Sydenham River, the habitat variables predicted to influence fish species at risk were generally related to their occurrences; however, species at risk were found in different habitats despite similar geographic distributions. Using the proposed framework, this suggested that ecosystem-based recovery plans were most appropriate. Although the difficulties with implementing recovery plans across multiple listed species remain, the proposed framework offers a basis for science-based decisions to guide the recovery planning process.

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Connecting community with data and resources to facilitate participation in protection of water resources.

Downsizing by all levels of government has decreased data collection required to support management and policy decisions. Citizens, bringing a strong local and historical perspective, have become increasingly active in collecting data due to their immediate and vested interest in environmental quality and protecting our natural heritage. Volunteer groups represent a huge potential work force, able to gather credible and relevant data that can complement government programs. However they need support in order to do this effectively. Difficulties that these groups face – access to standardized protocols, training, data and data management tools, volunteer management, fundraising – have been well-documented in several recent national reports.

Centre for Sustainable Watersheds (CSW), a non-profit group based out of eastern Ontario, draws on regional, provincial and federal resources to provide support to lake associations and other volunteer groups achieve their water protection goals. One of its signature projects has been development of Watersheds InfoXchange (WIX), a GIS-based information management system to help provide access to data and data management systems. This presentation will overview the key components of this innovative website and its vision for the future.

Data management and sharing are not the only issues faced by community. Over the past two years, Centre for Sustainable Watersheds worked with two other community NGOs, the Watershed Report Card and Citizens Environment Watch, to look at solutions to some of the challenges being faced by community monitoring practitioners. In June 2004, the group coordinated a meeting as a first step to bring representatives from conservation authorities, stewardship councils, municipalities, federal government, provincial government as well as volunteer monitoring groups together to discuss the feasibility of a provincial network of monitoring practitioners to support training, access to expertise, and information-sharing. 55 individuals participated in this inaugural meeting of what is becoming the Ontario Ecosystems Monitoring Council. This presentation will also look at the objectives of the Council, and the community-government connections being developed to support it.

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Towards accurate estimates of optimal yield of walleye (*Sander vitreus*) using historical, empirical, and theoretical patterns of recruitment

Accurate estimates of optimal yield are necessary to effectively manage fishes. Declining trends in stocks around the world suggest, in part, that current methods of estimating yield have fallen well short of this requirement. Increasingly, the inaccuracy of these models is being attributed to their failure to recognize that 1) survival of offspring depends on parental condition, and 2) life history depends on density. The major objective of my research is to incorporate this information into estimates of optimal yield for walleye (*Sander vitreus*), Canada's most intensively harvested freshwater fish. Collaborative research based at Queen's University suggests that parental condition is indeed important to survival of young walleye. Archival data from populations of walleye in and around Ontario are also being used to determine relationships between density and life history. Results of both projects will be built into an individual-based model to evaluate

their consequences for population dynamics, and how walleye respond to various management strategies. This information will then be incorporated into a conventional model of stock and recruitment for estimating optimal yield.

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Conservation value of alternative life history tactics in a living gene bank

Steelhead trout are endangered in many areas of British Columbia. A new conservation effort is the BC Living Gene Bank (LGB), a fish culture program that aims to increase population size while retaining natural genetic diversity and adaptation. Despite habitat restoration and fishing pressure alleviation, the Keogh River (BC) steelhead (*Oncorhynchus mykiss*) population declined dramatically due to reduced oceanic survival due to decreased productivity related to regime shifts and altered climatic conditions. In 1998, the LGB program removed 5% of the wild smolt run, raised them to maturity in culture, spawned the adults, raised the progeny to the parr and smolt stage, and then released them into the wild smolt run. The LGB program continued to do this for the 5-year program duration.

The successful contribution of LGB hatchery fish for wild production is not yet known. However, upon release there are alternative life history tactics expressed by the LGB fish. LGB smolts released into the Keogh River appear to follow one of three life history tactics: 1) immediate smolt migration; 2) river residency for one or more years and then smolt; 3) remain in-river to mature and spawn prior to any ocean migration. This third is a novel life history tactic that has not been observed in wild population to date.
We investigate the influence of the LGB program on wild recovery through the: 1) characterization of the alternative life history tactics in terms of their development, morphology, and demography; and 2) determination of the potential positive and negative impacts of each alternative life history tactic on wild population recovery.
LGB juveniles that remain within the river after release are larger in size than their wild conspecifics, but occupy similar habitats, and consume similar food as wild juveniles. LGB juveniles exhibit increased rates of precocity relative to wild juvenile steelhead. A proportion of LGB juveniles approach spawning condition upon release and fail to outmigrate, presumably to spawn precociously – a behaviour not documented in the wild population. Therefore, the LGB program has introduced a novel life history tactic with potentially strong implications for the efficacy of conservation hatchery programs.

Poster Presentation Abstracts

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Diking as a means of maintaining fish habitat in coastal wetlands in the face of climate change. (P)

We examined fish assemblages in six paired coastal wetlands across the southern Great Lakes basin. Each pair consisted of a closed (or natural barrier) coastal wetland and an adjacent open coastal wetland. Each wetland was sampled in the spring and fall of 2003 and 2004 using a grid-based sampling design and multiple gear types. Sampling methods included boat electrofishing and hoopnetting. Fish data from the closed and open wetlands were compared to determine if dikes affect fish species richness and diversity because fish habitat and accessibility to the wetland may be compromised. Species richness as well as species abundance was compared across all sites and between closed and open coastal wetlands. The Simpson's index of diversity (D) was calculated to compare fish assemblages between paired closed and open wetlands.

Mandrak, N, C. Bakelaar, **A. Doolittle*** (doolittlea@dfo-mpo.gc.ca), P. Brunette, D. Ming and K. Gray

Web mapping tool for species at risk in Ontario. (P)

This poster describes a joint initiative between DFO's Fish Habitat Management and Science programs to develop a user-friendly fish SAR distribution web mapping tool. This web mapping tool is designed to model fish SAR distributions in relation to environmental factors, including anthropogenic influences. The approach is to use GIS modeling to make predictions about the distribution of fish SAR and their critical habitat.

This mapping tool will assist not only DFO's Science sector with its recovery strategies, but also the Fish Habitat Management program in Ontario and its partners. When Fish Habitat Management staff review proposed development projects for potential impacts to fishes and fish habitat under the *Fisheries Act*, the tool will assist in expediting the review process by providing geo-referenced, up-to-date information on fishes, including fish SAR and their recovery plans, so that informed decisions can be made to minimize impacts on fish SAR.

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Changes in fish assemblages of three areas of concern in the lower Great Lakes. (P)

In 2004, the Great Lakes Laboratory of Fisheries and Aquatic Sciences (GLLFAS) sampled three Areas of Concern (AOC) in the lower Great Lakes: the St. Clair River, Detroit River and the St. Lawrence River. The AOCs contained several Remedial Action Plan (RAP) sites that were previously sampled in 1994, 1990, and 1986, respectively. Sites were sampled in a standardized manner using a 7.5 kW GPP Smith-Root boat electrofishing unit. Standardized sampling allowed for the comparison of both inter-annual and seasonal variation in fish assemblages. Fish assemblage data were analyzed using two techniques. The Index of Biotic Integrity (IBI) was used to generate scores for all RAP sites. The Detroit River scores declined from 29 in 1990 to 24 in 2004; the St. Clair River scores declined from 34 in 1994 to 28 in 2004; and the St. Lawrence

River scores increased from 26 in 1986 to 27 in 2004. ANOVAs and MANOVAs and associated post-hoc tests were used to examine inter-annual and season variation in the relative abundances of species captured at all RAP sites. The variation observed in the IBI scores, relative abundance and the role of standardized sampling in long-term fisheries programs will be discussed.

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Application of GIS to a risk assessment of the introduction and establishment of non-native fish species in the Great Lakes Basin. (P)

Geographic information systems (GIS) are emerging as a valuable tool to address spatial problems in fisheries research and management. GIS was applied to determine the risk of introduction and establishment of five species of Asian carp including: grass carp (*Ctenopharyngodon idella)*, bighead carp (*H. nobilis)*, silver carp (*H. molitrix)*, largescale silver carp (*H. harmandi*) and black carp (*Mylopharyngodon piceus*). A filter-based approach was used to identify areas in the Great Lakes basin which could serve as entry points for the carps or provide suitable habitat for their establishment. Spatial factors related to the biology and economic uses of the carps were incorporated into the analysis. Spatial data were obtained from several organizations and GIS was used to process the information through network, buffer, nearest feature and overlay analyses. Resulting maps and values describing distance and relationships between spatial layers were used to help assign levels of risk describing the probability for introduction and establishment of these carps. Data availability, quality and processing times were some of the challenges faced in this study. Future work will focus on the risk of introduction and establishment at a local scale, which will require the addition and refinement of spatial data.

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Do Agricultural Drains provide fish habitat? (P)

The purpose of this research is to determine whether drains act as natural systems in terms of the fish assemblages they support and what impact drain maintenance has on fish habitat. Fish species richness and abundance were examined in 30 agricultural drain sites paired with 30 similar sites on natural watercourses in southwestern Ontario. Pairs were defined by similarity in size, order and location within the same watershed. We predict that if drains do act as natural systems, then richness and abundance of fishes should be similar within pairs. Sampling effort was standardized for each pair using electrofishing and/or seining to collect fishes. All fishes were identified to species and total length was measured for the first 30 individuals of each species to estimate biomass in each type of watercourse. At each site, the physical attributes of the stream and flow, hydraulic head, substrate and riparian cover were measured to determine if there is a difference in instream or riparian habitat. The goal of this research is to develop and conduct the science necessary to determine whether drains provide fish habitat, to test the applicability of current legislation to drains, and to develop alternative management suggestions. The findings of this study will be used by fishery and drain managers to develop better drain management guidelines that consider the needs of agriculture, while preserving fish biodiversity.

Workshop

Biotelemetry Systems – Theoretical & Practical Considerations

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Overview

This course will examine biotelemetry from both a theoretical and practical perspective. The goal of the workshop is to impart a good understanding of benefits and tradeoffs which must be made during the study design phase of a project. This will permit researchers employing biotelemetry to make informed decisions during the selection of system components, helping to ensure the ultimate success of their projects.

Both acoustic and radio telemetry will be presented in the workshop.

Equipment examples provided will apply to commercially available equipment from a variety of manufacturers. Several Application Profiles will be discussed in which actual telemetry studies will be used to demonstrate typical use and features of telemetry equipment.

The ultimate goal of the workshop is not to turn biologists into engineers, but to impart an awareness and appreciation of methods and techniques which can be readily employed to maximize system performance. This information can be applied both during the project design phase as well as assisting in maintaining the required degree of system performance throughout the study through maintenance. Finally, a clearer understanding of system components and their attributes will enable users of biotelemetry equipment to more effectively troubleshoot and repair systems which have failed or suffered degradation in performance.

Presentation Outline

1) Review of Basic Physical Principles
2) Basic Terms Employed in Biotelemetry
3) Major Factors in a Biotelemetry System
    a) Biotelemetry Transmitter
    b) Propagation Loss in Water
    c) Air / Water Interface (radio)
    d) Propagation Loss in Air (radio)
    e) Receiving Antenna/Hydrophone
    f) Transmission Lines
    g) Receiving System
4) Calculating Overall Biotelemetry System Performance
5) Typical System Performance Calculations
6) Similarities and Differences with Between Radio and Acoustic Systems
7) Telemetry Case Studies

NOTES

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ONTARIO CHAPTER

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