Competitive Fishing in Ontario
Workshop Proceedings

Southcentral Sciences Section Workshop
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Cover photos (clockwise from top left): Rainbow trout anglers on a Lake Ontario tributary (MNR Photo); Angler with winning muskellunge from 1994 Muskies Canada tournament at Honey Harbor, Georgian Bay (MCI Photo); Entrants in Lake Ontario's Great Salmon Hunt (MNR Photo); Proud angler with trophy won during 1999 children's fishing derby in Kemptville, Ontario (Editor's Photo).
There is little doubt that the popularity of competitive fishing has increased considerably in the past decade. Although accurate records on individual events are generally not available, it is believed that there are several hundred competitive fishing events, including tournaments, derbies and contests, across Ontario each year. These events span all seasons of the year, include both inland and Great Lakes waters, and target a wide variety of fish species.

Despite their increasing popularity and obvious economic benefits to local economies, there are several controversial issues with respect to competitive fishing events. These include concerns about boating safety, the impacts of handling, weigh-in and release techniques of angled fish, interference with the activities of shoreline residents, the potential of overharvesting local fish stocks, impacts on other aquatic biota (e.g., nesting water birds), and competition with other non-tournament anglers.

One of the primary functions of the Ontario Ministry of Natural Resource's (MNR) science division is to collate and disseminate new science and pertinent information to both resource users and managers. One means of accomplishing this task is to organize and host interactive workshops. Three other workshops ("Bass Management in Ontario" in 1994; "Managing Muskies in the 90s" in 1995; and "Science in the Southeast" in 1997) have been held in southeastern Ontario in the past five years.

A two day workshop on competitive fishing events was held at the Kemptville College of Agricultural Technology on March 12 and 13, 1999. The workshop was organized by the Southcentral Sciences Section of the Ontario Ministry of Natural Resources. The objective of the workshop was to assemble a mix of speakers to summarize recent research activities and management approaches as well as review various issues and concerns with respect to competitive fishing in Ontario. The workshop format included presentations by 16 different speakers. Time was allotted for questions and general discussion after each presentation. The workshop concluded with a general synopsis and overview summarizing highlights of individual presentations and items of general discussion.

The interest in competitive fishing was evident by the fact that, despite inclement late winter weather conditions, at least eighty people attended the event. Workshop attendees included fisheries managers and researchers from the Ontario Ministry of Natural Resources, fishing tournament organizers, tournament anglers, representatives from local sportsmans organizations and cottage associations, and unaffiliated anglers. These workshop proceedings have been assembled to document the formal presentations at the workshop and transfer this information to those who were not in attendance.

Steven J. Kerr
Fisheries Specialist
Southcentral Sciences Section
Ontario Ministry of Natural Resources
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Welcome and Opening Remarks

Trevor Kellar
Southcentral Sciences Section
Ontario Ministry of Natural Resources
659 Exeter Road
London, Ontario
N6E 1L3

On behalf of the Ontario Ministry of Natural Resources and the Southcentral Sciences Section, I would like to welcome you to this workshop on competitive fishing. The goals of the workshop are to review what we know about the scope of competitive fishing events around the province and to look at some of these specific events in more detail. We will hear about current government policies and an enforcement perspective as well as a review of some of the biological impacts. We want to explore a few of the issues associated with tournaments and other competitive events as well as some of the opportunities they present.

Why is the Southcentral Sciences Section hosting this workshop? To answer that question you need to understand how the Ministry of Natural Resources (MNR) is presently organized. District staff are probably the people you are most likely to encounter in MNR. They handle all of the day-to-day operations and resolve local problems which arise. However, there are also science specialists in research units, in science and technology units and around the Great Lakes who work behind the scenes in support of local staff. You will hear from some of these fisheries specialists later in the agenda. Research activities address larger or longer term issues which require better understanding or the development of new science. Our science units also deal with short term science needs and place emphasis on transferring what knowledge we already have to our clients. This workshop, the fourth in southeastern Ontario since 1994, is an example of how we try to transfer information and advance our collective knowledge.

Why is it important to discuss competitive fishing? Well, competitive fishing events may have short or long term impacts which affect the sustainability of the fisheries resource. We can all think of examples which do impact on fisheries: pollution, overfishing, or climate change. While I don't want to suggest that competitive fishing events have the same level of impact as these examples, we really don't know. As resource managers and concerned anglers, we need to be sure that we are not having a negative impact by utilizing the best knowledge and science available to develop proper catch, handling and release procedures to utilize during fishing tournaments and other competitive events.

Once again, I'd like to welcome you to this workshop. I'd also like to thank Steve Kerr, our fisheries science specialist here in Kemptville, for organizing and hosting this event. Papers presented during the next two days will be published as workshop proceedings. I encourage you to meet informally with others in attendance to share ideas and information over the next two days.
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Ontario's Policy on Competitive Fishing Events

Evan Thomas
Fisheries Section
Fish and Wildlife Branch
Ontario Ministry of Natural Resources
P.O. Box 7000, 300 Water St
Peterborough Ontario
K9J 8M5

Competitive Fishing Events (CFEs) have been held in Ontario for several decades, with rapid expansion during the 1980's and 90's. A Ministry of Natural Resources (OMNR) policy, issued in 1984, is still in effect. It describes a neutral stance towards CFEs by OMNR and provides basic policy guidelines and recommendations for live-release. An effort was made to revise the policy during the mid 90's, including the adoption of a licensing system, but formal approval was never received. Given the current government policy context, options are offered for policy and regulations, including industry leadership, education, science development and local issue resolution.

Introduction

Competitive fishing events (CFEs) have operated in the province for at least several decades. Interest in the events has increased rapidly during the 1980's and 90's and several hundred are now thought to occur per year. Along with the benefits of participation and economic activity have come concerns regarding impacts on fish populations, lake ecosystems and other users.

The Ministry of Natural Resources (OMNR) first issued a policy on CFEs in 1984 and, despite attempts to modify it, this policy is still in effect.

The following provides a perspective on CFE policy from the standpoints of policy background, existing policy, current policy context and options to government policy and regulation.

Background

The first OMNR policy direction was developed by Fisheries Branch in 1984. While general in nature, it provided adequate guidance until the early 1990's, when events began to be held in increasing numbers throughout the province. As issues emerged, staff, organizations, and the public sought further direction and control. A draft policy was developed and refined based on the results of public input. The recommendations, including a fee-based licence, did not receive government approval in 1995. OMNR restructuring occurred at this point and no further work on a provincial policy has taken place since that time. Instead, an operational approach to manage CFEs has been developed in the Kawartha Lakes area, where one of the highest concentrations of events occur annually.

Existing Policy

The policy issued in 1984 provides a definition of a fishing tournament or derby, a policy statement indicating a neutral stance by OMNR, a brief set of policy guidelines, and guidelines for live-release. The policy simply recognizes that CFEs will occur, but since they are operated within the law and are generally within acceptable conservation parameters, OMNR staff should not take a direct role in their operation. It offers some guidance to organizers on how to ensure the survival of angled fish.
Ontario's Policy on Competitive Fishing Events

As the number of events expanded, questions arose as to the level of government involvement needed, and the adequacy of the provincial policy. The Fisheries Advisory Council, then in existence, provided recommendations and proposed that a thorough review occur in 1991. As a result, a review of the policy started in 1992 and a detailed proposal was developed in 1994.

1994 Policy Recommendations

The recommended policy was developed by a task team consisting of OMNR staff, industry representatives and key stakeholders. It addressed a variety of emerging issues but of greatest significance were proposals to implement a fee-based licence, and adoption of a more detailed definition of tournaments (catch-and-release), derbies (non-release events), and contests (extended time). A public questionnaire was distributed to key stakeholder organizations and individuals in order to determine perspectives on specific issues and the proposed policy reflected the input received. The recommended policy failed to receive approval in 1995 and has not advanced further since that time.

Current Policy Context

While the Strategic Plan for Ontario Fisheries (SPOF II) still provides provincial fisheries direction, the current government policy environment has changed since 1995 due to a number of factors

- OMNR restructuring resulted in less operational delivery capability;
- government direction towards deregulation occurred (Red Tape Review) with movement towards guidelines and codes of practice;
- Fish and Wildlife program priorities emerged including ecological sustainability and enhanced opportunities;
- public acceptance of outdoor activities have influenced policy;
- resource valuation and user-pays approaches have expanded.

As a result, we currently have a Ministry field structure that has limited capacity to take on further review and approval functions and increasingly looks to industry partners to cooperatively address their needs. Options to further regulation are sought such as guidelines and codes of practice which are monitored by industry and government. OMNR's responsibility for ensuring sustainability will be met by gathering information and new science on the state of resources and working with partners to ensure user activities are modified appropriately. Similarly, OMNR will work in partnership to provide a diverse range of activities and enhance angling opportunities where possible.

As we have recently witnessed, public acceptance of outdoor recreational activities can have significant influence on government policy. Participants and industry leaders will need to constantly assess their activities in relation to broader public perceptions and modify them appropriately - in a responsive, not reactionary mode.

It will be increasingly important to document the value of resources and angling activities and the cost to manage them effectively. At the same time, the contributions of resource users and those who benefit from them are increasingly critical. Anglers now recognize the value of the new Special Purpose Account to Fish and Wildlife management, and it is important for other users to be seen to support resource programs.

Options to Policy/Regulations

Given the current policy context and continuing interest in addressing the challenges surrounding CFEs, alternatives to prescriptive government policy and regulation should be explored.

The following options are offered for consideration:

- industry codes of practice/science based standards;
- science priority setting between industry, government, and academia;
- participant education regarding issues/concerns;
- adaptive reviews of industry practices (timing, mortality, disturbances, ecosystems impacts);
- industry financial support to science, resource management, enhanced opportunities;
- planning/issue resolution through local advisory committees.
Ontario's Policy of Competitive Fishing Events

Summary

While current OMNR policy remains neutral, it is apparent that CFEs can operate in concert with and support ecological sustainability and enhanced opportunity objectives, if carried out within acceptable parameters. Given government's current policy context it is suggested that industry and stakeholders develop operating standards and guidelines regarding CFE activities.

It is important that we continue to acquire the science and understanding around benefits and impacts of CFE activities and adapt practices accordingly. And finally, local issues can usually be addressed most effectively through local advisory committees.

The challenge is for industry, stakeholders and OMNR to identify innovative approaches that address the clear needs around CFE's and support outstanding issues through the development of science and understanding.


Definitions of Fishing Tournament or Derby

Any organized fishing activity in which participants are in competition with one another for prizes awarded on the basis of size, weight and/or number of fish caught.

General Policy Statement

The Ministry of Natural Resources will adopt a neutral stance with respect to fishing tournaments, neither condemning nor condoning them.

Policy Guidelines

The Ministry will discourage tournaments which it perceives as having a detrimental impact on the target species.

2. Ministry staff will not act in a judicial capacity at a tournament.

3. Ministry staff will not tag fish for promotional purposes except, at the Ministry's discretion, in tournaments aimed at put-and-take fisheries (e.g. Lake Ontario salmon fishery). The Ministry will, however, allow competent private individuals to tag a limited number of tournament fish and may suggest names of appropriate individuals if requested by tournament organizers.

4. The Ministry will encourage live-release and particularly immediate release of fish captured in tournaments where the Ministry believes it to be a worthwhile practice.

5. The Ministry will enforce all relevant legislation.

6. The Ministry will encourage tournament organizers to promote safe on-water and on-ice practices.

7. The Ministry will not stock fish specifically for tournament purposes.

Guidelines for the Live-Release of Tournament Fish

The merits of live release programs and the survival of tournament fish vary tremendously between species and tournaments, depending upon numerous factors which influence fish mortality. The following guidelines are intended to minimize fish mortality, both immediate and latent, in live-release tournaments. The Ministry cautions that the actual success of live release efforts for most species has not been well documented. Live release is proposed in this policy only as a possible mean of reducing harvest and returning large individuals, which are limited in number, back to the fishery. Live release of tournament fish should not be considered a satisfactory solution to offset the harvest effects of a tournament on an already stressed community.

1. Live-release tournaments should be scheduled so as to avoid extremes in air and water temperatures. Cool temperatures are most favourable for fish survival.
Ontario's Policy on Competitive Fishing Events

2. Handling of fish must be absolutely minimized. For this reason, immediate release, where the measurements are taken without removing the fish from the water is the most desirable type of live release. Immediate release is particularly advisable for large fish such as muskellunge (Esox masquinongy).

3. Where fish are to be held for subsequent release, an aerated livewell with bilge pump is essential both in contestants' boats and at the weigh-in station. It should be kept covered and the water changed frequently using water from the lake being fished. The Ontario Federation of Anglers and Hunters provide plans for simple construction of a portable livewell.

4. Only those fish which can be expected to survive should be returned to the water. Fish hooked in the eyes or gills or damaged in either place should be kept. Fish must not be held at the eyes or gills. Landing nets should be used where possible. Care must be taken not to remove the fish's protective body mucus.

5. Fish should be released as close to the general location of capture as possible.

6. The length of fishing day should be kept short as mortality rates generally increase the longer the fish are confined.

7. Angling methods should be encouraged that will minimize hook damage to the fish, (e.g. the use of single, barbless hooks) where possible. To reduce the likelihood of fish swallowing the hook, no live, preserved or prepared bait should be used.
A survey was conducted to examine competitive fishing events in Ontario. Information was obtained for 518 different events from a field staff questionnaire, conversations with tournament organizers and a review of the popular sport fishing literature. The majority of competitive fishing events were held in the southern part of the province. Most of the largest events were held on the Great Lakes. The majority (63.5%) of competitive activities occurred during the summer but there are events year-round. Bass, walleye, and pike were the most targeted fish species. Bass accounted for almost 40% of all competitive fishing events in the province. Many large, well organized events have developed guidelines to reduce conflicts and minimize biological impacts. Fisheries managers need to maintain more complete records of these activities and should make greater use of information which is available from competitive fishing events.

Introduction

There is every indication that interest in competitive fishing is increasing across North America (Shupp 1978; Duttweiler 1985). This observation is also true for the Province of Ontario where the number of competitive fishing events is believed to have increased dramatically in the last 10-15 years.

One of the first surveys on competitive fishing events in North America was completed by Schramm et al. (1991). From that survey some 20,697 events were documented. Ontario was reported to have approximately 100 events per year at that time. Most of these events were relatively long in duration (10% 1 day; 40% 2 day; and 50% 3 days or longer). There was no information on the number of participants, overall angling effort or catches. With the exception of information collected during that survey very little is known about competitive fishing activities in Ontario. In order to examine the current status of competitive fishing in Ontario, an effort was initiated to compile a representative sample of current competitive fishing events across Ontario.

Survey Techniques

Most information was obtained through a survey of field biologists employed by the Ontario Ministry of Natural Resources. A one page questionnaire was mailed to each field office in December 1998 and a reminder notice was sent to non-respondents in February 1999. The questionnaire requested information pertaining to the name of the event, organizer, target species, timing, duration, prizes, special rules or guidelines, and other details of individual competitive fishing events.

Tournament organizers also provided a great deal of information on events scheduled for the upcoming (1999) season particularly for those events featuring bass. Other information was derived from a review of popular fishing magazines and a search of various websites on the Internet.

Summary of Survey Results

Information was collected for a total of 518 organized competitive fishing events (see Kerr 1999). There was a wide range in the diversity of events in terms of the number of contestants, prizes, and length of event. There are numerous small, non-recurring, locally organized events on many inland waters. Undoubtedly, these types are events are under-
A Survey of Competitive Fishing Events in Ontario

represented in this survey. One of the largest events is the Great Salmon Hunt which is centered off the north shore of Lake Ontario. This event typically extends over a 6-7 week period in late summer, offers prizes in excess of $300,000 and attracts between 1415,000 participants. In 1998 over 6,700 fish were entered. There are several other large salmon derbies on the upper Great Lakes, notably Lake Huron.

Geographic Distribution of Events

When the geographic distribution of competitive fishing events is examined (Figure 1), it becomes obvious that the majority of this activity occurs in the southern part of the province. Southern Ontario accounts for 63.5% of the competitive fishing events which are held in inland waters of the province (Great Lakes excluded). Eighty-five competitive fishing events (16.4% of provincial total) were recorded on the Great Lakes.

Table 1. Generalized location of competitive fishing events in Ontario based on a 1999 survey.

<table>
<thead>
<tr>
<th>Waterbody</th>
<th>Number of Events (% of Total)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Misc. inland lakes</td>
<td>196 (37.8%)</td>
</tr>
<tr>
<td>Kawartha lakes</td>
<td>94 (18.1%)</td>
</tr>
<tr>
<td>Misc. inland rivers/streams</td>
<td>78 (15.1%)</td>
</tr>
<tr>
<td>Lake Ontario/Bay of Quinte</td>
<td>35 (6.8%)</td>
</tr>
<tr>
<td>Lakes Simcoe/Couchiching</td>
<td>35 (6.8%)</td>
</tr>
<tr>
<td>Lake Huron/Georgian Bay</td>
<td>24 (4.8%)</td>
</tr>
<tr>
<td>Lake Erie</td>
<td>19 (3.7%)</td>
</tr>
<tr>
<td>Lake Nipissing</td>
<td>8 (1.5%)</td>
</tr>
<tr>
<td>Lake Superior</td>
<td>6 (1.2%)</td>
</tr>
<tr>
<td>Lake St. Francis</td>
<td>5 (0.9%)</td>
</tr>
<tr>
<td>Lake St. Clair</td>
<td>5 (0.9%)</td>
</tr>
<tr>
<td>Lake of the Woods</td>
<td>3 (0.6%)</td>
</tr>
<tr>
<td>Lake Nipigon</td>
<td>2 (0.4%)</td>
</tr>
<tr>
<td>Lake Temagami</td>
<td>2 (0.4%)</td>
</tr>
<tr>
<td>Lake St. Lawrence</td>
<td>2 (0.4%)</td>
</tr>
<tr>
<td>Lake Timiskaming</td>
<td>1 (0.2%)</td>
</tr>
<tr>
<td>Welland Canal</td>
<td>1 (0.2%)</td>
</tr>
<tr>
<td>Private fishing preserve</td>
<td>1 (0.2%)</td>
</tr>
<tr>
<td>Summary</td>
<td>518 (100.1%)</td>
</tr>
</tbody>
</table>

Event Organizers

Competitive fishing events, summarized in terms of individual waters, are presented in Table 1. The Kawartha lakes are the most heavily utilized bodies of water with respect to commercial fishing events. This chain of lakes accounts for almost 20% of all competitive fishing events in Ontario. Lakes Simcoe and Couchiching also had a relatively large number of events.

Competitive fishing events are organized and hosted by a number of different groups (Table 2). Tournaments organized by professional organizations, such as Chevy-Mariner, Bassmasters, Bassmania, Reel Fish'n, etc., (see Table 3) account for the many (37.8\%) events. Several events are also organized by local fish and game clubs who use the proceeds to fund various conservation projects which they have underway. This is especially prevalent on the Great lakes where tournament proceeds are often utilized to fund fish culture programs.
All competitive events directed toward muskellunge were organized by local chapters of Muskies Canada Inc. Other organizers included private businesses (e.g., marinas, bait and tackle shops, etc.), community service clubs and local tourist organizations.

Table 3. Organizers of professional bass tournaments in Ontario (based on information derived from a 1999 survey).

<table>
<thead>
<tr>
<th>Organization</th>
<th>Number of Events</th>
</tr>
</thead>
<tbody>
<tr>
<td>Backwater Bass</td>
<td></td>
</tr>
<tr>
<td>Bassmania</td>
<td></td>
</tr>
<tr>
<td>Bassmasters (B.A.S.S.)</td>
<td></td>
</tr>
<tr>
<td>Bass'n'tario</td>
<td></td>
</tr>
<tr>
<td>Chevy-Mariner Pro Bass Tour</td>
<td></td>
</tr>
<tr>
<td>Heritage Fishing Series</td>
<td></td>
</tr>
<tr>
<td>Kawartha Angler Series</td>
<td></td>
</tr>
<tr>
<td>Kingston Bass Anglers</td>
<td></td>
</tr>
<tr>
<td>Northeastern Ontario Bass Association (NEOBA)</td>
<td></td>
</tr>
<tr>
<td>Ontario Sport Fishing</td>
<td></td>
</tr>
<tr>
<td>Ottawa Bass</td>
<td></td>
</tr>
<tr>
<td>Pro Anglers Outdoors Inc.</td>
<td></td>
</tr>
<tr>
<td>Reel Fish'n Competition Inc.</td>
<td></td>
</tr>
<tr>
<td>Renegade Bass</td>
<td></td>
</tr>
<tr>
<td>Southwestern Ontario Bass Association (SWOBA)</td>
<td></td>
</tr>
<tr>
<td>Top Bass Fishing Series</td>
<td></td>
</tr>
</tbody>
</table>

Temporal Distribution of Competitive Fishing Events

The temporal distribution of competitive fishing events is summarized in Table 4. Although the bulk (63.5%) of these events occur during the summer, there is significant activity during the other three seasons of the year.

Table 4. Temporal distribution of competitive fishing events in Ontario based on a 1999 survey.

<table>
<thead>
<tr>
<th>Season</th>
<th>Number of Events</th>
</tr>
</thead>
<tbody>
<tr>
<td>Winter (December-March)</td>
<td>63 (12.2%)</td>
</tr>
<tr>
<td>Spring (April-May)</td>
<td>64 (12.4%)</td>
</tr>
<tr>
<td>Summer (June-August)</td>
<td>329 (63.5%)</td>
</tr>
<tr>
<td>Autumn (September-November)</td>
<td>48 (9.9%)</td>
</tr>
<tr>
<td>Unknown</td>
<td>14 (2.7%)</td>
</tr>
<tr>
<td>Summary</td>
<td>518 (100.1%)</td>
</tr>
</tbody>
</table>

Duration of Competitive Fishing Events

The majority of competitive fishing events are relatively short (e.g., 1 or 2 days) in duration (Table 5). This is especially true for events in inland waters. Most derbies and tournaments on the Great Lakes are longer in duration. For example, salmon derbies usually run from 2-4 weeks in late July and August. Table 5. Duration of competitive fishing events in Ontario based on a 1999 survey.

<table>
<thead>
<tr>
<th>Duration of Event</th>
<th>Number of Events</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 day</td>
<td>203 (39.2%)</td>
</tr>
<tr>
<td>2 days</td>
<td>123 (23.7%)</td>
</tr>
<tr>
<td>3 days or more</td>
<td>80 (15.4%)</td>
</tr>
<tr>
<td>Unknown</td>
<td>112 (21.6%)</td>
</tr>
<tr>
<td>Summary</td>
<td>518 (99.9%)</td>
</tr>
</tbody>
</table>

This information varies substantially from data recorded in an earlier survey by Schramm et al. (1991). There appears to have been a trend from longer (e.g., > 3 days) events to more events of shorter (e.g., 1-2 days) duration. This is probably due largely to the increase in bass fishing events which are usually only one day in length.
Species Sought at Competitive Events

The species targeted at various competitive fishing events in Ontario is summarized in Table 6. Bass (largemouth and smallmouth bass combined) were the species sought in almost 40% of all competitive fishing events in Ontario. Similarly, bass were by far the species most targeted at competitive fishing events in the United States (Duttweiler 1985). Walleye were the second most targeted species (16.0% of events) while, collectively, trout accounted for 11.8% of the species sought in competitive events. It is interesting to note that several events target on coarse fish, panfish, and other underutilized species.

Table 6. Fish species sought at various competitive fishing events in Ontario. Values represent the fish which were identified in a 1999 survey. Some events indicated more than one species so the total does not equal 518.

<table>
<thead>
<tr>
<th>Fish Species</th>
<th>Number of Events</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bass (Micropterus spp.)</td>
<td>249 (37.4%)</td>
</tr>
<tr>
<td>Walleye (Stizostedion vitreum)</td>
<td>107 (16.0%)</td>
</tr>
<tr>
<td>Northern pike (Esox lucius)</td>
<td>77 (11.5%)</td>
</tr>
<tr>
<td>Lake trout (Salvelinus namaycush)</td>
<td>38 (5.7%)</td>
</tr>
<tr>
<td>Pacific salmon (Oncorhynchus Spp.)</td>
<td>30 (4.5%)</td>
</tr>
<tr>
<td>Yellow perch (Perca flavescens)</td>
<td>23 (3.5%)</td>
</tr>
<tr>
<td>All species</td>
<td>26 (3.9%)</td>
</tr>
<tr>
<td>Panfish</td>
<td>21 (3.2%)</td>
</tr>
<tr>
<td>Rainbow trout (Oncorhynchus mykiss)</td>
<td>14 (2.1%)</td>
</tr>
<tr>
<td>Muskellunge (Esoxmasquinongy)</td>
<td>14 (2.1%)</td>
</tr>
<tr>
<td>Brown trout (Salmo trutta)</td>
<td>12 (1.8%)</td>
</tr>
<tr>
<td>Lake whitefish (Coregonus clupeaformis)</td>
<td>12 (1.8%)</td>
</tr>
<tr>
<td>Trout</td>
<td>9 (1.4%)</td>
</tr>
<tr>
<td>Brook trout (Salvelinus fontinals)</td>
<td>5 (0.8%)</td>
</tr>
<tr>
<td>Bullhead (Ameiurus spp.)</td>
<td>2 (0.3%)</td>
</tr>
<tr>
<td>Burbot (Lota Iota)</td>
<td>2 (0.3%)</td>
</tr>
<tr>
<td>Carp (Cyprinus carpio)</td>
<td>1 (0.2%)</td>
</tr>
<tr>
<td>Unknown</td>
<td>21 (3.6%)</td>
</tr>
<tr>
<td><strong>Summary</strong></td>
<td><strong>666 (100.1%)</strong></td>
</tr>
</tbody>
</table>

Includes black crappies (Pomoxis nigromaculatus)

When compared to information on species sought in events approximately one decade ago (Schramm et al. 1991) some changes are evident. In both surveys bass were the most highly sought species but in the 1999 survey, the proportion of events directed toward both walleye and trout have declined.

Long Running Events

Many competitive fishing events are annual affairs and several have been held over a long period of time (Table 7). Many of the long running walleye events have been held on the Bay of Quinte. The longest running events for salmon commenced in 1966 (Bluewater Anglers Salmon Derby) and 1976 (Sarnia Salmon Derby and St. Catherines Salmon Derby). Lake Ontario’s Great Salmon Hunt originated in 1979. The longest running annual bass tournament is believed to be the Kenora Bass International which was initiated in 1987. Some smaller events which have been held annually over an extended period of time include the Caramat Fish Derby (since 1956), the Kemptville Scout and Guide Fish Derby (since 1964) and the Dorset Lions Club Fishing Derby (since 1973).

Table 7. Long-running (> 10 years) annual competitive fishing events in Ontario.

<table>
<thead>
<tr>
<th>Fish Species</th>
<th>Number of Annual Events</th>
</tr>
</thead>
<tbody>
<tr>
<td>Walleye</td>
<td>11</td>
</tr>
<tr>
<td>Pacific Salmon</td>
<td>9</td>
</tr>
<tr>
<td>Any/all species</td>
<td>6</td>
</tr>
<tr>
<td>Bass</td>
<td>4</td>
</tr>
<tr>
<td>Northern pike</td>
<td>4</td>
</tr>
<tr>
<td>Trout</td>
<td>3</td>
</tr>
<tr>
<td>Panfish</td>
<td>3</td>
</tr>
<tr>
<td>Muskellunge</td>
<td>1</td>
</tr>
<tr>
<td>Bullheads</td>
<td>1</td>
</tr>
</tbody>
</table>

Common Rules and Codes of Practice

Upon the review of information for over five hundred competitive fishing events, some common tournament rules and codes of practice become evident.

Most bass tournaments are based on catch-and-release practices. Many events have some sort of minimum size limit (e.g., 12”, 13”, 15”). The use of live bait is almost always prohibited. Competitors are usually expected to have functioning live wells and there are often penalties for sick or dead fish. Many tournaments also have guidelines for “culling” of fish. Competitive fishing events for walleye include both
A Survey of Competitive Fishing Events in Ontario

Summary and Recommendations

This survey represents the second time that competitive fishing events in Ontario have been reviewed. It would be useful to perform similar surveys at regular 5-10 year intervals to monitor trends in the number and types of competitive fishing events in Ontario. MNR field staff should be encouraged to maintain records of competitive fishing events in their areas of jurisdiction. It would also be prudent to monitor tournament practices to ensure they are utilizing the most current science available. Interest groups, tournament organizers and government should cooperate in conducting research and developing guidelines which will reduce impacts, from both a biological and social perspective, of competitive fishing events.

Generally, fisheries managers have not taken advantage of competitive fishing events as a source of information for management purposes. Several authors have reported the value of utilizing information from recurring events to monitor the vital population statistics of local fish stocks, fishing quality and relative abundance (Willis and Hartman (1986); Olson and Cunningham (1989); Quertermus (1991), Cooke et al. (1998)). Greater effort should be taken to collect and utilize information generated from competitive fishing events for fisheries management purposes.

References


A review of the published literature was conducted to identify the most notable potential impacts and concerns associated with competitive fishing events. Over 80 different papers from scientific journals and articles from outdoor magazines and the Internet were used as sources of information. Three major areas of concern are identified: sociological, economic and biological. Sociological concerns most frequently occur as a result of differences of opinion among various groups of resource users or between those who angle competitively and those who do not. Among the concerns are safety and insensitivity issues, reduced quality of fishing and conflicting attitudes about what recreational fishing should entail. Fisheries management agencies identify increases in costs and staff time associated with competitive fishing events. On the positive side, these events provide management agencies with an economical way of collecting biological data. The economic picture for most communities in which events are run is positive, often increasing tourism throughout other times of the year as well as during the event. The biological concerns are chiefly related to overexploitation of fish populations caused by stimulated fishing effort, concentrated effort on a particular body of water and increased mortality. Many of the potential negative impacts to fish populations can be minimized when organizers properly schedule and manage events, as well as educate the participants on the proper handling and confinement techniques of fish. Ontario's fisheries managers must identify and assess the sociological, economic and biological concerns and potential impacts of competitive fishing events and apply the best available management tools to each given situation in order to sustain healthy fisheries for the benefits of all.

Introduction

Fishing has been a human form of sport and recreation since 2000 BC and dates back to the Stone Age when its main purpose was to obtain food. While competitive fishing events have become popular in this century, it has been only in the past thirty years that they have developed into a growing use of the fishery resources in North America.

According to a 1989 survey, an estimated 31,000 organized competitive fishing events occurred annually on inland and marine waters of Canada, the United States, District of Columbia, Puerto Rico, and the U. S. Virgin Islands (Schramm et al. 1991 a).

The following summary of potential impacts and concerns related to competitive fishing events is based on a review, but is by no means the result of an exhaustive search of available literature. It is hoped that this review will provide an introduction to the variety of issues that are generally associated with competitive fishing events, but from a biological standpoint, may also be applicable to the act of angling in general.
Sociological Component

A review of the primary literature reveals that there is an increasing interest among recreational fisheries managers in understanding what motivates anglers. Why do people fish? What comparisons can be made among those anglers who are highly specialized, fish competitively and those anglers who do not? The answers to these questions help fisheries managers in their efforts to meet the diversity of enjoyments and benefits desired for by the public. A better understanding of what motivates competitive and noncompetitive anglers is a step forward in identifying the sociological concerns and impacts frequently associated with competitive fishing events.

Chipman and Helfrich (1988) found the attitudes and preferences for how the fishery resources are managed is related to the level of angler specialization. Psychological, social and natural environment-related motives were more common with less specialized anglers. Motivations directly related to the fishery resource (e.g., trophy fishing, challenge of catching a fish) were found to be more common to the specialized angler. Fedler and Ditton (1994) reviewed seventeen comparable studies involving specialized, non-specialized and tournament anglers and also found a significant diversity in the importance of individual motivations among these groups based on mode of fishing and target species.

Falk et al. (1989) reviewed more than twenty different studies on the importance of "non-catch" and "catch-related" aspects of fishing experiences of tournament and non-tournament saltwater anglers. Both groups agreed on the high importance of "non-catch" aspects of their fishing experiences, but tournament anglers attached greater significance to the "catch-related" element.

More recently, Wilde et al. (1998) studied differences between Texas tournament and non-tournament bass anglers' fishing motives, attitudes and demographic characteristics. They also found that for the most part, both groups share similar "non-catch" related motives for fishing. The two differences they did find were in how tournament anglers displayed more enthusiasm in experiencing new and different things, and experiencing adventure and excitement than do non-tournament anglers.

All the "catch-related" motives under review in this study were significantly different between these two groups. Non-tournament anglers show a greater desire to obtain fish for consumption while tournament anglers show a greater interest in the challenge of catching a fish, particularly a trophy fish and developing their skills. Angler attitudes between the two groups generally reflect their respective motives for fishing. Both groups agree that a successful fishing trip is one in which many fish are caught.

As in the Fedler and Ditton study, Wilde et al. (1998) found tournament angler attitudes are oriented more toward the species and size of fish caught, catch and release fishing and the sport. Wilde et al. (1998) also found tournament anglers tend to be male and younger than non-tournament anglers. Both Wilde et al. (1998) and Fisher (1997) found that tournament anglers also fish more frequently and belong to fishing clubs more than non-tournament anglers.

Overall, Wilde et al. (1998) reported that tournament anglers consider themselves more specialized and skilled than non-tournament anglers. Non-tournament anglers feel that tournaments negatively affect their fishing quality and that fish released at tournaments generally do not survive.

A third group, perhaps less reported in the literature but just as important, are those individuals who do not fish but live in or visit the communities where competitive sport fishing events occur. They are sometimes referred to as the observing public (Ontario Fisheries Advisory Council 1991) or non-anglers (Tournament Fishing Committee 1991). The expressed concerns of these individuals are often reflective of their interest in the environment and are driven by psychological and social motives.

Table 1 lists the sociological concerns associated with competitive fishing events most frequently reported in the literature for these three groups.
Table 1. Most frequently reported sociological concerns associated with competitive fishing

<table>
<thead>
<tr>
<th>Concerns</th>
<th>Reference</th>
</tr>
</thead>
</table>
| Impeded access to the waterbody
d. Boating safety                  | Schramm et al. (1991a); Schramm et al. (1991b)                             |
| - at weigh-in locations                                                   | Ontario Fisheries Advisory Council (1991); Shupp (1979);                  |
| - at boat launches                                                        | Duttweiler (1985); Dave Bell (pers. comm. 1999)                          |
| Loud, early morning starts                                               | Dave Bell (pers. comm. 1999)                                             |
| Excessive boating traffic                                                | Tournament Fishing Committee (1991)                                       |
| Liability                                                               | Ontario Fisheries Advisory Council (1991)                                 |
| Reduced quality of fishing experience by others                          | Tournament Fishing Committee (1991); Wilde et al. (1998)                  |
| - fewer fish                                                             |                                                                           |
| - invasion of private fishing location                                  |                                                                           |
| Conflicts with other anglers or user groups
d. Polarization of the fishing community                                 | Schupp (1979), Duttweiler (1985); Schramm et al. (1991a)                  |
| Conflicting attitudes about fishing                                      | Tournament Fishing Committee (1991); Shupp (1979)                         |
| - contemplative vs. competitive                                           | Schramm et al. (1991b); Ontario Fisheries Advisory Council (1991)       |
| - prize motivated vs. psychological                                      |                                                                           |
| Insensitivity of anglers to local citizens and their concerns            |                                                                           |
| Feelings that competitive fishing events take precedence over other activities | Tournament Fishing Committee (1991); Wilde et al. (1998)                  |
| Unethical use of the resource                                            | Tournament Fishing Committee (1991)                                       |
| - private financial gain from a public resource                          |                                                                           |

1 Administrative problem associated with competitive fishing events most frequently cited by fisheries management agencies (Schramm et al. 1991a).

All of these concerns, whether they are perceived or real, emulate the general motives and attitudinal statements supported by each of these three groups. The result of these differences in opinions fosters one of the most frequently identified competitive fishing event administrative concerns perceived by fisheries managers (Schramm et al. 1991 a). Conflict between those who do not participate in competitive fishing events and those who do.

Social gains often associated with competitive fishing events may be frequently overshadowed by conflicts among various user groups. Advertising for competitive fishing events increases the public's awareness to the availability of fishery resources and the sport of fishing (Schramm 1991a). Anglers in general prefer to fish with family or friends (Fedler and Ditton 1994; Wilde et al. 1998). In some states and provinces competitive fishing events are used to stimulate interest in recreational fishing as a family activity thereby promoting angling as a social event (Schramm et al. 1991 a). One need only perform a search on key words such as "fishing tournaments" "fishing derbies" or "ice fishing" on the Internet to find lists of events that promote fishing as a family activity.

Competitive events also have sparked an interest in fishing as a spectator's sport (Schramm et al. 1991b; Ontario Fisheries Advisory Council 1991). The social as well as economic gains derived from this "sport" is still very much unknown (Schramm et al. 1991 b).

**Economic Component**

Very few economic problems associated with competitive fishing are reported in the published literature. The American Fisheries Society Competitive Fishing Committee (Schramm et al. 1991b) reported that competitive fishing events can create economic problems for fisheries management agencies. The survey they conducted revealed that fisheries management agencies experience increases in staff time to handle monitoring and data collection, address complaints or issue permits, if they are a requirement, during competitive fishing events. Staff costs are greater still when events occur over a weekend or statutory holiday.

On the other hand, two prevalent economic benefits to fisheries management agencies are associated with competitive fishing (Schramm et al. 1991b). Firstly, competitive fishing events provide an economical way to acquire catch and biological data, particularly for large river systems or lakes (Ontario Fisheries...
Advisory Committee 1991). Cooke et al. (1998) found that the analysis of tournament fishing results on the Grand River, Ontario to be relatively inexpensive, simple and useful. Secondly, competitive fishing events promote awareness and wise use of the fishery resource (Schramm et al. 1991b). The latter stimulates a greater interest in fishing and may help increase revenues from licence sales. Promoting the resource also has direct economic benefits to local communities during and after these events (Table 2).

The economic ramifications for most communities in which events are run is positive. A survey conducted by the Ontario Fisheries Advisory Council (1991) revealed that the local retail outlets as well as places that provide accommodation and food fared well during such events. New Brunswick and Newfoundland encourage competitive fishing to advertise their fishery resource and promote tourism (Schramm et al. 1991 a). The Oswego County Administrator, John Tierney (1998) writes:

The economic benefits of tournaments and derbies are felt not just during the events, but also throughout the year. Anglers that come to Oswego County to compete discover our terrific fishery and return several times during the course of

Charities often benefit financially from a competitive event. For example, the Brainerd Jaycees in Minnesota has raised over $400,000 for nearly 50 non-profit organizations over the past few years (Brainerd Jaycees 1998). The largest benefactor of this event is an outdoor facility that promotes educational and growth-oriented activities for persons with developmental disabilities.

Sponsors and participants of competitive fishing events also realize economic gains in the form of proceeds from registration fees and prizes, respectively. As suggested in Table 1, this raises concerns with those who do not believe that private financial gain should be derived from a public resource. On the positive side, the fishery resources frequently benefit from contributions made by sponsors from proceeds of competitive fishing events. Financial contributions may be made directly to fisheries management agencies to conduct research or initiate fish or fish habitat improvement projects (Schramm et al. 1991 a).
Table 2. Economic benefits associated with competitive fishing events and the interest groups or organizations that gain the greatest benefit.

<table>
<thead>
<tr>
<th>Benefits</th>
<th>Financial Benefactor(s)</th>
<th>Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Provides opportunities to economically collect/record catch statistics and biological data</td>
<td>Fisheries Management Agencies (savings)</td>
<td>Schramm et al. (1991a); Schramm et al. (1991b); Ebbers (1987); Willis and Hartman (1986)</td>
</tr>
<tr>
<td>Increased revenues from angling licence sales as a result of promoting the fisheries resource</td>
<td>Fisheries Management Agencies - Fisheries Resource (directly) Anglers (indirectly) Local community (indirectly)</td>
<td>Schramm et al. (1991a); Ontario Fisheries Advisory Council (1991); Tournament Fishing Committee (1991)</td>
</tr>
<tr>
<td>Increased tourism and sales (during and after events)</td>
<td>Local community (accommodations, meals, tackle, clothing, gas, boat and motor sales, advertising sales)</td>
<td>Ontario Fisheries Advisory Council (1991); Schramm et al. (1991a); Tierney (1998); Shupp (1979); Duttweiler (1985)</td>
</tr>
<tr>
<td>Economic gain to community</td>
<td>Charitable organizations</td>
<td>Brainerd Jaycees (1998)</td>
</tr>
<tr>
<td>Economic or materialistic gains</td>
<td>Sponsors (Fishing Event) Participants</td>
<td>Tournament Fishing Committee (1991); Schramm et al. (1991b)</td>
</tr>
<tr>
<td>Supplemental money for fisheries management initiatives</td>
<td>Fisheries Resource (directly) Anglers (indirectly) Local community (indirectly)</td>
<td>Tierney (1998)</td>
</tr>
</tbody>
</table>

Biological Component

When it comes to studying the effects of angling in general and competitive fishing in particular, biological problems are perhaps the most frequently studied by the scientific community. The increase in the number of events occurring annually since the 1970s has prompted a closer review of the potential concerns and impacts affecting fish populations and fish health. Research presented at events such as the Eastern Ontario Catch and Release Workshop that was organized by Queen's University in 1992, or summarized in related workshop proceedings (Kerr and Cholmondeley 1994; Barnhart and Roelofs 1987) represent the quest to know how practices commonly used in competitive fishing affect fish. The events themselves are an economical and easy way to collect catch and biological data (Schramm et al. 1991a, Schramm et al. 1991b, Ebbers 1987, Willis and Hartman 1986, Duttweiler 1985, Ontario Fishery Advisory Council 1991, Holbrook 1975, Cooke et al. 1998).

One of the most common biological problems associated with competitive fishing cited in the literature is the stimulation of fishing effort and the concentration of that effort on a particular waterbody or a particular species (Schramm et al. 1991a, Tournament Fishing Committee 1991). Research has been done to study the relationship between mortality and decreases in species abundance and reduced fish size in a population (Cooke et al. 1998, Olson and Cunningham 1989, Hayes et al. 1995). Olson and Cunningham (1989) concluded that increasing exploitation generally decreases the size structure of a fish population. Hayes et al. (1995) found that populations of certain species of fish can withstand greater fishing about stock depletion (Kerr et al. 1994, Holbrook 1975); reduced fish size (Olson and Cunningham 1989); and, increased mortality rates (Hayes et al. 1995) are directly related to the increased effort and concentration of effort that competitive fishing brings to a body of water.

The mortality issue was most prevalent before the 1970s. Prior to 1972, very little was done to keep fish that were caught during tournaments alive other than to keep them wet (Holbrook 1975). The associated bad publicity of dead or dying fish and a fear of overfishing lead anglers to investigate new ways of keeping fish alive so that they could be returned to the water after weigh-in. New catch and release techniques and livewell technologies continue to develop in recognition of this biological and sociological problem.

Research has been done to study the relationship between mortality and decreases in species abundance and reduced fish size in a population (Cooke et al. 1998, Olson and Cunningham 1989, Hayes et al. 1995). Olson and Cunningham (1989) concluded that increasing exploitation generally decreases the size structure of a fish population. Hayes et al. (1995) found that populations of certain species of fish can withstand greater fishing.
Physiological systems of fish can become stressed by a variety of biological, chemical and physical factors (Wedemeyer et al. 1990). Any number of angling activities or circumstances can cause fish to become stressed and possibly die. Initial (immediate) mortality occurs when a fish dies any time from when it is caught to the time it is weighed; delayed mortality may occur anytime after the fish has been released. Delayed mortality may often go undetected. Some studies report that fish can die from several hours to several days (Tufts 1992) to at least a week later (Schramm and Heidinger 1988).

The most commonly noted causes of fish mortality as it relates to angling are listed in Table 3 and may be summarized under the following categories:

Seasonal Scheduling of Fishing Events

Higher mortality rates during periods of hot weather are documented in the literature. Hooking mortality rates also tend to increase with temperature. Higher water temperatures result in decreased dissolved oxygen levels.

Catch and Immediate Release

Fish exposed to air adds significant additional stress to an already exhausted fish. Proper handling of an exhausted fish is the key to ensure survival of a released fish. Other factors associated with catch-hold- and-release practices are mentioned below.

Hook Damage/Tackle

Fish that die are often hooked deep in critical areas such as the gills, esophagus or stomach. Most studies show that the use of live bait results in more deeply-seated hooks. Some studies show that size and type of hook and fishing method used affects hook placement and the amount of bleeding that occurs. Walleye (Stizostedion vitreum) have been shown to have low hooking mortalities even when hooked in the gills by a barbless hook with an artificial lure or hooked in the stomach with a live-baited, barbless hook. Salmonids and smallmouth bass (Micropterus dolomieu) tend to have higher mortality rates when hooked with live bait. Larger fish tend to have higher mortality rates when the hook is swallowed. Hooking mortality may increase with temperature.

Deep Water Retrievals

Swim bladder problems (expansion, rupture) most frequently occur when fish are caught at depths greater than 9 m and brought to the surface too quickly. This problem is most liable to occur during deep water ice fishing events or in the fall when fish are moving to deeper, colder water for the winter.

Handling

How the fish is handled, from the set of the hook until it is unhooked, determines how much physiological and physical stress the fish undergoes. Improper handling of a landed fish may cause loss of the protective mucous or scales. The general health of the fish is then threatened with the increased possibility of infection, disease or parasites at these damaged sites.

Livewell Confinement

Three main factors influence rate of survival of fish in livewells. Crowded livewells cause bruising and scarring of fish. This can lead to infection, disease, or invasion by parasites at the site of injury. High-speed travel, particularly during windy and wavy periods, can also cause bruising and scarring during transport to the weigh-in station. This can occur whether the livewell is crowded or not. Sudden changes to water temperature or increases in water temperature increase stress levels offish. Stressed fish use more dissolved oxygen and increase their excretion of harmful un-ionized ammonia from their gills. Increases in levels of ammonia or increased water temperatures further deplete dissolved oxygen levels in the livewell.

Weigh-in Practices

Handling is critical during the period of transport from the livewell to the weigh-in station and later to when the fish is released. During this period, fish are also susceptible to crowding, increases in water temperature and ammonia levels, decreased dissolved oxygen levels, air exposure and additional handling stress during the weigh-in procedure.
Relocation of Fish

Considerable concern has been expressed recently about the displacement of fish from the catch-site. At the time of release, fish display disorientation. They reportedly move to the bottom and settle into an area of protection and remain there for some time. Adverse interactions with fish already established in the area may occur at this time. Some physiological studies suggest that it can take a fish several weeks to regain its physiological and chemical balance after experiencing a high level of stress. Delayed mortality is greatest during this time. The fear of permanent displacement resulting in alterations in the natural distribution of fish has also been studied. Species such as smallmouth bass and muskellunge (Esox masquinongy) that already display a homing or home range tendency are more likely to return to or close to the location where they were caught. The release of fish into new waters is also a concern. The introduction of a new predatory fish species can often be detrimental to the existing fish community structure.

Table 3. A summary of literature related to the most frequently reported biological concerns and potential impacts associated with competitive fishing events.

<table>
<thead>
<tr>
<th>Biological Concerns</th>
<th>Potential Impacts</th>
<th>Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stimulation and concentration of fishing effort of a particular waterbody or fish species</td>
<td>Stock depletion, reduced catches, increased mortality rates, angler dissatisfaction</td>
<td>Tournament Fishing Committee (1991); Schramm et al. (1991 a); Duttweiler (1985); Wilde et al. (1998); Kerr et al. (1994); Schramm et al. (1985)</td>
</tr>
<tr>
<td>Effects of catch and release competitive fishing events</td>
<td>Physiological stresses to fish, delayed mortality, changes in growth rates due to stress</td>
<td>Ontario Fisheries Advisory Council (1991); Duttweiler (1985); Phelan et al. (1993); Manns and Quinn (1998a); Kerr et al. (1994); Schramm et al. (1985); Quinn (1989); Ferguson and Tufts (1992); Schramm and Heidinger (1988); Manns (Undated); Stange and Farley (1987a); Stange and Farley (1987b); Barnhart and Roelof (1987); Seidensticker (1977); Schramm et al. (1987); Weathers and Newman (1997); Klinert and Schiavone (1991); Clark (1983); Barnhart (1989); O’Neil and Pattenden (1992); O’Neil and Patalas (1993)</td>
</tr>
<tr>
<td>Effects of livewell confinement</td>
<td>Physiological and physical stresses to fish, delayed mortality</td>
<td>Phelan et al. (1993); Kerr et al. (1994); Manns (Undated); Fewlass and Heft (1990); Hartley and Moring (1993); Schramm and Heidinger (1988); Plumb et al. (1988); Manns and Quinn (1998a); Hartley and Moring (1995); Goeman (1991); Hoffman et al. (1996); Kwak and Henry (1995)</td>
</tr>
</tbody>
</table>

...Table 3
Table 3 (continued). A summary of literature related to the most frequently reported biological concerns and potential impacts associated with competitive fishing events.

<table>
<thead>
<tr>
<th>Biological Concerns</th>
<th>Potential Impacts</th>
<th>Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Effects of handling (during and after catch)</td>
<td>Physiological and physical stresses to fish, initial mortality, delayed mortality, infection, parasites or disease</td>
<td>Ontario Fisheries Advisory Council (1991); Duttweiler (1985); Phelan et al. (1993); Kerr et al. (1994); Dotson (1982); Schramm and Heidinger (1988); Kieffer et al. (1995); Dotson (1982); Ferguson and Tufts (1992); Steeger et al. (1994); Goeman (1991); Fielder and Johnson (1994); Wilde (1998)</td>
</tr>
<tr>
<td>Effects of the catch</td>
<td>Hooking injuries leading to initial and delayed mortality of released fish</td>
<td>Ontario Fisheries Advisory Council (1991); Kerr et al. (1994); Dextrase and Ball (1991); Dotson (1982); Anonymous (1989); Loftus et al. (1988); Muoneke (1992); Pelzman (1978); Mason and Hunt (1967); Payer et al. (1989); Nuhfer and Alexander (1992).</td>
</tr>
<tr>
<td>Water and air temperatures at time of catch (also see below)</td>
<td>Excessive stress caused by exhaustion</td>
<td>Schramm and Heidinger (1988); Barnhart and Roelofs (1987); Schill et al. (1986); Fletcher (1987); DuBois et al. (1994); Wydoski (1977); Bettoli and Osborne (1998); Rutledge and Pritchard (1977); Nelson (1998); Meals and Miranda (1994); Wilde (1998)</td>
</tr>
<tr>
<td>Water and air temperatures at time of catch (also see below)</td>
<td>Population size structure changes caused by increased mortality of larger fish</td>
<td>Schramm et al. (1991 a); Ontario Fisheries Advisory Council (1991); Kerr et al. (1994); Schramm and Heidinger (1988); Ridgway and Shuter (1994); Ridgway (1992); Fielder and Johnson (1994)</td>
</tr>
<tr>
<td>Effects of relocation of fish</td>
<td>Permanent displacement, alterations in natural distribution of fish species, introduction of fish species into new waters, increased vulnerability to anglers</td>
<td>Schramm et al. (1991 a); Ontario Fisheries Advisory Council (1991); Kerr et al. (1994); Schramm and Heidinger (1988); Ridgway and Shuter (1994); Ridgway (1992); Fielder and Johnson (1994)</td>
</tr>
<tr>
<td>Effects of pre-event practices</td>
<td>Hooking injuries leading to mortality</td>
<td>Ontario Fisheries Advisory Council (1991)</td>
</tr>
<tr>
<td>Effects of angling in deep waters (&gt; 9m)</td>
<td>Over-inflation of the air bladder</td>
<td>Feathers and Knable (1983); Anonymous (1993); Lee (1992); Keniry et al. (1996); Manns (Undated a); Manns (Undated b); Schramm and Heidinger (1988)</td>
</tr>
<tr>
<td>Effects of using different tackle</td>
<td>Serious injury leading to infection or death</td>
<td>Dotson (1982); Manns (Undated a); Mason and Hunt (1967); Payer et al. (1989); Klein (1965); Clapp and Clark (1989); Schaefer (1989); Nuhfer and Alexander (1992); Manns (Undated b); DuBois et al. (1994); Wydoski (1977); Rutledge and Pritchard (1977); Schill and Scarpella (1997); Turek and Brett (1997); Nelson (1998)</td>
</tr>
<tr>
<td>Scheduling tournaments during hot summer months</td>
<td>Mortality caused by increased temperatures, low dissolved oxygen, increased hooking mortalities</td>
<td>O'Neil and Pattenden (1992); Dotson (1982); Manns (Undated); Muoneke (1992); Nelson (1998); Meals and Miranda (1994); Hoffman et al. (1996); Kwak and Henry (1995)</td>
</tr>
</tbody>
</table>
Summary

The following points highlight the sociological, economic and biological concerns and impacts associated with competitive fishing.

- Competitive fishing has grown into a form of angling experience that is provided specifically through the organization of competitive fishing events.
- This relatively new form of recreation often presents some psychological and social differences of opinion with other members of the angling community and resource users.
- Communities in which competitive fishing events occur, as a whole experience significant economic gains during and after these events take place. Manufacturers of boats, motors, marine and fishing tackle supplies also benefit.
- Competitive fishing provides an avenue for fisheries managers to increase communications about specific resource management programs and offers a new opportunity for angler education.
- Any number of angling activities or circumstances can cause a fish to become stressed resulting in changes to its physiological state. If the physiological tolerance limits of a fish are exceeded, reproductive success and growth may become impaired; the resistance to bacterial infections, disease or parasitic infection may be lower, limiting its overall chance for survival.
- Many of the potential negative impacts to fish (e.g. hooking injury, exhaustion, stress from confinement or crowding) can be minimized when organizers properly schedule and manage events and prior to the event, educate the participants on the proper handling, confinement and release techniques of fish.
- Ontario’s fisheries managers are faced with the challenge of ensuring that the aquatic ecosystems remain healthy and productive so that society's present and future needs can be met (OMNR 1992). This involves identifying and assessing the sociological, economic and biological concerns and potential impacts of competitive fishing events and then applying the best available management tools to each given situation.

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potential impacts and concerns associated with competitive fishing events: a literature review


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Potential Impacts and Concerns Associated with Competitive Fishing Events: A Literature Review


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Despite the fact that most competitive fishing events target largemouth bass (*Micropterus salmoides*), there has been very little research on largemouth bass in Ontario waters. This project involved the use of ultrasonic and radio tags to determine home ranges of largemouth bass in Big Rideau Lake and the impacts of displacement practices from fishing tournaments. Bass which were tagged ranged in size from 36-46 cm in length and from 6-13 years of age.

Approximately 50 fixes of each tagged bass was used to determine home range. Compared to smallmouth bass (*Micropterus dolomieu*), largemouth bass in Big Rideau Lake were found to have relatively small home ranges ranging from 12 to 23 hectares for both control and released fish.

Bass were moved from their home ranges (i.e., point of capture) and transferred distances from 2-16 kilometers (mean of 7 km) distant. There appeared to be an adjustment time of approximately two weeks once a bass had been angled, displaced and released. One-fifth of the displaced fish returned to their home range that same year while other fish did not return until the following year. In no instance did any fish return to their home range if they had been displaced greater than 8 kilometers from their point of capture. Although there was evidence of a strong home range fidelity, smallmouth bass displayed much greater swimming movement to return greater distances to return to their home range than did largemouth bass. Despite these differences between the two species, the home range use was consistent between displaced and undisplaced largemouth bass.

Long term survival of tagged fish was estimated by analyzing the fate of radio tags. From this information it was found that approximately 50% of fishing mortality occurred on two summer weekends. It was also determined that the probability of released fish surviving for the entire fishing season was 0.6.

Current bass tournament catch-and-release practices have served to greatly reduce fishing mortality from that observed twenty years ago. Future studies should concentrate on improving catch-and-release practices and refining tournament rules to minimize mortality on angled bass.

**Editor's Note:** Mr. Ridgway's contribution represents only an abstract from his presentation as the paper has been submitted for publication in an upcoming issue of the *North American Journal of Fisheries Management*. 
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In recent years, there has been a marked increase in the number of live-release competitive fishing events in Ontario. Several previous studies have attempted to document the extent of mortality associated with these events in other parts of North America. At present, however, a thorough physiological examination of these events is required. Important factors which may influence the magnitude of stress in fish and therefore mortality in tournaments include angling, water temperature, confinement/livewell conditions and inherent interspecific differences in physiology. In the future, studies should use traditional physiological indicators of stress as well as recently developed molecular tools to directly quantify the relative importance of potential factors that may contribute to stress and therefore mortality in different species of fish within these events. This information would provide an extremely useful database which managers could then use to make appropriate decisions in order to minimize the impact of competitive fishing events on sportfish populations.

Introduction
Over the past several years, there has been a marked increase in the number of competitive fishing events in North America. In order to reduce their impact on the resource, many of these events have adopted a "live-release" format. There is also considerable pressure from fisheries managers and conservation organizations to further increase the percentage of these "live-release" events and reduce or eliminate the number of derbies (catch and kill events) for popular gamefish species such as bass and walleye. The number of live-release tournaments has therefore been steadily increasing and this trend will undoubtedly continue in the near future.

The increasing popularity of "live-release" tournaments has resulted in a significant amount of scientific research into the impact of these events on the resource. According to Hoffman et al. (1996), the percentages of mortality that have been documented for tournaments range from 0 to 94% for black bass (Micropterus spp.) and 2 to 47% for walleyes (Stizostedion vitreum). Although considerable effort has been directed towards quantifying initial and/or delayed mortality associated with various tournaments, the underlying physiological mechanisms contributing to mortality have not been well described. Moreover, there has been no serious attempt to identify the most stressful aspects of tournaments for different fish species. A thorough physiological assessment of current tournament practices is therefore warranted and would probably provide valuable insights into the relative importance of factors that may contribute to stress in fish during these events.

Stress and Mortality
Figure 1 presents a simple model to illustrate how various factors in addition to angling probably contribute to stress in fish during competitive fishing events. Under ideal conditions, the stress from any of these individual factors (eg. angling) would not normally result in mortality. When fish are exposed to several of these factors in a relatively short period of time, however, there is probably a cumulative effect which may exceed the tolerance of certain individuals and cause mortality. The following sections describe a number of factors which may potentially contribute to stress in fish during "live-release" tournaments.
A Physiological Perspective on Live-Release Competitive Fishing Events

Live-release tournaments, air exposure may occur at several stages, but the weigh-in process is probably associated with the longest duration of air exposure. Ferguson and Tufts (1992) showed that air exposure may be an important additional stress for exhaustively exercised/angled fish. Figure 2 shows that relatively short periods of air exposure caused a significant reduction in the number of rainbow trout surviving following exhaustive exercise. Since this study was carried out on hatchery trout under laboratory conditions, these results should not be directly extrapolated to catch and release situations involving wild fish. Nonetheless, these results do indicate that even short periods of air exposure may be a significant additional stress for angled fish.

Figure 1. Cumulative effects of stress factors in fish during competitive fishing events.

Potential Sources of Stress

Angling

Early studies by Black (1958) indicated that a significant percentage of fish which are exercised to complete exhaustion may actually die from the ordeal. Other investigators have also documented significant mortalities in exhaustively exercised fish (Beggs et al. 1980; Graham et al. 1982; Wood et al., 1983). In contrast, some studies have indicated that exhaustive exercise associated with angling stress may not result in significant mortality (Wydoski et al. 1976; Tufts et al. 1991; Booth et al. 1995; Kieffer et al. 1995). The reasons for these apparently conflicting results are not entirely clear. Angling to exhaustion certainly results in a significant physiological disturbance in fish (Tufts et al. 1991). Under ideal conditions, however, most wild fish are probably able to fully recover from the exhaustive exercise bout associated with angling. It is likely that mortality only arises when additional exogenous or endogenous factors exacerbate the post-angling physiological disturbance. In tournament situations, it is also noteworthy that fish are often not fully exhausted when they are landed. Under these conditions, the magnitude of the physiological disturbance caused by angling would be even less.

Air Exposure

An interesting feature of most "catch-and-release" angling situations is that there may often be a significant period of air exposure for measurements and photographs before the fish is released. Within

Figure 2. Effect of air exposure on survival of rainbow trout following exhaustive exercise. Redrawn from Ferguson and Tufts (1992).

Water Temperature

Water temperature is undoubtedly one of the most important factors influencing the survival of fish during live release tournaments. Several studies have demonstrated that water temperature has a significant impact on the physiological disturbance within a fish following exhaustive exercise (eg. Kieffer and Tufts, 1996; Wilkie et al. 1996, 1997). Survival of exhaustively exercised or angled Atlantic salmon is reduced at temperatures which are still several degrees below the upper lethal temperatures for resting fish (Fig. 3; Wilkie et al. 1996, 1997). According to Goeman (1991), mortalities in bass and walleye tournaments are also increased at higher water temperatures. In live release tournament situations, it is likely that temperature influences the magnitude of stress at numerous stages. The
physiological disturbances and stresses associated angling, confinement in live-wells, handling and air exposure probably all increase at higher

Another potential source of stress during competitive fishing events, which has received much less attention, arises from the acute temperature changes that fish may experience during the course of the day. For example, fish are often transferred from live wells at relatively high ambient temperatures to weigh-in stations in ice filled bags of water, then air exposed and released back into ambient water. Presumably, the intent of chilling the fish prior to the weigh-in is to reduce stress. It is conceivable, however, that the acute temperature changes associated with these practices may create an additional stress. The physiological impact of these practices should be investigated more thoroughly.

Confinement and Livewell Conditions

It is well known that confinement and crowding cause stress in fish. Holding fish for considerable periods of time in livewells must therefore be viewed as another significant factor among the stresses associated with competitive fishing events. The relative importance of this factor will also be increased in situations where Livewell temperatures increase above temperatures at which fish were caught or when Livewell oxygen levels drop below the hypoxic threshold for a particular species. Interestingly, it has also been documented that tournament mortalities are significantly increased during rough water conditions (Goeman, 1991).

The Livewell represents an interesting avenue for preventative steps to reduce the magnitude of stress in fish during tournaments. This has not been overlooked by commercial manufacturers who have created a variety of products to reduce stress in fish held in livewells. Since confinement stress causes physiological disturbances such as ion losses, for example, products containing additional ions would offset some of these problems. To my knowledge, however, many of the impressive claims made on the labels of these compounds, in terms of their ability to influence metabolism, enhance recovery and minimize stress within angled fish have not been substantiated in the scientific literature. Interestingly, the presence of a commercial Livewell compound did not significantly improve any measured physiological variables during recovery from exhaustive exercise in rainbow trout (Croke and Tufts, unpublished data). In contrast to these results, recovery of exhaustively exercised trout seemed to be enhanced when the fish were placed in a noncommercial mix of physiologically relevant ions (Bagatto and Tufts, unpublished data). These preliminary results suggest that there may be room to improve the manipulation of Livewell conditions in order to minimize stress and enhance the survival of fish in live-release tournaments, but this area requires further study. At the present time, conscientious efforts to maximize aeration and prevent hypoxia while fish are held in livewells, particularly during amateur events involving less experienced anglers, would probably be an important step towards minimizing mortality caused by Livewell stresses.

Figure 3. Effect of water temperature on survival of exhaustively exercised Atlantic salmon. Data from Wilkie et al. (1997).
A Physiological Perspective on Live-Release Competitive Fishing Events

Figure 4. Effect of a noncommercial mix of physiologically relevant ions on the recovery of blood pH in rainbow trout following exhaustive exercise (Bagatto and Tufts, unpublished data).

Inherent Species Differences in Physiology

The physiological and biochemical responses to exhaustive exercise are known to vary between species of fish (Wood and Perry, 1985; Gonzalez and McDonald, 1994; Moyes and West, 1995). It is reasonable to assume that the responses of different species to other potential sources of stress within tournaments such as confinement will also be somewhat variable. Some of these interspecific differences, such as the relative "leakiness" of the gill under stressful conditions may be important factors contributing to different rates of mortality between species in tournament situations. One can speculate, for example, that species with gills that have low rates of ion losses following exercise and during confinement would be better target species for tournaments. In contrast, species which exhibit relatively high rates of ion loss under these circumstances may also exhibit higher rates of mortality in tournaments. Broad interspecific differences in other physiological characteristics such as upper lethal temperatures and ranges of temperature tolerance are also well documented and may be important determinants of mortality within tournaments. Thus, basic physiological differences between species must largely account for the general observations that some species such as bass are relatively tolerant of tournament practices whereas others such as walleyes, for example, seem to be less tolerant in this regard. These insights provide yet another example of the important link between basic and applied scientific issues. Much of the basic research in the area of fish physiology is typically carried out on a few model organisms such as the rainbow trout. In contrast, relatively little information is available about the basic physiology of many fish species of Ontario sportfish such as bass, walleye, pike (Esox lucius) and muskellunge (Esox masquinongy). An improved database in this area would probably enhance the ability of managers to make decisions such as those associated with tournaments.

Future Directions

At present, the physiological basis for fish mortality associated with live-release tournaments has not been clearly determined. According to Wood et al. (1983), the magnitude of the post-exercise acidosis within the muscle may be an important factor determining whether exhaustively exercised fish will survive. During our previous physiological studies examining the consequences of catch- and release- in salmonids, the extent (magnitude and duration) of the intracellular acidosis was often correlated with survival. In some instances, however, such as following exercise at higher temperatures, there was actually greater mortality within groups where faster recovery of the intracellular acidosis was observed (Wilkie et al. 1997). These results therefore indicate that the magnitude of the intracellular acidosis is probably not directly linked to the mortality of fish following exhaustive exercise or angling and that better physiological indicators are required.

Interestingly, elevated cortisol levels have been found to inhibit recovery of metabolic variables in exhaustively exercised salmonids (Eros and Milligan, 1996). These results suggest that elevated cortisol levels resulting from confinement in livewells may extend the duration of the physiological disturbance after angling. Higher temperatures may also disturb the relationships between substrates and products within metabolic pathways in fish. Indeed, metabolic breakdown is thought to be one of the primary causes of mortality as fish approach their upper lethal temperature. Thus, some form of metabolic dysfunction resulting from a variety of cumulative stresses could well be responsible for the short-term mortalities observed in fish during tournaments. Several studies have also documented significant long-term mortalities in fish after tournaments. In this case, it has been hypothesized that stresses may be reducing the fishes ability to deal with infections or disease.
Better indices are required to determine the magnitude of stress in fish associated with various tournament practices and tournaments under different environmental conditions. Traditionally, studies evaluating stress in fish have measured variables such as cortisol levels, plasma osmotic concentrations and blood glucose levels since these variables are altered as part of the primary and secondary responses to stress. In the future, however, studies attempting to evaluate the magnitude of stress in fish during tournaments should also incorporate recently developed molecular tools to evaluate cellular stress within tissues. In this regard, several labs in this area have recently been exploring the possibility of using heat shock or stress proteins as useful indicators of cellular stress in fish. Since fish red blood cells are nucleated, it is conceivable that small non-terminal blood samples may be used in future studies to gain insight into the magnitude of stress in fish within tournaments. We are currently exploring this possibility.

In conclusion, the growing popularity of live-release tournaments has raised concerns over the impact of these events on populations of sportfish. A number of studies have attempted to document the extent of mortality in these events for different species and under a various of environmental conditions. At present, however, a thorough physiological investigation of tournament practices and their impact on different target species is required. Such studies would provide valuable information that fisheries managers as well as tournament organizers could use to make appropriate decisions regarding numerous issues such as specific tournament practices, appropriate target species and suitable environmental conditions etc in order to minimize mortality during these events.

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A Physiological Perspective on Live-Release Competitive Fishing Events


Compliance Issues at Competitive Fishing Events

Compliance Issues at Competitive Fishing Events

Merilyn Twiss and John Chevalier
Provincial Enforcement Section
Ontario Ministry of Natural Resources
P.O. Box 7000, 300 Water Street
Peterborough, Ontario
K9J 8M5

Competitive fishing events are increasingly popular. Biological, sociological and economic benefits and negative consequences have been identified, but there has been little documentation of associated compliance issues. Tournament anglers differ from non-tournament anglers, particularly with respect to motivation. While the non-catch related motivations are important to both groups, tournament anglers place greater importance on catch-related motivations. Tournament anglers are usually more specialized anglers, and support conservation measures. The introduction of extrinsic rewards such as prizes or trophies may cause changes in angler goals and motivations. Ontario Ministry of Natural Resources (MNR) field enforcement staff were contacted, and provided information on compliance issues associated with competitive fishing events. Problems encountered include fishing prior to the season opening date, transport of fish from another waterbody, illegal sale of fish, fishing with too many lines, licensing issues and over-limits. Increased workloads and unrealistic expectations of tournament organizers and the public were also identified. New government policies, particularly licensing of events, in combination with changes to tournament rules and organization would help address these problems.

Introduction

Competitive fishing tournaments have been taking place for several decades now, with a considerable increase in the popularity of these events in recent years. Salmon derbies were held in Alaska as early as 1947 (Schwan 1982). Competitive bass fishing tournaments were first formally organized in the southern USA in 1967, and were occurring in all regions of the contiguous USA by 1978 (Shupp 1979). Schramm et al. (1991 a) reported an estimated 31,000 competitive fishing events occurring annually throughout North America, with a wide variety of species targeted. All states and provinces in North America, including Ontario, report competitive fishing events taking place within their jurisdictions (Schramm et al. 1991 b). The events range from derbies for under-utilized species, often held to encourage youth and family participation (Schedler and Haynes 1984), to very competitive events with prizes of a high cash value (Schramm et al. 1991b; Wilde et al. 1998).

The mean age of tournament participants is somewhat younger than that of the general angling population, and is typically between 30 and 50 years of age (Belusz and Witter 1986).

Numerous benefits of fishing tournaments and derbies have been identified. The media attention and public relations associated with competitive fishing events are usually positive, promoting participation in the sport, and awareness of fisheries management programs, while providing opportunities for fisheries management agencies to communicate with anglers (Duttweiler 1985; Schedler and Haynes 1984; Willis and Hartmann 1986; Schramm et al. 1991 a, 1991 b). The economic benefits generally, and in particular for communities near where the events are held, can also be significant (Shupp 1979; Duttweiler 1985; Belusz and Witter 1986; Ditton and Loomis 1987; Schramm et al. 1991 a, 1991 b). Data collection at tournaments has been identified as an economical, efficient way for agencies to obtain fish population estimates and acquire information about catch-per-unit-effort, or other parameters of fishing quality (Holbrook et al. 1972; Aggus and Rainwater 1975; Hickman and Hevel 1975; Farman et al. 1982; Quertermus 1991).

Potentially negative biological consequences associated with competitive fishing events also have
been identified. Although many events promote catch-and-release fishing, researchers have demonstrated that pre- and post-release mortality of fish will occur, with resultant reduction in overall population abundance (Schramm et al. 1987; Goeman 1991; Fielder and Johnson 1994; Kwak and Henry 1995; Weathers and Newman 1997; Wilde 1998). Depending on the timing of the event, disruption of spawning activities and subsequent loss of reproductive potential for the population also may occur (Hayes et al. 1995). There is some evidence that tournament fishing can alter the population size structure, with fewer large fish present (Olson and Cunningham 1989; Meals and Miranda 1994). Changes in the gene pool also have been suggested (Schramm et al. 1991b). Release of fish at sites distant from the initial capture site may influence fish distribution in a waterbody, altering the availability of fish to anglers, and potentially affecting forage fish and competitor species populations (Lantz and Carver 1975; Blake 1981; Healey 1990; Schramm et al. 1991b). Tournament anglers fishing close to nests of waterbirds such as loons can keep the birds off the nest for long periods of time, resulting in failure of the nest attempt (Twiss, unpubl. data).

Many negative social consequences of competitive fishing events, whether real or perceived, have been suggested. These include over-concentration of fishing pressure, conflicts with non-tournament anglers, access problems, conflicts with local citizens, negative press for recreational fishing or for fisheries management agency programs, increased workloads for agency staff, and creation of safety hazards (Shupp 1979; Duttwieiler 1985; Schramm et al. 1991a, 1991b).

Despite the increase in popularity of competitive fishing events, and resulting efforts to document associated benefits and problems, there has been little information collected on compliance issues arising from these events. While some tournaments actually establish and enforce biologically desirable rules beyond what is legislated (Schramm et al. 1991a), this does not preclude the possibility of compliance problems. We reviewed the information available about tournament angler characteristics and attitudes to predict possible implications for enforcement programs. We also contacted Ministry of Natural Resources (MNR) field enforcement staff throughout Ontario to compile information about infractions and enforcement problems which have been experienced with competitive fishing events.

### Attitudinal Profiles of Tournament Anglers, and Implications for Enforcement Programs

Researchers studying the characteristics of anglers usually agree that tournament anglers are not a homogeneous group, and with the considerable diversity present, there is no such thing as "the average angler" (Ditton and Loomis 1987; Loomis and Ditton 1987; Hahn 1991; Fisher 1997; Wilde et al. 1998). Nevertheless, it can be helpful to assess characteristics of anglers separated into groups based on degree of fishing specialization, or motivation.

The majority of tournament anglers are male, with the male to female ratio being much higher for this group than for non-tournament anglers (Belusz and Witter 1986; Ditton and Loomis 1987; Falk et al. 1989; Ditton and Loomis 1987; Wilde et al. 1998). When compared to non-tournament anglers, entrants in competitive fishing events usually fish more frequently, are more likely to belong to a fishing club or association, perceive themselves as equally or more skilled than non-tournament anglers, are more likely to subscribe to outdoors or fishing magazines, are more likely to fish with friends rather than family members, are more likely to spend some or most of their vacation fishing, and are more specialized, fishing primarily for only one, or a few species (Ditton and Loomis 1987; Loomis and Ditton 1987; Falk et al. 1989; Wilde et al. 1998).

The motivations of tournament anglers often are very different than those of the general angling population. The opportunity to win prizes of considerable value and to have one's skill as an angler publicly recognized are likely to be strong motivators for tournament contestants. Angler motivations can be categorized as catch-related or activity-specific, (i.e. unique to fishing) and non-catch related or activity general, (i.e. common to all outdoor recreation activities) (Ditton and Fedler 1984; Loomis and Ditton 1987; Fisher 1997). Non-catch related motivations include relaxation, escape from one's regular routine, family recreation, being outdoors, enjoying natural surroundings or natural beauty, and being with friends. Catch related motivations include number, size and species of fish caught, and disposition of the catch. Non-tournament anglers typically rate the non-catch motivations as being of more importance to them. By contrast, while tournament anglers also regard these motivations as important, they rank them behind the catch-related motives and the aspects of challenge, sport, or testing of skills (Belusz and Witter 1986; Loomis and Ditton...
Most fishing clubs and associations support conservation initiatives, and given that a large proportion of tournament anglers belong to these groups, it can be inferred that they support conservation measures and protection of fishery resources (Falk et al. 1989). Tournament anglers are defined as specialized anglers, and as angler specialization increases, anglers increasingly favour strict enforcement of game laws, are more willing to accept restrictions such as prohibitions on the use of live bait, and exhibit a strong commitment to conservation issues, particularly relating to habitat (Hahn 1991). On the other hand, when valuable prizes can be won, or significant financial benefits can be gained, as is the case with many large tournaments, motivations may change. The temptation to improve the odds of winning by breaking the law will be greater. Loomis and Ditton (1987) suggest that the introduction of extrinsic rewards such as prize money or trophies into an otherwise intrinsically interesting activity like fishing could result in a shift in goals and participation for some anglers.

Fishing Tournament Compliance Issues Reported by Ontario MNR Enforcement Staff

Fisheries regulations are intended to meet society's objectives, and may be implemented for biological, ecological, sociological or economic reasons (Noble and Jones 1993). Implementation of regulations requires understanding and compliance by the user group, (in this case anglers), which can be promoted by a visible enforcement presence and compliance marketing (Noble and Jones 1993). Detection and deterrence of infractions are equally important components of an enforcement program (Noble and Jones 1993; Millar 1995). Enforcement efforts have proven effective at reducing fisheries violation rates (Mikel 1981), but they can be costly, and the establishment of priorities to allow for the planned delivery of enforcement effort is essential, particularly when fiscal constraints are a reality (Millar 1995). A provincial compliance plan has been developed for Ontario, to provide direction for MNR's enforcement work (Anon. 1998). This document provides general compliance planning direction, with more detail to be provided in individual district compliance plans. It is at this more local level that information about compliance issues associated with competitive fishing events will likely be of most relevance.

We contacted all of MNR's District and Great Lakes Enforcement Supervisors (total of 28), and asked them if competitive fishing events took place in their area. We also asked them to identify any enforcement concerns identified in association with these events. Responses were received from 16 of the Supervisors. Some had also circulated our request for information to other enforcement staff in their area, and an additional six responses were received from these officers, for a total of 22 responses. An analysis of the responses indicates that tournaments or derbies, targeting a variety of species, are being held in numerous locations throughout the province. The larger, well-organized tournaments tend to present fewer enforcement issues. Most tournament competitors have paid large entry fees, and do not want to risk being thrown out of the competition for violation of the regulations. Also, there are usually strict rules observed, and the organizers "self-police" the event. The exception to this may be the events that extend over long periods of time, such as "The Great Salmon Hunt". These events typically do not have organizers on the water monitoring the event on a daily basis.

Despite the self-regulating nature of many tournaments, enforcement staff responding to our request for information did report some infractions taking place at competitive fishing events. Of particular concern was the number of tournament anglers observed fishing prior to the opening date, in preparation for a tournament, especially for bass. When questioned by an officer, they claimed to be fishing for another species for which the season was open. Other violations of fishing regulations occurred in combination with fraudulent attempts to enter winning fish. This included the transport of fish from another waterbody, registry of fish caught prior to the opening date, fish caught in nets and entered as angler-caught for the tournament, and attempts to sell large fish to competitors. Another problem with sale of fish was reported after a derby on Lake Superior. The large lake trout entered by contestants were extremely fatty, and not considered edible by the anglers, so the fish were being discarded after the weigh-in. This created public relations problems for the event, and organizers decided to sell fish...
Compliance Issues at Competitive Fishing Events

"donated" by the anglers, with the money going to the charity holding the event. This was clearly an illegal sale of fish, although the derby organizers thought that they were simply preventing a waste of the fish. Charges were not laid, but action to address the problem would have been required had the event not been discontinued. Conservation officers also reported that tournament anglers fishing with too many lines can be a problem, particularly for events taking place on the Great Lakes. Other illegal activities encountered concerned licensing requirements. In some cases, competitors actually do not possess a valid licence, while in other cases they have forgotten to carry it with them. Some tournament entrants checked by conservation officers were entering full limits of fish at the weigh-in, yet had purchased only a "conservation limit" licence. One officer reported charging a tournament competitor for fishing while under suspension. The individual had used another person's Outdoors Card to enter the tournament under an assumed name.

Other situations encountered by conservation officers while monitoring competitive fishing events were technically illegal, but more difficult to prosecute. A situation commonly encountered is where anglers are in possession of their legal limit, but continue to fish for larger fish. If they catch a bigger fish, they release the smallest of the previously caught fish. They are therefore in possession of an over-limit until the smaller fish is released. Technical over-limits also can occur when tournament organizers are transporting fish to a release site after the weigh-in. Often, large numbers of fish are transported in one boat with only one or two licence-holders aboard. Another questionable situation was encountered at a tournament held on a water system where locks and dams separated portions of the waterbody. The fish were caught on one side of these barriers, but released on the other side. Officers had to decide whether or not these were separate waterbodies, in which case the fish were being released illegally.

Other problems reported by enforcement staff concern workloads and administrative or social issues. Tournaments usually concentrate large numbers of anglers on one waterbody for a relatively short period of time. Providing adequate enforcement coverage for these events may mean that other areas receive inadequate attention. Some tournament anglers are resentful of time spent being checked by conservation officers during an event. Their view is that even a few minutes reduction in fishing time may cost them a chance at a prize, and they express these concerns to the officers. The local MNR office also may have to spend time responding to complaints from non-tournament anglers and local residents about real or perceived problems. With high concentrations of anglers, it is more difficult to detect infractions such as over-limits. Winter fishing from ice huts makes detection of over-limits especially difficult, and also prompts calls from the public about debris left on the ice. With high concentrations of fish huts, it can be difficult to determine who is at fault.

The expectations of tournament organizers and the general public at times are unrealistic, or add to enforcement workloads. Conservation officers may be asked to enforce safety-related regulations such as number of life jackets aboard the boats, or liquor infractions. Ontario conservation officers currently are not empowered to enforce the federal Small Vessels regulations nor the Liquor Control Act. Sometimes officials expect that enforcement staff will monitor and enforce the tournament regulations, which clearly is outside their mandate. Tournament rules usually require that a contestant be disqualified if they are found in violation of any of the fisheries regulations, and event organizers expect officers to report any charges laid against entrants. MNR currently has a policy which precludes disclosure of charges prior to conviction.

Conclusions

Although most large tournaments have carefully enforced rules that are more restrictive than the actual fisheries regulations, infractions still occur. There are also workload concerns and social issues that must be dealt with by enforcement staff. Changes to MNR policy and to tournament organization could help to reduce the infractions and other compliance issues associated with competitive fishing events in Ontario.

Many jurisdictions require that tournament organizers obtain a permit for events with more than a set number of participants (Schramm et al. 1991 a), and this is an option worthy of consideration by policy makers in Ontario. A permit system for competitive fishing events would provide an opportunity to distribute fishing pressure and reduce conflicts with other anglers and area residents. It would also facilitate planning of enforcement effort.

Organizers of competitive fishing events could do much to reduce compliance issues by making changes to how events are planned and regulated. Ensuring that tournaments begin at least a couple of days after
the season opening date for the target species would help to reduce the amount of pre-season fishing. Another option already employed by some tournaments is to prohibit competitors from fishing on the waterbody where the event is being held immediately prior to the tournament. Catch-and-release requirements in a tournament are preferred from a biological perspective, and would also help to eliminate some of the infractions occurring in combination with fraudulent entries. Requiring anglers to show a valid outdoors card/fishing licence when registering for the event would prevent problems. Over-limit problems would be avoided by restricting the number of fish eligible for weigh-in by each angler to a number lower than the legal possession limit. Tournament organizers should also ensure that there are enough licences on board the boat transporting fish to a release site to avoid the problem of a technical over-limit. Organizers should also ensure that fish are returned to the same waterbody from which they were taken. If possible, attempts should also be made to regulate competitors' use of access points, and disposal of debris around ice huts, to minimize complaints from local residents. Ensuring that boats of all tournament entrants are clearly marked, perhaps with large numbers, would be helpful. Conservation officers would then be able to identify the competitors, and limit their time spent checking them to a minimum. It is also very important that tournament organizers understand the scope of a conservation officer's responsibilities. An officer will only be able to respond to matters pertaining to the legislation they are responsible for enforcing, and will not play a role in enforcing tournament rules.

Competitive fishing events likely will continue to be popular in the future. Development of sound government policies, a carefully planned compliance program and well-organized and regulated tournaments are essential for ensuring that these events remain socially and biologically sustainable.

Acknowledgments

Much of the information upon which this paper is based was obtained by contacting District and Great Lakes Enforcement Supervisors, who in some cases also requested information from enforcement staff in their units. We are grateful for the assistance provided by all the individuals responding to our request. Thanks are also extended to staff of the Ministry of Natural Resources Library in Peterborough for their assistance with the literature search.

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Compliance Issues at Competitive Fishing Events


Compliance Issues at Competitive Fishing Events


Federal Aid in Fish Restoration and Anadromous Fish Studies, Vol. 23, Alaska Department of Fish and Game, Juneau, Alaska, USA.


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The Bass Anglers Sportsman Society (B.A.S.S.) is the largest fishing organization in the world. It is a tournament-driven organization which organizes 20 major professional tournaments and sanctions over 25,000 federation tournaments annually. The Ontario Bass Federation is comprised of 28 Bassmaster clubs. In addition to tournaments, Bassmaster clubs must initiate at least one conservation project and one children's fishing event per year. B.A.S.S. has sponsored or organized competitive fishing events for over 30 years. All tournaments are based on the principles of conservation, sportsmanship, safety, and sound tournament practices.

History and Background

The Bass Anglers Sportsman Society (B.A.S.S.) was formed in 1968 by Ray Scott. It is a bass fishing tournament driven organization who are strong believers in the philosophy of catch-and-release and lend support to sound fisheries management practices. Members strive to set an exemplary example for both tournament minded and recreational anglers alike - both on and off the water.

The founding goals of the organization are to:

- organize the bass anglers of America;
- stimulate public awareness of bass fishing as a major participation sport and to elevate the sport to a place of prominence with golf, bowling, boat racing and billiards;
- improve our skill as bass anglers through the exchange of expert bass catching techniques and ideas;
- offer local state conservation departments our organized moral and political support and encouragement;
- promote full adherence to all conservation codes;
- demand adequate water standards and legal enforcement of existing regulatory standards;
- detect and report any polluter and call public and political attention to his crime;
- encourage private and governmental study into why fishing on our lakes and streams deteriorates and what can be done for these waters to restore and maintain top bass fishing for ourselves and our children;
- promote and encourage youth fishing. Kids don't go fishing - they are taken fishing. Instill at an early age an interest and love for this great recreation; and
- present national championship fishing tournaments. These bass tournaments bring together the nation's most dedicated bass fishermen. The publicity derived from these tournaments proves their value in stimulating public interest in our bass angling sport.

Ontario Bass Federation (O.B.F.)

The formation of the Ontario Bass Federation (O.B.F.) was spearheaded by a small group of dedicated bass anglers including the current president Des Barnes of Aurora. The O. B. F. was established in the fall of 1995. It is a non-profit organization comprised of 28 Bassmaster clubs. Over 800 members of B.A.S.S. belong to one of the 28 O.B.F. chapter clubs across the province. Clubs range from North Bay in the north to Windsor in the southwest and east to the Ottawa Valley. The O. B. F. has a provincial Conservation Director, Media Director, Tournament Director, and Youth Director. Each club has their own directors as well. The O. B. F.
President and Conservation Director attend annual B.A.S.S. workshops in the United States.

The O. B. F. is sponsored by BPI Mutual Funds and the Toronto Sportsman's Show. At the Toronto Sportsman's Show in March 1998, 1,200 children aged 7-14 years of age, competed for a share of $10,000 scholarships presented by BPI Mutual Funds. In 1999, over 2,000 children participated.

The O. B. F. is one of 51 federations around the world belonging to B.A.S.S. Other Federations include South Africa, Zimbabwe, Italy, Japan and 46 U.S. states. These federations and their member clubs or chapters are known as the "grass routes" of B. A. S. S.

Each club must organize and operate at least one Casting Kids Event annually. Many clubs also become involved in local community events. For example, in conjunction with the local Lion's Club, the Ottawa club co-hosted a fishing tournament for blind people. Other clubs take part in Santa Claus parades, local fund raisers, etc.

**O. B. F. Conservation Projects**

Each O. B. F. club must complete at least one conservation project per year.

In 1998, the Mississauga Bassmasters club won the B.A.S.S. National Conservation award. This was the first time that a club outside the United States has won this award. Conservation projects completed by this club include the installation of a log chain around the perimeter of some small islands in the Orangeville Reservoir, placement of 14 artificial bass spawning nests into Lake Ontario near Port Credit, and the construction and placement of several small artificial islands, complete with small trees and plants, into Lake Aquitaine near Mississauga.

Other noteworthy O. B. F. conservation projects, many of which were partially funded through the Community Fisheries and Wildlife Involvement Program (CFWIP), include shoreline reclamation projects, adult northern pike transfers, walleye and bass spawning rehabilitation, cattle fencing, garbage clean-up, purple loosestrife removal, fisheries data collection, and bald eagle reintroduction.

**B.A.S.S. Tournaments**

B.A.S.S. organizes 20 major professional tournaments annually with over six million dollars in prizes. They also conduct the B.A.S.S. Masters Classic often referred to as the "Super Bowl" of fishing tournaments. Finally the B.A.S.S. organization sanctions over 25,000 federation tournaments annually.

The O. B. F. has proven experience in running large tournaments. The Federation has organized four provincial O. B. F. qualifiers (Midland in 1996, Windsor in 1997 and North Bay in 1997 and 1998). The economic impact of these events on the local communities was substantial.

**Fishing Tournament Ethics**

For twenty-five years, B.A.S.S. tournaments have been a forum for promoting bass fishing, sportsmanship, safety and conservation through the examples of professional angling and media coverage of the pros, the events, the winning techniques and the rules of competition. B.A.S.S. tournament rules continue to be refined always reflecting sportsmanship, angler ethics, and establishing new conservation practices with emphasis on protecting black bass fishing for the future. Examples of some B.A.S.S. revolutionary tournament practices include the exclusive use of artificial baits, the mandatory use of boat engine "kill switches" and catch-and-release (initiated in 1972) with mandatory operating livewells in tournament boats. In 1991, B.A.S.S. entered into a cooperative agreement for a live release boat to distribute tournament-caught bass in various areas of the tournament lake as designated by the state/provincial fisheries manager.

Sportsmanship among fishing tournament competitors is a top priority for both tournament organizers and participating anglers. In 1989, B.A.S.S. formed the Association of B.A.S.S. professionals who as a group have the goal of advocating environmental protection, conservation and enhancement of the natural resource. Many of the official tournament rules reinforce a high level of ethical behavior among competitors. Some of these rules include:
Bass Anglers Sportsman Society (B.A.S.S.); Organization and Tournament Ethics

- no drugs or alcohol is permitted on board;
- competing anglers cannot solicit assistance from non-anglers;
- stepping onshore, except in the case of an emergency, is not permitted; and
- disqualification for disorderly or unsportsmanlike conduct can be administered by tournament officials.

There are also several "unwritten" tournament rules which include:

- not fishing too close to other anglers;
- maintaining a clean, professional appearance;
- avoid taking the fishing locations of others who may have found fish there before you;
- respecting the wishes of shoreline landowners who do not want you fishing around their docks;
- being polite and courteous to other boaters and cottagers while on the water as well as spectators at the weigh-in ceremonies;
- ensuring safe boating practices
- avoid fishing too close or disturbing nesting waterfowl; and
- disposing of garbage properly and collecting the occasional piece of garbage which may be encountered.

In summary, most tournament anglers are fully aware that their actions can reflect either positively or negatively on tournament fishing. B.A.S.S. anglers realize that they must be ambassadors of the sport and set an example for others by following the highest standard of sportsmanship and ethical behavior.

References

OFAH Competitive Fishing Event Guidelines and Sanctioning Policy

C. Alwyn Rose  
*Ontario Federation of Anglers and Hunters*  
P.O. Box 2800  
Peterborough, Ontario  
K9J 8L5

The Ontario Federation of Anglers and Hunters (OFAH) recognizes competitive fishing as a legitimate activity but realizes that conflicts can arise between organizers and other resource users. Guidelines have been developed to ensure that competitive fishing events can be carried out in a manner which promotes conservation and our angling heritage, ensures protection of the resource, and reassures other resource users that their concerns have been addressed. These guidelines promote safety, encourage proper catch, handling, and release techniques, require reporting of tournament results, impose limitations on prefishing, and stipulate adherence to fisheries and boating regulations. Organizers which meet OFAH guidelines for competitive fishing events benefit from the privileges of OFAH sanctioning of their event. A cooperative approach and the maintenance of high standards of conduct are recommended for competitive fishing events in Ontario.

**Introduction**

The Ontario Federation of Anglers and Hunters (OFAH) is by far the largest non-profit conservation organization in Ontario. It currently has approximately 79,000 members and 585 affiliated clubs. OFAH efforts focus on management and education.

The Ontario Federation of Anglers and Hunters recognizes competitive fishing as a popular and legitimate activity in Ontario. OFAH does not advocate or promote any individual competitive fishing event but will sanction events, provided that fisheries conservation objectives are not compromised and the event is conducted in a safe, responsible and sportsmanlike manner. To this end guidelines (OFAH 1998) have been developed for competitive fishing events.

**Definitions**

A competitive fishing event is defined as any angling activity in which participants are solicited and have the opportunity to win prizes or recognition. For the purposes of developing guidelines and sanctioning events, the following definitions have been utilized:

**Tournament** - A competitive fishing event on designated waters, requiring pre-registration, and where all fish are intended to be live-released.

**Derby** - A competitive fishing event on designated waters, requiring pre-registration, that may or may not be live-release.

**Contest** - A competitive fishing event which may involve a large geographic area, extended period of time, may or may not require pre-registration, and may or may not be live release.

**OFAH Guideline and Sanctioning Policy**

OFAH sanctions competitive fishing events to promote conservation, public safety and sportsmanship. It is intended that sanctioned events will also increase cooperation between event organizers and other resource users.
The OFAH will only sanction a competitive fishing event where fisheries and other aquatic resources are protected; fishing effort does not exceed the sustainable capacity of the resource; and the social, biological and economic values associated with recreational angling are recognized.

To obtain OFAH sanction for a competitive fishing event, organizers must submit a written proposal at least 60 days prior to the event and before any advertising material is released mentioning OFAH. Not all submissions will receive OFAH sanctioning and the organizer must wait for a positive written response before using the OFAH sanctioned events logo on any advertising.

The general conditions for OFAH sanctioning may be summarized as follows:

**Tournament Administration** - In consideration of shoreline landowners and cottagers, it is recommended that events not commence before 7 am. Other details on the administration of competitive fishing events include closing registration for 48 hours prior to the tournament opening, requiring contestants to report in at the end of each fishing day, and clearly delineating event boundaries and any closed fishing areas. Disqualified anglers forfeit their entry fee and the decision of judges and/or tournament organizers is final and not subject to appeal.

**Safety** - This includes the recommended use of lifejackets, stipulation of kill switches with tether cords on boats, absence of alcoholic beverages or other illegal intoxicating substances, restrictions on maximum outboard motor horsepower and adequate boat insurance coverage. All tournament boats must be clearly marked and a minimum distance (30 m) must be maintained between competitors boats during tournament fishing runs.

**Data Collection** - Event organizers shall cooperate in data collection with the Ontario Ministry of Natural Resources (MNR) and OFAH wherever possible.

**Adherence to Regulations** - All events must adhere to the Ontario Fishery Regulations with respect to daily catch and possession limits, proper angling techniques, possession of a valid angling licence, etc. Fish must be hooked in the mouth to be eligible for entry. In addition, all boats must have necessary safety equipment and be in compliance with federal boating regulations. The use of cellular phones, SCUBA gear, and underwater video equipment (e.g., submersible cameras) is prohibited.

**Prefishing** - Pre-tournament fishing practices will be allowed until 5:00 pm on the day prior to the beginning of the tournament. No pre-fishing by participants will be tolerated for tournaments taking place on opening day of the fishing season.

**Restrictions on Number of Anglers per Waterbody**

The number of boats and contestants should be based on size of the waterbody. It is recommended that:

- waters less than 500 hectares - up to 50 boats
- waters 500-1000 hectares - up to 100 boats
- greater than 1000 hectares - up to 150 boats

It is also recommended that, on large waterbodies (e.g. >1000 ha), a maximum of 200 boats be imposed for a waterbody when conflicting dates and locations cannot be avoided.

**Proper Catch and Handling Techniques** - A minimum size limit should be in effect for target species (e.g., 30 cm for bass; 36 cm for walleye; 41 cm for northern pike and rainbow trout). Functioning live wells must be present on every boat and ice should be used in extremely warm conditions. The use of live or preserved bait is prohibited. The transfer of fish between boats or the passage of fish through locks is not allowed. Damaged or stressed fish, which are not believed to survive if released, must be retained. All non-target or undersized fish must be released immediately. Every effort must be taken to minimize fish exposure to air and minimize handling mortality. OFAH has live release tanks which may be used on a first come-first served basis.

**Reporting** - A complete written report of the competitive event must be submitted to OFAH within 7 days of the completion of the event.

**Gift to Conservation** - A financial contribution must be made by the tournament organizer to a conservation group or for a conservation project of their choice.

The values of the sanctioning process include recognition of sponsors, reaffirmation of resource conservation principles, protection of our angling
heritage, and recognition of the concerns of shoreline landowners and other resource users. We believe that OFAH sanctioning also instills a code of conduct for anglers to behave in a sportsmanlike manner and for organizers to deliver events that meet general goals and objectives for conservation. The rights and privileges of OFAH sanctioning include:

**Communications** - Competitive fishing event scheduling, contacts, and results appear on the OFAH website for the current season and reciprocal links to the competitive fishing event's home page are available.

**Sanctioned Events Logo and Name** - Sanctioned competitive fishing events have the right to use the OFAH sanctioned events logo on all of their promotional material. This right expires at the end of each competitive fishing season.

**Expert Advice** - Sanctioned competitive fishing event organizers have access to OFAH professional staff for advice and guidance on aspects of the guidelines.

**Credibility with the Public and Anglers** - OFAH sanctioned events have the support of the largest conservation organization in the Province of Ontario and shows that the event has high standards, in terms of safety, live release methods, and cooperation.

**Conclusions**

The popularity of competitive fishing events can lead to conflicts among organizers and with other activities on the same waterbody but well organized events can provide socio-economic benefits to the local community. It is the responsibility of competitive fishing event organizers and all participants to maintain the high standards of conduct set out in the OFAH competitive fishing event guidelines. The success of competitive fishing events rests on the shoulders of organizers and participants. Cooperation is the key to success.

**References**

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The Kenora Bass International (KBI) is provided as an example to promote the use of competitive fishing events as a means of collecting valuable biological data for fisheries management purposes. The KBI is an annual event which began in 1988 and now attracts approximately 200 teams of anglers from both Canada and the United States. The event targets both largemouth bass (*Micropterus salmoides*) and smallmouth bass (*Micropterus dolomieu*). This tournament has been found to provide a cost effective means of obtaining biological data including growth rates, obtain samples from the older, larger individuals in a population, and monitor year class strengths. Bass angled, tagged, and released have provided evidence that there are legitimate concerns regarding displacement which require efforts to return angled fish to their "home" ranges. There has been an important educational component associated with this event. Much has been learned of handling, transfer, and release techniques which has improved survival of tournament caught bass. Several videos, involving underwater footage, have also been produced in cooperation with the KBI event. The Ministry of Natural Resources (MNR) association with this event has also provided the opportunity to increase its profile and improve relations with a diversity of client groups.

### Introduction

This paper provides a brief history of the Kenora Bass International Tournament (KBI), primarily with regards to the involvement of the Kenora District office of the Ministry of Natural Resources (MNR) and the fisheries management opportunities that have developed because of this involvement.

The cornerstone of MNR's data collection in the past traditionally has been index netting programs where fish are captured using a variety of techniques e.g. gill nets, trap nets, seines, trawls, etc. The key to this methodology is that the information is collected unbiased, randomly, and all portions of the population are sampled. This ensures a level of quality control that is either lacking or perceived to be lacking in other data collection methodologies. These programs provide us with the best information on population parameters such as growth, mortality, relative abundance, year class strength, etc; all of the variables used by biologists to manage fisheries.

The downside to these programs is that they can be expensive, labour intensive and our present staffing levels and budgets limit the number of lakes and frequency at which we can sample. Our capture techniques can sometimes result in high mortality which is often not desirable when dealing with certain situations (cottage lakes). Also, some species such as muskellunge (*Esox masquinongy*), lake trout (*Salvelinus namaycush*), lake sturgeon (*Acipenser fulvescens*) do not appear to be vulnerable to traditional sampling gear.

Index netting programs do not provide "direct" information on harvest levels or the preferences of our clients. To secure harvest and preference information, we monitor and sample the catch of our respective user groups e.g. commercial fishermen, anglers, tourist industry, subsistence fishers, etc. The methodology ranges from simple monitoring of commercial quotas or volunteer angler diaries to very sophisticated lake-wide creels. While doing this, we take advantage of the situation and will sample their catch for population parameters previously mentioned.

Although these parameters are useful, we recognize the information is limited and often biased. That is, usually only a portion of the population is targeted or captured. For example, in the case of commercial
fisheries the population segment targeted is dictated by the mesh size used (usually older and larger fish). Similarly, anglers depending on their preference (trophy experience or shore lunch) will focus their efforts on specific portions of the population resulting in a skewed sample in the creel. As a result, portions of the population are often under-represented in sampling programs dependent on harvest collections. In addition, we are sometimes uncomfortable with the quality or accuracy of the information because we are relying on someone else to collect or report it. For example are the net locations, mesh sizes, or time spent fishing etc. accurate?

Professional biologists recognize the limitations of the data and although we may question its reliability, the "indirect" collection of population parameters from harvest information or our client groups has become an integral part of our portfolio of sampling techniques. However, there is one type of recreational fishery where we have been reluctant or have ignored the opportunity to collect information and that is the competitive fishing event or tournament! The question I pose is WHY? Based on my own experiences, these are the possible reasons I have identified:

1. The data is limiting and could be unreliable. Tournament fishermen are targeting a specific portion of the population; usually the largest fish and there is often uncertainty that they are being "completely honest" with some of the information provided (e.g. location of catch).

2. Biologists and resource managers tend to be conservative by nature and there is often the reluctance to adopt something "new".

3. There may be philosophical differences whereby some biologists and managers and many are not supportive of this "type" of angling experience.

4. The endorsement factor. There is the impression that by collecting information from a tournament or being associated with a tournament, implies endorsement of the activity.

I am going to use the KBI to illustrate the levels of involvement that are available and the indirect and direct benefits that can be obtained by monitoring competitive fishing tournaments. Before going into this detail, I believe at a minimum, even if we do not monitor the catch at tournaments (that is, have a direct presence), we should at least be aware of the number of tournaments that are occurring in our respective districts; where they are occurring and when; what species they are targeting; and whether they are practicing catch and release techniques.

Are we presently doing this? As far as I'm aware (and I believe Steve Kerr's earlier presentation verifies this) there is no coordinated effort at a provincial, regional or even district level to collect this type of information. As fisheries managers it is difficult to understand why we would ignore an activity that is obviously utilizing the resource and could potentially significantly impact fish populations.

Before becoming involved in a tournament, I have two suggestions to offer. As an MNR representative I will not endorse any tournament and even though I try to keep an "arms length" approach to my activities, the mere presence of the MNR may imply an acceptance or association of the tournament in the public's perception. As a result, before I collect any information from a tournament, I try to find out as much information about the organizers as possible. Have they run a tournament before; what's their "track record"; how receptive are they to suggestions, etc. Ideally, for the first year you should just observe the tournament and its operation, particularly how they handle the fish. Secondly, it is important to have a clear objective of the type of information you want to collect from the tournament and how you will use this information for fisheries management!

**History of the KBI**

The KBI began in 1988 and originally was intended to be a walleye (*Stizostedion vitreum*) tournament held in early August on Lake of the Woods. The Kenora District office of the Ministry of Natural Resources was concerned that walleye stocks in Lake of the Woods were already being fully utilized. Even though the tournament was to be catch-and-release, we were concerned that mortality would be high considering the time of year and the distances that would be traveled. The Kenora District suggested the organizers should target an under utilized specie(s) such as bass that are harder in live wells.
It should be realized that there was, and still is, a love-hate relationship with bass in northern Ontario. At that time, the tourist industry saw some potential for smallmouth bass (*Micropterus dolomieu*) and largemouth bass (*Micropterus salmoides*), but few local anglers sought out these species. We had a total open season on Lake of the Woods and bass were managed almost by default.

Times have changed however. What started as a 40 team tournament made up primarily of local anglers was an instant success. Today the KBI has grown to become one of the largest events of its kind in Canada attracting over 200 teams. Amateurs and professionals from both Canada and the United States participate in this tournament. The tournament is a major tourist attraction and has been estimated to contribute $650,000 directly to the local Kenora economy, with an additional $1.8 million in spin-off benefits.

From a fisheries management perspective, the KBI focused interest not only on smallmouth and largemouth bass fishing in Lake of the Woods but also on the quality of fishing. We now manage for a high quality bass fishery in the Lake of the Woods and have acknowledged this goal in the Minnesota-Ontario Boundary Waters Fisheries Atlas (1998). In fact, Lake of the Woods was the first waterbody in the Northwest region where a catch and release season during the nesting period was instigated. This regulation was marketed as a proactive measure rather than a reaction to a declining fishery. We saw attitudes were changing towards this specie(s) and to ensure that a high quality or trophy fishery was maintained in the Lake of the Woods, a catch-and-release season was readily adopted by the angling public.

Prior to 1992, MNR ignored the tournament and the fisheries opportunities associated with it. However with the success of the tournament and the developing angler interest in bass MNR re-evaluated their position and realized the tournament was an opportunity to collect information cheaply that would assist in the management of an emerging "trophy" fishery.

Figure 1 illustrates the opportunities that have developed since initial MNR involvement with the KBI. What started out as a simple request for advise on fish handling procedures, led to annual monitoring of the competitors catch. This grew into a radio telemetry project and the development of educational videos.

In 1992, the KBI organizers approached MNR for advice on how to improve their fish handling procedures. In earlier years the competitors would take their catch from their live wells, place them in water filled plastic bags and "walk" them to the weigh in station located on the Kenora harbour front. Although the competitors and organizers made every effort to "process" the fish as fast as possible, the reality was the fish were housed in very cramped containers where water temperature could increase rapidly and oxygen levels could drop rapidly. Even though bass are a very hardy fish, we felt this process exposed them to unnecessary stress and could contribute to delayed mortality.

To remedy the situation, we recommended the organizers set up a series of large "hatchery" troughs leading from the competitors docking area to the central weigh in station. Each trough had a flow through system, with water being continuously pumped from the lake to ensure uniform water temperature and high levels of oxygen. The troughs were obtained as "surplus" equipment from Manitoba's Whiteshell Hatchery. To take advantage of the flow through system, we suggested the competitors transport their catch in mesh containers (plastic laundry baskets). Even when delays occurred during the weigh in, the fish were always in fresh water with temperatures that were similar to the live well and with adequate levels of oxygen.

Figure 1. Fisheries management opportunities derived from the Kenora Bass International tournament.

**Improved Fish Handling**

In 1992, the KBI organizers approached MNR for advice on how to improve their fish handling procedures. In earlier years the competitors would take their catch from their live wells, place them in water filled plastic bags and "walk" them to the weigh in station located on the Kenora harbour front. Although the competitors and organizers made every effort to "process" the fish as fast as possible, the reality was the fish were housed in very cramped containers where water temperature could increase rapidly and oxygen levels could drop rapidly. Even though bass are a very hardy fish, we felt this process exposed them to unnecessary stress and could contribute to delayed mortality.

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Again, our recommendations were not an endorsement of the tournament, but I believe a fulfillment of our responsibility to provide technical advice to ensure fish are handle properly and not exposed to undue stress. Furthermore the willingness of the organizers to implement these suggestions,
confirmed this was a "good" candidate tournament to monitor.

Data Collection

As stated previously, before collecting data from a tournament you should have a clear objective of the type of information you want to collect and how you are going to use it. In our case, the Kenora District had very little information on bass because our management programs traditionally focused on other species such as walleye, lake trout, lake whitefish (*Coregonus clupeaformis*) etc. and our collection techniques usually were not effective in capturing a large sample size of bass. Furthermore, with the shift of managing Lake of Woods to provide a high quality or trophy bass fishing opportunities, there was a need to monitor this portion of the population.

A tournament can be the ideal medium to do this, because the competitors usually target the largest fish. In the case of the KBI, over 400 highly motivated anglers are roaming Lake of the Woods over a three day period targeting (sampling) the trophy portion of the bass fishery. Prior to fishing, the competitors are given a map dividing Lake of the Woods into six sectors (Figure 2). As we are all aware, tournament anglers are very secretive about their fishing areas and as a result the sectors chosen were deliberately kept large so the competitors would not feel threatened in revealing their capture locations. The anglers are asked to record which sector the bass were captured in. By knowing "generally" where the bass were captured, in the organizers were assisted in their efforts to return the bass to their "home range." It also allows the opportunity to examine various population variations within the different sectors of Lake of the Woods.

During the tournament, MNR sets up a sampling table behind the weigh-in tent and takes a random sample of bass before they are taken to the distribution vehicles. Date, location of capture (sector), total length, round weight, and a scale sample are taken from each bass. In addition, a floy tag with a unique number is attached to each bass to assist in determining bass movements from their release site.

From strictly a numbers perspective, the monitoring program has been a resounding success. We have increased our annual samples from less than 100 per year to several hundred (Figure 3). In fact with the extension of the tournament to a third day, we were able to collect over 1200 samples in 1998. Because the tournament has a 12 inch (30.5 cm) minimum size and the anglers are targeting the largest bass they can capture, these samples are a reflection of the larger or "trophy" component of the fishery.

Figure 3. Number of smallmouth and largemouth bass sampled from KBI 1992-1998.

Value of Tournament Data

It seems that more fisheries managers, particularly in the United States, are recognizing the value of tournament collected data. It is an inexpensive and simple method to assess numbers and sizes of sport fish in large lakes and rivers (Willis and Hartmann 1986; Ebbers 1987). Furthermore, Quertermus (1991) showed that information collected from tournaments were in close agreement with data collected from the more expensive and traditional roving creel surveys conducted by the Georgia Department of Natural Resources.
From the bass we have sample from the KBI, a tremendous amount of whole lake and with-in sector information can be obtained (CPE, length - weight relationships, growth rates, year class strength, quality indices, fishing pressure areas etc.).

Even the simplest of information length-weight, age-length can be beneficial from not only a management, but also an extension perspective. For example, how often are you asked by anglers, tourist operators, school groups etc., how much would my fish weigh if it 15 inches long? Or how old is a 2 pound bass? Although it may seem simplistic, having this sort of information at your finger tips increases your credibility with client groups. With the data collected from the KBI, one can quickly reference the graphs (or supply them to our clients) and tell them a 15 inch bass usually weighs about 2 pounds and is 8 years old on Lake of the Woods.

This data will also permit comparisons with populations in other lakes within and outside your administrative jurisdiction. Figure 4 compares smallmouth bass growth rates in Lake of the Woods, Shoal Lake (Kenora District) and Rainy Lake (Fort Frances District). Lake of the Woods and Rainy Lake smallmouth bass illustrate similar growth rates whereas Shoal Lake smallmouth bass are consistently larger at an earlier age. Information of this nature has interesting and valuable tourist marketing applications. For example, most anglers will insist Rainy Lake bass are larger than Lake of the Woods bass because their diet is primarily smelt whereas Lake of the Woods bass feed heavily on crayfish. However, the tournament data suggests there is little difference in their growth rates and it would be difficult to rate Rainy Lake as a better trophy destination based strictly on this information. On the other hand, Shoal Lake's faster growth rates and larger sizes suggest there may be potential to market this waterbody as a trophy destination for bass fishermen.

Figure 4. Comparison of smallmouth bass growth rates from Lake of the Woods, Shoal Lake and Rainy Lake 1994.

Another level of analysis involves the examination age frequency distributions from annual monitoring programs. For example, Figure 5 compares age frequency distributions from the 1993 KBI and 1993 lake wide creel. Both sets of data show some similarities (e.g. weak 1986 year class - 7 years old) but there are obvious differences. The KBI data suggests an abundance of older age classes whereas the creel data suggests erratic year class strengths and a predominance of younger fish. Which data set is true or more accurate? In fact both data sets provide an accurate representation on what they are sampling if you consider the time of year they were taken, the skill and target of the angler etc. One would expect the KBI data should be dominated by older fish since the anglers are targeted larger fish and have a greater skill level than the average angler. Conversely, the creel information should have a greater percentage of younger fish since the anglers are often harvesting for food. Also since two-thirds of the creel harvest occurs during the months of May and June this may explain the high percentage of 8 year olds in the catch (possibly nest guarding males).

Figure 5. Comparison of smallmouth bass age-frequency, for the 1993 lake wide creel and KBI.
More importantly, Figure 5 shows the weakness of relying on one data source or year when interpreting catch statistics. For example, the creel data shows erratic age class frequency (year class strength) and poor representation in the older age categories. This could be interpreted as either the fishery has experienced heavy angling harvest or perhaps widely fluctuating spawning success. Although not as dramatic, a manager could interpret a single year of KBI data to suggest similar interpretations.

The value of using several years data to understand what is occurring in a fishery is shown by Figure 6. This figure illustrates year class strength as smallmouth bass progress through the fishery from 1992 to 1996. Concerns regarding potential overharvest are alleviated by the consistent representation of older bass in the fishery in all years sampled at the KBI. The weak representation of 1986 and 1987 year classes, probably reflects poor nesting success. From a management perspective, it is apparent we have strong or at least good year classes (1987, 1988, 1989, 1990, and 1991) coming into and sustaining the bass fishery.

One of the most exciting uses of the KBI data will be to evaluate the effectiveness of the 1996 catch and release regulation on enhancing the quality of bass fishing in Lake of the Woods. Based on the 1996 KBI data, it is obvious there are strong year classes moving through the fishery. As stated previously, over two thirds of the harvest traditionally occurred during the months of May and June. Many of the fish harvested during this period were nesting males. On Lake of the Woods male and female smallmouth bass are all sexually mature by age 6 (Mosindy 1998). Therefore, not only do we have the benefit of strong year classes moving through the fishery, but we now are providing protection to the older and larger fish when they are most vulnerable. We expect this will result in a greater abundance of larger fish or an increase in angling quality.

Figure 6. Year class strength of smallmouth bass captured in the KBI from 1992 - 1996.

One way to track this is by using a length-categorization system. Figure 7 illustrates the categories suggested by Gablehouse (1984). They are quality (28-35 cm.), preferred (35-43 cm.), memorable (43-51 cm.) and trophy (51+ cm.). Although this is a valuable tool to see if our objective of enhancing trophy opportunities is occurring, it is apparent from the size categories we should be developing a system that reflects realistic sizes that can be expected in northern rather than southern waters. Figure 7 suggests that we are beginning to see an increase in the quality category which is moving into the preferred. We anticipate once the 1997 and 1998 data is analyzed, this trend will be confirmed.

Figure 7. Lake of the Woods smallmouth bass size categories from KBI 1992 - 1996.

I am not abdicating that we abandon our traditional sampling programs and rely on tournaments as our sole of information. But we should be cognizant of the information tournaments can supply and be willing to use this data to complement other data sources. In reality, fisheries managers seldom base their decisions on a single source of information or parameter, but instead look at a variety of information sources or trends to determine what is occurring in a
fishery. Tournament data supplies one of the most valuable management parameters, trend-through-time data.

Percent of Catch by Sector

Figure 8 depicts the percent catch for each Lake of the Woods sector from 1992 to 1996. This type of information gives the manager clues to where the main fishing pressure for bass is occurring (at least during the tournament). It apparent from the tournament data, that Sectors 1 and 2 contribute at least 60% of the catch followed by Sectors 4 and 5.

Figure 8. Percent catch by sector from KBI 1992 - 1996.

Tournament effort is definitely affected by distance from the weigh-in station and weather conditions. Sectors 1 and 2 are the closest areas from Kenora and as a result receive heavier angling pressure during the tournament. However, during years of good weather conditions, KBI anglers will venture into Sectors 5 and 6 to take advantage of the largemouth bass populations that tend to be more abundant in these parts of the lake.

Although the percent catch by sector is interesting in itself, particular to anglers, its real value is more apparent when you consider the potential controversy surrounding displaced bass.

Movements

One of the more contentious issues that could have arose because of the tournament was the displacement of large bass from their home ranges. Prior to 1992, all captured bass were released in the immediate vicinity of the weigh-in station (Kenora Harbour).

Although the tournament was based on practicing catch-and-release techniques, there were concerns that the released fish were vulnerable to angling and harvesting after the tournament ended. It was common practice for anglers to fish the harbour for several days after the tournament and there was the perception many of the "trophy" bass were being harvested.

There was also concern from the tourist industry and bass anglers that the large or trophy bass were being moved from their home ranges and stockpiled in the Kenora area. That is, bass captured from the furthest sectors (2, 5 and 6) were being released in the Kenora area and were not returning to their capture sites. Sectors 5 and 6 are home to numerous tourist lodges that recognized and appreciated the value of the emerging bass fishery. Although Ridgway and Shuter (1996) found Lake Opeongo bass were capable of returning to their home range after being displaced, there was the suspicion that Lake of the Woods bass would not return to their capture sites because of the greater distances involved and the complexity of this water body.

To alleviate this concern and diffuse a potentially contentious issue, the KBI organizers sought the advite of MNR, the assistance of the Kenora Sportsmen's Conservation Club (KSCC) and secured the use of the Shimano distribution boat. Beginning in 1992, all competitors were asked to identify what sector they captured their bass in. Those bass captured closest to Kenora (Sector 1) were transported and released by the Shimano boat away from Kenora and its harbour. Whereas those captured from the furthest Sectors 2, 5, and 6 were transported by truck in hatchery transfer tanks (purchased by KSCC) and were released in several locations.

As mentioned previously, MNR attached floy tags to all released bass. The objective of this exercise was to determine whether the displaced bass dispersed from the release sites and how far they moved. Unfortunately, bass anglers are very secretive and very few tags returns were reported. Those that were, suggested little movement from the release sites was occurring.

In an effort to determine how effective the distribution program was the MNR, in conjunction with a number of volunteer groups, including the KBI, KSCC and Kenora scuba divers, initiated a radio telemetry project. The project was partially funded by KBI and the Community Fisheries and
Wildlife Involvement Program (CFWIP). The main objectives of the study were to determine the "normal" movements of smallmouth bass in Lake of the Woods and whether displaced bass were capable of finding their way "home".

Over a three year period, 38 male smallmouth bass were equipped with internal radio tags. The study focused on males because they are responsible for the incubation and rearing of the young and therefore, from a reproductive perspective, are the more important of the sexes. Furthermore, because of their strong nest fidelity behaviour (Ridgway et al. 1991) it was hypothesized of the two sexes, males would exhibit the strongest behavior or ability to return to their home range. For logistical reasons the study was restricted to sector 2.

The control component of the study following the normal movements of bass from three different "habitat" types (based on food abundance and water quality), while the displacement component was actually three separate experiments. In experiment one, bass were moved a short distance (5km.) in a simple system. That is, the fish would have to make one or two navigation decisions to find their way home. Experiment two increased the displacement distance to over 21 km, but again the system was simple with few navigational decisions. Finally, in experiment three bass were moved a long distance (over 29 km.) and because of the number and complexity of islands, many decisions would be necessary to return to their summer range.

In contrast to the Opeongo study, the control fish in Lake of the Woods tend to be quite sedentary. That is, in Lake Opeongo bass have greater home ranges (100 to 300 ha.) than previously reported (Ridgway et al 1996) and during the summer months utilize different sections of the home range shoreline. Ridgway equated this to "working" a trap line. Where as in Lake of the Woods, the normal pattern for bass was to move 2 to 4 km from their nest location and spend the majority of the summer months (60 to 80%) at one or two specific locations along a shoreline or reef. At the extreme of sedentary behaviour, we had one individual who spent his entire summer months within a 20 to 40 m radius of his nest location! The differences in Lake of the Woods and Opeongo summer ranges are probably food related.

Similar to the Opeongo study, we found three of the four individuals moved a short distance (Experiment 1) from their normal summer range within two to four weeks. However, less than half of the bass (three out of seven) displaced a long distance/simple system (Experiment 2) returned to their summer range and the successful individuals took from 3 weeks to 11 months to accomplish this feat. Finally, only two of the 13 displaced bass were able to negotiate the long distance/complex system (Experiment 3). Although smallmouth bass appear to have the ability to find their way home from great distances and through complex systems, few seem to exercise this ability!

What does this mean to the fishery and its management? The telemetry study suggests the tourist industry and angler concern regarding the displacement of bass by the tournament was legitimate. With the high density of crayfish (food) in the Kenora area and the long distances and complexity of the Lake of the Woods, it is highly unlikely bass captured from the furthest sectors and released in the Kenora area, would return to their home range. However, the KBI practice of transporting the bass back to their home "sector" by truck or boat should alleviate the concern regarding fishing opportunities. Even though the bass may not return to their home range, they are returned to their original sectors of the lake and therefore are available to the lodges that are dependent upon them for trophy fishing opportunities.

As illustrated by Figure 2, these sectors are large and it highly unlikely that many of these fish would return to their original home range. Does this matter to the bass? To answer this question we examined two aspects of bass biology: reproduction and mortality. Ridgway et al. (1991) reported smallmouth bass exhibit strong nest site fidelity and will return to the same nest location, year after year. However if a bass is displaced from its home range, will it establish a new nest site and successfully reproduce? Of the six displaced bass that did not return to their home range and were located in the spring, all had successfully established new nest sites. It appears displacement does not adversely affect the male's ability to establish a new nest site.

Although the sample size is small, there is evidence and some concern, that displacement increases mortality. During the course of the study only 2 of the 14 (14%) control bass died. One died a few weeks after surgery and its death was attributed to either the implantation procedure, spawning stress or a combination of both. The other control bass died a year later after nesting and its death was caused by stress associated with spawning and defending its nest and young. In contrast, 12 of the 22 (55%) displaced bass died! Four died several weeks after receiving a
radio tag and death was attributed to either the surgery, spawning or a combination of the two stresses. Five more individuals died over winter, while the remaining three mortalities occurred after the displaced bass had successfully nested.

Although the control bass exhibited a relatively sedentary life style during the study, the displaced bass did not. In many cases, the displaced bass spent much of the summer roaming the shoreline often traveling great distances possibly searching for their way "home" or perhaps looking for a new home range to establish. Regardless, they expended more energy than the control bass and it is speculated this contributed to their higher mortality rate.

Public Relations

One area we often tend to underestimate is the public's perception of our work. There are a number of excellent projects and programs occurring every year through Ontario, but often the public is not aware of what we are doing! For the first year of the KBI we kept a relatively "low profile", but it was obvious the public was interested in our sampling program. In subsequent years, we have advertised our presence at the KBI and encouraged the public to watch, question and even participate in the sampling program. This has resulted in "good public relations" for the Kenora District and an opportunity to show the community the MNR in action!

Educational Videos

In addition to the movement information, the telemetry project afforded us the opportunity to obtain a tremendous amount of underwater footage. From this material we have produced three separate videos. One video depicts "The Life History of Smallmouth Bass" including nest building, courtship behaviour, spawning, incubation of eggs and rearing of young. The second video illustrates "How to Implant Radio Tags" and, finally, the third video "Concerns Regarding Underwater Viewing Systems" documents an over-wintering site and the vulnerability of this species to angling when using an underwater viewing system.

All three videos are valuable educational tools and have been shown to MNR staff, angling clubs, schools etc. Furthermore, the video showing how an underwater viewing system increases angling efficiency has been utilized by the Minnesota Department of Natural Resources in their attempt to restrict the use of this equipment by anglers.

Conclusions

Do tournaments provide opportunities for fisheries management? Hopefully the KBI example has illustrated the wide array of opportunities that are available.

At the most basic level, we should, as a resource management agency, be monitoring the number and type of tournaments that are occurring in our jurisdiction. Monitoring a tournament should not confused with or considered an endorsement of the activity.

Tournaments, like any other fishing activity, should be used to obtain fisheries information that will ultimately benefit the resource. This can range from the collection of basic population parameters to the undertaking of projects (e.g. radio telemetry) to answer specific questions (e.g. displacement). In addition to the information tournaments can supply, they also provide an opportunity for a variety of groups to become involved in fisheries management.
Acknowledgements

I would like to thank the KBI for the opportunity to monitor their tournament and their financial support to undertake the telemetry project. I also thank the Kenora Sportsmen's Conservation Club, Kenora Scuba Divers and the summer students who assisted in the collection of information at the tournament and with the radio telemetry project. Special thanks and acknowledgment of Laureen Parsons, OMNR Resource Technician who was responsible for many of the field activities associated with the telemetry project and assisted with the analysis of the information presented in this paper.

References


Fisheries of the Lake Erie System

Lake Erie and Lake St. Clair support the most productive and diverse fisheries of the Great Lakes (Halyk 1998). Fisheries on the Ontario portion of Lake Erie include a commercial food fishery, a commercial bait industry, and a sport fishery.

The commercial fishery is based on the use of gill nets set for yellow perch (Perca flavescens), walleye (Stizostedion vitreum), lake whitefish (Coregonus clupeaformis), white bass (Morone chrysops), and white perch (Morone americana) throughout the lake. Open water trawling is conducted for rainbow smelt (Osmerus mordax) in the central and eastern portions of the lake. Hoop nets and seine nets are utilized to catch panfish (Centrarchidae spp.), carp (Cyprinus carpio), catfish (Ictaluridae spp.), and yellow perch in Long Point Bay. In the western basin of Lake Erie, trapnets are used to capture walleye, white bass, and yellow perch.

The commercial baitfish industry is based on largely on shiners (Cyprinidae spp.). Beach seining is conducted in the spring and summer. In the fall and winter, seining and dip netting is carried out in the harbors and marinas.

There is a year-round sport fishery on Lakes Erie and St. Clair. Open water trolling occurs for walleye, trout (Salvelinus spp.), and Pacific salmon (Oncorhynchus spp.) in Lake Erie in addition to white bass and white perch in Lake St. Clair. There is a nearshore boat fishery for smallmouth bass (Micropterus dolomieu), panfish, and yellow perch in Lake Erie's western basin, Long Point Bay, Port Colborne area and throughout Lake St. Clair. A pier, tributary and shoreline fishery exists for Pacific salmonids, yellow perch, northern pike (Esox lucius), panfish, and walleye in areas such as Long Point Bay, Rondeau, Port Maitland, Port Ryerse, and Belle River. A spear and archery fishery exists for northern pike in inner Long Point Bay and eastern Lake Erie tributaries. Finally, there is a winter (ice) fishery for yellow perch and northern pike in Rondeau Bay, Gravelly Bay, Long Point Bay, and Mitchell's Bay.

Highlights of the 1998 Creel Survey

An aerial sport fishing survey of the Canadian waters of Lake Erie was carried out from June 1 through August 31, 1998 to determine angling pressure and distribution. Lakewide flights were made at various times of the day on 28 occasions, and the number of fishing boats were counted as an index of fishing activity. This information was integrated with fishing trip data from interviews conducted at selected access points along the Canadian shoreline of Lake Erie to estimate angling pressure and harvest (MNR 1998).
In 1998, total lake-wide angling effort was estimated at 1,032,899 rod hours. Walleye continued to be the most highly sought species by Lake Erie anglers, followed by bass and rainbow trout (*Oncorhynchus mykiss*) (Figure 1). More smallmouth bass were captured than any other sport fish by Lake Erie anglers in 1998 (Figure 2). Yellow perch, walleye, and rainbow trout also made significant contributions to the sport fishery.

**Survey Highlights**

In 1998, a total of 39 competitive fishing events were held on the Lake Erie system. Lake St. Clair hosted the most events followed (in order) by eastern Lake Erie, the Detroit River, western Lake Erie, and central Lake Erie (Figure 3). The target species in most events was bass, followed by walleye, trout and panfish.

Twenty-eight (28) of thirty-nine (39) events were classified as "catch-and-release" events. Eleven (11) events were regarded as "catch-and-keep" events with some special catch-and-release categories. In most cases, events targeting bass were catch-and-release whereas those targeting walleye were catch-...

Forty-one percent (41%) of the events were organized by fishing organizations with affiliations throughout Ontario or beyond (e.g., Southwestern Ontario Bass Association). Fish and game clubs (39%), fishing related businesses (13%), and community service organizations (10%) were also identified as event organizers.

Entry fees were variable ranging from $10 to $1000 with most events falling in the $20-30 range. The number of fish entered varied widely from 25 to over 600. Most events had 200-300 fish entered.

**1999 Survey of Competitive Fishing Events**

**Survey Techniques**

Statistics on competitive fishing events staged on the Lake Erie system are incomplete. Organizers of known fishing derbies and tournaments on the Lake Erie system were contacted by telephone and asked a series of questions regarding the nature of their particular event. Key information regarding the various events is summarized in Table 1. With no formal requirement for government sanctioning and

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*Figure 1. Fishing effort directed to major sport fish species in the Lake Erie system in 1998.*

*Figure 2. 1998 Lake Erie sport fish catch.*

*Figure 3. Distribution of 1998 competitive fishing events on Lake Erie and the St. Clair system.*
Table 1. 1998 competitive fishing events held in Ontario waters or a combination of Ontario and U.S. waters of Lake Erie and St. Clair.

<table>
<thead>
<tr>
<th>Event Name</th>
<th>Target Species</th>
<th>Location</th>
<th>Season</th>
<th>Year Originated</th>
<th># Events Season</th>
<th>Entry Fee</th>
<th># Participants</th>
<th># Fish Entered</th>
<th>Catch &amp; Release</th>
<th>Entry Fee Note</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rivers Blues</td>
<td>Walleye</td>
<td>Detroit River</td>
<td>April</td>
<td>-</td>
<td>1</td>
<td>$30/person</td>
<td>200</td>
<td>300</td>
<td>N</td>
<td></td>
</tr>
<tr>
<td>Amherstburg Strawberry Festival</td>
<td>Walleye</td>
<td>Detroit River</td>
<td>April</td>
<td>-</td>
<td>1</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>Riverside Sportsmen Bass/Perch</td>
<td>SMB LMB</td>
<td>Det. R., L. St.C.</td>
<td>July</td>
<td>1997</td>
<td>1</td>
<td>$20/person</td>
<td>50-70</td>
<td>-</td>
<td>N</td>
<td></td>
</tr>
<tr>
<td>Rose City Walleye</td>
<td>SMB LMB</td>
<td>Detroit River</td>
<td>May</td>
<td>1998</td>
<td>1</td>
<td>$150/team</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>Lake Shore Bass Derby</td>
<td>SMB LMB</td>
<td>E. Lake Erie</td>
<td>Summer/</td>
<td>1985</td>
<td>1</td>
<td>$10/adult $5/child</td>
<td>200</td>
<td>-</td>
<td>N</td>
<td></td>
</tr>
<tr>
<td>Can-Am Walleye</td>
<td>Walleye</td>
<td>E. Lake Erie</td>
<td>August</td>
<td>-</td>
<td>1</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>Port Colborne 444</td>
<td>Walleye</td>
<td>E. Lake Erie</td>
<td>June 19,20</td>
<td>1987</td>
<td>1</td>
<td>$160/boat, max 4 per</td>
<td>514</td>
<td>665</td>
<td>N</td>
<td></td>
</tr>
<tr>
<td>Port Dover Perch Festival</td>
<td>Yellow perch</td>
<td>E. Lake Erie</td>
<td>Spring</td>
<td>-</td>
<td>1</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>N</td>
<td></td>
</tr>
<tr>
<td>Flatt's Walleye Derby</td>
<td>SMB LMB</td>
<td>E. Lake Erie</td>
<td>July</td>
<td>1988</td>
<td>1</td>
<td>$12/person</td>
<td>500</td>
<td>500</td>
<td>N</td>
<td></td>
</tr>
<tr>
<td>GM Mariner Pro Bass Classic</td>
<td>SMB</td>
<td>E. Lake Erie</td>
<td>July 3,4</td>
<td>1996</td>
<td>1</td>
<td>$1K/pro, $500/amat</td>
<td>96</td>
<td>715</td>
<td>Y</td>
<td></td>
</tr>
<tr>
<td>SWOBA</td>
<td>SMB LMB</td>
<td>Lake Erie, L. St.C.</td>
<td>Summer/Fall</td>
<td>-</td>
<td>12</td>
<td>$100/person</td>
<td>150</td>
<td>750</td>
<td>Y</td>
<td></td>
</tr>
<tr>
<td>Colchester Walleye Derby</td>
<td>Walleye</td>
<td>W. Lake Erie</td>
<td>June</td>
<td>1991</td>
<td>1</td>
<td>$15/person</td>
<td>425</td>
<td>2000</td>
<td>N</td>
<td></td>
</tr>
<tr>
<td>Leamington Walleye Derby</td>
<td>Walleye</td>
<td>W. Lake Erie</td>
<td>June</td>
<td>1996</td>
<td>1</td>
<td>$20/person</td>
<td>600</td>
<td>1500</td>
<td>N</td>
<td></td>
</tr>
<tr>
<td>Bakie's Annual Professional</td>
<td>Walleye</td>
<td>W. Lake Erie</td>
<td>June</td>
<td>1996</td>
<td>1</td>
<td>$20/person</td>
<td>50</td>
<td>40</td>
<td>N</td>
<td></td>
</tr>
<tr>
<td>WalleyeTrail</td>
<td>Walleye</td>
<td>Detroit River</td>
<td>April</td>
<td>-</td>
<td>1</td>
<td>$1K/pro, $525/amat.</td>
<td>240</td>
<td>3500</td>
<td>Y</td>
<td></td>
</tr>
<tr>
<td>Tri-State Bass</td>
<td>SMB LMB</td>
<td>L. Erie, Det. R., L. St.C.</td>
<td>Spring/Fall</td>
<td>1986</td>
<td>3</td>
<td>$60-$140/person</td>
<td>200</td>
<td>500-700</td>
<td>Y</td>
<td></td>
</tr>
<tr>
<td>Motor City Bass Classic</td>
<td>SMB LAB</td>
<td>Lake St. Clair</td>
<td>Summer</td>
<td>-</td>
<td>1</td>
<td>-</td>
<td>60</td>
<td>400</td>
<td>Y</td>
<td></td>
</tr>
<tr>
<td>Nanticoke</td>
<td>SMB</td>
<td>E. Lake Erie</td>
<td>Summer</td>
<td>-</td>
<td>1</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>Port Maitland Walleye Derby</td>
<td>SMB</td>
<td>E. Lake Erie</td>
<td>Fall</td>
<td>1990</td>
<td>1</td>
<td>$12/person</td>
<td>200-300</td>
<td>300</td>
<td>N</td>
<td></td>
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<tr>
<td>Port Maitland-Great Bass Hunt</td>
<td>SMB</td>
<td>E. Lake Erie</td>
<td>July</td>
<td>1980</td>
<td>1</td>
<td>$20/person</td>
<td>300</td>
<td>300-500</td>
<td>N</td>
<td></td>
</tr>
</tbody>
</table>

SMB=Smallmouth Bass  
LMB=Largemouth Bass  
* prize value for first prize only
References


There are currently 15 sport fish derbies that have been operating in Lake Huron for more than one year. The longest running derby is the Sarnia Salmon derby which began in 1976. An estimated 17,000 people participate in sport fish derbies annually, harvesting in excess of 43,000 kg of fish. The CFPS Chantry Chinook Classic, operated by the Lake Huron Fishing Club, and the Owen Sound Salmon Spectacular, operated by the Sydenham Sportsman's Association, are two of the largest, longest running derbies in Lake Huron. Details regarding these two derbies are examined in more detail in this presentation.

Introduction

Recreational fishing has long been a popular year-round activity in and around the Great Lakes, including Lake Huron. Throughout the years, fish and game organizations have formed around the lake bringing together people with similar interests and concerns about the resources they rely on. The Ministry of Natural Resources (OMNR) recognized the importance of involving these individuals in fisheries management projects and in 1982, the Community Fisheries Involvement Program (CFIP) was created (OMNR, 1990).

The CFIP program is no longer limited to fish and game clubs, it also includes community associations, municipalities, tourist operators, and anyone with an interest in the benefits of maintaining Ontario's fish resources. Initially, CFIP projects were aimed at habitat rehabilitation projects but very quickly, fish culture and hatchery interests became a prominent feature of the program. This continues to be the major focus of CFIP groups around the Great Lakes.

As the interest in this program increased, funding increased as well. Today, approximately one million dollars is allocated to CFIP projects across the province annually. Unfortunately, interest and requests for financial assistance have increased as well, resulting in reduced allocations on a per project basis (K. Dodge, pers. comm.). One obvious way for fish and game groups to pay for their CFIP projects was promotional fund raising. The most obvious fund raiser for a fisheries related project was, of course, the sport fish derby. These events became very popular throughout the 1980's and 1990's, drawing large numbers of participants, and providing sufficient funding for fish and game groups to continue to operate their hatcheries and perform rehabilitation work.

Lake Huron

Sport fish derbies have been occurring in Lake Huron for many years, the majority having started in the early 1980's. Beginning in 1993, the Lake Huron Management Unit (LH MU) began trying to collect information about sport fish derbies around the lake, recognizing the role they play in the overall management of the sport fishery in the lake. The Unit was also interested in establishing partnerships with the organizations running the derbies in order to share information and knowledge about the local fisheries.

Currently, we have been able to gather information regarding 15 derbies that take place annually in Lake Huron (Table 1). Most of these derbies have been in operation for a number of years, although there are 3 that are only a year or two old. We do know of other derbies occurring in the lake, that are either very small or localized, or occur irregularly (often for only one year), for which we have no known contact or specific information.
Table 1. Known sport fish derbies in Lake Huron waters including estimated or actual number of participants in 1998.

<table>
<thead>
<tr>
<th>ID</th>
<th>Derby Name</th>
<th>Organization</th>
<th>Year Began</th>
<th>Number Of Entrants</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Sarnia Salmon Derby</td>
<td>Bluewater Anglers Club</td>
<td>1976</td>
<td>2,000</td>
</tr>
<tr>
<td>2</td>
<td>Georgian Triangle Spring Trout Derby</td>
<td>Georgian Triangle Anglers Association</td>
<td>1980</td>
<td>1,200</td>
</tr>
<tr>
<td>3</td>
<td>Meaford Kids Bass Derby</td>
<td>East Grey Hunters and Anglers Association</td>
<td>1981</td>
<td>700</td>
</tr>
<tr>
<td>4</td>
<td>Bruce Peninsula Family Fishing Derby</td>
<td>Private Organizing Committee</td>
<td>1983</td>
<td>3,000</td>
</tr>
<tr>
<td>5</td>
<td>UPS Chantry Chinook Classic</td>
<td>Lake Huron Fishing Club</td>
<td>1984</td>
<td>2,596</td>
</tr>
<tr>
<td>6</td>
<td>Fish Kincardine Salmon Derby</td>
<td>Town of Kincardine</td>
<td>1984</td>
<td>1,238</td>
</tr>
<tr>
<td>7</td>
<td>Annual Splake Derby</td>
<td>Little Current Fish and Game Club</td>
<td>1987</td>
<td>150</td>
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<tr>
<td>8</td>
<td>Owen Sound Salmon Spectacular</td>
<td>Sydenham Sportsmen's Association</td>
<td>1987</td>
<td>4,700</td>
</tr>
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<td>9</td>
<td>Grand Bend Salmon and Trout Derby</td>
<td>Village of Grand Bend</td>
<td>1988</td>
<td>1,000</td>
</tr>
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<td>10</td>
<td>Georgian Triangle Salmon Derby</td>
<td>Georgian Triangle Anglers Association</td>
<td>1991</td>
<td>140</td>
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<tr>
<td>11</td>
<td>Meaford Summer Sizzler</td>
<td>East Grey Hunters and Anglers Association</td>
<td>1993</td>
<td>100</td>
</tr>
<tr>
<td>12</td>
<td>Meaford 50/50 Salmon Derby</td>
<td>East Grey Hunters and Anglers Association</td>
<td>1994</td>
<td>300</td>
</tr>
<tr>
<td>14</td>
<td>Little Current Lions Club Event</td>
<td>Little Current Lions Club and N.E. Ontario Bass Association</td>
<td>1997</td>
<td>60</td>
</tr>
<tr>
<td>15</td>
<td>Collingwood's Salmon Slam Tournament</td>
<td>Georgian Triangle Anglers Association</td>
<td>1998</td>
<td>134</td>
</tr>
</tbody>
</table>

From the information we have gathered, it appears that we can classify the sport fish derbies on Lake Huron into three groups. The first group of derbies (Class 1) have been in operation for generally over 10 years, are almost always associated with a fishing club that operates a fish hatchery, annually harvest over 4,500 kg of fish, and generally attract over 1,000 participants every year. Virtually all of the derbies in this class raise, and subsequently target, chinook salmon (Oncorhynchus tshawytscha), rainbow trout (Oncorhynchus mykiss), and brown trout (Salmo trutta), generally, but not always, in that order. The duration of these derbies is generally 8 to 10 days, usually at the same time each year. Examples of this class of derby are the Chantry Chinook Classic, the Fish Kincardine, and the Owen Sound Salmon Spectacular derbies (Figure 1).

The second group of derbies (Class 2) have generally not been in operation for more than 10 years, are still generally associated with a club which may or may not have a hatchery, annually harvest less than 1,800 kg of fish, and generally attract less than 700 participants a year. These derbies also target some or all of the salmoded species listed above and may also target lake trout (Salvelinus namaycush) (backcross in some areas), smallmouth bass (Micropterus dolomieu) and largemouth bass (Micropterus salmoides), or as in one case, all sport fish species in the area. These derbies usually operate for less than 7 days, usually at the same time each year. Examples of this type of derby include the Bruce Peninsula Family Derby, the Meaford Salmon Derby, and the Little Current Splake Derby (Figure 1).

The third group of derbies (Class 3) is what could be classified as competitive fishing tournaments. This type of derby has long been associated with bass tournaments, professional fishermen, and organized circuits around the province or the continent. These sport fish derbies target a specific fish species, generally promote catch and release with limited numbers of fish entered, and generally run one or two days in duration. Participation is often restricted in this type of derby, either by number or by large entrance fees or both. There are currently 3 derbies of this type in Lake Huron, two bass tournaments in the North Channel, and the most recent derby in Lake Huron, the Collingwood Invitational Salmon Slam (Figure 1).
On average, approximately 17,000 people participate in one or more of the 15 sport fish derbies on Lake Huron in a given year. The harvest during these events is estimated to be approximately 43,000 kg, with chinook salmon representing about 75% of the harvest.

In order to better understand the nature of the sport fish derbies in Lake Huron, I have identified two class I derbies which will be investigated further in this paper, the CFPS Chantry Chinook Classic and the Owen Sound Salmon Spectacular.

Case Histories

The Lake Huron Management Unit has had an interest in the sport fishing derbies in Lake Huron for a number of years. Frequent questions regarding derbies include: when and where do the derbies take place, what form does the harvest take (i.e. is there catch-and-release?), what species are being targeted, how are prizes awarded, what is the size of the harvest, and could it have any effect on Lake Huron fish stocks. At the same time, the LHMU saw these organizations as potential partners and a source of valuable data, which could possibly be used to aid in assessing Lake Huron fish stocks.
Beginning in 1993, fish and game clubs which conducted sport fish derbies were contacted and asked if they would be interested in forming partnerships in order to share data and technical expertise. Two of those organizations approached were the Lake Huron Fishing Club and the Sydenham Sportsmen’s Association who both agreed to participate in a cooperative sampling program with the LHMU. The following case studies are only possible due to the generous contribution of time, effort, and ultimately data by these two organizations and their members.

CFPS Chantry Chinook Classic

Lake Huron Fishing Club

The Lake Huron Fishing Club (LHFC) was founded in 1983, a sportsman's group representing fishermen in the general vicinity of Kincardine, Port Elgin, Southampton, and Walkerton. The club membership general sits at 400-450 full time members with its prime mandate being habitat rehabilitation and supplemental stocking in Lake Huron. From the very beginning the LHFC recognized the need for additional funds to carry out the work it intended to do. Hence, the CFPS Chantry Chinook Classic Derby (Chantry) began in 1984 as the premier fund raiser for the Lake Huron Fishing Club.

To date, the LHFC has raised approximately \$231,000 through its efforts, applying these funds to a large number of habitat enhancement and rehabilitation projects in and around the Lake Huron watershed. The club also built and operates two fish hatcheries, one a chinook salmon hatchery and the other a state of the art brown trout hatchery. Through these efforts, the club has been able to produce and release approximately 2.5 million chinook salmon and almost 250,000 brown trout.

Chantry Chinook Classic

As the name implies, the Chantry Chinook Classic focuses on chinook salmon as the prime species for the derby. Two categories exist in this derby, salmon, comprising all members of the pacific salmon family, and trout, which includes rainbow trout as well as brown and lake trout.

Prizes are awarded in a number of ways with the largest salmon for the derby receiving the grand prize and the largest trout receiving the consolation prize. Besides these, prizes are awarded to both the largest salmon and closest fish to a hidden weight on a daily basis. In the end, the top 25 salmon from the derby and the top 5 trout receive prizes. Another potential award during the derby is the result of capturing one of twenty-five specially tagged chinook salmon. The Chantry Chinook Classic also runs special events days with accompanying special prizes for children only, for ladies only, and for seniors only. As in most other derbies, the Chantry requires that all fish entered be brought to a derby weigh-in station for official entry, that all fish must be caught that day, and that once a fish is entered, it cannot be re-entered in the derby. All fish must be brought to the weigh-in station in the state that they were captured.

The Chantry derby generally begins on the Friday of the fourth weekend in July and runs for 15 days, ending on the Saturday of the first full weekend in August. This derby is restricted to the waters of Lake Huron from Point Clarke in the south to Lyle Island Light in the north; approximately 120 km of shoreline (Figure 1). There are 5 weigh-in stations used during this derby, one at each of Kincardine, Port Elgin, Southampton, Sauble Beach, and Pike Bay.

Statistics for the Chantry

Participation in the Chantry derby began at 1,178 entrants in 1984, quickly peaked at 5,625 in 1986 and then settled to around 3,100 entrants throughout the 1990's (Figure 2). Participation has averaged around 3,125 since 1992. The fishing club maintains records regarding home addresses of participants and also locations of sales of tickets. Just over 50% of all participants in 1998 were considered local residents, suggesting a fairly large influx of non-residents to attend this derby.

![Figure 2. Number of entrants in the Chantry derby, 1984 to 1998.](image)
Catch statistics from the Chantry derby are only available for the period 1992 to 1998. Prior to 1992, data were generally not kept after the completion of the derby and the final awards had been presented.

The total number of fish caught during the Chantry steadily increased from 1992, peaking in 1997 with 5,948 fish entered, and then declined in 1998 (Figure 3). The one exception was the 1996 derby. High winds and poor lake conditions kept fishermen off of the lake for several days, with virtually no lake fish being weighed in on those days.

Based upon entries in the derby, the most commonly caught fish has been chinook salmon. Entries of species have varied through the years with the number of chinook salmon entries peaking in 1997, rainbow trout in 1995, brown trout in 1994, pink salmon (Oncorhynchus gorbuscha) in 1996, and lake trout peaking in 1998. Coho salmon (Oncorhynchus kisutch) and Atlantic salmon (Salmo salar) have never played an important role in this particular derby.

In 1993 the winning fish weighed 16.75 kg while in 1998 the winning salmon only weighed 9.67 kg. This phenomenon has been observed in other areas of Lake Huron and continues to be investigated by various fisheries management agencies including the Lake Huron Management Unit (OMNR, 1998).

Somewhat to the contrary, total biomass harvested during the Chantry derby peaked at 23,400 kg in 199 (Figure 4). Chinook salmon biomass peaked in 1995 and has declined ever since (Figure 5). The same holds true for rainbow trout and pink salmon. On the other hand, lake trout biomass has been steadily increasing, with the highest biomass harvested in 1998. Brown trout had a huge increase in harvested biomass in 1994 followed by a return to relatively low levels ever since. The harvest of coho salmon has been stable since 1992.

The average size of fish caught in the Chantry derby has remained relatively unchanged since 1992 with one pronounced exception (Figure 6). The average size of chinook salmon entered in this derby has decreased significantly during the past three years. This is also evident in the maximum entered or the winning salmon category. In 1993 the winning fish weighed 16.75 kg while in 1998 the winning salmon only weighed 9.67 kg. This phenomenon has been observed in other areas of Lake Huron and continues to be investigated by various fisheries management agencies including the Lake Huron Management Unit (OMNR, 1998).
Another way to assess the success of or changes in a fish derby is to examine the angler success rate. This is a gross attempt to standardize harvest rates based upon the number of anglers entered in the derby. Since actual fishing time is not known, a true estimate of catch-per-unit-effort (CPUE) is not available. Using only derby entry data it appears that angler success was increasing from 1992 to 1997 and then decreased in 1998 (Figure 7), the exception being 1996 which was an off year. It appears that the decline in 1998 was primarily driven by the lack of chinook salmon entries.

Other information collected by the Chantry derby staff over the years includes clip code information as well as sea lamprey scar information. This data has generally been collected from all fish entered at all weigh-in stations.

The SSA has been involved in a large number of projects aimed at improving fishing and hunting opportunities in the Grey-Bruce region. These range from building bat boxes, coordinating deer feeding stations in extreme winters, constructing and maintaining fish ways, and, since 1982, stocking fish into the waters of Georgian Bay. The club began stocking rainbow and brown trout in 1982 and then added chinook salmon to their hatchery system in 1985. Since that time an estimated 5.5 million salmon and trout have been stocked into the rivers, streams and waters of Owen Sound.

**Owen Sound Salmon Spectacular**

In anticipation of the peak return of the 1985 stocked chinook salmon, the SSA organized and, with the assistance of some large corporate sponsors, commenced the Owen Sound Salmon Spectacular fishing derby. This annual event was designed to specifically target chinook salmon which are returning to Owen Sound bay as they prepare to enter the two large spawning rivers in the region.

The derby also includes a trout category, which in the past included rainbow trout, brown trout and lake trout. In 1995, lake trout were dropped from this category due to concerns over rehabilitation efforts and increased commercial exploitation of lake trout in the derby fishing area. This was a decision made by the club and fully supported by the LHMU.

The prize awarding system used for the Salmon Spectacular is a daily winner type versus the overall winner type used in other derbies. In this derby, the top 10 chinook salmon entered on each day, are awarded prizes. There is also a top trout winner for each day of the tournament. The grand prize is then awarded for the largest salmon entered throughout the derby and a consolation prize is awarded for the top trout. A participation winner is drawn from all fish entered in the derby for a very significant prize. A draw from all ticket holders results in another prize being awarded.

As in most derbies, there are a list of official entrance requirements and rules for the Salmon Spectacular. Fish must be entered on the same day they are caught and must be legally angled to be eligible. The SSA also has a 5 lb (2.26 kg) minimum weight for all fish which can be entered in the derby. There is only one weigh-in station for this derby, located at the Owen Sound marina in Owen Sound. Fish can be entered at the main weigh-in station if considered eligible for one of the daily prizes or at an express weigh-in.
station if not large enough for a daily prize but to be included in the total derby draw for the participation prize.

The Salmon Spectacular derby generally begins on the last (fourth) Friday in August and ends on the first Sunday in September. The derby runs for 10 days and is restricted to the waters in Owen Sound Bay and Colpoys Bay bordered by a line from Vail's Point in the east to Hay Island, at the mouth of Colpoys Bay in the west (Figure 1). Fish cannot be entered if caught upstream of the first bridges in either the Pottawatami or Sydenham rivers.

**Statistics for the Salmon Spectacular**

Catch information for the Salmon Spectacular derby is limited to four years (1995 to 1998). Some partial information is available for earlier years but many gaps in the data are evident. This is typical of the evolution of sport fish derbies and the current realization of the importance of this information.

The number of people participating in the Owen Sound Salmon Spectacular has averaged approximately 4,060 over the past several years, with just under 4,700 entered in 1998 (Figure 8). This is much higher than the number of fish entered (Figure 9), suggesting that many (close to half) of the people who purchase a ticket do not catch fish large enough to enter into the derby.

The estimated total number of fish entered in this derby increased through the 1990's, peaked in 1995, and declined afterwards. The total number entered in 1998 was up once again but not to the level seen in 1995. Chinook salmon consistently make up the largest proportion of fish entered, with trout generally only comprising anywhere from 2% to 14% of the total number of fish entered (Figure 10). Interestingly, the trout component has changed from being dominated by lake trout (74%) in 1989 to being 100% rainbow trout in 1998. The latter value is due to the fact that lake trout are no longer allowed in this derby. Brown trout played a very minor role in this derby.
The total biomass of fish entered also peaked in 1995, with just over 16,000 kg of fish entered in the main weigh station (Figure 11). The total weight declined in 1996 and stayed at this depressed level in 1997 and 1998, even though the number of fish entered increased in 1998. This is explained by the decline in the average weight of chinook salmon entered in the derby which has occurred over the past two years. The mean weight of chinooks has declined by approximately 34% over the past two years (Figure 12).

At the same time, the winning chinook weight has also decreased from 10.98 kg in 1992 to 6.48 kg in 1998, a drop of 33.4%. The change in mean weight is not evident in the trout category, or more specifically in rainbow trout which has dominated this category during the past four years. No significant change in the mean weight of this species has been observed (Figure 12).

The number of fish entered per angler appears to have decreased over the past four years as well (Figure 13) suggesting a slight decline in fishing success in this derby. This is based upon the total number of anglers who entered a fish in the derby and is not necessarily the number of anglers who were actually fishing. This type of comparison is not practical however, given the different reporting procedures and entry rules in various derbies around the lake.

The Salmon Spectacular derby staff also have collected other biological information while weighing in fish for the derby including things such as sex (by external examination) and sea lamprey scarring. The LHMU has been reluctant to report some of this information due to the subjective nature of the data and its collection. However, it is still useful as an exploratory analysis tool.

LHMU Participation

The Lake Huron Management Unit began attending the Chantry Classic derby and the Salmon Spectacular derby in 1994 and has attended these events every year since. The purpose of attending these derbies, as well as a number of others, is two-fold. The first reason is to collect biological information which will assist in assessing fish stocks in Lake Huron. This includes collecting scale samples for aging purposes, heads from coded wire tagged fish, stomach samples for diet analysis, clip code and lamprey attack data as well as the standard length and weight data. Sampling by the LHMU is species specific and helps to accurately detail the characteristics of the harvest during the derby. The collection of length and weight data is a check against data collected by derby volunteers, allowing us to extrapolate data collected by these staff.
The second reason for attending sport fish derbies is to supply anglers and the public in general with information about the fish stocks in Lake Huron, the LHMU's assessment programs in Lake Huron, and to assist the derby organizers by answering any questions which may arise.

Summer students or seasonal technical staff generally set up a sampling station at the busiest of the weigh-in stations, in some years more than one station has been sampled. In most years, every day that a derby runs it is monitored, generally from the time the weigh-in station opens until mid-day. Several days have been monitored from opening time to closing time and it appears that 60-75% of all fish are weighed-in during the first few hours following the opening of the stations. Therefore, we concentrate our efforts during those peak times.

Sport fish derbies have become one of the LHMU's most reliable sources of information regarding salmonid fishes in Lake Huron. The data they have supplied, along with some limited angler creel information, have helped to detect changes in growth rates of some species in Lake Huron, movement by tagged salmonids including trans-lake migration from U.S. planting sites, determine mortality rates for lake trout, and measure sea lamprey attack rates in the main basin of the lake.

Catch statistic data collected from sport fish derbies needs to be assessed with the derby regulations in mind. Prizes for mystery weights and no minimum weights will bring in more fish of all sizes than will derbies with minimum weights and maximum weight prizes only. Mean weights for all species will vary depending upon the derby format. Also, grouping of fish into family categories can make some information irretrievable or biased depending upon which species are or are not included in the statistics.

The LHMU has found that collecting information which can be very subjective or is not easily observed is often best collected by Unit staff and results extrapolated to all fish caught in the derby. For instance, sea lamprey attack data is extremely difficult to standardize, training is lengthy, and interpretation can be very subjective. The Unit has found that it is more accurate to supply trained personnel to collect this type of data from a sub-sample of the derby catch and then apply the marking rates to all fish entered. This is also true for sex information which, unfortunately, is best achieved by internal examination.

One outstanding piece of information critical to achieving a better understanding of the status of fish stocks targeted by sport fish derbies is some estimator of catch-per-unit-effort (CPUE). The LHMU has recently attempted to collect this information through the use of derby diaries. These are randomly distributed to anglers participating in derbies in specific areas and retrieved immediately following the completion of the derby. Although return rates have generally been low, this program will continue to be promoted for its potentially significant benefits at establishing CPUE values. The potential information they will supply is well worth the effort.

The role of the sport fish derby in Lake Huron and perhaps in all the Great Lakes is currently evolving. Most sport fish derbies in Lake Huron started out as fundraisers for game and fish groups who in turn apply the proceeds to conservation issues and requirements in their areas of interest. The derby is generally the result of stocking by the host organization and the whole program is seen as a put-and-take fishery. The host club puts the effort into creating a localized sport fishery, then benefits from their efforts while at the same time funding future conservation efforts. In most cases, the derby is the sole source, or at least the principal source, of funds for the club organizing it.

In recent years, however, we have seen the occurrence of more and more "spontaneous" fish derbies appearing in Lake Huron. These derbies are not associated with sport and fish groups, and are being used as fundraisers for a variety of purposes and causes, some of which are not related to conservation of resources in any way. This increased exploitation needs to be addressed in order to ensure the sustainability of both the sport fish derby programs and the sport fish around the lake.

Questions around the carrying capacity of the Great Lakes also need to be investigated more closely. In recent years, concerns around available forage base have prompted changes in chinook stocking rates in both U.S. and Canadian waters in 1999, the former through legislation, the latter on a voluntary basis (OMNR, 1998). Questions have arisen regarding the sustainability of maintaining an exotic predator base in the face of a declining prey base. There are also concerns about the effect of a predator population based upon exotic species and what impact this might have on native predators and other components in the fish communities in the Great Lakes.
Sport Fish Derbies in Lake Huron: Two Case Studies

This and other issues such as health and disease of fish stocks, genetic integrity and egg taking practices as well as derby regulations and the effects of different regulations on harvest and derby success need attention. The answer to these questions will hopefully help preserve sport fishing activity in the Great Lakes and also maintain healthy fish stocks for all citizens to enjoy.

In conclusion, it is also important to recognize the efforts of the Lake Huron Fishing Club, the Sydenham Sportsman's Association and other fish and game organizations who participate in the derby monitoring program on Lake Huron. All have been exemplary partners in every way and should be congratulated on the work they accomplish and thanked for their sharing of information and participation in the protection of the fishery resources in Lake Huron.

References


Personal Communications

Competitive Walleye Angling in the Bay of Quinte

Alastair Mathers, Tom Lawrence and Jim Hoyle
Lake Ontario Management Unit, Ontario Ministry of Natural Resources, R. R. #4 Picton, Ontario KOK 2T0

Competitive angling for walleye (Stizostedion vitreum) has been an important component of the fisheries of the Bay of Quinte for the last fifteen years. This paper provides a summary of the history and extent of these events and provides prospective on their importance relative to other fisheries. A summary of the four major competitive walleye angling events held annually in the Bay of Quinte is presented. Although considerable numbers of walleye are harvested during these events the size of the harvest is low compared to other fisheries (non-competitive angling, commercial fishing, and aboriginal fishing) and competitive fishing does not seem so have a major impact on the resource. Competitive fishing events do attract anglers to the area and appear to stimulate the local economy.

Introduction

The history of the walleye (Stizostedion vitreum) in the Bay of Quinte has been summarized by Bowlby et al. (1991). During the 1950 and 60s, the walleye were moderately abundant and subject to relatively high levels of commercial harvest and low levels of angler harvest. Northern pike (Esox lucius) and bass (Micropterus spp.) populations were high, but less abundant than walleye. Alewifes (Alosa pseudoharengus) were abundant and white perch (Morone americana) populations were low.

In the 1960s, the walleye population started to decline, most likely due to habitat loss and fish community change associated with nutrient enrichment and continued commercial harvest. Walleye populations remained extremely low throughout most of the 1970s. Water quality was poor and alewife and white perch were abundant and may have limited walleye recruitment by consuming young walleye and competing with them for food.

Die-offs of alewife in 1977 and white perch in 1978 in addition to completion of pollution control programs in 1977, resulted in a moderate year-class of walleye in 1977 and a very strong 1978 year-class of walleye. Over the next decade, continued improvements in water quality and habitat, low levels of exploitation, and low levels of white perch allowed walleye populations to recover. Over the same period angling, commercial and aboriginal fisheries developed. Within the Bay of Quinte the angling fishery is focused almost entirely on the walleye, with small harvest of other fish species.

Competitive Angling Fisheries

We surveyed organizers of four major competitive walleye fishing events held in the Bay of Quinte (located between Trenton and Bath along the shores of Lake Ontario) (Table 1). All of the events with the exception of the Quinte Fishing Series were initially organized during the early 1980's when the walleye population and angling for walleye were expanding rapidly.
Competitive Walleye Angling in the Bay of Quinte

Table 1. Details of four major competitive walleye fishing events held in the Bay of Quinte.

<table>
<thead>
<tr>
<th>Name of Event</th>
<th>Timing</th>
<th>First Year of Event</th>
<th>Number of partic. during 1998</th>
<th>Entry fee</th>
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</thead>
<tbody>
<tr>
<td>Walleye '98</td>
<td>1st weekend of May</td>
<td>1982</td>
<td>5,600</td>
<td>$8</td>
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<tr>
<td>Deseronto Firemen's Derby</td>
<td>1st weekend of May</td>
<td>1981</td>
<td>2,000</td>
<td>$5</td>
</tr>
<tr>
<td>Kiwanis Walleye World</td>
<td>1st weekend of May</td>
<td>1980</td>
<td>5,400</td>
<td>$15</td>
</tr>
<tr>
<td>Quinte Fishing Series</td>
<td>1st weekend in May and June</td>
<td>1988</td>
<td>104</td>
<td>$120</td>
</tr>
</tbody>
</table>

Other smaller competitive fishing events occur however we have no method of collecting information on these events. Organizers of the major derbies were very cooperative with our survey of competitive fishing in the area. Continued contact between the Ministry and the event organizers should be promoted.

The 'Kiwanis Walleye World' event has been held during the opening weekend of the fishing season (1st weekend of May) on an annual basis since 1980. Current event regulations offer prizes for the largest walleye, largest pike in both adult angler and junior angler categories. In addition, prizes are offered for the capture of a tagged fish and for 'hidden weight' categories. All fishing has been 'catch and release' only since 1996. Events in previous years did not require catch-and-release fishing. Over 5,400 people participated during 1998 and many sponsors helped to provide prizes.

The 'Napanee Rod and Gun Club Walleye '99' event has been held annually on opening weekend since 1982. A prize is offered for largest walleye. All fish weighed-in must be released alive to be eligible for prizes. Events in previous years did not require catch-and-release fishing. In order to be entered into the competition fish must be at least 21" (53.3 cm) in length. Over 5,600 people participated during 1998 and many sponsors donated prizes.

The Deseronto Firemen's Derby is also held on opening weekend. This event has been held annually since 1981. Prizes are offered for the largest walleye weighed in and entered. Live release of the entered fish is not a requirement of this derby. Over 2,000 people participated during 1998.

The Quinte Fishing Series is a 'tournament-style' fishing event. It is held on the second weekend in both May and June. Approximately 50 teams participate in catch-and-release fishing on each of the weekends. Anglers are allowed to weigh-in up to the daily possession limit (4 fish per day) with penalty points being deducted for fish which do not survive to be released. Many sponsors are attracted to this event. There is also an October combination walleye/bass tournament.

Impact of Competitive Angling on the Walleye Resource

The impact of competitive angling on the walleye population in the Bay of Quinte can be evaluated based on surveys of walleye angling which have been conducted by the Lake Ontario Management Unit of the Ontario Ministry of Natural Resources, on an annual basis since 1980. Angling effort was measured using aerial and on-water counts. Roving on-water interviews provided information on catch/harvest rates and biological characteristics of the harvested walleye. Detailed survey designs are reported by Hoyle (1998) and results are provided by Hoyle, Bowlby and Smith (1999).

Surveys showed that during the years 1995 to 1998 angling effort associated with competitive fishing events (average of 85,162 angler hours) represented 69% of the total angling effort during the opening weekend. Surveys showed that a total of 7,434 walleye were harvested by anglers on opening weekends during 1995 to 1998. Assuming that harvest rates for anglers entered in competitive fishing events are the same as those not entered in events, then an average 5,096 walleye would have been harvested by anglers in competitive events.

Although the walleye harvest associated with competitive fishing events in the Bay of Quinte is considerable, it is a minor component compared with other sources of mortality. Harvest for all documented sources, including commercial fishing, sport fishing, and aboriginal spear fishing, averaged over 170,000 fish for the period between 1995 and 1998. This suggests that walleye harvest associated with competitive fishing events accounts for only 3% of the total documented harvested (Figure 1).
Overharvest of walleye does not appear to be a threat to the eastern Lake Ontario/Bay of Quinte population since exploitation rates have been low (less than 15%). However, the lack of strong recruitment in recent years is a concern for fisheries managers. A strong year class of walleye has not been produced since 1994. Changes in fish habitat (e.g., nutrients, light, aquatic plants, etc.) do not appear to favour walleye, while other species such as yellow perch (*Perca flavescens*), bass, sunfish (*Lepomis* spp.), and pike, appear to be increasing in abundance. The Kiwanis Walleye World is the first event to change their regulations in response to the changes in fish habitat. In 1998, as many pike as walleye were weighed in at the Trenton event site. It seems likely that all of the competitive fishing events will have to adapt to the changes in the walleye population.

Over $150,000 is raised annually from the ticket sales for competitive angling events. In addition, anglers purchase a wide variety of goods and services during their participation in competitive fishing events. It was estimated that $4 million was spent by 12,000 anglers fishing in the Bay of Quinte during 1984 (Trushinski, 1986). In addition, competitive angling events promote angling and tourism in the Bay of Quinte area. Most of the revenue from events provides financial support for local events and

**Acknowledgements**

We greatly appreciate the assistance of Pete Thompson of the Quinte Fishing Series, Owen Kinmond of the Trenton Kiwanis, the Napanee Rod and Gun Club and the Deseronto Firemen in the completion of the survey. Steve Kerr provided valuable comments on an earlier draft of this
References


The Kawartha lakes probably support the greatest concentration of competitive fishing activities in Ontario. At least 54 events are planned for 1999. In response to increasing concerns, the Kawartha Lakes Competitive Fishing Events Committee (KLCFEC) was established in 1996. The committee was comprised of fisheries managers, event organizers, cottage and tourist associations, and other interest groups. A comprehensive set of guidelines was prepared for competitive fishing events which were to be held on the Kawartha lakes. These included scheduling of events, number of participants, bait and gear restrictions, fish handling procedures, release strategies, public education, and data collection. The KLCFEC represents a proactive approach to resolving user conflicts and ensuring the sustainability of the fisheries resource.

Introduction

The Kawartha lakes are a chain of 18 lakes which are part of the Trent-Severn Waterway connecting Georgian Bay with Lake Ontario. The lakes are shallow and eutrophic with a warm water fish community dominated by walleye, bass, muskellunge and panfish.

The Kawartha Lakes receive heavy fishing pressure due to their close proximity to the most populated portion of southern Ontario. Most of the competitive fishing events on the Kawartha Lakes are live release tournaments. Derbies, especially for the main sport fish species, are discouraged.

For 1999, there are in excess of 54 tournaments proposed on the Kawartha Lakes, including approximately 15 tournaments on Rice Lake and the Trilakes which includes Pigeon, Buckhorn and Chemung Lakes (Table 1).
Table 1. Proposed Competitive Fishing Events in the Kawartha Lakes for 1999.

<table>
<thead>
<tr>
<th>Date</th>
<th>Days</th>
<th>Lake</th>
<th>Organization</th>
<th>Fish Species</th>
</tr>
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<tr>
<td>25 Apr.</td>
<td>1</td>
<td>Rice</td>
<td>Reel Fish'n Competitions</td>
<td>Crappie and Perch</td>
</tr>
<tr>
<td>1 May</td>
<td>1</td>
<td>Rice</td>
<td>Bassmania Tournaments Inc.</td>
<td>Crappie</td>
</tr>
<tr>
<td>15 May</td>
<td>1</td>
<td>Rice</td>
<td>Reel Fish'n Competitions</td>
<td>Walleye</td>
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This number does not include the smaller tournaments such as the B.A.S.S. club tournaments which are usually one day events with less than 25 boats, or muskellunge events which are immediate release at capture events.

Over 70% of the 1999 tournaments are targeted on bass (40). The remaining events target walleye (6), walleye (Stizostedion vitreum) and bass (Micropterus spp.) (5), pike (Esox lucius) (1), black crappie (Pomoxis nigromaculatus) (1), and black crappie and yellow perch (Perca flavescens) (1).

Tournaments include one day events (34) or two day events (20). Most are held on weekends (49), but a few are held through the week (5 one day events are proposed for 1999).

History

In the late 1980s, the Ontario Ministry of Natural Resources (OMNR) began a process to develop District Fisheries Management Plans. In the Lindsay District, this process began in 1987 and included a number of public meetings. One of the products of these public meetings was a list of issues which included concerns about competitive fishing events. The main concerns were: the transfer of fish between waterbodies, preseason fishing associated with opening day events, safety and lack of information on the impacts of competitive fishing events.

These concerns resulted in a meeting between OMNR and some of the clients involved in competitive fishing events. The meeting was held in 1988 and included OMNR, the Federation of Anglers and Hunters (OFAH), Sir Sandford Fleming College (SSFC), Pro Bass and The Canadian Bass Research Foundation. It was noted that over 18 tournaments were held on the Kawartha Lakes in 1987.

The messages which were presented to OMNR at the meeting were as follows: OMNR should take a more active role in regulating events; better guidelines should be developed to ensure events are run properly; more research was required in Ontario to determine the real impacts of events on fish populations (especially on delayed mortality and displacement) and more education was required to correct some of the misconceptions about live release tournaments.

OMNR indicated that it was not planning to implement a permitting system in the near future and suggested that efforts should be focused on encouraging more research on impacts of competitive fishing events.

The OFAH established the OFAH Live Release Fund which provided support for studies on live release research. Several studies were carried out in the Kawartha Lakes. Babin (1995) studied post-release mortality of walleye, and bass caught in 17 tournaments in the Kawartha Lakes.

In 1991, the Ontario Fisheries Advisory Council (OFAC) which had been created to advise the Minister of Natural Resources with fisheries management issues, released a report regarding competitive fishing events in Ontario. The report included a recommendation that OMNR should develop a policy about competitive fishing events and develop a permitting system to regulate events.

From 1992 - 1994, OMNR held a number of meetings with clients to get input on how to implement the recommendations of the OFAC report. These meetings resulted in the development of a draft policy statement in 1994 which included a permitting system administered by OMNR. With a change in government and reductions in budgets and staff, the draft policy never received corporate approval.

The Lindsay District office continued to receive complaints about the number of events in the Kawartha Lakes and concerns about the impacts. In response to the complaints, the Minister indicated that OMNR was not prepared to implement a permitting system, but that staff at the Lindsay District office would meet with event organizers and other clients to develop a voluntary approach to resolve issues on the Kawartha Lakes. If this approach worked in the Kawartha Lakes, OMNR would consider implementing similar approaches across Ontario. The first meeting to start the developing the process was held in February 1996 at the OMNR office in Lindsay, Ontario.
Establishment of a Committee

The initial meeting (February 1996) included the following: OMNR, OFAH, Rice Lake Tourist Association (RLTA), Bobcaygen Chamber of Commerce (BCC), Kawartha Anglers Series Tournaments (KAST) and Bass'n'tario.

The purpose of the meeting was to initiate discussions which would address the Minister's commitment to work with event organizers and clients to solve problems. It was also suggested that a workshop be planned to develop guidelines and the meeting was used to develop a terms of reference, a list of attendees, and a list of issues and potential solutions for the proposed workshop.

The recommendations from the meeting included the following: all tournament organizers should be invited to participate in the process; and rather than a workshop, a local advisory council, chaired by an independent party should be created to deal with competitive fishing event issues. Other recommendations included developing a system to coordinate schedules, collecting and donating a portion of entry fees for conservation work, monitoring tournaments and educating the public.

At about the same time, the Kawartha Fisheries Association (KFA) was formed to assist OMNR with the management of the fisheries in the Kawartha Lakes. In preparation for the next meeting of the committee, OMNR prepared a background document (Bell 1996), which included goals, objectives, principles and definitions, a discussion of issues and possible solutions and a recommendation that a committee be established with representation from various clients interested in competitive fishing events and chaired by the KFA.

The background document was presented at the next meeting (November 1996). The meeting was attended by OMNR, OFAH, RLTA, KFA, Bobcaygen Chamber of Commerce, Canada Lakes Loon Survey, Ontario Bass Federation (Bassmasters), Bassmania, Bass'n'tario, Chevy/Mariner Bass Tour (ProBass), Heritage Fishing Series, KAST, Ontario Sport Fishing (Kellogg's Series) and Top Bass Fishing Series. Reel Fish'n Competitions (60 hp limit) and Pro Anglers Outdoors Inc. were two other organizations which were invited, but, could not attend.

The recommendations from the meeting included the following: the representative from the KFA would chair the Kawartha Lakes Competitive Fishing Events Committee (KLCFEC) and OMNR would supply resources; the KLCFEC would concentrate its efforts on tournaments and a subcommittee would be established to revise the OFAH guidelines which already provided good direction; the KLCFEC would coordinate the scheduling of 1998 tournaments to reduce conflicts; and the list of issues would be reviewed and a process to develop solutions in addition to the guidelines would be established.

The goal, objectives, principles and definitions of events adopted by the KLCFEC are presented in Appendix I.

A subcommittee prepared a draft of the standards of operation from the OFAH guidelines for review at the next full KLCFEC meeting in April 1997. At the April meeting the draft standards of operation were reviewed and revised, the tentative schedule for 1998 was discussed and the issues and solutions were discussed.

By August 1997 the standards of operation were completed. Through 1998 several meetings were held, but, little progress was made other than to confirm the schedule for 1999 and assign individuals specific issues to develop a draft discussion of the issue and recommended solutions to be presented to the KLCFEC. A draft action plan is currently being prepared to help speed up the process and provide better direction to the KLCFEC.

Issues

The KLCFEC identified a number of issues which required attention:

1. Number of Events and Anglers:

- In waterbeds where fishing pressure and harvest are high, the added fishing mortality caused by events may reduce angling quality.
- The high numbers of tournaments and boats can reduce the quality of the fishing experience or outdoor recreational experience for others using the waterbody. Complaints about the noise associated with the early morning start times and the loud noise of the high powered motors are common, especially when there are tournaments almost every weekend in the summer.
- For most of the Kawartha Lakes the number of tournaments is not a major concern. However,
Kawartha Lakes Competitive Fishing Events Committee

for the Trilakes (Pigeon, Buckhorn and Chemung) and Rice Lakes the numbers have increased to the point where there are approximately 15 tournaments annually. Through July and August there are tournaments almost every weekend. Although there are no signs that bass populations are in peril, residents, cottagers and anglers are complaining about the noise and activity caused by tournament anglers.

- Large numbers of high powered boats in confined areas such as launch ramps, rivers, narrows, etc., in addition to other boaters, is a potential safety problem.

2. Fish Handling Mortality

2a. Types of Baits

Research conducted in the United States and Canada regarding survival rates of caught-and-released fish, clearly shows that mortality rates are lower with artificial baits followed by natural baits and, finally, live baits. Therefore, live release events should be restricted to artificial baits only.

2b. Live Wells

- Studies have shown that the length of time and number of fish held in live wells have a direct impact on fish mortalities. Allowing anglers to hold their daily entry limit may cause some fish to be held most of the day which increases stress. Walleye don't survive well in live wells especially when water temperatures are high. Bass seem to survive well unless water temperatures are high. Largemouth bass seem to handle higher water temperatures than smallmouth bass. Northern pike do not survive well in standard livewells especially in warm water periods.
- Rough water conditions have been identified as resulting in high mortalities of fish transported in livewells. Cutting down on the distance traveled and time held in livewells will reduce mortalities.

2c. High Water Temperatures

- Studies have shown that tournament-associated mortality increases exponentially with temperature for walleye and black bass; with total mortalities of 10%, 24% and 40% expected for black bass at water temperatures of 15°C, 25°C and 35°C, respectively.
- As water temperatures increase during open water months, fish move to deeper cooler water. Fish taken from depths greater than eight metres may suffer from the equivalent of the "bends". Mortality of these fish can be very high. Since the Kawartha Lakes do not have deep water habitat which is suitable for warmwater species to inhabit, this is not a concern (but may be in other waters).

2d. Weigh-in, Display and Holding

- The handling and holding of fish during tournaments can be extensive. Fish may be carried in bags or containers to the weigh-in, weighed in, held in display tanks, and held in transfer tanks until they are released. The longer the fish are held the higher the stress levels and higher the mortalities.

3. Fish Distribution

- Fish caught in tournaments are frequently released a distance from the point of capture and usually only at one or two sites. Some species such as smallmouth bass are known to swim long distances to return to their home areas. Other species such as largemouth bass do not return if release over 8 km from their home area.
- Local anglers are complaining that after several events, it is difficult to catch larger bass in some locations. If there are large numbers of tournaments on a given lake the local populations of fish may be significantly altered by how the fish are distributed after the event.
- Large numbers of fish released in certain locations are very vulnerable to harvest by anglers subsequent to the event because it may take several days or more for fish to disperse. Fish which are released in areas with good habitat will remain at the site for sometime before moving. Some of the tournaments release the fish in deeper water with little structure to facilitate the movement of fish away from the site as quickly as possible after release.

4. Transfer of Fish Between Waterbodies

- It is illegal to transfer a live fish from one water body to another (Ontario Fisheries Regulations 4(1)(c)).
5. MNR Enforcement

- Tournament anglers must abide by fisheries regulations and rules set out by the organizers. Conservation officers do not want to harass tournament anglers, but are prepared to deal with infractions if they occur. To make it easier for tournament participants to be recognized, their boats should be prominently marked.
- Tournaments are often held on the opening day of the season for a particular species. Any angler who is practice fishing prior to the event is breaking the law because they are fishing for a species during the closed season even if they return all the fish. In the case of bass, if fish are taken off the spawning, the eggs or fry may be eaten by predators; even if the fish return in a few minutes.

6. Administration:

6a. Committee or Association Structure

- For the Kawartha Lakes Competitive Fishing Events Committee (KLCFEC) to endorse competitive fishing events and to have some standing to be able to deal with the issues, it must be a recognized organization with a constitution, a set of bylaws, elected officers, a set of standards of operation, etc.
- Rules are required regarding membership on the committee.
- Rules must be established to clarify the endorsement, scheduling, monitoring and donating processes.

6b. Scheduling of Events

- It is important to know the schedules for each tournament organization well in advance to ensure that multiple tournaments on a given lake are kept to a minimum. Also, it will assist in directing tournaments away from lakes with large numbers of tournaments to lakes with no or fewer tournaments. Knowing well in advance will provide adequate time to resolve conflicts before tournament information is printed.

6c. Monitoring Events

- Monitoring is required to ensure that endorsed tournaments are following the Standards of Operation. A monitoring program is required to effectively ensure compliance as well as ensuring fish are properly handled.
- Information collected during monitoring activities will be useful to organizers to assist with improving the handling of fish to ensuring that mortalities are kept to a minimum.
- Organizers are responsible to ensure the competitive anglers are following the rules and regulations associated with their events.

6d. Donations to Conservation

- Tournaments are using the fisheries which are a public resource similar to fishing guides and tourist establishments.
- Tournaments put extra pressure on fisheries.
- Many tournament organizers donate a portion of their profits to various groups and organizations for research, rehabilitation and protection of the fishery or other conservation work.

7. Data and Information Collection.

- Tournaments provide an excellent opportunity to obtain fish population data at a low cost.
- Some studies have shown that information from tournaments is a good index for estimating the status of the fish populations. On many lakes this may be the only source of information which is available to track the fish populations.
- Many tournament organizers already collect information annually on the success of their anglers, the numbers of fish weighed in, the biggest fish and the weight of fish.

8. Impacts of Tournaments on Other Organisms.

- Where sensitive aquatic and terrestrial sites exist, the disturbance caused by competitive fishing events may have a negative effect on various organisms.
- The only concern to date is with regards to impacts on loon nesting and rearing success in Pigeon Lake. There is information which suggests that bass tournaments held in the end of June through the first two weeks of July may be having a negative effect on the survival of young loons.
- MNR is presently working with a local loon survey participant and the Long Point Bird Observatory to try to confirm if impacts exist. Researchers are now trying to get information on previous tournaments to determine impacts and will continue to monitor the loon success.

- Tournament weigh-in events are a good opportunity to get messages across to the public about fisheries management, habitat protection, catch and release fishing, the health of the fisheries, etc.
- Tournaments are recognized as a legitimate use of the resource. As with any activity there may be some negative impacts and some positive benefits. Messages need to be developed which show how the tournaments are run in a manner to reduce negative impacts and explain the positive benefits.

Solutions

The KLCFEC has developed a number of solutions to address specific issues. These solutions are included as rules in the Standards of Operations.

The Committee continues to discuss the issues and develop additional solutions. The following are some of the points or recommendations under discussion:

- Encourage organizers to use alternate fish species for events.
- Limit the number of events on a waterbody in a given year. Develop a process to allocate event opportunities in conjunction with event organizers. Events with a history of being well organized will be given priority.
- Try to run tournaments on non-traditional tournament lakes. Smaller tournaments like B.A.S.S. club events should run as many tournaments as possible on smaller lakes.
- Organizers should contact local marinas and resorts to notify them of the tournaments and asked to be notified if they have any areas which they would like to be identified to be out of bounds.
- Adopt guidelines for proper use of livewells and proper handling of fish through the weigh-in.
- Develop guidelines to assist with the distribution of fish throughout the lake.
- Develop criteria for selecting suitable release sites for different species.
- Identify suitable release sites for each lake.
- Develop a distribution schedule for lakes with many tournaments, (e.g. Trilakes and Rice Lake.) This would be for internal committee use, only.
- The KLCFEC should develop and approve a constitution, set of bylaws and elect the necessary officials to run the committee. Direction is needed on the structure of the committee and subcommittees, the timing and number of meetings, etc.
- A monitoring program should be developed. The program should consider the following: who does the monitoring, what training and qualifications are required, how many events are monitored each year, to whom does the monitoring team report, how quickly must organizers respond to the request for action, etc.?
- Where sensitive sites are identified, these sites should be protected from negative impacts from tournaments as required.
- Develop a communication plan for individual competitive fishing events which will identify messages, audiences, products and timelines.
- Best management practices for handline fish should be available for anglers at all tournaments.
- Ensure that new anglers and experience anglers get the message that the welfare of the fish is the number one priority for organizers and competing anglers.
- Strive to increase long-term survival of fish by staying abreast of the latest catch and release studies.
- Organizers should establish better public relations with cottager's and homeowner associations, tourist associations, municipalities, marinas, etc., to open the lines of communication and work together to solve problems.

References


Kawartha Lakes Competitive Fishing Events Committee

APPENDIX I

Kawartha Lakes Competitive Fishing events goals, Objectives, Principles and Definitions.

Goal

To ensure that competitive fishing events do not adversely affect the health of aquatic ecosystems and contribute appropriate cultural, social and economic benefits from fisheries resources.

Objectives

To provide for the effective cooperative management of competitive fishing events in the Kawartha Lakes, while sustaining fisheries and other natural resources, achieving equitable benefits to communities and clients, and administering events effectively.

Principles

1. Competitive Fishing Events are recognized as a legitimate recreational activity.
2. MNR will not promote competitive fishing events.
3. Fishing effort associated with CFEs must not exceed the capacity of the fishery to sustain quality fishing.
4. Fisheries will be managed in recognition of the full range of fishery values ensuring that all anglers (non-competitive and competitive) have an opportunity to safely enjoy the resource.
5. Impacts of CFEs on other resources, e.g., wildlife/loons will be addressed.
6. Responsibility for managing the resource must be shared amongst participants, sponsors, organizers, anglers, local communities and resource managers.
7. Benefits and costs associated with CFEs must be recognized and shared equitably to assist with maintaining the fishery.
8. Conflicts with other users and residents must be minimized.
9. Competitive fishing events can provide economic benefits to local economies and Ontario.
10. Competitive fishing events can be a good low cost source of information to monitor fish populations.

Definitions

Competitive Fishing Events - any angling activity in which participants are solicited and have the opportunity to win prizes or recognition. Events include tournaments, derbies and contests.

Contests - events which may involve a broad geographic area, an extended period and/or no pre-registration.

Derbies - events on designated waters requiring preregistration of participants and fish are not necessarily returned to the water alive.

Organizer - any group, organization or individual who assumes responsibility for arranging and/or delivering a competitive fishing event.

Sponsor - any group, company, organization or individual who provides money or prizes to be given out at CFEs.

Tournaments - events on designated waters requiring preregistration of limited participants and all fish caught are intended to be returned alive to the originating waterbody.
A bowhunting event for carp (Cyprinus carpio), known as the Northeastern Bowfishing Championship, has taken place on the St. Lawrence River for the past eighteen years. This event has increased in size to the point where approximately 500 hunters from several states and provinces currently participate. Prizes are awarded for the top fifty carp in terms of weight. Fish in the mid forty pound range usually win the event. There have been few problems encountered over the duration of the event. This event has had significant economic benefits to the local area both during the event and at other times of the year. Plans are currently underway for the 1999 bowfishing championship.

History and Background

This bowfishing event began in 1981 as a small competition to bring archers together and raise money for three local sportsmans clubs. The St. Lawrence River soon became known for good hunting conditions and extremely large carp (Cyprinus carpio). The event grew rapidly and in 1986 picked up a national sponsorship. With national advertising the bowfishing event grew into one of the biggest in North America with an average of 500 hunters competing each year. Prizes are awarded for the top fifty carp entered. Prizes include cash ($1,000 first prize, $750 second prize, and $500 third prize) in addition to items donated by local and national businesses. Donated prizes include bows, organized hunts, tree stands and other valuable merchandise.

Event Format

A small game licence or fishing licence is required of all participants. Only bows and arrows are allowed. Crossbows are not allowed and the use of gaffs is prohibited. Hunting is allowed after dark in New York waters but not in Ontario. There are also regulations for the proper disposal of carp carcasses.

The waters for the event include eastern Lake Ontario, the St. Lawrence River, Lake St. Lawrence and Lake St. Francis. Prizes are awarded to the largest carp in terms of weight of a single fish. Weights are measured to the nearest one hundredth of a pound by scales which are tested and certified annually. There have been suggestions on making the shoot a team or total weight event but the organizers have not changed from the largest single fish format. Some of the reasons for this include the increased complexities of more fish at the single weigh-in site and also a change in the atmosphere of the event and enforcing more rules among participants. The general feeling was that by basing the competition of the largest fish the event is more of a friendly competition.

Contestants in the event come from all over North America. In 1998 there were contestants registered from 12 states and 2 provinces (Table 1). On average approximately 500 anglers enter the bowfishing event each year.
The Northeastern Bowfishing Championship

Table 1. Origin of entrants in the 1998 Northeastern Bowfishing Championship.

<table>
<thead>
<tr>
<th>Origin of Entrant</th>
<th>Number of Entrants</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alaska</td>
<td>1</td>
</tr>
<tr>
<td>Colorado</td>
<td>1</td>
</tr>
<tr>
<td>Connecticut</td>
<td>2</td>
</tr>
<tr>
<td>Massachusetts</td>
<td>4</td>
</tr>
<tr>
<td>Maryland</td>
<td>2</td>
</tr>
<tr>
<td>North Carolina</td>
<td>1</td>
</tr>
<tr>
<td>New Jersey</td>
<td>17</td>
</tr>
<tr>
<td>New York</td>
<td>311</td>
</tr>
<tr>
<td>Ohio</td>
<td>9</td>
</tr>
<tr>
<td>Ontario</td>
<td>75</td>
</tr>
<tr>
<td>Pennsylvania</td>
<td>24</td>
</tr>
<tr>
<td>Quebec</td>
<td>12</td>
</tr>
<tr>
<td>Vermont</td>
<td>13</td>
</tr>
<tr>
<td>Virginia</td>
<td>1</td>
</tr>
<tr>
<td><strong>Summary</strong></td>
<td><strong>473</strong></td>
</tr>
</tbody>
</table>

Carp Entries

Most winning carp are in the mid forty pound range. The top fifty carp in the 1998 championship ranged in weight from 32.74 to 45.34 pounds (Table 2).

Economic Value

The Northeastern Bowfishing Championship nets between $4,000 to $6,000 annually. The proceeds are divided between the organizers and the host club. The host club also generates revenue from concessions and raffles offered to participants. Local motels and camp sites in the area are utilized to capacity during the event. Local gas stations, fast food restaurants, grocery stores and sport shops also see a notable increase in business the weekend of the event. It has also been found that many of the contestants, once they become familiar with the area and what it has to offer, come back with their families to spend additional vacation time. In addition, many participants have started to arrive 2-3 days before the event or remain a few days after the event. It is amazing to see that a tournament for carp brings more money into the local economy than other fish species. The local sportsmen enjoy the fact that none of the area game fish are disturbed by the event and many feel that by taking some carp that they may even be helping the local sport fishery.
Problems

There have been very few problems throughout the years although the organizers have found they had to modify the rules as State or Provincial regulations have changed. One of the first problems encountered was cheating. This was resolved by the introduction of a polygraph test. Another major problem which organizers faced each year was contestants challenging the weight of their entry. This was solved by the use of high quality digital scales which are very accurate and are certified annually. The organizers have found that, by keeping rules to a minimum, and by elucidating rules which are in effect, there have been few problems.

Future Events

Plans are currently being finalized for the 1999 event which will be held on June 12 and 13 at Ogdensburg, New York.

EDITOR'S NOTE: In spite of a late cancellation by Mr. Bouchard, he did manage to prepare this paper and information for the workshop presentation which was done on his behalf by Steven Kerr.
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Competitive Fishing Events for Muskellunge in Canada: Experiences, practices and perspective from Muskies Canada

Ian Smith
Muskies Canada
P.O. Box 814
Kitchener, Ontario
N2G 4C5

Muskies Canada has been organizing "outings" for muskellunge (Esox masquinongy) for 20 years. A number of things distinguish these derbies from other competitive fishing events. No cash prizes are offered, MCI events are "point of capture live release outings", and the winner is determined through the honour system. All fish are released at boat-side and a combination of length and girth is used to record the catch. At the conclusion of the outing, the winner, that is the angler releasing the largest muskellunge, receives a trophy. In a typical year, 6-7 outings take place ranging from the Montreal area to Georgian Bay or the French River system. Participation ranges from 25 to 150 anglers depending on the event. Event dates and waters are determined early in the season (e.g., January) with the events running from a traditional "opener" during the second weekend in June through fall outings on Georgian Bay during the third weekend of October. In addition to the members-only outings organized by Muskies Canada, our Montreal Chapter organizes a one-day public outing on the St. Lawrence River, and Muskies Inc. chapters often run members and public events in Canadian waters. In 1999 for the first time a major ($20,000) cash tournament will take place in Canada for muskellunge, while a variety of "small payout" events are operated by resorts and marinas.

Introduction

The pursuit of the muskellunge (Esox masquinongy) in Canada has a storied history and a promising future. In the 1950's and 1960's numerous world class muskellunge were captured in the St. Lawrence River. In the 1970's this phenomena occurred in the Dryden area of Northwestern Ontario. The practice of mounting trophy muskellunge on the wall took it's toll however and the numbers of large fish declined - along with this the level of angler participation also declined.

In recent years, the impacts of new management approaches, including reduced bag limits, larger minimum size limits and voluntary catch and release, have begun to result in a surging fishery for numbers of fish and for larger fish than ever. Today 40 and 50 pound muskellunge are being caught and released from a number of waterbodies in Canada, including the St. Lawrence and Ottawa Rivers, Georgian Bay, Lake of the Woods, Lac Seul, Eagle Lake, Wabigoon Lake, and Dinorwic Lake. Tremendous "numbers" fisheries have developed in Lake St. Clair and the Kawartha lakes regions, while quality (larger fish) fishing can be found in the Sudbury, Tweed and Montreal areas. Musky fishing in Canada is a growing industry, with angler participation increasing as evidenced by reports from major tackle companies that they "can't keep the shelves stocked" with musky tackle. Emerging management trends in Ontario are to enhance the natural diversity of available fisheries, to enhance the long-term survival of individual fish on record-class waters through progressive size limits (44", 48" or larger) and to ensure sustainability of populations through the protection of females to age seven" (Muskellunge Size Limit Regulation Committee 1999).

Along with the increased popularity of the muskellunge fishery has come an increased number of competitive fishing events. In the United States an increasing number (5-6 in 1999) of large events occur every year, with $30-40,000 in prizes, attracting 500 or more anglers. The more traditional "derby" however are those sponsored by chapters of
Competitive Fishing Events for Muskellunge in Canada

Muskies Inc. or by independent clubs, which are for members only.

In Canada, few public competitive fishing events take place, typically sponsored by resorts with 100 or so anglers participating. Muskies Canada organizes between 6 and 7 members-only derbies every year. The organization and operation of Muskies Canada outings are typical of most derbies aligned with Muskies Inc. or other clubs, and very similar to those of derbies sponsored by resorts.

Muskies Canada: The Organization

Muskies Canada Incorporated (MCI) started in 1978 as an off-shoot to Muskies Inc., a United States based conservation organization founded five years earlier. Approximately a dozen "founding members" gathered in Toronto and elected Bruce Park as the initial chairman (Nelson 1998). In the early years Chapters were formed in Toronto, Lindsay and Gananoque, though the latter two no longer exist. In later years chapters formed in Hamilton, Kitchener, Tweed (closed in 1998), Ottawa and Montreal.

Muskies Canada has (in 1999) roughly 300 members spread among 5 chapters. Each chapter has a chair and executive, who organize monthly meetings. Overseeing the overall organization is a National Executive. The National Executive publishes the monthly newsletter (Release Journal) and maintains the angler log information.

As a conservation organization, MCI devotes time and money to supporting research into habitat and the muskellunge fishery. Examples include the radio-tracking work undertaken by the Ottawa Chapter from 1994-97, and tagging work undertaken by the Tweed and Montreal chapters during the same time period. The Ottawa chapter has in recent years turned their attention to habitat restoration and "watch-dog" activities, particularly in the Rideau and Ottawa Rivers, to ensure no further habitat is lost. In the past two years MCI has contributed financially and with volunteer time to research programs on Georgian Bay and Lake Simcoe, and to stocking muskellunge into the Spanish River delta to restore a historic fishery there.

All chapters promote the catch-and-release ethic. One method has been the installation of launch ramp signs, which indicate the size limit for a particular waterbody and also provide pictures of northern pike (Esox lucius) and musky (if both inhabit the waterbody) so anglers will be able to release any musky which are sub-legal, without confusing them with pike which often have smaller size limits. Another method is through sporting and fishing shows, discussing with the angling public the means and benefits of catch and release. A third is through publications and lectures, in addition to educating anglers that MCI members may take fishing, as many are guides. Through a combination of larger size limits and voluntary catch and release, the muskellunge fishery in most of Canada has rebounded well from the numbers and size of fish caught in the 1970's and 1980's. This bodes well for the future.

The History of MCI Outings

Informal "outings" to area waterbodies in 1979, undoubtedly with a few dollars on the side for the largest or most fish, gradually transformed into the modern "derby" with rules, prizes, banquets and trophies. MCI runs an informal annual "contest" each year in which the largest fish by a male, female or child angler, and the angler with the most inches in a derby, receives a plaque.

One form of "outing" in the early days were the MCI - Muskyteer's contests. Held on Georgian Bay in October these events pitted select members of MCI against an all-star team of anglers who dubbed themselves the Muskyteer's. The Muskyteer's were a diverse group of self-dubbed "giant killers" who even published an annual newsletter (The Brodkingnagian Bugle) to keep track of their events. The first annual MCI-Muskyteer's event took place in 1983, with MCI (32 members) taking the crown in the inaugural event over the ten Muskyteers in attendance. Sadly this group of fine old musky-chasers is greatly diminished in size and is no longer able to get together to swap tails.

Another "outing" is the annual competition between Muskies Inc. and MCI. This total point of capture-live release event uses the honour system to determine the winning team, defined as the team with the most inches/angler at the end of the weekend. Since 1979 this event has alternated between Canadian and U.S. waters.

Both MCI and Muskies Inc. use the same basic structure for their present day derbies/outings. Two basic principles are followed - the honour system and point of capture-live release. All fish that are released are reported based on the honour system - the winning fish may or may not yield a cash or merchandise gift, but in most instances only a trophy.
is awarded the angler releasing the largest fish. What differentiates musky derbies from bass (*Micropterus* spp.) and walleye (*Stizostedion vitreum*) competitive fishing events is that all fish are released immediately after capture and measuring. No central weigh-in takes place so no fish are transported. In essence the MCI/Muskies Inc./resort derby produces no greater stress upon the fish/fishery than a typical day on the water. In a similar vein the Montreal chapter of MCI organizes a one-day public outing on the St. Lawrence River, which is a point of capture-live release event, with door prizes and a raffle table.

1998 MCI Outing Results

Outcomes from the derbies held by Muskies Canada in 1998 are summarized in Table 1. A total of six derbies included 590 angler days of effort, yielding 135 fish, the catch rate/day ranging from zero fish in one derby to a high of 0.7 fish/day. The largest fish entered was 51 inches in length, roughly 40 pounds (18.1 kg). In 1998 Muskies Canada hosted the "Can-Am", with members of Muskies Inc. travelling to the tri-lakes (Pigeon, Chemung and Buckhorn) in Ontario. The Can-Am is always the largest derby, having 95 anglers in 1994, 125 in 1996 and 145 in 1998. The Can-Am has been held on Pigeon Lake for the past 3 events as this venue features both trolling and casting opportunities, numbers of fish, and an abundance of on-water accommodations. In 1998 the largest fish was 49 inches (124.5 cm) and the participants averaged 0.25 fish/day - in other words the average boat caught only one legal fish the whole weekend.

The "user" conflicts of concern to competitive fishing event organizers are avoided to a large extent because of the choice of waterbodies and the seasons. The most popular events for our club take place in June, before the bass season opens, and after Labour day when fishing for most anglers is winding down. Many of the waterbodies fished for muskellunge are not traditionally fished in derbies or tournaments for other species. In addition to the waters listed in Table 1, recent MCI derbies have been held on Stoney, Balsam and Cameron Lakes in the Kawartha region, Kashagawigamog Lake in the Haliburton region, Moira Lake near Tweed, and the St. Lawrence River near Montreal and Gananoque.

Table 1: Summary statistics for Muskies Canada Inc. sponsored events during 1998.

<table>
<thead>
<tr>
<th>Waterbody</th>
<th>Month</th>
<th>Number of Anglers</th>
<th>Number of Fish Caught</th>
<th>Biggest Fish (in Inches)</th>
<th>Average Size ² (inches)</th>
<th>Catch-per Unit-Effort (CUE)¹</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kashabog</td>
<td>June</td>
<td>59</td>
<td>31</td>
<td>41.5</td>
<td>36</td>
<td>0.3</td>
</tr>
<tr>
<td>Ottawa River</td>
<td>August</td>
<td>35</td>
<td>33</td>
<td>51</td>
<td>39.5</td>
<td>0.7</td>
</tr>
<tr>
<td>Tri-lakes (Kawarthas)</td>
<td>September</td>
<td>142</td>
<td>66</td>
<td>49</td>
<td>39.5</td>
<td>0.25</td>
</tr>
<tr>
<td>Georgian Bay</td>
<td>Early October</td>
<td>25</td>
<td>0</td>
<td>--</td>
<td>--</td>
<td>0.0</td>
</tr>
<tr>
<td>Pickerel River</td>
<td>Late October</td>
<td>33</td>
<td>2</td>
<td>50</td>
<td>43.5</td>
<td>0.03</td>
</tr>
<tr>
<td>Ottawa River</td>
<td>Late October</td>
<td>36</td>
<td>3²</td>
<td>51</td>
<td>50.5</td>
<td>0.08</td>
</tr>
</tbody>
</table>

¹ The CUE is determined as the number of fish released per 8 hour day.
² Additional fish were caught but the sizes were not recorded.
The Rules for MCI Outings

As it has become a tradition not to have cash prizes at MCI events, rules become relatively unnecessary, but a few are maintained. A minimum tackle rule of 20 pound test ensures that fish are brought quickly to the boat without over-playing and minimizes the chances of a fish breaking off a lure. Regardless of the local size limits the outing size limit is 36 inches (91.4 cm). This is maintained because in many popular lakes now the limit is 40 inches (101.6 cm) or 44 inches (111.8 cm). The outing limit serves merely as a guide to reporting (honour system) the released fish, but can have an effect on the angler with the most inches contest. Because this contest is run over the year, on different waters, the 36 inch (91.4 cm) limit serves to "standardize" the competition, otherwise an angler catching 2 or more 43 inch (109.2 cm) fish on the Ottawa (sub-legal) might lose out to an angler catching two 35 inch (88.9 cm) fish from the Kawarthas.

All outings are run on the honour system, using length to determine the winning fish, with girth being used as a tie-breaker. At the discretion of organizer, merchandise prizes for the largest fish released and for the most inches/outing are sometimes provided, such prizes typically have a cash value of $50.

Ethics and Considerations of MCI Outings

The importance of ethics and angler behaviour cannot be overstated with respect to club activities, as clubs persist due to angler/member good will, friendship and mutual respect.

Hard and fast rules of angler participation in Muskies Canada outings include the "point of capture-live release" credo. Anglers are encouraged to perform water releases, where the fish is measured in the water, and removed only long enough for a photo. Photographers are encouraged to hold their breath while taking pictures so as to ensure the fish are not held out of water longer than is safe. Tackle restrictions (20lb test) are normally only an issue for new members to the practice of muskellunge angling. Dacron and braids/fused lines from 36 to 80 pound test are the traditional lines of choice for muskellunge. While these lines are chosen for their ability to withstand the abuse from fishing 1-4 ounce lures, they allow the angler to land a 20 to 30 pound fish in a few minutes, thereby minimizing stress.

While live bait is typically not used at MCI outings, this is not "banned" at the present time. Quick-strike rigs are the means of choice for such presentations, and these would allow the easy release of baited muskellunge. It is a matter of personal choice that has MCI members using lures only at the present time, though they often may use bait in the fall outside of derby events. The methods of choice for most derby participants are horizontal presentations for active fish, which limits conflicts with other anglers. Three key techniques are used. The first, offshore deep-water trolling for fish associated with baitfish schools, has no impact on traditional anglers unless shoals/humps are targeted. The second, weedline trolling, can result in conflict with anglers who use vertical presentations on key spots, and especially those who anchor and bait-fish such spots. The third, run and gun casting presentations, has limited impacts as anglers often pass up occupied spots for secondary spots, or move through a spot quickly searching for active fish.

Boating movements during an outing limit conflicts also. No mass starts are used, and the anglers most often stay at resorts on the lake where the outing is being held. A "trickle" start is more typical, with most boats leaving before the "official" start time, as it is accepted to fish outside the derby hours, but fish caught outside derby hours don't count. The absence of a central weigh-in limits boating congestion also. The boats used by muskie anglers range from small "car top" boats to larger "bass" boats and even 24 foot (7.3 m) cabin cruisers, depending on the waterbody, so it is not possible to comment on impacts from things such as excess speed.

The fact that the "winner" is determined with the fishes length, which can be done in the water without removing the fish, is an important consideration. The use of fish weight to determine the winner clearly requires more handling that length. Finally, that the honour system is used and that no cash is offered reduces the "pressure" on participants to be successful, likely resulting in less likelihood of their behaviour resulting in on-water conflicts with other users.
Some Thoughts on Muskellunge Tournaments

In the United States a number of cash tournaments take place every year. A sampling of two such events (Anon. 1998; PMTT 1999) highlights general rules of operation as follows:

- entry fees typically run from $150-350 U.S. for a two-person team;
- typical tournament sizes range up to 150 boats; first place ranged from $10,000 to $20,000, with prizes through to 10th place common, plus prizes for largest fish each day;
- prizes awarded on the points system, where a qualifying fish must be 34 inches (86.4 cm) or 36 inches (91.4 cm) total length, with a legal fish getting 30 points, and each 1/4 inch equates to an additional point, so that if the tournament legal limit was 34 inches, a 34.5 inch (87.6 cm) fish is worth 32 points;
- bonus points are often provided for a "good release" usually 10 points;
- sometimes a bad release results in the loss of 10 points;
- sometimes dead fish do not count at all, though normally they equate to an automatic 10 point demerit, and often the angler responsible for the dead fish cannot fish further that day;
- fish may be entered as measured by "on-the-water' judges, or as entered at shore-based stations; and
- live-wells in working order or "appropriate wells that will serve the same purpose" are required.

Some special note must be taken of peculiarities for muskellunge events. These peculiarities have kept the Ontario Federation of Anglers and Hunters and the Kawartha Fisheries Association from providing endorsement of muskellunge events in the absence of criteria specific to muskellunge. In many states and in Ontario, the legal limit is one fish per day, so if an angled fish dies, the angler must cease fishing deliberately for muskellunge. It is not possible for the angler in possession of the fish, even when alive in a live-well, to continue fishing deliberately for muskellunge for the same reason. Hence all events require that any legal fish be immediately entered and released.

Many boats do not have live-wells capable of handling large fish such as muskellunge and which can ensure a good release. Concern over the stress of transportation has led to the use of judge boats. Such boats, often with tall flags and/or radios and cell-phones, provide the independent verification essential to a well-run event. The use of judge boats on large waterbodies requires the use of cell-phones or VHF radio to contact the judges - the use of such communication devices is banned in most bass and walleye tournaments to ensure teams don't conspire for success. Good releases result in bonus points and continued fishing - dead muskellunge mean lost points and the end of fishing for the day.

In the spring of 1999, a "Professional Musky Tournament Trail" announced it's intention to have a number of tournaments with one on the Canadian side of Lake St. Clair. In Canada, several large derbies have been held either by independent clubs or by Muskies Inc., but for the first time a full-scale, "cash pay-out tournament" is being planned. Discussions with many MCI members, the Ontario Federation of Anglers and Hunters, the Ministry of Natural Resources, and with the tournament organizers, highlighted the absence of a set of "rules" applicable to musky events such as these.

The vocal opposition expressed to the author by some MCI members and musky anglers, and even fishery management staff, tends to focus on fish handling, weigh-ins and transportation, and the potential for mortality. Transporting fish many miles in rough water is likely to stress them, while the large expanse of water in many traditional musky waters will be difficult to manage using judge boats. Many specialized boats used for fishing on Lake St. Clair, Georgian Bay and the St. Lawrence river are not equipped with live-wells. The size limit for possession ranges from 40 through 44 inches (101.61-111.8 cm) in many Ontario waters where cash events might be held, much larger than the 34 or 36 inches (86.4-91.4 cm) typical in American waters. On average, the Canadian events may feature larger fish being transported than in the other events on the "Trail".

Discussions with many individuals led to the following suggestions for organizers considering cash events for muskellunge - these suggestions may be applicable to northern pike derbies with some amendments. Muskellunge events should strive to limit negative effects on the released fish by using the following guidelines:
Competitive Fishing Events for Muskellunge in Canada

- minimum tackle strength (20 pound test) and no live-bait rigs (quick-strike or other);
- mandatory equipment includes a cradle, gaff (where legal), bogo-grip or minimum 30” diameter net
- (gear capable of holding a muskellunge boat-side until judged), bolt cutters, jaw spreaders and long-nose pliers,
- utilize "point of capture-live release" preferably during all months, but definitely when the surface water temperatures exceed 75 °F (23.9 °C);
- use the point system with a minimum size of 36” (regardless of the legal limit for the water-body for retention of a fish) when measured by judges on the water, the legal limit when transported to shore-based measurements;
- dead fish do not count for any points, anglers who kill a musky being unable to continue in the event; and
- provide bonus points for good releases at the discretion of the judges.

Organizers should consider the following means to provide "point of capture-live release" events that will not be subject to cheating or collusion:

- run the event as a "draw/honour" event with anglers drawing their partner the evening before;
- record all releases by Polaroid camera using a (provided) measuring board or tape of distinctive character;
- record all releases on video using a supplied pre-recorded tape, which has the advantage of allowing a "weigh-in" on shore;
- limit the entry of fish to those measured by judge boats only (no transport); or
- provide each boat with a neutral observer, assigned at random each morning.

Organizers who wish to allow fish transporting to shore-based weigh-in stations may wish to utilize the following guidelines:

- provide a judge boat for every 2 square miles of lake/river and provide bonus points for fish entered at judge boats;
- require all boats to be in possession of a cell phone or VHF radio in order to summon judge boats;
- require all fish entered on shore to be transported in boats having a minimum 50 inch (127 cm) live-well capable of holding a 12 inch (30.5 cm) depth of water with recirculation and aeration to facilitate cooling in hot weather; and
- all boats to return the angled fish to the vicinity of the capture site before resuming fishing for the day.

Conclusions and Recommendations

At the present time the club derbies organized by Muskies Canada do not have any substantial impact on the local fishery as no fish are transported in livewells. Impacts on local users are limited by the absence of a mass start and a central weigh-in, and that most participants stay on the water at a local resort. Many waterbodies fished by MCI are often not traditionally used by walleye or bass derbies, so "access" to fishing spots is not impacted. The actual means of angling for muskellunge limits conflicts with cottage owners, residents and bass/walleye anglers, because of the reliance upon horizontal techniques, often through offshore trolling.

The muskellunge fishery in Canada is improving, due to voluntary catch-and-release practices, increased size limits, and improved water quality. The number of anglers fishing for muskellunge is also increasing. The pursuit of muskellunge is often viewed as an "elite" activity, and it is likely that cash derbies will be popular in the future. It is recommended that such derbies enforce gear and live-bait restrictions, including the mandatory use of a gaff, cradle or "release" net so that fish can be measured in the water. Such derbies should also utilize VHF/CBs and on-water officials to measure fish, so that the stress of point of catch- delayed release is minimized.

Acknowledgements

Information on the history of Muskies Canada and it's events was provided by Mr. John Power and Steven Nelson of MCI. Comments on potential concerns and solutions for tournaments were provided by Neil McIntnes, Darren Onyshko, Hedrik Wachelka, Mike Lazarus and Mike Butler of MCI, Larry Ramsell of Professional Musky Tournament Trail, and Al Rose of the Ontario Federation of Anglers and Hunters. Thanks also to the numerous individuals who provided comments and suggestions during discussions at the Competitive Fishing Workshop in Kemptville.
References


Personal Communication

Larry Ramsell, Muskies Inc., Illinois, U.S.A.
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In his introduction and charge to the group, Trevor Kellar presented you with several challenges.

The first was a charge to get to know one another better. After two days and a night of sharing ideas on tournament fishing, I think we can all agree that this goal has been met. The networking that has been going on both in and out of the sessions will certainly carry on into the future, and provide the basis for improvements in the sport and industry of tournament fishing.

Trevor also explained how the ministry organization delivers science, and especially how the Science Transfer Units act as the facilitators and deliverers of the science message to their clients. I certainly feel that this workshop is a shining example of this type of activity.

Finally, he spoke of the increase in understanding the effects of tournament fishing in its several formats - tournaments, derbies and contests on the communities - both aquatic and terrestrial - on which they are based. The presented papers looked at policy, the law, social concerns, biology, and ethics associated with fishing tournaments.

Evan Thomas started off by providing us with definitions of the three major types of competitive fishing events. Tournaments - short duration, live release; derbies - short duration, catch and kill; and contests, usually long duration, catch and kill. He summarized the efforts that MNR has made in the past 20 years to manage the emerging phenomenon of tournament fishing in Ontario. He chronicled the attempts to move from a basically hands-off, non-involvement policy in the mid-1980s to an attempt to come to grips with the issue in the mid-1990s - to no avail, since no corporate consensus could be reached at the time. So, the hands-off policy of the 1980s remains in effect. In spite of this, local arrangements have evolved between ministry staff and tournament organizers, generally to the mutual benefit of both parties. More on this later.

At the time of the most recent review, licencing was considered, and rejected as being not enough of a revenue generator. I would like to suggest that this was the wrong reason for rejecting licencing. Even a free licence would legitimize this increasingly popular activity while providing some modicum of control over ethics, safety and good sportsmanship.

As well, it would provide a vehicle to promote the sustainability message which still guides the ministry's fish management efforts. The lure of non-tax revenues continues to attract those who are looking for ways to bolster shrinking budgets, but I think it is more important to look at the spin-off benefits which might accrue if MNR takes a more active role in competitive fishing events - increased outdoor card sales, increased profile for MNR activities, greater credibility with traditional clients, outreach and partnership opportunities, the list goes on. It is clear from the feedback at this conference, and from the local arrangements which have evolved over time, that it is time to re-visit the permitting issue.

Steve Kerr then presented a review of the competitive fishing scene in Ontario. It quickly became clear that MNR has a less than complete idea of how big this phenomenon really is in the province. What is clear however is that over 80% of all competitive fishing activity takes place in the southern part of the province, and that "professional" events make up about half of the events he examined. While these larger events garner much of the public interest and press coverage, there are probably literally hundreds of cottage associations, chambers of commerce, service clubs and other local organizations which sponsor small events across the province, likely exceeding by far those documented by Steve. This
should suggest to MNR that some sort of documentation and tracking of these competitive fishing events is long overdue. He also neatly summarized some of the rules which have evolved for various competitive fishing events. Catch and release practices are now widespread, especially in the professional events, though some smaller derbies and contests allow, and in many cases encourage, catch and kill. The use of live wells is becoming more common and mandatory in most if not all of the professional events. Boat manufacturers and the larger tournament organizations continue to work to improve live well design. Other rules around the use of artificial lures, rules against culling and penalties for dead or sick fish are also evolving.

Rick Morgan of the Ontario Federation of Anglers and Hunters made the excellent point that while the number of events is fairly large, their impact may be a factor of the number of participants than the number of tournaments. Popular bodies of water such as the Bay of Quinte or Rice Lake may see several events on one weekend, with thousands of participants. Rick also made the point that competitive fishing events are not the only angling mortality factor, and that tourist outfitters and other recreational anglers generally have a larger impact, a point strongly borne out by Alastair Mather’s analysis of the Bay of Quinte fishery.

Ruth Grant spoke of the social, economic and biological effects of competitive fishing events, highlighting some of the conflicts which have been documented in the published literature. While the same people may engage in "contemplative" fishing, competitive fishing is different. The lure of cash, a trophy or simply recognition changes the fishing experience. For many communities, competitive fishing is big business. The downside is that it brings with it a concentration of boats and people which some areas and communities are ill-equipped to handle. No matter how sportsmanlike the conduct of the participants, fifty or a hundred bassboats firing up in a quiet little backwater at 5 or 6 in the morning is bound to wake up a few folks. Poorly marketed events can leave a bad taste, and give the entire industry a bad name. There is a major role to be played by sanctioning organizations to help competitive fishing organizers lay the groundwork for a well-run, "clean" event - starting with pre-marketing the event, through minimizing conflict with traditional users, to intelligent handling, processing and display of captured fish. To tournament organizers who think of bringing the U.S. experience north, I can only say that we're not Americans, and there is a difference.

The social context of big tournament states like Oklahoma or Arkansas may not translate well to Chaffey's Locks or Gravenhurst Bay.

Ruth also touched on the sensitivities around the big business of competitive fishing making money from a public resource. There is no question that this is indeed the case, but so do outfitters, restaurants, tackle manufacturers, grocery, beer and liquor stores - in short any business which makes it living from anglers, whether recreational or competitive. Fishing is an engine of tourist economics, and needs to be put in the proper context. Again, clever marketing strategies can often help to allay some of this criticism. MNR needs to play a more active role in articulating its position with respect to sport fishing in general, and competitive fishing events as a legitimate part of this industry. Taking a hands-off policy will only lead to conflict and ambivalence. However, in order for MNR to be comfortable under its sustainability mandate, more needs to be done to ensure that competitive fishing events are run according to an accepted set of protocols which can be sanctioned, not just by B.A.S.S. or OFAH, but also by the ministry. MNR needs the revenue from fishing licence sales. Permitting competitive fishing events will not be a revenue generator in and of itself. However, if it leads to an increase in interest in sport fishing, with a subsequent increase in licence sales, MNR had better be there to reap the benefits.

Ruth wrapped up by mentioning some of the biological concerns associated with handling mortality, fish released far away from capture sites, adverse temperature conditions and other factors which might affect the health of fish handled in tournaments.

Mark Ridgway and Bruce Tufts then presented evidence of what happens to the fish when they are caught, handled and released. Bruce, a physiologist from Queen's University, has studied the changes in blood chemistry and enzymes when fish are exercised, analogous to being played on the end of a line, and then handled by removal from the water, and placed into a live well before release back into the waterbody from which they came. His research showed that handling dramatically increases stress in fish. Recovery from exercise is generally complete after 4 hours, and few, if any fish die after exercise alone. However, when air exposure is added to exercise, stress indicators shoot up, strongly correlated with the length of the exposure. As well, mortality, absent after straight exercise, becomes an important factor. The take home message here is that
air exposure should be minimized. Bruce also talked about live wells and the efforts to minimize post handling stress and assist recovery. His research has shown that some live well additives on the market may have limited value, and that anesthetics and pure oxygen injection may in fact have the opposite effect of that desired. The increased demand for oxygen and excretion of ammonia commonly seen from fish in live wells are in fact the animal's effort to return to some degree of normalcy, and to dissipate waste products from exercise. Dampening these responses can extend the period the fish are stressed. More research is clearly needed in live well design, additives and handling practices. Mark Ridgway then took us to Big Rideau Lake, and his largemouth bass radio telemetry study. The important points to come out of his study:

- largemouth bass mortality from angling is significantly lower today than it was 20 years ago - possibly due to the adoption of catch/release ethics;
- largemouth bass in tournaments on Big Rideau are 6 - 13 years old and from 36 - 46 cm long;
- fish released within 8 km of their capture site tend to return to their home ranges, usually within 3 - 4 weeks;
- fish released farther than 81 km away from their capture site, will likely take up residence in the area of release;
- released fish seem to take about a week to recover from their handling; and
- largemouth bass and smallmouth bass are different. Tournament organizers need to take this into account when planning catch and release strategies.

Clearly, there is merit to taking fish back to their approximate capture site to be released, and the use of a live release boat such as that promoted by Shimano could well prove to be of benefit.

John Chevalier, the manager of MNR's enforcement program for the province reinforced the ambivalence of the province to the special needs of tournaments. Efforts such as the live release boat are, under current regulations, technically illegal (more than 2 limits being in the temporary possession of the boat operators while transporting them back to the capture sites). It does not appear that the province is yet ready to work with tournament organizations to meet the challenges of these events in a positive, "let's make it happen" type of way. A sanctioned code of practice, developed in cooperation with the compliance people at MNR might go a long way to solving some of these issues.

Wil Wegman, representing B.A.S.S. gave us an enthusiastic picture of how one of the major organizations operates. It is clear from his presentation that tournament fishing is big business, especially in the U.S., but increasingly in other areas around the world. This particular organization has developed a strict code of conduct for its participants, which could serve (and has) as a model for other organizations and the regulatory agencies. I'm still not sure if I can envision the SkyDome in Toronto as a venue for a weigh-in for a pro-bass tournament, but who knows? While B.A.S.S. promotes conservation, education and seminar programs and the like, this aspect of the professional tours tends to get lost in hoopla of the big events. Even B.A.S.S. needs to get out and market this message more effectively. Their business's running events, and image is everything. If they were to promote the conservation/sustainability image, it might be easier to build bridges with MNR.

Al Rose presented the OFAH's position on sanctioning tournaments. The Federation is and should be a major player in the competitive fishing game. They could have a role to play as a broker or leader in a province-wide effort, with MNR, B.A.S.S. and the other major players to legitimize competitive fishing events by developing an acceptable code of practice and permitting system. Such a system would put all parties on notice about the "right" way to run a tournament, as well as providing the regulatory agency with a way of tracking this important activity. This could be a partnership with real benefit for all concerned.

Barry Corbett, Alastair Mathers, Al Murray and Lloyd Mohr all presented examples of major competitive fishing events on the Great Lakes and on Lake of the Woods. Two messages emerged. The first is that local arrangements do work, and can provide valuable data for the management of the fishery, never mind the partnerships it fosters around the local communities, values which are extremely hard to quantify, but which bear fruit in many ways. The second message is that fish communities are dynamic entities, especially on the Great Lakes, where community structure continues to evolve dramatically since the collapse of the top predator stocks in the 40s and 50s, the stocking of millions of salmonids, and the invasions of exotics from across the ocean in the 80s and 90s. Neither Lake Erie, Lake Huron, Lake Ontario nor the Bay of Quinte have been immune to these changes. Tournament organizers need to be
aware of these huge shifts in abundance of the prime prey species when they plan their events. For instance, the massive walleye fishery in the Bay of Quinte in the 80s and early 90s is presently but a shadow of those booming years. The average size, maximum size and biomass of chinook salmon harvested in Lake Huron has declined almost by half. Climate change, habitat alteration and the invasion of exotics all contribute to irreversible changes in the lakes' ecosystems.

Dave Bell then told us about one area's attempts to get a handle on tournaments, and the efforts to set up a protocol to minimize conflicts and address other biological issues (loons, pre-season fishing). The experience of using the Kawartha Fisheries Association as the honest broker in these discussion could serve as the model for others to follow in an atmosphere where distrust and vested interests are a reality.

Ian Smith (Muskies Canada) and Steve Kerr (speaking on behalf of St. Lawrence River carp bowhunters) further emphasized the idea that all the groups with national or regional representation have well defined codes of conduct, but that individual agendas vary - ranging from no-kill, on-site, in-water release, artificials only, heavy tackle to minimize playing time tournaments, to catch and kill, no bait restrictions, maximize playing time derbies and contests. The challenge will be to meet those agendas in a proactive way.

**In Summary**

- MNR does not have detailed documentation on the magnitude or diversity of competitive fishing events in Ontario;
- competitive fishing is here to stay;
- competitive fishing can have major economic spin-off benefits;
- impacts can be severe in the short term, but total effects generally pale beside the total recreational angling effects on fish populations;
- various interests have different agendas, though there are obvious commonalities, and areas of agreement which can be used to build further consensus;
- there is a need and demand for some sort of regulation or permitting, if only to legitimize the activity;
- any such process needs to be open, transparent, and involve the major players;
- event organizers need to be aware of the long term dynamics of fish stocks in the target areas for tournaments;
- there is a serious need for organizers to gain legitimacy with the local communities in which they plan to operate; and
- conflict resolution mechanisms need to be developed to deal with non-compliance or non-participation.
Competitive Fishing Events in Ontario
-- Workshop Participants --

(A = Attendee; S = Speaker; M = Moderator)

Steve Aubrey (A)
Ontario Ministry of Natural Resources
Kemptville District
Postal Bag 2002, Concession Road
Kemptville, Ontario.
KOG 1J0

Peter Aunger (A)
Ontario Ministry of Natural Resources
Kemptville District
Postal Bag 2002, Concession Road
Kemptville, Ontario.
KOG 1J0

Debbie Baker
South Nation Conservation
P.O. Box 69
Berwick, Ontario.
K0C 1G0

Helen Ball (A)
Ontario Ministry of Natural Resources
Peterborough District
300 Water Street, P.O. Box 7000
Peterborough, Ontario.
K9J 8M5

Dave Bell (S)
Ontario Ministry of Natural Resources
Southcentral Region
300 Water Street, P.O. Box 7000
Peterborough, Ontario.
K9J 8M5

Anne Bendig (A)
Ontario Ministry of Natural Resources
Kemptville District
Postal Bag 2002, Concession Road
Kemptville, Ontario.
KOG 1J0

Sean Bond (A)
Unaffiliated angler
Brockville, Ontario.

Brian Boyd (A)
P.O. Box 101
Finch, Ontario.
K0C 1K0

John Chevalier (S)
Ontario Ministry of Natural Resources
Provincial Enforcement Section
300 Water Street, P.O. Box 7000
Peterborough, Ontario.
K9J 8M5

Ross Cholmondeley (A)
Ontario Ministry of Natural Resources
Peterborough District
Postal Bag 7200
Kingston, Ontario.
K9J 5S8

Marc Cloutier (A)
Tournament Organizer (WFG Promotions)
343 Angela Crescent,
Cornwall, Ontario.
K9H 7A1

Barry Corbett (S)
Ontario Ministry of Natural Resources
Kenora District
808 Robertson Street
Kenora, Ontario.
P9N 3X9

David Critchlow (A)
Ontario Ministry of Natural Resources
Kemptville District
Postal Bag 2002, Concession Road
Kemptville, Ontario.
K0G 1J0

Wendall Crosbie (A)
Lanark & District Fish and Game Association
R.R. # 1
Balderson, Ontario.
K0G 1A0
Art Cunningham (A)  
Kingston Bass Anglers  
7-311 Yorke Street  
Kingston, Ontario.  
K7M 1G2

Jim Flinn (A)  
Unaffiliated angler  
P.O. Box 1758  
Kemptville, Ontario.  
KOG 1 J0

Christie Curley (A)  
Ontario Ministry of Natural Resources  
Kemptville District  
Postal Bag 2002, Concession Road  
Kemptville, Ontario.  
KOG 1 J0

Karen Fraser (A)  
Environmental Consultant  
R.R.#4  
Brockville, Ontario.  
K6V 1 P0

Don Currie (A)  
Charleston Lake Association  
Athens, Ontario.  
K0E 1B0

Tony Gascon (A)  
Bass Anglers of Ottawa  
General Delivery  
Clayton, Ontario.  
K0A 1P0

Bob Dale  
Grenville-Carleton Sportsmens Club  
P.O. Box 189  
North Gower, Ontario  
K0A 2T0

Gary Gaussiran (A)  
Mercury Pro Bass  
P.O. Box 93  
Lachute, Quebec.  
J8H 3X2

Mark Darroch (A)  
Brockville & District Sportsmens Club  
Algonquin, Ontario  
K0E 1B0

Ruth Grant (S)  
R.E. Grant and Associates  
R.R.#3  
Brockville, Ontario.  
K6V 5T3

Blair Dawson (A)  
Ontario Out of Doors Magazine  
183 Kennedy Road  
West Aurora, Ontario.  
04J 2L8

Mike Hewitt  
Big Rideau Lake Association  
P.O. Box 93  
Portland, Ontario.  
K0G 1V0

Dale Dewey (A)  
Lake Ontario Management Unit  
Ontario Ministry of Natural Resources  
R.R.#4  
Picton, Ontario.  
K0K 2T0

Mark Hopson (A)  
Environmental Writer 50  
Rosehill Avenue, Apt. 302  
Toronto, Ontario.  
M4K 1G6

Peter Dyment (A)  
Undergraduate Student  
Department of Biology  
Queen's University  
Kingston, Ontario.  
K7L 3N6

Larry Hodgins (A)  
Renegade Bass  
R.R.#4  
Kemptville, Ontario.  
K0G 1J0

Mark Ferguson (A)  
Ontario Ministry of Natural Resources  
Peterborough District  
Postal Bag 7200  
Kingston, Ontario.  
K9J 5S8

Don Hughes (A)  
Haliburton-Hastings Fisheries Assessment  
Ontario Ministry of Natural Resources  
P.O. Box 500  
Bancroft, Ontario.  
K0L 1C0
**Competitive Fishing Events in Ontario - Workshop Participants**

<table>
<thead>
<tr>
<th>Name</th>
<th>Address</th>
</tr>
</thead>
<tbody>
<tr>
<td>Trevor Kellar (S)</td>
<td>Southcentral Sciences Section, Ontario Ministry of Natural Resources 659 Exeter Road, London, Ontario, N6E 1L3</td>
</tr>
<tr>
<td>Steven Kerr (S, M)</td>
<td>Southcentral Sciences Section, Ontario Ministry of Natural Resources Postal Bag 2002, Concession Road, Kemptville, Ontario, K0G 1J0</td>
</tr>
<tr>
<td>Frank Kirkpatrick (A)</td>
<td>R.R. #1, Battersea, Ontario, K0H 1H0</td>
</tr>
<tr>
<td>Richard L'Abbe (A)</td>
<td>Tournament Organizer, 1480 Concession XVII, Casselman, Ontario, K0A 1M0</td>
</tr>
<tr>
<td>Steve Lawrence (A)</td>
<td>Ontario Ministry of Natural Resources, Bancroft District, P.O. Box 500, Bancroft, Ontario, K0L 1C0</td>
</tr>
<tr>
<td>Tom Lawrence (A)</td>
<td>Lake Ontario Management Unit, Ontario Ministry of Natural Resources, R.R. #4, Picton, Ontario, K0K 2T0</td>
</tr>
<tr>
<td>Martin Leduc (A)</td>
<td>Tournament Organizer, Plantagenet, Ontario, K0B 1L0</td>
</tr>
<tr>
<td>Peter Lindsay (A)</td>
<td>Kawartha Fisheries Association, P.O. Box 125, Lindsay, Ontario, K9V 4R8</td>
</tr>
<tr>
<td>Michael Lynch-Staunton (A)</td>
<td>61 Morton Drive, Kanata, Ontario, K2L 1W9</td>
</tr>
<tr>
<td>Alastair Mathers (S)</td>
<td>Lake Ontario Management Unit, Ontario Ministry of Natural Resources, R.R. #4, Picton, Ontario, K0K 2T0</td>
</tr>
<tr>
<td>Jane McCann (A)</td>
<td>Lanark &amp; District Fish and Game Association, R.R. #7, Perth, Ontario, K7H 3C9</td>
</tr>
<tr>
<td>Howard McDonald (A)</td>
<td>39 Sequinbourg Street, Casselman, Ontario, K0A IM0</td>
</tr>
<tr>
<td>Steve McGovern (A)</td>
<td>Boreal Sciences Section, Ontario Ministry of Natural Resources, Highway 101 East, South Porcupine, Ontario, P0N 1H0</td>
</tr>
<tr>
<td>Andy McKee (A)</td>
<td>Ontario Ministry of Natural Resources, Midhurst District, 1450 7th Avenue East, Owen Sound, Ontario, N4K 2Z1</td>
</tr>
<tr>
<td>Jeff McNaughton (A)</td>
<td>Ontario Ministry of Natural Resources, Kemptville District, Postal Bag 2002, Concession Road, Kemptville, Ontario, K0G 1J0</td>
</tr>
<tr>
<td>Lloyd Mohr (S)</td>
<td>Lake Huron Management Unit, Ontario Ministry of Natural Resources, 1450 7th Avenue East, Owen Sound, Ontario, N4K 2Z1</td>
</tr>
<tr>
<td>John Moore (A)</td>
<td>Bass Anglers of Ottawa, Ottawa, Ontario.</td>
</tr>
</tbody>
</table>
Competitive Fishing Events in Ontario - Workshop Participants

Rick Morgan (A)
Ontario Federation of Anglers and Hunters
P.O. Box 2800
Peterborough, Ontario.
K9J 8L5

Henk Rietveld (S)
165 Fowler Road
R.R.# 1
Huntsville, Ontario.
PH2 2J2

Al Murray (S)
Lake Erie Management Unit
Ontario Ministry of Natural Resources
659 Exeter Road
London, Ontario.
N6E 1L3

Jeff Roddick (A)
Unaffiliated angler
RR#4
Brockville, Ontario.
K6V 5T4

Paul Norris (A)
Ontario Ministry of Natural Resources
300 Water Street, P.O. Box 7000
Peterborough, Ontario.
K9J 8M5

Al Rose (S)
Ontario Federation of Anglers and Hunters
P.O. Box 2800
Peterborough, Ontario.
K9J 8L5

Ed Puddephatt (A)
Ottawa Valley South Bassmasters
P.O. Box 645
Winchester, Ontario.
K0C 2K0

Daryl Seip (A)
Ontario Ministry of Natural Resources
Kemptville District
Postal Bag 2002, Concession Road
Kemptville, Ontario.
K0G 1J0

Kathy Rankine (A)
Big Rideau Lake Association
P.O. Box 93
Portland, Ontario.
K0G 1V0

Ed Shaw (A)
59 Garden Street
Gananoque, Ontario.
K9G 1H6

Jorgen Rasmussen (A)
Muskies Canada Inc.
P.O. Box 526
Metcalfe, Ontario.
K0A 2P0

Garry Smith (A)
Kawartha Lakes Fisheries Assessment Unit
Ontario Ministry of Natural Resources
322 Kent Street West
Lindsay, Ontario.
K9V 4T7

Mike Rawson (A)
Kawartha Lakes Fisheries Assessment Unit
Ontario Ministry of Natural Resources
322 Kent Street West
Lindsay, Ontario.
K9V 4T7

Ian Smith (S)
Muskies Canada Inc.
4346 Elm Crescent
Burlington, Ontario.
L7L 1J3

Mark Ridgway (S)
Aquatic Ecosystems Science Section
Ontario Ministry of Natural Resources
300 Water Street, P.O. Box 7000
Peterborough, Ontario.
K9J 8M5

Bob Snead (A)
Big Rideau Lake Association
P.O. Box 93
Portland, Ontario.
K0G 1V0

Roy Steele (A)
South Nation Conservation
P.O. Box 69
Berwick, Ontario.
K0C 1G0
Vicki Stevenson (A)
Big Rideau Lake Association
P.O. Box 93
Portland, Ontario.
K0G 1V0

Mark Stirling (A)
Lake Simcoe Fisheries Assessment Unit
Ontario Ministry of Natural Resources
Sutton West, Ontario
L0E 1R0

Paul Synkowicz (A)
Backwater Bass Association
24 McLachlin Street
Arnprior, Ontario.
K7S 2Y8

Stephen Taylor (A)
Ontario Ministry of Natural Resources
Parry Sound District
R.R.#2
Bracebridge, Ontario.
PIL 1W9

Evan Thomas (S)
Fish and Wildlife Branch
Ontario Ministry of Natural Resources
300 Water Street, P.O. Box 7000
Peterborough, Ontario.
K9J 8M5

Bruce Tufts (S)
Department of Biology
Queen's University
Kingston, Ontario.
K7L 3N6

Brent Valere (A)
Tournament Angler
Burlington, Ontario.

Hans von Rosen (A)
VR&M Enviro-Tech
R.R.#1
Lanark, Ontario.
K0G 1K0

Wil Wegman (S)
Ontario B.A.S.S. Federation
Aurora, Ontario.
L4G 3G8

Jeff Whimperis (A)
Unaffiliated Angler
Portland, Ontario.
K0V 1G0

Michael Yee (A)
Mississippi Valley Conservation Authority
P.O. Box 268
Lanark, Ontario.
K0G 1K0

Larry York (A)
4418 York Road
R.R.#1
Battersea, Ontario.
K0H 1H0

Bert Van Wout (A)
Ontario Ministry of Natural Resources
Kemptville District
Postal Bag 2002, Concession Road
Kemptville, Ontario.
K0G 1J0