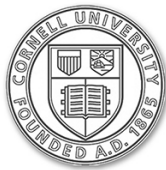




## Lake Ontario Resident Anglers: Motivations, Constraints, and Facilitators

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# Lake Ontario Resident Anglers: Motivations, Constraints, and Facilitators

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## Introduction

Coastal businesses in the Lake Ontario region (i.e., Jefferson, Oswego, Cayuga, Wayne, Monroe, Orleans, and Niagara counties) are greatly dependent on anglers for income. Past promotional efforts in the Lake Ontario region have primarily focused on non-resident anglers (i.e., anglers from outside New York State) interested in fishing for trout and salmon. This study is focused on New York's Lake Ontario resident anglers -- a large and fairly stable angler group whose travel within the Lake Ontario region is less affected by high fuel costs and the state of the economy than non-resident anglers. The purpose of this study is to understand the motivations, constraints, and facilitators specific to resident fishing efforts in order to inform future fisheries management, and sportfishing promotion and marketing efforts in the Lake Ontario region.

Three types of factors are considered in this study: motivations, constraints, and facilitators. Motivations are the "forces that drive people to achieve particular [recreational] goals" (Decker, Brown, & Siemer, 2001, p.47). For example, Siemer, Brown, and Decker (1989) identified four main motivations for salmon fishing: affiliation (i.e., spending time with others), relaxation/escape, achievement, and nature appreciation. Kuehn, Dawson, and Hoffman (2006) identified additional motivations such as enjoyment and nurture (i.e., the desire to pass on fishing knowledge, skills, and traditions to family and friends). Constraints are factors that limit or prevent participation in leisure activities (Crawford & Godbey, 1987; Henderson, Stalnaker, & Taylor, 1988). In contrast to constraints is the concept of "facilitators" -- factors that enable or promote participation in leisure activities (Raymore, 2002). Elements such as access to fishing locations, time available for fishing, and costs related to fishing can be considered as both facilitators and constraints, depending on individual circumstances. For example, an individual who lives next to a fishing access site may have greater opportunity to fish than someone who lives 20 miles away from the fishing access. For the angler living near the access, access would be viewed as a facilitator; access might be viewed as a constraint for the person living farther away. This study examines the fishing motivations, constraints, and facilitators for NY's Lake Ontario region resident anglers, focusing on the three largest subgroups: smallmouth bass, largemouth bass, and "no preference" anglers (i.e., anglers who prefer to catch whatever is biting rather than a particular species of fish).

## Methods

This study uses a survey of anglers residing within the seven Lake Ontario counties in New York State to identify the factors influencing fishing participation and to estimate the total fishing-related expenditures of Lake Ontario resident anglers. A random sample of 7,000 property owners (1,000 per county) was compiled from the online property tax records for each Lake Ontario county. The survey was conducted in fall, 2009, with four mailings; respondents were also given the choice of responding via an identical online questionnaire (Dillman, 2007).

Survey questions included: fishing characteristics (i.e., number of trips per year, types of equipment used, location for fishing, species preference); demographics (i.e., gender, age, income level, education level, location of residence); direct expenditures related to fishing in 2009; household composition and interest of household members in fishing; and motivations, constraints, and facilitators. A qualifying question of “Have you or another member of your household participated in fishing at least once between 2005 and 2009?” was used to identify households containing an angler. An adult angler within the household was then asked to complete the full questionnaire. Households without an adult angler were asked to return the questionnaire, with only questions pertaining to household members completed. A species preference question (i.e., “what species do you most prefer to catch?”) was used to subdivide respondents into angler groups (i.e., smallmouth bass, largemouth bass, Coho and Chinook salmon, rainbow trout/steelhead, lake and brown trout, perch, walleye, no species preference, and other; Wilde and Ditton, 1994). Participation was identified by asking respondents to indicate the number of fishing trips (for all fish species combined) taken each year from 2005 to 2009; the average annual number of trips over this five-year period was then calculated for each respondent.

Survey statements related to motivations, constraints, and facilitators were based on previous sportfishing research studies. For the motivation-related questions, a five-point agreement scale (i.e., -2 = strongly disagree, -1 = disagree, 0 = neutral, 1 = agree, 2 = strongly agree) was used to identify if each of the motivation statements was a reason why the respondent goes fishing. For constraint/facilitator statements, respondents were asked if each of the statements limits or enables their participation in fishing. The five-point scale used was: -2 = greatly limits participation, -1 = limits participation, 0 = neither, 1 = enables participation, 2 = greatly enables participation.

Input on the sportfishing motivations, constraints, and facilitators included on the questionnaire was obtained through a discussion session with the Lake Ontario Fisheries Coalition (an organization created to represent fisheries interests with decision-makers); the questionnaire was then distributed for review to the Lake Ontario Sportfishing Promotion Council, Lake Ontario Fisheries Coalition (which included New York State Department of Environmental Conservation staff), Eastern Lake Ontario Salmon and Trout Association, and New York Sea Grant. The questionnaire was revised and the full survey was implemented. After the survey completion deadline, a short, one-page survey (comprised of 11 questions related to demographics and fishing participation that were included on the full questionnaire) was mailed to all non-respondents to identify any statistical differences between respondents to the full survey and respondents to the one-page survey. The proportion of angler households existing in the full and short surveys was also compared to identify if the full sample is representative of the Lake Ontario region population.

The statistical analyses consisted of a confirmatory factor analysis (to confirm the grouping of survey questions into each motivation, constraint, and facilitator) and analysis of variance (to identify significant differences between angler groups). In addition, descriptive statistics for angler demographics, fishing participation, motivations, and constraints/facilitators were calculated for each county and the Lake Ontario region as a whole. Due to only a portion of Cayuga County being near Lake Ontario, only residents from the townships of Sterling, Victory, Ira, Conquest, and Cato were surveyed for this study; expenditure data presented for Cayuga County are for these townships only as well.

After results were obtained, a discussion session was held in May, 2011, with the Lake Ontario Fisheries Coalition to discuss the management implications of this study. The strategies for future fishing programs and promotions identified during this discussion are presented in the "Management implications" section of this report.

## Results and Discussion

**Overall Survey Response.** Of the 7,000 questionnaires mailed to Lake Ontario households, 1,303 were completed and returned by 723 anglers (681 of whom completed the full survey) and 504 non-anglers; 76 respondents did not wish to participate. Following the removal of undeliverable addresses and non-Lake-Ontario property owners, the qualified sample totaled 5,580 households, with a response rate of 23%. The number of responding anglers and non-anglers for each county is shown in Table 1. A one-page survey was sent to all property owners who did not respond to the original survey (4,277 owners); 608 individuals responded. The proportion of angler households in the original sample (55%) was compared to the proportion of angler households in the one-page survey sample (55%); no significant difference was found, indicating that the proportion of angler households responding to the full survey is representative of the proportion of angler households in the Lake Ontario region.

**Table 1.** Response by county.

County	Total number of respondents	Number of responding anglers	Number of responding non-anglers
Jefferson	217	121	89
Monroe	141	68	63
Cayuga	218	142	62
Niagara	159	79	67
Orleans	184	91	81
Oswego	180	107	61
Wayne	204	115	81
<b>Total</b>	<b>1,303</b>	<b>723</b>	<b>504</b>

**Demographics.** The average respondent was 57 years old at the time of the survey, and had more than 14 years of schooling and more than 22 hours of free time per week. The majority of respondents to the survey were males (91%). The average respondent had two or three children; the majority (71%) of the respondents with children fished with them at least once each year. Sixty-nine percent (69%) of respondents had an income between \$25,000 and \$100,000 per year, and 70% of respondents lived in a rural area, hamlet or village with less than 5,000 residents. In most counties, the proportion of respondents living in the county year-round ranged from 85% to 94%; Cayuga County had a lower percentage (71%) than other counties, indicating that a higher percentage of Cayuga County respondents were second home owners.

With regard to household members, most angler households had an average of 1.2 adult males, 1.1 adult females, 0.3 male children (i.e., under the age of 18), and 0.2 female children. Ninety-nine percent (99%) of angler households had an adult angler (1% had only children or teens who fished); 93% had at least one adult male angler and 46% at least one adult female angler.

**Fishing characteristics.** Of the responding anglers, 18% preferred to fish for smallmouth bass and 11% for largemouth bass; 37% did not have a preference for a fish species (i.e., "no preference" anglers; Table 2); similar percentages were identified for no-preference, smallmouth, and largemouth bass anglers in most counties (Table 3). Regardless of species preference, the average angler spent 46% of his/her time fishing for whatever was biting, 13% of his/her time fishing for smallmouth bass, 10% for panfish, and 9% fishing for largemouth bass; county breakdowns are shown in Table 4.

New York's average Lake Ontario resident angler spent 14.5 trips per year fishing at all locations (i.e., inside and outside the Lake Ontario region) between 2005 and 2009; of these trips, 9.7 per year (approximately 67% of all fishing trips) were within the Lake Ontario region. The average number of trips per year in the Lake Ontario region was highest for those who preferred to fish for walleye (14.5 trips/year; Table 5); these anglers comprise 9% of all responding resident anglers. No preference anglers (i.e., those comprising 37% of responding anglers) took an average of 7.3 trips per year within the Lake Ontario region.

**Table 2.** Fish species preference of respondents (n = 572).

Species	Number of Respondents	Percentage of Respondents
No Preference	210	37%
Smallmouth Bass	103	18%
Largemouth Bass	62	11%
Walleye	49	9%
Panfish	54	9%
Coho/Chinook	29	5%
Rainbow/Steelhead	31	5%
Other <sup>a</sup>	17	3%
Brown Trout	11	2%
Lake Trout	6	1%

<sup>a</sup> Includes bullhead, pike, brook trout.

**Table 3.** Percent of responding anglers by species preference group and county of residence.

Angler group	Percent of respondents by county of residence						
	Jefferson (n=102)	Monroe (n = 48)	Cayuga (n = 117)	Niagara (n = 62)	Orleans (n = 76)	Oswego (n = 84)	Wayne (n = 96)
No preference	35%	40%	34%	36%	46%	31%	37%
Smallmouth bass	15	19	23	18	13	18	20%
Largemouth bass	10	6	14	8	13	8	13%
Panfish	12	2	9	11	4	14	9%
Walleye	7	4	14	8	5	12	6%
Rainbow/Steelhead	5	8	3	8	7	5	5%
Coho/Chinook	7	6	2	6	7	7	4%
Lake trout	2	0	0	0	0	3	2%
Brown trout	5	11	0	2	0	0	2%
Other <sup>a</sup>	2%	4%	1%	3%	5%	2%	3%

<sup>a</sup> Includes bullhead, pike, brook trout.

**Table 4.** Percent of time spent fishing for each species by county of residence.

Species	Percent of time spent fishing						
	Jefferson (n = 93)	Monroe (n = 46)	Cayuga (n = 108)	Niagara (n = 50)	Orleans (n = 72)	Oswego (n = 79)	Wayne (n = 85)
No preference	49%	46%	42%	52%	53%	37%	47%
Smallmouth bass	12	10	17	8	9	15	14%
Largemouth bass	7	12	10	4	8	6	14%
Panfish	10	5	9	11	9	18	7%
Walleye	4	3	7	4	5	10	2%
Rainbow/Steelhead	3	6	3	7	5	4	4%
Coho/Chinook	4	7	3	8	5	5	4%
Lake trout	1	1	0	1	1	0	2%
Brown trout	5	6	1	4	1	2	2%
Other <sup>a</sup>	5%	4%	8%	1%	4%	3%	4%

<sup>a</sup> Includes bullhead, pike, brook trout.

**Table 5.** Average fishing participation within and outside the Lake Ontario region for respondents by angler group<sup>a</sup>. Participation is averaged for the years 2005 through 2009.

Angler group	Number of respondents (n)	Trips/year within the Lake Ontario Region	Trips/year for all fishing locations
Walleye	48	14.5	19.9
Panfish	54	12.0	15.8
Other species	17	11.6	17.5
Coho/Chinook	28	11.0	19.2
Largemouth bass	62	10.9	16.4
Smallmouth bass	101	9.5	14.3
Rainbow/Steelhead	31	7.5	14.8
No preference	207	7.3	10.3
All anglers	609	9.3	13.6

<sup>a</sup> Lake trout and brown trout anglers are not included due to low sample sizes.

In 2009, large percentages of respondents fished either on Lake Ontario (42%) or on a body of water outside the Lake Ontario region (47%); 24% of respondents fished on an embayment of Lake Ontario, while 37% fished on one of the lake's tributaries. Eight percent (8%) fished in the United States in a state other than New York, and 8% fished in another country.

Respondents used a wide variety of fishing equipment when fishing in the Lake Ontario region: 57% used spinning, 38% spin-casting, 33% bait-casting, and 12% fly fishing rods and reels; 5% used other types of equipment for fishing. In addition, 13% went ice fishing in 2009.

Respondents were asked whether they usually fished from a boat or from the shore in 2009, and what type of boat they used. Sixty percent (60%) of respondents fished from the shore, 61% used a gas-powered motorboat, 17% used a non-motorized boat, 14% fished on the ice, and 7% used a boat with an electric motor.

**Motivations.** The factors that motivate responding anglers to fish are shown in Tables 6 and 7. Negative values in this table indicate that the factor does not motivate the average angler to fish, while positive values indicate that the factor does motivate the average angler. Overall, the motivators identified as most important were enjoyment (i.e., the enjoyment associated with reeling in a fish), nature appreciation (i.e., spending time in nature), affiliation (i.e., spending time with family and friends while fishing), and personal achievement (i.e., fishing for the challenge and to improve skills). For many respondents, teaching others how to fish (i.e., nurture; Table 7), escaping from everyday work and pressure (i.e., escape), and their satisfaction with their typical fishing experience (i.e., satisfaction with catch) were moderately important motivators. These motivations indicate that anglers fish in order to spend time with friends and family in nature, and to enjoy the sport of fishing itself. Fishing for food was not a motivation for the average responding angler. Competition was also not a motivator; many anglers who participate in fishing derbies may do so in order to spend time with friends and family outdoors rather than to compete.

**Table 6.** Motivations of responding anglers.

Motivation	Statements used on questionnaire
Enjoyment	<ul style="list-style-type: none"> <li>• Because I enjoy the experience of fishing.</li> <li>• Because I enjoy the excitement of reeling in a fish.</li> <li>• Because I enjoy spending time in nature.</li> <li>• Because I appreciate the beauty of nature.</li> </ul>
Nature appreciation	<ul style="list-style-type: none"> <li>• To be surrounded by nature.</li> <li>• To relax.</li> <li>• Because I appreciate the beauty of nature.</li> </ul>
Affiliation	<ul style="list-style-type: none"> <li>• To spend time with family and/or friends.</li> <li>• To share the fishing experience with friends and/or relatives.</li> <li>• Because I expect to enjoy my time with friends and/or family.</li> </ul>
Personal achievement	<ul style="list-style-type: none"> <li>• For the challenge of catching fish.</li> <li>• To learn new fishing skills and techniques.</li> <li>• To try different fishing techniques, equipment, tackle, and/or bait.</li> </ul>
Nurture	<ul style="list-style-type: none"> <li>• To share my knowledge of fishing with friends and/or relatives.</li> <li>• To pass on my family fishing traditions to others.</li> <li>• Because I like to teach others (i.e., adults and/or children) how to fish.</li> <li>• Because passing my knowledge on to younger generations is important to me.</li> </ul>
Escape	<ul style="list-style-type: none"> <li>• For the solitude of fishing alone.</li> <li>• For peace and quiet.</li> <li>• To escape from daily obligations (work, errands, etc.).</li> </ul>
Satisfaction with catch	<ul style="list-style-type: none"> <li>• Because I am satisfied with the number of fish I normally catch.</li> <li>• Because I am satisfied with the quality of the fishing experience I normally have.</li> </ul>
Success at catching fish	<ul style="list-style-type: none"> <li>• To catch large fish, even if I only catch one.</li> <li>• To catch numerous fish, even if they are small.</li> <li>• Because I expect to catch fish.</li> <li>• To be successful at catching fish.</li> </ul>
Expectations of others	<ul style="list-style-type: none"> <li>• Because my kids, grandkids, other relatives, and/or friends ask me to go.</li> <li>• Because my relatives and friends expect me to go fishing.</li> </ul>
Food	<ul style="list-style-type: none"> <li>• To provide food for my family.</li> <li>• To catch fish for food.</li> </ul>
Competition	<ul style="list-style-type: none"> <li>• To compete in fishing events such as derbies, tournaments, and competitions.</li> <li>• For the achievement of participating in a fishing derby or tournament.</li> <li>• To compete with other anglers over who catches the biggest or the most fish.</li> </ul>



**Table 7.** Average motivations<sup>a</sup> by angler group.

<b>Motivation</b>	<b>Smallmouth bass (n = 103)</b>	<b>Largemouth bass (n = 60)</b>	<b>Walleye (n = 49)</b>	<b>Coho &amp; Chinook (n = 30)</b>	<b>Rainbow trout &amp; steelhead (n = 32)</b>	<b>Panfish (n = 54)</b>	<b>No preference (n = 205)</b>
Enjoyment <sup>b</sup>	1.3	1.5	1.4	1.6	1.5	1.4	1.4
Nature appreciation	1.2	1.5	1.4	1.3	1.5	1.3	1.3
Affiliation	1.2	1.3	1.2	1.3	1.4	1.4	1.3
Personal achievement	1.0	1.1	1.0	1.2	1.2	0.6	0.8
Nurture	0.7	0.7	0.7	0.8	0.9	0.8	0.5
Escape	0.5	0.7	0.7	0.7	0.8	0.6	0.6
Satisfaction with catch	0.3	0.7	0.4	1.0	0.7	0.5	0.5
Success at catching fish	0.4	0.5	0.5	0.6	0.5	0.2	0.2
Expectations of others <sup>b</sup>	0.3	0.4	0.3	0.3	0.3	0.6	0.4
Food	-0.7	-0.7	0.3	-0.5	-0.4	0.3	-0.5
Competition	-1.0	-0.8	-0.4	0.1	-0.8	-0.9	-1.0

<sup>a</sup> Motivations are based on the following scale: -2 = strongly disagree (with the item on the questionnaire being a motivator), -1 = disagree, 0 = neutral, 1 = agree, 2 = strongly agree.

<sup>b</sup> Factor could not be confirmed through factor analysis; results should be used cautiously.

***Constraints and Facilitators.*** Factors limiting and enabling fishing participation (i.e., constraints and facilitators) are shown in Tables 8 and 9. Negative values indicate that the factor is a constraint, near zero values that the factor is neutral (i.e., neither constrains nor facilitates), and positive values that the factor facilitates fishing participation. The most important constraints were bad weather, the economic costs associated with fishing (e.g., license fees, transportation costs), and the availability of free time to fish. Bad weather is likely an important constraint since a large percentage of anglers fish from a boat, and Lake Ontario is often inaccessible by boat when the weather is poor. Time includes time spent at work, on family obligations, and for maintaining a household, all of which limit the amount of free time available for fishing. Economic costs were identified as slight constraints for all anglers (except for walleye anglers who identified economic costs as an important constraint). Because the costs associated with fishing are perceived as slight constraints by most anglers, they are unlikely to greatly limit participation in fishing for the average responding angler.

The most important facilitators were good weather, past experience in fishing, and having the access and equipment needed to fish. The most important facilitator -- good weather -- likely makes it possible for anglers to access Lake Ontario by boat. Past experience with fishing gives anglers the skills and knowledge they need to fish, facilitating their participation. Access is needed for shoreline fishing as well as for launching boats. Other facilitators included level of commitment (i.e., an individual's perceptions of his/her dedication to fishing), level of interest (i.e., an individual's perceptions of his/her interest in fishing), and level of knowledge (i.e., the respondent's perceived level of fishing-related knowledge and skill); these facilitators were least important for the no preference group. Social support (i.e., having the support and companionship of friends, family, and other fishing partners) was a moderate facilitator for the average angler. Health and well-being had the lowest mean value of all facilitators, likely due to the fact that angler health varies by age and individual, creating more variation in this factor than in others. A final construct -- perceptions of [fisheries] management -- was close to neutral; it seems likely that perceptions of management neither constrain nor facilitate fishing involvement for the average respondent.

**Table 8.** Constraints and facilitators of responding anglers.

Type	Factor	Statements used on questionnaire
Constraints	Bad weather	<ul style="list-style-type: none"> <li>• Poor weather conditions.</li> </ul>
	Time	<ul style="list-style-type: none"> <li>• Family obligations (e.g., caring for children or other relatives).</li> <li>• Time spent maintaining my household (e.g., cleaning, cooking, shopping, repairs).</li> <li>• Time spent working in a paid job.</li> <li>• The amount of free time I have.</li> </ul>
	Perceptions of environment	<ul style="list-style-type: none"> <li>• My thoughts about contaminant levels in Lake Ontario fish.</li> <li>• My thoughts about Lake Ontario's water quality.</li> <li>• My thoughts about Lake Ontario's water levels.</li> <li>• My thoughts about the health of the Lake Ontario environment in general.</li> <li>• My thoughts about eating fish from Lake Ontario.</li> </ul>
	Economic costs	<ul style="list-style-type: none"> <li>• The cost of paying for a fishing license.</li> <li>• The cost of travelling to a fishing location (e.g., fuel costs).</li> <li>• The cost of purchasing bait and tackle.</li> <li>• The cost of purchasing fishing equipment (e.g., rods &amp; reels).</li> </ul>
Neutral	Perceptions of management <sup>c</sup>	<ul style="list-style-type: none"> <li>• Regulations concerning catch limits and size for fish caught on Lake Ontario, its embayments, and tributaries.</li> <li>• Levels of fish stocked in Lake Ontario.</li> <li>• Management of the Lake Ontario fishery in general.</li> </ul>
Facilitators	Good weather	<ul style="list-style-type: none"> <li>• Good weather conditions.</li> </ul>
	Past experience	<ul style="list-style-type: none"> <li>• Having fished or not fished as a child.</li> <li>• Having fished or not fished as a teenager.</li> </ul>
	Access and equipment	<ul style="list-style-type: none"> <li>• My ability to easily travel to fishing locations.</li> <li>• The availability of fishing equipment.</li> <li>• The proximity of my home to fishing locations.</li> </ul>
	Level of knowledge	<ul style="list-style-type: none"> <li>• My knowledge of fishing techniques.</li> <li>• My knowledge of boat access and/or shoreline fishing sites on Lake Ontario, its embayments, or tributaries.</li> <li>• My knowledge of the Lake Ontario fishery in general.</li> <li>• My knowledge of the catch rates of the fish species I prefer.</li> <li>• Handling fish and/or bait.</li> <li>• My fishing skills and abilities.</li> </ul>
	Social support	<ul style="list-style-type: none"> <li>• Being able to fish with someone who can teach me new fishing techniques.</li> <li>• Being encouraged to fish by friends and relatives throughout my life.</li> <li>• Having friends (who are the same age as me) support my involvement in fishing.</li> </ul>
	Level of interest	<ul style="list-style-type: none"> <li>• My level of interest in participating in fishing.</li> <li>• My level of interest in other recreational activities besides fishing.</li> <li>• My level of interest in learning more fishing techniques.</li> </ul>
	Level of commitment	<ul style="list-style-type: none"> <li>• My dedication to the sport of fishing.</li> <li>• My involvement in fishing organizations, events, and/or programs.</li> <li>• The focus of fishing in my life.</li> </ul>
	Health and well-being	<ul style="list-style-type: none"> <li>• My health.</li> <li>• My physical abilities.</li> <li>• My age-related abilities.</li> <li>• My thoughts about the safety of myself or my family while fishing.</li> </ul>

**Table 9.** Average constraints<sup>a</sup> and facilitators<sup>a</sup> by angler group.

Type	Factor	Smallmouth bass (n = 99)	Largemouth bass (n = 57)	Walleye (n = 47)	Coho & Chinook (n = 29)	Rainbow trout & steelhead (n = 32)	Panfish (n = 53)	No preference (n = 198)
<b>Constraints</b>	Bad weather	-0.8	-0.7	-0.6	-0.8	-0.3	-0.8	-0.7
	Time	-0.5	-0.6	-0.5	-0.7	-0.6	-0.6	-0.6
	Perceptions of environment	-0.2	-0.3	-0.5	-0.3	-0.4	-0.4	-0.4
	Economic cost	-0.1	-0.1	-0.6	-0.3	-0.4	-0.1	-0.2
<b>Neutral</b>	Perceptions of management	-0.1	0.2	-0.1	0.2	0.1	0.0	0.1
<b>Facilitators</b>	Good weather	1.0	0.9	1.0	0.9	0.7	0.8	0.8
	Past experience	0.9	0.8	0.9	1.2	1.0	1.0	0.9
	Access and equipment	0.6	0.7	0.4	0.8	0.5	0.5	0.5
	Level of knowledge	0.6	0.5	0.6	0.9	0.7	0.4	0.2
	Social support	0.6	0.6	0.6	0.9	0.7	0.6	0.5
	Level of interest	0.5	0.5	0.5	0.6	0.6	0.4	0.3
	Level of commitment	0.4	0.4	0.4	0.6	0.5	0.4	0.0
	Health and well-being	0.3	0.2	0.4	0.4	0.3	0.5	0.4

<sup>a</sup>Constraints and facilitators are based on the following scale: -2 = greatly limits fishing participation, -1 = limits fishing participation, 0 = neutral, 1 = enables fishing participation, 2 = greatly enables fishing participation.

***Differences between angler groups.*** In addition to determining the mean values of the motivations, constraints, and facilitators, statistical tests were run to identify differences in these factors between different responding angler groups. The significant differences revealed are as follows:

Motivators:

- Personal achievement (i.e., fishing for the challenge and to improve fishing skills) is more of a motivating factor for rainbow trout and steelhead anglers (possibly related to the experience of catching a hardfighting fish) than for panfish anglers.
- Fishing for food is a slight motivator for walleye and panfish anglers, but is not a motivator for other angler groups.
- Success at catching fish motivates Coho and Chinook anglers more than other angler groups.
- Satisfaction with the catch (i.e., being satisfied with the fish caught and the fishing experience itself) is a greater motivator for Coho and Chinook anglers than for smallmouth bass anglers.

Facilitators:

- Perceived level of knowledge about fishing was a greater facilitator for Coho/Chinook, rainbow trout/steelhead, walleye, and bass anglers than for no-preference anglers.
- Perceived level of commitment to fishing was less of a facilitator for no-preference anglers than for any other angler group.

Constraints:

- The economic cost associated with fishing was a greater constraint for walleye anglers than for bass, panfish, and no-preference anglers.
- Bad weather was a constraint for all responding angler groups, but affects rainbow trout and steelhead anglers less than smallmouth bass anglers, likely because trout and steelhead anglers are largely stream-dependent (poor weather likely affects those who fish from boats the most).

**Expenditures.** Of all responding anglers, 46% fished both inside and outside the Lake Ontario Region, and 39% fished in the Lake Ontario region only; 15% fished outside of the Lake Ontario region only. In 2009, the average respondent spent an estimated \$513 ( $\pm$  \$57) on rods and reels, bait and tackle, ice, fuel, and food and beverages within and outside the Lake Ontario region (Table 10; n = 478). All resident angler households within the Lake Ontario region spent (both inside and outside the region) an estimated total of \$151.3 million ( $\pm$  \$16.9 million) for rods and reels, bait and tackle, food and beverages for fishing trips, fuel for transportation to fishing sites, and ice and ice chests. The average respondent fishing *only* in the Lake Ontario counties spent an estimated \$494 ( $\pm$  \$93) in 2009 for rods and reels, bait and tackle, ice, fuel, and food and beverages (n = 181).

**Future interest in fishing.** The questionnaire included questions on the future interest of responding anglers and non-anglers in fishing. For non-angler households, 38% of respondents indicated that at least one member of their household was interested in fishing in the future; this percentage was higher (93%) for angler households, likely because most responding anglers plan to fish in the future.

For marketing purposes, it's important to identify the number of residents overall who do not fish currently but are interested in fishing in the future. For households without anglers, approximately 0.5 individuals per household on average were identified as having an interest in fishing in the future. In households with an angler, an average of 0.3 household members (who do not currently fish) had an interest in fishing (note: this number includes adults, teens, and children). When these numbers are extrapolated to the estimated 537,840 households in the Lake Ontario region (U.S. Census Bureau, 2011), it can be estimated that approximately 150,000 and 284,600 non-anglers in angler and non-angler households, respectively, may be interested in fishing in the future (a total of 434,600 individuals of all ages).

For angler households, slight differences between current fishing activity and interest in fishing in the future appeared. The number of males interested in fishing in the future was slightly lower than the number currently fishing. The opposite was found for adult females, and male and female children; the number of individuals in each of these groups that is interested in fishing in the future was slightly higher than the number currently fishing.

**Table 10.** Average fishing expenditures for responding anglers by county of residence, 2009.

Expenditure	Average fishing expenditures per respondent by county of residence (US dollars)							
	Jefferson (n = 84)	Monroe (n = 35)	Cayuga <sup>a</sup> (n = 103)	Niagara (n = 47)	Orleans (n = 72)	Oswego (n = 70)	Wayne (n = 77)	Lake Ontario Region (n = 478)
Rods and reels	\$118	\$121	\$114	\$96	\$92	\$111	\$65	\$102
Tackle and bait	\$116	\$141	\$171	\$94	\$92	\$138	\$66	\$119
Ice and ice chest	\$14	\$9	\$10	\$4	\$5	\$9	\$4	\$8
Fuel and transportation costs	\$187	\$268	\$289	\$288	\$266	\$218	\$147	\$234
Food and beverages for fishing trips	\$121	\$149	\$146	\$122	\$199	\$97	\$85	\$131
<b>Total<sup>b</sup></b>	<b>\$552</b>	<b>\$691</b>	<b>\$564</b>	<b>\$604</b>	<b>\$436</b>	<b>\$479</b>	<b>\$368</b>	<b>\$513</b>

<sup>a</sup>Cayuga County results are only for the townships of Sterling, Victory, Ira, Conquest, and Cato.

<sup>b</sup>The total presented includes only the items most frequently purchased in 2009: rods and reels, bait and tackle, ice and ice chests, fuel for transportation to fishing sites, and costs for food and beverages on fishing trips. Although respondents were asked to identify their expenditures for boats, vehicles used for fishing trips, second homes used for fishing, fishing clothes/waders, charter/guide services, and overnight lodging, a relatively low number of respondents paid for each of these items in 2009; these items were not included in the total expenditure calculation. Total expenditures for each county were calculated by averaging the total expenditures for each respondent rather than by summing the expenditures in each column (the sum of the expenditures listed in each column will not equal the “total” listed at the bottom of the column).

**Results for three largest angler groups.** In order to provide detailed information that can be used for future Lake Ontario sportfishing marketing efforts, results were compiled for the three largest resident angler groups: no preference, smallmouth bass, and largemouth bass anglers.

No preference anglers:

- This angler group comprises a large percentage (37%) of Lake Ontario resident anglers.
- The average no-preference angler takes 10 fishing trips per year, 7 of which are within the Lake Ontario region.
- Forty percent (40%) of these anglers fish on either Lake Ontario or its tributaries, from shore (76%), and with a spin-casting (53%) and/or spinning (48%) reel (Table 11).
- While most are male, 20% are female (above the statewide percentage of 14%; Connelly & Brown, 2009).
- Eighty percent (80%) have a household income of \$100,000 or less per year.
- The average respondent is primarily motivated to fish by enjoyment, nature appreciation, and affiliation (Table 7).
- Their primary constraints are bad weather and time (Table 9).

- Their main facilitators are good weather, past experience, access and equipment, and social support (Table 9).
- The average no-preference respondent spent \$319 ( $\pm$  \$67) in 2009 on rods and reels, bait and tackle, ice, fuel, and food and beverages purchased inside and outside the Lake Ontario region, accounting for an estimated total of \$34.5 million ( $\pm$  \$7.3 million) per year in expenditures for these items (within and outside the Lake Ontario region) for all NY Lake Ontario region resident households with no-preference anglers (n = 161).

#### Smallmouth bass anglers:

- This group comprised 18% of responding Lake Ontario resident anglers.
- The average responding smallmouth bass angler takes an average of 14 fishing trips/year, approximately 9 of which are in the Lake Ontario region.
- The majority of these respondents fish on Lake Ontario (52%) using a gas-powered motorboat (76%) and a spinning reel (59%).
- Most (94%) are male.
- Sixty-seven percent (67%) have a household income of \$100,000/year or less.
- The average respondent is primarily motivated to fish by enjoyment, nature appreciation, affiliation (i.e., spending time with others), personal achievement (i.e., success at catching fish and improving skills), and nurturing others into the sport.
- Their primary constraints are bad weather and time (i.e., family/work obligations).
- Their main facilitators are good weather, past experience, access and equipment, and social support.
- Respondents preferring to fish for smallmouth bass spent an average of \$514 ( $\pm$  \$134) in 2009 on rods and reels, bait and tackle, ice, fuel, and food and beverages purchased inside and outside the Lake Ontario region (n = 83), accounting for an estimated total of \$27.3 million ( $\pm$  \$7.1 million) per year in expenditures for these items (within and outside the Lake Ontario region) for all NY Lake Ontario region resident households with smallmouth bass anglers (n = 83).

#### Largemouth bass anglers:

- This angler group comprised 11% of responding Lake Ontario resident anglers.
- The average responding largemouth bass angler takes an average of 16 fishing trips per year, 11 of which are within the Lake Ontario region.
- Large percentages of these anglers fish on Lake Ontario (37%) and its tributaries (42%), either with a gas-powered motorboat (61%) or from shore (55%), and with a spinning reel (64%).
- Most (85%) are male.
- Sixty-eight percent (68%) have a household income of \$100,000 or less per year.
- The average respondent is primarily motivated to fish by enjoyment, nature appreciation, affiliation, and personal achievement; nurture, escape, and satisfaction with catch were moderate motivations.
- Their primary constraints are bad weather and time.
- Their main facilitators are good weather, past experience, access and equipment, and social support.
- Respondents preferring to fish for largemouth bass spent an average of \$609 ( $\pm$  \$190) in 2009 on rods and reels, bait and tackle, ice, fuel, and food and beverages purchased



inside and outside the Lake Ontario region (n = 45), accounting for an estimated total of \$19.4 million (+ \$6.1 million) per year in expenditures for these items (within and outside the Lake Ontario region) for all NY Lake Ontario region resident households with largemouth bass anglers (n = 45).

**Table 11.** Fishing characteristics and demographics for the three largest resident angler groups.

Characteristic/ Demographic	Angler group		
	No preference (n = 211)	Smallmouth bass (n = 106)	Largemouth bass (n = 63)
Fishing participation <sup>a</sup> (average number of trips/year)	All: 10.3 LO: 7.3	All: 14.3 LO: 9.5	All: 16.4 LO: 10.9
Where do you most often fish? <sup>b</sup>	LO: 40% LO bays: 25% LO tributaries: 40% Other in NY: 49% Outside NY in US: 9% Other countries: 10%	LO: 52% LO bays: 22% LO tributaries: 22% Other in NY: 42% Outside NY in US: 5% Other countries: 8%	LO: 37% LO bays: 24% LO tributaries: 42% Other in NY: 45% Outside NY in US: 6% Other countries: 3%
What type of rod and reel do you most often use? <sup>b</sup>	Spinning: 48% Baitcasting: 26% Spincasting: 53%	Spinning: 59% Baitcasting: 36% Spincasting: 33%	Spinning: 64% Baitcasting: 40% Spincasting: 35%
Do you usually fish from shore or a boat? <sup>b</sup>	Gas-powered motorboat: 46% Shore: 76% Non-motorized boat: 23% Electric motor: 3%	Gas-powered motorboat: 76% Shore: 43% Non-motorized boat: 13% Electric motor: 8%	Gas-powered motorboat: 61% Shore: 55% Non-motorized boat: 21% Electric motor: 21%
Proximity of home to LO, tributary, or bay	Waterfront property: 12% Over 0.5 mi. from LO: 74%	Waterfront property: 29% Over 0.5 mi. from LO: 59%	Waterfront property: 22% Over 0.5 mi. from LO: 59%
Age (average)	54.6 years	58.6 years	55.6 years
Number of children (average)	2.4	2.6	2.3
Do you fish with your child(ren)?	Yes: 71%	Yes: 66%	Yes: 73%
Number of years of education (average)	14.4 years	14.7 years	14.1 years

<sup>a</sup>The average participation for 2005 through 2009 is presented for all water bodies (All) and for Lake Ontario (LO) trips alone.

<sup>b</sup>Overlap exists between categories since respondents could choose more than one category.

## Management Implications

**Overall.** Most angler groups were motivated to fish by their enjoyment of catching fish, their appreciation for nature, their desire to spend time with family and friends on fishing trips, and their desire to improve their skills at catching fish (i.e., personal achievement). Fishing events that focus on the enjoyment of catching fish as well as the social side of the sport will likely attract resident anglers the most. Fishing derbies that promote a "fun time spent with family and friends" (rather than the competitive aspects of derbies since competition was not a motivator) will also likely engage resident anglers.

While many of the factors that enable fishing participation (e.g., good weather, the support of family and friends) cannot be influenced by fisheries management and promotion, access (another important facilitator) can be. Since bad weather is the primary constraint for many responding anglers, providing shoreline access throughout the Lake Ontario region is important when bad weather prevents access to the lake by boat. Shoreline access is also extremely important for anglers fishing with young children. Assessment of current levels and quality of shoreline access (on Lake Ontario, tributaries and embayments) is needed to identify any sections of the Lake Ontario shoreline with inadequate access. Expanding conservation easement access on private land should be considered in areas with inadequate access. Inadequate trash removal by users of access sites may be a concern of private landowners with fishing access on their properties (indicated as a concern during the focus group session with the Lake Ontario Fisheries Coalition); installing "Carry In/Carry Out" educational signage in private access areas may help to ensure that property owners continue to permit fishing access on their lands in the future.

The results of this study indicate that past fishing experience (i.e., fishing as a teenager and as a child) works as an important facilitator for adult anglers, giving them the skills and knowledge needed to fish. Encouraging youth fishing programs in schools and communities should be expanded in order to maintain an active resident fishing population in the long term. School fishing programs integrated into physical education classes would likely have the greatest impact on youth participation, though fishing clubs and youth groups (e.g., Girl and Boy Scouts) are important as well, especially for reaching children in households without anglers. Kids' fishing derbies, which are already held in certain communities throughout the Lake Ontario region, could also engage children in fishing. Based on study results, the focus of these derbies should be to provide a fun experience for children (rather than a competitive one) that is relatively short in duration (to accommodate the shorter attention spans of children).

With an estimated 434,600 residents in the Lake Ontario region with no fishing experience but with an interest in learning how to fish, fishing clinics held throughout the region may be an effective way to provide a first introduction to fishing. Holding the clinics in community parks or facilities that attract a diversity of residents (e.g., YMCAs) might help reach these non-anglers. Charter boat services that promote short fishing excursions combined with fishing lessons may attract these potential anglers as well (note: short charter trips will likely not be feasible for charter services whose fishing locations are distant from their port due to high fuel costs).

**No preference anglers.** The majority of these anglers (74%) live away from the Lake Ontario shoreline, and most fish from shore. Providing and promoting shoreline fishing locations is essential for attracting this group of anglers.

Shoreline fishing will also be popular with no-preference anglers who wish to teach their children or grandchildren how to fish. Seventy-one percent (71%) of responding no-preference anglers indicated that they fish with their children. Since fishing is usually a sport passed down from one generation to the next, this high percentage will likely be important in maintaining the tradition of fishing in the Lake Ontario region. Providing and promoting family-based fishing activities (such as children's derbies) may be popular with this group of anglers, as well as with other angler groups.

In addition, it is important to note that 61% of the women surveyed self-identified no-preference fishing as their preference. Programs focused on female anglers need to strongly consider the motivations of no-preference anglers when structuring educational programs and determining promotional strategies. Specifically, education efforts should be focused on improving knowledge and skills related to fishing, have a strong social component, and be as low-cost as possible.

***Smallmouth bass anglers.*** Promotions that focus on the social aspects of fishing, new techniques, access areas, or events will likely help maintain this group's interest in fishing. This is also a group which fishes less as its free time decreases, income level increases, and proximity of home to fishing location increases. In other words, smallmouth anglers will likely require adequate fishing access near home to best take advantage of limited free time. Because this group is heavily reliant on fishing from boats on Lake Ontario, bad weather conditions will likely affect it more than many other angler groups; promoting shoreline access areas suitable for smallmouth bass fishing may be useful during times of poor weather.

***Largemouth bass anglers.*** The motivations of this group are similar to those of smallmouth bass anglers, with the exceptions of escape and satisfaction with catch being more important for largemouth bass anglers. Promotions that focus on the social aspects of fishing, new techniques, access areas, or events will likely help maintain this group's interest in fishing; promoting the peacefulness of Lake Ontario fishing areas and fishing as an escape will also likely attract these anglers.

## **Study Limitations**

It is important for fisheries managers and promoters to understand the limitations of this study prior to implementing any of the recommendations included herein. First, the sample used for the survey is based on property tax records. While this source of contact information is effective at including anglers who may fish without a license, it does not include anglers who reside in apartments. Anglers who reside in apartments may be younger, have different income levels, and have different perceptions concerning fishing. Second, the motivations, constraints, and facilitators discussed herein reflect respondents' perceptions of recent fishing experiences. Respondents' actions at the time of fishing may vary from what they report after the experience (i.e., their perceptions may vary from their actual experience). Third, questions regarding angler expenditures and participation are subject to recall biases (i.e., respondents may not recall exactly what they actually spent or how often they fished). In order to minimize these biases, expenditure data was collected for the most recent year to the survey, and participation data was averaged over a five year period.

## **Conclusion**

In conclusion, results indicate that New York's Lake Ontario-resident anglers fish primarily for the enjoyment of fishing, as well as to spend time with friends and family in nature, and to expand their fishing skills and success at catching fish. Providing and promoting fishing experiences that focus on the social side of fishing, spending time in nature, and the thrill of reeling in a fish would likely be most effective for increasing the interest of these resident anglers in fishing. Due to the large percentage of female anglers in the no-preference angler group, programs focused on female anglers should consider the motivations of no-preference anglers when organizing educational programs and determining promotional strategies.

With regard to constraints and facilitators, assessment of the amount of shoreline access is likely needed to ensure adequate boat launch facilities and shoreline fishing access. Since fishing appears to be weather dependent for many anglers, it is important to provide adequate shoreline access for when poor weather prevents anglers from boating.

Past fishing experience is an important facilitator since it gives anglers the skills and knowledge they need to participate in fishing. Previous studies have examined the importance of childhood and adolescent fishing participation on adult participation (Kuehn et al., 2006); this study seems to reinforce the idea that individuals who fish as children and teenagers are more likely to participate as adults. Expanding programs that engage children in fishing may be essential for preventing a decline in the number of resident anglers in the future.

In summary, future management efforts should focus on providing adequate access, promoting the social/enjoyment aspects of fishing, and bringing more young and female anglers into the sport.

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