



Selected results from the 2020 recreational fishing survey in Ontario

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Selected results from the 2020 recreational fishing survey in Ontario

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Abstract

The 2020 recreational fishing survey was the tenth in a series of surveys conducted in Ontario every five years since 1975. We focused the survey primarily on three populations of anglers: *Ontario resident* (i.e., fishing licence purchasers from Ontario), *other Canadian* (i.e., fishing licence purchasers from other Canadian provinces), and *Ontario senior* anglers (i.e., 65- to 70-year-old former fishing licence purchasers from Ontario). Some information was also estimated for *non-resident* (fishing licence purchasers from outside Canada) and *younger* (less than 18 years old) anglers. Relative to 2015 survey results, the number of active anglers, days fished, and fish caught and harvested declined in 2020. This decline was largely driven by the 89% decrease in licence sales to *non-resident* anglers between 2019 and 2020. Among *Ontario resident* anglers, licence sales increased by 7% between 2019 and 2020 resulting in more days fished and fish caught between 2015 and 2020 for this group. While *younger* anglers were also estimated to increase their days fished, more *Ontario senior* anglers were estimated to have fished fewer days between 2015 and 2020, suggesting that the COVID-19 pandemic effects on fishing activity differed by angler age and residency.

We estimated that 1.15 million anglers actively fished in 2020, spending about 15.6 million days fishing and about \$1.74 billion on consumables and investments wholly attributable to fishing. Excluding anglers who were non-residents of Canada or under 18 years of age, these about 782,000 active anglers fished for 13.6 million days, 87% of which were during the open water season. Anglers targeted walleye (*Sanders vitreus*) at over twice the rate of any other species and harvested about 19% of the 51 million caught fish. *Ontario senior* anglers had the highest rate of harvesting their caught fish while *other Canadian* anglers had the lowest. *Ontario resident* anglers from northwestern Ontario and anglers with a sport fishing licence tended to prefer and target walleye, to consume fish, and to use live baitfish more than other anglers. Finally, while the sampled anglers' stated adherence to various fishing and boating-related advice and rules was high, non-adherence rates were not trivial: (i) about 20% of anglers reported releasing live baitfish into a waterbody, (ii) 57% of anglers who fished multiple waterbodies in 2020 with the same watercraft did not always wash their watercraft, and (iii) 55% of anglers who were aware of a fish consumption guide did not always follow the advice. Consequently, opportunities exist to increase adherence and compliance of anglers with advice and rules designed to limit unwanted outcomes from recreational fishing in Ontario.

Résumé

Résultats sélectionnés de l'enquête sur la pêche récréative en Ontario de 2020

L'enquête sur la pêche récréative de 2020 était la dixième d'une série d'enquêtes menées en Ontario tous les cinq ans depuis 1975. Elle était axée sur trois populations de pêcheurs à la ligne : les *résidents de l'Ontario* (c.-à-d. les acheteurs de permis de pêche de l'Ontario), les *autres pêcheurs canadiens* (c.-à-d. les acheteurs de permis de pêche provenant d'autres provinces canadiennes) et les *pêcheurs âgés de l'Ontario* (c.-à-d. les anciens acheteurs de permis de pêche de l'Ontario âgés de 65 à 70 ans). Certaines données ont également été estimées pour les *pêcheurs non résidents* (c.-à-d. les acheteurs de permis de pêche provenant de l'extérieur du Canada) et les *jeunes pêcheurs de*

l'Ontario (c.-à-d. les pêcheurs âgés de moins de 18 ans). Comparativement aux résultats de l'enquête de 2015, le nombre de pêcheurs actifs, de jours de pêche et de poissons capturés et récoltés a diminué en 2020. Cette baisse s'explique en grande partie par la diminution de 89 % des ventes de permis aux *pêcheurs non résidents* entre 2019 et 2020. Chez les *résidents de l'Ontario*, les ventes de permis ont augmenté de 7 % entre 2019 et 2020, ce qui a entraîné une hausse du nombre de jours de pêche ainsi que de la quantité de poissons capturés entre 2015 et 2020 dans ce groupe. Si, selon nos estimations, les *jeunes pêcheurs* ont également augmenté leurs jours de pêche, les *pêcheurs âgés de l'Ontario* en compteraient moins entre 2015 et 2020. On peut en conclure que les répercussions de la pandémie de COVID-19 sur les activités de pêche diffèrent selon l'âge et le lieu de résidence des pêcheurs.

Nous avons estimé que 1,15 million de pêcheurs à la ligne pêchaient activement en 2020, ce qui correspondrait à environ 15,6 millions de jours de pêche. Il en découlerait des retombées d'environ 1,74 milliard de dollars en achats de produits de consommation et en investissements entièrement attribuables à la pêche. En excluant les pêcheurs qui ne résident pas au Canada et ceux âgés de moins de 18 ans, l'on obtient un nombre approximatif de 782 000 pêcheurs actifs, ce qui correspondrait à 13,6 millions de jours, dont 87 % pendant la saison des eaux libres. Les pêcheurs à la ligne visaient le doré jaune (*Sanders vitreus*) plus de deux fois plus que toute autre espèce. De plus, ils ont récolté environ 19 % des 51 millions de poissons capturés. Les *pêcheurs âgés de l'Ontario* avaient le taux le plus élevé de récolte par rapport à leurs prises, tandis que les *autres pêcheurs canadiens* enregistraient le taux le plus bas. Les *pêcheurs résidents de l'Ontario* du nord-ouest de la province et ceux titulaires d'un permis de pêche sportive avaient tendance à viser le doré jaune, à consommer du poisson et à utiliser des poissons-appâts vivants plus que les autres. Enfin, si la conformité déclarée des répondants à diverses règles ainsi que leur réceptivité à des conseils liés à la pêche et à la navigation de plaisance étaient élevées, les taux de non-adhésion n'étaient pas négligeables : i) environ 20 % des pêcheurs à la ligne ont déclaré avoir relâché des poissons-appâts vivants dans un plan d'eau; ii) 57 % ont répondu avoir pêché dans plusieurs plans d'eau en 2020 avec la même embarcation sans avoir toujours lavé celle-ci; iii) 55 % ont confié ne pas avoir toujours suivi les recommandations relatives à la consommation du poisson, même s'ils les connaissaient. Par conséquent, il y a lieu d'accroître l'adhésion et la conformité des pêcheurs aux règles établies et aux conseils fournis afin de limiter d'éventuels effets indésirables de la pêche récréative en Ontario.

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Contents

Abstract	iii
Résumé	iii
Acknowledgements	iv
Introduction	1
Methods	2
Study area and populations of interest	2
Survey process	4
Questionnaire development	5
Study variables	5
Weighting and non-response bias	7
Analyses	7
Results	8
Response rates and non-response bias	8
Characteristics of responding anglers	9
Activity, catch, and harvest	10
Angler perspectives and other behaviours	15
Bait and tackle	15
Fish consumption	16
Watercraft precautions	18
Comparing angling in 2019 and 2020	19
Other behaviours and perspectives	21
Benefits from angling	22
Satisfaction with fishing	22
Expenditures	23
Discussion	25
Conclusions	29
References	31
Appendix 1. Glossary	34
Appendix 2. Copy of the 2020 Ontario Recreational Fishing Surveys	36
Appendix 3. Detailed results of angler surveys	46
Appendix 4. Reliability of angler survey estimates	56

Introduction

Recreational fishing is a very popular pastime in Ontario. In 2015, the estimated number of anglers between 18 and 70 years old was 1.2 million (OMNRF 2020a). These anglers obtain many benefits from recreational fishing including food, recreational services, and the physical and psychological benefits associated with nature contact (Arlinghaus et al. 2020). Besides these benefits, angling can affect aquatic resources through harvesting fish along with other effects on fish, fish communities, and aquatic ecosystems (see Lewin et al. 2006 for details).

An angler survey is one method to help understand the benefits and impacts associated with recreational fishing. While individuals and agencies have conducted one-off surveys of anglers in Ontario since 1959 (e.g., Cox and Straight 1975, Drake et al. 2014, Hunt et al. 2021a), Fisheries and Oceans Canada and the Ministry of Natural Resources and Forestry (MNRF) have conducted a regular survey with a large-sized sample of anglers every five years since 1975. Here, we report results from the 2020 survey of recreational fishing in Ontario (delivered solely by MNRF) and, where appropriate, compare results to those from previous surveys to understand changes over time.

The benefits of conducting a broad scale and long-term survey are the richness of information for the year in question and trends over time. Here, we focus primarily on the richness of the information in 2020. Nevertheless, we compare some results from 2020 to results from more recent surveys (2010 and 2015). These comparisons help the reader to understand changes to recreational fishing in Ontario in 2020 that might have arisen from societal responses to the COVID-19 pandemic or ongoing changes to Ontario's demographics.

The effects of the COVID-19 pandemic on recreational fishing in Ontario are not well understood. Although research from the United States suggests that fishing activity increased during the pandemic (Midway et al. 2021), research from Ontario suggests that while fishing activity declined during the spring of 2020, many new anglers were attracted to fishing during the year (Howarth et al. 2021). A large share of recreational fishing in Ontario comes from anglers who are non-residents of Canada (e.g., non-residents accounted for 24% of anglers 18 and older in 2015; OMNRF 2020a). Federal government decisions to close the Canada-U.S. land border to non-essential travel made it difficult for non-residents to fish in Ontario in 2020. Emerging evidence from Denmark also suggests that the pandemic might have affected older anglers more negatively than younger anglers (Gundelund and Skov 2021). Thus, the effect of the pandemic on recreational fishing in Ontario is unknown and may vary depending on residency and age. Here, we begin to address this gap using information from licence sales and survey results.

The 2020 survey also affords an opportunity for a richer understanding of recreational fishing and anglers in Ontario. In past surveys (2010 and 2015; OMNRF 2014, 2020a), this nuanced perspective was provided by separating anglers into populations based on residency and age. We also provide a more detailed examination of purchasers of Ontario resident fishing licences from 2020 (*Ontario resident* anglers) by examining responses by subpopulations of these anglers based on their fishing licence and origin.

The origin of *Ontario resident* anglers might help to explain the diversity in anglers' behaviours, benefits, and impacts. This diversity likely arises from the social-ecological context that confronts any given angler. This context includes density of human populations, availability and accessibility of lakes and rivers, availability and abundance of different fish species, and different norms within communities of anglers. For example, urbanites are less likely to engage in angling and they participate less frequently in angling than do individuals from more rural settings (Hunt et al. 2017, Arlinghaus et al. 2020). In Ontario, walleye (*Sanders vitreus*) is the most highly sought species by anglers (OMNRF 2014, 2020a). The distribution and abundance of walleye is uneven throughout Ontario with higher abundance and opportunities available in northern Ontario (OMNDMNRF 2022). Thus, anglers from northern Ontario might behave differently, resulting in different effects and benefits than other anglers (e.g., northern Ontario anglers might target walleye at higher rates, catch and harvest more walleye, and be more satisfied with their fishing experience than other anglers). Conversely, anglers from southern Ontario may target different species or travel longer distances to reach waterbodies containing their most preferred species.

A detailed analysis of the 2020 survey involves not only a more thorough examination of the key statistics associated with recreational fishing, but also other aspects of angler behaviours and perspectives. One such aspect is anglers' self-reported adherence to regulations and advice. Regulations and advice are developed for more reasons than addressing concerns with overharvesting fish by anglers. One reason is to reduce the likelihood that anglers will illegally release baitfish in or nearby a waterbody in Ontario (Drake et al. 2014) or will introduce invasive species by inadvertently moving species to a new waterbody when trailering watercraft (Bossenbroek et al. 2001). In 2020, anglers were only advised to clean, drain, and dry their watercraft before moving it to a new waterbody (Canadian Council on Invasive Species 2022). A second reason is to reduce the exposure of anglers and family members to contaminants through consumption of fish. Advice about fish consumption for Ontario anglers is provided by a Guide to Eating Sport Fish in Ontario (MECP 2017). This guide, which is now available only online as a mapping application, provides information about safe levels of consumption for groups of people with different sensitivities to contaminants. Consumption recommendations are based on different fish species, sizes of fish, and locations where fish are caught. We examine the self-reported adherence of anglers to these rules and advice to better understand the types of impacts that might arise from lack of adherence.

Methods

Study area and populations of interest

Our focus was the entire recreational fishery in Ontario, which consists of about 250,000 lakes and 490,000 km of rivers (OMNDMNRF 2022). Walleye, which is the most targeted and preferred fish species by anglers in Ontario (OMNRF 2014, 2020a), are more abundant in lakes in northern than central and southern Ontario (OMNDMNRF 2022). The same difference in abundance generally holds for other popular game fish including lake trout (*Salvelinus namaycush*) and northern pike (*Esox lucius*), although smallmouth bass (*Micropterus dolomieu*) are more abundant in southern Ontario lakes (OMNDMNRF 2022). The Laurentian Great Lakes also are sources of much sought after species such as walleye and yellow perch (*Perca*

flavescens), smallmouth and largemouth bass (*Micropterus salmoides*), lake trout, and anadromous Pacific salmonids including rainbow trout (*Oncorhynchus mykiss*), Chinook salmon (*Oncorhynchus tshawytscha*), and coho salmon (*Oncorhynchus kisutch*) (OMNRF 2020b).

Ontario's population and its population of anglers are not evenly distributed. Ontario's 2021 population of more than 14 million (Statistics Canada 2022) was heavily concentrated in southern Ontario and especially around the city of Toronto. Although the rate of Ontario's population that participates in recreational fishing is negatively associated with population density (Hunt et al. 2017), most anglers reside in highly populated parts of Ontario (OMNRF 2020a).

We sampled three populations of anglers in Ontario: (i) *Ontario resident* anglers who purchased a fishing licence for 2020, (ii) *other Canadian* anglers who purchased an Ontario fishing licence for 2020, and (iii) *Ontario senior* anglers who previously purchased an Ontario fishing licence and were between 65 and 70 years old (see Appendix 1 for definitions of these and other common groups and terms). *Ontario senior* anglers are deemed fishing licence holders because those 65 years and older are not required to purchase a license. These three populations of interest exclude other deemed licence holders (e.g., individuals less than 18 or more than 70 years old, military veterans, individuals with a disability), members of Indigenous communities exercising an Aboriginal or treaty right, and *non-residents* of Canada. *Non-resident* anglers were omitted from the sample because of the closure of the Canada-U.S. land border to non-essential travel, preventing most anglers from travelling into Canada for the open water season in 2020.

Within our *Ontario resident* and *other Canadian* angling populations, we stratified anglers by licence type: (i) three year or annual sport fishing licences, (ii) three year or annual conservation licences, and (iii) one day licence holders. A sport fishing licence is more expensive and provides higher catch and possession limits for harvesting fish than a conservation licence. For the *Ontario resident* population, anglers were also stratified by their origin using the first character of the postal code of their mailing address, and postal code P, which encompasses northern Ontario, was divided into northwest and northeast areas with the northwest comprising postal codes starting with POT, POV, POW, POX, POY, P7, P8, and P9 and the northeast comprising all other postal codes beginning with P.

We sampled 32,000 anglers from these populations and subpopulations. The number of samples was chosen from considerations of the expected reliability of survey estimates (i.e., power analyses) and pragmatic considerations of financial cost and respondent burden. A total of 2,000 samples were drawn for *Ontario senior* anglers while the remaining 30,000 samples were drawn in exact proportion to the number of licensed anglers in the *other Canadian* and *Ontario resident* angler populations and stratification by licence type and geographic strata. The one exception to this sampling approach was an oversampling of *Ontario resident* anglers who resided in the northwest. This oversampling enabled us to obtain reliable estimates for individuals from this origin without increasing the overall sample size and the survey cost.

The estimated number of unique anglers for each population and stratum are provided in Table 1. These estimates exclude individuals who purchased multiple licences that were valid for 2020. Individuals with duplicate licences valid for 2020 represented only about 1% of *Ontario*

resident anglers but about 13% of *other Canadian* anglers. These duplicates primarily occurred when the same individual purchased multiple, one day fishing licences.

Table 1. Estimated number of unique anglers from sampled populations and, for Ontario residents, subpopulations in a 2020 survey of anglers in Ontario. (NA = not applicable or not available)

Population	Sport fishing licence ¹	Conservation licence ¹	One day licence ¹	Overall
Ontario senior	NA	NA	NA	82,370
Other Canadian	16,144	14,302	15,392	45,838
Ontario resident ²	511,260	371,335	19,453	902,048
Southeast (K)	81,085	79,206	2,196	162,487
Greater Toronto (L)	138,712	140,369	7,631	286,712
Toronto (M)	39,332	35,924	4,933	80,189
Southwest (N)	117,590	90,784	3,302	211,676
Northeast (east P)	88,978	21,620	761	111,359
Northwest (west P)	45,563	3,432	630	49,625
Total (excluding non-residents)	527,404	385,637	34,845	1,030,256
Non-resident ³	NA	NA	NA	35,175
Total (all above)	NA	NA	NA	1,065,341

¹ Numbers were estimated using rates of each type of licence holder purchasing multiple fishing licences for 2020.

² Letters following Ontario regions indicate first letter of license holder's household postal code.

³ No information was available to estimate numbers of different licence holders.

Survey process

The survey process followed Dillman's (2000) Tailored Design Method with up to three contacts with selected anglers. Anglers were contacted by mail on January 8, 2021 and provided with an option to respond to the survey online using a passcode and keywords to find the survey.

On February 4, 2021, a second letter was sent to all individuals who had not yet responded to the online survey. This mailing comprised a cover letter, paper copy of the questionnaire, and a postage-paid self-addressed envelope. Anglers were reminded that they could complete the questionnaire online using the passcode and keywords. Paper copies of the questionnaire included unique numbers to remove survey respondents from receiving a third contact.

On March 12, 2021, a third contact was made to all non-respondents who had already been randomly preassigned to receive either a letter or full mailing contact. The letter contact used the same methods as the first contact (i.e., a letter to encourage online responses and reminder to complete the questionnaire). The full mailing contact used the approach for the second

contact (i.e., a letter, hard copy questionnaire, and return postage paid envelope). These letter and full mailing contacts were conducted to assess the financial costs and benefits (i.e., increased response rates) of these approaches.

Questionnaire development

The survey was developed and reviewed by the authors and many others from MNRF and MECP (see acknowledgements). These reviews focused on reducing the complexity and number of questions that any single respondent had to answer. We classified all questions from the 2010 and 2015 questionnaires as (i) important and time sensitive, (ii) important but less time sensitive, or (iii) less important. This classification helped us to narrow the focus and number of the questions for 2020 survey. Despite these efforts, the number of important and time sensitive questions resulted in a long and complex questionnaire. Therefore, we further identified a set of core questions that were important, time-sensitive, and would require many responses to produce reliable estimates. These core questions were presented on both versions of two different questionnaires, with the remaining questions divided between the different questionnaires (see Appendix 2 for copies of both).

Draft questionnaires were tested in September 2020 with two focus groups of MNRF staff: one with avid and the other with less avid anglers. These focus groups provided feedback and advice about the questionnaire length and specific questions. The questionnaires were finalized for print in October 2020 and for online in December 2020.

Individuals whose preferred language of correspondence was specified as French in the Fish and Wildlife Licensing Service database received a French version of the questionnaire. The final print questionnaires were compiled into an 8-page booklet. The online questionnaires were developed, tested, and posted to an Ontario.ca web address. While this web address was public facing, a passcode was required to begin the online questionnaire.

Study variables

The survey consisted of four main types of questions: (i) fishing activity including catch and harvest, (ii) angler perspectives and their other behaviours, (iii) benefits from fishing, and (iv) angler characteristics. The questions about fishing activity included whether anglers participated in fishing in 2020 and, if yes, the number of days and hours they fished during the open water and ice fishing seasons. Anglers also provided detailed information about the waterbodies that they fished in Ontario in 2020. For the four most fished waterbodies for a respondent, this detailed information was where they fished, the number of days fished by season, fish species targeted by season, overall catch and harvest of fish, and the modes (i.e., by shore or watercraft) and time of day that they fished during the open water season. For additional waterbodies fished, the angler was only asked for details about where they fished, the number of days fished by season, and the target species for the open water season. Finally, anglers were asked questions about engagement in fishing tournaments and fishing activities of other household members.

The section on angler perspectives and other behaviours focused on themes of bait and tackle, fish consumption, watercraft movement, comparisons to 2019, preferred fish species, and

preferred information sources. The bait and tackle questions focused on the frequency of using (i.e., did not use, sometimes, often) various bait and tackle in 2020, the source of obtaining any live baitfish (i.e., purchased from a commercial retailer, self-harvested, other), and how often (i.e., never, sometimes, often) the angler used different means to handle or dispose of leftover baitfish at the end of a fishing day. The fish consumption questions included the frequency of consuming fish meals and awareness of and adherence to the Guide to Eating Ontario Sport Fish (MECP 2017). Watercraft movement-related questions included whether the individual used the same watercraft to fish more than one waterbody in 2020 and, for those who did, their frequency (i.e., never, sometimes, always) of following clean, drain, and dry precautions and the rationale for not following these precautions. Finally, the questions about comparing fishing activity in 2019 provide another crude indicator of the potential effect of the COVID-19 pandemic on recreational fishing in Ontario. Anglers who fished in Ontario in both 2019 and 2020 were asked whether their fishing activity, expenses, and information sought in 2020 was less, the same, or more compared to 2019.

The section on benefits included questions related to satisfaction and expenditures. Anglers were asked five questions related to their experience that were loosely tied to their satisfaction, including their overall experience and the catch rates and average fish sizes for both their most- and second-most preferred species. Experience was measured using the scale of excellent, very good, good, fair, poor, and very poor.

Expenditures are not typically defined as benefits. Instead, they are the building blocks to estimate economic impacts from fishing and the economic value of recreational fishing. In terms of impacts, direct expenditures by anglers provide the base input to understand how fishing-related expenditures cycle through the provincial and/or regional economies. In terms of value, expenditures provide a conservative estimate of the value of recreational fishing. Simply put, the value of recreational fishing must be at least equal to what anglers spend or they would likely not participate in this activity. Of course, the real value of recreational fishing is likely much higher given no actual market exists for recreational fishing destinations other than angling packages.

As was done for previous surveys of anglers, we estimated expenditures at the household scale and separated these expenditures into consumables (trip-related) and investments (gear, equipment, and building-related) categories. This household estimate requires the researcher to estimate the number of unique households associated with each angling population and subpopulation. We estimated these numbers by asking anglers about the number of other household members aged 18 to 64 who fished in 2020 and whether anyone in the household fished without a licence during a free fishing day in 2020. This approach, which is similar but not identical to the approach used in past surveys, resulted in an estimate of fewer unique households in 2020 than did an estimate based on a thorough search for duplicate mailing addresses in the licence database in 2020. In other words, the methods used here and for previous surveys to estimate households might underestimate the number of households and thus total expenditures. Finally, for all non-fishing equipment investments, we asked the individual to estimate the proportion of total investments attributable to fishing. This approach differed from that used in previous surveys where respondents estimated the percentage attributable to fishing for each investment category separately.

We omitted 64 expenditure reports (less than 0.5% of responses) as not valid because of excessive expenditures being reported (e.g., reporting spending more than \$5000 in consumables per day of fishing by all individuals in the household). Excluding these individuals results in a conservative estimate of recreational fishing expenditures.

Questions about angler characteristics were limited to age, gender, origin, household size, and licence type. We use origin and licence type as moderator variables to help understand differences in behaviours, impacts, and benefits among anglers.

Weighting and non-response bias

Respondents were assigned both an individual and household weight for previous surveys. These weights were used to provide population level estimates for the questions (e.g., multiplying expenditures by the household weight for each respondent and then summing over all respondents). However, this weighting approach does not correctly account for non-item responses. In other words, if a respondent did not answer a question such as the amount of money spent fishing in Ontario, the respondent was assumed to have incurred no expense. To address this issue, we first estimated the average response to a question for each population and subpopulation of anglers. Next, we multiplied these averages by the number of unique anglers in each population and stratum.

Sometimes the individuals who respond to a survey differ in characteristics and behaviours from individuals who do not respond. Past surveys of recreational fishing in Ontario have accounted for these non-response biases when reporting numbers of active anglers, effort, catch, harvest, and expenditures (OMNRF 2014, 2020a). We assessed non-response bias here by comparing individuals who responded before the final survey contact (before March 12, 2021) to individuals responding after this date. The belief is that late responders are more like non-respondents, and thus one can assess non-response bias using this extrapolation method (Armstrong and Overton 1977) that is commonly used in survey-based, marketing research (Collier and Bienstock 2007). Of course, what one can infer about people who do not complete requests for a voluntary survey is limited.

Non-response bias adjustments were only made in the presence of a statistically significant difference ($P < 0.05$) when comparing early and late responders for their rate of actively fishing in 2020 (z-test of proportions), total days fished (independent samples t-test), and total expenditures reported (independent samples t-test). Any adjustment to the rate of active anglers affects many other estimates including overall and seasonal days fished, fish caught, and fish harvested. An adjustment to the total days fished also affects seasonal estimates of days fished, fish caught, and fish harvested.

Analyses

Estimates for different survey questions and themes are provided for *Ontario resident*, *Ontario senior*, and *other Canadian* angler populations. When combined, we refer to these three populations as *all sampled* anglers. We also provide some estimates that include *non-resident* and *younger* (i.e., less than 18 years old) along with *all sampled* anglers.

Estimates for *non-resident* anglers were derived using the known number of unique licence holders for 2020 (Table 1). We then estimated the number of active anglers using both the reported rate from 2015 and by allowing only 8% of non-residents who purchased a three-year licence in 2018 or 2019 to be a potentially active angler in 2020. This 8% value came from the number of one year and 8-day licence holders in 2020 divided by the average numbers from 2018 and 2019. Given an estimate of the number of active anglers, we then used per active angler estimates from 2015 for days fished, fish caught, fish harvested, and expenditures to estimate these key statistics for *non-resident* anglers in 2020. It is possible that *non-resident* fishing activity in Ontario was more concentrated in January and February in 2020 than 2015 given that the main onset of the pandemic began in March for Ontario. We did not adjust the estimates from the *non-resident* anglers to account for this belief. For *younger* anglers, we estimated the number of active anglers and days fished using survey responses from *all sampled* anglers about any younger anglers in their household.

The results presented in the main body of the text are often aggregated into groups of fish instead individual species. This aggregation was undertaken to (i) help the reader contrast preferences and target species among different populations and subpopulations of anglers, (ii) address the tendency for respondents to report general names rather than fish species (e.g., bass, trout, salmon), (iii) report multiple species in the same family (e.g., largemouth bass and smallmouth bass), and (iv) report the wrong species (e.g., confusing smallmouth, largemouth, and rock bass). Species-specific results are provided in Appendix 3 and, if an angler reported more than one species, we selected the first species mentioned.

We present the reliability of the survey estimates through relative standard errors (RSE). Following past efforts (OMNRF 2014, 2020a), we defined estimates as reliable if RSE was less than 16.5%, somewhat reliable if RSE was between 16.5 and 33%, and unreliable if RSE was higher than 33%. Estimates for RSEs for key statistics are provided in Appendix 4. Note that RSEs may give a false impression of reliability when the average value for a statistic is about zero, such as for estimating species-specific catch and harvest rates per day of fishing.

Results

Response rates and non-response bias

From the 32,000 randomly selected anglers invited to participate in this survey, 14,561 individuals provided at least some usable responses. After accounting for the 1,341 individuals who were removed because of either an undeliverable address or being deceased, the final response rate was 47%. This response rate is higher than the rates for comparable samples from the 2015 (18%) and 2010 (36%) surveys.

In 2020, *Ontario senior* anglers had the highest (64%) while *other Canadian* anglers had the lowest (38%) response rates. The rate for *Ontario resident* anglers was 47%. About 75% of all responses were received online. This rate of online response was highest for *other Canadian* (81%) and lowest for *Ontario senior* anglers (62%).

The survey design included a split-sample approach with different treatments for individuals who had not yet responded and were sent a third survey contact. Among all individuals who received the full mail package for their contact, about 17% responded to the survey with 34% of these responses submitted online. For the individuals who only received a letter for their third contact, about 15% responded with about 58% submitted online. These results suggest that using a letter for the third contact produced about the same response as using the more costly full mail contact.

Non-response bias tests were conducted between individuals who responded early (before the third contact) and late for each sampled angler population for actively fishing in 2020, days fished, and total expenditures, which here and elsewhere are reported in 2020 Canadian (CAD) dollars (Table A3.1). Based on the non-response bias assessment, the estimates for the number of active anglers were adjusted for two populations: (i) a reduction of 2.2% for *Ontario resident* and (ii) an increase of 4.5% for *other Canadian* anglers (Table 2). No evidence indicated that days fished by active anglers or expenditures differed between the early and late responders, so no other adjustments were made. By contrast, the adjustments for the 2010 survey, which were applied to the 2015 survey data, were 1.8, 16.6, and 6% reductions to active anglers, days fished, and expenditures, respectively, for all populations except *other Canadian* anglers (OMNRF 2020a).

Table 2. Adjustments to 2020 Ontario angler survey data from non-response bias assessment. (NS = not statistically significant ($P > 0.05$) and no adjustment made; days fished based on average days by respondents who actively fished in 2020; CAD = Canadian dollars for the 2020 year)

Population	Active fishing (%)	Days fished	Total expenditures (CAD 2020)
Ontario resident	-2.23	NS	NS
Ontario senior	NS	NS	NS
Other Canadian	4.53	NS	NS

Characteristics of responding anglers

Survey respondents were asked to provide information about their gender and age. About 1% of *all sampled* anglers preferred not to answer the question about gender identity. Of those who provided an answer, 78.3, 21.6, and 0.1% identified as male, female, and other, respectively. These rates were consistent among the various populations (e.g., 21.7, 20.9, and 22.2% of *Ontario resident*, *Ontario senior*, and *other Canadian* anglers who identified as female).

Most (52%) of the survey respondents were aged 50 years and older with only 11% younger than 30 (Table A3.2). By contrast, only 40% of the entire sample of 32,000 anglers were between 50 to 69 years while 24% were less than 30 years. Much of this overrepresentation of older anglers in the sample was handled with the stratification of anglers into the *Ontario resident* and *Ontario senior* angler groups. However, the *Ontario resident* angler sample is still overrepresented by older anglers.

The age distribution percentages for *all sampled* anglers were about the same between *Ontario resident* and *other Canadian* anglers. The distribution of *Ontario senior* anglers was, by design, much different and obviously older than the distributions for the other angling populations.

Activity, catch, and harvest

Only 76% of *all sampled* anglers reported actively fishing in Ontario in 2020 (Figure 1, Table A3.3). Active fishing rates were highest for *other Canadian* anglers (93%), and among *Ontario resident* anglers, sport fishing licence holders (80%) and residents of northeast (81%) or northwest (85%) Ontario. *Ontario senior* anglers were the least likely (56%) to report actively fishing in Ontario in 2020. These activity rates were much lower than those for 2015 (86, 87, 95, and 65% for *all sampled*, *Ontario resident*, *other Canadian*, and *Ontario senior* anglers, respectively).

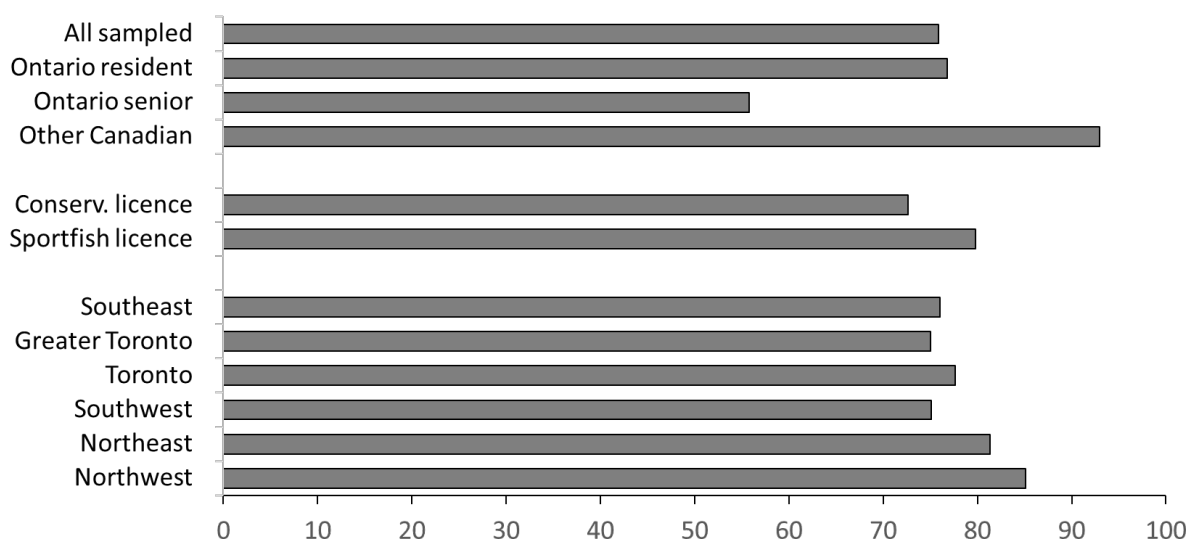


Figure 1. Active fishing rates (%) in Ontario in 2020 by population and, for Ontario residents, licence type and origin.

The number of active anglers including *all sampled*, *non-resident*, and *younger* anglers fishing in Ontario in 2020 was estimated to be 1.16 million. Most of these anglers were *Ontario resident* (693,000), followed by *younger* (~345,000), *Ontario senior* (~46,000), *other Canadian* (~43,000), and finally *non-resident* (~27,000) anglers. This overall estimate of active anglers for 2020 was much lower than for 2015 and 2010 (1.51 and 1.63 million, respectively). This large decline was primarily driven by *non-resident* (91% decline) and to lesser extents *other Canadian* (28% decline) and *Ontario senior* (20% decline) anglers. Active *Ontario resident* anglers in 2020 only declined by 8% while active *younger* anglers increased by 6% from 2015.

Days fished by *all sampled*, *non-resident*, and *younger* anglers in Ontario in 2020 was about 15.6 million (tables 3 and A3.3). This 2020 estimate was about 3 and 19% less than the estimates for 2015 and 2010, respectively. These declines were driven by *non-resident* and *Ontario senior* anglers who spent 90 and 12% fewer days fishing in Ontario in 2020 than in 2015. By contrast, days fished was estimated to be 27 and 9% higher in 2020 than 2015 for *younger* and *Ontario resident* anglers while days fished by *other Canadian* anglers was largely unchanged (3% increase).

For *all sampled* anglers, most fishing activity occurred during the open water season with 87 and 84% of all days and hours fished, respectively. The percentage of all days and hours spent ice fishing was highest for *Ontario resident* anglers. For *all sampled* anglers, ice fishing activity was much higher in 2020 than 2015.

Table 3. Estimated days and hours fished (in thousands) in Ontario in 2020 during different seasons by population. (ON = Ontario; NA = not available)

Population	Open water days	Ice days	Total days	Open water hours	Ice hours	Total hours
ON resident	10,466	1,689	12,155	43,771	9,157	52,928
ON senior	705	80	785	2,875	400	3,275
Other Canadian	393	34	427	2,134	208	2,342
All sampled	11,563	1,803	13,367	48,780	9,765	58,545
Non-resident	NA	NA	203	NA	NA	NA
Younger	NA	NA	2,044	NA	NA	NA
All sampled, non-resident and younger	NA	NA	15,614	NA	NA	NA

The average days fished per active angler was 16.1 days with 14.8 of these days occurring during the open water season. *Ontario resident* anglers fished the most days on average (17.5) followed by *Ontario senior* (17.1) and *other Canadian* (10.0) anglers. These estimates were much higher than those in 2015 (15, 16, and 7 days for *Ontario residents*, *Ontario seniors*, and *other Canadians*, respectively).

Fishing during the open water season occurs from a watercraft such as a boat or from shore including from docks or wading in the water. Anglers provided detailed information about the waterbodies they fished, including whether the days that they reported open water fishing were from a watercraft, shore, or both. Most (55%) of fishing activity occurred from only a watercraft with 25% of activity occurring from both the shore and watercraft and the remaining 20% only from the shore (Table 4). *Ontario resident* anglers fished only from the shore at the highest rate while *other Canadian* anglers were least likely to fish only from the shore.

Table 4. Open-water fishing activity (%) in Ontario in 2020 by mode and population.

Mode	Ontario resident	Ontario senior	Other Canadian	All sampled
Only from watercraft	53.3	71.5	72.2	55.2
Only from shore	25.8	13.2	19.8	20.0
Both watercraft and shore	21.0	15.3	8.0	24.8

The detailed information that *all sampled* anglers provided about the waterbodies they fished provides insights into fishing activity across Ontario in 2020 (Figure 2). First, much more activity occurred during the open water than the ice fishing seasons. Second, more activity was evident at waterbodies in southern than northern areas of Ontario. Third, some key waterbodies, such as individual Great Lakes, Lake Simcoe, Lake Nipissing, Ottawa River, Lake of the Woods, and Grand River, attracted a large share of fishing activity (see Table A3.4 for a list of most fished

waterbodies). Finally, during the ice fishing season, Lake Simcoe and to a lesser extent Lake Nipissing were favoured destinations.

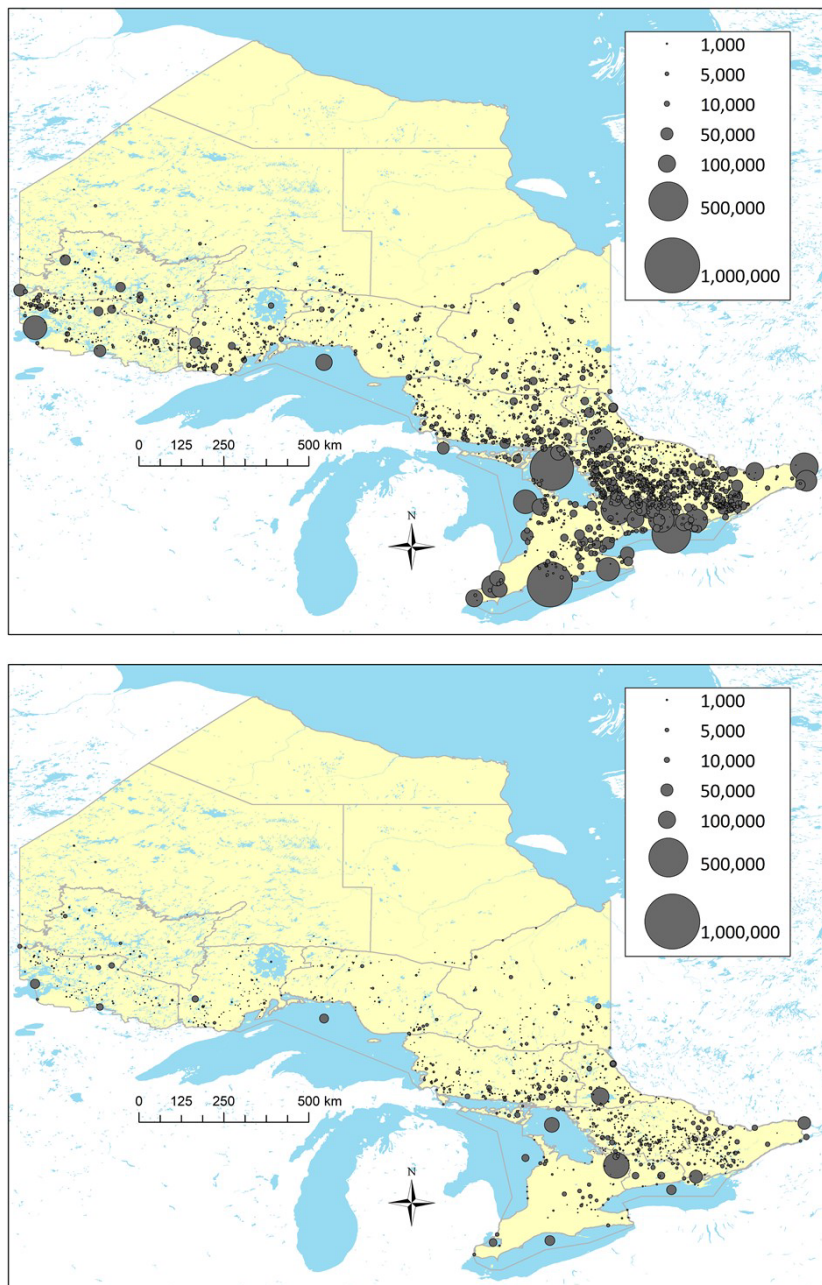


Figure 2. Estimated fishing activity (days) in 2020 at Ontario waterbodies. (top panel is open water and bottom panel is ice fishing season; circles are proportional to days fished in a season.)

Walleye was the most targeted species by *all sampled* anglers in 2020 (Table 5 and for species specific details see Table A3.5). *Other Canadian* anglers targeted walleye at the highest rate, and walleye was a much more likely target during the ice than the open water fishing season. Bass, sunfish (*Lepomis peltastes*), and crappie (*Pomoxis* sp.) were the second most targeted species group in the open water season in Ontario in 2020 but were targeted at a rate almost

10 times less during the ice fishing season. Among the remaining species groups, trout and salmon, yellow perch, and whitefish (*Coregonus clupeaformis*) were targeted relatively more often during the ice fishing season, with *other Canadian* anglers targeting pike and muskellunge (*Esox masquinongy*) at a higher rate than did other angling populations.

Table 5. Fishing activity targeting fish species groups (%) in Ontario in 2020 by population and season.

Species group	Ontario resident	Ontario senior	Other Canadian	All sampled	All sampled open	All sampled ice
Walleye	33.9	39.7	56.3	35.0	34.1	40.2
Bass, sunfish, and crappie	30.9	24.3	16.2	30.1	34.2	3.4
Trout and salmon	16.6	15.1	12.8	16.4	15.5	22.1
Pike and muskellunge	9.3	8.5	13.8	9.4	9.4	9.2
Yellow perch	4.7	6.2	0.1	4.6	3.0	15.4
Multiple species	2.3	3.2	0.1	2.2	2.4	1.5
Whitefish	1.3	2.7	0.2	1.4	0.4	7.7
Catfish	0.4	0.0	0.0	0.4	0.5	0.0
Other	0.5	0.3	0.5	0.5	0.5	0.5

The most targeted fish species by *all sampled* anglers was also the most caught fish species in 2020 (Table 6). The top three most caught fish species in 2020 (i.e., walleye, yellow perch, and smallmouth bass) aligned with the top three from 2015 and 2010. This order differed for *other Canadian* anglers in 2020 who most often reported catching walleye, smallmouth bass, and northern pike.

Over a quarter of all caught coldwater species (e.g., brook trout (*Salvelinus fontinalis*), Chinook salmon, coho salmon, lake trout, lake whitefish, rainbow trout, and splake (*Salvelinus namaycush* X *Salvelinus fontinalis*)) were harvested by *all sampled* anglers in Ontario in 2020 (Table 6). By contrast, fewer than 10% of all caught warmwater species (e.g., largemouth bass, muskellunge, smallmouth bass, and sunfish) were harvested. Coolwater species including walleye and yellow perch also had harvest rates above 25%. Among the specific angling populations, *Ontario senior* anglers tended to harvest fish at the highest rate (24% overall) for all species while *other Canadian* anglers harvested fish at the lowest rate (about 15% overall).

We also asked *all sampled* anglers about their participation in fishing tournaments in 2020. Participation in a fishing tournament was very low with a rate of only 2.5% of *all sampled*, active anglers in Ontario. Participation in fishing tournaments occurred at the highest rate among *other Canadian* anglers (3.6%) and the lowest rate among *Ontario senior* anglers (0.6%), with *Ontario resident* anglers falling in the middle (2.5%).

Table 6. Estimated catch and harvest of fish species in Ontario in 2020 by population (numbers are in thousands while numbers in parentheses are per cent harvested; sunfish+ include sunfish and bluegill).

Species	Ontario resident	Ontario senior	Other Canadian	All sampled
Walleye	9,413 (29.6)	551 (40.2)	1,115 (20.4)	11,080 (29.2)
Yellow perch	9,129 (28.0)	709 (23.0)	228 (7.4)	10,066 (27.2)
Smallmouth bass	8,125 (9.7)	367 (19.1)	410 (4.8)	8,903 (9.8)
Northern pike	4,027 (11.4)	173 (16.7)	318 (4.5)	4,518 (11.1)
Sunfish+	5,125 (8.8)	373 (5.5)	15 (0.0)	5,514 (8.6)
Largemouth bass	4,374 (9.0)	221 (15.6)	94 (2.1)	4,688 (9.2)
Black crappie	1,181 (30.8)	92 (28.1)	37 (26.6)	1,309 (30.5)
Other	949 (13.4)	54 (20.0)	5 (11.1)	1,008 (13.7)
Lake trout	786 (31.4)	27 (51.5)	23 (45.9)	837 (32.5)
Rainbow trout	782 (24.5)	30 (46.1)	24 (57.8)	837 (26.3)
Brook trout	456 (31.0)	23 (60.8)	9 (35.9)	488 (32.5)
Lake whitefish	409 (34.3)	23 (48.2)	4 (27.0)	436 (35.0)
Chinook salmon	416 (25.3)	15 (28.7)	25 (72.7)	456 (28.0)
Muskellunge	203 (0.7)	10 (7.3)	13 (0.0)	226 (1.0)
Coho salmon	96 (39.0)	3 (16.7)	11 (95.6)	110 (44.3)
Splake	77 (48.7)	2 (66.7)	5 (67.2)	83 (50.2)
Total	45,548 (19.4)	2,674 (23.8)	2,337 (15.0)	50,559 (19.4)

Finally, we asked anglers whether anyone from their household aged 18 to 64 fished without a licence during a free fishing day in 2020. More than one in twenty of *all sampled* anglers (6.1%) stated that someone aged 18 to 64 in their household fished without a licence during a free fishing day in Ontario in 2020. This rate of participation was highest for *Ontario resident* anglers (6.3%), with *other Canadian* anglers (4.7%) and *Ontario senior* anglers (4.8%) reporting about the same rate.

Angler perspectives and other behaviours

Bait and tackle

Most of the active, *all sampled* anglers reported using hard baits (e.g., crankbaits), soft plastics, earthworms, or live baitfish sometimes or often in Ontario in 2020 (Figure 3). No other types of bait and tackle (e.g., leeches or fish parts) were used by more than 20% of *all sampled* anglers (see Table A3.6 for details). Among the four most popular bait and tackle types, artificial lures (including hard baits and soft plastics) were used more often than natural baits (including

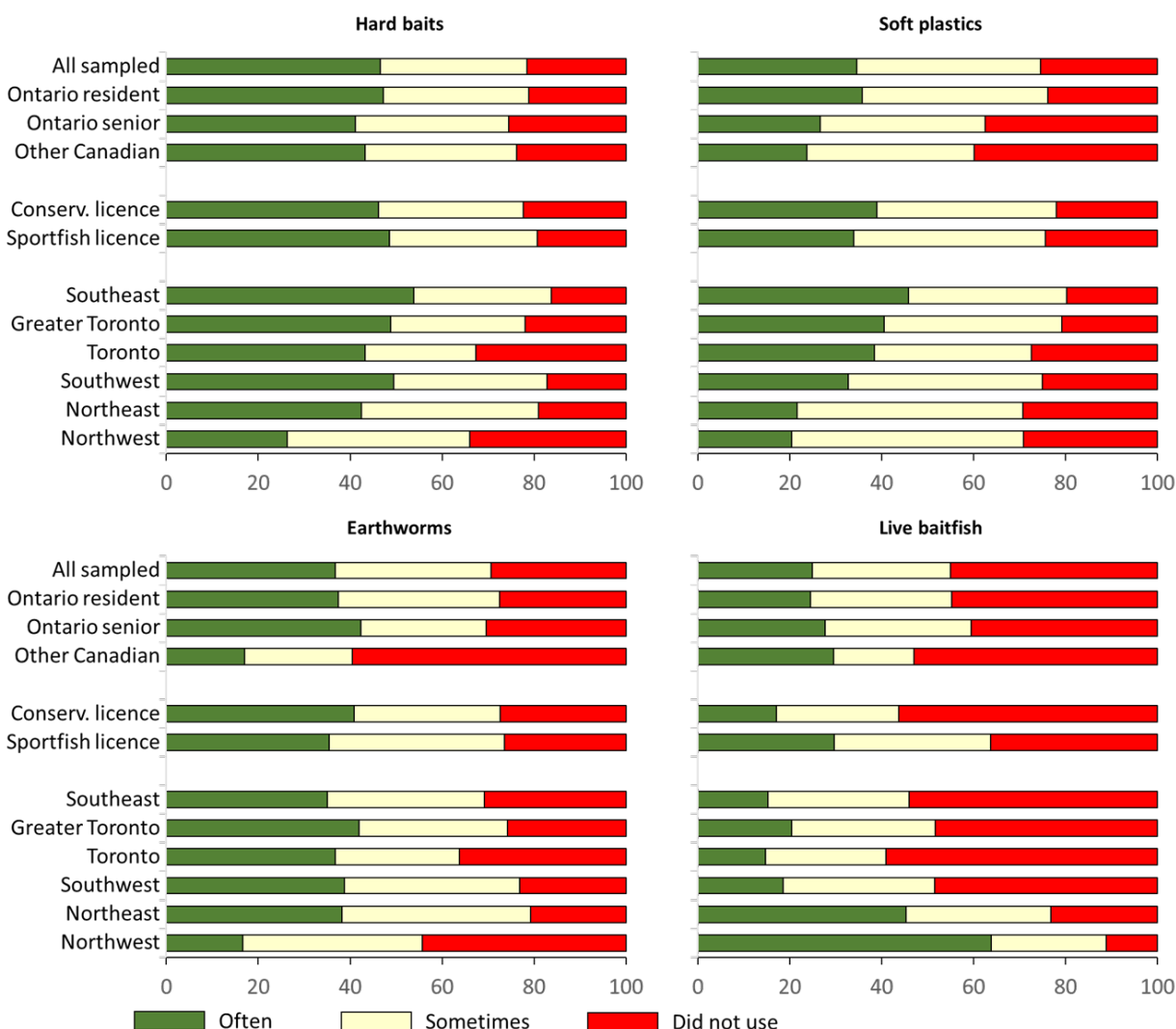


Figure 3. Reported use (%) of bait and tackle in Ontario in 2020 by active anglers from different populations and, for Ontario residents, different licence types and origins.

earthworms and live baitfish). *Ontario resident* anglers were most likely to have used soft plastics (76% stating often or sometimes) while *other Canadian* anglers were least likely to have used earthworms for fishing in Ontario in 2020 (40% stating often or sometimes). Among *Ontario resident* anglers, sport fishing licence holders and those residing in the northeast and northwest were most likely to have used live baitfish while northwest anglers were least likely to have used hard baits or soft plastics.

Information on where live baitfish were obtained and the frequency of using different methods to handle or dispose of leftover baitfish is provided in tables A3.7 and A3.8. Here, we focus on one concerning way that some anglers reported handling or disposing of their leftover baitfish: releasing them into the waterbody that they fished (Figure 4). Overall, about 20% of live baitfish users from *all sampled* anglers reported releasing baitfish sometimes or often into the waterbody that they fished in 2020. This rate was highest for *other Canadian* anglers (31%), and among *Ontario resident* anglers, lowest for sport fishing licence holders (17%) and anglers from the northeast (10%) and northwest (12%) parts of the province.

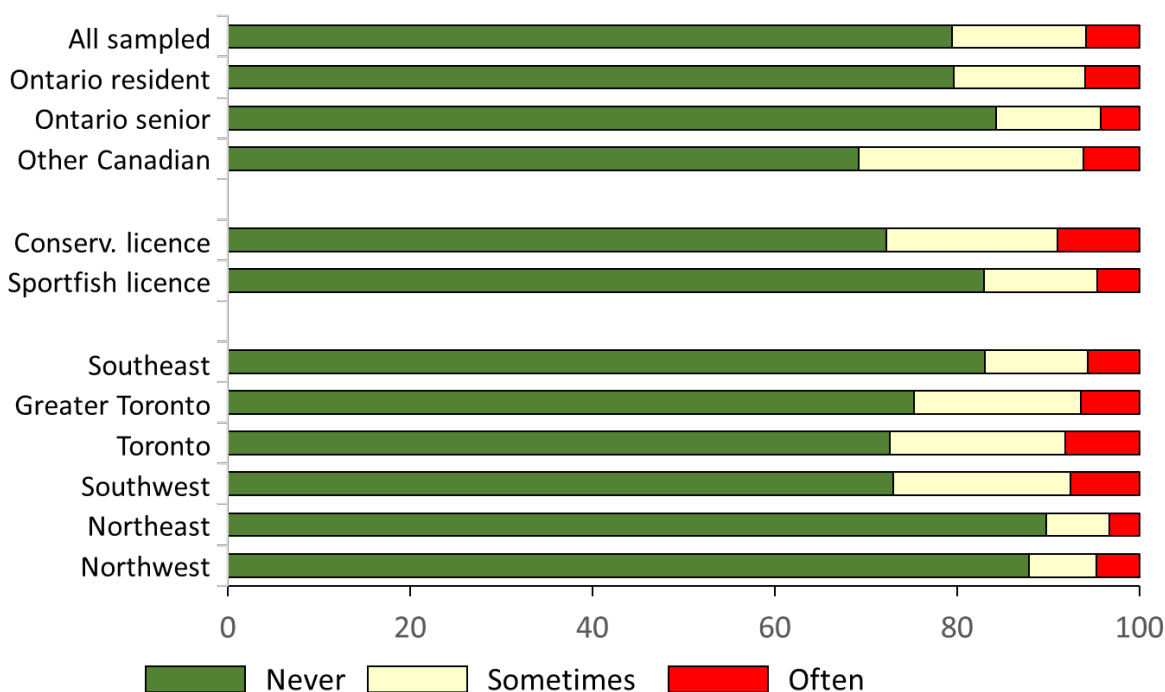


Figure 4. Reported release (%) of leftover baitfish into a waterbody in Ontario in 2020 by live baitfish anglers from different populations and, for Ontario residents, different licence types and origins.

Fish consumption

Anglers who actively fished in Ontario in 2020 were asked how often they ate sport fish, their awareness of the Guide to Eating Ontario Sport Fish, and, for those who were aware of the guide, their adherence to it. Fish consumption was measured by stated frequency of meals over the year. More than 33% of *all sampled* anglers stated that they never consumed a fish meal in 2020 while 39% stated that they consumed fish meals less than once per month (Figure 5). *Ontario resident* anglers were least likely to report consuming fish meals. However, among

Ontario resident anglers, sport fishing licence holders and anglers from the northeast and northwest were most likely to report eating fish meals.

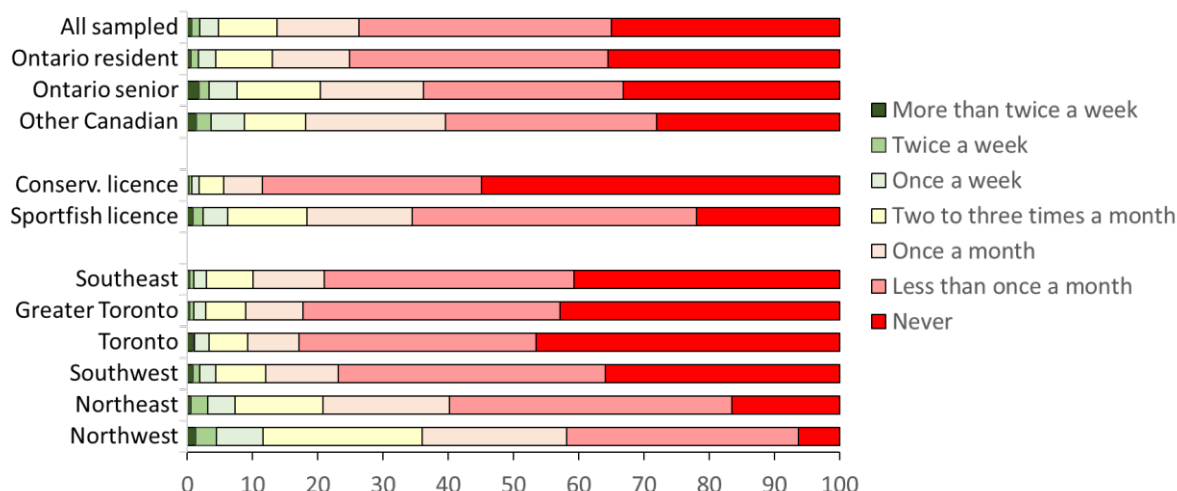


Figure 5. Reported frequency (%) of consuming sport fish in Ontario in 2020 by population and, for Ontario residents, licence type and origin.

Awareness levels of the Guide to Eating Sport Fish in Ontario were generally low (57% for *all sampled* anglers) and especially low for *other Canadian* anglers (28%) and *Ontario resident* anglers with a conservation licence (50%; Figure 6, Table A3.9). About 70% of anglers who were aware of the guide stated that they always or usually adhered to the guide (Figure 6, Table A3.9). However, *Ontario resident* anglers with sport fishing licences (64%) and those residing in northeast (60%) and northwest (58%) Ontario stated lower levels of always or usually adhering to the guide than did other anglers.

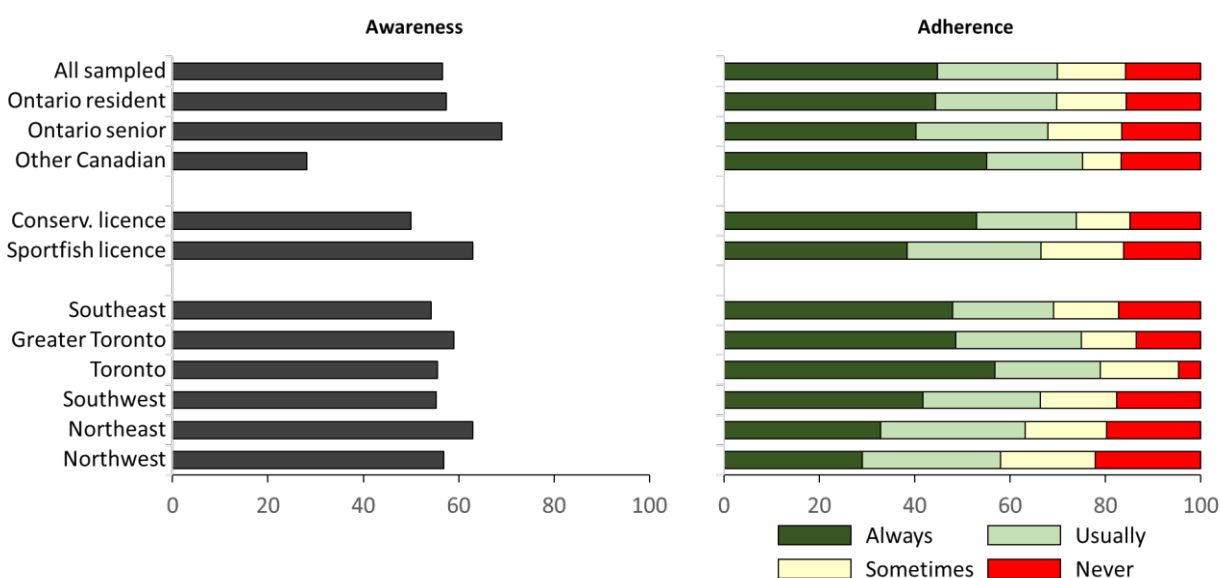


Figure 6. Awareness (%) of the Guide to Eating Sport Fish in Ontario (left panel) and for those aware, stated adherence (%) to following the guide (right panel) in Ontario in 2020 by population and, for Ontario residents, licence type and origin.

Watercraft precautions

Anglers who actively fished in Ontario in 2020 were asked whether they fished multiple waterbodies with the same watercraft. About one-quarter (24%) of *all sampled* anglers stated that they did (Figure 7). Rates of fishing multiple waterbodies were lowest among *other Canadian* anglers (12%). Among *Ontario resident* anglers, rates of fishing multiple waterbodies were highest for sport fishing licence holders (29%) and anglers from southeast (30%), northwest (32%), and northeast (34%) areas.

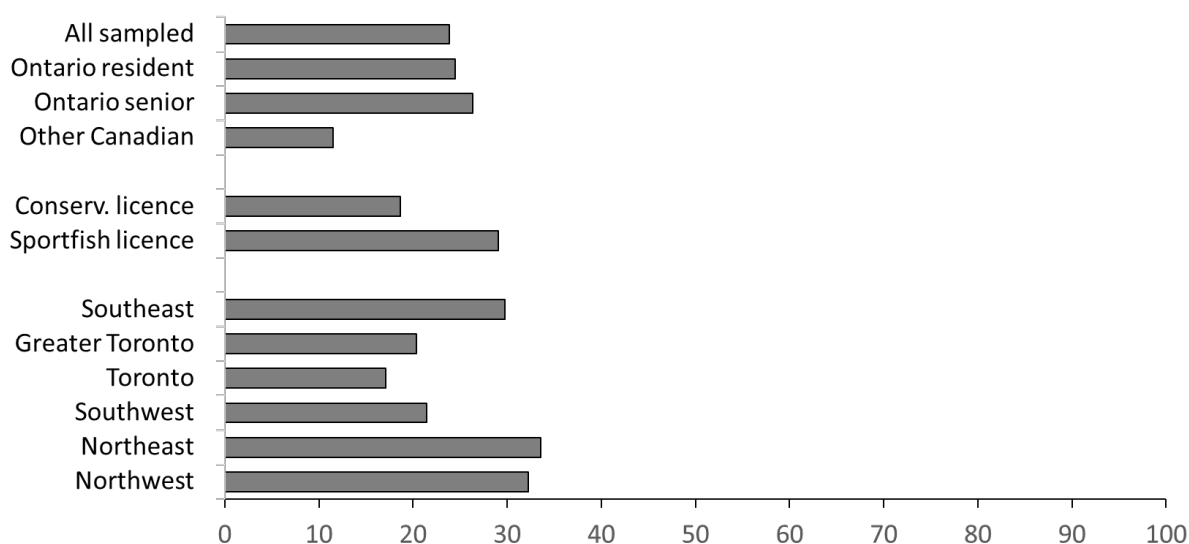


Figure 7. Reported use (%) of same watercraft for fishing multiple waterbodies in Ontario in 2020 by active anglers from different populations and, for Ontario residents, different licence types and origins.

For anglers fishing multiple waterbodies from the same watercraft, we asked about their adherence to precautions when moving the watercraft between waterbodies. Stated adherence to always follow the precautions among *all sampled* anglers was very good (>80%) for cleaning their boat and draining water from their watercraft and engine, good (almost 70%) for allowing the watercraft to dry, and poor (<50%) for washing the watercraft with hot or high-pressure water (Figure 8, Table A3.10). Adherence for washing their boat was lowest for *Ontario senior* anglers, with only 25% stating they always adhere to the advice.

The main reason for not always following advice for watercraft precautions was a lack of awareness (38%) followed by a belief that no aquatic invasive species were present in fished waterbodies (16%), and that aquatic invasive species are not a problem (7%). Few of *all sampled* anglers stated that they lack access to the right equipment (4%), that it is inconvenient (2%), or that their actions will not make a difference (1%).

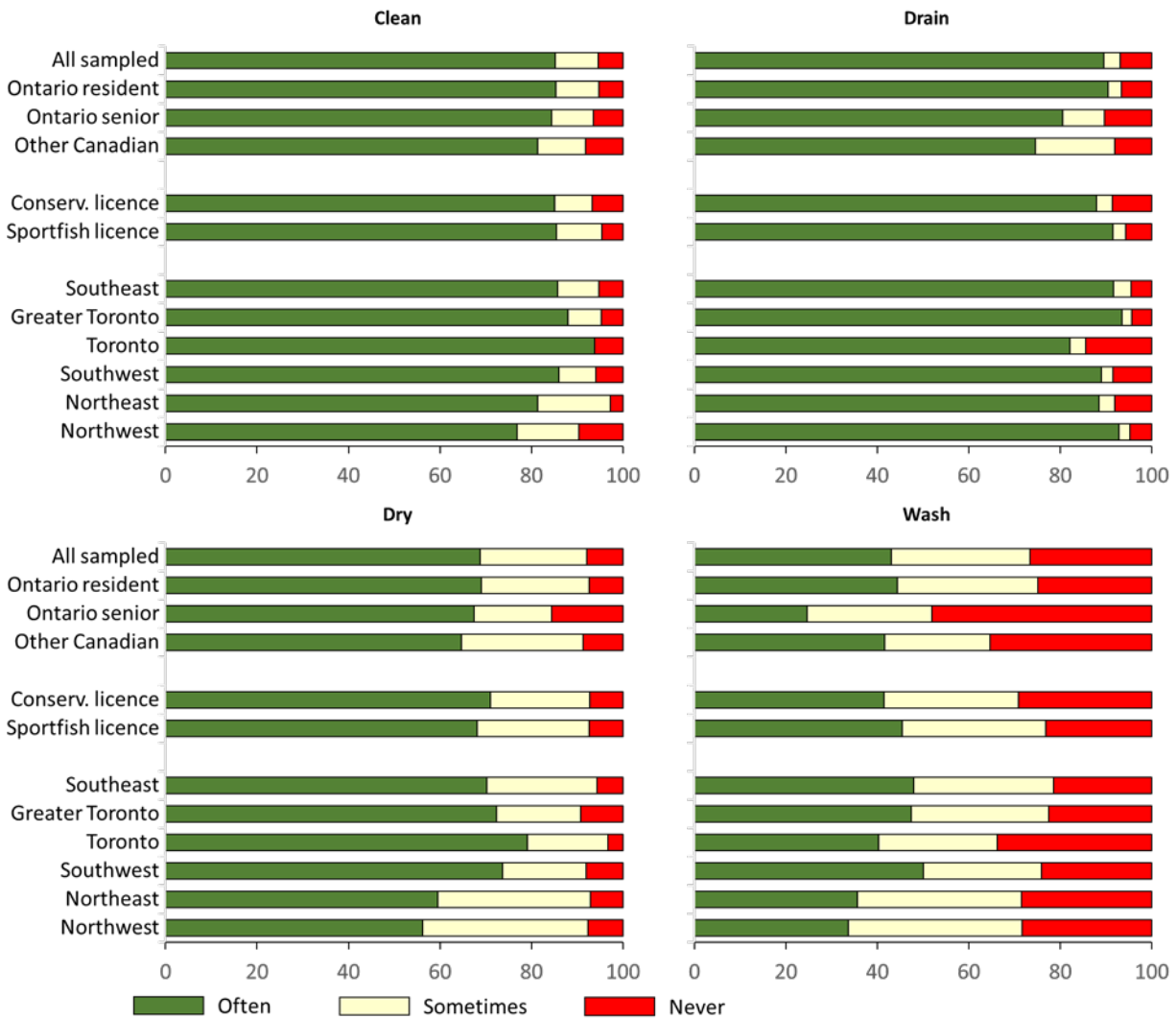


Figure 8. Reported adherence (%) to advice regarding moving watercraft by anglers who moved watercraft to multiple waterbodies in Ontario in 2020 by population and, for Ontario residents, licence type and origin. (Top left panel: cleaning vegetation from boat and trailer; top right panel: draining water from watercraft; bottom left panel: allowing watercraft to thoroughly dry before moving; and bottom right panel: washing watercraft with high pressure or hot water.)

Comparing angling in 2019 and 2020

To further understand potential effects of the COVID-19 pandemic on angling beyond changes to licence sales and comparisons from the 2015 and 2020 surveys, we asked anglers who reported fishing in both 2019 and 2020 to compare their 2020 activity, expenditures, and information-seeking behaviours to those in 2019. Most of *all sampled* anglers indicated no change in their fishing activity between 2019 and 2020. A higher percentage of *all sampled* anglers stated a decrease in 2020 compared to 2019 (Figure 9, see Table A3.11 for details). These anglers reported fishing less days in 2020 than 2019, especially in the spring and summer.

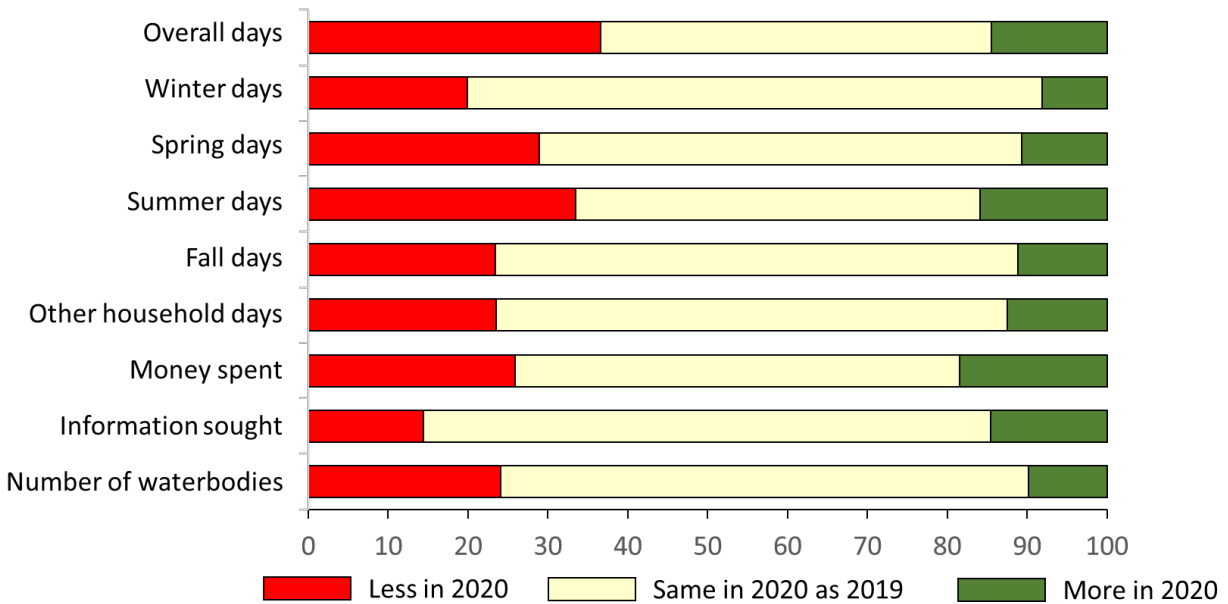


Figure 9. Reported changes (%) to fishing activity and other behaviours in Ontario between 2019 and 2020 active anglers from different populations and, for Ontario residents, different licence types and origins.

The analysis of angling activity changes (Figure 9) focuses only on anglers who actively fished in 2019 and 2020. Here, we also account for anglers who only actively fished in 2020 but not 2019 and those who fished in 2019 but not 2020 to evaluate change to overall fishing in 2020. Combining all these anglers, 38% of *all sampled* anglers reported fishing less in 2020 than 2019 while 28% fished more. The *Ontario senior* angler population had the highest difference with 56% of these anglers fishing less while only 12% fished more in 2020 than in 2019 (Figure 10).

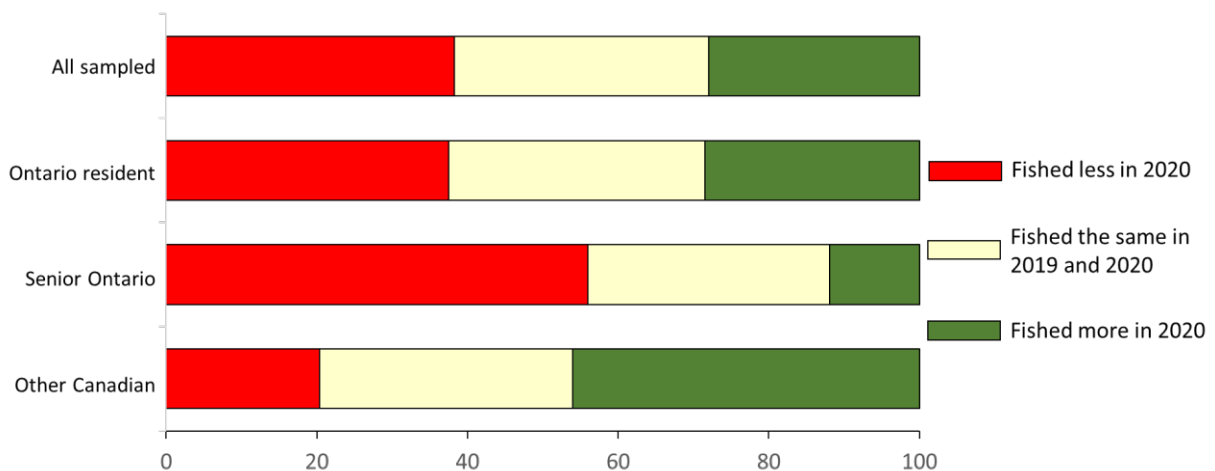


Figure 10. Reported change to overall fishing activity (%) from 2020 to 2019 in Ontario by anglers who fished or reported fishing less, more, or the same by different populations.

Other behaviours and perspectives

We provide some information about angler preferences by grouping fish species (see tables A3.12 to A3.14 for species-specific results). Overall, walleye (41%) was most preferred by *all sampled* anglers followed by bass, sunfish, and crappie (32%), trout and salmon (15%), and northern pike and muskellunge (7%) (Figure 11) with northern pike being far more preferred than muskellunge (Table A3.12). Walleye was most preferred by *Ontario resident* anglers with a sport fishing licence (48%) and who resided in northeast (63%) and northwest (88%) Ontario. Fishing for trout and salmon was most preferred by *other Canadian* anglers (27%) and *Ontario resident* anglers from Toronto (21%) and bass, sunfish, and crappie were most preferred by those *Ontario resident* anglers with a conservation licence (46%) from southeast (40%), Greater Toronto (42%), and Toronto (47%).

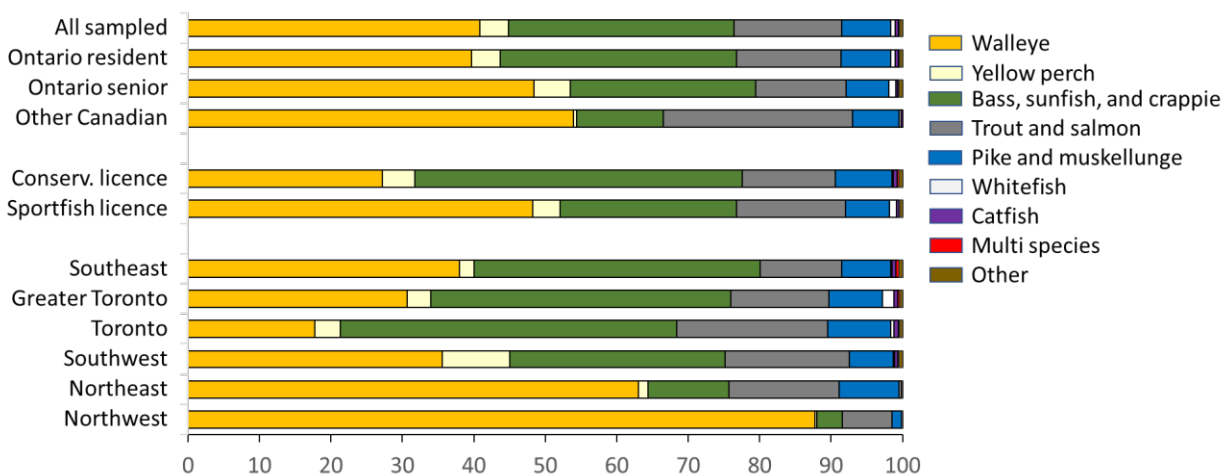


Figure 11. Preferred groups of fish species in Ontario in 2020 by active anglers from different populations and, for Ontario residents, licence type and origin.

Anglers were asked about their preferred sources to obtain fishing-related information from government agencies. More than 45% of *all sampled* anglers preferred websites or online maps (Figure 12). When compared relatively among the specific angling populations, *Ontario senior* anglers were most likely to prefer receiving their information by print (44%) and least likely to prefer receiving it from websites (35%).

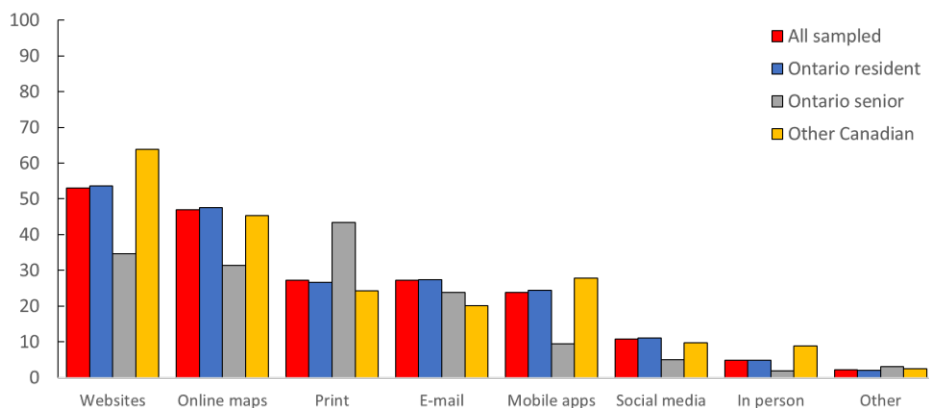


Figure 12. Preferred information sources (%) in Ontario in 2020 by population.

Benefits from angling

Satisfaction with fishing

Benefits from recreational fishing are measured through the satisfaction type questions and expenditures. Overall, 73% of active, *all sampled* anglers rated their fishing experience as excellent, very good, or good (Figure 13, see Table A3.15 for details). *Other Canadian* anglers were most satisfied among the specific populations (86% rating their experience as excellent, very good, or good). Among *Ontario resident* anglers, those with sport fishing licences (74%) and who resided in northwest Ontario (85%) were most satisfied with their overall fishing experience.

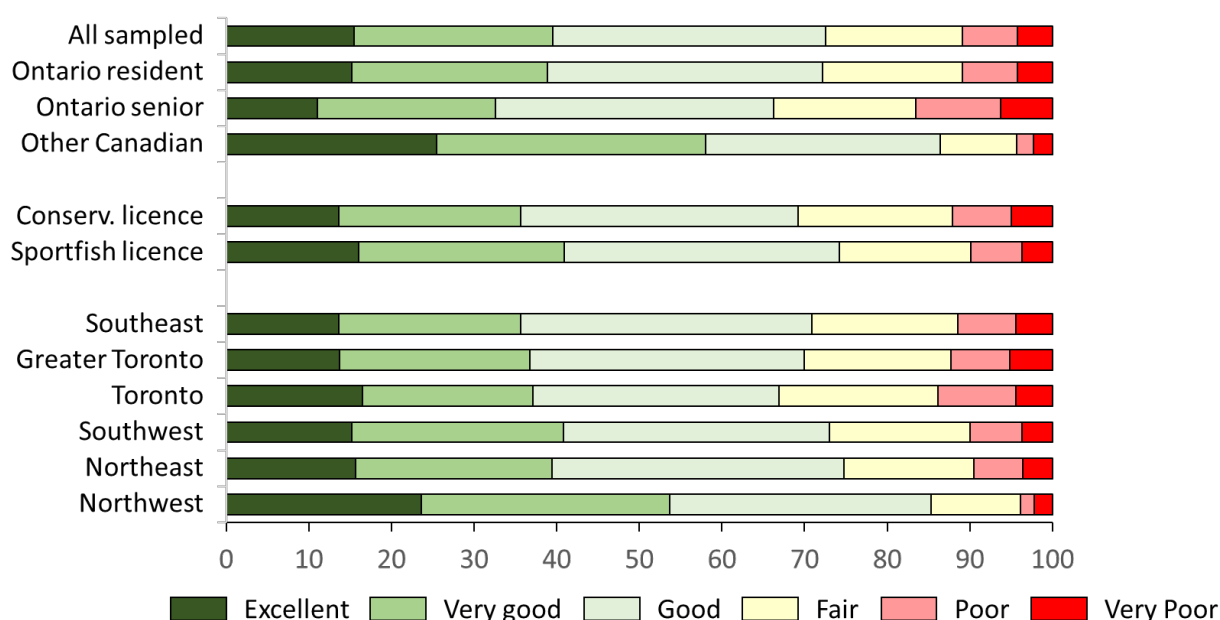


Figure 13. Ratings of overall fishing experience (%) in Ontario in 2020 by active anglers from different angling populations and, for Ontario residents, different licence types and origins.

Active anglers were also asked to evaluate the catch rate and size of the caught fish for their most and second most preferred species. Here, we focus only on catch rates and size of the most preferred species (Figure 14, see Table A3.15 for details). Among *all sampled* anglers, satisfaction (the combined ratings of excellent, very good, and good) was higher for the overall experience (73%) than the catch rates (48%) or size of caught fish (45%) for the most preferred species. *Other Canadian* anglers were most satisfied with the catch rate (66%) and size (64%) of their most preferred species. Among *Ontario resident* anglers, sport fishing licence holders (52 and 48%) and anglers residing in the northwest (69 and 65%) were most satisfied with catch rates and size of their most preferred species, respectively.

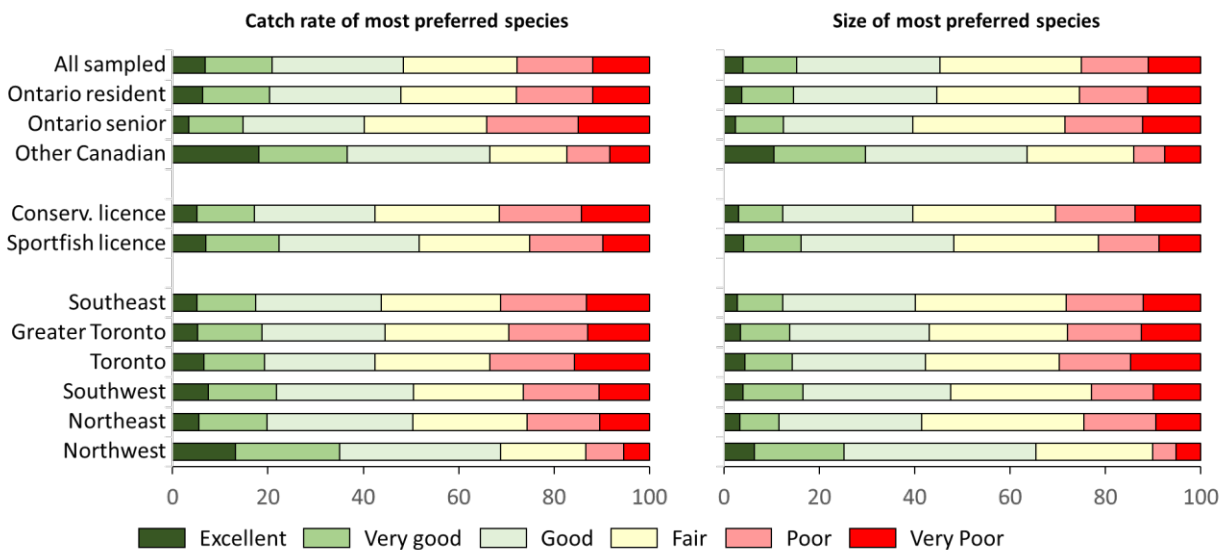


Figure 14. Ratings of catch rate (left panel) and size of fish (right panel) (%) for most preferred fish species in Ontario in 2020 by active anglers from different populations and, for Ontario residents, different licence types and origins.

Expenditures

For each angling population, we estimated household expenditures for angling in Ontario in 2020. These expenditures include investments (e.g., gear, equipment, and building-related) wholly attributable to fishing and consumables (e.g., trip-related costs), which are reported here as angling packages and others (Table 7, see tables A3.16 and A3.17 for more details). For the online survey, respondents were asked whether they had no household expenditures to report in 2020. Almost half (49%) of online respondents stated that they did not have any expenditures to report while only 26% of respondents to the print survey reported no expenditures. Even among active anglers, more than 40% compared to 15% of individuals responding online and print, respectively, stated they had no expenditures. Given this very high rate of stated zero expenditures by online respondents, our expenditure estimates for 2020 should be viewed as conservative.

Household expenditures by *all sampled* anglers were estimated to be \$1.70 billion in 2020 with \$1.0 billion in investments wholly attributable to fishing, \$631 million in consumables including licence sales, and 60 million in angling packages. This total increases to \$1.74 billion when combining *all sampled* and *non-resident* anglers if we assume that the average *non-resident* angler for 2020 spent the same amount as in 2015 after adjusting for inflation. While total expenditures in 2020 in by *all sampled* anglers increased from an inflation adjusted \$1.49 billion in 2015 to \$1.70 billion in 2020, these total expenditures declined when adding *non-resident* anglers to *all sampled anglers* (an inflation adjusted \$1.89 billion in 2015 to \$1.74 billion in 2020). We caution readers that these comparisons might be affected by the high rate of reporting no expenditures by online respondents in 2020 and revisions to methods to estimate expenditures between 2015 and 2020 (e.g., the slightly different approach to estimate investments wholly attributable to fishing in 2020 than 2015).

Table 7. Estimated fishing-related expenditures (millions of dollars) in Ontario in 2020 by population. (Totals for *non-resident* and *all sampled* anglers assume that average expenditures for non-resident anglers in 2015 when adjusted for inflation apply to 2020; * cannot separate from consumables and is reported as consumables here; ON = Ontario)

Population	Consumables (trip-related)	Angling packages	Investments (gear and equipment)	Total
ON resident	559	52	899	1,510
ON senior	40	3	60	104
Other Canadian	32	5	51	87
All sampled	631	60	1,011	1,701
Non-resident	38	*	2	40
All sampled and non-resident	669	60	1,013	1,741

The average household spent \$2,356 on consumables, angling packages, and investments wholly attributable to fishing. These averages were highest for *other Canadian* anglers (\$2,664), lowest for *Ontario senior* anglers (\$1,383), and for *Ontario resident* anglers was \$2,458.

About 9% of *all sampled* anglers reported purchasing an angling package in Ontario in 2020 (Table 8). This rate was highest for *other Canadian* anglers and lowest for *Ontario senior* anglers. Among the anglers who participated in an angling package, most indicated that they took an overnight trip to a road accessible lodge or outpost camp. *Other Canadian* anglers were most likely to have participated in a day fishing trip with a charter or guide, but they reported taking no ice angling packages in Ontario in 2020. Note that our definition of an angling package in 2020 differed from that in 2015 so results may not be comparable.

Table 8. Participation (%) in angling packages and, among participants, types of packages in Ontario in 2020 by population.

Type of angler package	Ontario resident	Ontario senior	Other Canadian	All sampled
Participated in angling package	7.0	3.9	18.5	7.3
Overnight, remote lodge/camp	9.9	10.8	3.0	9.1
Overnight, road lodge/camp	50.5	54.1	37.5	49.1
Overnight, ice fishing hut	12.0	13.5	0.0	10.1
Day, ice fishing hut	12.9	16.2	0.0	11.5
Day, charter boat/guide	24.5	35.1	73.0	30.5
Other	5.0	2.7	3.0	4.7

Discussion

Between 2015 and 2020, the number of *all sampled* and *non-resident* anglers declined by 21% while the corresponding active anglers in Ontario declined by 32% (274,000 and 379,000, respectively). These declines were primarily driven by the 89% reduction in licensed non-resident anglers from 2019 to 2020. While license sales during the same period for *other Canadian* anglers declined by 13%, sales for *Ontario resident* anglers increased by 7%. The decline in active anglers was also driven by lower rates of anglers reporting that they fished in 2020 compared to 2015. The reported rates of actively fishing in 2020 were 77 and 56% compared to 87 and 66% in 2015 for *Ontario resident* and *Ontario senior* anglers, respectively. These structural changes help to explain why estimates of days fished, fish caught, and fish harvested were lower in 2020 than 2015 when *all sampled* and *non-resident* anglers were combined.

For *non-resident* anglers, the COVID-19 pandemic was associated with large declines in days fished, fish catch and harvest, and expenditures relative to 2015. The causal factor for the declines was obvious (i.e., the pandemic and associated land border closure for non-essential travel between the United States and Canada prevented most *non-resident* anglers from fishing in Ontario). Expenditures were estimated to have declined from an inflation adjusted \$426 million in 2015 to \$39 million in 2020. While the 2020 estimates are uncertain as we did not sample this population, the sheer magnitude of the difference along with the 89% decline to licensed *non-resident* anglers provides overwhelming evidence that COVID-19 greatly reduced the number of *non-resident* anglers and thus, the associated economic impacts of fishing from *non-resident* anglers. These effects were most evident in northwestern Ontario where *non-resident* angling activity typically represents a large share of all activity (OMNRF 2020b; also see estimates of fishing activity for Lake of the Woods in Table A3.2).

When we exclude *non-resident* anglers from the overall estimates, 7 and 13% increases in days fished and fish caught occurred between 2015 and 2020 (harvest was estimated to decline by 6%). These increases were driven largely by *Ontario resident* anglers who had increases of 9 and 16% for days fished and fish caught, respectively, despite fewer active anglers in 2020 than 2015. Expenditures by these *Ontario resident* anglers were also estimated to increase from about an inflation adjusted \$1.3 billion in 2015 to \$1.5 billion in 2020.

Combined with increases for *younger* anglers in terms of the number of active (6%) and days fished (27%), the effect of the pandemic on recreational fishing in Ontario in 2020 varied among different angling populations. For Ontario resident anglers less than 65 years old, the pandemic was associated with increased fishing activity (and increased fish catch), which is consistent with the overall increase of fishing activity in the United States during the onset of the pandemic (Midway et al. 2021).

For *Ontario senior* anglers, the estimated decline in fishing activity from 2015 and 2020 is consistent with results from Denmark (Gundelund and Skov 2021) indicating older anglers to be more negatively affected by the pandemic than younger anglers. Expenditures for Ontario senior anglers, however, appeared to increase from an inflation adjusted \$90 million in 2015 to \$104 million in 2020. Time will tell whether these effects associated with the pandemic are ephemeral or represent a persistent change.

Surveys of anglers provide relevant information about how different social-ecological contexts such as the availability and abundance of different species influence anglers. For example, while walleye remained the most preferred fish species by *Ontario resident* anglers, this preference was more pronounced in northern Ontario where walleye abundance is highest (OMNDMNRF 2022). *Ontario resident* anglers from the northwest also rated their fishing experience as better (more satisfying) than other anglers. The increased rating likely reflects the higher abundance of walleye as catch-related fishing quality including harvest is known to be strongly and positively associated with satisfaction (Arlinghaus 2006, Birdsong et al. 2021). Likewise, use of live baitfish and consumption of fish tended to be highest in northern Ontario where walleye populations were more abundant. This latter point is consistent with the finding that Minnesota anglers who targeted walleye used live baitfish at higher rates than anglers who targeted largemouth bass (McEachran et al. 2022).

Walleye preference was not universal among *Ontario resident* anglers as anglers from Toronto and Greater Toronto areas were most likely to prefer the group of bass, sunfish, and crappie. Again, this preference is understandable given that smallmouth (and largemouth) bass abundance is highest in southern Ontario (OMNDMNRF 2022).

The importance of context is also revealed through differences in rates of harvesting fish. While we cannot clearly separate anglers' voluntary (e.g., size is too small to harvest) from mandatory (e.g., size-based limits) reasons for harvesting caught fish, the results imply that voluntary release of fish caught by anglers differs among contexts and angler populations. Coldwater fish species such as trout, salmon, and whitefish were harvested at rates above 25% and often above 30% by *all sampled* anglers in 2020. Likewise, popular coolwater fish species including walleye, yellow perch, and black crappie were harvested at rates above 25%. By contrast, warmwater species including bass and sunfish were harvested at rates less than 10%. This almost three-fold difference in harvest rates between coldwater and warmwater species largely held for the 2015 and 2010 surveys (OMNRF 2002a, 2014). These results suggest that anglers' decisions about harvesting fish are likely influenced by individual species, catch rates (e.g., high catch rates for sunfish), regulations, and norms and preferences for eating different fish species. These norms are present in other contexts such as Wisconsin where voluntary release rates for smallmouth bass were much higher than those for walleye (Gaeta et al. 2013). The differences in harvest rates between cold- and coolwater versus warmwater species is important. Overharvesting concerns might be more paramount for cold- and coolwater species because of high release rates by anglers for warmwater species. This result suggests that managing solely for a harvest perspective for warmwater species might fail to provide non-harvest aspects of recreational fishing that anglers seek for species with very high catch-and-release rates.

Another important difference in harvest rates was among populations of anglers. *Ontario senior* anglers reported the highest level of harvest rates among all angling populations. This result implies that while *Ontario seniors* might make up a small percentage of all Ontario anglers (i.e., 8% of *all sampled* anglers in 2020), their per day fishing activity could have more effects than those of other angler populations, especially since their deemed licenses have the higher limits associated with sport fishing licences. For example, *Ontario senior* anglers reported harvesting about 10% more fish per day than did *Ontario resident* anglers. Thus, understanding the

numbers and types of anglers can be important for understanding potential impacts to fish populations and fisheries.

Target species differed between the open water and ice fishing seasons. Fishing activity targeting smallmouth bass, largemouth bass, or bass in general represented about 32% of all activity during the open water season, but just 0.7% during the ice fishing season. This lack of target in winter is strongly influenced by the fishing closure for largemouth and smallmouth bass during ice conditions in much of southern Ontario (OMNRF 2020c) and a perceived decline in activity by smallmouth bass in winter. By contrast, many cool- and coldwater species represented a larger share of the targeted fishing during the ice than the open water season. Notable increases from open water to ice fishing seasons were estimated for yellow perch (from 3.1 to 15.3%), lake trout (from 3.7 to 13.4%), walleye (from 33.6 to 40.1%), and lake whitefish (from 0.4 to 8.0%). These differences are important as ice fishing activity in 2020 represented a larger share of all fishing activity (13%) than in 2015 (10%). Consequently, species such as lake whitefish were estimated to have more targeted fishing activity and catch in 2020 than in 2010 or 2015. These increases relate to the importance of ice fishing for lake whitefish along with its prominent role as an important species to harvest by anglers fishing Lake Simcoe (Dunlop et al. 2019).

Important differences also arose when comparing *Ontario resident* anglers by their licence type and origin. Anglers who held a sport fishing tended to be more committed and active in fishing 2020 (e.g., higher rates of actively fishing, numbers of days fishing, using watercraft in multiple waterbodies, and consuming fish along with using live baitfish) than those with a conservation licence. This commitment is consistent with findings that centrality of angling to their lifestyle is, on average, higher for sport fishing than conservation licence holders (Hunt et al. 2021a). As a key source to describe angler diversity, recreation specialization (Bryan 1977, Ditton et al. 1992) comprises commitment, behaviour, and cognition or skill dimensions (Scott and Shafer 2001). Given that, relative to conservation licence holders, sport fishing licence holders are more committed and avid (behavioural dimension), the type of fishing licence likely is a good proxy for recreation specialization in Ontario. Therefore, by monitoring sales for different fishing licence types, it is possible to understand how commitment, avidity, and other angler behaviours might be changing.

Anglers reported their adherence to three different rules and advice: (i) not disposing leftover baitfish in the waterbody they fished, (ii) following the advice for cleaning, draining, and drying watercraft before moving it to new waterbodies, and (iii) following advice for consuming sport fish in Ontario. Stated adherence varied by the type of rule or advice and characteristics of the angler. Adherence was highest for draining water from and cleaning watercraft before moving it to a new waterbody (90 to 95%), followed by NOT releasing live baitfish into waterbodies (about 80%), fish consumption advice and drying watercraft before moving (about 70%), and finally washing watercraft with a pressure washer or hot water before moving it (about 40%).

The adherence rates were not related to potential penalties. In 2020, the only adherence rate for a rule with a defined penalty was not releasing live baitfish into a waterbody. However, anglers' stated adherence was highest for cleaning vegetation and draining water from watercraft. The fact that 20% of live baitfish users in Ontario reported sometimes or often releasing live baitfish into waterbodies is concerning. The lack of adherence to this rule has not

appreciably improved over time. In a reanalysis of data for *Ontario resident* anglers from the 2010 and 2015 recreational fishing surveys, the adherence rates for releasing live baitfish were 22.2, 24.3, and 19.0% for 2010, 2015, and 2020, respectively, however, live baitfish use declined from 70.8 to 61.1 to 58.1% for 2010, 2015, and 2020, respectively with evidence that the rate of live baitfish use was even higher before 2010 (see Fera et al. 2014).

The adherence rates for clean, drain, dry also provide timely information from which to assess the effectiveness of a regulation for watercraft in Ontario that began on January 1, 2022 (Ontario Regulation 354/16, 2022). The regulation codifies the best management practices of cleaning vegetation and mud and draining water from watercraft and associated trailers into law. Future surveys of anglers can provide information on compliance with the new regulation that should provide insights into the effectiveness of changing a best management practice to a regulation.

The adherence to clean, drain, and dry principles in 2020 appeared to increase relative to 2003 (Fera et al. 2014) although this conclusion is affected by the slightly different ways that statements were worded in these surveys. The statements in 2020 nested the statements in 2003 (e.g., “allow boat to dry for 5 days” in 2003 became “allow the watercraft and fishing equipment to dry thoroughly for at least 5 days” in 2020). Consequently, we expected that adherence rates in 2020 should decline given that the statements in 2020 required more actions on the part of the angler. In three instances, however, the per cent of anglers stating that they always followed the principles was much higher in 2020 than 2003 (i.e., 84 to 61, 68 to 46, and 42 to about 10% for clean, dry, and wash, respectively, in 2020 compared to 2003 (Fera et al. 2014). Only for the principle of drain did we observe no improvement in stated adherence between 2020 and 2003 likely because the adherence rate was about 90%.

The estimated rates of adherence by anglers to follow rules and advice should be viewed with caution. On the one hand, social desirability bias likely results in overestimated rates as people tend to bias their self reports towards perceptions that they believe are correct or socially desirable (Fisher 1993). On the other hand, lack of awareness of rules and advice can influence adherence. For example, only 57% of *all sampled* anglers were aware of the Guide to Eating Sport Fish in Ontario, and thus, adherence could be improved through efforts to make anglers more aware of the guide. However, increased awareness is not always associated with increased adherence (Hunt et al. 2021c). While the estimates of adherence presented here may be upwardly biased, we believe that monitoring changes to stated adherence over time and among different rules and advice are relevant and needed. If anglers report increasing adherence to the rules and advice over time, it suggests that anglers are at a minimum, becoming increasingly aware that the behaviour in question is desirable.

Long-term monitoring of key statistics associated with recreational fishing in Ontario depends on the comparability of estimates over time. Nevertheless, when confronted with decreasing response rates, high levels of item non-response, and highly complex and lengthy surveys, it is incumbent for researchers to review and where necessary revise the survey design and questionnaires. Given the very poor response rate for the 2015 survey, we modified the survey design and re-evaluated questions and questionnaires for the 2020 survey. With a focus on maintaining comparability of estimates over time, we revised the survey design (e.g., three contacts and personalization), reduced costs to deliver the survey (e.g., reducing content and

presenting questions in two versions, ensuring that mail packages would not require additional postage), and reduced the cognitive burden for the angler (e.g., reviewed the survey and questions with focus groups of anglers). These revisions likely explain the marked improvement to the response rate (47% in 2020 compared to 18 and 35% in 2015 and 2010, respectively, for *all sampled* anglers). We also saw that in 2020 about 75% of all survey responses were provided online. While our survey revisions made the comparability of some estimates such as expenditures more challenging, we believe they enhance the validity of the survey estimates for 2020.

For the 2025 survey, further revisions to the design and questions could be considered. At minimum, efforts should be spent to achieve high levels of response without incurring high levels of printing and postage costs. We also recommend reviewing three long-standing practices with the survey. First, the expenditure questions should be reviewed to assess the current focus on reporting household rather than individual expenditures and to reconsider the expenditure categories included. It might be desirable to revise the future survey such that it is comparable with surveys of hunters in Ontario. A need also exists to ensure consistency in the ways that online and print respondents report their expenditures. Second, a more direct satisfaction question could be asked to anglers. In 2015, a set of traditional satisfaction questions along with the overall evaluation question was asked (OMNRF 2020a) and these traditional satisfaction questions are comparable with those from ministry hunting surveys. The current experience rating question adopts an asymmetric scale, which likely results in an inflated perspective about the benefits that anglers obtain from fishing. Finally, reconsidering the ability of respondents to recall specific details of their fishing trips over the course of an entire year is warranted. Combined with the increased number of responses provided online, the design of future surveys should consider using proxies for measures such as number of fish caught and harvested rather than asking anglers for exact numbers, which are likely to be significantly upwardly biased (Hogg et al. 2010).

Conclusions

We estimated a net loss to fishing activity, days fished, fish caught, fish harvested, and expenditures in 2020 relative to 2015. However, these average effects blur the nuanced changes among angler populations. While the numbers of active anglers and fishing activity declined among *non-resident* and *Ontario senior* anglers, activity increased for *Ontario resident* and *younger* anglers. It is likely that these differences between recreational fishing in Ontario between 2015 and 2020 were influenced by the onset of the COVID-19 pandemic.

Fishing activity, other behaviours, and preferences were influenced by the type of angler and the context they faced. While anglers most preferred and targeted walleye, these preferences and targeting rates were most evident for northwest Ontario anglers and anglers holding a sport fishing licence. These two groups of anglers were also more likely to have used live baitfish, consumed sport fish, been more satisfied, and spent more days fishing per angler in 2020 than other anglers. These differences confirm that anglers are a diverse community and accounting for this diversity is important for effectively managing the behaviours, impacts, and benefits from recreational fishing.

We also examined anglers' stated adherence towards following advice or rules to prevent unwanted impacts to aquatic ecosystems and anglers. While most anglers stated that they adhered to the advice, a sizeable per cent of anglers did not (e.g., 20% of live baitfish users reporting releasing baitfish into a waterbody). Given the more than one million anglers in Ontario in 2020, even a small rate of anglers not following advice and rules can lead to significant impacts to resources and people.

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Appendix 1. Glossary

Definitions are provided to clarify usage for select terms in this report.

All sampled anglers consist of *Ontario resident*, *Ontario senior*, and *other Canadian* anglers.

An **angler** is an individual who participates in recreational fishing regardless of method.

An **angling package** consists of purchases made for fishing from or through a lodge, outfitter, or their agent that includes services such as lodging, food, transportation, and guiding.

An **active angler** is a person who fished in Ontario in the year they were surveyed.

The **bass, sunfish, and crappie** group consists of all fish species from the Centrarchidae family.

The **catfish** group consists of all fish species from the Ictaluridae family.

Consumables are expenditures on goods and services (e.g., food, accommodation, licence fees) incurred during the process of fishing in Ontario.

Days fished represents a day, or any part of a day, during which an angler fished in Ontario.

A **deemed licence holder** is a person who did not purchase a fishing licence, but who is considered licensed given age (<18 years or >64 years) or other criteria (e.g., disability status).

Fish caught equals the total number of fish caught in 2020.

Fisheries management zone is one of 20 areas into which Ontario is divided to support fisheries management.

A **household** consists of individuals residing in the same dwelling.

Investments are expenditures on gear, equipment, and land that support angling activities. Only the percentage of these investments that are attributable to fishing (wholly attributable) are reported here.

The **multi species** group consists of cases where an angler targeted or preferred fish from multiple groups (e.g., walleye and yellow perch or smallmouth bass and northern pike).

A **non-resident** angler is a non-resident of Canada who purchased a fishing licence for Ontario during the survey year.

An **other Canadian** angler is a Canadian but not Ontario resident who purchased a fishing licence for Ontario during the survey year.

An **Ontario resident** angler is an Ontario resident who purchased a fishing licence for Ontario during the survey year.

An **Ontario senior** angler is an Ontario resident who purchased a fishing licence for Ontario in the past but now because of their age (65 to 70 years old) are considered a deemed fishing licence holder.

The **pike and muskellunge** group consists of all fish species from the Esocidae family.

Recreational fishing is a non-commercial fishing activity. Ceremonial and subsistence fishing are not covered by the survey, and no attempt was made to include these fishing activities in our results.

The **trout and salmon** group consists of all species of fish from the Salmoninae family except Coregonids.

The **walleye and perch** group consists of all fish species from the Percidae family.

A **younger** angler is an individual less than 18 years old who resided with a sampled angler and was identified to have fished in Ontario during the survey year.

Appendix 2. Copy of the 2020 Ontario Recreational Fishing Surveys

2020 Survey of Recreational Fishing in Ontario



Here is a list of most fish species that anglers fish for in Ontario

Atlantic Salmon	Channel Catfish	Northern Pike
Black Crappie	Chinook Salmon	Pumpkinseed (sunfish)
Bluegill (sunfish)	Coho Salmon	Rainbow Smelt
Brook (speckled) Trout	Lake Herring (cisco)	Rainbow Trout (steelhead)
Brown Trout	Lake Trout	Smallmouth Bass
Bullhead (catfish)	Lake Whitefish	Splake
Burbot (ling)	Largemouth Bass	Walleye (pickerel)
Carp	Muskellunge (muskie)	Yellow Perch

If you misplaced your postage-paid return envelope, please mail the survey to Dr. Len Hunt, Research Scientist, Human Dimensions of Conservation and Ecosystem Management, at the address below.

Centre for Northern Forest Ecosystem Research
103-421 James Street South
Thunder Bay, ON, Canada
P7E 2V6



1) Did you fish in Ontario in 2020? (please check a box below)

- ☐ Yes ☐ No (please go to question 9)

2) About how many days did you fish in Ontario in 2020 during the ...

open water season _____ days

ice fishing season _____ days

3) On average, how many hours did you fish on a fishing day in Ontario in 2020 for the ...

open water season _____ hours per day

ice fishing season _____ hours per day

4) What fish species do you most prefer to fish for in Ontario? (if possible, be specific – on the survey's front cover is a list of many fish species that anglers fish for in Ontario)

Most preferred species _____

Second most preferred species _____

Third most preferred species _____

5) How would you rate your fishing experience in Ontario in 2020?

	Very poor	Poor	Fair	Good	Very good	Excellent
Your catch of your most preferred species	☐	☐	☐	☐	☐	☐
Size of caught fish for your most preferred species	☐	☐	☐	☐	☐	☐
Your catch of your second most preferred species	☐	☐	☐	☐	☐	☐
Size of caught fish for your second most preferred species	☐	☐	☐	☐	☐	☐
Your overall recreational fishing experience	☐	☐	☐	☐	☐	☐

6) Did you fish in an organized fishing tournament or derby in Ontario in 2020?

- ☐ Yes ☐ No

7) For water bodies that you fished in Ontario in 2020, please record on the next page:

- the water body name AND a nearby landmark (e.g., town or park near the water body);
- days fished and species that **you** mainly fished for open-water and ice seasons;
- Fishing method (shore, boat) and the times of day that **you** fished; and
- about the total number of fish that **you** caught and that **you** harvested (kept) by species.

7a) Your Most Fished Water Body in 2020

Water body name _____ Nearby landmark (town or park name) _____

Number of days ice fished _____ Main species fished for (ice) _____

Number of days fished in open water _____ Main species fished for (open water) _____

You fished the open water from ... ☐ Watercraft (e.g., boat, canoe) ☐ Shore/dock/wading
(please check all that apply) ☐ Before 10AM ☐ 10AM to 2PM ☐ 2PM to 5PM ☐ After 5PM

*Please estimate how many fish that **you** caught and that **you** kept at this water body in 2020*

Species	Caught	Kept		Caught	Kept		Caught	Kept
Walleye/pickereel	_____	_____	Black Crappie	_____	_____	Chinook Salmon	_____	_____
Northern Pike	_____	_____	Sunfish	_____	_____	Coho Salmon	_____	_____
Muskellunge	_____	_____	Lake Trout	_____	_____	Rainbow Trout	_____	_____
Smallmouth Bass	_____	_____	Brook Trout	_____	_____	Other (please specify below)	_____	_____
Largemouth Bass	_____	_____	Splake	_____	_____		_____	_____
Yellow Perch	_____	_____	Lake Whitefish	_____	_____		_____	_____

7b) Your Second Most Fished Water Body in 2020

Water body name _____ Nearby landmark (town or park name) _____

Number of days ice fished _____ Main species fished for (ice) _____

Number of days fished in open water _____ Main species fished for (open water) _____

You fished the open water from ... ☐ Watercraft (e.g., boat, canoe) ☐ Shore/dock/wading
(please check all that apply) ☐ Before 10AM ☐ 10AM to 2PM ☐ 2PM to 5PM ☐ After 5PM

*Please estimate how many fish that **you** caught and that **you** kept at this water body in 2020*

Species	Caught	Kept		Caught	Kept		Caught	Kept
Walleye/pickereel	_____	_____	Black Crappie	_____	_____	Chinook Salmon	_____	_____
Northern Pike	_____	_____	Sunfish	_____	_____	Coho Salmon	_____	_____
Muskellunge	_____	_____	Lake Trout	_____	_____	Rainbow Trout	_____	_____
Smallmouth Bass	_____	_____	Brook Trout	_____	_____	Other (please specify below)	_____	_____
Largemouth Bass	_____	_____	Splake	_____	_____		_____	_____
Yellow Perch	_____	_____	Lake Whitefish	_____	_____		_____	_____

7c) Your Third Most Fished Water Body in 2020

Water body name _____ Nearby landmark (town or park name) _____

Number of days ice fished _____ Main species fished for (ice) _____

Number of days fished in open water _____ Main species fished for (open water) _____

You fished the open water from ... ☐ Watercraft (e.g., boat, canoe) ☐ Shore/dock/wading
(please check all that apply) ☐ Before 10AM ☐ 10AM to 2PM ☐ 2PM to 5PM ☐ After 5PM

*Please estimate how many fish that **you** caught and that **you** kept at this water body in 2020*

Species	Caught	Kept		Caught	Kept		Caught	Kept
Walleye/pickereel	_____	_____	Black Crappie	_____	_____	Chinook Salmon	_____	_____
Northern Pike	_____	_____	Sunfish	_____	_____	Coho Salmon	_____	_____
Muskellunge	_____	_____	Lake Trout	_____	_____	Rainbow Trout	_____	_____
Smallmouth Bass	_____	_____	Brook Trout	_____	_____	Other (please specify below)	_____	_____
Largemouth Bass	_____	_____	Splake	_____	_____		_____	_____
Yellow Perch	_____	_____	Lake Whitefish	_____	_____		_____	_____

7d) Your Fourth Most Fished Water Body in 2020

Water body name _____ Nearby landmark (town or park name) _____

Number of days ice fished _____ Main species fished for (ice) _____

Number of days fished in open water _____ Main species fished for (open water) _____

You fished the open water from ... ☐ Watercraft (e.g., boat, canoe) ☐ Shore/dock/wading
(please check all that apply) ☐ Before 10AM ☐ 10AM to 2PM ☐ 2PM to 5PM ☐ After 5PM

*Please estimate how many fish that **you** caught and that **you** kept at this water body in 2020*

Species	Caught	Kept		Caught	Kept		Caught	Kept
Walleye/pickereel	_____	_____	Black Crappie	_____	_____	Chinook Salmon	_____	_____
Northern Pike	_____	_____	Sunfish	_____	_____	Coho Salmon	_____	_____
Muskellunge	_____	_____	Lake Trout	_____	_____	Rainbow Trout	_____	_____
Smallmouth Bass	_____	_____	Brook Trout	_____	_____	Other (please specify below)	_____	_____
Largemouth Bass	_____	_____	Splake	_____	_____		_____	_____
Yellow Perch	_____	_____	Lake Whitefish	_____	_____		_____	_____

8) If you fished at more than four water bodies, please provide some details about your fishing activities on these other water bodies.

Water body name	Nearby landmark (town or park name)	Number of days fished ...		Main species fished for in open water
		(open water)	(ice)	
5. _____	_____	_____	_____	_____
6. _____	_____	_____	_____	_____
7. _____	_____	_____	_____	_____
8. _____	_____	_____	_____	_____
9. _____	_____	_____	_____	_____
10. _____	_____	_____	_____	_____

Please record any additional water bodies on a separate page and include it with the survey.

Household Expenditures on Recreational Fishing

Note: "Member of your household" refers only to individuals living in your residence/home in 2020

9) What best describes the types of angling packages that you and/or members of your household purchased for fishing in Ontario in 2020? (please check all that apply)

Note: "Angling package" refers to purchases made from or through a lodge, outfitter, or their agent that includes services for fishing such as lodging, food, transportation, and guiding

- ☐ No angling package was purchased in 2020 (please skip to question 10)
- ☐ Overnight trip(s) to a remote (only plane or train-accessible) lodge or outpost camp
- ☐ Overnight trip(s) to a road or boat-accessible lodge or outpost camp
- ☐ Overnight trip(s) to a commercial ice fishing hut
- ☐ Day trip(s) to a commercial ice fishing hut
- ☐ Day trip(s) for charter boat or guided fishing
- ☐ Other angling package (please specify) _____

10) What water bodies did you fish in with your purchased angling packages?

Water body name(s)	Name of lodge/outfitter
1. _____	_____
2. _____	_____
3. _____	_____

11) About how much did you and members of your household spend on recreational fishing in Ontario in 2020? (you do not need to include your fishing licence costs; please do not include expenditures outside of Ontario)

Trip-Related and Fishing Equipment Expenditures (record zeros if no expenditures in Ontario were made in 2020)	Amount spent in Ontario in 2020
All angling packages from Q9 (DO NOT REPEAT THIS AMOUNT BELOW)	\$ _____
Overnight accommodation (e.g., hotels, motels, cottage)	\$ _____
Campsite fees (e.g., private, provincial, national)	\$ _____
Food (e.g., groceries, restaurant meals, alcoholic beverages)	\$ _____
Travel costs within Ontario for recreational fishing (e.g., vehicle expenses including gas and repairs, car rentals, air fares)	\$ _____
Household-owned boat/watercraft costs (e.g., gas, repairs, moorage, storage, insurance)	\$ _____
Rentals for fishing (e.g. boats, gear, snowmobiles)	\$ _____
Fishing supplies (e.g., lures, line, tackle, bait)	\$ _____
Fishing equipment (e.g., rods, reels, fish finders, ice huts)	\$ _____
Fishing-related clothing (e.g., vests, waders)	\$ _____
Access fees (e.g., park fees, boat launch fees, fish derby fees)	\$ _____
Other trip expenditures (please specify) _____	\$ _____

Large Purchases Related to Fishing
Record zeros if no large purchases in Ontario were made in 2020

Camping equipment (e.g., tents, camper trailers)	\$ _____
New and used boating equipment (e.g., boats/watercraft, motors, trailers)	\$ _____
New and used special vehicles (e.g., 4x4s, camper, ATV, snowmobiles)	\$ _____
Land-buildings (e.g., cabins, cottages, land)	\$ _____
Other investments (please specify) _____	\$ _____

12) For only your large purchases related to fishing in the box above, about what percentage of these were spent primarily for fishing in Ontario? (please check a box)

0%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐

Fishing and Aquatic Invasive Species

13) Did YOU fish in more than one water body in Ontario in 2020 using the same watercraft (boat, kayak, canoe) that you own?

- ☐ Yes ☐ No (Please go to question 16)

14) How often did you take the following actions in 2020 to prevent the introduction and spread of aquatic invasive species when moving your watercraft between water bodies?

	Never	Sometimes	Always
Visually inspect and manually remove attached plants, animals and mud from the watercraft, motor, trailer & fishing equipment	☐	☐	☐
Drain water from the watercraft (including motor, bilge, live well)	☐	☐	☐
Allow the watercraft and fishing equipment to dry thoroughly for at least 5 days	☐	☐	☐
Wash the watercraft (including the motor) or equipment with high pressure and/or hot water	☐	☐	☐

15) If you selected never and/or sometimes in the previous question for any of these actions, please indicate why? (please select all that apply)

- ☐ I was not aware of the need to take these actions
- ☐ The water bodies where I fish or boat do not have aquatic invasive species
- ☐ I do not believe aquatic invasive species are a problem
- ☐ I did not have access to the right equipment to wash the watercraft
- ☐ It is inconvenient to inspect and wash my watercraft
- ☐ I do not believe the actions will help prevent the spread of aquatic invasive species

16) How do you most prefer to receive fishing-related information from government agencies (e.g., regulations, places to fish, consumption advisories)?

- ☐ Online interactive maps ☐ Mobile apps ☐ E-mail ☐ In person/phone
- ☐ Web sites ☐ Social media ☐ Print ☐ Other (specify) _____

How Your 2020 Fishing Compares to Fishing In 2019

17) Did you fish in Ontario in 2019?

- ☐ Yes ☐ No (please go to question 19)

Please Turn to Next Page

18) How did your fishing in Ontario in 2019 compare to your fishing in 2020?

	More in 2019 than 2020	About the same in 2019 as 2020	More in 2020 than 2019
Your overall days fished	☐	☐	☐
Your days fished during Winter (Jan to March)	☐	☐	☐
Your days fished during Spring (April to June)	☐	☐	☐
Your days fished during Summer (Jul to Sep)	☐	☐	☐
Your days fished during Fall (Oct to Dec)	☐	☐	☐
Days fished by your other household members	☐	☐	☐
Number of water bodies you fished	☐	☐	☐
Money spent by you and your household to fish	☐	☐	☐
Time you spent online looking for fishing information	☐	☐	☐

Information About You and Your Household

19) What describes the Ontario fishing licence that you possess to fish in Ontario?

- ☐ Sport fishing (higher price and higher possession limits)
- ☐ Conservation (lower price and lower possession limits)
- ☐ No purchase required (e.g., Canadian resident who is 65 years and older)

20) What are the first three characters of your postal code? _____

21) In what year were you born? _____

22) Are you?

- ☐ Female
- ☐ Male
- ☐ Other
- ☐ Prefer not to answer

23) Excluding yourself, how many people residing in your home fished in Ontario in 2020 and how many days in total did they fish?

	Number who fished in Ontario in 2020	Total number of days fished in Ontario in 2020
Children under 18 years old	_____	_____
Adults 18 to 64 years old	_____	_____
Adults 65 years and older	_____	_____

Thank you! Please record any comments about fishing in Ontario on a separate sheet. Please do not include your name or other personally identifiable information in these comments.

The final two pages of the questionnaire from the second version of the survey with questions that differed from version 1. (Note that question six from version 1 was not asked in version 2.)

Information About Use of Bait, Lures, and Eating Fish			
12) How often did <u>you</u> use live baitfish when fishing in Ontario in 2020?			
☐ Did not use (<i>please go to Question 15</i>) ☐ Sometimes ☐ Often			
13) How did you obtain the live baitfish that you used? (<i>check all that apply</i>)			
☐ Purchased from a commercial retailer (e.g., bait store) ☐ Self harvested ☐ Other (please specify) _____			
14) What do you do with your leftover live baitfish at the end of the day?			
	Never	Sometimes	Often
Dispose baitfish on land or in trash	☐	☐	☐
Preserve baitfish (frozen/salted)	☐	☐	☐
Give baitfish to other anglers	☐	☐	☐
Retain baitfish live for later use	☐	☐	☐
Someone else takes care of the baitfish	☐	☐	☐
Release baitfish into water body	☐	☐	☐
Other (please specify) _____	☐	☐	☐
15) How often did you use other bait/tackle when fishing in Ontario in 2020?			
	Did not use	Sometimes	Often
Dead baitfish and/or fish parts	☐	☐	☐
Live worms	☐	☐	☐
Live leeches	☐	☐	☐
Fish eggs	☐	☐	☐
Other natural bait (frogs, crayfish)	☐	☐	☐
Soft lures (artificial worms, grubs, tubes)	☐	☐	☐
Hard lures (crankbaits, spoons, flies)	☐	☐	☐
Other (please specify) _____	☐	☐	☐
16) About how often did <u>you</u> eat fish caught by angling in Ontario waters in 2020?			
☐ Never	☐ Once a month	☐ Once a week	☐ More than twice a week
☐ Less than once a month	☐ 2 to 3 times a month	☐ Twice a week	
Please Turn to Next Page			

17) Are you aware of the Guide to Eating Ontario Fish?

- ☐ Yes ☐ No (please go to question 19)

18) How often do you follow the consumption advice in the Guide?

- Never Sometimes Usually Always Not sure
☐ ☐ ☐ ☐ ☐

Information About You and Your Household

19) What describes the Ontario fishing licence that you possess to fish in Ontario?

- ☐ Sport fishing (higher price and higher possession limits)
☐ Conservation (lower price and lower possession limits)
☐ No purchase required (e.g., Canadian resident who is 65 years and older)

20) What are the first three characters of your postal code? _____

21) In what year were you born? _____

22) Are you?

- ☐ Female ☐ Male ☐ Other ☐ Prefer not to answer

23) Excluding yourself, how many people residing in your home fished in Ontario in 2020 and how many days in total did they fish?

	Number who fished in Ontario in 2020	Total number of days fished in Ontario in 2020
Children under 18 years old	_____	_____
Adults 18 to 64 years old	_____	_____
Adults 65 years and older	_____	_____

24) Did anyone in your home who is 18 to 64 years old, fish without a licence on a free fishing day in Ontario in 2020?

- ☐ Yes ☐ No

Thank you! Please record any comments about fishing in Ontario on a separate sheet. Please do not include your name or other personally identifiable information in these comments.

Appendix 3. Detailed results of angler surveys

Table A3.1. Non-response bias tests between early and late responders to the 2020 survey of Ontario anglers. (* = statistically significant difference between early and late responders at $P < 0.05$.)

Variable	Ontario resident	Ontario senior	Other Canadian	All sampled
Fished in 2020				
Early (%)	79.9	56.4	87.5	78.3
Late (%)	75.9	52.1	95.2	74.9
Z-value	4.10*	1.05	-2.05*	3.60*
Df	12,893	1,147	507	14,551
Days fished				
Early (average)	18.1	17.1	10.8	17.8
Late (average)	18.1	17.2	10.8	17.7
t-value	0.07	-0.04	-0.02	0.13
Df	10,222	639	450	11,315
Expenditures				
Early (average \$)	2,604.52	1,384.10	3,058.04	2,529.10
Late (average \$)	2,515.73	1,348.08	2,527.33	2,440.24
t-value	0.28	0.07	0.45	0.31
Df	12,462	1,027	503	13,996

Table A3.2. Age (%) of respondents to the 2020 survey of Ontario anglers by population. (Values are based on unweighted responses.)

Age group	Ontario resident	Ontario senior	Other Canadian	All sampled
18 to 29 years	12.3	0.0	10.8	11.3
30 to 39 years	17.6	0.0	19.8	16.3
40 to 49 years	22.3	0.0	22.0	20.5
50 to 59 years	27.8	0.0	27.0	25.6
60 to 69 years	19.5	94.3	20.2	25.3
70 or more years	0.5	5.7	0.2	0.9

Table A3.3. Fishing activity estimates in Ontario by population and survey year. (* = 2020 estimates assume averages from 2015 hold for 2020; ** = estimates for *younger* anglers in 2020 exclude non-residents.)

Population	Ontario resident	Ontario senior	Other Canadian	Non-resident	Younger
2020					
Number of anglers	902,048	82,370	45,838	35,175	NA
Active anglers	709,059	45,912	40,762	27,338*	344,508**
Open water anglers	678,144	44,701	41,661	NA	NA
Ice anglers	196,590	9,336	5,715	NA	NA
Fishing effort open (days)	10,466,250	704,534	392,571	NA	NA
Fishing effort ice (days)	1,688,787	80,472	33,799	NA	NA
Total fishing effort (days)	12,155,037	785,006	426,370	202,782*	2,043,649**
Fishing effort open (hours)	43,770,862	2,874,961	2,133,812	NA	NA
Fishing effort ice (hours)	9,156,743	400,123	208,044	NA	NA
Total fishing effort (hours)	52,927,605	3,275,084	2,341,856	NA	NA
2015					
Number of anglers	867,683	88,913	62,071	321,684	NA
Active anglers	756,371	57,114	59,057	315,489	324,253
Open water anglers	741,931	55,939	57,302	312,326	NA
Ice anglers	198,753	12,584	5,523	9,037	NA
Fishing effort open (days)	9,975,730	806,515	374,352	1,951,503	NA
Fishing effort ice (days)	1,181,122	82,563	21,485	35,975	NA
Total fishing effort (days)	11,156,852	889,078	415,837	1,987,478	1,615,785
Fishing effort open (hours)	47,609,879	3,592,478	2,101,187	13,629,569	NA
Fishing effort ice (hours)	6,874,202	376,511	120,894	252,115	NA
Total fishing effort (hours)	54,484,082	3,968,989	2,222,081	13,881,684	NA
2010					
Number of anglers	1,051,332	63,761	31,468	313,446	NA
Active anglers	877,200	56,350	29,899	308,211	370,435
Open water anglers	846,947	45,832	28,888	304,616	NA
Ice anglers	244,805	13,965	5,396	10,110	NA
Fishing effort open (days)	11,772,246	750,711	275,809	2,204,915	NA
Fishing effort ice (days)	1,673,759	117,602	27,637	46,232	NA
Total fishing effort (days)	13,445,005	868,313	303,446	2,251,147	2,386,861
Fishing effort open (hours)	NA	NA	NA	NA	NA
Fishing effort ice (hours)	NA	NA	NA	NA	NA
Total fishing effort (hours)	NA	NA	NA	NA	NA

Table A3.4. Estimated fishing activity (thousands of days) at most heavily fished waterbodies in Ontario in 2020 by all sampled anglers. (2015 and 2010 estimates include fishing activity by *non-resident* anglers.)

Waterbody	Open water	Ice	Total	2015 total	2010 total
Lake Huron (includes Georgian Bay)	815	90	905	602	867
Lake Ontario (includes Bay of Quinte)	691	87	778	631	803
Lake Erie	683	34	716	713	809
Lake Simcoe	316	218	534	483	648
Lake Nipissing	219	103	322	271	315
Ottawa River	258	56	314	267	383
Rice Lake	215	17	233	177	333
Lake of the Woods	192	29	221	381	488
Lake St. Clair	173	21	194	198	n/a
Grand River	180	4	183	250	236
St. Lawrence River	148	11	159	254	201
Pigeon Lake	140	3	143	105	124
Rideau River	109	10	119	102	177
Lake Superior	92	27	119	66	46
Scugog Lake	96	15	111	97	201
Detroit River	97	3	100	155	141
Trent River	95	4	99	122	NA
Saugeen River	95	4	98	48	66
French River	78	7	85	116	117
St. Clair River	78	5	83	54	73
Thames River	81	1	82	61	98
Big Rideau Lake	71	6	77	65	98
Sturgeon Lake	69	4	72	63	48
Buckhorn Lake	66	1	67	76	67
Niagara River	63	1	64	52	132
Rainy Lake	48	15	63	91	111
Balsam Lake	60	2	62	67	54
Chemong Lake	54	6	60	44	84
Lake Muskoka	47	10	57	53	72
Lake Couchiching	43	12	56	39	25

Table A3.5. Fishing activity (%) targeting species in Ontario in 2020 by population and season.

Species	Ontario resident		Ontario senior		Other Canadian		All sampled	
	Open	Ice	Open	Ice	Open	Ice	Open	Ice
Walleye	32.1	40.7	42.6	23.6	56.0	50.4	33.6	40.1
Smallmouth bass	15.8	0.6	12.5	0.0	11.1	1.0	15.4	0.6
Largemouth bass	11.3	0.0	6.9	0.0	3.4	0.0	10.8	0.0
Northern pike	7.8	9.1	7.2	10.8	6.8	1.6	7.7	9.1
Lake trout	3.6	13.1	4.8	16.2	4.1	22.4	3.7	13.4
Bass (any)	5.7	0.1	6.7	0.0	2.3	0.0	5.6	0.1
Yellow perch	3.1	15.4	4.6	18.7	0.0	0.8	3.1	15.3
Rainbow trout	4.5	1.6	2.3	2.5	0.7	2.0	4.2	1.6
Anything	3.4	1.5	1.8	0.4	1.4	1.2	3.2	1.4
Chinook salmon	3.1	0.0	1.1	0.0	2.2	0.0	3.0	0.0
Brook trout	1.4	4.2	2.2	4.7	0.5	6.6	1.4	4.2
Muskellunge	1.7	0.3	1.3	0.0	7.9	0.0	1.9	0.3
Lake whitefish	0.3	8.0	1.7	10.4	0.0	2.3	0.4	8.0
Trout (any)	1.3	0.9	1.5	4.7	0.0	0.0	1.3	1.1
Sunfish+	1.1	0.3	0.6	4.1	0.0	0.0	1.0	0.4
Black crappie	0.7	2.2	0.5	1.2	0.3	4.1	0.7	2.2
Coho salmon	0.5	0.0	0.1	0.0	2.7	0.0	0.5	0.0
Splake	0.2	1.5	0.1	2.8	0.1	2.3	0.2	1.5
Catfish	0.5	0.0	0.0	0.0	0.0	0.0	0.4	0.0
Common carp	0.4	0.0	0.2	0.0	0.0	0.0	0.4	0.0
Brown trout	0.3	0.0	0.2	0.0	0.0	0.0	0.3	0.0
Other coldwater	0.7	0.1	0.9	0.0	0.5	5.3	0.7	0.2
Other warmwater	0.4	0.1	0.0	0.0	0.0	0.0	0.3	0.1
Other coolwater	0.1	0.2	0.0	0.0	0.0	0.0	0.1	0.1
Other	0.1	0.1	0.0	0.0	0.1	0.0	0.1	0.1

Table A3.6. Use of bait and tackle (%) to fish in Ontario in 2020 by active anglers from different angling populations (some = sometimes; never = 100 – *often* – *some*).

Bait/tackle	All sampled		Ontario resident		Ontario senior		Other Canadian	
	Often	Some	Often	Some	Often	Some	Often	Some
Hard baits	46.6	31.8	47.2	31.7	41.1	33.4	43.2	33.0
Soft plastics	34.6	40.0	35.8	40.4	26.7	35.9	23.7	36.4
Earthworms	36.7	34.0	37.5	35.0	42.0	27.7	17.0	23.3
Live baitfish	24.9	30.1	24.5	30.7	27.7	31.7	29.5	17.6
Live leeches	4.3	11.4	4.0	11.2	4.0	12.0	9.1	12.9
Dead baitfish	3.0	12.9	2.9	13.1	1.2	10.1	7.7	13.5
Eggs	1.8	5.9	1.9	6.4	1.8	4.9	0.0	0.0
Other natural	0.8	6.1	0.8	6.3	1.5	7.1	0.4	2.3
Other	0.5	0.5	0.5	0.6	0.0	0.3	0.4	0.0

Table A3.7. Source of live baitfish (%) in Ontario in 2020 by live baitfish users from different populations (commercial purchase and self-harvest include cases where respondents also stated other).

Population	Commercial purchase	Self harvest	Commercial and self harvest	Only other
Ontario resident	79.0	8.0	12.0	1.0
Ontario senior	81.5	7.2	10.3	1.0
Other Canadian	89.8	1.0	2.9	6.3
All sampled	79.6	7.6	11.5	1.3

Table A3.8. Ways of handling leftover live bait (%) in Ontario in 2020 by live baitfish users from different populations (some = sometimes; never = 100 – *often* – *some*).

Action	All sampled		Ontario resident		Ontario senior		Other Canadian	
	Often	Some	Often	Some	Often	Some	Often	Some
Threw away	22.5	21.7	22.9	22.3	24.7	16.8	11.8	16.3
Gave away	18.8	38.8	18.9	39.3	14.1	33.0	23.2	36.5
Retained	27.9	31.5	27.6	32.7	28.3	24.6	34.7	18.5
Preserved	8.7	17.1	8.7	17.5	7.3	8.9	11.6	21.3
Released	5.8	14.7	5.9	14.4	4.2	11.5	6.2	24.6
Other handled it	7.7	17.3	7.2	18.1	7.3	9.4	18.5	13.4

Table A3.9. Awareness (%) of Guide to Eating Sport Fish in Ontario in 2020 by population and adherence (%) to the advice in the guide among aware anglers (not sure was excluded from the per cent estimates for always, usually, sometimes, and never).

Guide	All sampled	Ontario resident	Ontario senior	Other Canadian
Awareness	56.6	57.4	69.0	28.2
Adherence to advice				
Always	44.7	44.4	40.3	55.1
Usually	25.2	25.3	27.7	20.2
Sometimes	14.3	14.6	15.5	8.1
Never	15.8	15.7	16.5	17.0
Not sure	9.9	10.1	8.4	7.0

Table A3.10. Adherence (%) to principles of “clean, drain, and dry” in Ontario in 2020 by anglers from different populations who fished multiple waterbodies with the same watercraft (some = sometimes; never = 100 – *always* – *some*).

Precaution	All sampled		Ontario resident		Ontario senior		Other Canadian	
	Always	Some	Always	Some	Always	Some	Always	Some
Clean	85.2	9.4	85.4	9.4	84.4	9.1	81.4	10.5
Drain	89.5	3.7	90.5	2.9	80.5	9.1	74.6	17.3
Dry	68.8	23.3	69.0	23.7	67.5	16.9	64.7	26.7
Wash	43.0	30.3	44.4	30.8	24.7	27.3	41.6	23.0

Table A3.11. Reported change (%) in fishing activity and other behaviours in Ontario by anglers actively fishing in 2019 and 2020 from different populations. (Less = less in 2020 than 2019; More = more in 2020 than 2019; about the same = 100 – *less* – *more*.)

Fishing activity or other	All sampled		Ontario resident		Ontario senior		Other Canadian	
	Less	More	Less	More	Less	More	Less	More
All days	36.6	14.4	37.0	14.9	36.5	9.1	28.5	13.0
Winter days	19.9	8.1	20.7	8.3	13.3	6.0	11.0	5.5
Spring days	29.0	10.6	29.0	10.9	31.4	6.4	22.5	11.1
Summer days	33.4	15.9	33.6	16.4	33.9	9.7	28.3	14.5
Fall days	23.4	11.1	23.5	11.6	24.7	6.7	18.0	6.9
Days by others in household	23.6	12.5	23.9	12.8	21.0	8.0	20.7	12.5
Money spent	25.9	18.4	26.4	19.1	24.6	13.8	18.7	10.9
Information	14.4	14.5	14.5	15.2	13.3	8.7	15.4	8.5
Waterbodies	24.1	9.9	25.0	10.2	18.3	7.6	12.2	6.1

Table A3.12. Reported most preferred fish species (%) in Ontario in 2020 by active anglers from different populations (when multiple species were listed by a respondent, the first species recorded was selected for this table).

Fish group	Ontario resident	Ontario senior	Other Canadian	All sampled
Walleye	38.5	47.9	53.0	39.8
Smallmouth bass	13.7	11.6	7.3	13.2
Largemouth bass	13.5	9.2	3.4	12.7
Northern pike	5.6	5.1	3.0	5.4
Lake trout	4.0	2.9	4.3	4.0
Yellow perch	3.9	4.9	0.4	3.8
Anything/not sure	3.9	1.1	1.9	3.6
Rainbow trout	3.6	2.9	0.9	3.4
Bass (unspecified)	2.8	3.8	0.9	2.8
Brook trout	2.6	4.0	1.2	2.6
Chinook salmon	1.8	0.6	8.1	2.1
Muskellunge	1.1	1.0	3.5	1.2
Coho salmon	0.5	0.2	9.7	1.0
Black crappie	0.7	1.1	0.2	0.7
Sunfish	0.8	0.0	0.0	0.7
Other	2.4	3.0	2.0	2.4

Table A3.13. Reported second most preferred fish species (%) in Ontario in 2020 by active anglers from different populations (when multiple species were listed by a respondent, the first species recorded was selected for this table).

Fish group	Ontario resident	Ontario senior	Other Canadian	All sampled
Smallmouth bass	17.4	19.4	14.6	17.3
Walleye	14.3	16.6	12.1	14.3
Northern pike	14.0	11.2	19.6	14.1
Largemouth bass	13.1	10.7	4.4	12.5
Yellow perch	9.6	11.0	3.7	9.4
Lake trout	7.0	6.1	8.3	7.0
Rainbow trout	4.6	2.9	12.3	4.9
Anything/not sure	3.7	1.7	3.1	3.6
Brook trout	2.9	3.6	1.6	2.9
Bass (unspecified)	2.7	4.8	1.6	2.7
Chinook salmon	1.7	1.2	3.0	1.7
Black crappie	1.6	2.5	2.2	1.7
Muskellunge	1.5	0.8	4.8	1.7
Sunfish	1.0	0.8	0.2	1.0
Coho salmon	0.7	0.8	4.2	0.9
Other	3.1	5.4	4.1	3.3

Table A3.14. Reported third most preferred fish species (%) in Ontario in 2020 by active anglers from different populations (when multiple species were listed by a respondent, the first species recorded was selected for this table).

Fish group	Ontario resident	Ontario senior	Other Canadian	All sampled
Northern pike	16.2	14.5	22.5	16.4
Smallmouth bass	11.6	12.6	10.3	11.6
Walleye	11.7	11.0	4.9	11.3
Yellow perch	9.4	10.9	5.6	9.3
Largemouth bass	8.8	9.1	6.3	8.7
Anything/not sure	8.8	4.7	10.4	8.7
Lake trout	6.7	7.0	7.4	6.8
Rainbow trout	5.0	4.7	8.1	5.1
Muskellunge	3.2	3.3	6.9	3.4
Brook trout	3.2	4.1	1.9	3.2
Black crappie	2.6	3.9	1.1	2.6
Bass (unspecified)	2.4	4.8	2.2	2.5
Chinook salmon	1.8	1.7	5.6	2.0
Sunfish	2.0	0.8	0.3	1.8
Lake whitefish	1.6	1.4	1.1	1.6
Other	4.1	5.4	2.4	4.1

Table A3.15. Evaluations (%) of angling in Ontario in 2020 by active anglers from different populations.

Angler group	Excellent	Very good	Good	Fair	Poor	Very poor
Overall experience						
All sampled	15.5	24.0	33.0	16.6	6.6	4.3
Ontario resident	15.2	23.7	33.2	17.0	6.7	4.2
Ontario senior	11.0	21.6	33.7	17.2	10.2	6.3
Other Canadian	25.4	32.6	28.4	9.3	2.0	2.3
Catch rate for most preferred species						
All sampled	6.8	14.1	27.5	23.9	15.9	11.9
Ontario resident	6.3	14.0	27.4	24.2	16.1	11.9
Ontario senior	3.3	11.4	25.5	25.7	19.2	14.9
Other Canadian	18.1	18.6	29.9	16.2	9.0	8.3
Size of most preferred fish species caught						
All sampled	4.0	11.3	30.1	29.6	14.0	11.1
Ontario resident	3.7	10.9	30.0	29.9	14.2	11.2
Ontario senior	2.4	10.0	27.2	31.9	16.3	12.1
Other Canadian	10.5	19.1	33.9	22.3	6.5	7.6

Angler group	Excellent	Very good	Good	Fair	Poor	Very poor
Catch rate for second most preferred species						
All sampled	4.0	11.2	27.4	26.9	16.5	14.0
Ontario resident	3.7	11.2	27.5	27.2	16.6	13.9
Ontario senior	2.2	8.3	22.1	28.4	20.7	18.3
Other Canadian	10.1	15.3	31.5	20.2	11.3	11.5
Size of second most preferred fish species caught						
All sampled	3.5	10.3	28.4	28.3	15.7	13.7
Ontario resident	3.3	10.2	28.4	28.5	15.9	13.6
Ontario senior	1.6	8.5	23.2	31.4	17.5	17.9
Other Canadian	9.4	15.0	34.2	21.4	9.1	10.9

Table A3.16. Angler expenditures (in thousands CAD) on consumables including angling packages in Ontario in 2020 by population.

Expenditure item	All sampled	Ontario resident	Ontario senior	Other Canadian
Angling packages	59,508	51,919	3,055	4,534
Accommodation	61,208	51,863	4,289	5,057
Campsite fees	40,171	33,454	4,822	1,896
Food	98,780	86,520	5,890	6,369
Travel costs	114,312	102,144	6,591	5,577
Watercraft costs	160,690	143,049	11,672	5,969
Fishing rentals	11,667	9,861	737	1,069
Fishing supplies	71,490	65,616	3,681	2,194
Fishing clothing	26,374	24,314	1,211	849
Access fees	18,401	16,567	1,136	698
Other	1,780	1,392	200	188
Fishing licences	25,727	23,992	0	1,734
Total	690,108	610,692	43,282	36,135

Table A3.17. Angler expenditures (in thousands CAD) on investments wholly attributable to angling in Ontario in 2020 by population.

Expenditure item	All sampled	Ontario resident	Ontario senior	Other Canadian
Fishing equipment	118,603	110,531	4,943	3,129
Camping equipment	81,342	75,746	3,627	1,969
Boating equipment	380,342	333,732	22,150	24,460
Special vehicles	176,127	164,383	9,721	2,023
Land-buildings	252,558	213,239	19,844	19,474
Other	1,553	1,394	76	83
Total	1,010,612	899,113	60,361	51,137

Appendix 4. Reliability of angler survey estimates

Table A4.1. Relative standard errors (%) for key statistics in Ontario in 2020 by population.

Statistic	All sampled	Ontario resident	Ontario senior	Other Canadian
Days fished open water	1.3	1.4	5.2	7.0
Days fished ice season	2.7	2.7	14.7	15.7
Days fished total	1.3	1.3	5.2	6.8
Hours fished open water	0.5	0.6	2.3	2.3
Hours fished ice season	1.1	1.2	4.3	4.6

Table A4.2. Relative standard errors (%) for angler expenditures on consumables in Ontario in 2020 by population.

Expenditure item	All sampled	Ontario resident	Ontario senior	Other Canadian
Angling packages	5.2	5.6	25.0	17.8
Accommodation	4.0	4.0	18.4	16.0
Campsite fees	5.1	5.3	19.8	24.0
Food	2.3	2.4	10.8	10.6
Travel costs	2.4	2.5	11.2	12.0
Watercraft costs	3.5	3.7	12.3	17.4
Fishing rentals	6.9	7.2	24.6	31.6
Fishing supplies	2.8	2.9	8.7	11.9
Fishing clothing	3.5	3.6	17.9	18.3
Access fees	5.2	5.5	23.3	21.0
Other	32.8	37.7	77.8	82.9
Total	1.9	2.0	8.3	8.9

Table A4.3. Relative standard errors (%) for angler expenditures on investments wholly attributable to fishing in Ontario in 2020 by population.

Expenditure item	All sampled	Ontario resident	Ontario senior	Other Canadian
Fishing equipment	14.7	15.7	13.3	20.4
Camping equipment	10.2	10.6	49.0	58.4
Boating equipment	6.3	6.4	21.3	27.5
Special vehicles	6.4	6.6	29.5	53.4
Land-buildings	17.7	19.6	61.6	50.8
Other	38.2	43.9	77.3	85.2
Total	6.2	6.5	26.5	26.7

Table A4.4. Relative standard errors (%) for catch and harvest in Ontario in 2020 by population. (Estimates are based on waterbody specific reports and not individuals; * = no reported catch or harvest.)

Statistic	All sampled	Ontario resident	Ontario senior	Other Canadian
All catch	2.4	2.6	11.5	10.1
All harvest	3.3	3.6	8.5	9.0
Walleye catch	5.0	5.6	15.0	13.6
Walleye harvest	3.1	3.4	10.5	10.7
Yellow perch catch	5.3	5.5	23.5	24.3
Yellow perch harvest	8.3	8.8	19.6	43.9
Smallmouth bass catch	3.3	3.5	10.7	14.3
Smallmouth bass harvest	4.5	4.9	12.5	29.8
Sunfish catch	4.4	4.3	27.7	31.8
Sunfish harvest	13.2	13.6	47.4	*
Northern pike catch	3.3	3.5	12.6	12.7
Northern pike harvest	4.7	4.8	21.6	28.2
Largemouth bass catch	4.2	4.4	12.5	30.0
Largemouth bass harvest	4.8	5.1	16.0	56.2
Black crappie catch	9.1	9.5	38.4	44.2
Black crappie harvest	10.1	10.6	43.2	57.9
Other catch	2.3	2.4	9.3	6.3
Other harvest	5.6	6.1	11.8	11.2
Lake trout catch	1.7	1.7	11.4	12.3
Lake trout harvest	2.5	2.7	4.6	17.2
Rainbow trout catch	10.0	10.6	25.4	23.7
Rainbow trout harvest	7.0	7.4	35.9	23.6
Brook trout catch	12.6	13.4	22.1	65.2
Brook trout harvest	10.0	10.8	27.3	53.4
Lake whitefish catch	24.3	25.9	45.2	63.8
Lake whitefish harvest	16.1	17.2	42.8	50.1
Chinook salmon catch	10.0	10.7	35.2	34.0
Chinook salmon harvest	9.4	9.8	31.3	31.9
Muskellunge catch	10.9	11.6	36.0	45.5
Muskellunge harvest	36.1	31.8	87.8	*
Coho salmon catch	9.5	10.6	49.7	20.4
Coho salmon harvest	10.3	11.9	59.5	20.9
Splake catch	14.4	15.3	42.5	54.0
Splake harvest	14.4	15.6	48.8	45.2

