Economic Impact and Social Benefits Study of Coldwater Angling in Minnesota

Prepared for:

Minnesota Department of Natural Resources

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Tourism Center

The Tourism Center, part of the University of Minnesota Extension Service, has provided research and educational programs for the tourism industry and Minnesota communities since its inception in 1987. Its mission is to assist communities and industry, through education and research, make informed decisions about tourism and its place in natural, social, political, and economic environments.

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The Cooperative Fish and Wildlife Research Units Program was established to facilitate cooperation among the U.S. Department of the Interior, universities, state fish and wildlife agencies, and private organizations, by conducting programs of research and education related to fish and wildlife resource management. The Minnesota Cooperative Fish and Wildlife Research Unit emphasizes research on impacts of human activities on aquatic and terrestrial ecosystems that are of state, regional, and national significance. The research program addresses not only the biological, but also social and economic aspects of both game and non-game fisheries and wildlife management in the context of maintenance of biological diversity, and integrity and sustainability of ecosystems.

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EXECUTIVE SUMMARY

A staggered mail back design instrument was used to collect detailed data, based on the recipients most recent coldwater angling trip, on expenditures and benefits received for anglers fishing in each of five different resources.

The coldwater fishing resources examined in this study were: streams year round; Lake Superior by boat; Lake Superior shores and streams (up to the first boundary); inland lakes in winter; and inland lakes in spring, summer and fall.

Region 2, which is comprised of the Northeastern section of the state, accounted for over 37% of all coldwater angling trips followed by Region 5 (Southeast) at 33.1%, and Lake Superior at 10.6%.

Anglers rated the overall fishing experience quite high in terms of satisfaction. Satisfaction scores for the overall fishing experience exceeded those recorded for size of fish caught, number of fish caught, and the overall quality of trout/salmon fishing. Obviously there is something about the entire experience that brings satisfaction to the angler that appears independent of the act of catching fish.

On average anglers spent over 6 days per year fishing in streams year round followed by over 4 days fishing in lakes in spring, summer and fall. Inland lakes in winter recorded an average of 2 trips per angler per year, followed by Lake Superior shores and streams (less than 2 days annually) and Lake Superior by Boat (slightly over 1 day per year).

The most popular means to reach the fishing site is by pickup truck or SUV (56.7%). Slightly more than 20% of coldwater anglers used a standard car to travel to the fishing site. In the economic impact estimates vehicle costs (apart from variable expenses such as fuel) were not calculated which brings a conservative bias to the economic impact estimates.

The average coldwater angler is white, male, approximately 43 years old, has a median family income exceeding $68,000 per year and comes from a household of approximately three people (mean=2.84 years). Over 91% of all coldwater anglers to Minnesota live in the state.

Using zip code analysis it is apparent that Region 2 (northeast) attracts coldwater anglers from a larger market area than all other Regions. Second to Region 2 is Region 7 that consists of boat fishing on Lake Superior.

Examining travel party size, length of trip by fishing type and number of days spent fishing per trip reveal some interesting findings by angling type. Region 2 (Northeast) coldwater anglers are, for the most part, associated with the resort market in the area.

They have higher travel party sizes and spend fewer days per trip fishing for trout/salmon than their counterparts in other regions. Those fishing streams year round and Lake Superior shores/streams have smaller party sizes, shorter trip lengths but spend almost all their free time fishing.

For the most part coldwater anglers rate the quality of the trout/salmon fishing over the years as "about the same" with salmon anglers a little more likely to rate salmon fishing as in "slight decline".

Average per day angler expenditures for all types of coldwater angling was $33.90 for home purchases and $71.31 away from home. On average coldwater anglers spent approximately $105 per person per day in pursuit of trout and salmon.

Anglers fishing streams year round spent on average $29.37 per day in their home area and $56.57 away from home while fishing. Money spent at home went primarily for fishing equipment ($12.89) followed by fuel/oil ($7.91) and non-restaurant food ($5.14). The highest "away" expenses were recorded for lodging ($11.59), restaurant food ($11.07) and fuel/oil ($10.38). Total direct sales due to anglers fishing streams year round amounted to over $30 million, with another $18 million in direct income. Total expenditures support over 632 full and part time jobs.

Anglers fishing Lake Superior shores/streams spent on average $34.41 per day in their home area and $92.50 away from home while fishing. Money spent at home went primarily for fishing equipment ($17.98) followed by fuel/oil ($7.24) and non-restaurant food ($5.00). The highest "away" expenses were recorded for lodging ($26.07), restaurant food ($19.22), and fuel/oil ($13.82). Total direct sales due to anglers fishing Lake Superior shores/streams amounted to over $21 million, with another $12+ million in direct income. Total expenditures support over 435 full and part time jobs.

Anglers fishing Lake Superior by boat spent on average $44.79 per day in their home area and $121.13 away from home while fishing. Money spent at home went primarily for fuel/oil ($13.99) followed by fishing equipment ($7.24) and non-restaurant food ($7.95). The highest "away" expenses were recorded for outfitting, charter boat and guide service ($31.45), lodging ($23.42), and restaurant food ($20.02). Total direct sales due to anglers fishing Lake Superior by boat amounted to over $18 million, with another $11.9+ million in direct income. Total expenditures support over 778 full and part time jobs.

Anglers fishing inland lakes in spring, summer, and fall spent on average $33.20 per day in their home area and $72.01 away from home while fishing. Money spent at home went primarily for fishing equipment ($10.70) followed by non-restaurant food ($9.50) and fuel/oil ($8.05). The highest "away" expenses were recorded for lodging ($15.32), fuel/oil ($13.38) and restaurant food ($11.04). Total direct sales due to anglers fishing inland lakes in spring, summer and fall amounted to over $38 million, with another $24+ million in direct income. Total expenditures support over 794 full and part time jobs.

Anglers fishing inland lakes in winter spent on average $25.97 per day in their home area and $55.42 away from home while fishing. Money spent at home went primarily for fuel/oil ($7.95) followed by fishing equipment ($7.00) and non-restaurant food ($6.34). The highest "away" expenses were recorded for fuel/oil ($13.31) followed by lodging ($12.05) and restaurant food ($8.80). Total direct sales due to anglers fishing inland lakes in winter amounted to over $14 million, with another $9+ million in direct income. Total expenditures support over 299 full and part time jobs.

Total Economic impact across all categories of cold water angling account for between $140.7 to $156.7 million in direct sales, $85.5 to $95.2 million in income, and together all expenses support between 3,128 and 3,482 full and part time jobs.

In general, the experiences that anglers rated as most important to fishing satisfaction included relaxation, nature appreciation, personal achievement and social affiliation. Attributes such as catching fish to eat, catching a trophy fish, and simply catching a fish all recorded lower mean scores and were not considered as important as some of the more intangible benefits.

For anglers fishing streams year round and Lake Superior shores/streams, the most important experiences were relaxation, nature appreciation, and personal achievement.

The most important experience domains for anglers fishing Lake Superior by boat, inland lakes in spring, summer and fall and inland lakes in winter were relaxation, nature appreciation, and social affiliation.

INTRODUCTION

Outdoor recreation activities have been a focus of research for many years. There are a number of U.S. sources that can be used to obtain a picture of what has been happening with respect to participation rates and economic impacts. The sources include academic research articles, agency reports, interest group studies and contract reports. All are consistent in describing fishing participation levels as very limited or no growth over the years. Cordell and Super's (2000) growth index rate for fishing from 1983-1995 is 0.96, which suggests a very slight decline in participation rates over the 12-year period.

A newly released study by the U.S. Fish and Wildlife Service is consistent with research by Cordell and Super. The 2001 National Survey of Fishing, Hunting, and Wildlife-Associated Recreation reports that participation rates for anglers nationwide were roughly constant. The number of anglers in 2001 was 34,067,000, down slightly from 35,246,000 anglers in 1996 (U.S. Fish and Wildlife Service, 2002).

One should not assume that limited or no growth in participation equates to limited or no growth in related expenditures. Actually the opposite is occurring. Brown et al. (2000) examined hunting participation rates and related expenditures and found that while hunting participation is trending downward, the average expenditure for those who still hunt is increasing at a substantial rate. Therefore, rates of participation only tell part of the value story for outdoor recreation pursuits.

In addition, the approach to managing fisheries has changed in the past 3 decades. Beginning in the early 1970s with the work of Driver and his associates (Driver and Toucher 1970, Driver and Brown 1975, Driver 1985) as well as Hendee and his associates (Potter et al.1973, Hendee 1974), attention has been focused on identifying the motivations and experiences associated with fish- and wildlife-dependent recreation. Numerous studies of hunters and anglers have clearly demonstrated that these recreationists are not focused simply on harvest, but instead they are seeking "multiple satisfactions" that together define a quality hunting or fishing experience (Decker et al. 1980, Ditton et al. 1982, Witter et al. 1982, Hammitt et al. 1989, Driver et al. 1991; see Manning 1999 for review).

Based on research of angling motivations, a strategy for management known as experience-based, or benefits-based, management has been developed (Manfredo et al. In press). This approach involves identifying anglers' motivations and preferences for fishing; segmenting the angling public based on these various motivations and preferences; and specifying management programs to match the desired outcomes, or experiences, of the various segments of anglers. Benefits-based management is a marketing approach in the sense that managers using an benefits-based approach are concerned with identifying the specific benefits, or experiences, preferred by anglers (or customers) and identifying, or developing, fishing opportunities that match these

preferences. The approach encourages managers to broaden their focus from just catch rates or creel sizes to improving the overall experiences of anglers, and it can facilitate the identification of meaningful outcome indicators and standards for recreational fishing management.

The benefits-based approach recognizes that quality fishing opportunities and outcomes require more than just provision of fisheries resources by managers. Producing quality fishing opportunities requires active, collaborative effort by managers and the larger public to identify the preferences for experiences and outcomes that are produced through management of the recreational fisheries. Under this approach, a diverse range of quality fishing opportunities are defined by the mixture of anglers' preferences for:

- Experiences (outcomes desired by anglers)
- Activities (defined by target species, equipment, specialization, etc.)
- Setting (includes physical, managerial and social attributes)

This report offers information that can be utilized to develop a typology, or range, of quality coldwater angling opportunities based on angler preferences for experiences, activities, and settings.

Due to the shift from focusing exclusive on resource management to including and often emphasizing benefits-based management, the issues recreation managers now face are increasingly complex. McCool and Patterson (2000) refer to the issues of the past as "tame" compared to the "wicked problems and messes" today's managers must address. It is not expected that these issues will become less divisive as interest groups, who have become more sophisticated over the years, exert pressure to have species and resources managed for their benefit. Therefore, data on user experiences and groups becomes an essential ingredient in the manager's ability to perform his/her job.

It is the intent of this report, then, to provide information useful to managers and anglers interested in coldwater fishing opportunities in the state of Minnesota. Specifically, this research effort focuses on assessing the economic benefits derived from coldwater angling to the state's economy and the associated user benefits that come from trout and salmon fishing in Minnesota.

This study was designed to not only assess coldwater angling in general, but to examine specific types of trout and salmon fishing and their related benefits – both economic and social. In particular, five types of coldwater angling were examined in detail:

- Stream fishing year round statewide
- Inland lake fishing during spring, summer, and fall
- Inland lake fishing in winter
- Lake Superior boat fishing
- Lake Superior shores and stream below the posted boundaries

Initially, it was hoped that streams open to winter fishing would constitute a separate category but there was an inadequate sample size to separate this type of angling from the rest of the stream fishing category.

BACKGROUND

According to the Travel Industry Association's TravelScope survey, 23.6 million residents and non-residents traveled in Minnesota in 1999. These travelers generated gross sales of $8.3 billion, contributed $4.6 billion to Minnesota gross regional product, supported approximately 126,360 jobs totaling $ 3.3 billion in wages and $1 billion in state and local tax receipts (www.dted.state.mn.us).

Approximately one-third (32.6%) of these travelers hunted or fished while on their trip in Minnesota, which is not surprising since Minnesota provides some of the premier fishing opportunities in the country. The Minnesota Department of Natural Resources reports that fresh-water fishing in Minnesota currently supports over 1.5 million resident and non-resident anglers. These anglers spend more than $1.8 billion on fishing-related recreation in the state each year, with the largest portion of spending going to boats, gas, and lodging, although a significant amount is also spent on bait ($50 million), lures, lines, and tackles ($34 million), and ice fishing equipment ($8 million) (U.S. Fish and Wildlife Service, 1997; see also Ditton, Holland, and Anderson, 2002).

These figures indicate that recreational fishing is a multimillion-dollar industry in Minnesota. In fact, the American Sports Fishing Association's 1996 Sport Fishing Participation and Economic Impact report ranked Minnesota fourth in the nation in direct overall economic impact from fresh water fishing in America. The Association reported that fresh-water fishing in Minnesota generated $1.9 billion in angler's expenditure, $3.7 billion in total economic impact, $948 million in wages and salaries, and 47,293 jobs in Minnesota compared to national figures of $37.8 billion in angler's expenditures, $108.4 billion in total economic impact, $28.3 billion in salaries and wages and 1.2 million jobs (www.asafishing.org, www.dfg.ca.gov/fishing/econ.sptfish.htm).

These spending numbers suggest that recreational fishing contributes significantly to the economic fabric of the areas in the state where the bulk of fishing is located. A recent U.S. Fish and Wildlife report found that Minnesota has more anglers, receives more income from fishing, and attracts more angling tourists than any of the surrounding states (U.S. Fish and Wildlife Service, 2002). Minnesota remains one of the top fishing states in the country.

Unfortunately much of data available fail to provide any details about specific types of coldwater fishing practiced in the state. In fact, the 1996 U.S. Fish and Wildlife study reported that the number of responses received from trout anglers in the state was so low that the U.S. Fish and Wildlife Service cautioned readers from drawing any conclusions about trout angling based on the information presented in the report. Thus, the only concrete figures are those collected by the Minnesota Department of Natural Resources, which reports selling over 98,000 trout stamps in 2000.

In a search for additional information about coldwater angling, creel census data and management reports were reviewed. These reports detail information about angling success rates, seasonal participation rates, and management plans, but offer little insight into the types of experiences anglers seek and nothing about anglers' expenditures.

Thus, the need for this study, which offers an in-depth investigation of coldwater angling's value from both an economic and social perspective, is clear. The economic perspective examines the monetary benefits directly accrued to those who provide goods and services to the coldwater anglers, with indirect benefits widely dispersed throughout society. The social perspective focuses on the experiences related to the benefits derived by anglers themselves.

METHOD

Hypotheses

As mentioned in the introduction, the purpose of this study was to investigate the economic and social benefits of coldwater angling participation in the state of Minnesota. Two null hypotheses guided this study:

> ***There are no <u>expenditure</u> differences between the different types of coldwater angling investigated.***
>
> ***There are no <u>experience</u> differences between the different types of coldwater anglers.***

Research Design

Data collection was conducted using a staggered mail back survey design. This method was determined to be the best substitute for the ideal intercept method, which was not feasible given available resources. The staggered mail back design, in addition to having the advantage of reducing recall bias, also allowed us to cover almost an entire year of angling activity to obtain as much information on the five different types of coldwater angling that were the primary focus of this study.

Sampling Strategy

Because a trout/salmon stamp is required when fishing for trout/salmon in Minnesota, information collected by DNR upon purchase of the trout/salmon stamp provided the basis for the sampling frame for this research. Staff at the Minnesota Department of Natural Resources randomly selected names and addresses for the study based on criteria (i.e., dates of trout/salmon stamp purchase and sample size) supplied by the research team.

Surveys were mailed out over a seven-month period from March to September 2001. For the first month of the study, a sample was drawn from the list of anglers purchasing trout/salmon stamps from January to December 2000. For the remaining six months, samples were drawn monthly from only the most recent list of newly purchased trout/salmon stamps. Using this method, only those who purchased a stamp in the preceding month were eligible to receive a questionnaire, thereby reducing recall bias.

Table 1 details the month surveys were mailed, the time period representing each monthly sample, the number of surveys mailed to trout/salmon stamp purchasers, the number of surveys received, and the response rate for each month.

Table 1
Sampling Strategy and Response Rates

Month Mailed	Sampling Period	Number of Surveys Mailed	Number of Surveys Received	Response Rate*
Mar 2001	Jan-Dec 2000	1,200	209	19.9%
Apr 2001	Jan 2001	500	137	31.0%
May 2001	Feb 2001	500	214	44.9%
Jun 2001	Mar 2001	1,571	433	29.9%
Jul 2001	Apr 2001	1,474	559	42.6%
Aug 2001	May 2001	2,059	610	33.5%
Sep 2001	Jun 2001	2,993	860	32.9%
OVERALL		10,297	3,022	32.9%

* Response Rate = Number of surveys received / (Number of surveys mailed - Number of undeliverable surveys)

A lower than expected return rate was received from the initial wave of survey mailing. It was assumed that this low response rate occurred due to the necessity of using a year-old database of trout/salmon stamp holders for the first sampling period. In an effort to improve overall response rates, we added a postcard reminder and a small incentive. Postcard reminders were mailed to all questionnaire recipients approximately ten days after they were expected to receive the questionnaire in the mail. A DNR trout/salmon species window decal was also included in all mailings to encourage recipients to return completed surveys. As Table 1 shows, response rates improved over the course of the study, resulting in an overall response rate of 32.9%, which exceeded the study quota of 3,000 completed responses.

In addition to obtaining information from holders of trout/salmon stamps, this study also included responses from people purchasing one-day fishing licenses who fished for trout/salmon. There are approximately 42,000 holders of one-day fishing licenses, which includes coldwater angling privileges. Telephone contact was made with 1,047 one-day license holders who were asked if the license had been used to fish for trout or salmon. Only 7.6% of one-day holders indicated that the one-day license was used to fish for trout/salmon. Those who used the one-day license for coldwater angling were asked to complete a questionnaire (Appendix A). Of the 80 people (7.6%) who agreed to fill out the questionnaire, 87.5% returned completed surveys, and their responses are included in the results presented in this report.

Another source of one-day license holders are anglers purchasing one-day paper licenses issued by chapter boat captains on Lake Superior. Because it was determined that the number of these licenses was relatively small, they were not included in this study, although this exclusion possibly underestimates the percentage of anglers using one-day licenses to fish for trout/salmon in Minnesota.

Questionnaire Design

A brief discussion of the major sections in the questionnaire as well as the rationale underlying the survey frames the results and contextualizes the report findings.

The questionnaire (Appendix A) was comprised of four sections:

- Most Recent Trip
- Last 12 Months
- Species Preferences by Resource
- Demographics

All survey respondents were asked to provide detailed information for their most recent trip to fish for trout or salmon in Minnesota in order to obtain "fresh" information, especially with respect to expenditures.

Expenditure and benefit information was also elicited with respect to the most recent coldwater-angling trip.

From information about each angler's most recent trip, it is possible to examine the various types of trout/salmon fishing that take place over the course of one year. Thus, these results reflect what one could expect to find during the course of a typical year of trout/salmon fishing in Minnesota. In this context, "typical" is used to describe the various types of trout/salmon fishing activity and the characteristics that occur during the course of a year. Because the year in which this study was undertaken did not present any significant, naturally occurring impediments to trout/salmon fishing in Minnesota (with the exception of heavy snowfall in the winter and unusually high water in the spring in Southeastern Minnesota, which may have kept some anglers away), it is appropriate to consider these results to be "typical" of trout/salmon fishing in Minnesota.

Information about the most recent fishing trip is also crucial for estimating the economic impact of the various types of trout/salmon angling because daily per person expenditures are necessary for those calculations. Those expenditures are then applied to each angling type and adjusted for total number of days spent pursuing that type of angling experience, resulting in total economic impact.

Where the first section concentrated on the most recent coldwater-angling trip taken by survey recipients, the second section asked respondents to think about all trout/salmon fishing over the last 12 months. Specifically, questions in this section focused on the number and type of coldwater angling trips taken during the previous twelve months, the number of coldwater angling trips taken outside Minnesota and the state or country where those trips most frequently occurred, and the vehicle type normally used to drive to fishing spots. These questions offer a more general understanding of coldwater fishing patterns.

The third section of the survey was designed to provide DNR managers with information about trout and salmon species preferences with respect to specific Minnesota resources:

- Trout Streams
- Inland Trout Lakes
- Lake Superior Shores or Streams Below the Posted Boundaries
- Lake Superior by Boat

The final section of the questionnaire elicits demographic information, memberships in fishing associations or clubs, Internet usage, and overall assessments of the quality of trout and salmon fishing in Minnesota.

Data Analysis

Data analysis for this study was performed in SPSS (Statistical Package for the Social Sciences).

Originally the intent was to model six different types of coldwater-angling. Initial analysis of the data determined that all but one of the six coldwater-angling types could be analyzed as a separate category. Only streams open to winter fishing in Southeast Minnesota did not have sufficient completed responses to stand alone as a separate type of angling activity, which can be attributed, in part, to weather-related issues than the sampling strategy or research method used.

Another study conducted by one of the co-authors of this study (Dr. David C. Fulton) intercepted very few anglers in the study area during the winter 2001 months, which was consistent with our low response from anglers fishing Southeast streams during the winter and early spring. Therefore, it was decided to aggregate streams open to winter fishing in Southeast Minnesota with streams in Minnesota during spring, summer and fall, creating a new category streams in Minnesota year round. Analysis was completed using five angling type categories:

- Streams in Minnesota year round
- Lake Superior shore or streams below the posted boundary (all seasons)
- Lake Superior by boat
- Inland lakes in spring, summer or fall
- Inland lakes in winter (ice fishing)

RESULTS

Results are organized into four major sections:

- Descriptive Details
- Angling Behavior by Fishing Type
- Economic Impact by Fishing Type
- Benefits by Fishing Type

The first section begins with a descriptive examination of the findings related to anglers' most recent trip for trout/salmon, followed by a discussion of angling behavior over the last twelve months, management preferences, and demographic descriptions of all trout/salmon anglers. The second section consists of an examination of angling behavior related to five different angling types. In this section the five angling types are compared and contrasted to identify statistically significant differences. The third section details economic impact by angling type. Each type of fishing was isolated, and statistically compared to other angling types. The resulting analysis sheds light on the differences that exist between anglers when fishing for trout/salmon in different ways and on different resources. The fourth and final section consists of an examination of experiences sought from engaging in coldwater angling.

Descriptive Details

Most Recent Trip

1.   Where did your MOST RECENT trip to fish for trout or salmon in Minnesota take place? Please put an "X" on the map where you last fished for trout or salmon.

As Figure 1 illustrates, most trout/salmon angling trips were to the Northeast and Southeast areas of the state. Over 37% of all trips were in northeast Minnesota (Region 2). The type of activity taking place there would include lakes in summer and winter, stream fishing for brook trout, rainbows and some steelhead and salmon, and Lake Superior coastal fishing (from shores and in rivers below the first upstream obstruction) for rainbow, steelhead and salmon.

The second most popular fishing region was in the Southeast section of the state where the angling is confined to brook, brown and rainbow trout in streams. Over 33% of the angling days took place in the southeast region (Region 5).

Region 7 includes all trout/salmon fishing on Lake Superior, and accounted for over 10% of the angling reported. This type of angling would cover all boat (i.e. charter and private) fishing on Lake Superior.

The other four regions combined accounted for less than 20% of total angling in the state.

Figure 1
Location of Most Recent Trout/Salmon Fishing Trip

Percent
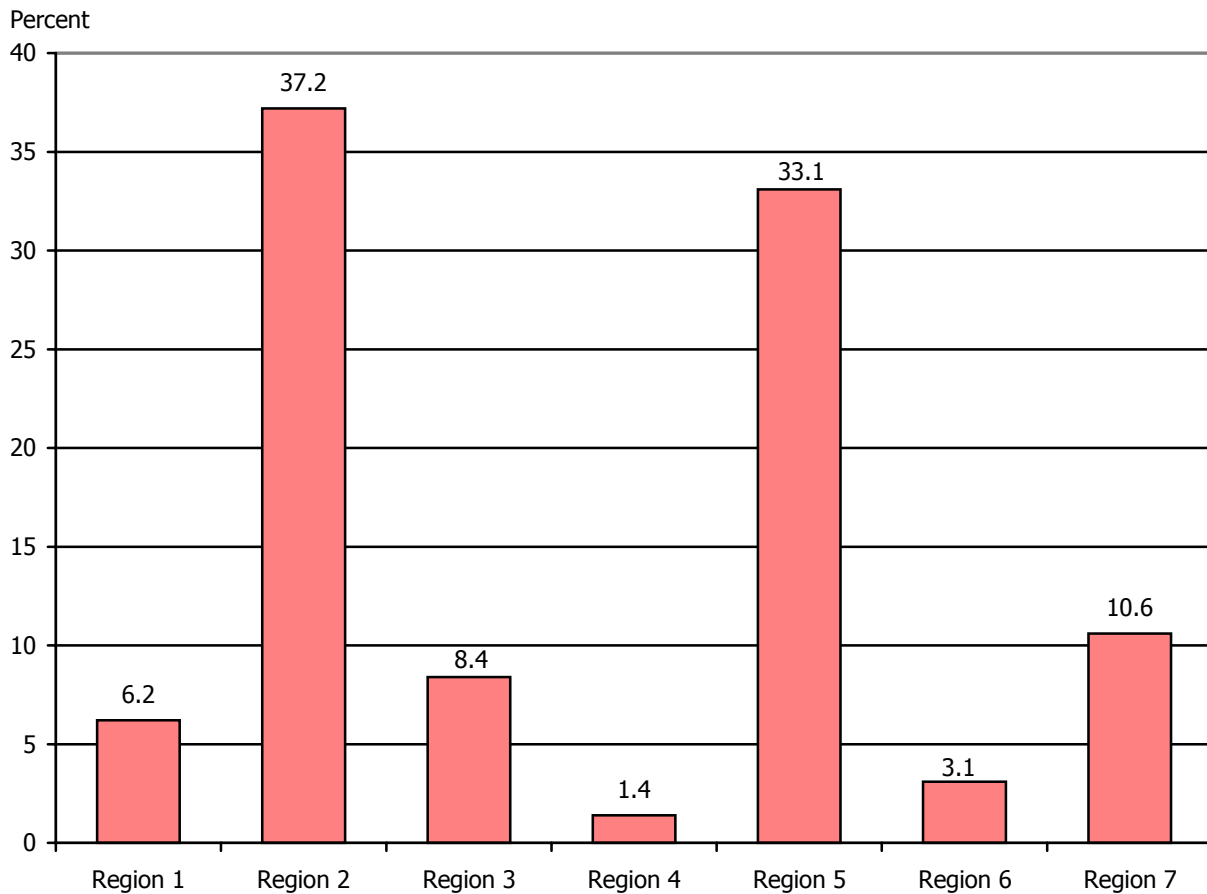
2. When did your MOST RECENT trip to fish for trout or salmon in Minnesota take place?

Figures 2 and 3 provide pictures of angling distribution for trout/salmon fishing in Minnesota.

The most popular months for trout/salmon fishing are June, July, May and August, in that order (Figure 2). The months of October, November and December show the lowest activity levels, which may be due, in part, to the staggered mail survey method employed for this study. The months of October, November, and December were not survey months and therefore may be somewhat underrepresented in the total.

Figure 2
Month of Most Recent Trip
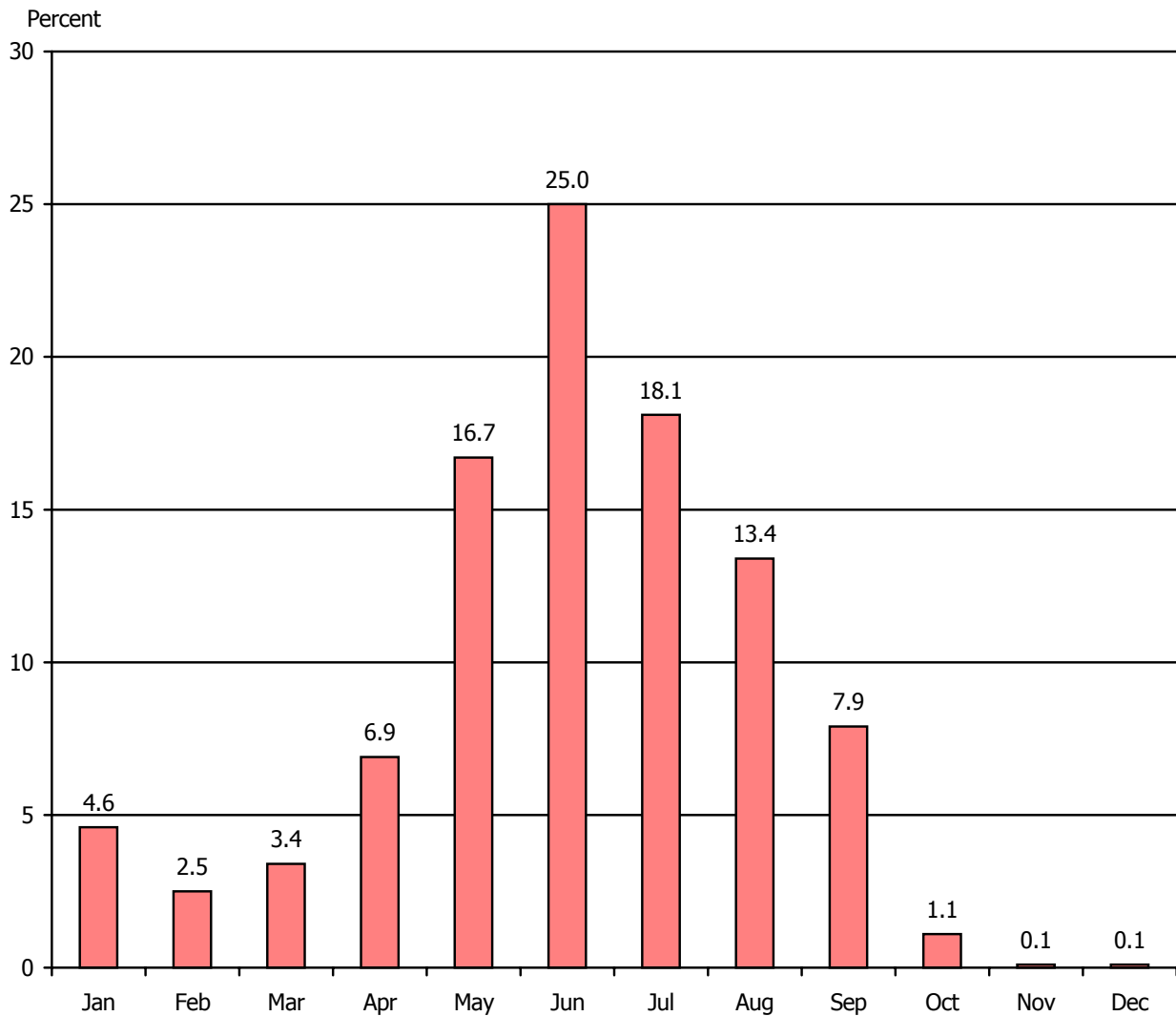
Percent

As expected, the majority of angling trips were taken in 2001 with 14.4% taken in 2000 (Figure 3), which is reasonable because the first month's sample was drawn from the 2000 database of anglers.

Interestingly, the percent of anglers that took their last coldwater angling trip in 1999 (2.3%) indications a small percent of coldwater anglers buy a trout/salmon stamp with no definite plans to fish for trout or salmon.

Figure 3
Year of Most Recent Trip

Percent
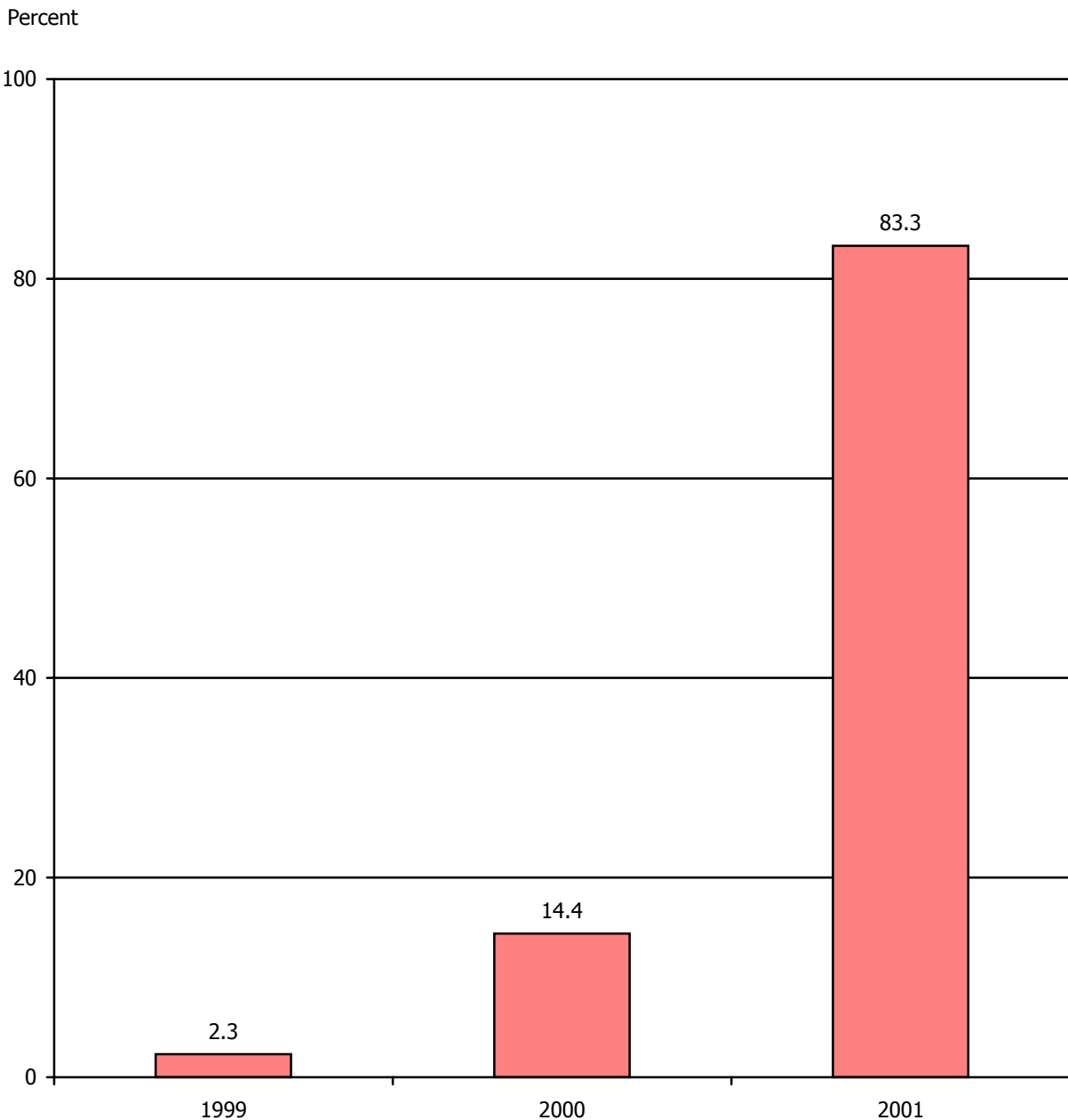
3.   Which type of fishing best describes that trip?

The type of fishing trip taken is a key question for determining economic impact.

As Figure 4 shows, the most popular type of Minnesota coldwater angling occurs in the state's streams from April to October (40.8%). The second most popular resource was inland lakes during spring, summer, and fall (29.5%).

Almost all resource types were popular enough with anglers to achieve sufficient sample sizes for further analysis, with the exception of streams open to winter fishing in Southeast Minnesota. Instead, responses for this category (n=39) were added to the category streams year round.

Figure 4
Fishing Types

Lake Superior shores/streams 8.7%
Lake Superior by boat 11.4%
Streams Apr-Oct 40.8%
Inland lakes spr/sum/fall 29.5%
SE streams winter 1.3%
Inland lakes winter 8.3%
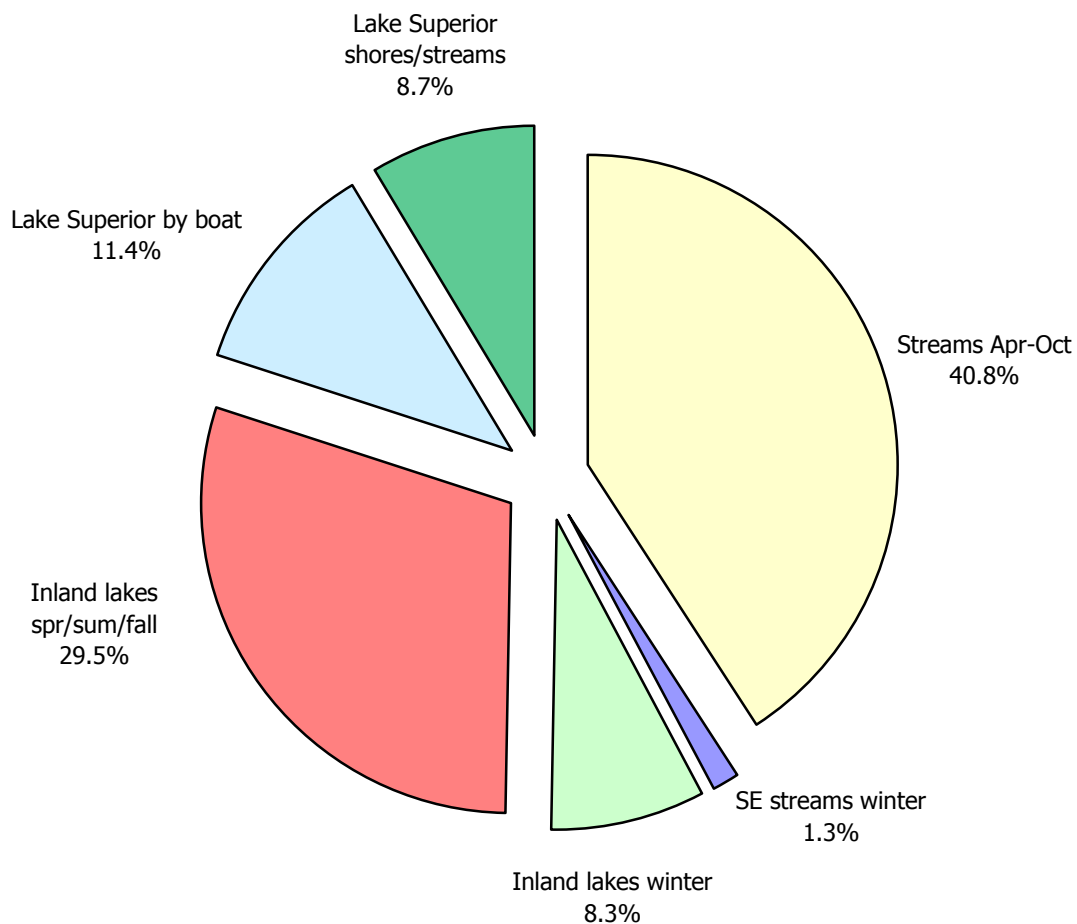
4. How would you describe the fishing method used for your MOST RECENT trip to fish for trout or salmon in Minnesota?

As Figure 5 shows, artificial lures edged out bait fishing as the most popular method to fish in Minnesota. Over 40% of anglers used artificial lures on their most recent trip as compared to 39% who used bait. Less than 20% engaged in flyfishing for trout/salmon in Minnesota.

Figure 5
Fishing Method

Percent

Artificial lures	Flyfishing	Bait fishing
40.5	19.0	38.9
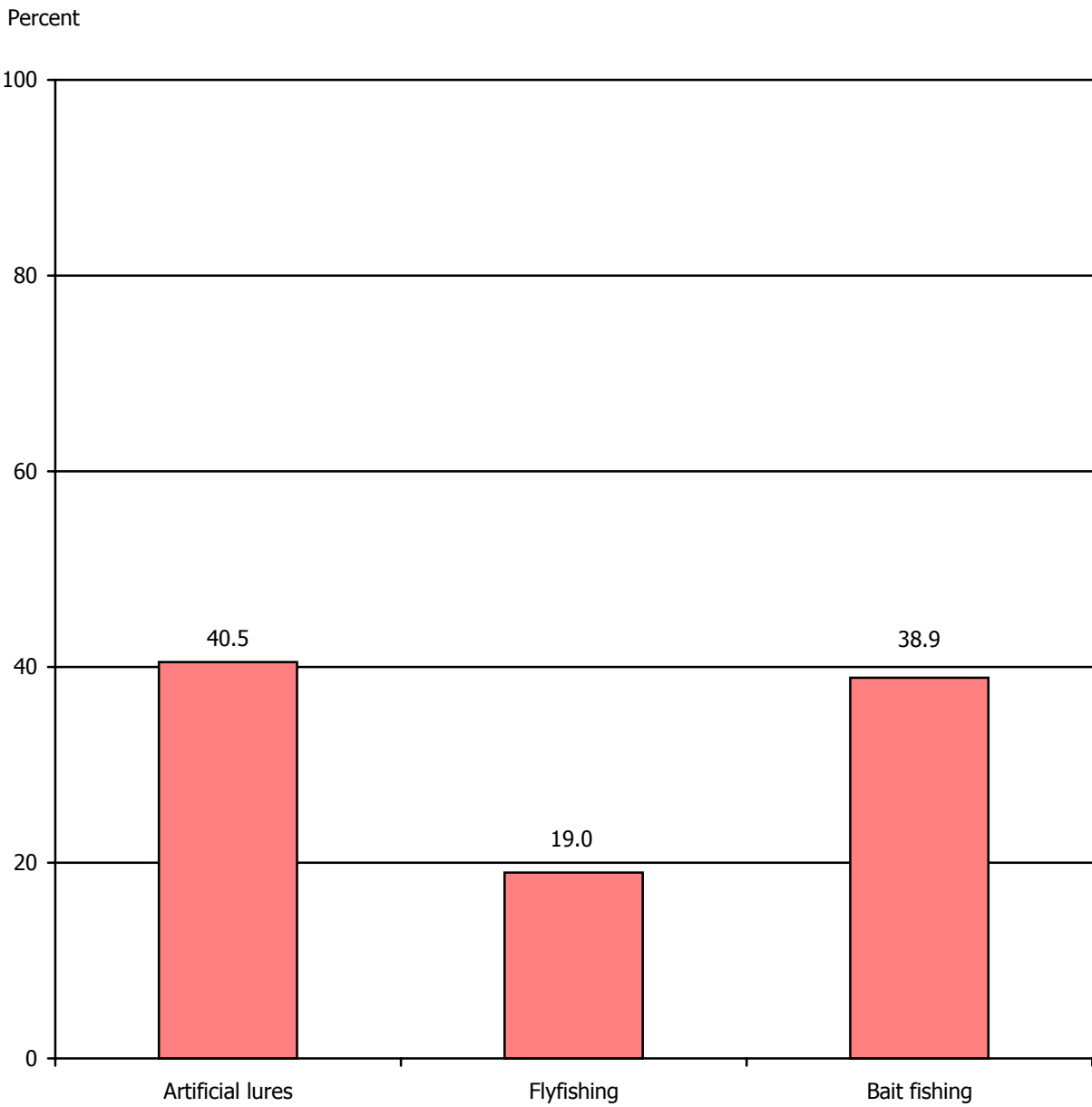
5.   On your MOST RECENT trip to fish for trout or salmon in Minnesota did you….

Only 11.3% of anglers fishing for trout/salmon in Minnesota kept all the fish they caught (Figure 6).

Slightly more than 20% (20.2%) of anglers reported catching no fish, while slightly over 25% (25.5%) released all the fish they caught.

The largest group of anglers kept some fish and released others (43.0%).

Figure 6
Fishing Strategies
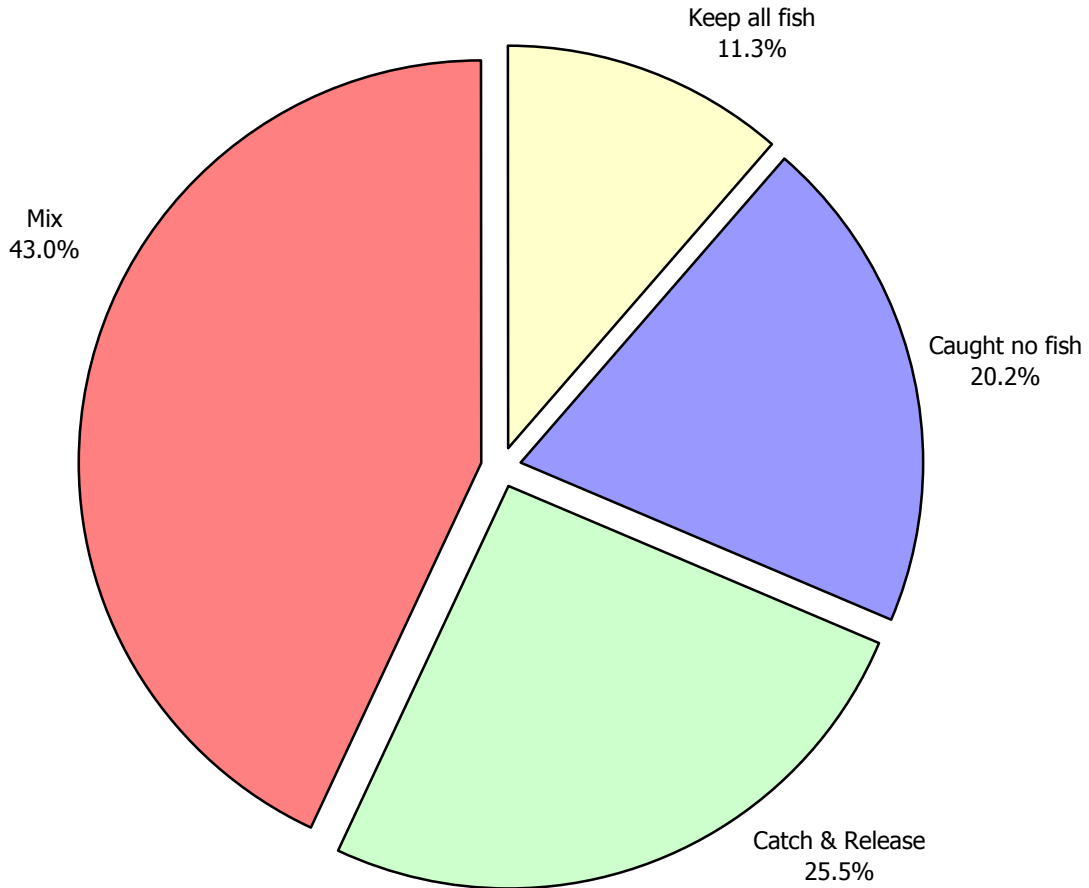
6.   What was the main purpose of the trip?

As Figure 7 illustrates, over 80% of coldwater anglers stated their main purpose for taking the trip involving their most recent angling experience was specifically to fish.

Another 12.1% of anglers were in the area for other pleasurable purposes and took advantage of the time to do some coldwater angling. Very few (1.4%) were on a business trip which they then combined with coldwater angling.

"Other" trip purposes (6.1%) included specific recreational activities or travel for personal reasons.

Figure 7
Trip Purpose

Fishing
80.4%

Pleasure other
than fishing
12.1%

Business
1.4%

Other
6.1%
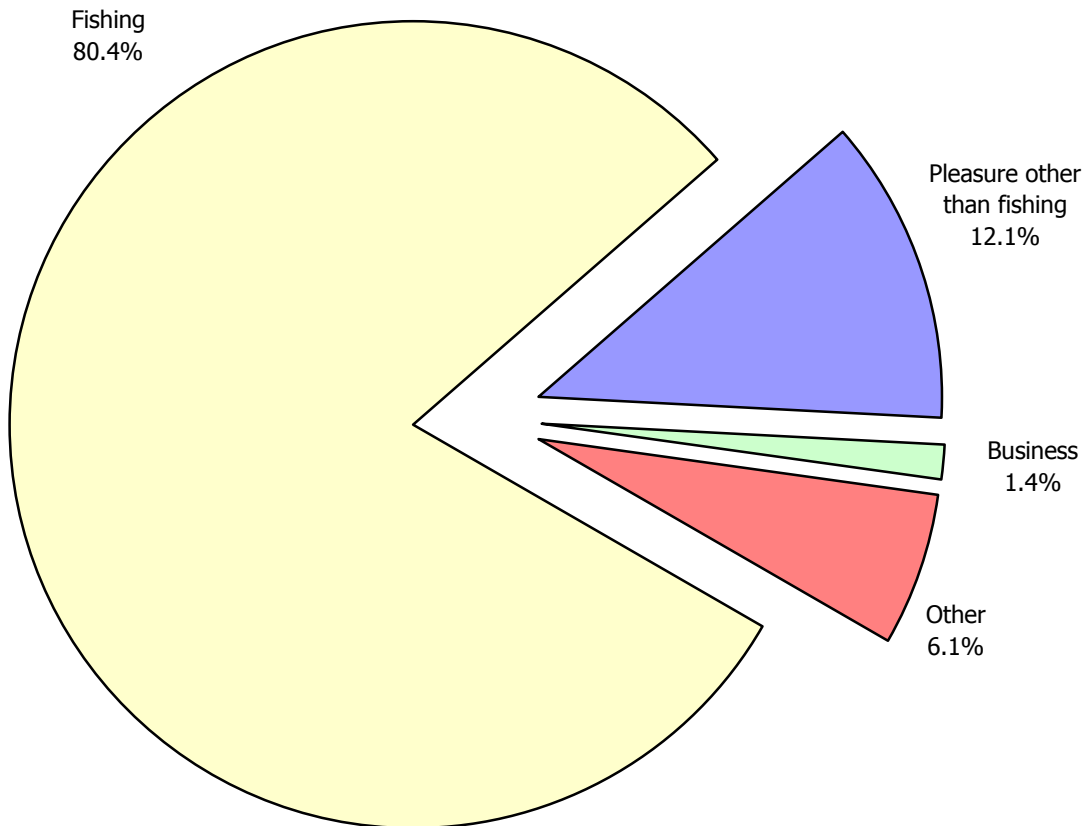
7. How many people were on this trip (including yourself)?

8. How many days did you spend away from your permanent or seasonal home on that trip?

9. How many days on that trip did you actually fish for trout and salmon?

10. How many miles was the place you went fishing from your permanent or seasonal home?

As Table 2 shows, average party size for coldwater anglers was 2.96 people, with most parties consisting of two people.

The average number of days spent away during the latest fishing trip was 2.31 days, with the most trips lasting just one day.

The number of days actually spent fishing was 1.85 days, with the most common being one day.

The average number of miles traveled to fish for trout/salmon was 130.86 miles, with the most common distance consisting of 100 miles.

These results indicate that the typical trip to Minnesota to fish for trout/salmon is short in duration and takes place within a two-hour drive of home.

Table 2
Characteristics of Most Recent Trip

	Mean	Median	Mode	Range
Travel party size	2.96 people	2 people	2 people	1-20 people
Length of trip	2.31 days	1 day	1 day	0-30 days
Days fishing	1.85 days	1 day	1 day	0-30 days
Distance from home	130.86 miles	75 miles	100 miles	0-2100 miles

11.   How did you get to the access point for your MOST RECENT fishing trip?

As expected, the majority (78.2%) drove to the access point to begin their fishing trip (Figure 8).

There were some surprises when reviewing answers to this question, including the relatively few people who used dogsleds (0.2%) or ATVs (0.6%) to access the site. Further, higher than expected percentages were noted for those visitors who flew directly into the access point (0.8%) or flew to nearby areas (0.6%).

Figure 8
Mode of Travel
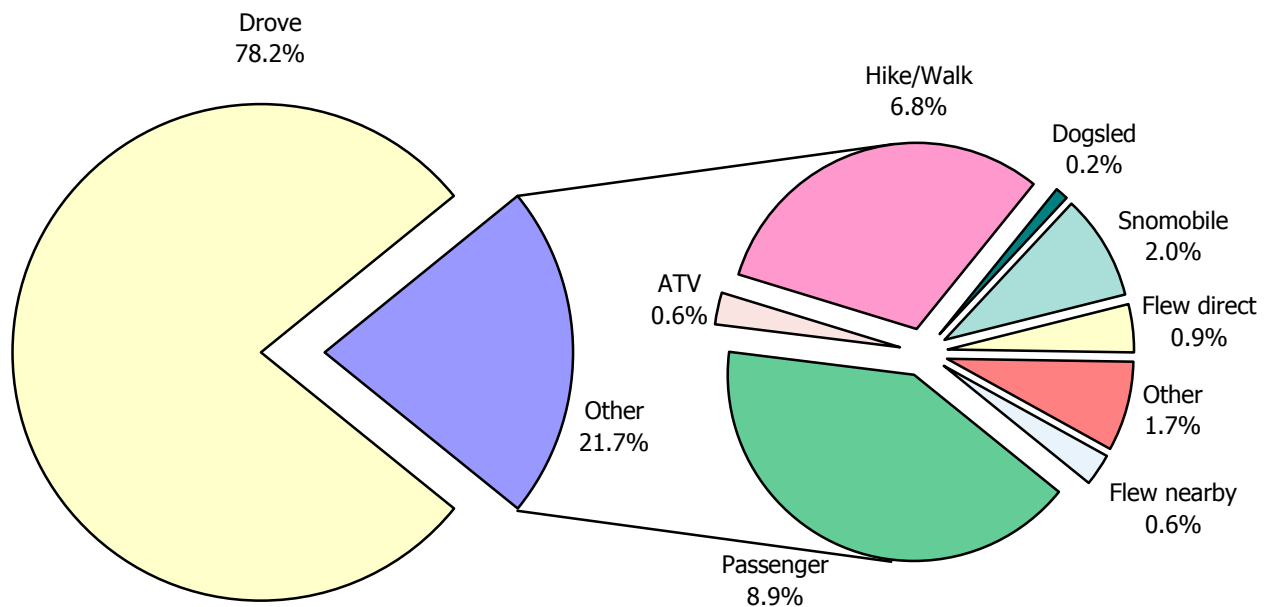
12.   Please record your expenses on your MOST RECENT trout or salmon fishing trip in Minnesota by where the expense took place. For example, under the "HOME" category, record those expenses that took place in your home community. For the "AWAY" category, record those expenses that occurred when you were out of your home community.

Table 3 summarizes expenditure data for all anglers in the sample. Respondents were asked to distinguish between consumer purchases made at home before the trip from those made in the locale of the fishing activity.

Fishing equipment was the largest expenditure in preparation for the trip ($12.57/person/day). Total expenditures at home were $33.90 per person per day.

The largest expenses en route and onsite were lodging ($15.39/person/day), prepared food ($12.55/person/day), and gas ($12.70/person/day), with expenses away from home totaling $71.31 per person daily. In sum, the typical coldwater angler spent $105.21/day.

Table 3
Per Person Per Day Angler Expenditures

Expenditure Category	Home	Away
Fuel/oil	$8.58	$12.70
Food (Restaurant)	$1.60	$12.55
Food (Non-restaurant)	$7.07	$7.31
Outfitting, charter boat or guide service	$0.67	$5.54
Lodging	$0.45	$15.39
Entertainment (Includes gambling)	$0.32	$3.25
Shopping (Gifts, clothes, handicrafts, etc.)	$0.75	$4.82
Fishing equipment (Rods, reels, waders, lures, bait, etc.)	$12.57	$6.74
Transportation other than motor vehicle (Air, train, etc.)	$0.94	$0.85
Other packaged trip (inclusive of meals, lodging, etc.)	$0.95	$2.16
TOTAL	**$33.90**	**$71.31**

* Columns may not add exactly due to rounding errors

13.   Below is a list of experiences anglers may have while fishing for trout/salmon.

13A.   Please think about your MOST RECENT trip to fish for trout or salmon. Look over the list below and mark the number that best represents how important each experience was to your satisfaction during that trip.

13B.   For each experience that you marked a 5, 6, or 7, please indicate the extent to which you were able to attain that experience during your MOST RECENT trip to fish for trout or salmon.

Coldwater anglers were asked to identify how important different experiences, or benefits were to their satisfaction with their most recent fishing trip in Minnesota. Specifically, anglers were asked to evaluate the importance of these 33 different experiences to their fishing satisfaction. A 7-point scale was used, ranging from very unimportant (1) to very important (7). Respondents were then asked to rate any benefit items where they rated importance as 5, 6, or 7 in terms of attainment, where 1 was did not attain and 4 was totally attained. Table 4 summarizes these results for all respondents.

Overall, the five most important experiences sought were enjoying nature and the outdoors (mean=6.19) and relaxing (mean=6.13). The two least important benefits sought were

being around other anglers (mean=2.87) and competing with friends who fish (mean=2.75). In terms of attainment, the highest score was achieved for developing your skills and abilities (mean=3.89), while the two lowest attainment scores were recorded for catching a trophy (mean=1.69) and keeping a trophy fish (mean=1.68).

Table 4
Benefit Importance and Attainment

	13A. Mean Importance	13B. Mean Attainment
Being with friends	5.41	3.58
Being alone	3.81	3.08
Competing with friends who fish	2.75	2.91
Being around other anglers	2.87	3.15
Using your fishing equipment	5.18	3.60
Being with people who are enjoying themselves	5.46	3.51
Learning about nature	5.28	3.16
Relaxing	6.13	3.53
Catching food for your family	3.25	2.75
Getting exercise	4.50	3.12
Enjoying nature and the outdoors	6.19	3.63
Catching a trophy	3.59	1.69
Sharing your skills and knowledge with others	4.33	2.77
Thinking about your personal values	4.65	3.09
Being in a quiet and peaceful place	5.97	3.40
Visiting areas you've fished in the past	4.69	3.34
Meeting new people	3.37	2.60
Doing something with your family	5.11	3.22
Developing your skills and abilities	4.96	3.89
Giving your mind a rest	5.70	3.38
Fishing in a wilderness setting	5.52	3.22
Getting away from crowds of people	5.86	3.26
Getting away from family for awhile	3.71	3.26
Catching fish	5.06	2.80
Keeping fish to eat	3.97	2.73
Keeping trophy fish	3.05	1.68
Catching a particular species of fish	4.30	2.79
Catching at least one fish	5.15	3.13
The size of fish you catch	4.35	2.46
Catching your limit	3.20	2.33
Catching more than one kind of trout/salmon	3.51	2.23
Keeping enough fish for a meal	3.88	2.79
Releasing all fish you catch	3.94	3.18

14. For your MOST RECENT trip to fish for trout and/or salmon in MINNESOTA how satisfied or dissatisfied were you with the following?

15. For your MOST RECENT trip to fish for trout or salmon IN MINNESOTA, how would you rate the overall QUALITY of the trout/salmon fishing?

Anglers were generally satisfied with the overall fishing experience they were able to obtain (Table 5). On a five-point scale, overall mean satisfaction was 3.99, indicating high levels of user satisfaction with the entire experience. However, that satisfaction score appears to be related to more than the size or number of fish caught. Anglers were slightly less satisfied with the size of fish caught (mean=3.33) and the number (mean=3.26) than they were with the overall experience (mean=3.99). Clearly there is more to the angling experience than catching enough fish of a certain size, which is also evident in respondents' assessments of the overall quality of trout or salmon fishing in Minnesota (mean=3.06). The mean score of 3.06 for overall quality of trout or salmon fishing in Minnesota is close enough to the neutral category to conclude that trout/salmon anglers are ambivalent about the quality of coldwater angling in the state. While they may be satisfied with the overall fishing experience, they report slightly lower levels of satisfaction with size and quantity caught, suggesting that there is something else affecting anglers' perceptions of overall quality of trout and salmon fishing in the state.

Table 5
Satisfaction with Most Recent Trip

	Mean	Median	Mode	Scale
Overall fishing experience	3.99	4	4	1=very dissatisfied to 5=very satisfied
Size of trout or salmon caught	3.33	3	4	1=very dissatisfied to 5=very satisfied
Number of trout or salmon caught	3.26	3	4	1=very dissatisfied to 5=very satisfied
Quality of trout or salmon fishing	3.06	3	3	1=very low to 5=very high

Last 12 Months

In order to determine total economic impact it is important to determine, on average, how many total trips were taken to fish in each of the resources identified in question 3 of the questionnaire. This section covers not only that finding, but also other fishing experiences within the previous 12 months. Again, using the staggered mail survey, this approach should yield the "typical" activity patterns of the anglers surveyed.

16. How many days during the last 12 months did you fish for trout or salmon in Minnesota in each of the following ways?

These findings are consistent with the frequencies of responses to the type of most recent trip. As expected, the most popular type of coldwater angling is stream fishing year round (mean=6.14 days annually), followed by inland lake fishing in spring, summer and fall (mean=4.14 days annually). All other types of fishing recorded averages of less than 2 days for the previous 12-month period (Figure 9).

Figure 9
Mean Number of Trout/Salmon Fishing Days in Last 12 Months

Mean Days
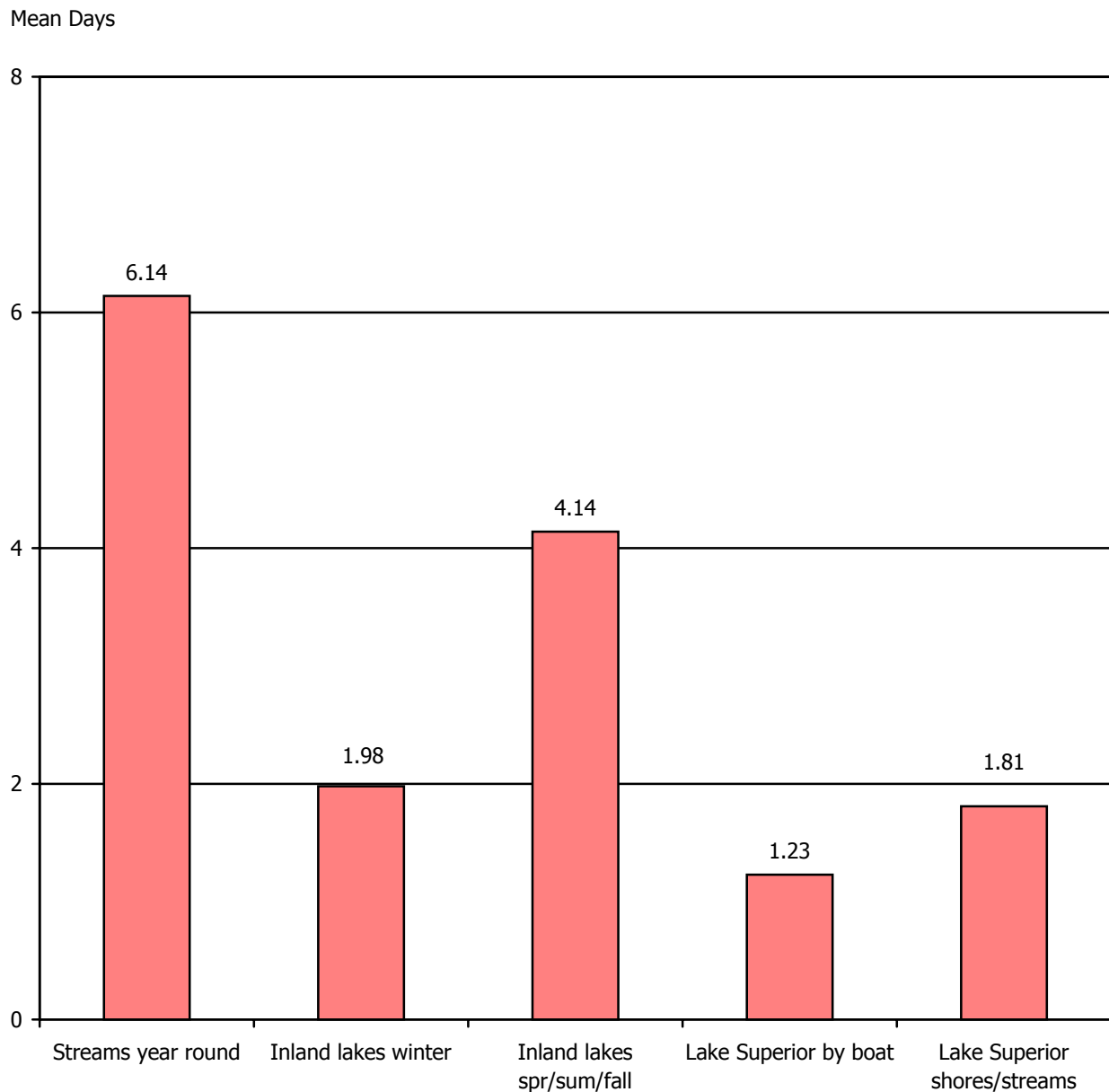
17.   Approximately how many days in the LAST 12 MONTHS did you fish for trout and/or salmon OUTSIDE of Minnesota?

The average number of days spent <u>outside</u> Minnesota fishing for trout/salmon in the last year was 3.34 days (Table 6).

Table 6
Trout/Salmon Fishing Outside of Minnesota

	Mean	Median	Mode	Range
Days fishing outside of Minnesota	3.34 days	0 days	0 days	0-100 days

However, as Figure 10 shows, few anglers who fish a lot outside Minnesota (30.6%) inflate the mean; 69.4% of anglers did not fish for trout/salmon outside Minnesota in the 12 months prior to the study period.

Figure 10
Trout/Salmon Fishing In and Outside of Minnesota
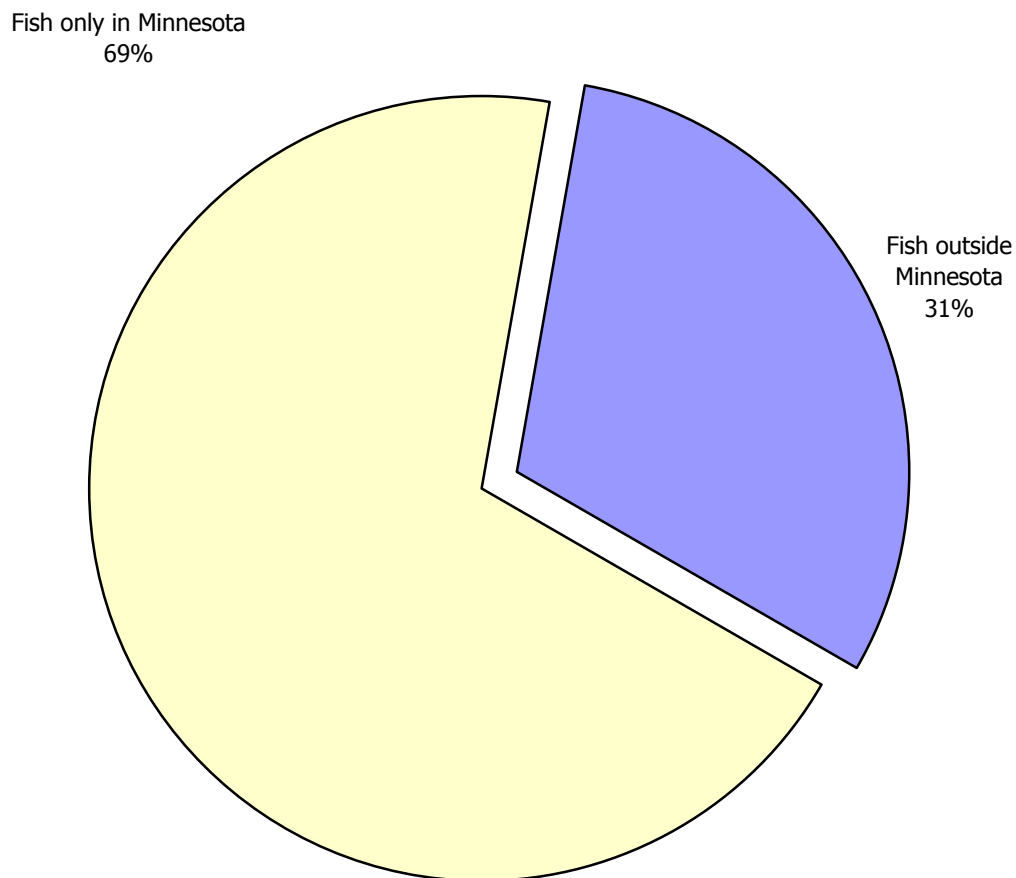
17A. In what state or country did you fish most often in the LAST 12 MONTHS (excluding Minnesota)?

Of those anglers who reported fishing outside of Minnesota, 40.5% identified Wisconsin as the place where they fish most often when they travel out of Minnesota to fish for trout or salmon.

Other popular places outside of Minnesota for trout/salmon anglers included Canada (16.3%), Montana (5.8%), and Michigan (4.4%), as seen in Figure 11.

Figure 11
Location of Trout/Salmon Fishing Outside of Minnesota

Canada
16.3%

Other countries
0.6%

Other
42.7%

WI
40.5%

MT
5.8%

MI
5.5%

IA
4.4%

AK
4.0%

SD
3.8%

WY
3.6%

CO
3.3%

Other US
12.3%
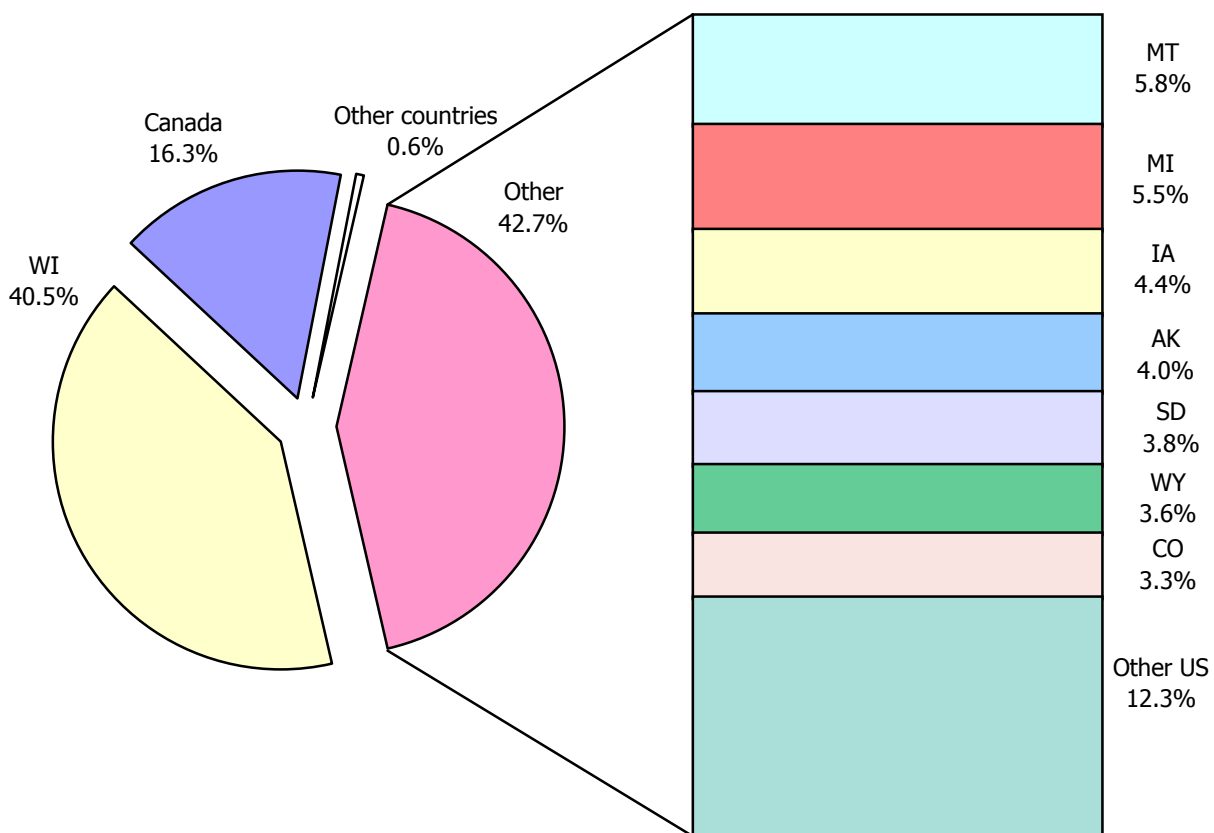
18.   When you drive to your fishing spot what type of vehicle do you normally use?

The most popular vehicle to drive for trout/salmon fishing is a pickup truck (56.7%). The "other" category was also high at 16.2%, and included many people who distinguished between an SUV and a pickup truck.

Only 23.4% of the state's coldwater anglers use a car to reach fishing spots, with an even smaller percent (3.7%) traveling by recreational vehicles (RV) (Figure 12).

Figure 12
Type of Vehicle Used Most Often to Reach Trout/Salmon Fishing Spots

Percent

60	
	56.7
50	
40	
30	
23.4	
20	16.2
10	
	3.7
0	
Car	Pickup truck	RV	Other
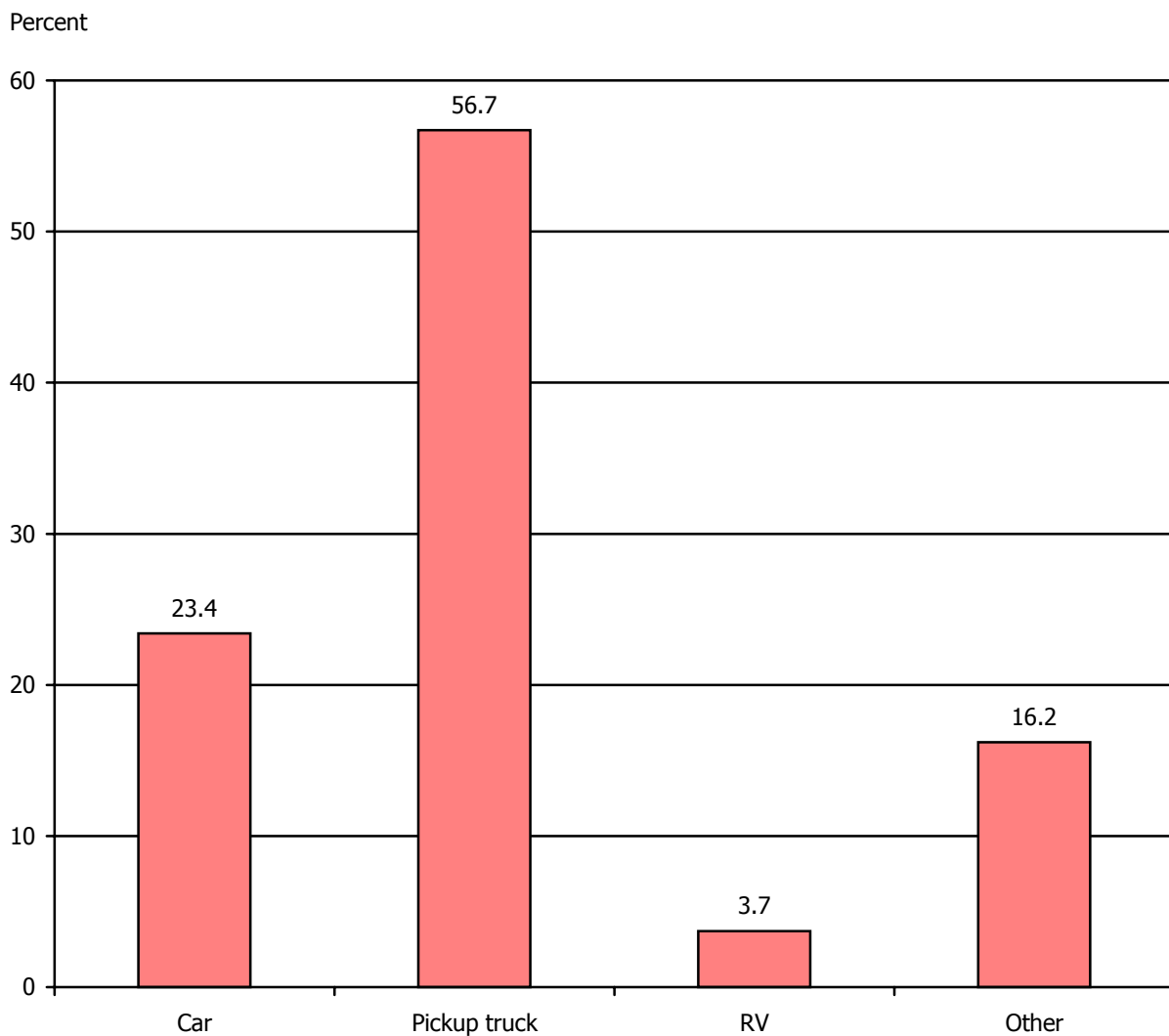
Preferences

19. When fishing <u>TROUT STREAMS</u> in Minnesota, which species of fish do you prefer (in rank order)? If you do not fish that resource, mark the box labeled "I do not fish trout streams in Minnesota."

Overall, rainbow trout was the most preferred species by anglers fishing trout streams in Minnesota (36.7%), followed by brook trout (33.7%) and brown trout (32.5%) as seen in Figure 13. About one-third (31.6%) of the sample indicated that they did not fish trout streams in Minnesota.

Figure 13
Species Preference: Trout Streams

Percent Most
Preferred

Percentages do not total 100% because multiple selections were allowed.

19A.   When fishing <u>TROUT STREAMS</u> in Minnesota, do you prefer wild trout or stocked trout?

As Figure 14 shows, coldwater anglers fishing trout streams in Minnesota indicated no clear preference (64.6%) between wild or stocked trout.

However, if a preference was expressed, anglers preferred wild trout (33.2%) to stocked trout (2.2%).

Figure 14
Preference for Wild Trout/Stocked Trout

No Preference
64.6%

Wild Trout
33.2%

Stocked Trout
2.2%
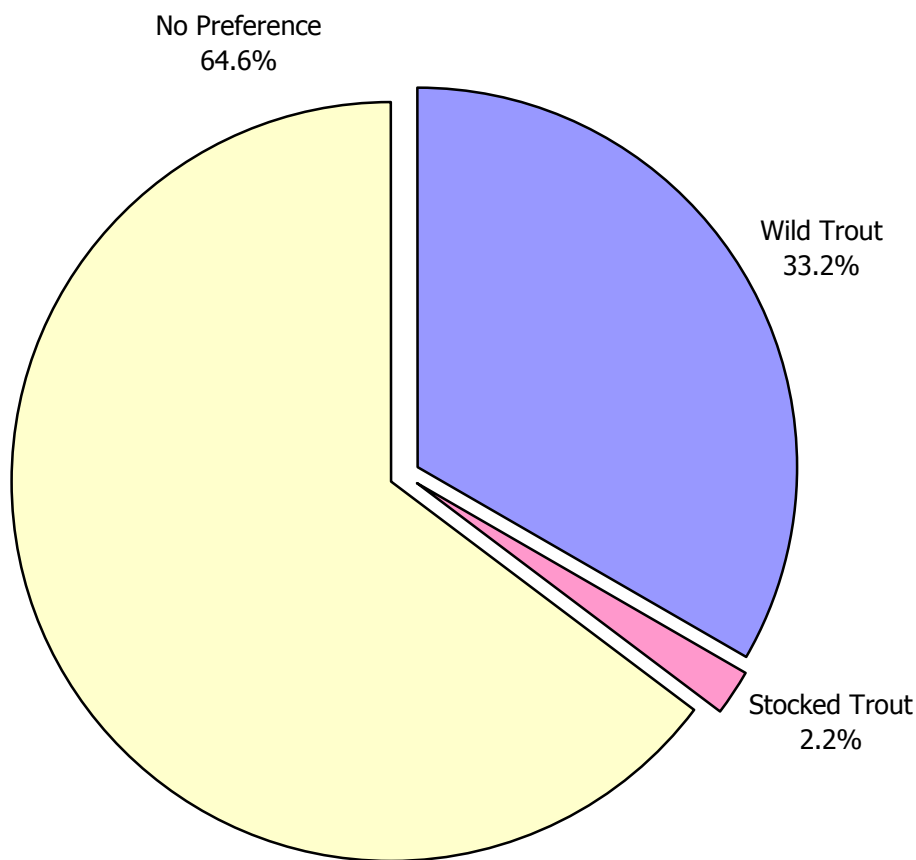
20.   When fishing <u>INLAND TROUT LAKES</u> in Minnesota, which species of fish do you prefer (in rank order)? If you do not fish that resource, mark the box labeled "I do not fish inland trout lakes in Minnesota."

Anglers fishing inland trout lakes in Minnesota indicated that the species they most preferred to catch was rainbow trout (51.9%) followed closely by lake trout (49.6%). About one-third (31.9%) preferred brook trout, while brown trout and splake were

only preferred by 15.4% and 15.3%, respectively (Figure 15). About one-third (38.3%) of anglers indicated that they did not fish inland trout lakes in Minnesota.

Figure 15
Species Preference: Inland Trout Lakes

Percent Most Preferred
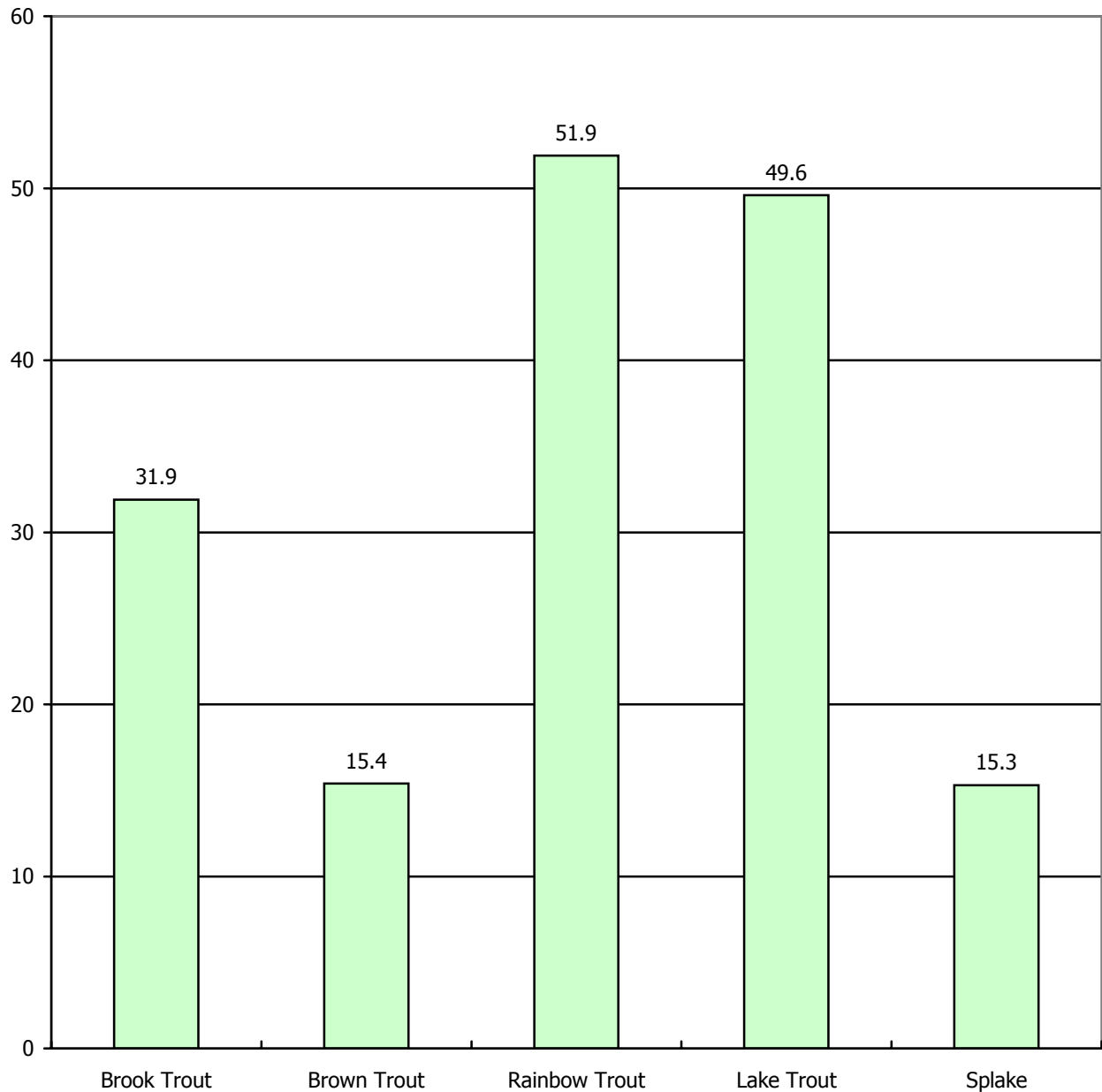
Percentages do not total 100% because multiple selections were allowed.

21.	When fishing <u>LAKE SUPERIOR SHORE OR STREAMS BELOW THE POSTED BOUNDARIES</u> in Minnesota, which species of fish do you prefer (in rank order)? If you do not fish that resource, mark the box labeled "I do not fish Lake Superior shore or streams below the posted boundaries in Minnesota."

As Figure 16 illustrates, anglers fishing Lake Superior shores and streams below the posted boundaries in Minnesota expressed a clear preference for steelhead (56.7%), followed by Kamloops rainbow (40.8%) and brook trout (38.3%). Brown trout was preferred by 17.0% of anglers fishing Lake Superior shores and streams below the posted boundaries. Slightly more than two-thirds (68.5%) of anglers indicated that they did not fish Lake Superior shores and streams below the posted boundaries in Minnesota.

Figure 16
Species Preference: Lake Superior Shore or Streams Below the Posted Boundaries

Percent Most Preferred
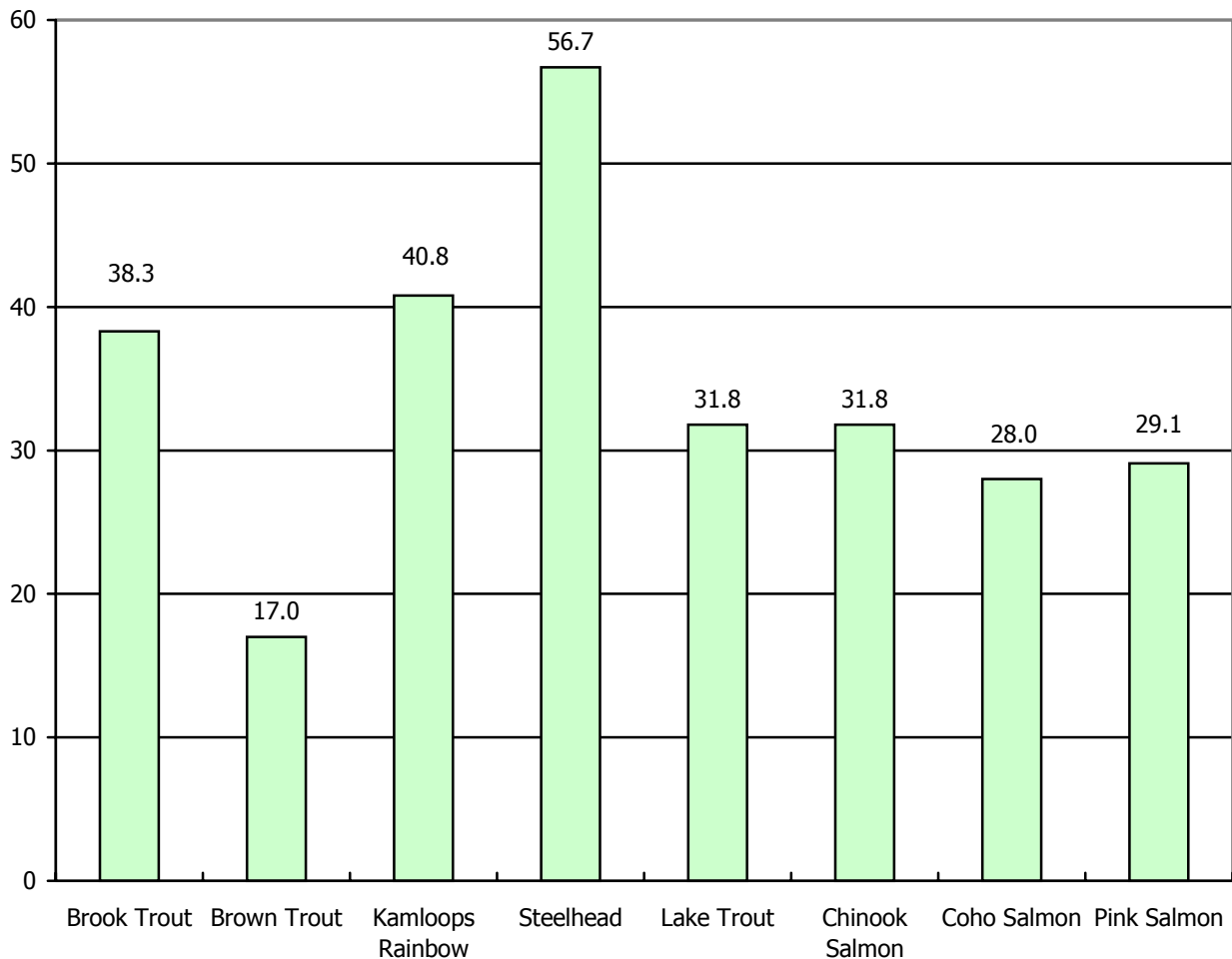
Percentages do not total to 100% because multiple selections were allowed.

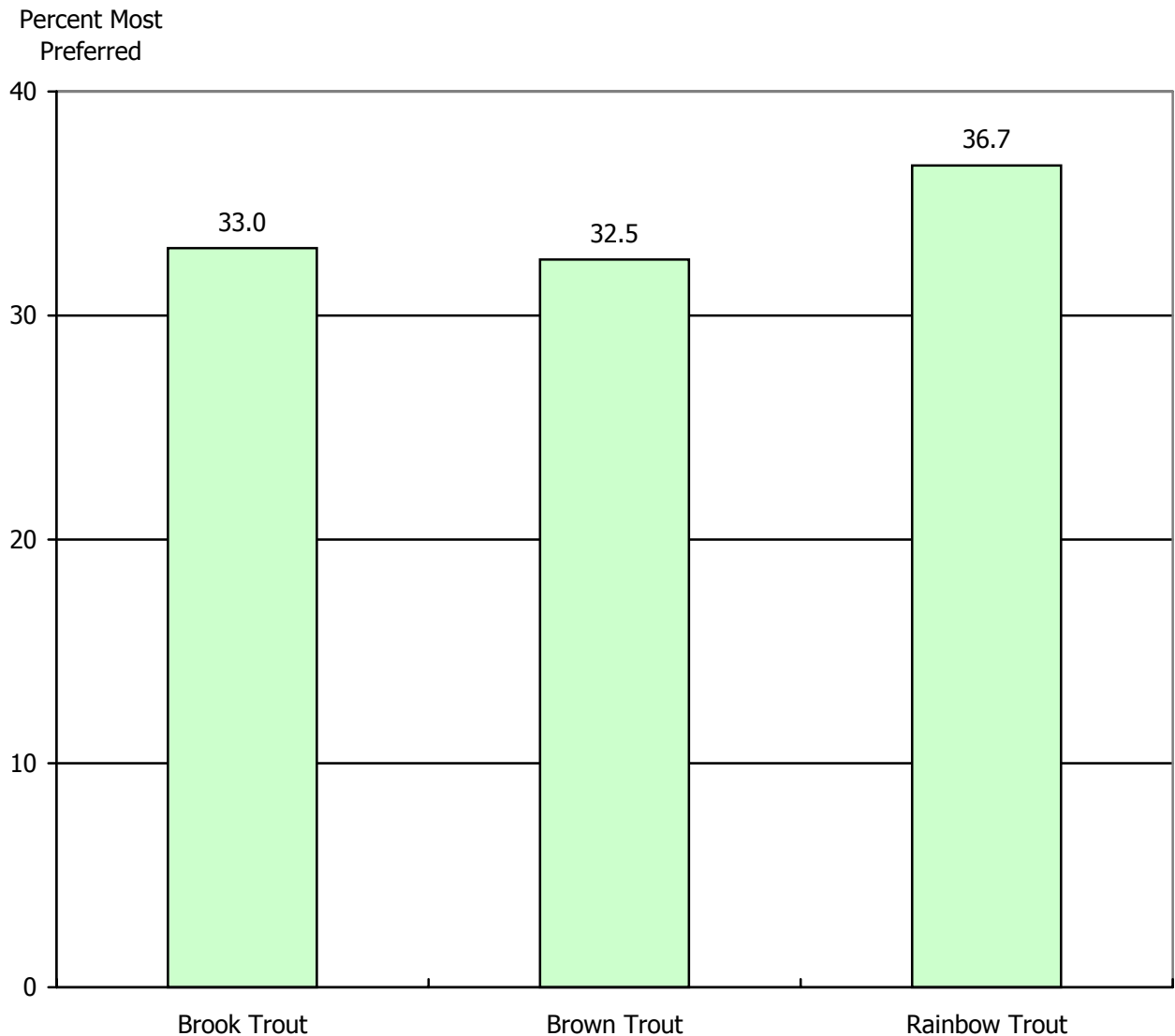22.   When fishing <u>RAINBOW TROUT ON LAKE SUPERIOR SHORE OR STREAMS</u> in Minnesota, which species of fish do you prefer (in rank order)? If you do not fish that resource, mark the box labeled "I do not fish rainbow trout on Lake Superior shore or streams in Minnesota."

Anglers fishing for rainbow trout on Lake Superior shores and streams in Minnesota indicated no preference (76.4%). Of those anglers with a preference, 65.0% preferred unclipped steelhead (possibly wild) (Figure 17). More than two-thirds (70.7%) of anglers indicated that they did not fish for rainbow trout on Lake Superior shores and streams in Minnesota.

Figure 17
Species Preference: Rainbow Trout on Lake Superior Shore or Streams

Percent Most Preferred
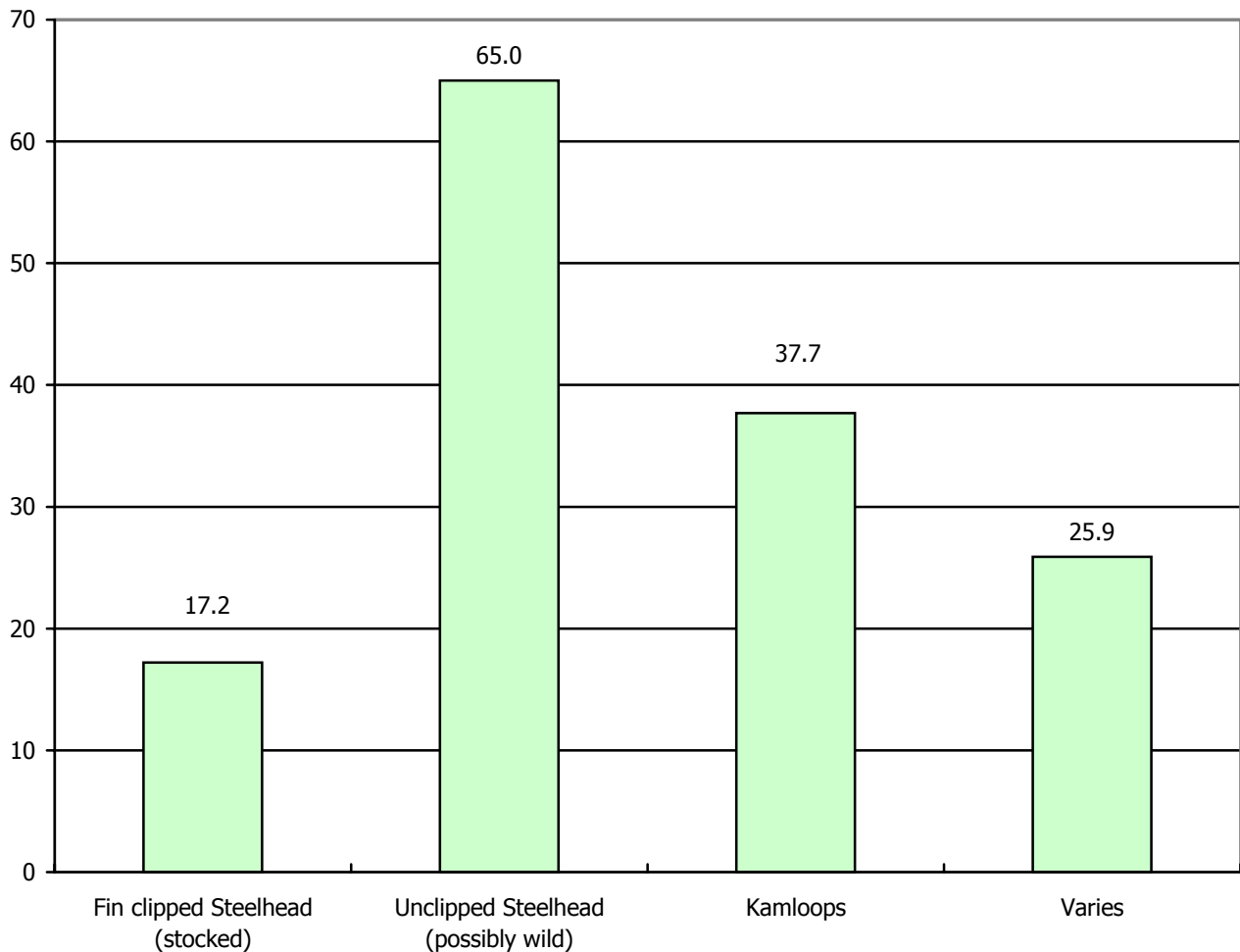
Percentages do not total 100% because multiple selections were allowed.

23. Where do you MOST OFTEN fish Lake Superior shores or streams?

Over one-half (54.3%) of anglers fishing on Lake Superior shores and streams in Minnesota fished between Duluth and Two Harbors, followed by 28.0% of anglers who fished most often between Two Harbors and Tofte.

As Figure 18 shows, only 17.7% of anglers fished on Lake Superior shores and streams in Minnesota fished between Tofte and the Canadian border.

Figure 18
Fishing Spots along Lake Superior Shore or Streams

Between Tofte & the
Canadian border
17.7%

Between Duluth &
Two Harbors
54.3%

Between Two Harbors
& Tofte
28.0%
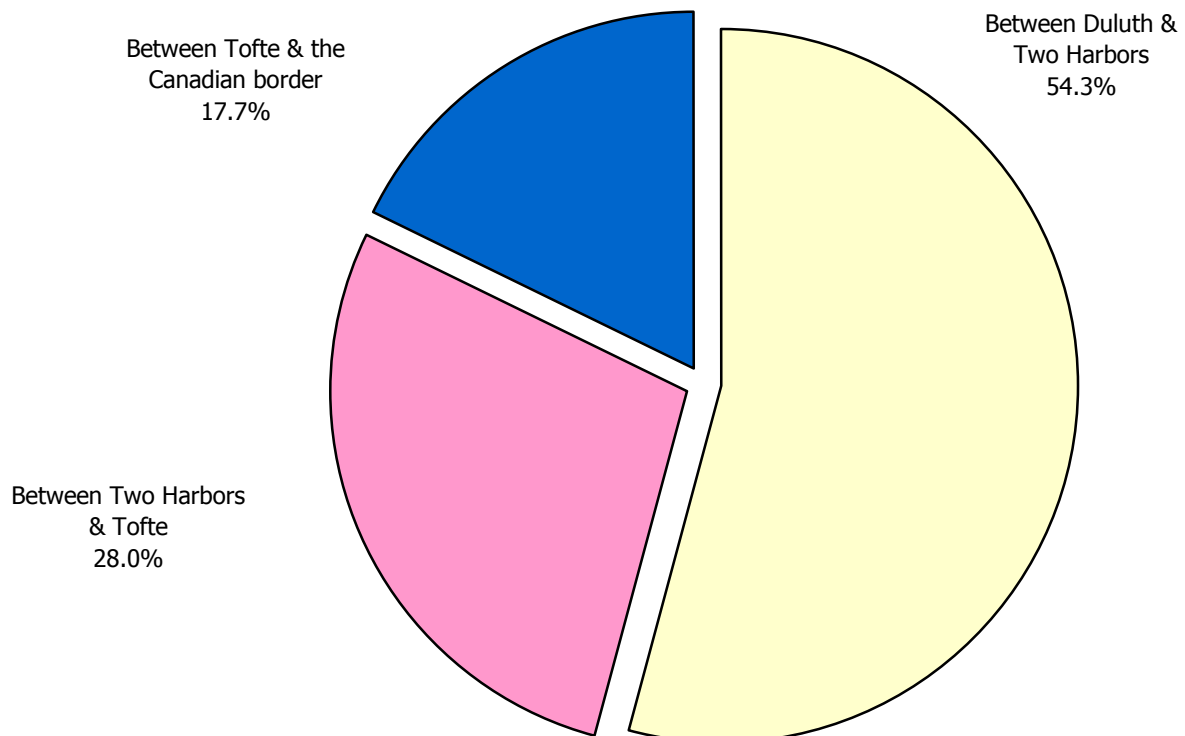
23A.   How many years have you been fishing for STEELHEAD and KAMLOOPS in
          Minnesota?

On average, anglers reported fishing for steelhead for 11.3 years, while anglers fishing
for Kamloops averaged 7.1 years (Figure 19)

Figure 19
Years Fishing Steelhead and Kamloops
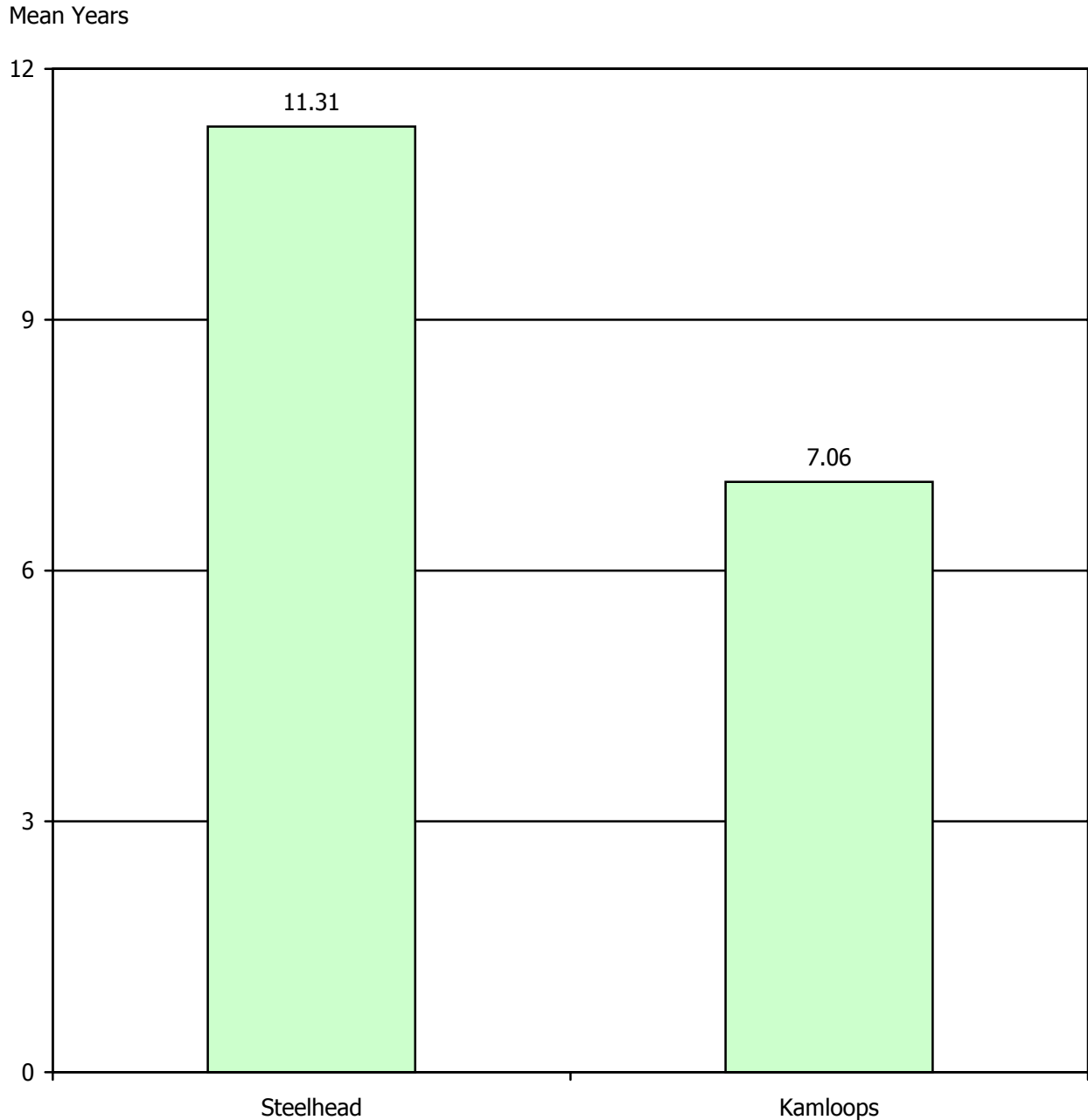
Mean Years

23B. Over this length of time, do you believe the number of STEELHEAD and KAMLOOPS you have caught has decline, increased or stayed the same?

Anglers indicated that, on average, steelheads were generally declining over time, while the number of kamloops were generally seen to be increasing (Figure 20).

However, means for each suggest that the number of steelhead is declining slightly over time (mean=2.44), while the number of kamloops is viewed as having remained relatively steady over the years (mean=2.93).

Figure 20
Number of Steelhead and Kamloops Over Time
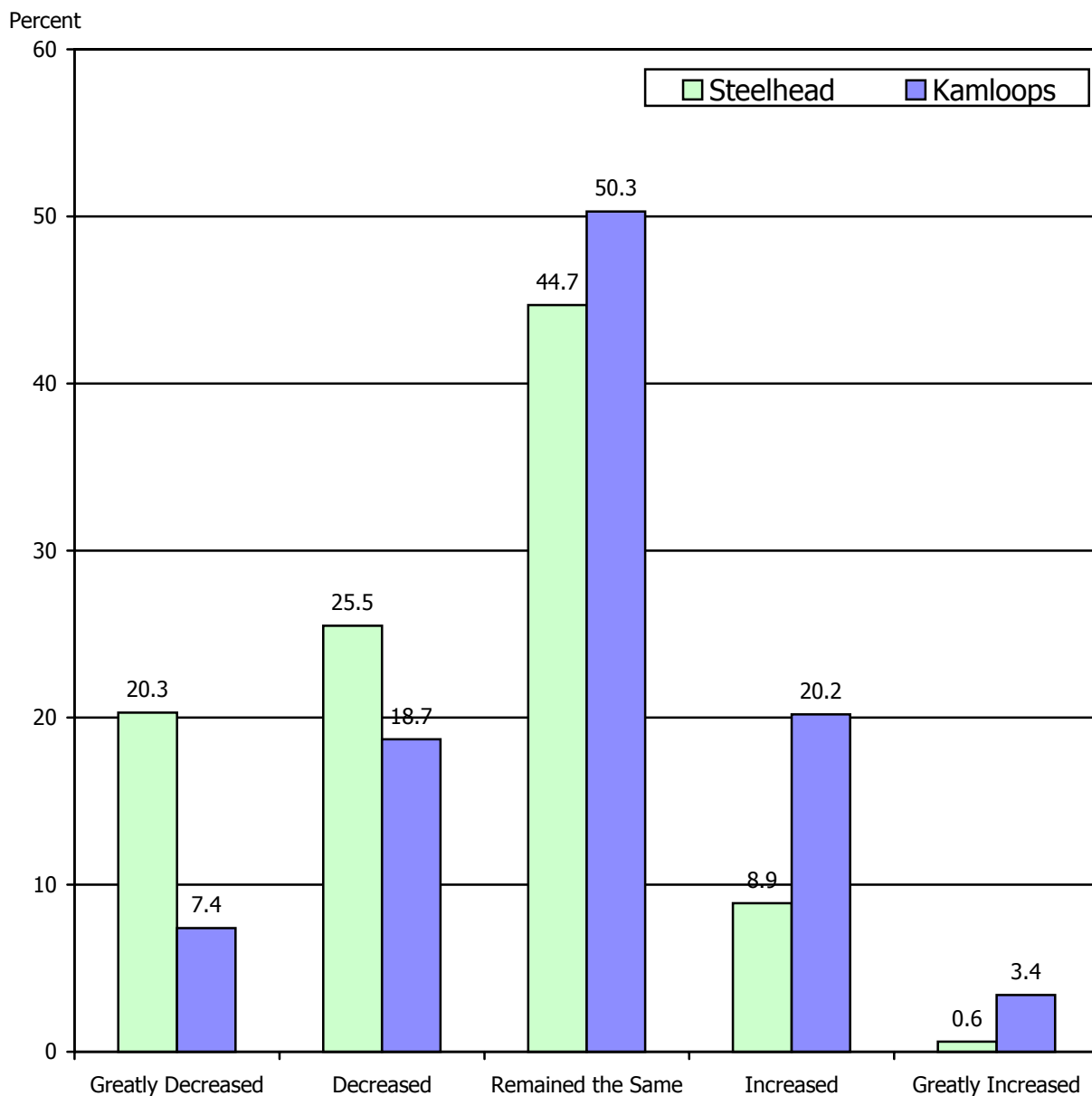
24. When fishing LAKE SUPERIOR FROM A BOAT in Minnesota, which species of fish do you prefer (in rank order)? If you do not fish that resource, mark the box labeled "I do not fish Lake Superior from a boat in Minnesota."

As Figure 21 indicates, anglers fishing on Lake Superior from a boat indicated a joint preference for lake trout (46.3%) and Chinook salmon (45.3%). Almost three-fourths (73.7%) of anglers indicated that they did not fish Lake Superior from a boat in Minnesota.

Figure 21
Species Preference: Lake Superior from a Boat
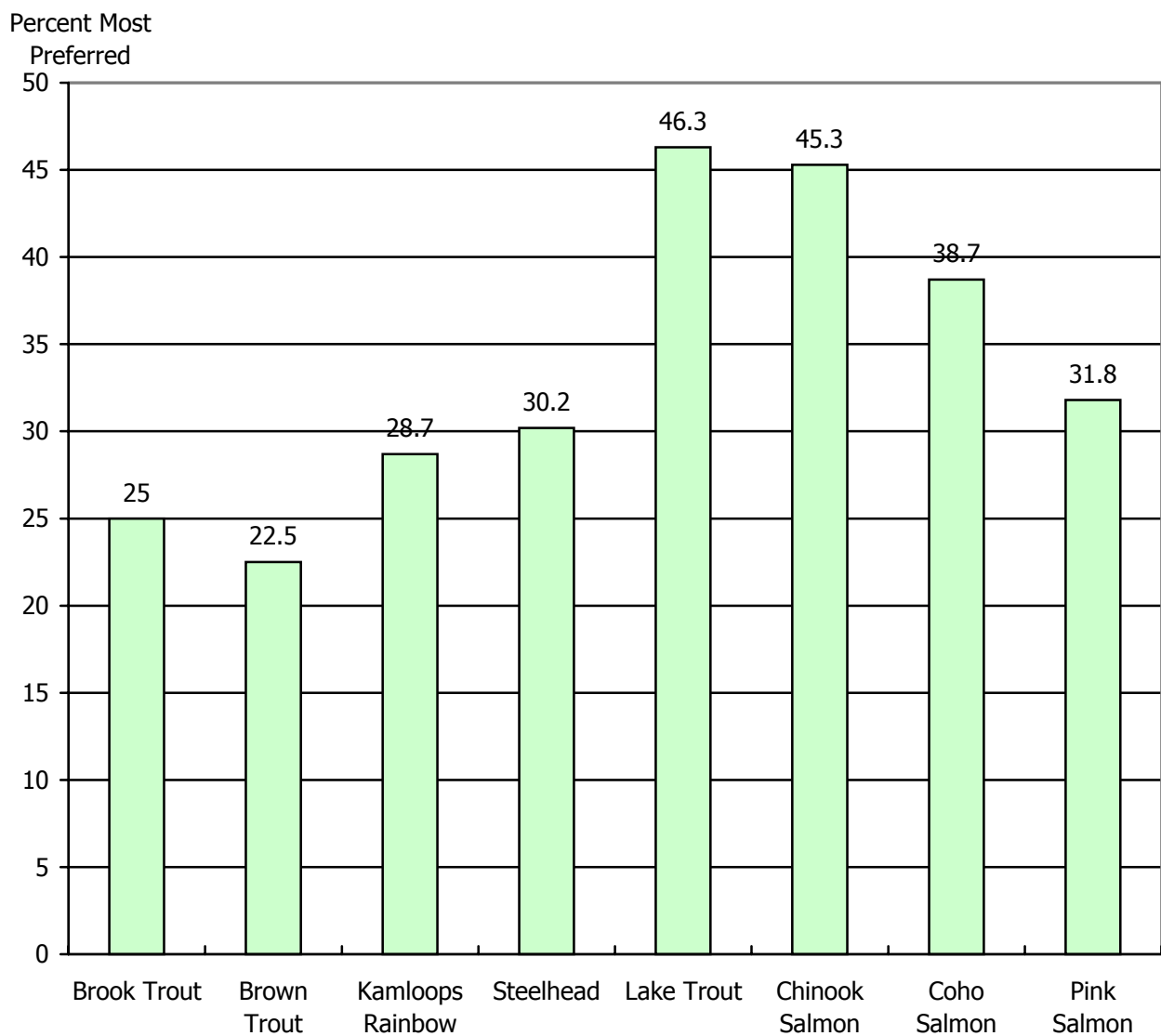
Percentages do not total 100% because multiple selections were allowed.

<u>Demographics</u>

Table 7 summarizes basic demographic information for coldwater anglers in this study related to age, income, and number of people in the household.

Table 7
Respondent Characteristics

	Mean	Median	Mode	Range
Age	43.11 years	43 years	46 years	16-89 years
Income	$68,360	$60,000	$100,000	$0-$500,000
Number of people in household	2.84 people	2 people	2 people	1-11 people

Median age for respondents in the study was 43 years old, which is slightly older than the Minnesota median age of 35.4 reported in the 2000 Census (U.S. Census Bureau, 2000). This difference is explained, in part, by the Minnesota DNR policy requiring the purchase of a trout/salmon stamp for anglers 16 or older. Thus, anglers younger than 16 were not included in the study because the database generating the sample was comprised of people purchasing trout/salmon stamps or anglers purchasing one-day stamps.

Average household income for coldwater anglers was just over $68,000, which is higher than the 2000 Census mean ($60,408) and median ($48,719) income in Minnesota (U.S. Census Bureau, 2000), which suggests a relatively affluent angling population. However, household income ranged from $0 (less than $1,000 annually) to more than $1 million annually. To make the results more useful, a cap of $500,000 was placed on total annual household income, with figures above $500,000 discarded as outliers.

The average number of people living in the household was 2.84 people. Household size ranged from 1 to 11 people, but the most common household size was two people. And, as Figure 22 shows, males (90.7%) outnumbered females (9.3%) in the sample, which is not surprising as considerably more males than females purchase trout/salmon stamps.

Figure 22
Gender

Male
90.7%

Female
9.3%
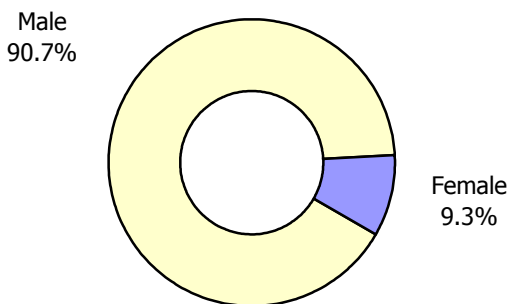
The coldwater angling population possesses relatively high education levels, with 45% of respondents reporting at least a college degree (Figure 23). Only 3.7% possessed less than a high school education.

Figure 23
Education Level

Percent

Education Level	Percent
Some high school	3.7
High school/GED grad	14.0
Some voc/tech school	6.8
Voc/tech degree	13.6
Some college	16.9
Associate degree	23.5
BS/BA degree	7.7
Post grad/professional degree	13.8
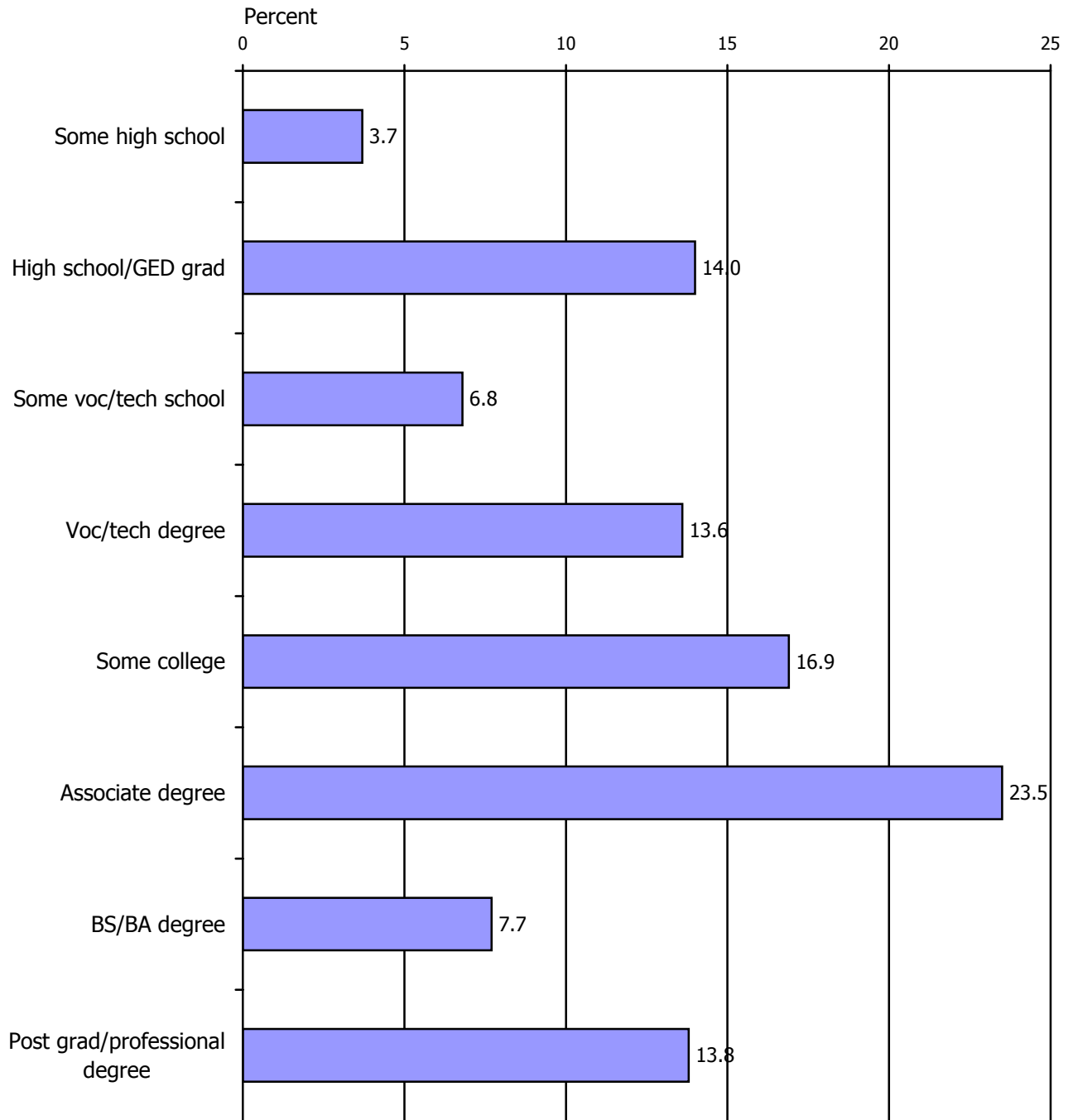
Not surprisingly, 98.4% of the sample reported their race/ethnicity as White, with only 1.6% claiming another race/ethnicity (0.7% Asian, 0.4% American Indian, 0.3% Latino, and 0.2% Black) (Figure 24).

Figure 24
Race/Ethnicity
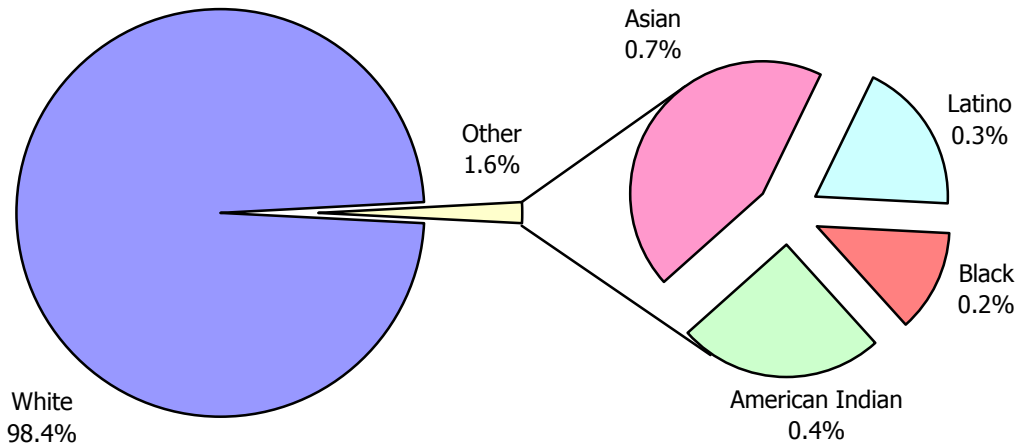
As Figure 25 shows, the majority of coldwater anglers in the sample, not surprisingly, reside in Minnesota, followed by Wisconsin (2.7%). This finding follows general travel patterns to the state. What this finding suggests (via indirect evidence) is that Minnesota's traditional travel patterns do not shift even when trout/salmon fishing is considered as a separate tourist activity because the state does not evoke a strong enough image as a coldwater fishing destination.

Figure 25
State of Origin
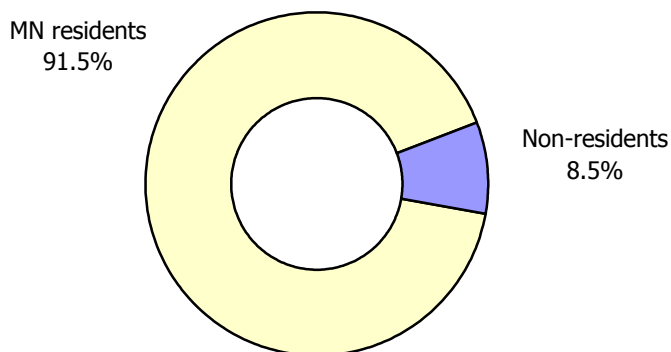
For a more detailed examination of traveler origin, zip code maps were generated for each of the seven regions (see below using MapInfo Professional (Maps 1-7).

As the maps and corresponding figures illustrate (Figures 26-32), some regions of Minnesota attract more long distance travelers to fish for trout/salmon, while others serve a more local traveler base.

Map 1
Zip Code Analysis for Region 1

Number of Visitors by Radius
- 44 visitors: 0-50 miles
- 61 visitors: 50-100 miles
- 56 visitors: 100-200 miles
- 8 visitors: 200-300 miles
- 7 visitors: over 300 miles
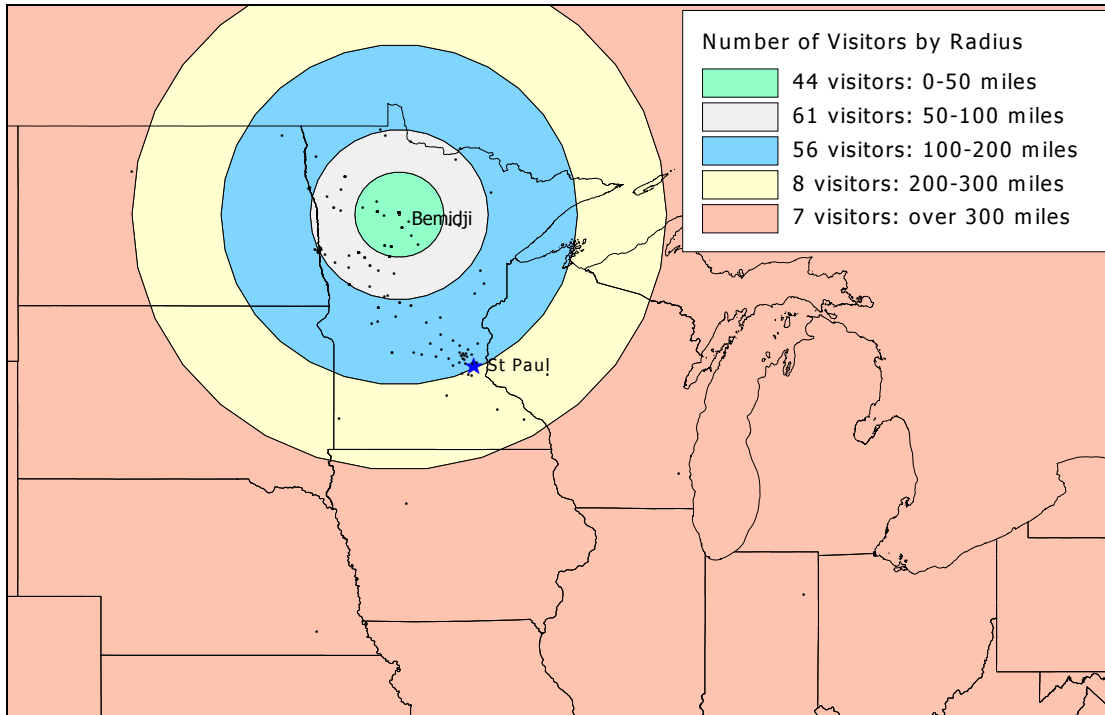
Figure 26
Distance Traveled to Fish Region 1

0-50 miles
25.0%

50-100 miles
34.7%

over 300 miles
4.0%

200-300 miles
4.5%

100-200 miles
31.8%

Map 2
Zip Code Analysis for Region 2

Number of Visitors by Radius
- 115 visitors: 0-50 miles
- 315 visitors: 50-100 miles
- 148 visitors: 100-200 miles
- 389 visitors: 200-300 miles
- 73 visitors: over 300 miles
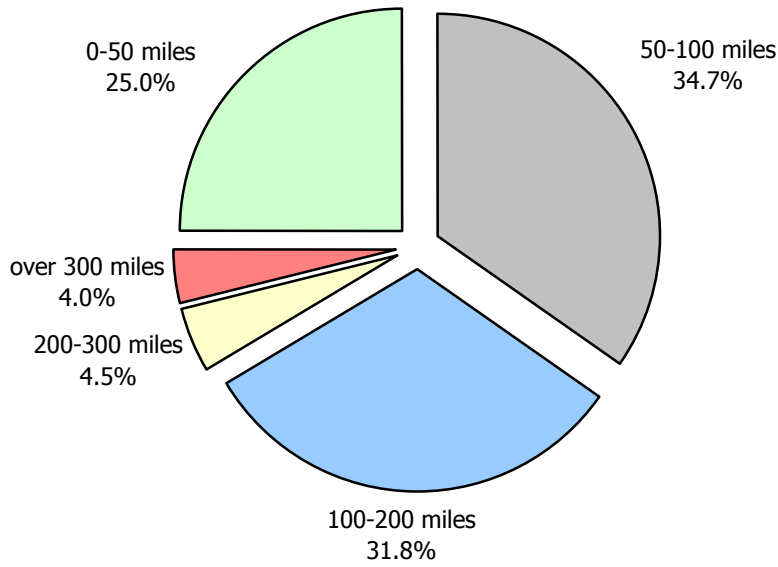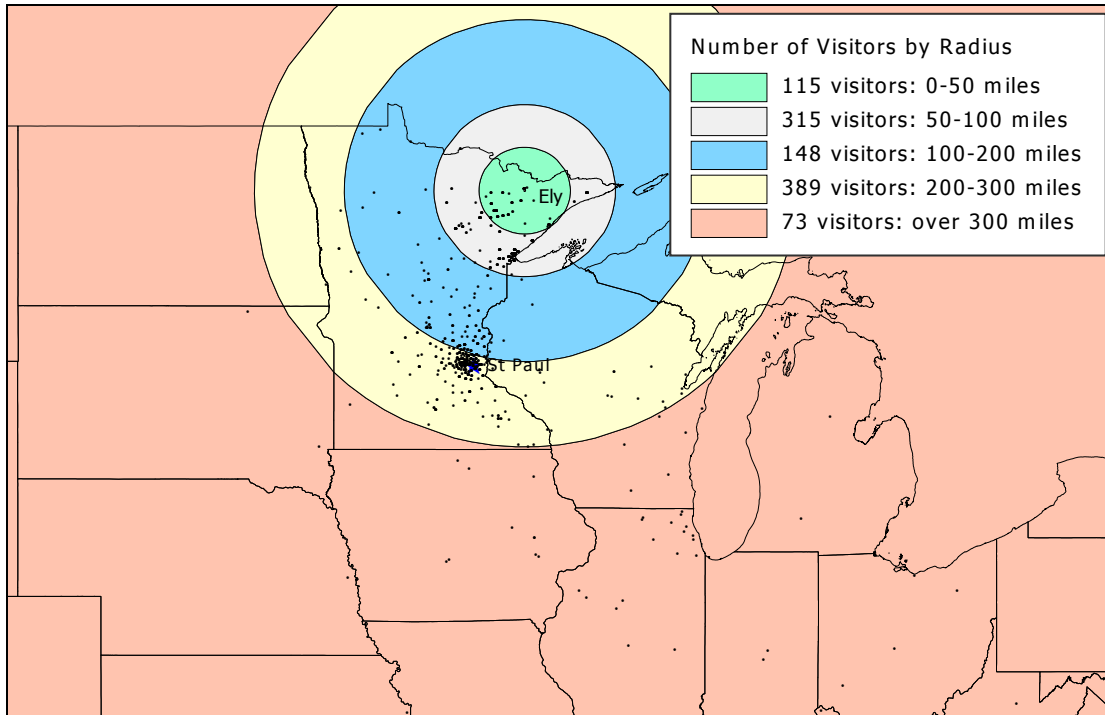
Figure 27
Distance Traveled to Fish Region 2

- 50-100 miles 30.3%
- 0-50 miles 11.1%
- over 300 miles 7.0%
- 100-200 miles 14.2%
- 200-300 miles 37.4%

Map 3
Zip Code Analysis for Region 3

Number of Visitors by Radius

- 74 visitors: 0-50 miles
- 104 visitors: 50-100 miles
- 47 visitors: 100-200 miles
- 3 visitors: 200-300 miles
- 5 visitors: over 300 miles
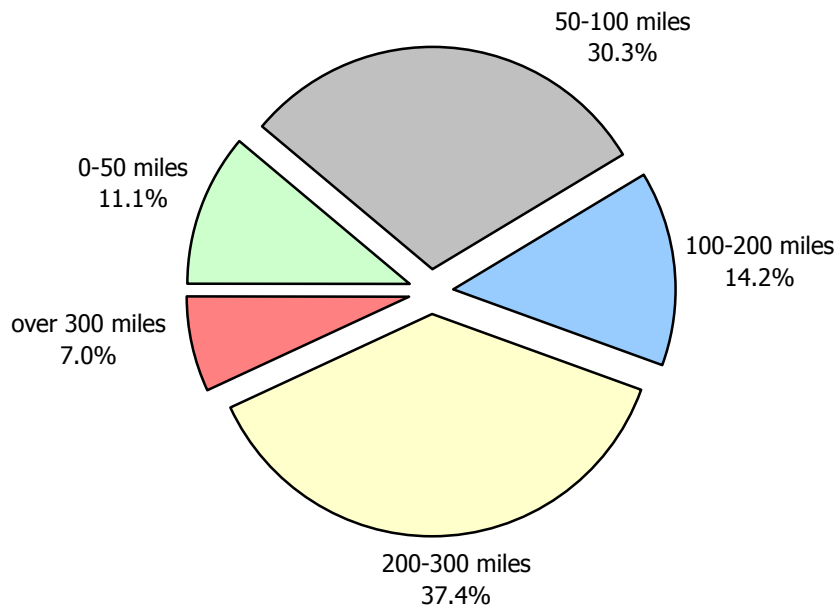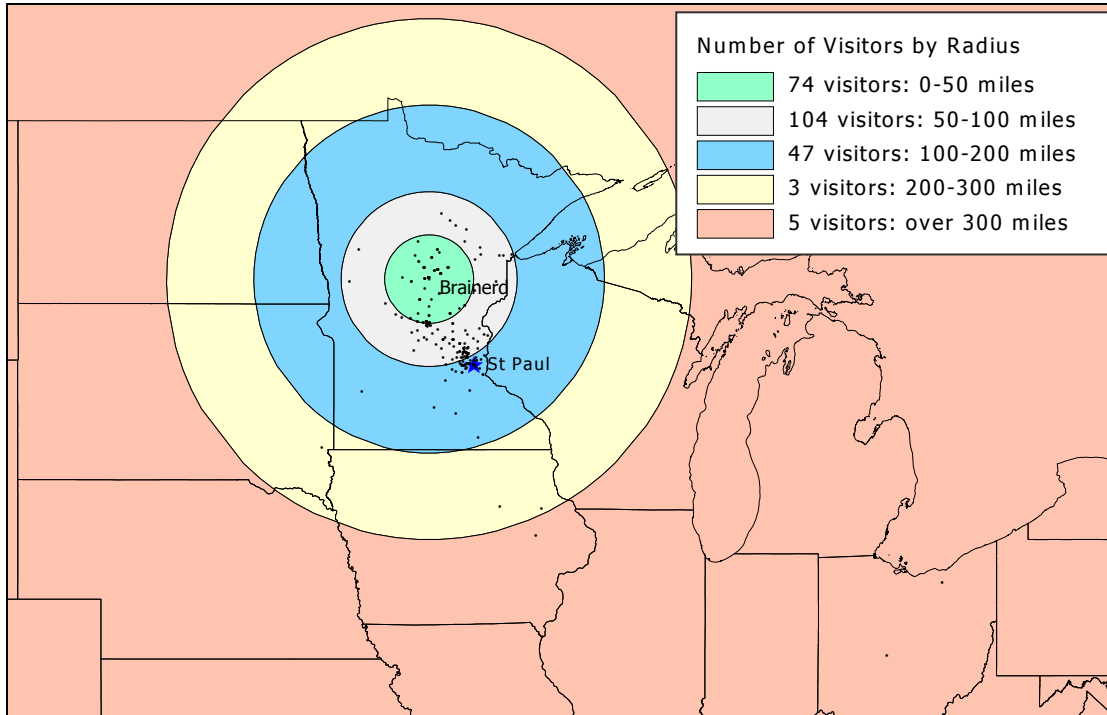
Figure 28
Distance Traveled to Fish Region 3

- 0-50 miles 31.8%
- 50-100 miles 44.6%
- 100-200 miles 20.2%
- 200-300 miles 1.3%
- over 300 miles 2.1%

Map 4
Zip Code Analysis for Region 4

Number of Visitors by Radius
- 20 visitors: 0-50 miles
- 18 visitors: 50-100 miles
- 1 visitor: 100-200 miles
- 1 visitor: 200-300 miles
- 2 visitors: over 300 miles

St Paul

New Ulm
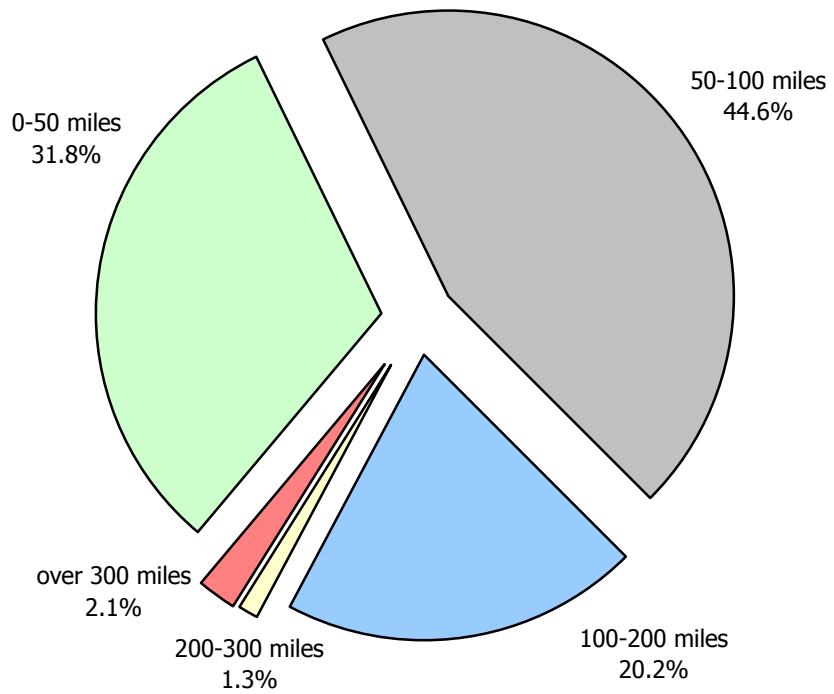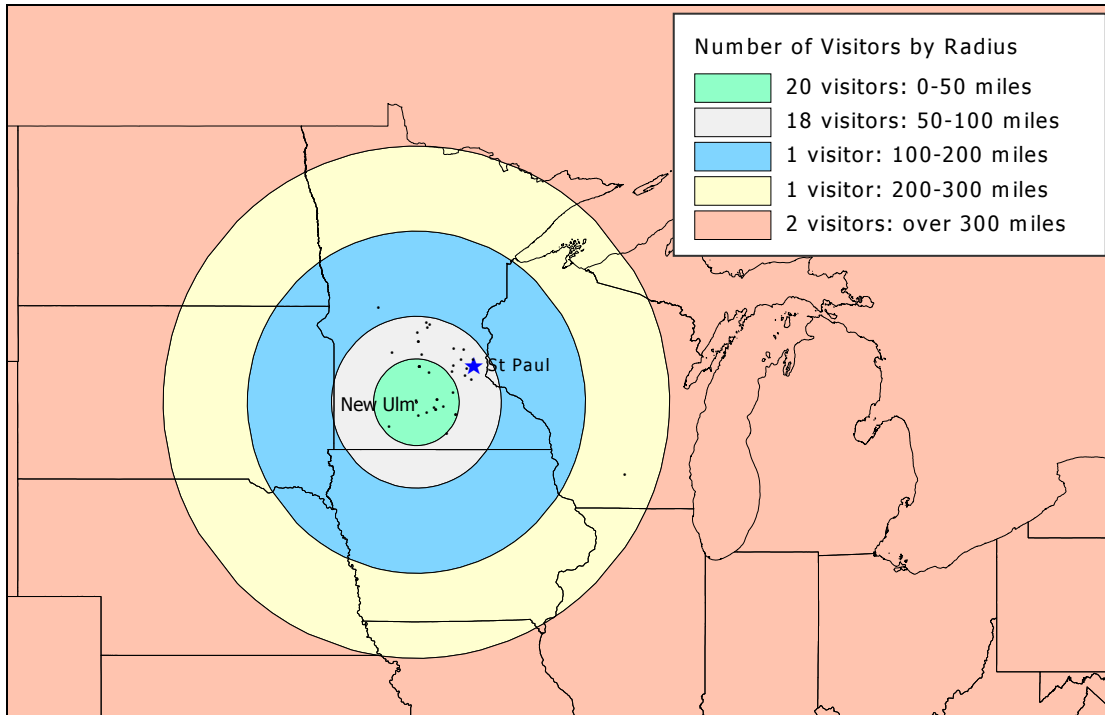
Figure 29
Distance Traveled to Fish Region 4

50-100 miles
42.9%

100-200 miles
2.4%

200-300 miles
2.4%

over 300 miles
4.8%

0-50 miles
47.6%

Map 5
Zip Code Analysis for Region 5

Number of Visitors by Radius
- 339 visitors: 0-50 miles
- 219 visitors: 50-100 miles
- 321 visitors: 100-200 miles
- 34 visitors: 200-300 miles
- 19 visitors: over 300 miles
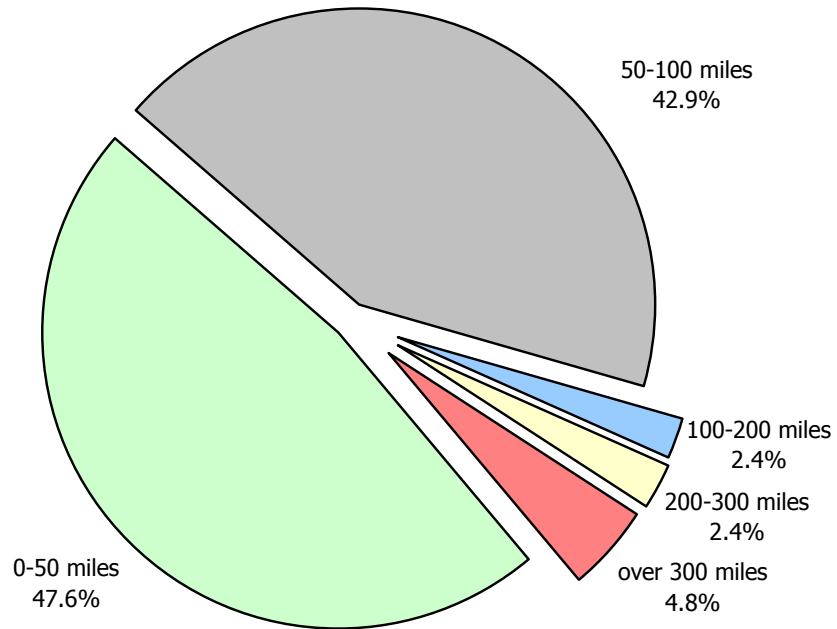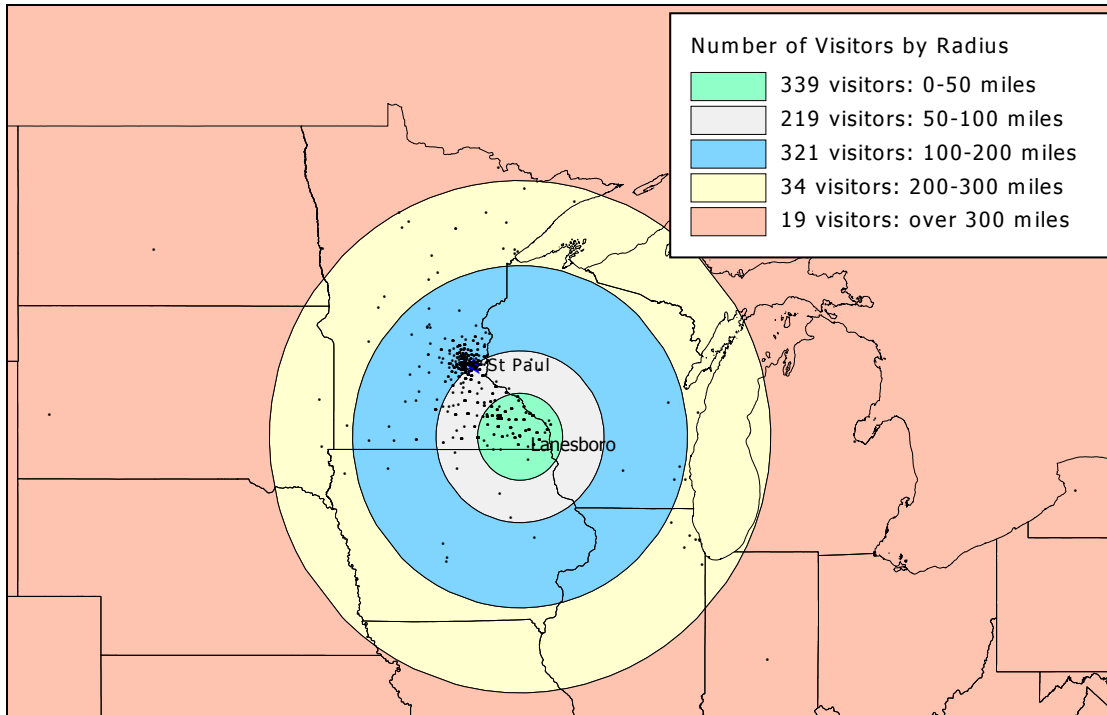
Figure 30
Distance Traveled to Fish Region 5

- 50-100 miles 23.5%
- 0-50 miles 36.4%
- 100-200 miles 34.4%
- 200-300 miles 3.6%
- over 300 miles 2.0%

Map 6
Zip Code Analysis for Region 6

Number of Visitors by Radius
- 80 visitors: 0-50 miles
- 3 visitors: 50-100 miles
- 3 visitors: 100-200 miles
- 2 visitors: 200-300 miles
- 2 visitors: over 300 miles
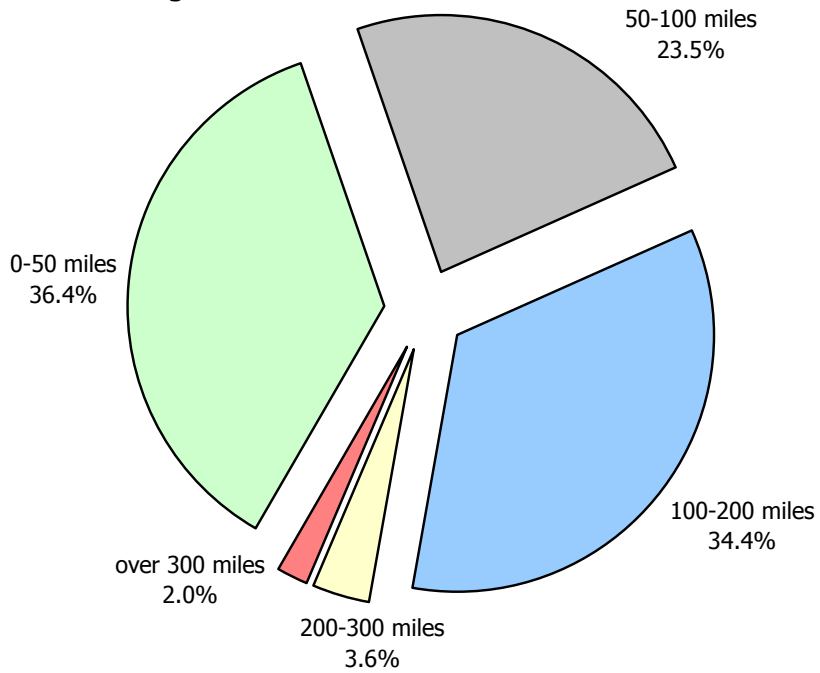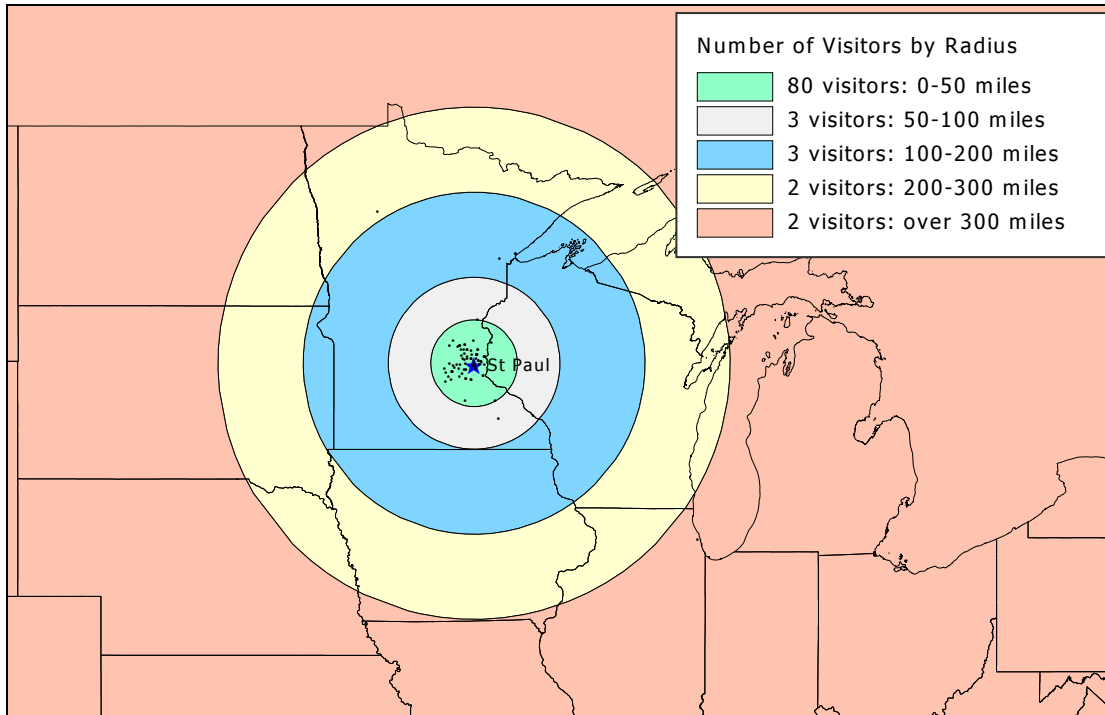
Figure 31
Distance Traveled to Fish Region 6

0-50 miles
88.9%

50-100 miles
3.3%

100-200 miles
3.3%

200-300 miles
2.2%

over 300 miles
2.2%

Map 7
Zip Code Analysis for Region 7

Number of Visitors by Radius
131 visitors: 0-50 miles
24 visitors: 50 -100 miles
111 visitors: 100-200 miles
11 visitors: 200-300 miles
19 visitors: over 300 miles

Two Harbors

St Paul
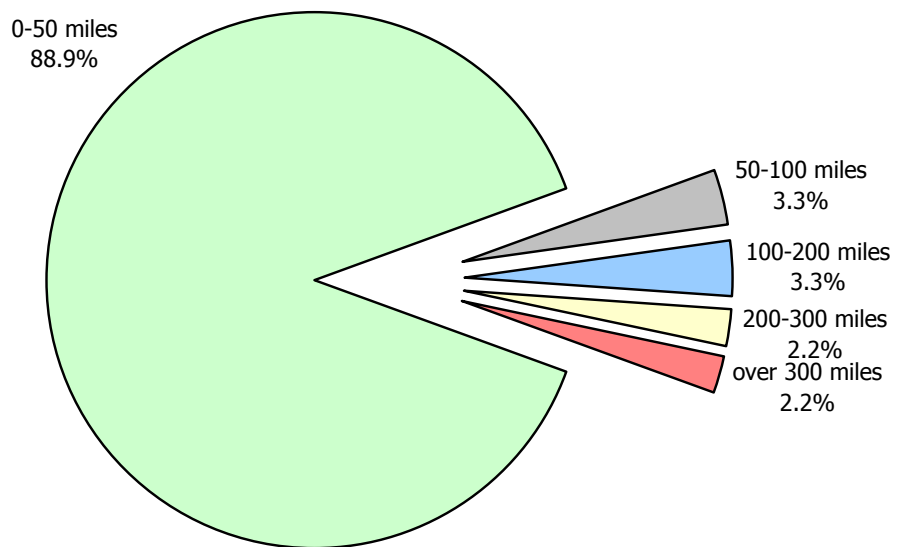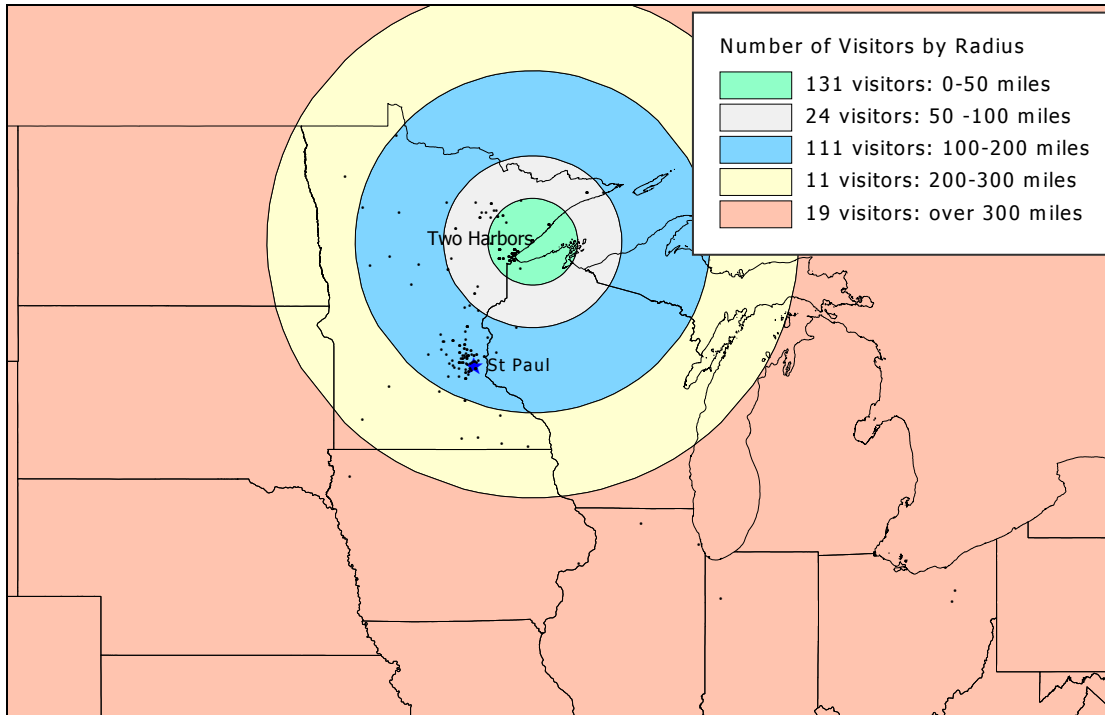
Figure 32
Distance Traveled to Fish Region 7

50-100 miles
8.1%

0-50 miles
44.3%

100-200 miles
37.5%

over 300 miles
6.4%

200-300 miles
3.7%
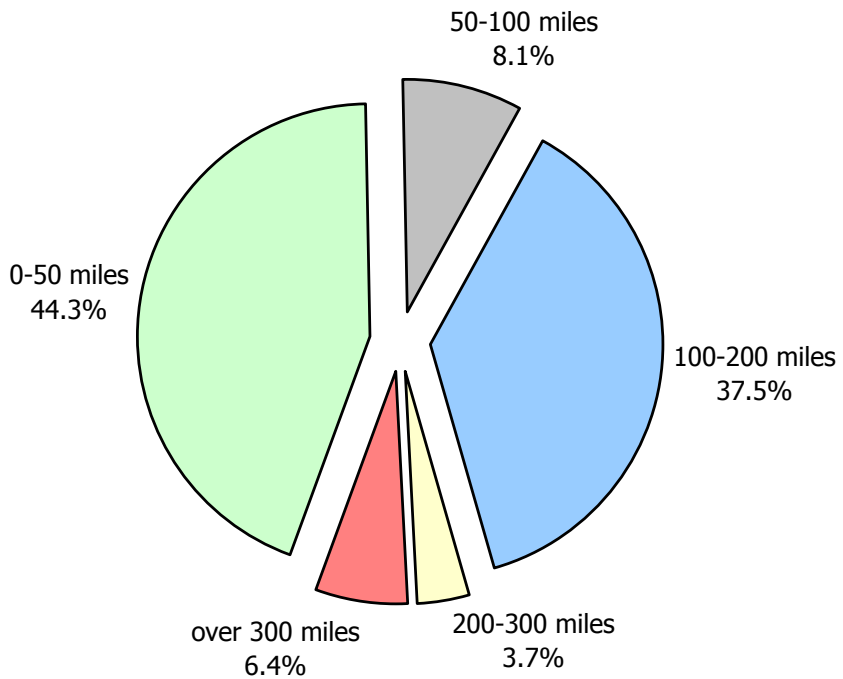
Club membership is relatively low for coldwater anglers in this sample – only 13.2% of coldwater anglers reported that they belong to a fishing club (Figure 33).

Figure 33
Trout/Salmon Club Membership

No club affiliation 88.2%

Club member 13.2%

Club	Club Members
Federation of Fly Fishers	23
Izaak Walton League	20
North American Fishing Club	125
Minnesota Trout Association	12
Trout Unlimited	188
Lake Superior Steelhead Assn	35
W Lake Superior Trollers Assn	15
Other Associations	57
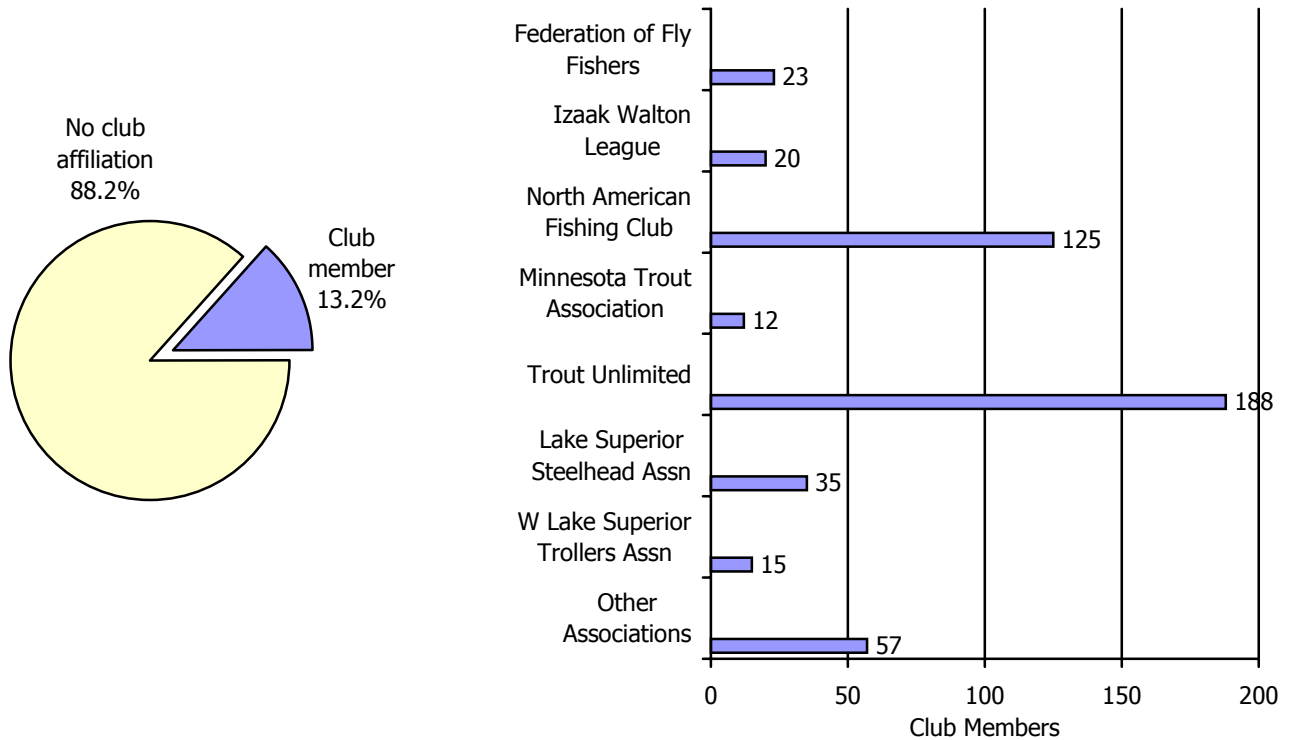
Among those coldwater anglers belonging to a club, the highest club membership was reported for Trout Unlimited, followed by the North American Fishing Club.

Internet use was fairly high for the sample, with 69.2% of coldwater anglers using the Internet for travel related services, including licenses, related to their trout/salmon fishing trip (Figure 34). Interestingly, the use of the Internet among coldwater anglers in this sample is slightly higher than that of Minnesota (60.7%-66.2%) and the nation (53.6%-54.1%), as reported in a joint study by the National Telecommunications & Information Administration and the Economics & Statistics Administration (U.S. Department of Commerce, 2002).

Figure 34
Internet Usage
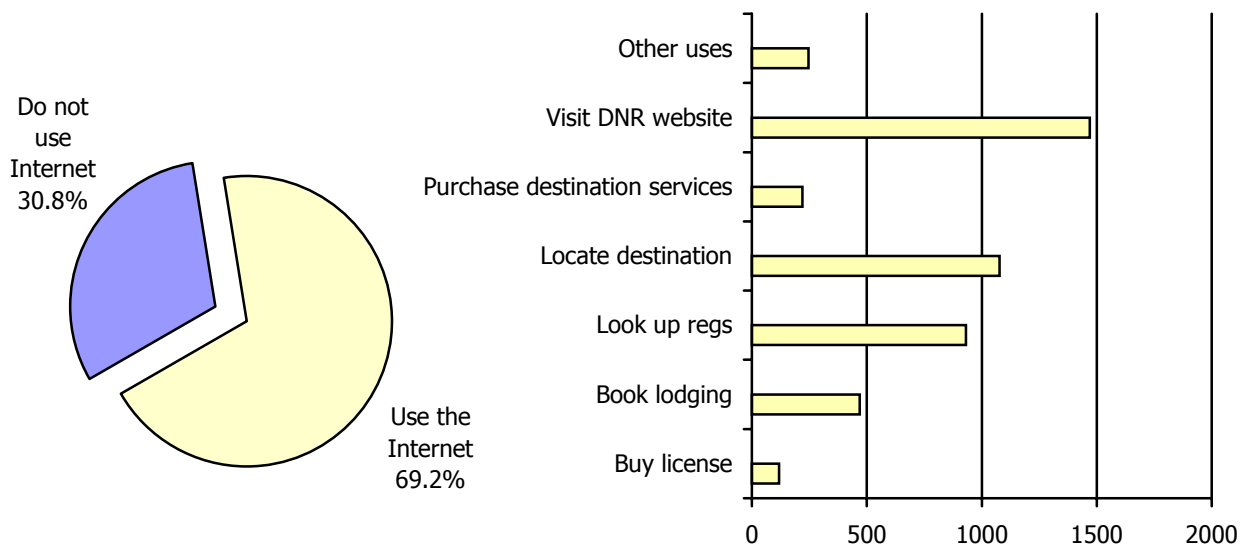
Of those that reported using the Internet, the largest number of anglers reported visiting the DNR website, which may also include viewing regulations.

The Internet was also very popular for locating the fishing destination and booking lodging. Few coldwater anglers in the sample used the Internet to purchase services in the destination area, to buy a license, or for other uses.

The average number of years fishing for trout was 15.48 years, but the mean number of years fishing for salmon was slightly lower at 10.56 years (Table 8).

Table 8
Years Fishing for Trout/Salmon

	Mean	Median	Mode	Range
Years fishing trout	15.48 years	10 years	1 year	0-60 years
Years fishing salmon	10.56 years	8 years	1 year	0-57 years

Coldwater anglers were asked to evaluate the quality of trout and salmon fishing over the years they had been fishing for trout or salmon in Minnesota. As Table 9 details, the average respondent felt that the quality of the <u>trout</u> fishing in Minnesota had remained relatively constant (mean=2.96). However, respondents believe that <u>salmon</u> fishing over the years has declined somewhat, with an average rating of 2.65, which is still in the category of remained the same, but tends toward the decreased end of that scale.

Table 9
Quality of Fishing for Trout/Salmon

	Mean	Median	Mode	Scale
Quality of trout	2.96	3	3	1=greatly decreased to 5=greatly increased
Quality of salmon	2.65	3	3	1=greatly decreased to 5=greatly increased

Angling Behavior By Fishing Type

Different types of angling behavior should produce different profiles of users if the null hypothesis guiding this study is to be rejected. In order to test the null hypothesis that no difference exists between angling types, the means, based on questionnaire responses, were compared using the SPSS (Statistical Package for the Social Sciences) Analysis of Variance (ANOVA) procedure. The statistic used for comparing means is the Scheffé test. Results are presented as comparisons, in terms of mean scores and statistically significant differences, between fishing types so that the differences become clear.

Significant differences were noted with respect to the number of people in the angling party based on type of angling participation. The highest mean (mean=3.57) was recorded for inland lake fishing in winter. By contrast Lake Superior shores and streams recorded the smallest party size at 2.48 people, or approximately one less person per party than found for inland lakes in winter. Lake Superior by Boat (mean=3.44) also had a significantly larger party size than for any of the other angling types excluding Lake Superior shores and streams (Figure 35).

Figure 35
Travel Party Size Difference by Fishing Type

Mean Travel Party Size
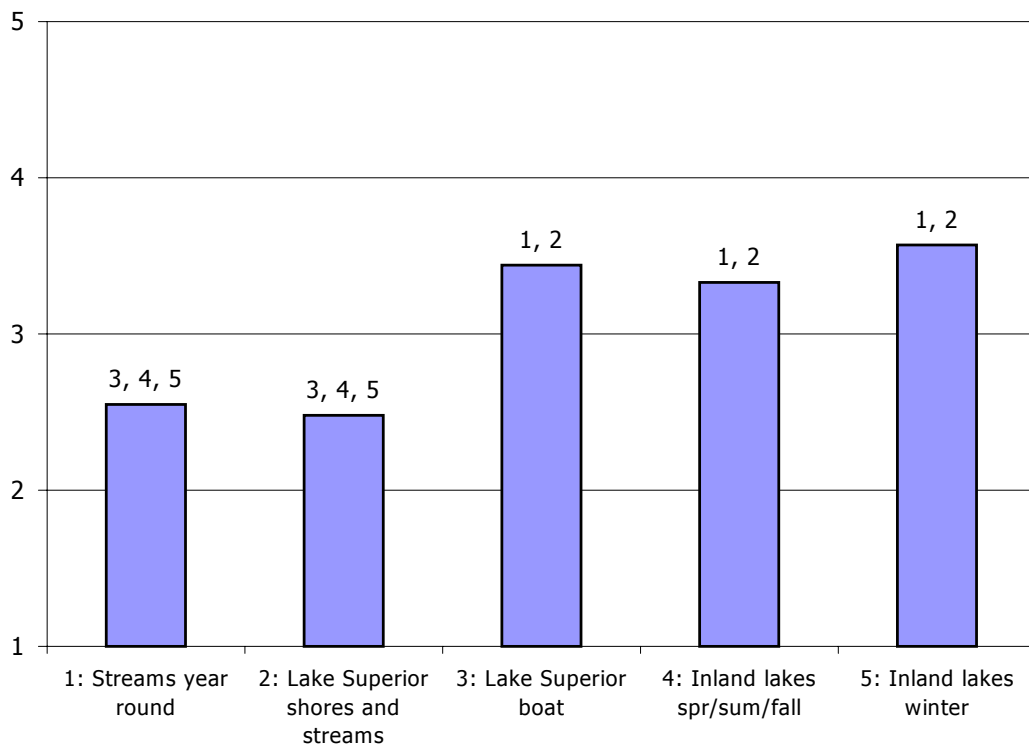
Note: A number appearing at the top of the bar identifies those fishing type(s) with mean scores significantly different than the mean score for that particular fishing type.

These results suggest that inland lakes in winter and Lake Superior by boat angling types are conducive to a larger party size than any of the other three types of angling. It is possible that inland lakes in winter and Lake Superior by Boat anglers may have different motivations for fishing than found for the other angling types. Indeed, in the Benefits section of this report this conjecture was supported. The evidence of larger party size appears to suggest that social interactions may be a reason for engaging in these two types of coldwater angling.

When days away from home were examined with respect to angling type inland lakes spring, summer and fall recorded significantly higher days away from home on the average trip than for all other angling types, with the exception of Lake Superior shores and streams. As Figure 36 illustrates, an average of 2.9 days away from home per trip was recorded for inland lakes spring, summer and fall, which was significantly higher than streams year round (mean=1.97), Lake Superior by boat (mean=2.15), or inland lakes in winter (mean=1.91).

Figure 36
Length of Trip by Fishing Type

Mean Length of Trip

Note: A number appearing at the top of the bar identifies those fishing type(s) with mean scores significantly different than the mean score for that particular fishing type.

The number of days away from home only tells part of the story. The other part is determined by examining the number of days that were actually spent fishing while away from home. As in the previous comparison, inland lakes spring, summer and fall recorded the highest average number of days fishing while on a trip; however, the average was almost one day less than the average trip length (mean=2.08 days fishing of mean=2.90 days away from home). The other four angling types did not show this much of a difference between days away from home and days spent fishing. When comparing the average number of days fishing to other angling types, inland lakes in spring, summer and fall was significantly higher than both Lake Superior by boat (mean=1.63) and streams year round (mean=1.69), as seen in Figure 37.

Figure 37
Number of Days Fishing by Fishing Type

Mean Fishing Days

Note: A number appearing at the top of the bar identifies those fishing type(s) with mean scores significantly different than the mean score for that particular fishing type.

Based on the findings for both the number of days away from home (Figure 36) and the number of days spent fishing (Figure 37), it can be said that inland lakes in spring summer and fall generates more days away from home than all fishing types except Lake Superior shores and streams as well as more days coldwater fishing per trip than Lake Superior shores and streams and inland lakes in winter.

Statistically significant differences in the mean number of miles anglers drive to fish for trout/salmon also occurred when comparing fishing types, as Figure 38 shows.

Anglers fishing in inland lakes in spring summer and fall drive further (mean=159.35 miles one way) to their fishing spot than those fishing streams year round (mean=105.80 miles one way) – the only significant difference recorded between angling types for the number of miles driven to fish for trout/salmon in Minnesota.

Figure 38
Number of Miles Driven to Fish by Fishing Type

Mean Miles

Note: A number appearing at the top of the bar identifies those fishing type(s) with mean scores significantly different than the mean score for that particular fishing type.

Satisfaction with the overall fishing experience was relatively good and fairly consistent for all five coldwater angling types.

Scores ranged from 3.83 for Lake Superior shores and streams to near 4 for the other four fishing types. A score of 4 indicates satisfaction, so there are likely few complaints about the overall fishing experience coldwater anglers achieved.

When mean scores were compared, significant differences existed between anglers fishing Lake Superior shores and streams year round in Minnesota (Figure 39). Specifically, anglers fishing streams year round were significantly more satisfied with the overall fishing experience (mean=4.05) than those fishing Lake Superior shores and streams (mean=3.83).

Figure 39
Satisfaction with Overall Fishing Experience by Fishing Type

Mean Satisfaction

Note: A number appearing at the top of the bar identifies those fishing type(s) with mean scores significantly different than the mean score for that particular fishing type.

Comparing satisfaction levels based on <u>size</u> of trout/salmon caught reveals some interesting differences (Figure 40). First, satisfaction scores were lower for this variable than they were for the overall fishing experience.

Second, anglers on Lake Superior shores and streams recorded a satisfaction score of 3.08, which was significantly lower than for anglers fishing streams year round (mean=3.36) and inland lakes spring, summer, fall (mean=3.35).

Thus, when basing satisfaction on size of the fish, Lake Superior shores and streams, anglers are less likely to be satisfied than the other four angling types.

Figure 40
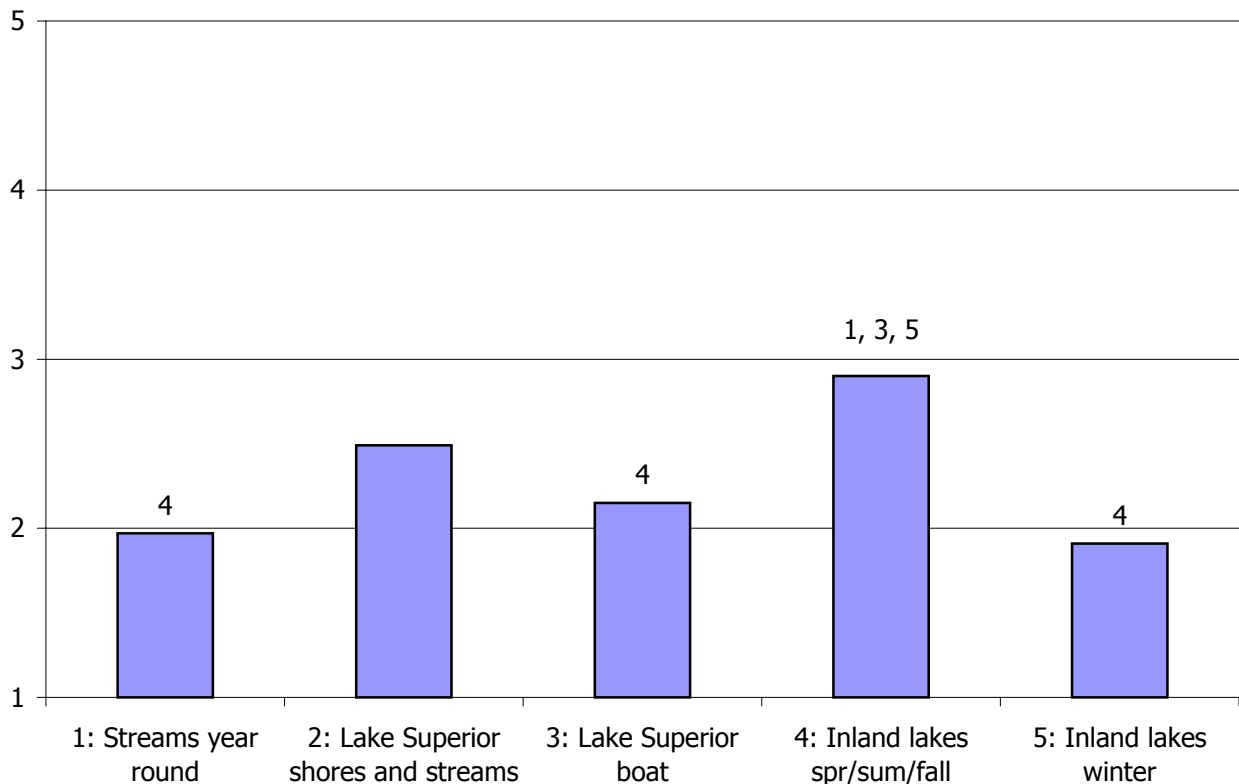Satisfaction with Size of Trout/Salmon Caught by Fishing Type

Note: A number appearing at the top of the bar identifies those fishing type(s) with mean scores significantly different than the mean score of that particular fishing type.

A similar finding is recorded for the <u>number</u> of trout/salmon caught. Lake Superior shores and stream anglers were most likely to be dissatisfied with the number of fish caught. This angling type reported lower satisfaction scores (mean=2.81) than all other groups, and was statistically different from other fishing types, with the exception of inland lakes in winter (mean=3.12). As Figure 41 illustrates, coldwater anglers fishing streams year round were most satisfied with the number of fish caught, recording a mean satisfaction score of 3.38, when compared to other angling types.

Figure 41
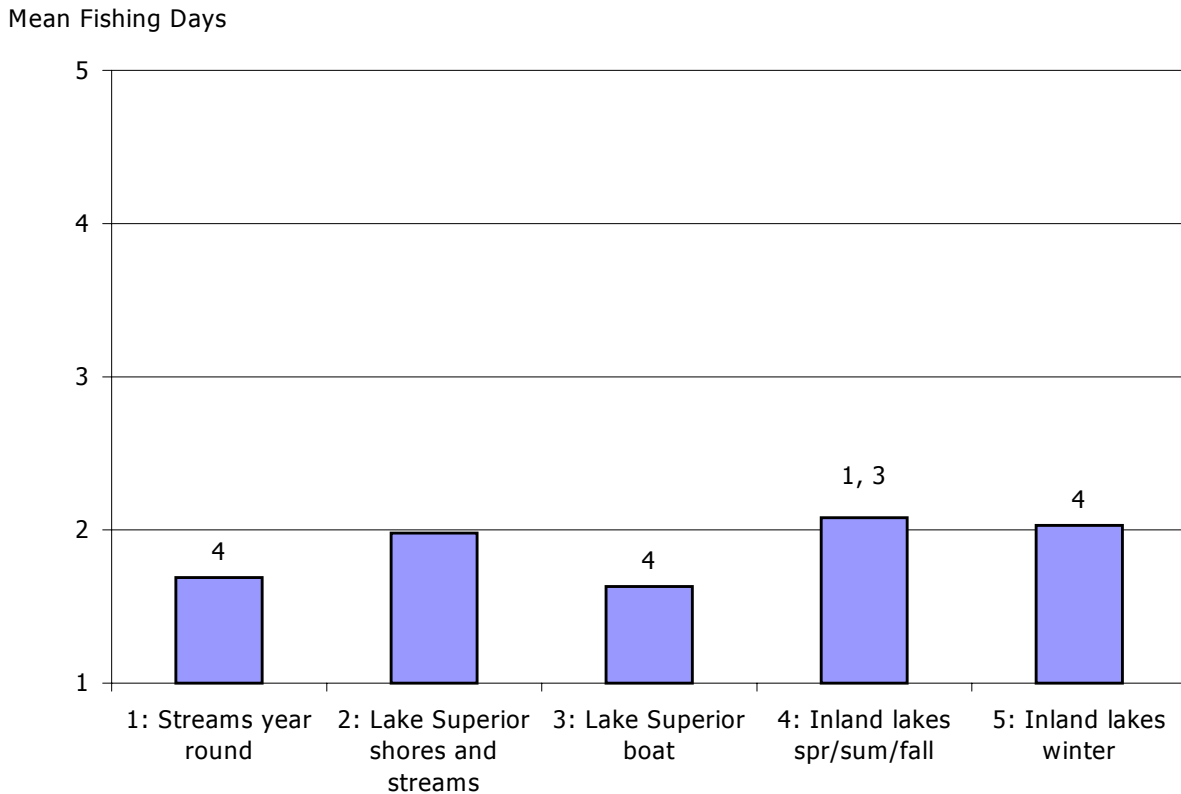Satisfaction with Number of Trout/Salmon Caught by Fishing Type
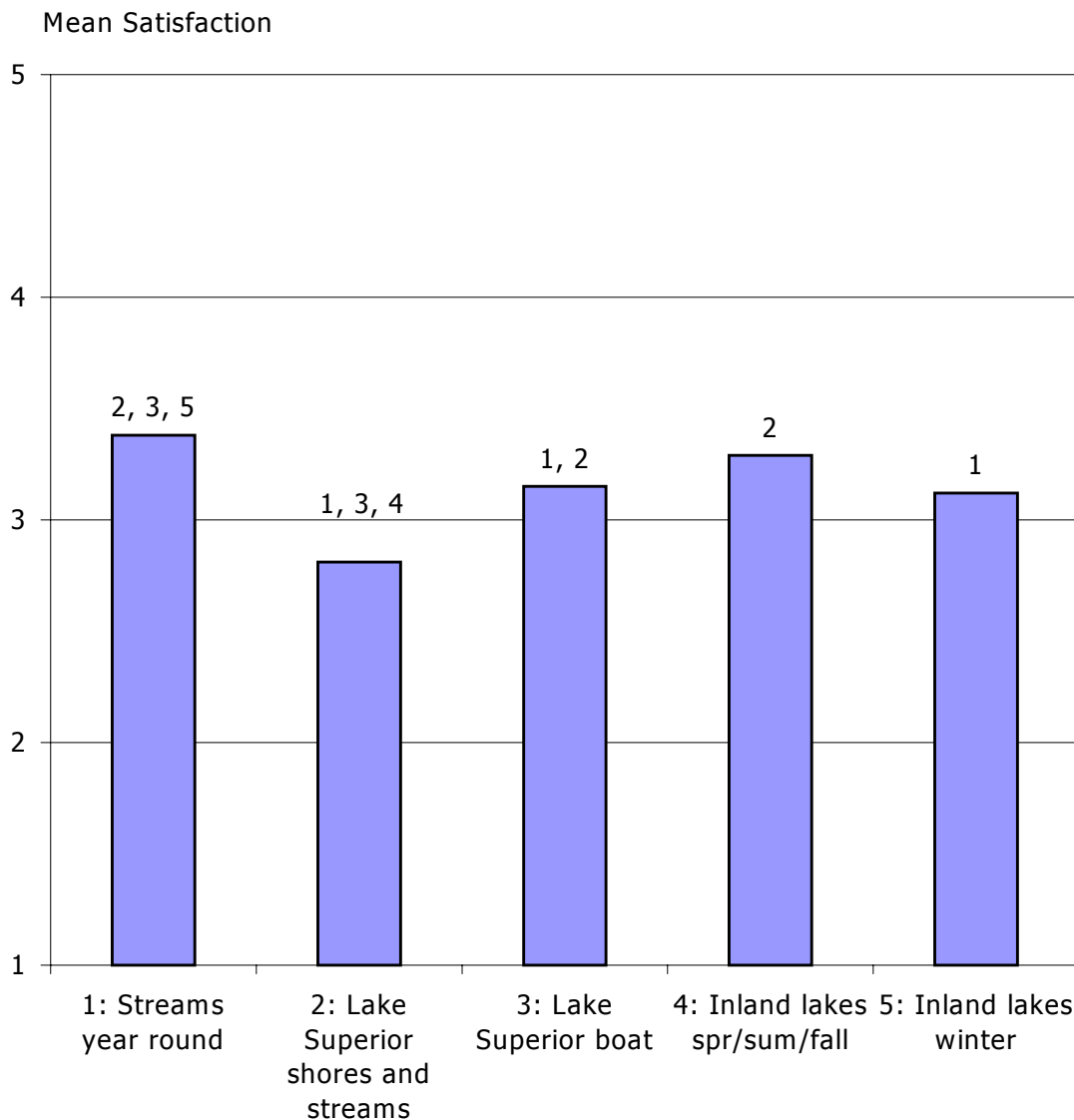
Mean Satisfaction

Note: A number appearing at the top of the bar identifies those fishing type(s) with mean scores significantly different than the mean score of that particular fishing type.

When overall quality of trout/salmon fishing on the most recent fishing trip is examined, some interesting results were found. The average scores are, for the most part, one point lower than those recorded for overall satisfaction with the overall fishing experience. For example, Lake Superior shores and streams recorded a mean of 2.71 for the quality of trout/salmon fishing, down from overall satisfaction with the fishing experience (mean=3.83). All angling types recorded lower scores related to the quality of trout/salmon fishing when compared to satisfaction with the fishing experience.

Even with the lower average scores for overall quality, patterns established earlier remained intact. As Figure 42 illustrates, anglers fishing streams year round (mean=3.18) continued to score the highest of all the angling types in terms of satisfaction with the quality of the fishing experience, followed by inland lakes spring, summer, fall (mean=3.07) and inland lakes in winter (mean=3.00). The lowest average score was recorded for anglers fishing Lake Superior shores and streams (mean=2.71), followed by Lake Superior by boat (mean=2.93).

Figure 42
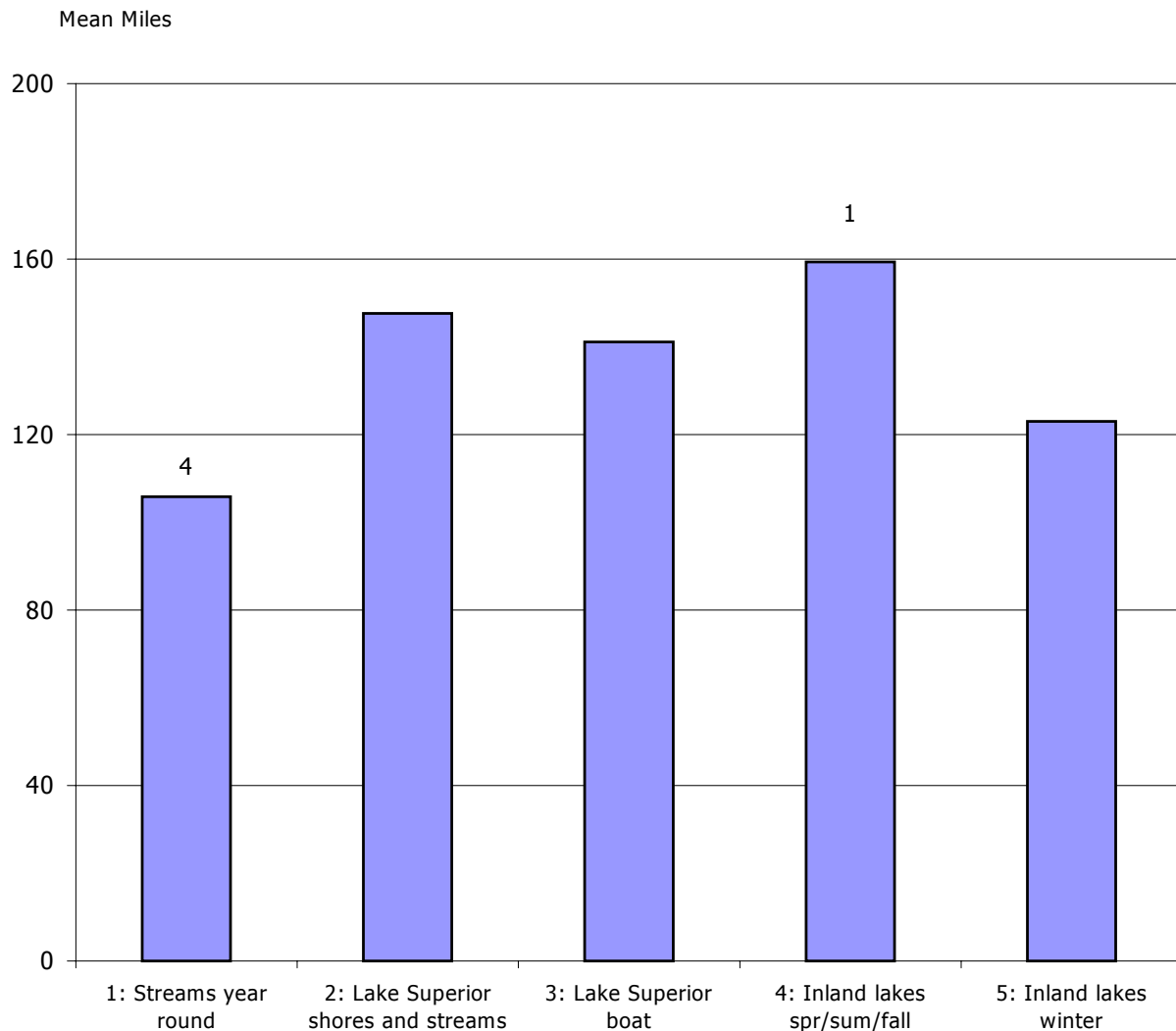Quality of Trout/Salmon Fishing by Fishing Type

Mean Satisfaction

Note: A number appearing at the top of the bar identifies those fishing type(s) with mean scores significantly different than the mean score of that particular fishing type.

Anglers were asked how many years they had been fishing for <u>trout</u> in Minnesota. The only statistically significant difference was between anglers fishing inland lakes in spring, summer, and fall (mean=14.17 years) and those fishing Lake Superior by boat (mean=17.84 years). Specifically, anglers fishing Lake Superior by boat were more experienced than their counterparts who fished in inland lakes spring, summer, and fall (Figure 43).

Figure 43
Number of Years Fishing for Trout in Minnesota by Fishing Type
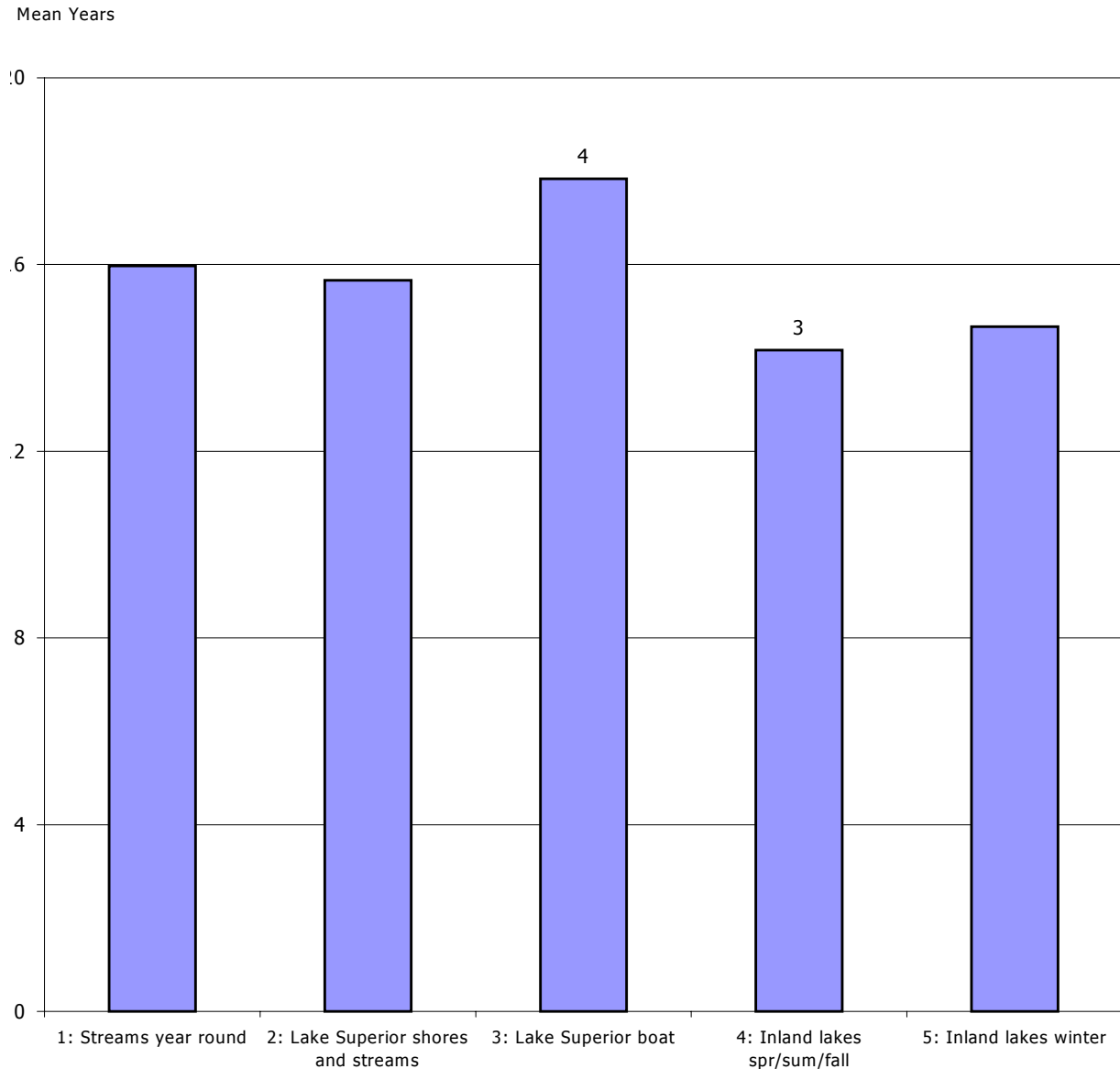
Mean Years

Note: A number appearing at the top of the bar identifies those fishing type(s) with mean scores significantly different than the mean score of that particular fishing type.

The same analysis was conducted for the number of years spent <u>salmon</u> fishing in Minnesota. As expected, the average number of years fishing for salmon in Minnesota was lower across all categories when compared to anglers pursuing trout.

Again, anglers fishing Lake Superior by boat reported more experience fishing for salmon than anglers in all other categories. However, as Figure 44 shows, the only statistically significant difference was between anglers fishing Lake Superior by boat (mean=12.93 years) and those fishing streams year round (mean=8.44).

Figure 44
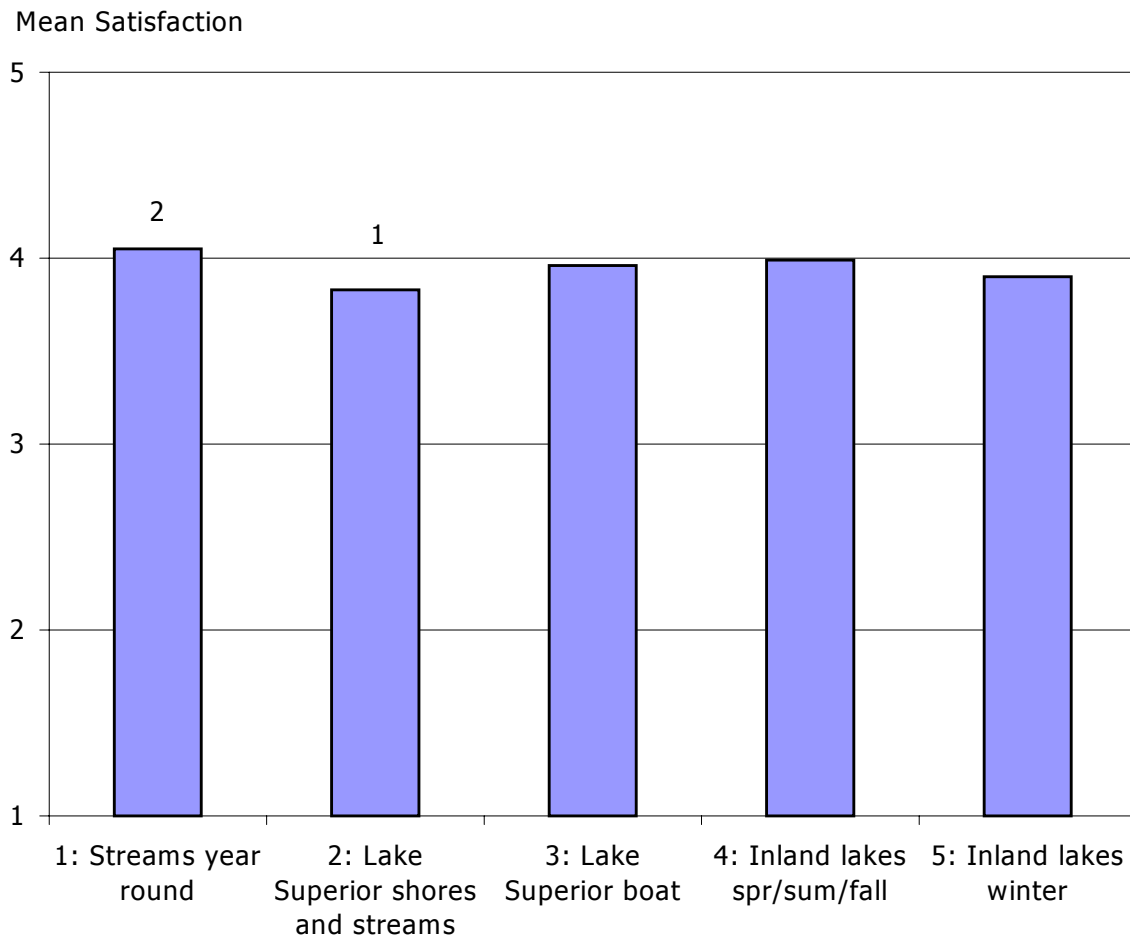Number of Years Fishing for Salmon in Minnesota by Fishing Type
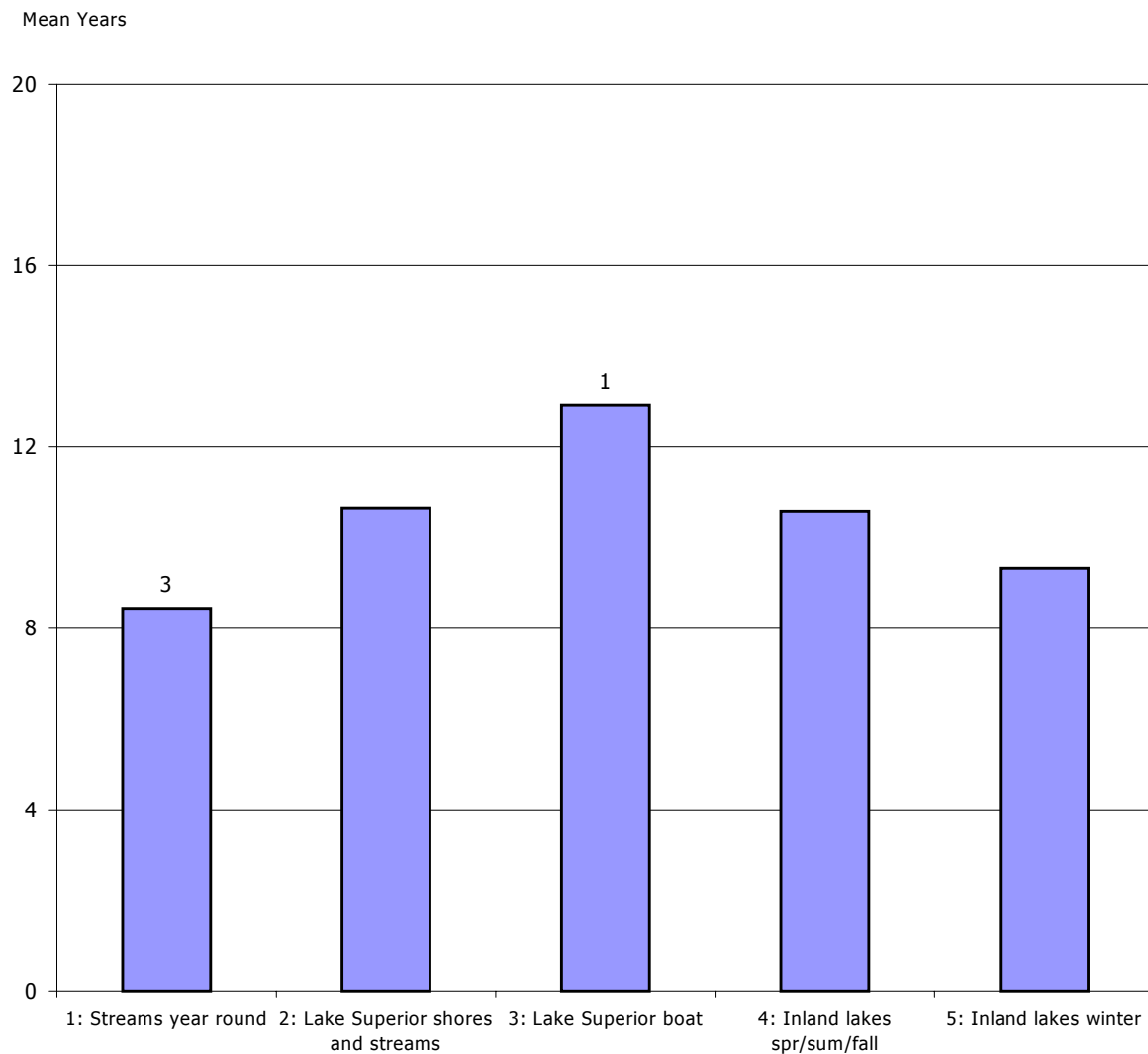
Mean Years

Note: A number appearing at the top of the bar identifies those fishing type(s) with mean scores significantly different than the mean score of that particular fishing type.

Anglers were then asked to rate the quality of the trout fishing over the years. Generally, few anglers noticed any difference over the years with most scores indicating that anglers believe it has remained the same (Figure 45). The only statistically significant differences were between those fishing streams year round (mean=3.04) and anglers fishing Lake Superior shores and streams (mean=2.84). Specifically, anglers fishing Lake Superior shores and streams were most likely to feel the quality of the trout fishing had declined slightly compared to those fishing streams year round, who felt that quality of trout fishing had slightly increased over the years.

Figure 45
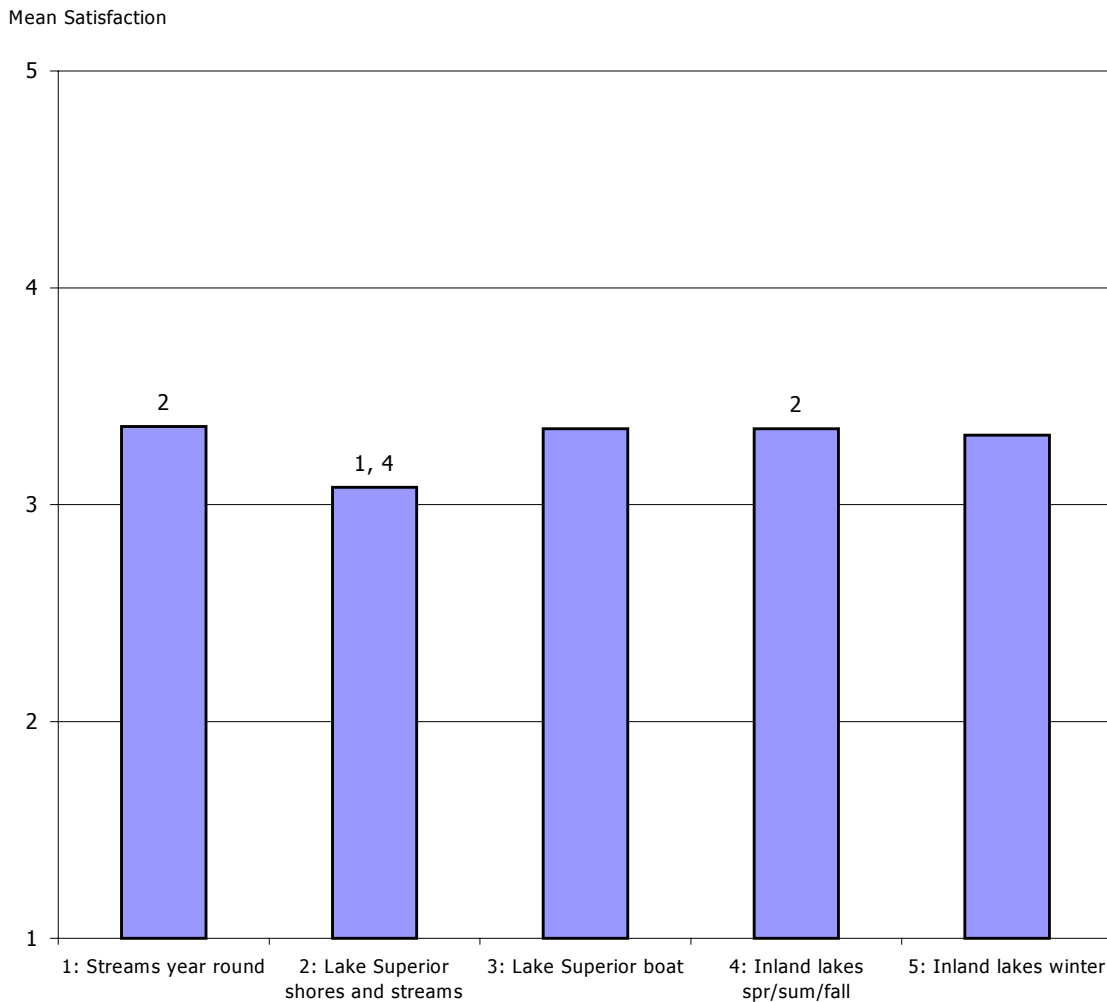Quality of Trout Fishing Over the Years by Fishing Type
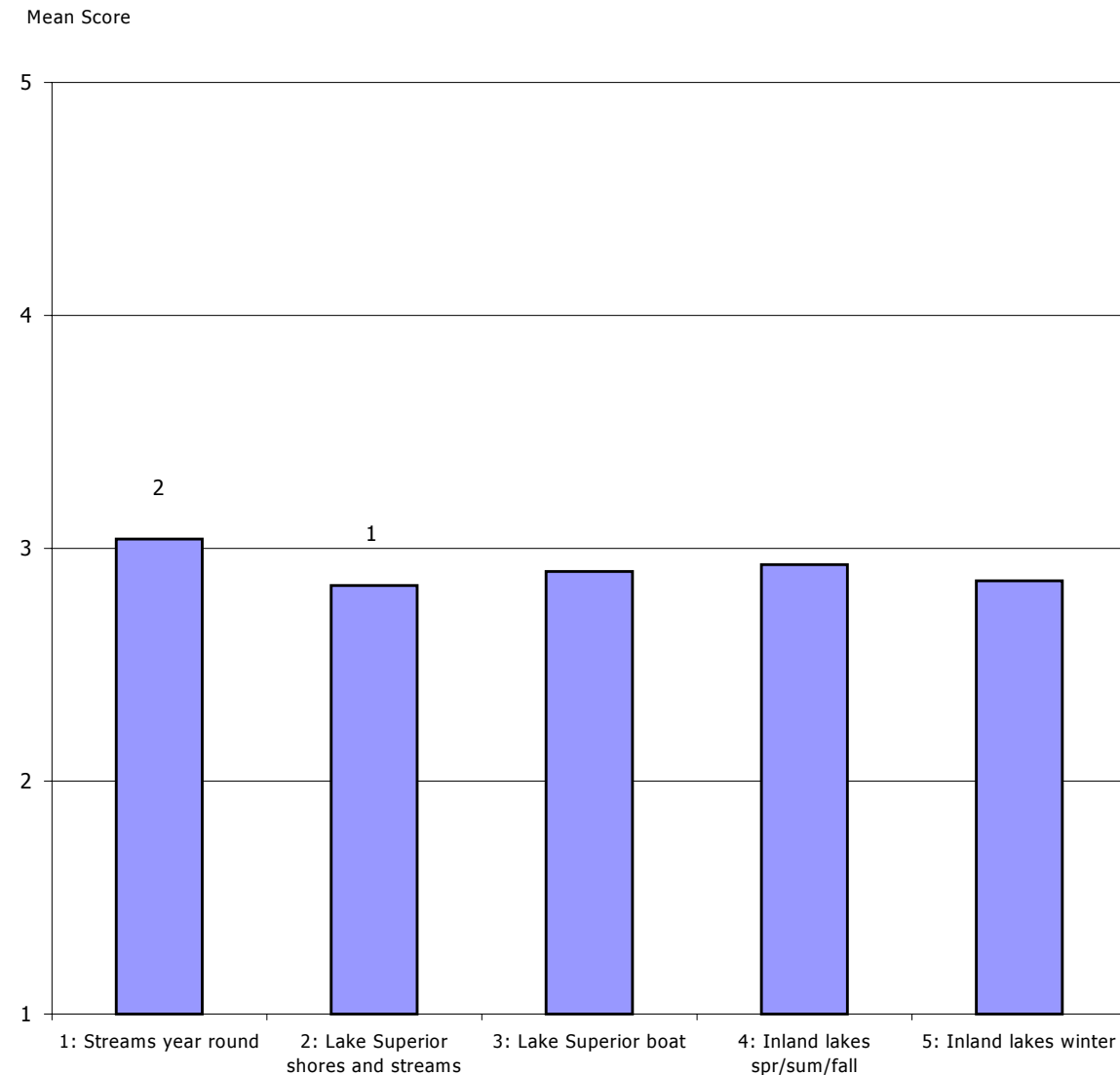
Mean Score

Note: A number appearing at the top of the bar identifies those fishing type(s) with mean scores significantly different than the mean score of that particular fishing type.

When examining overall quality of the <u>salmon</u> fishing experience over the years, scores for all angling types were slightly more negative. Anglers reported slight to moderate declines in salmon fishing in Minnesota over the years. As Figure 46 illustrates, coldwater anglers fishing for salmon in streams year round recorded the highest score (mean=2.86). Those mean scores were statistically higher than scores reported by anglers fishing for salmon in Lake Superior shores and streams (mean=2.46), coldwater anglers fishing Lake Superior by boat (mean=2.60), and those fishing for salmon in inland lakes in the spring, summer, and fall (mean=2.60). However, overall, scores indicated that anglers believed salmon fishing in Minnesota were generally in decline.

Figure 46
Quality of Salmon Fishing Over the Years by Fishing Type
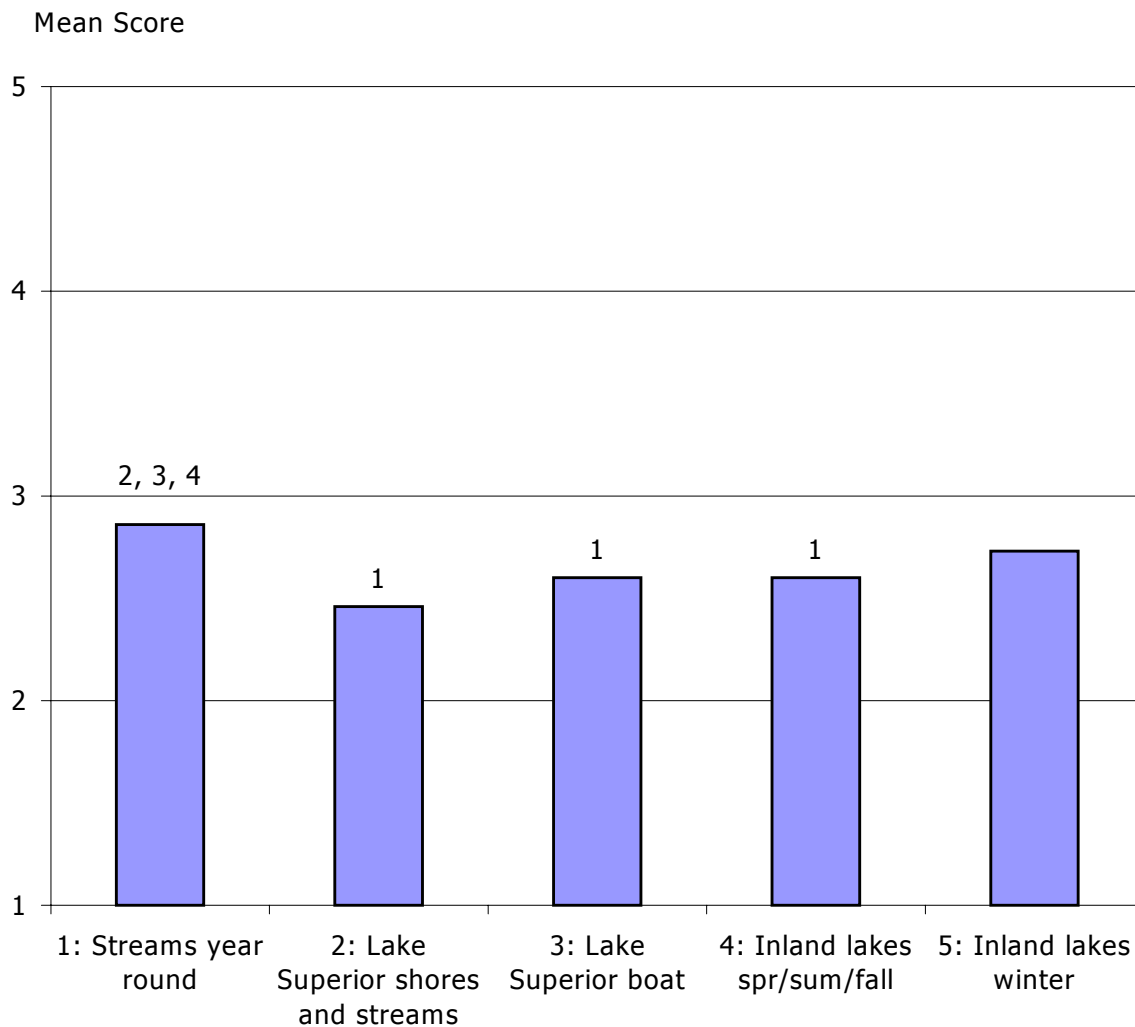
Mean Score

Note: A number appearing at the top of the bar identifies those fishing type(s) with mean scores significantly different than the mean score of that particular fishing type.

Angling types were also examined by demographic characteristics. When mean age was considered, a few statistically significant differences between angling types were noted.

In general, anglers fishing Lake Superior by boat were older than anglers in the four other categories (Figure 47). Specifically, anglers fishing Lake Superior shores and streams (mean=41.43 years; median=42) and streams year round (mean=41.98 years; median=42) were among the youngest, roughly 5 years younger than the Lake Superior by boat angling group (mean=46.43 years; median=47). Anglers fishing inland lakes in winter (mean=43.11 years; median=43) and those fishing inland lakes in spring, summer, and fall (mean=43.75; median=44) were in the middle.
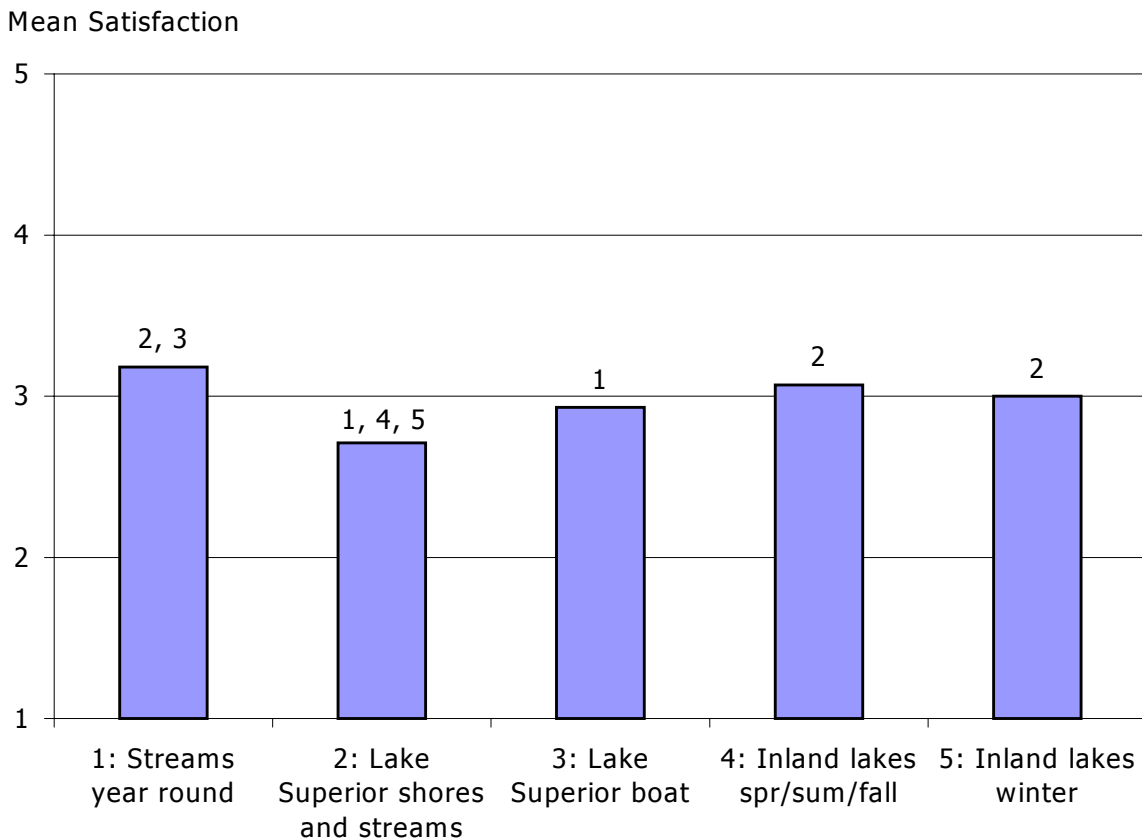
Figure 47
Age by Angling Type
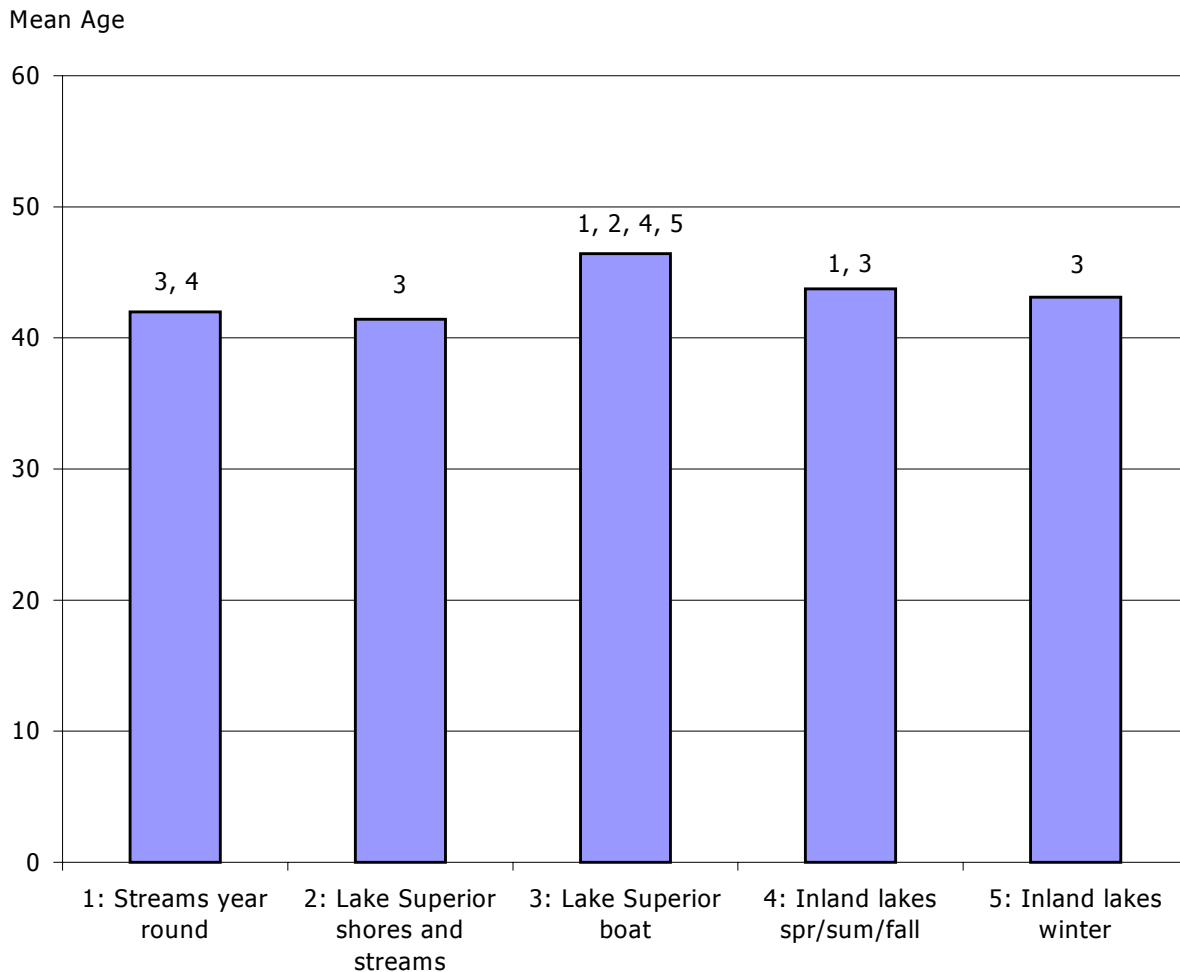
Mean Age

Note: A number appearing at the top of the bar identifies those fishing type(s) with mean scores significantly different than the mean score of that particular fishing type.

There were no significant differences noted for household income between coldwater angling types (Table 10). The average household income is $65,000 to $72,000 per year, but since there were no statistically significant differences between the categories, we must assume that income levels are fairly consistent between angling categories.

Table 10
Household Income by Fishing Type

	Mean
Streams year round	$70,090
Lake Superior shores and streams	$67,540
Lake Superior boat	$72,000
Inland lakes spring/summer/fall	$65,080
Inland lakes winter	$66,260

Anglers across all types of coldwater angling were predominantly male. Again, there were no significant differences noted between categories (Table 11).

Table 11
Gender by Fishing Type

	Male	Female
Streams year round	91.4%	8.6%
Lake Superior shores and streams	91.6%	8.4%
Lake Superior boat	88.2%	11.8%
Inland lakes spring/summer/fall	89.6%	10.4%
Inland lakes winter	94.6%	5.4%

Types of attractors used to entice trout/salmon to bite were also compared across the angling types. The three methods compared were: bait, tied flies, and artificial lures. As expected there were many differences noted between the angling types and their preferred method of catching fish.

Table 12
Fishing Method by Fishing Type

	Artificial Lures	Flyfishing	Bait Fishing
Streams year round	27.7%	34.3%	39.4%
Lake Superior shores and streams	35.2%	34.4%	32.0%
Lake Superior boat	90.1%	0.6%	8.1%
Inland lakes spring/summer/fall	45.8%	6.1%	49.2%
Inland lakes winter	37.2%	2.9%	63.2%

*Columns not rows total to 100% because multiple responses were allowed.

Anglers fishing Lake Superior by boat were most likely to use artificial lures (90.1%), followed by bait (8.1%), with few of these anglers using flies (0.6%). Flyfishing was most popular among anglers fishing streams year round (34.3%) and Lake Superior shores and streams (34.4%). Anglers fishing inland lakes in winter (63.2%) and inland lakes in spring, summer, and fall (49.2%) were the two groups most likely to use bait (Table 12).

Finally, angling types were examined with respect to how the fish were treated after being caught, and Table 13 details these fishing strategies for all fishing types. Over one-third (37.9%) of those fishing Lake Superior shores and streams reported that they caught no fish on their most recent trip, which is much higher than the percentage in other categories. Anglers fishing inland lakes in winter recording the second highest no-catch rate at 26.4%. Anglers fishing streams year round recorded the lowest no-catch rate at only 14.5% of the population.

Table 13
Fishing Strategy by Type

	Keep all fish	Caught no fish	Catch-and-release all fish	Keep some, release some
Streams year round	3.2%	14.5%	43.5%	38.7%
Lake Superior shores and streams	5.9%	37.9%	28.1%	28.1%
Lake Superior boat	33.7%	18.4%	5.7%	42.2%
Inland lakes spring/summer/fall	14.5%	22.1%	12.0%	51.5%
Inland lakes winter	16.1%	26.4%	7.0%	50.4%

*Rows may not total 100% due to rounding errors.

Anglers fishing streams year round were the most likely to release all trout/salmon caught (43.5%). By contrast, only 5.7% of anglers fishing Lake Superior by boat released all fish caught. Those fishing inland lakes in spring, summer, and fall (51.5%) and inland lakes in winter (50.4%) were most likely to keep some fish and release some fish.

Economic Impact By Fishing Type

The Minnesota Department of Natural Resources devotes significant resources to angling and conservation programs related to coldwater fisheries. Here, an attempt is made to quantify the economic activity associated with those investments, specifically, the money anglers spend pursuing recreational coldwater fishing by fishing type, and the broader direct and secondary (indirect and induced) economic impacts to communities and the state.

<u>Procedure</u>

Expenditure data were collected by survey, and spending profiles were segmented to distinguish between consumer purchases made at home prior to trip, and those made in the locale of the fishing activity. Spending at home by non-Minnesota residents was omitted from impact analyses, as that spending does not benefit Minnesota.

The economic impacts of coldwater fishing are estimated using the following general approach:

Impact = Number of fishing days x Average spending per fishing day x Regional multiplier

Total fishing days by fishing type were based on the average number of angler-reported days fishing for each fishing type per year multiplied by a base population of anglers. A base population range for fishing type was derived using seasonal trout stamp sales for 2001**.** An upper range value was 95% of the stamp sales and the 85% level served as the low-end estimate.

The upper and lower ranges are used because it is known that some people collect stamps with no intent to fish for trout/salmon. Others purchase the stamps so that they are legal in case they happen to catch a trout or salmon. Previous research on waterfowl hunting (Fulton et al. 2002) reveals that approximately 10% of the migratory stamp purchasers do not hunt waterfowl. The percentage of non-users of waterfowl stamps should be a bit higher than for trout/salmon stamps as Federal Migratory Bird stamps have a long history of being collected for their intrinsic value. Therefore, to be confident with our estimates, the 85% and 95% of trout stamp sales was used to bracket each end of the economic impact range.

The estimate of total trout/salmon anglers was augmented by including 7.6% of day stamp sales of 42,038 for 2001 (or 3,195). As there was no way to determine how many one-day license holders use it to fish for trout/salmon from DNR records, a phone interview was conducted with 1,047 anglers that had purchased a one-day license in 2001.

From those telephone interviews, it was determined that 7.6% of them use the one-day license for coldwater fishing purposes. Therefore, the high and low range estimates of the total number of trout/salmon anglers in Minnesota are:

*High Range = (94,766 * 0.95) + 3,195 = 93,223*
*Low Range = (94,766 * 0.85) + 3,195 = 83,746*

The high and low estimates for base population of anglers were then multiplied by the reported average days fishing by type, yielding total fishing days by type (high and low). These values are reported in Table 14.

Table 14
Fishing Days by Fishing Type

	Mean Days Fishing in Last 12 Months	Total Fishing Days	
		Low	High
Streams year round	6.14 days	514,200	572,389
Lake Superior shores and streams	1.81 days	151,580	168,734
Lake Superior by boat	1.23 days	103,008	114,664
Inland lakes spring/summer/fall	4.14 days	346,708	385,943
Inland lakes winter	1.98 days	165,817	184,582

Spending estimates were gathered from and based on angler-reported expenses on the most recent trip. Multipliers are derived from input-output models of Minnesota and the appropriate sub-state region using IMPLAN (IMpact Analysis for PLANning).[1]

Overview

The estimates for economic impacts are presented in a set of three tables for each fishing type:

- Angler spending reported by various expense categories on a per person per day basis
- A broad summary of impacts, including the total spending at the consumer level for goods and services purchased, direct, indirect, induced, and total economic effects on sales, income, and jobs at the low and high estimate of angler numbers
- Distribution of these direct and total effects from angler spending by key economic sectors

In all, a sense of the direct and "multiplier" effect of spending on the state's economy can be seen.

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[1] IMPLAN Pro® Version 2.0, Minnesota data set for 1999

Terms

For clarity, terms used in this section are defined below.

Direct Effects – the immediate impacts (IMPLAN derived) from visitor spending, e.g., hotel sales.

Indirect Effects – the impacts generated by visitor spending from industries that supply goods or services to impacted businesses, e.g., linen sales to hotels.

Induced Effects – the impacts generated by households spending of income earned by the direct or indirect impacts generated by visitor spending, e.g., hotel or linen business employees spending earnings.

Total Effects – the sum total of direct, indirect, and induced effects.

Spending – the gross (total) economic activity at the consumer/visitor level.

Sales – the value of visitor spending less the value of goods and services from outside the impact area.

Income – economic effects coming from employee compensation, proprietor (self-employed individual's) income, other property income (e.g., interest, rents, dividends), and indirect business taxes (excise and sales taxes paid by individuals to businesses).

Jobs – includes both full-time and part-time workers and is measured in annual average jobs.

Margins/Capture rate – for many industries, products sold are made outside of the region being investigated. Economic effects from sales to visitors of those goods do not accrue to the region's economy and must be deducted from the impact analysis. For retail sales, for example, only the margin of value above the wholesale price benefits, or is "captured" by, the business and region. Typically 60-70% of spending by tourists ends up as final demand within a local area.

To recap, we can understand how economic impact is figured by first looking at angler spending. All angler expenditures were summed by sector (i.e., expense category) and then multiplied by the total number of angling days for each type of angling. This is called gross expenditures. However, gross expenditures do not reveal true economic impact for the state of Minnesota stemming from angler expenditures because of something called "leakage." Once gross expenditure figures are entered into the IMPLAN model, direct sales are determined. Simply put, direct sales starts with gross expenditures minus the effects of "leakage" or sales made to suppliers outside the study area.

For example, if an angler were to spend $100 on a new fly fishing reel, part of what was spent went to the company that produced the reel. If the reel was made in Japan, the

wholesale cost a retailer paid for that item was subtracted from gross spending, as Japan received the benefit, not Minnesota. This represents "leakage." What leaks from the economy is the value of the purchase that did not accrue to local businesses because the reel was not produced locally. In this example, only the retail margin accrues to the local area. If the reel were assembled locally from foreign parts, only the value of the foreign parts would be considered leakage from the local economy.

Consequently, direct sales only refer to the amount of money remaining in the area and available for re-spending in the area on locally provided goods or services. The more that intermediate inputs to products and services are provided locally, the greater the direct sales levels (less leakage) and the greater the economic impact to the region to be re-spent locally. Further, the more extensive and complete a local area economic base is, the greater the likelihood that direct sales will result in greater local area spending.

Economic Impact: Streams Year Round

Table 15 displays per person per day expenditures reported by anglers engaged in fishing in streams year round. These values include spending at home (if Minnesota resident) as well as expenses away from home. For visitors who reside outside Minnesota, their home spending was not included because those benefits do not accrue to Minnesota's economy.

Table 15
Per Person Per Day Angler Expenditures: Streams Year Round

Expenditure Category	Home	Away
Fuel/oil	$7.91	$10.38
Food (Restaurant)	$1.36	$11.07
Food (Non-restaurant)	$5.14	$6.21
Outfitting, charter boat or guide service	$0.34	$1.27
Lodging	$0.25	$11.59
Entertainment (Includes gambling)	$0.17	$2.70
Shopping (Gifts, clothes, handicrafts, etc.)	$0.51	$4.41
Fishing equipment (Rods, reels, waders, lures, bait, etc.)	$12.89	$6.88
Transportation other than motor vehicle (Air, train, etc.)	$0.03	$0.67
Other packaged trip (inclusive of meals, lodging, etc.)	$0.76	$1.43
TOTAL	**$29.37**	**$56.57**

* Columns may not add exactly due to rounding errors

Fishing equipment was the largest expenditure in preparation for the trip. Total expenses at home were $29.37 per person daily. The largest expenses en route and onsite were lodging, prepared food, and gas, with expenses away from home totaling $56.57 per person daily. In sum, the typical stream angler spent $85.93 per day.

In total, stream anglers spent between $44.2 and $49.2 million statewide. More than 60% of this spending is captured by the state's economy as direct sales, estimated to be between $30.7 and $34.1 million. While all services are retained as direct sales, only the retail and wholesale margins are retained in the economy for most purchases of goods, as these products are generally made outside Minnesota. The direct sales generated between $17.8 and $19.8 million in direct income and supported between 632 and 703 jobs (Table 16).

Direct effects come from immediate sales made to anglers throughout the duration of their activity. In turn, these direct sales generate additional, secondary economic activity as suppliers of goods and services purchase supplies and services for their businesses (indirect effects) and pay out wages and salaries, generating household spending in the economy (induced effects). When secondary effects are added to direct effects, total sales effects from stream anglers totaled between $47.4 and $52.8 million. Total income effects ranged from $27.9 to $31.1 million in support of between 822 and 915 jobs statewide.

Table 16
Economic Impacts of Angler Trip Spending: Streams Year Round

Impact Measure	Low	High
Spending ($ Millions)	44.2	49.2
Direct Effects		
Sales ($ Millions)	30.7	34.1
Income ($ Millions)	17.8	19.8
Jobs	632	703
Indirect Effects		
Sales ($ Millions)	7.4	8.2
Income ($ Millions)	4.2	4.7
Jobs	76	85
Induced Effects		
Sales ($ Millions)	9.4	10.4
Income ($ Millions)	5.8	6.5
Jobs	115	127
Total Effects		
Sales ($ Millions)	47.4	52.8
Income ($ Millions)	27.9	31.1
Jobs	822	915

Table 17 shows the distribution of effects. The largest direct effects are in the lodging, eating and drinking, and retail sectors for stream anglers. The greatest total effects are largely in the transportation and retail/wholesale sectors.

Angler spending showed highest direct job effects in sectors with higher reported spending (i.e., eating and drinking, retail/wholesale), with secondary job support in recreation/entertainment and transportation/services sectors.

Table 17
Distribution of Angler Spending Impacts by Key Sectors: Streams Year Round

Economic Sector Group	Direct Effects		Total Effects	
	Low	High	Low	High
Sales Effects ($ '000)				
Manufacture/Production	1,735 – 1,931		4,734 – 5,270	
Transport & Services	1,336 – 1,487		11,041 – 12,291	
Recreation & Entertainment	1,986 – 2,211		2,468 – 2,747	
Lodging	5,479 – 6,099		5,632 – 6,269	
Eating & Drinking	5,752 – 6,403		6,212 – 6,915	
Retail/Wholesale	9,792 – 10,900		12,206 – 13,588	
Government	29 – 32		387 – 431	
Total	**30,678 – 34,149**		**47,395 – 52,759**	
Income Effects ($ '000)				
Manufacture/Production	798 – 888		1,896 – 2,111	
Transport & Services	962 – 1,072		7,257 – 8,078	
Recreation & Entertainment	1,357 – 1,511		1,564 – 1,741	
Lodging	3,636 – 4,048		3,737 – 4,160	
Eating & Drinking	3,119 – 3,472		3,368 – 3,749	
Retail/Wholesale	7,948 – 8,847		9,807 – 10,916	
Government	11 – 12		13 – 15	
Total	**17,832 – 19,849**		**27,898 – 31,055**	
Job Impacts (Number of Jobs)				
Manufacture/Production	15 – 16		35 – 39	
Transport & Services	15 – 17		119 – 133	
Recreation & Entertainment	144 – 160		151 – 168	
Lodging	113 – 125		116 – 129	
Eating & Drinking	162 – 180		175 – 194	
Retail/Wholesale	184 – 205		220 – 244	
Government	–		3	
Total	**632 – 703**		**822 - 915**	

Economic Impact: Lake Superior Shores & Streams

Table 18 suggests that anglers fishing Lake Superior shores and streams exhibit a very different spending pattern than their counterparts fishing for trout/salmon on Minnesota streams. While in their home area, anglers fishing Lake Superior shores and streams spend more for food (groceries) to be transported to the site ($5/day/person) and fishing equipment ($17.98/person/day). While away from home, they still spend a large amount of money at restaurants ($19.22/person/day) and lodging ($26.07 per person/day). Fuel remains a considerable portion of their expenses as well.

Table 18
Per Person Per Day Angler Expenditures: Lake Superior Shores and Streams

Expenditure Category	Home	Away
Fuel/oil	$7.24	$13.82
Food (Restaurant)	$1.94	$19.22
Food (Non-restaurant)	$5.00	$7.83
Outfitting, charter boat or guide service	$0.63	$2.37
Lodging	$0.26	$26.07
Entertainment (Includes gambling)	$0.41	$5.69
Shopping (Gifts, clothes, handicrafts, etc.)	$0.41	$6.69
Fishing equipment (Rods, reels, waders, lures, bait, etc.)	$17.98	$7.91
Transportation other than motor vehicle (Air, train, etc.)	$0.07	$0.81
Other packaged trip (inclusive of meals, lodging, etc.)	$0.48	$1.64
TOTAL	**$34.41**	**$92.05**

* Columns may not add exactly due to rounding errors

The total economic impacts of anglers fishing Lake Superior shores and streams are illustrated in Table 19. The significant amount of home and away spending ($126.46/person/day) generated between $19.2 and $21.3 million in consumer spending.

Direct sales effects captured in the economy totaled between $15.0 and $16.7 million, with total income levels between $8.5 and $9.5 million. This spending directly supports between 352 and 391 jobs.

Total effects bring the sales impacts up to between $21.3 and $23.7 million. Total income effects are between $12.4 and $13.8 million, while employment effects are between 435 and 484 jobs across Minnesota as a result of coldwater anglers fishing Lake Superior shores and streams.

Table 19
Economic Impacts of Angler Trip Spending: Lake Superior Shores and Streams

Impact Measure	Low	High
Spending ($ Millions)	19.2	21.3
Direct Effects		
Sales ($ Millions)	15.0	16.7
Income ($ Millions)	8.5	9.5
Jobs	352	391
Indirect Effects		
Sales ($ Millions)	2.9	3.2
Income ($ Millions)	1.6	1.8
Jobs	33	37
Induced Effects		
Sales ($ Millions)	3.5	3.9
Income ($ Millions)	2.2	2.4
Jobs	50	56
Total Effects		
Sales ($ Millions)	21.3	23.7
Income ($ Millions)	12.4	13.8
Jobs	435	484

The distribution of impacts from anglers fishing Lake Superior shores and streams is displayed by sector in Table 20. Again, the largest direct effects are seen where angler spending is highest (retail/wholesale, eating and drinking, and lodging sectors).

In contrast, secondary effects come from industries providing intermediate goods and services that support the primary sectors, i.e., transport and services, shipping for example.

Table 20
Distribution of Angler Spending Impacts by Key Sectors: Lake Superior Shores and Streams

Economic Sector Group	Direct Effects		Total Effects	
	Low	High	Low	High
Sales Effects ($ '000)				
Manufacture/Production	1,652 – 1,839		2,519 – 2,804	
Transport & Services	435 – 485		4,210 – 4,687	
Recreation & Entertainment	1,142 – 1,271		1,282 – 1,427	
Lodging	3,151 – 3,508		3,235 – 3,601	
Eating & Drinking	3,012 – 3,353		3,256 – 3,624	
Retail/Wholesale	3,736 – 4,159		4,777 – 5,317	
Government	15 – 17		205 – 228	
Total	**14,970 – 16,665**		**21,318 – 23,731**	
Income Effects ($ '000)				
Manufacture/Production	725 – 807		1,066 – 1,187	
Transport & Services	316 – 352		2,682 – 2,986	
Recreation & Entertainment	825 – 918		878 – 978	
Lodging	2,059 – 2,292		2,114 – 2,353	
Eating & Drinking	1,569 – 1,747		1,697 – 1,889	
Retail/Wholesale	3,029 – 3,372		3,833 – 4,267	
Government	6		91 – 101	
Total	**8,529 – 9,494**		**12,369 – 13,768**	
Job Impacts (Number of Jobs)				
Manufacture/Production	15 – 17		22 – 25	
Transport & Services	4		48 – 54	
Recreation & Entertainment	87 – 96		89 – 100	
Lodging	77 – 86		79 – 88	
Eating & Drinking	91 – 101		98 – 109	
Retail/Wholesale	78 – 87		95 – 106	
Government	-		2	
Total	**352 – 391**		**435 - 484**	

Economic Impact: Lake Superior by Boat

Overall, spending by anglers fishing Lake Superior by boat is larger than that of their counterparts fishing Lake Superior shores and streams. Total spending of $165.91 per person per day is distributed between home and away expenses, as seen in Table 21. The biggest difference exists in their use of charter or guide services while away from home, an average of $31.45 per person daily. Another major difference in spending is a larger fuel expense ($17.77/person/day), explained by those using their own boats (rather than those using charter/guide services on the lake).

Table 21
Per Person Per Day Angler Expenditures: Lake Superior by Boat

Expenditure Category	Home	Away
Fuel/oil	$13.99	$17.77
Food (Restaurant)	$2.67	$20.02
Food (Non-restaurant)	$7.95	$7.00
Outfitting, charter boat or guide service	$3.52	$31.45
Lodging	$0.22	$23.42
Entertainment (Includes gambling)	$0.49	$4.75
Shopping (Gifts, clothes, handicrafts, etc.)	$0.91	$6.90
Fishing equipment (Rods, reels, waders, lures, bait, etc.)	$13.24	$6.89
Transportation other than motor vehicle (Air, train, etc.)	$0.23	$1.25
Other packaged trip (inclusive of meals, lodging, etc.)	$1.56	$1.67
TOTAL	**$44.79**	**$121.13**

* Columns may not add exactly due to rounding errors

Gross (consumer) spending by coldwater anglers fishing Lake Superior by boat ranged from $17.1 to $19.0 million (Table 22).

Direct sales generated between $13.3 and $14.7 million.

Direct income ranged from $8.6 to $9.7 million, and supported between 706 and 786 direct jobs.

With the multiplier secondary effects added in, these figures grow to between $18.7 and $20.8 million in sales and $11.9 and $13.2 million in income, supporting between 778 and 866 jobs statewide generated by coldwater anglers fishing Lake Superior by boat in Minnesota. The relatively large number of full and part time jobs attributed to this type of angling is due to the rather large expenses for outfitting, charter boat or guide services. This is a labor-intensive sector meaning expenses in this category accrue more directly to the labor force.

Table 22
Economic Impacts of Angler Trip Spending: Lake Superior by Boat

Impact Measure	Low	High
Spending ($ Millions)	17.1	19.0
Direct Effects		
Sales ($ Millions)	13.3	14.7
Income ($ Millions)	8.6	9.7
Jobs	706	788
Indirect Effects		
Sales ($ Millions)	2.2	2.4
Income ($ Millions)	1.2	1.3
Jobs	25	28
Induced Effects		
Sales ($ Millions)	3.2	3.6
Income ($ Millions)	2.1	2.3
Jobs	47	53
Total Effects		
Sales ($ Millions)	18.7	20.8
Income ($ Millions)	11.9	13.2
Jobs	778	866

The distribution of impacts by sector is shown in Table 23. The largest direct effects are in the recreation/entertainment; eating and drinking; and retail sectors for anglers fishing Lake Superior by boat. The greatest total effects are largely in the retail/wholesale; transport and services; and recreation/entertainment sectors. Angler spending showed notably high direct job effects in the recreation/entertainment sectors, which is where the higher levels of spending activity occurred.

Table 23
Distribution of Angler Spending Impacts by Key Sectors: Lake Superior by Boat

Economic Sector Group	Direct Effects		Total Effects	
	Low	High	Low	High
Sales Effects ($ '000)				
Manufacture/Production	874 – 973		1,641 – 1,826	
Transport & Services	445 – 495		3,612 – 4,021	
Recreation & Entertainment	4,139 – 4,608		4,250 – 4,830	
Lodging	1,922 – 2,140		1,995 – 2,221	
Eating & Drinking	2,192 – 2,440		2,414 – 2,688	
Retail/Wholesale	2,405 – 2,788		3,408 – 3,794	
Government	10 – 12		167 – 186	
Total	**13,285 – 14,788**		**18,692 – 20,807**	
Income Effects ($ '000)				
Manufacture/Production	381 – 424		696 – 774	
Transport & Services	322 – 359		2,301 – 2,562	
Recreation & Entertainment	3,480 – 3,874		3,525 – 3,924	
Lodging	1,256 – 1,398		1,304 – 1,451	
Eating & Drinking	1,143 – 1,273		1,260 – 1,402	
Retail/Wholesale	2,041 – 2,271		2,743 – 3,053	
Government	4		73 – 81	
Total	**8,627 – 9,603**		**11,909 – 13,256**	
Job Impacts (Number of Jobs)				
Manufacture/Production	8 – 9		15 – 16	
Transport & Services	5		41 – 46	
Recreation & Entertainment	527 – 587		530 – 590	
Lodging	47 – 53		49 – 55	
Eating & Drinking	66 – 74		73 – 81	
Retail/Wholesale	53 – 59		69 – 77	
Government	-		1 – 2	
Total	**706 – 786**		**778 - 866**	

Economic Impact: Inland Lakes in Spring/Summer/Fall

The spending patterns of anglers fishing inland lakes in spring, summer, and fall are reported in Table 24. Average total spending of $105.21 per person per day places this activity in the middle of the spending profile of the five fishing types.

Fishing equipment, including rods, reels, waders, lures, and bait ($10.70/person/day) and fuel expenditures ($8.05/person/day) rank at the top of the home expenditure categories.

Away from home, lodging ($15.32/person/day), fuel ($13.38/person/day), and eating and drinking ($11.04/person/day for restaurant purchases and $9.40/person/day for non-restaurant food purchases) are the highest expense categories.

Table 24
Per Person Per Day Angler Expenditures: Inland Lakes in Spring, Summer, and Fall

Expenditure Category	Home	Away
Fuel/oil	$8.05	$13.38
Food (Restaurant)	$1.16	$11.04
Food (Non-restaurant)	$9.50	$9.40
Outfitting, charter boat or guide service	$0.21	$4.25
Lodging	$0.73	$15.32
Entertainment (Includes gambling)	$0.32	$3.02
Shopping (Gifts, clothes, handicrafts, etc.)	$0.84	$4.77
Fishing equipment (Rods, reels, waders, lures, bait, etc.)	$10.70	$6.80
Transportation other than motor vehicle (Air, train, etc.)	$0.50	$1.10
Other packaged trip (inclusive of meals, lodging, etc.)	$1.19	$2.93
TOTAL	**$33.20**	**$72.01**

* Columns may not add exactly due to rounding errors

Gross total expenditures generated by coldwater anglers fishing inland lakes in the spring, summer, and fall range from $36.5 to $40.6 million statewide.

Direct effects in sales contribute between $24.5 and $27.2 million, while direct income yields between $15.5 and $17.3 million, supporting between 630 and 701 jobs (Table 25).

When secondary effects are added in, these impacts grow to between $38.8 and $43.2 million in sales, between $24.2 and $27 million in income, supporting between 794 to 884 jobs.

Table 25
Economic Impacts of Angler Trip Spending: Inland Lakes in Spring, Summer, and Fall

Impact Measure	Low	High
Spending ($ Millions)	36.5	40.6
Direct Effects		
Sales ($ Millions)	24.5	27.2
Income ($ Millions)	15.5	17.3
Jobs	630	701
Indirect Effects		
Sales ($ Millions)	6.3	7.0
Income ($ Millions)	3.6	4.0
Jobs	65	72
Induced Effects		
Sales ($ Millions)	8.1	9.0
Income ($ Millions)	5.1	5.7
Jobs	99	111
Total Effects		
Sales ($ Millions)	38.8	43.2
Income ($ Millions)	24.2	27.0
Jobs	794	884

Table 26 illustrates the distribution of these effects by sector. The largest direct effects are in the retail/wholesale sector, followed by the lodging sector for anglers fishing inland lakes in spring, summer, and fall.

The greatest total effects are largely in the transport and services and retail/wholesale sectors. Coldwater angler fishing inland lakes in spring, summer, and fall spending showed the highest direct and total employment effects in the recreation/entertainment sector.

Table 26
Distribution of Angler Spending Impacts by Key Sectors: Inland Lakes in Spring, Summer, and Fall

Economic Sector Group	Direct Effects		Total Effects	
	Low	High	Low	High
Sales Effects ($ '000)				
Manufacture/Production	2,529 – 2,816		5,073 – 5,647	
Transport & Services	1,732 – 1,928		10,072 – 11,212	
Recreation & Entertainment	2,456 – 2,733		2,872 – 3,197	
Lodging	5,008 – 5,575		5,160 – 5,744	
Eating & Drinking	3,807 – 4,238		4,261 – 4,744	
Retail/Wholesale	7,163 – 7,974		9,315 – 10,369	
Government	23 – 25		327 – 364	
Total	**24,456 – 27,223**		**38,829 – 43,223**	
Income Effects ($ '000)				
Manufacture/Production	1,163 – 1,295		2,112 – 2,351	
Transport & Services	1,248 – 1,390		6,656 – 7,409	
Recreation & Entertainment	1,840 – 2,048		2,023 – 2,251	
Lodging	3,323 – 3,700		3,424 – 3,812	
Eating & Drinking	2,064 – 2,298		2,310 – 2,572	
Retail/Wholesale	5,889 – 6,556		7,542 – 8,395	
Government	9 – 10		154 – 171	
Total	**15,537 – 17,295**		**24,232 – 26,975**	
Job Impacts (Number of Jobs)				
Manufacture/Production	21 – 24		39 – 43	
Transport & Services	20 – 22		109 – 121	
Recreation & Entertainment	239 – 266		246 – 274	
Lodging	103 – 114		106 – 118	
Eating & Drinking	107 – 119		120 – 133	
Retail/Wholesale	141 – 156		171 – 191	
Government	-		3	
Total	**630 – 701**		**794 - 884**	

Economic Impact: Inland Lakes in Winter

Spending by anglers on inland lakes in winter ($81.39/person/day) is less overall than spending during the warmer months ($105.21/person/day) as reported by coldwater anglers fishing inland lakes during the spring, summer, and fall months.

Table 27 shows expenses by categories, revealing similar expenditure patterns to those of inland lake anglers during the warmer months, but at lower levels.

Table 27
Per Person Per Day Angler Expenditures: Inland Lakes in Winter

Expenditure Category	Home	Away
Fuel/oil	$7.95	$13.31
Food (Restaurant)	$1.50	$8.80
Food (Non-restaurant)	$6.34	$4.29
Outfitting, charter boat or guide service	$0.22	$3.39
Lodging	$0.77	$12.05
Entertainment (Includes gambling)	$0.48	$2.36
Shopping (Gifts, clothes, handicrafts, etc.)	$0.46	$2.53
Fishing equipment (Rods, reels, waders, lures, bait, etc.)	$7.00	$4.80
Transportation other than motor vehicle (Air, train, etc.)	$0.35	$0.29
Other packaged trip (inclusive of meals, lodging, etc.)	$0.91	$3.61
TOTAL	**$25.97**	**$55.42**

* Columns may not add exactly due to rounding errors

Similarly, overall effects are diminished in comparison (Table 28). Total spending contributes to between $13.5 and $15.0 million, with direct sales effects totaling between $9.1 million and $10.1 million, direct income ranging from $5.8 to $6.4 million, supporting from 237 to 264 direct jobs across Minnesota.

Added multiplier effects bring total effects from fishing inland lakes in winter to between $14.5 and $16.2 million in total sales, $9.1 to $10.1 million in total income, and between 299 to 333 total jobs.

Table 28
Economic Impacts of Angler Trip Spending: Inland Lakes in Winter

Impact Measure	Low	High
Spending ($ Millions)	13.5	15.0
Direct Effects		
Sales ($ Millions)	9.1	10.1
Income ($ Millions)	5.8	6.4
Jobs	237	264
Indirect Effects		
Sales ($ Millions)	2.4	2.6
Income ($ Millions)	1.4	1.5
Jobs	25	27
Induced Effects		
Sales ($ Millions)	3.1	3.4
Income ($ Millions)	1.9	2.1
Jobs	37	42
Total Effects		
Sales ($ Millions)	14.5	16.2
Income ($ Millions)	9.1	10.1
Jobs	299	333

Distribution of these effects by sector is shown in Table 29. The largest direct effects are in the retail/wholesale sector, followed by the lodging sector for anglers fishing inland lakes in winter.

The greatest total effects are largely in the retail/wholesale and transportation/services sectors.

Coldwater angler fishing on inland lakes in winter showed the highest direct and total employment effects in the recreation and entertainment sector.

Table 29
Distribution of Angler Spending Impacts by Key Sectors: Lake Superior by Boat

Economic Sector Group	Direct Effects		Total Effects	
	Low	High	Low	High
Sales Effects ($ '000)				
Manufacture/Production	816 – 908		1,778 – 1,979	
Transport & Services	811 – 902		3,971 – 4,420	
Recreation & Entertainment	968 – 1,078		1,131 – 1,259	
Lodging	1,913 – 2,130		1,970 – 2,193	
Eating & Drinking	1,537 – 1,711		1,709 – 1,911	
Retail/Wholesale	2,423 – 2,697		3,223 – 3,588	
Government	8 – 9		123 – 136	
Total	**9,083 – 10,111**		**14,516 – 16,158**	
Income Effects ($ '000)				
Manufacture/Production	375 – 418		733 – 816	
Transport & Services	589 – 656		2,640 – 2,939	
Recreation & Entertainment	722 – 804		793 – 883	
Lodging	1,270 – 1,413		1,307 – 1,455	
Eating & Drinking	833 – 928		926 – 1,031	
Retail/Wholesale	1,976 – 2,200		2,591 – 2,885	
Government	3		58 – 64	
Total	**5,768 – 6,421**		**9,053 – 10,078**	
Job Impacts (Number of Jobs)				
Manufacture/Production	7 – 8		14 – 15	
Transport & Services	9 – 10		43 – 48	
Recreation & Entertainment	93 – 103		96 – 106	
Lodging	39 – 44		40 – 45	
Eating & Drinking	43 – 48		48 – 54	
Retail/Wholesale	46 – 51		57 – 64	
Government	-		1	
Total	**237 – 264**		**299 - 333**	

Spending Variations: Comparison By Type

Looking at selected expenditure categories for comparisons, differences can be seen between the five different fishing types.

Figure 48 illustrates a comparison of food expenditures (restaurant and grocery) by fishing type. Clearly, anglers fishing Lake Superior by boat had higher expenditures for restaurant service while away from home as compared to anglers of other fishing types.

Figure 48
Food Expenditures by Fishing Type
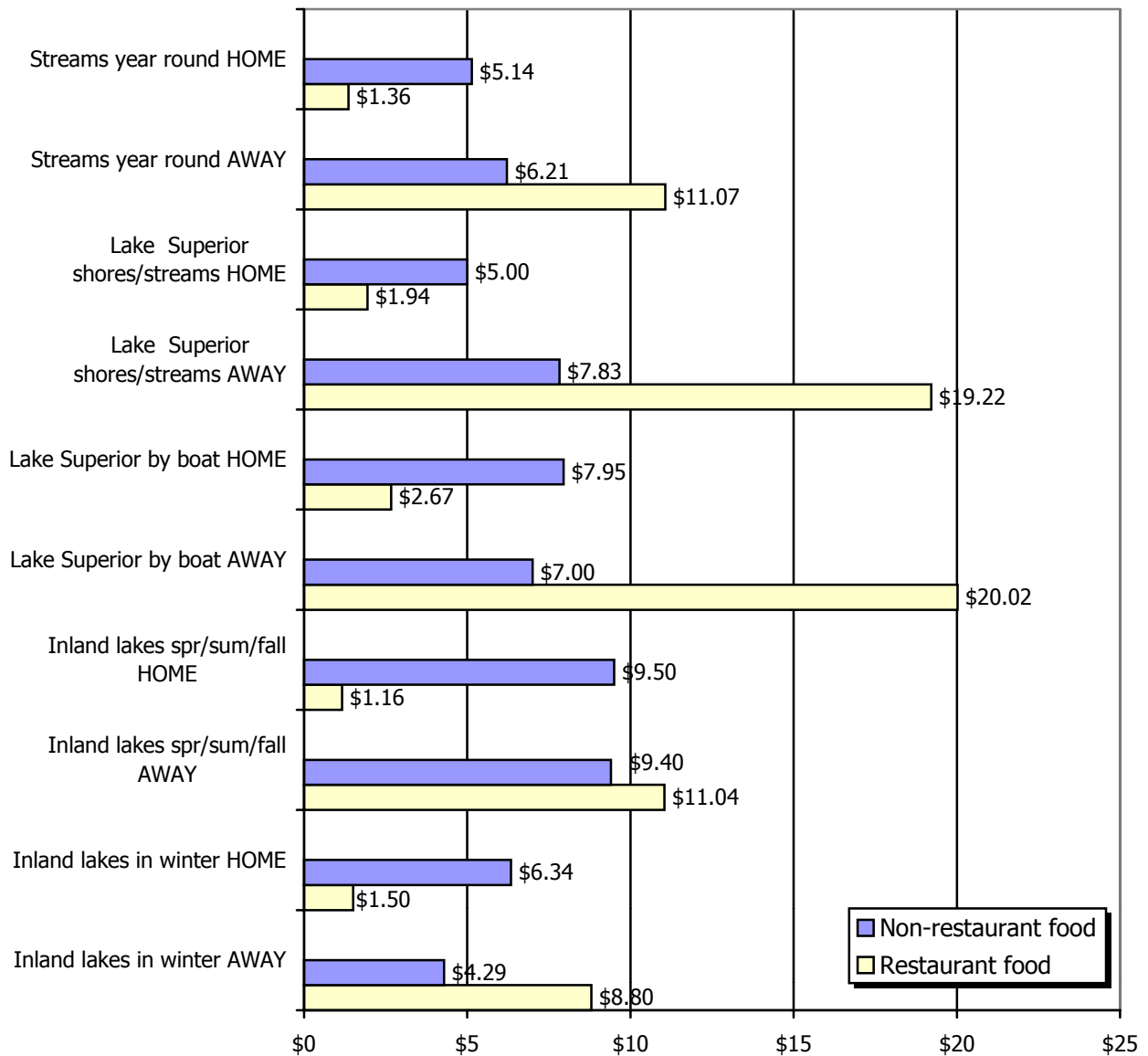
Figure 49 shows expenses reported for fishing equipment, general shopping (retail), and entertainment. In every case, fishing equipment appears to be a purchase made prior to leaving home, with anglers fishing Lake Superior streams and shores spending the most. In contrast, shopping and entertainment spending is typically an away-from-home expense. Anglers fishing Lake Superior by boat and Lake Superior shores and streams spent the most on purchases classified as shopping and entertainment expenses. Overall, anglers fishing inland lakes in the winter generally spent the least on fishing equipment, shopping, and entertainment – at home and away from home.

Figure 49
Expenditures on Fishing Equipment, Shopping, and Entertainment by Fishing Type
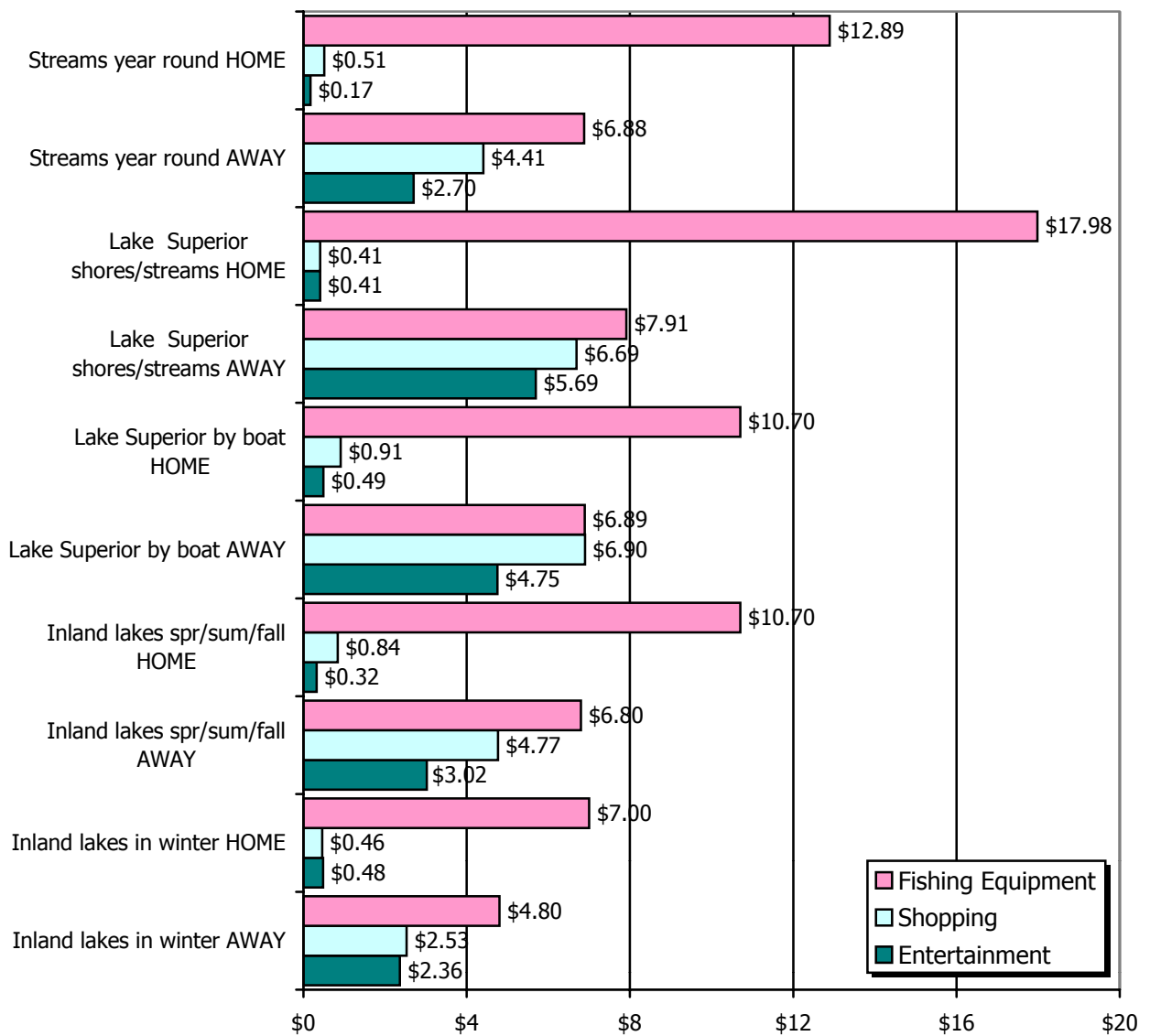
Overall Impact

Using the high impact measure, Figure 50 shows how each fishing type compares when viewing total sales and total income. While the per person expenditures for anglers fishing year round were not the highest among all fishing types, year-round stream fishing still ranks highest in sales and volume because of its ranking highest in total number of activity days. Anglers fishing inland lakes during spring, summer, and fall were second, followed by the other three fishing types.

Figure 50
Sales and Volume Totals by Fishing Type
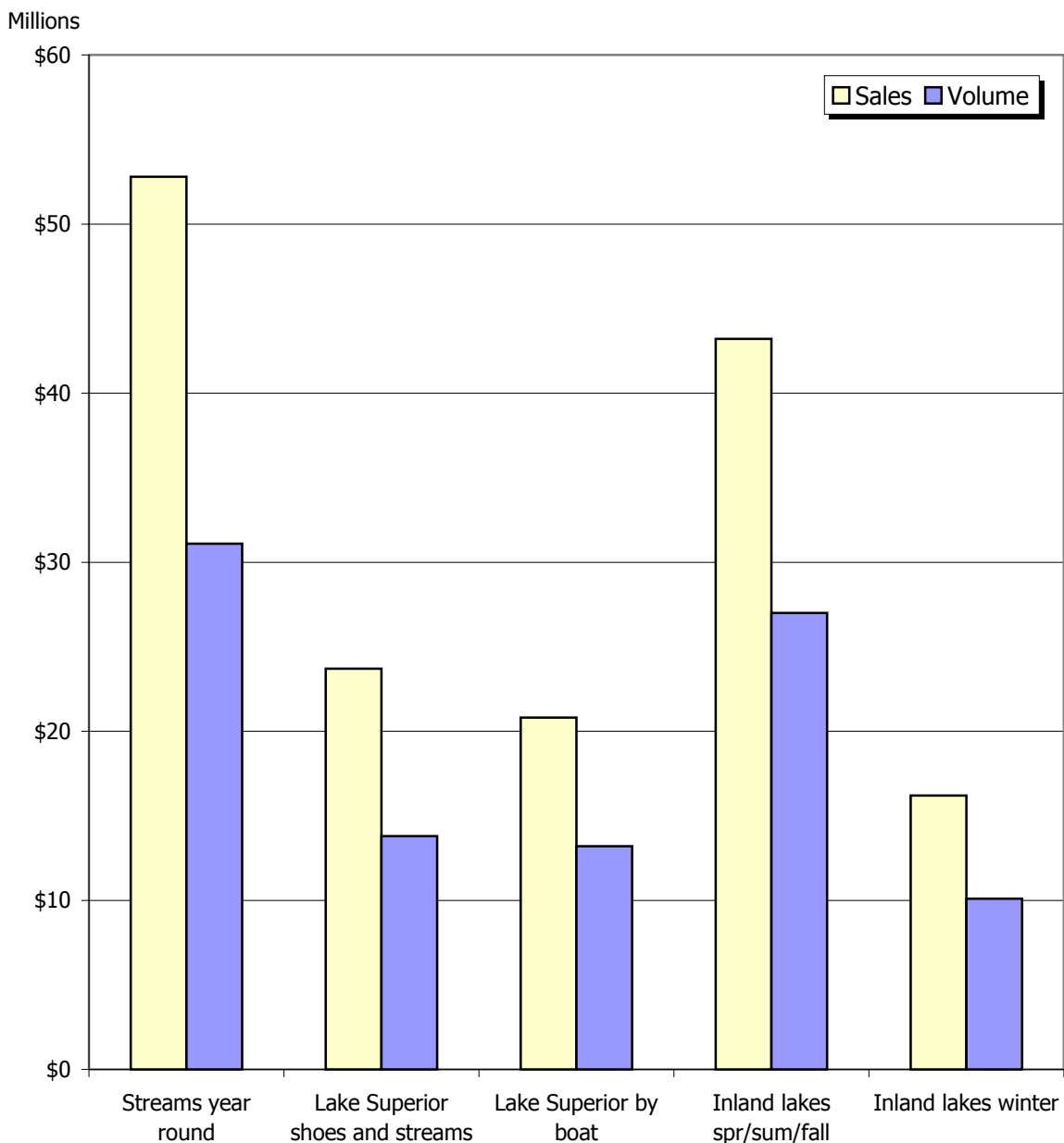
Millions

Table 30 shows the overall total economic impacts of coldwater fishing in Minnesota. All five fishing types combined generated between $130.5 and $145.1 million spending annually.

The direct effects of this activity generate between $92.6 and $102.8 million in annual sales impacts on the Minnesota economy, between $56.2 and $62.7 million annually in income, in support of between 2,557 to 2,845 jobs directly.

When combined with the multiplier effects of this economic activity, the total effects are between $140.7 and $156.7 million annually in sales. Total annual income ranges from $85.5 to $95.2 million, supporting a total of between 3,128 and 3,482 full and part-time jobs as a result of trout/salmon fishing in Minnesota.

Table 30
Total Economic Impacts of Fishing Trip Spending, All Activities

Impact Measure	Low	High
Spending ($ Millions)	130.5	145.1
Direct Effects		
Sales ($ Millions)	92.6	102.8
Income ($ Millions)	56.2	62.7
Jobs	2,557	2,845
Indirect Effects		
Sales ($ Millions)	21.2	23.4
Income ($ Millions)	12.0	13.3
Jobs	224	249
Induced Effects		
Sales ($ Millions)	27.3	30.3
Income ($ Millions)	17.1	19.0
Jobs	348	389
Total Effects		
Sales ($ Millions)	140.7	156.7
Income ($ Millions)	85.5	95.2
Jobs	3,128	3,482

Benefits By Fishing Type

<u>Importance of Experiences to Coldwater Anglers</u>

Coldwater anglers were asked to identify how important different experiences, or benefits, were to their satisfaction with their most recent fishing trip in Minnesota. Anglers were asked to evaluate the importance of 33 different experiences to their fishing satisfaction. A 7-point scale was used, ranging from very unimportant (1) to very important (7), with a midpoint of 4.

<u>Experience Scales</u>

The 33 experience items were based on previous research findings regarding motivations of general recreation and fishing (Manfredo, Driver and Tarrant 1996, Manning 1999, Currie and Fulton 2001).

Using past research as a guide, similar experience items among the 33 total items were also used to define eight different experience domains:

- Social Affiliation
- Personal Achievement
- Nature Appreciation
- Relaxation
- Escape
- Fishing for Food
- Trophy Fishing
- Fishing for Recreation

Items used to define each domain are identified in Table 31, which summarizes the reliability of each of the eight experience domains.

Three items did not fit into any of the scales: releasing all the fish you catch, being around other anglers, and competing with friends who fish.

All scales, with the exception of escape (alpha=0.54), resulted in Cronbach's alpha scores of 0.60 or higher, with 6 scales having alphas > 0.70, suggesting that all eight domains were reliable.

Table 31
Benefit Items and Scale Domains

Reliability of Experience Scales	Corrected Item-total Correlation	Cronbach's Alpha
Social Affiliation		0.73
Being with friends	0.51	
Being with people who are enjoying themselves	0.62	
Sharing your skills and knowledge with others	0.49	
Meeting new people	0.38	
Doing something with your family	0.47	
Personal Achievement		0.62
Using your fishing equipment	0.42	
Getting exercise	0.38	
Developing your skills and abilities	0.50	
Nature Appreciation		0.75
Learning about nature	0.57	
Enjoying nature and the outdoors	0.61	
Fishing in a wilderness setting	0.55	
Relaxation		0.84
Relaxing	0.67	
Being in a quiet and peaceful place	0.71	
Giving your mind a rest	0.67	
Getting away from crowds of people	0.67	
Escape		0.54
Being alone	0.30	
Thinking about your personal values	0.35	
Visiting areas you've fished in the past	0.34	
Getting away from family for awhile	0.32	
Fishing—Food		0.87
Catching food for your family	0.67	
Keeping fish to eat	0.81	
Keeping enough fish for a meal	0.77	
Fishing—Trophy		0.74
Catching a trophy	0.65	
Keeping trophy fish	0.56	
The size of fish you catch	0.50	
Fishing Catch		0.77
Catching fish	0.55	
Catching a particular species of fish	0.49	
Catching at least one fish	0.58	
Catching your limit	0.53	
Catching more than one kind of trout/salmon	0.54	
Excluded Items		
Releasing all fish you catch	--	--
Being around other anglers	--	--
Competing with friends who fish	--	--

Based on these reliability assessments, eight corresponding experience domain scales were calculated using the mean of the items in each scale as each respondent's scale score for that domain. The overall mean score of all study respondents on each of the scales and for the single item, releasing all the fish you catch, are summarized in Figure 51.

Figure 51
Overall Mean Scale Scores

Mean Importance
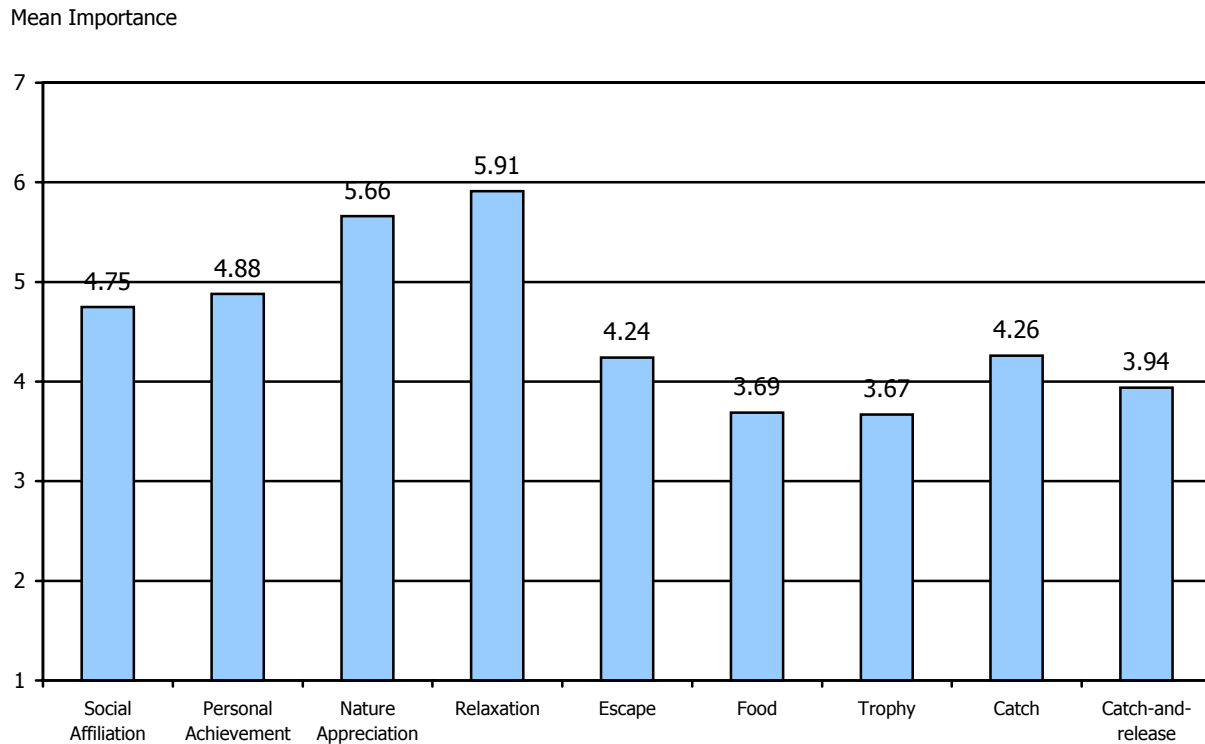
Paired-comparison t-tests were used to compare means scores across all the scales. Because of the numerous (36) comparisons being made, Bonferroni adjustments were calculated when considering the significance of each comparison. Thus, to be considered significant, the p levels had to be less than 0.05/36 or $p < 0.001$.

Overall, relaxation (mean=5.91) was rated the most important experience followed by nature appreciation (mean=5.66), personal achievement (mean=4.88), and social affiliation (mean=4.75). Escape (mean=4.24) and catching fish (mean=4.26) also had means greater than 4.00 indicating they were at least slightly important benefits sought by anglers in this study. All scale means for the study population were significantly different from one another, except the means of Fishing for Food and Trophy Fishing. As indicated by a mean of 4.00 or higher, all experiences were considered to be important to angling satisfaction, except fishing for food (mean=3.69), fishing for trophy (mean=3.67), and catch-and-release (mean=3.94).

Experience Domains by Fishing Type

After the scale scores were calculated, comparisons between the eight experience domains and the five fishing types (i.e., streams year round; Lake Superior shores and streams; Lake Superior by boat; inland lakes in spring, summer, and fall; and inland lakes in winter) were made using one-way ANOVA. As Table 32 details, there were significant differences ($p < 0.001$) between fishing types on each of the experience domains and for the item release all the fish you catch.

Table 32
ANOVA Results: Experience Domains by Fishing Type

	Streams year round	Lake Superior shores/ streams	Lake Superior by boat	Inland lakes spr/sum/ fall	Inland lakes winter	ANOVA F	Results Sig.
Social Affiliation	4.54	4.73	4.96	4.95	4.88	17.48	P<0.001
Personal Achievement	5.03	5.10	4.43	4.79	4.83	18.28	P<0.001
Nature Appreciation	5.79	5.76	5.14	5.65	5.60	20.12	P<0.001
Relaxation	6.01	5.97	5.52	5.92	5.79	12.50	P<0.001
Escape	4.42	4.32	3.78	4.14	4.16	21.68	P<0.001
Fishing-Food	3.15	3.64	4.24	4.13	4.10	61.50	P<0.001
Fishing-Trophy	3.57	3.82	3.78	3.69	3.80	6.01	P<0.001
Fishing-Catch	4.12	4.36	4.40	4.34	4.42	7.07	P<0.001
Catch & Release	4.41	4.02	3.19	3.60	3.62	52.20	P<0.001

Differences on mean scale scores between each of the angling types were examined using post-hoc multiple comparison tests with Bonferroni adjustments within each set of comparisons on a single scale. Significance was set at $P < 0.005$ (0.05/10). The results of this analysis are discussed for each of the eight experience domains.

Social Affiliation

All groups had mean scores greater than 4.00 for social affiliation. Stream anglers (mean=4.54), however, had statically lower social affiliation scores than Lake Superior boat anglers (mean=4.96) or inland lake anglers fishing spring, summer, and fall (mean=4.95) or anglers fishing inland lakes in winter (mean=4.88). Anglers fishing Lake Superior shores and streams (mean=4.73) did not differ significantly from any of the other fishing types. Figure 52 summarizes these results.

Figure 52
Social Affiliation by Fishing Type
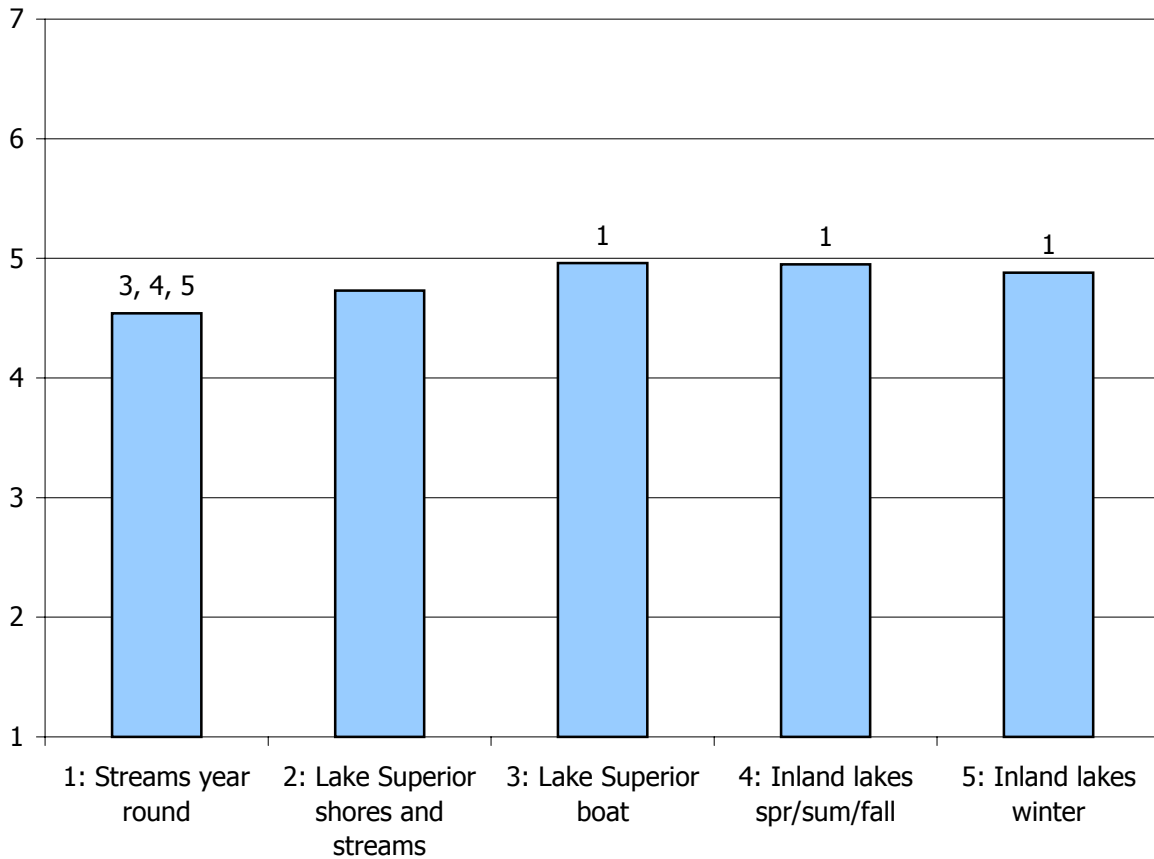
Mean Importance

Note: A number appearing at the top of the bar identifies those fishing type(s) with mean scores significantly different than the mean score for that particular fishing type

Personal Achievement

All angling types also had mean scores greater than 4.00 for personal achievement. Lake Superior boat anglers (mean=4.43) had significantly lower scores on personal achievement than any of the other angling types: streams year round (mean=5.03), Lake Superior shores and streams (mean=5.10), inland lakes in spring, summer, and fall (mean=4.79), and inland lakes in winter (mean=4.83). No statistically significant differences between any of the other angling types with respect to personal achievement (Figure 53) were found.

Figure 53
Personal Achievement by Fishing Type

Mean Importance

Note: A number appearing at the top of the bar identifies those fishing type(s) with mean scores significantly different than the mean score for that particular fishing type

Nature Appreciation

As with personal achievement, Lake Superior boat anglers had the lowest scores for nature appreciation (mean=5.14), and these anglers were different than all the other angling types: streams year round (mean=5.79), Lake Superior shores and streams (mean=5.76), inland lakes in spring, summer, and fall (mean=5.65), and inland lakes in winter (mean=5.60).

None of the other angling types differed from one another on this scale, and all angling types had mean scores greater than 5.00 (Figure 54).

Figure 54
Nature Appreciation by Fishing Type
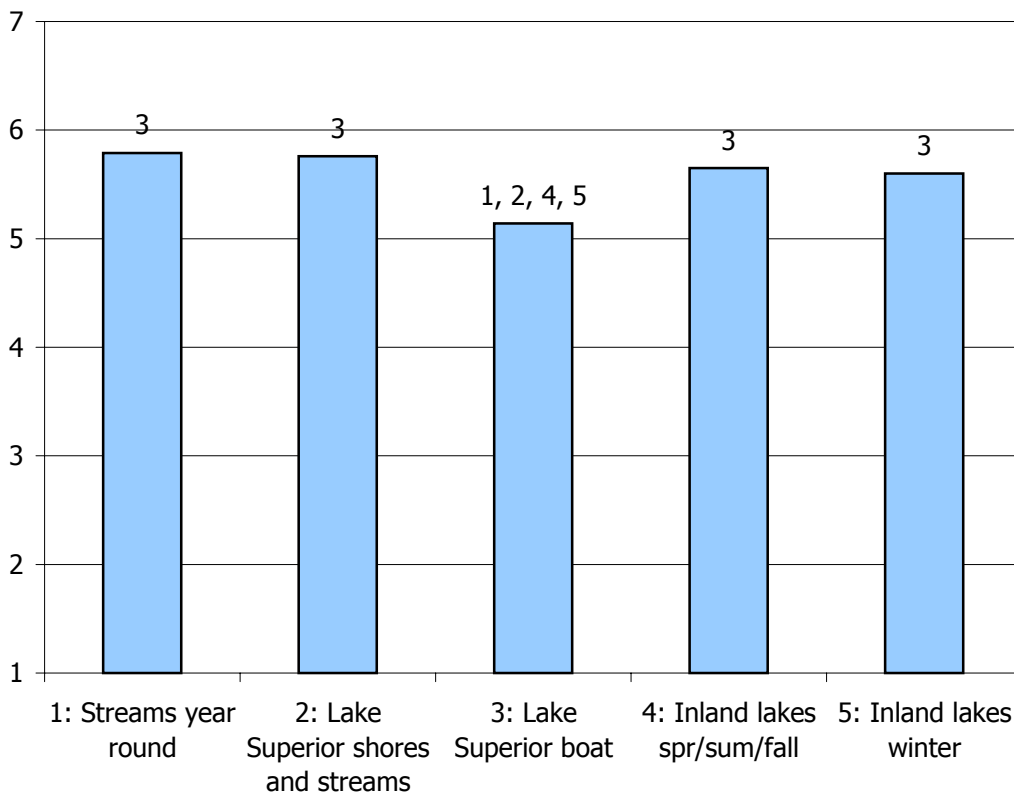
Mean Importance

Note: A number appearing at the top of the bar identifies those fishing type(s) with mean scores significantly different than the mean score for that particular fishing type

Relaxation

Mean scores of all fishing types were highest for the relaxation dimension when compared to the other experience dimensions, with most groups having means approaching 6.00 (Figure 55).

Lake Superior boat anglers (mean=5.52) again had significantly lower mean scores than three of the other fishing types: streams year round (mean=6.01), Lake Superior shores and streams (mean=5.97), and inland lakes in spring, summer, and fall (mean=5.92). Anglers who fished inland lakes in winter did not differ from any of the other fishing types (mean=5.79).

Figure 55
Relaxation by Fishing Type
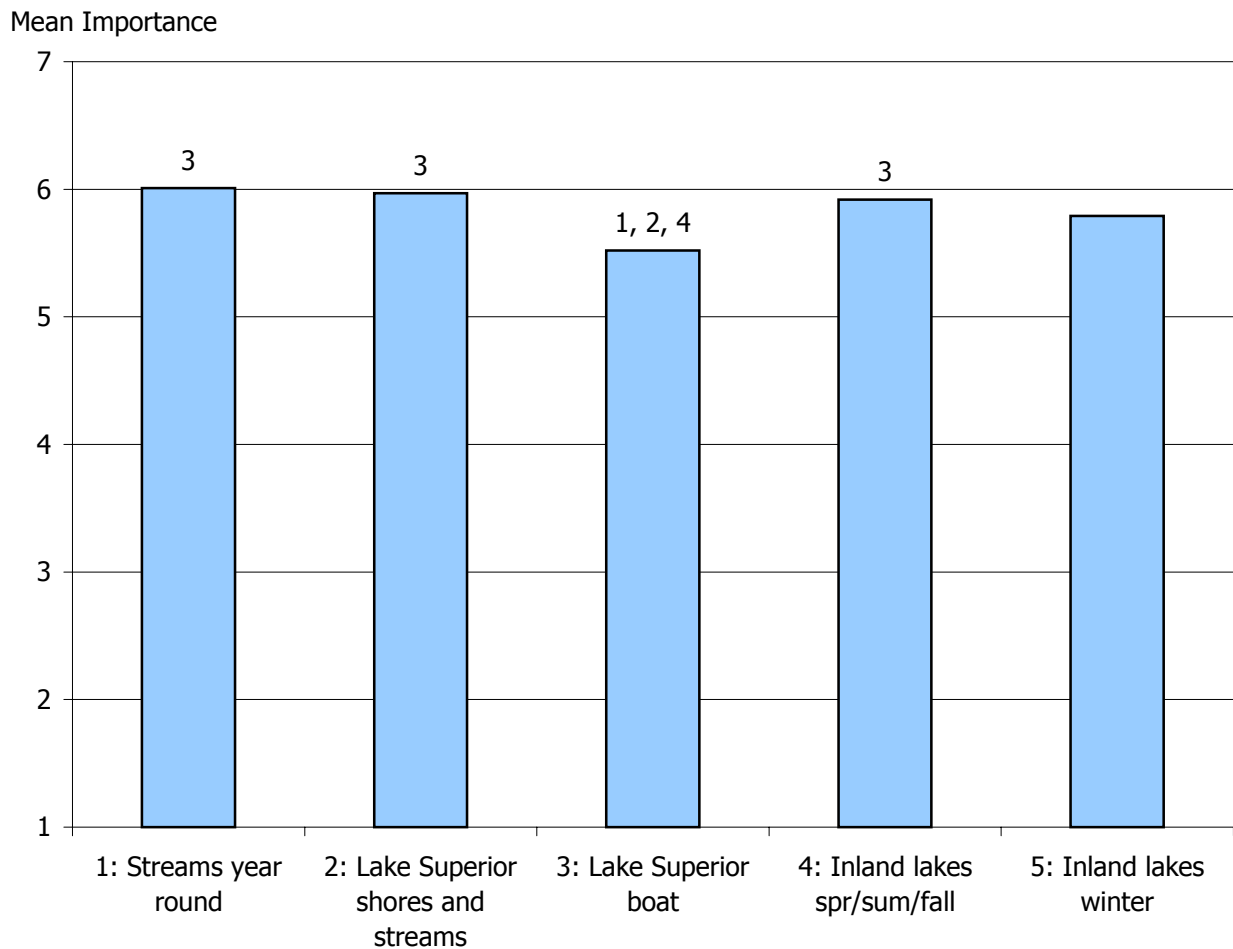
Mean Importance

Note: A number appearing at the top of the bar identifies those fishing type(s) with mean scores significantly different than the mean score for that particular fishing type

<u>Escape</u>

Ratings of escape averaged greater than 4.00 among four of the fishing types: streams year round (mean=4.42), Lake Superior shores and streams (mean=4.32), inland lakes in spring, summer, and fall (mean=4.14), and inland lakes in winter (mean=4.16). As Figure 56 shows, these four groups did not significantly differ from one another on their mean ratings of escape, but Lake Superior boat anglers (mean=3.78) were significantly lower on this scale than all the other angling types.

Figure 56
Escape by Fishing Type

Mean Importance
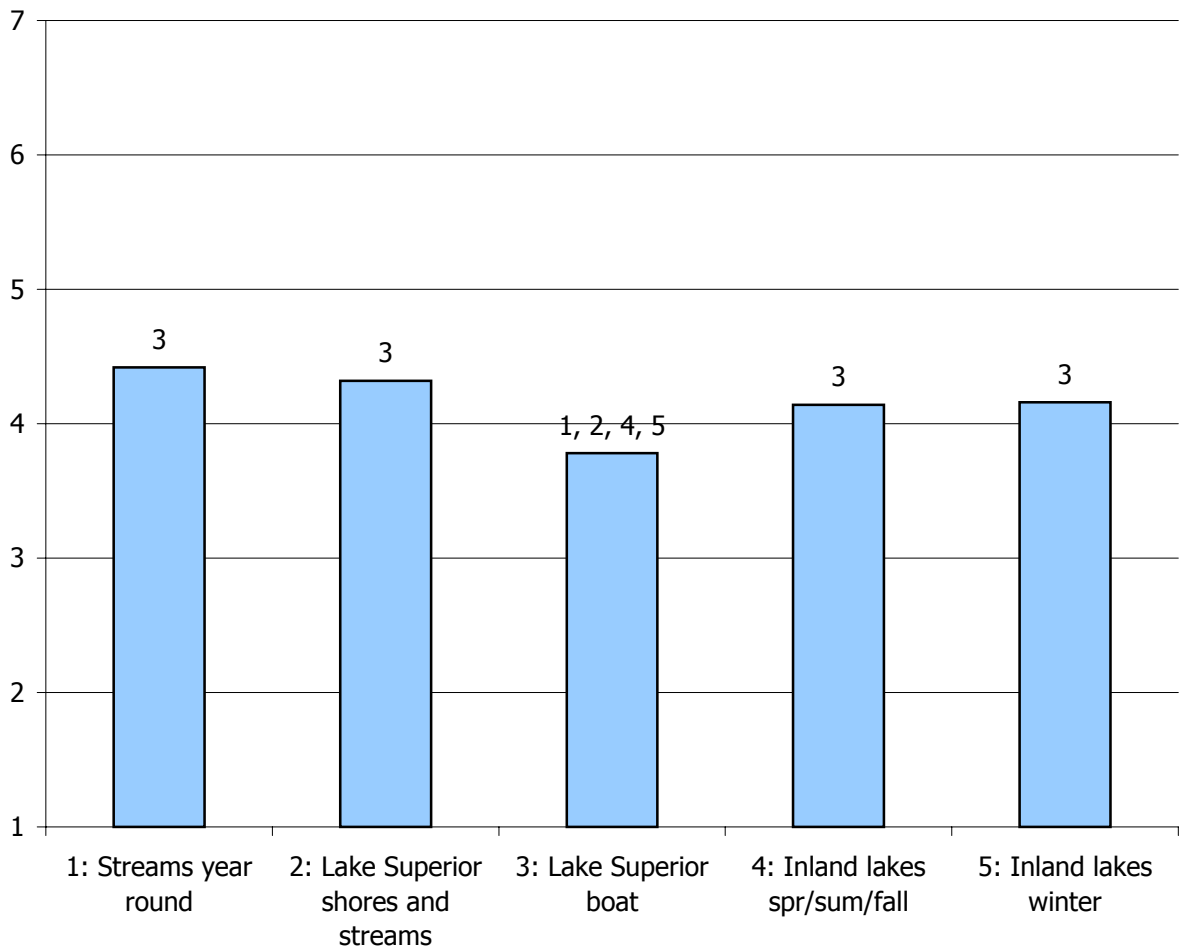
Note: A number appearing at the top of the bar identifies those fishing type(s) with mean scores significantly different than the mean score for that particular fishing type

Fishing for Food

Anglers who fished streams year round (mean=3.15) and Lake Superior shores and streams (mean=3.64) had mean scores below 4.00 for fishing for food. For these two fishing types, these means were the lowest rated experience scale domain, and they were significantly lower than all the other angling types: Lake Superior by boat (mean=4.24), inland lakes in spring, summer, and fall (mean=4.13), and inland lakes in winter (mean=4.10), and from one another on this scale (Figure 57).

Figure 57
Fishing for Food by Fishing Type
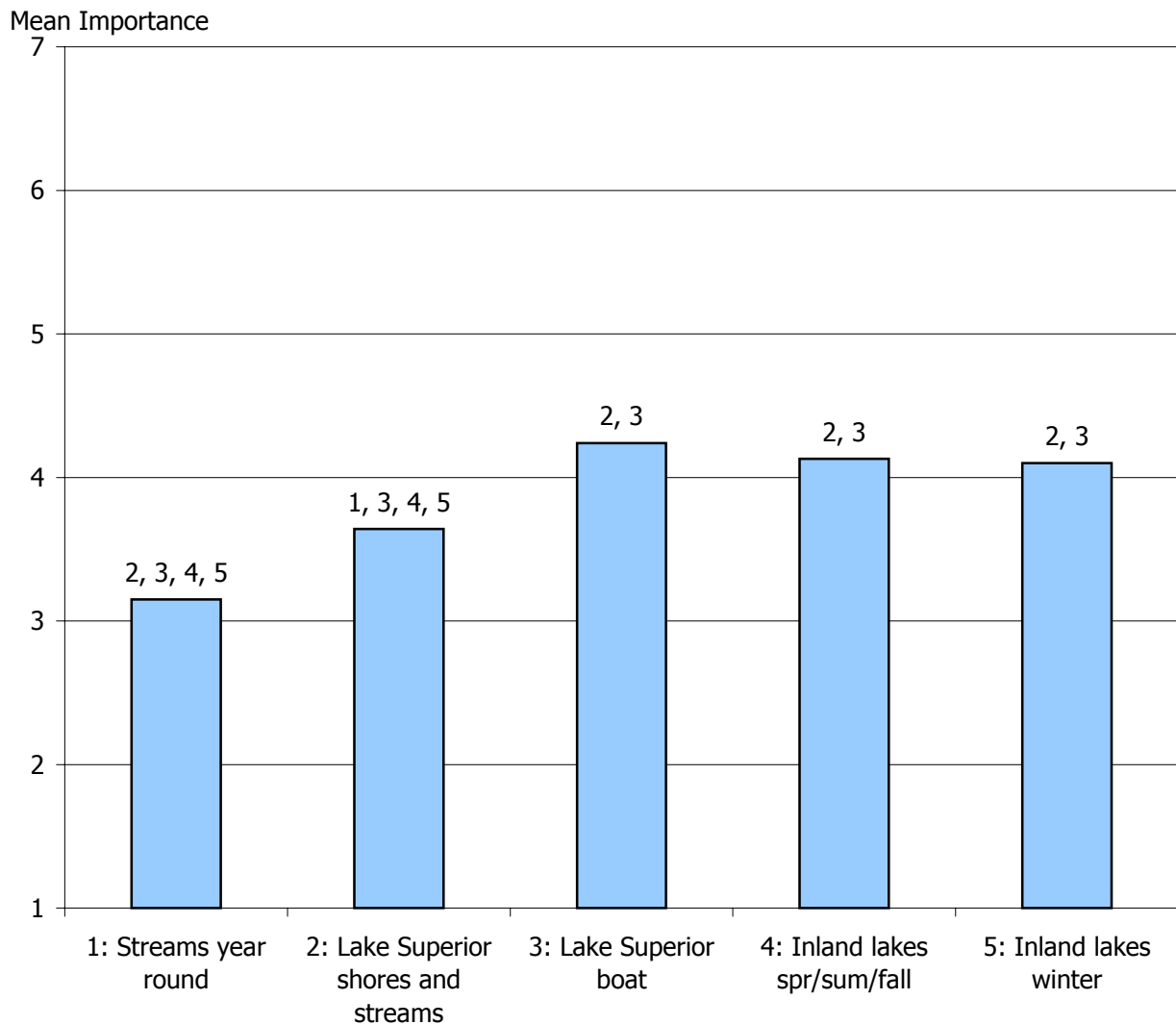
Mean Importance

Note: A number appearing at the top of the bar identifies those fishing type(s) with mean scores significantly different than the mean score for that particular fishing type

<u>Trophy Fishing</u>

For three of the fishing types, trophy fishing had the lowest overall mean score among the eight experience scales: Lake Superior by boat (mean=3.78), inland lakes spring, summer, and fall (mean=3.69), and inland lakes in winter (mean=3.80).

Additionally, all five fishing groups had mean scores below 4.00: streams year round (mean=3.57) and Lake Superior shores and streams (mean=3.69) on this experience scale, indicating that it is less important to fishing satisfaction than most other experiences for all of the angling types.

There were no statistical differences in means across the angling types on this scale (Figure 58).

Figure 58
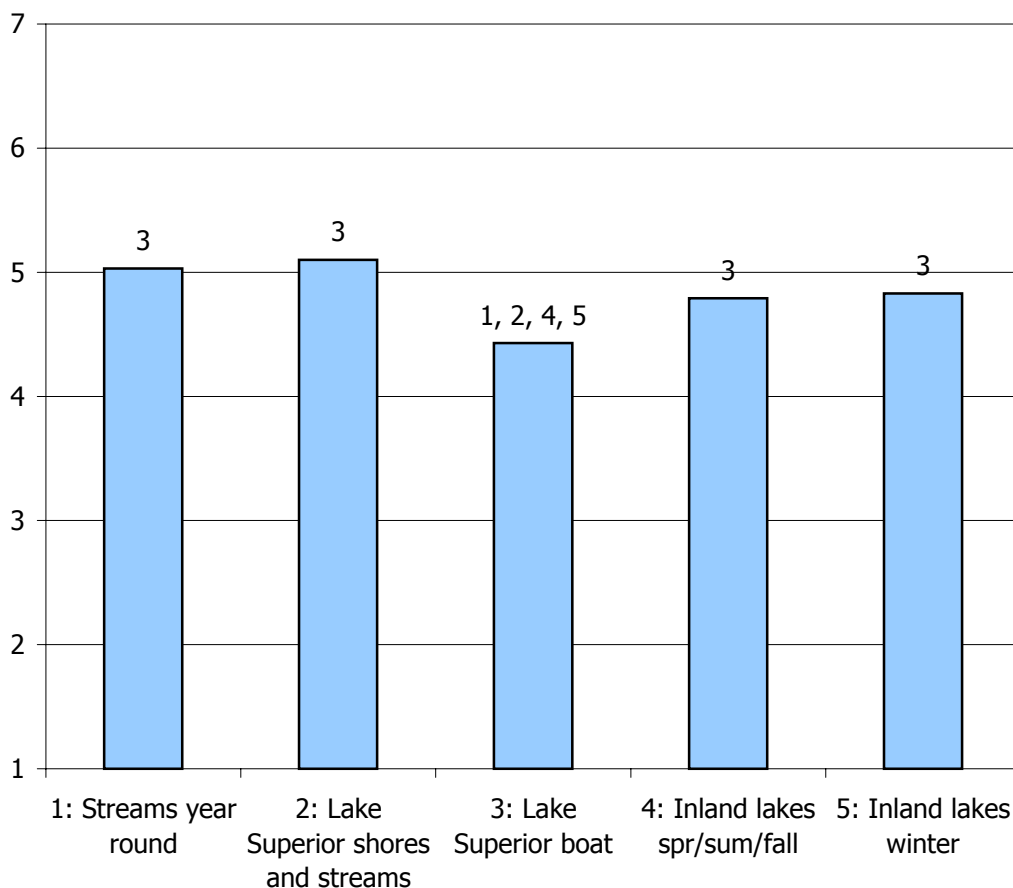Fishing for Trophies by Fishing Type
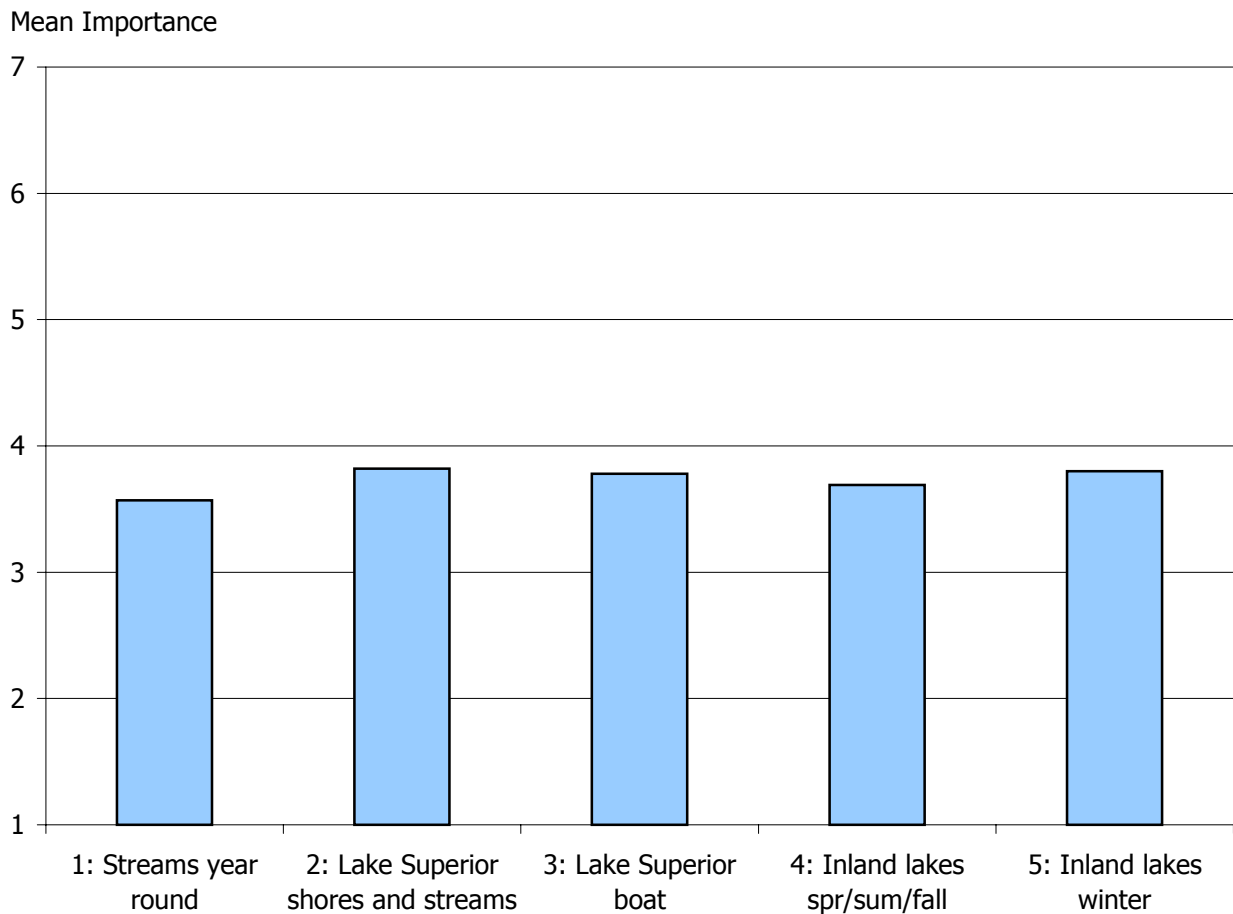
Mean Importance

Note: A number appearing at the top of the bar identifies those fishing type(s) with mean scores significantly different than the mean score for that particular fishing type

<u>Catching Fish</u>

All fishing types had mean scores greater than 4.00 for catching fish: streams year round (mean=4.12), Lake Superior shores and streams (mean=4.36), Lake Superior by boat (mean=4.40), inland lakes in spring, summer, and fall (mean=4.34), and inland lakes in winter (mean=4.42). However, for all groups, their mean scores were lower for catching fish than for social affiliation, personal achievement, nature appreciation, and relaxation. There were no statistically significant differences between the angling types on their rating of the importance of catching fishing (Figure 59).

Figure 59
Catching Fish by Fishing Type
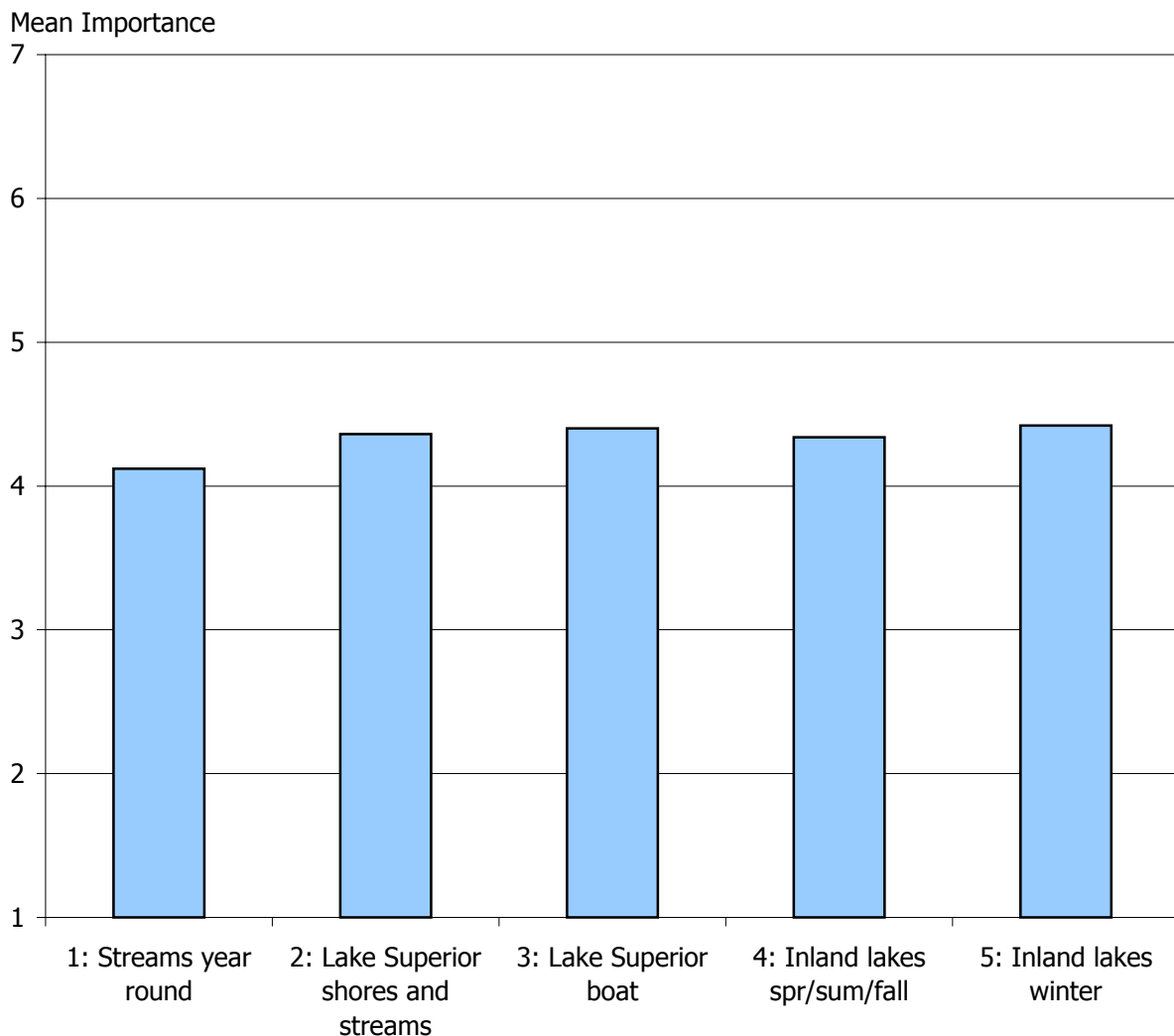
Mean Importance

Note: A number appearing at the top of the bar identifies those fishing type(s) with mean scores significantly different than the mean score for that particular fishing type

<u>Catch-and-Release</u>

Anglers fishing streams year round (mean=4.41) and fishing Lake Superior shores and streams (mean=4.02) rated the importance of catch-and-release fishing significantly higher than did Lake Superior boat anglers (mean=3.19). Lake Superior boat anglers and Lake Superior shores and streams anglers did not differ from inland lake anglers in spring, summer, and fall (mean=3.60) or inland lake anglers in winter (mean=3.62). Anglers fishing streams year round, however, had significantly lower mean ratings for catch-and-release than Inland lake anglers (Figure 60).

Figure 60
Catch-and-Release by Fishing Type

Mean Importance
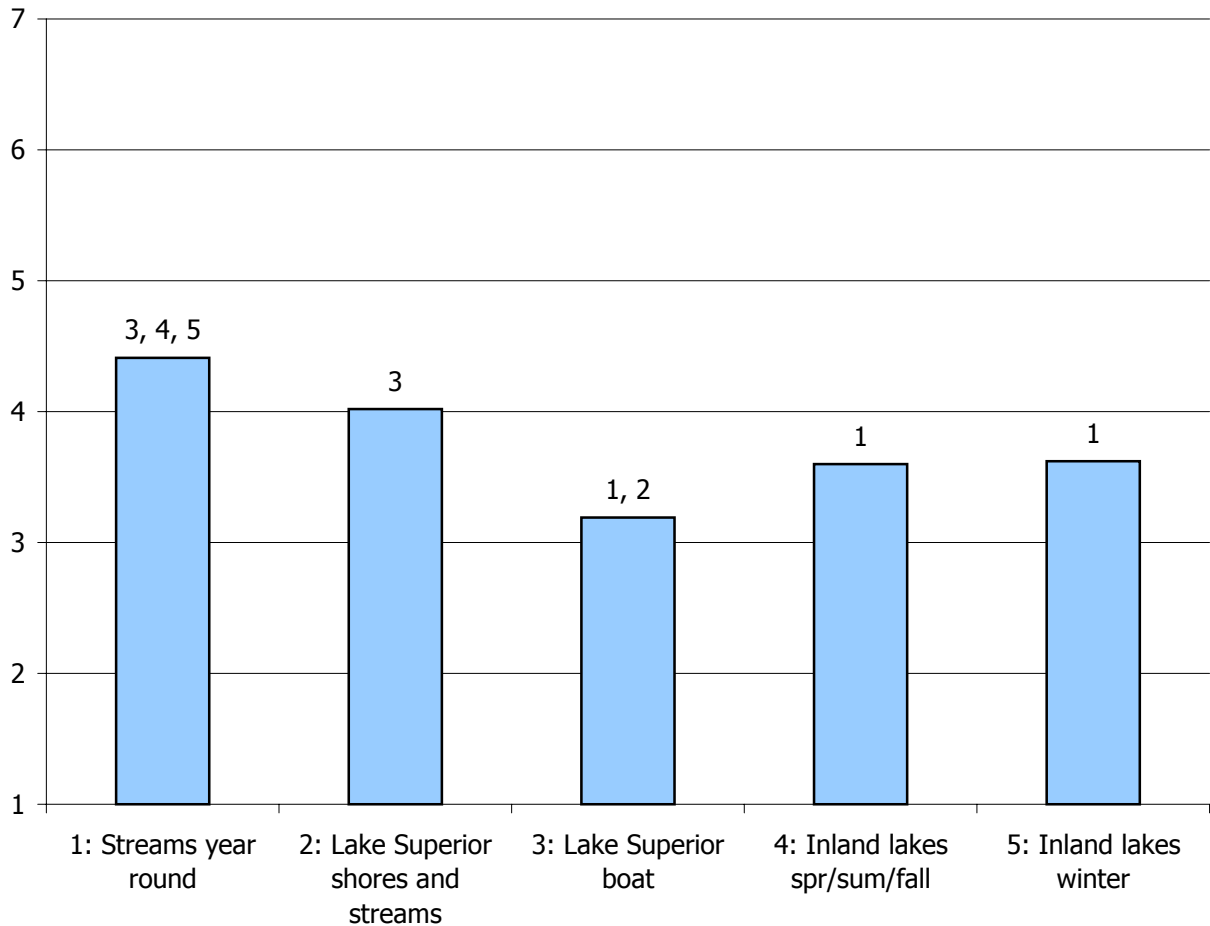
Note: A number appearing at the top of the bar identifies those fishing type(s) with mean scores significantly different than the mean score for that particular fishing type

Summary

All angling groups placed more importance on experiences not directly associated with catching fishing such as relaxation, nature appreciation, personal achievement, and social affiliation than they did direct fishing experiences.

However, there were significant differences across the groups on the relative importance of most of the experience domains.

In general, stream and inland lake anglers emphasized nature appreciation, relaxation and personal achievement more than Lake Superior boat anglers. Stream anglers also emphasized catch-and-release fishing more than Lake Superior boat or inland lake anglers. In contrast, Lake Superior boat and inland lake anglers placed more importance of fishing for food and social affiliation than did stream anglers.

Experience Attainment

Respondents who indicated that an experience was at least somewhat important to their angling satisfaction were also asked to indicate the extent to which they attained those experiences on a scale ranging from not at all (1) to totally attained (4). Frequency of responses and mean scores for each fishing type on these items are summarized in Appendix B, along with the F-test score and p value for each item.

Generally speaking, though, stream anglers attained social affiliation, personal achievement, nature appreciation, relaxation and catch-and-release experiences, while trophy and fishing for food motivations were least likely to be attained. A very similar pattern was present for anglers fishing Lake Superior shores and streams anglers. Lake Superior boat anglers and both types of inland lake anglers exhibited similar patterns, except attainment of fishing for food was somewhat higher for these anglers than for stream anglers.

SUMMARY AND DISCUSSION

There were many differences noted between the five different types of fishing investigated in this study. The differences were substantial, significant, and revealing. The evidence presented strongly argues for rejecting both of the null hypotheses used to guide this research. Therefore, we can state with a high degree of certainty that expenditure differences do exist for anglers between the different types of coldwater angling and that different experiences are sought by anglers engaging in different types of fishing. The research that allowed us to reject both null hypotheses also provides us with some interesting insights into other differences between anglers in the five different fishing types.

Fishing By Type

Streams Year Round

Anglers fishing streams year round recorded the highest level of activity, averaging over six trips per year to fish for trout and salmon in streams. The majority of that stream fishing (approx 75%) takes place in the Southeastern part of the state which records approximately 33% of all coldwater angling days per year. Most of the trips for stream fishing are of the short (1-2 days) variety. It appears from the zip code analysis, average miles traveled, and mean number of days away from home that many anglers are on a day trip. This was more pronounced when just those fishing the southeastern streams were examined.

Anglers fishing streams year round also recorded the highest satisfaction scores in overall fishing experience, size of fish caught, and number of fish caught. Approximately 34% of these anglers used flies, which together with anglers fishing Lake Superior shores and streams, was the highest level recorded across all fishing categories.

Anglers fishing streams year round recorded the second highest level of economic impact for any fishing type. Over $47 million in sales related to the activity generated over $27 million in income for those on the receiving end of expenditures, with over 820 jobs directly tied to this type of angling.

Compared to most of the other angling types, stream anglers are characterized by placing lower importance on social affiliation and fishing for food. They also placed more importance on catch-and-release fishing. Along with Lake Superior shore and stream anglers and inland lake anglers, they also placed emphasis on relaxation, nature, appreciation and personal achievement.

Lake Superior Shores and Streams

Anglers pursuing trout and salmon on Lake Superior shores and streams recorded the smallest party size across the coldwater angling categories. They also recorded the longest trip length, with most of those days spent fishing.
Satisfaction scores for overall trip experience, overall fishing experience, size of fish caught, and number of fish caught were the lowest for any of the coldwater fishing types.

With respect to experiences sought, anglers fishing Lake Superior shores and streams were primarily after relaxation, escape, nature appreciation, catch and release, and personal achievement, but they were not seeking social affiliation of fishing for food. Of all the fishing types, this type appears to be the most critical with respect to the quality of the fishery and most different with respect to experiences sought. It appears to be a tough group to please.

Lake Superior shores and streams anglers were responsible for over $21 million in sales, over $12 million in income, supporting more than 435 jobs.

Lake Superior by Boat

Anglers fishing Lake Superior by boat recorded the second largest party size (mean=3.44) across all fishing types, which might be explained, in part, by fixed-rate pricing for commercial charters, which is the same for one person or a boat full. The average trip length of anglers fishing Lake Superior by boat was 2.15 days, with 1.63 of those days spent fishing.

Although anglers fishing Lakes Superior by boat were neutral about the size and number of fish, they recorded the second lowest score for overall quality of the most recent coldwater fishing trip. This lower score might be due, in part, to experience with the resource; anglers in this fishing type averaged close to 18 years of experience fishing on the big lake. However, there is no evidence that this group of anglers viewed the fishery as more than in slight decline over the years, which was consistent with all other fishing types with the exception of anglers fishing Lake Superior shores and streams.

With respect to demographics, anglers fishing Lake Superior by boat were generally older, with an average age in the late 40s, when compared to anglers in the other fishing types.

Anglers fishing Lake Superior by boat placed high importance on the experiences of social affiliation and fishing for food, and, as expected low importance on catch-and-release. They also placed less importance on nature appreciation, relaxation, escape and personal achievement than any of the other angling groups.

With respect to economic impact, this group of anglers is responsible for yearly sales of over$18 million, $12 million in income, supporting more than 775 jobs.

Inland Lakes in Spring, Summer and Fall

Anglers fishing inland lakes in spring, summer and fall are the second most popular fishing type in the state, with a total of 29.5% of all coldwater angling related to this category. These anglers also recorded the second highest average number of fishing days per year (mean=4.14 days annually) pursuing trout on inland lakes in spring, summer, and fall. However, there is some indication that this type of fishing is part of a larger vacation experience because anglers in this group spent, on average, more days away from home than for any other fishing type. When comparing the number of days away from home (mean=2.90 trip days) and the number of days spent fishing (mean=2.08 fishing days), anglers in this fishing type spend about one day less fishing than the length of the entire trip. This large gap was not noted for any other type of fishing category. These anglers are also driving further to their fishing spot when compared to anglers in other fishing types.

This information, combined with zip code analysis, suggests that anglers fishing inland lakes in spring, summer, and fall are likely part of Minnesota's resort visitor segment. Using resorts as a base, anglers are able to gain access to many trout lakes. These anglers may also be traveling with others in the travel party who may not fish as much or at all, which would help explain the large gap between the number of days away from home and the number of days fishing.

Anglers in this category also recorded fairy high satisfaction levels for the overall fishing experience, number of fish caught, and size of fish caught.

As with stream anglers, this group is characterized by placing emphasis on nature appreciation and relaxation. However, they also emphasized social affiliation and fishing for food.

In terms of economic impact, this group of anglers accounted for over $38 million in sales; over $24 million in income; and supporting over 790 jobs.

Inland Lakes in Winter

Anglers pursuing coldwater species on lakes in winter recorded the highest average party size (mean=3.57 people) and also the lowest number of days away from home (mean=1.91 days per trip).

Anglers in this category recorded the lowest satisfaction with number of fish caught across all five fishing types, but this dissatisfaction did not carry over to overall quality of the experience or overall quality of the fishing trip. While this group emphasizes fishing

for food, it appears that anglers fishing inland lakes in winter are gaining much more from the experience than simply catching fish. High scores on the social affiliation, nature appreciation, and relaxation scales support this finding.

As expected, however, anglers in this fishing type recorded the lowest level of total economic impact, generating over $14 million in sales and over $9 million in income in support of approximately 300 jobs.

Total Economic Impact

Total economic impact from coldwater angling in Minnesota is estimated to fall between $140.7 and $156.7 million due to direct sales. Total income generated by these sales adds another $85.5 to $95.2 million. In all, between 3,128 and 3,482 jobs in this state are directly tied to coldwater angling annually.

The above figures may not seem overly large; however, that assumption might be in error. First, these estimates are highly conservative because they do not take into account other related expenses, such as durable equipment like vehicles and boats. Results from this study reveal that less than 25% of coldwater anglers use a car to get to their fishing spot. Many drive SUVs and pickup trucks. Some fly or use snowmobiles to get to their fishing spot. None of the expenses related to buying or maintaining these vehicles were included in the impact numbers.

Second, these economic impact estimates do not include any value for consumer surplus. Consumer surplus is what the user would be willing to pay, over and above what they now spend, to pursue the activity. There are many studies evaluating non-market goods, of which coldwater angling is one. Using a consumer surplus or other non-market evaluation technique would significantly raise total economic impact. For a thorough discussion of non-market methods, see Loomis (2002).

Finally, even though the total economic impact may be considered small when compared to warm water fishing in the state, the impacts are highly concentrated in a few areas. This concentration may be especially true of the Inland lakes in spring, summer and fall category. If this group of anglers is part of the resort market as hypothesized, then expenditures from those anglers may accrue to a very narrow band of resorters. Similar arguments can be made for bait shops and outfitters that cater to the coldwater angling market in the main areas where the bulk of the activity takes place. Whereas warm water angling does benefit those directly supplying goods and services to anglers, those suppliers can be found across the state, with more impact occurring close to major resources (e.g. Mille Lacs, Leech Lake) There are few areas in the state with major resources for coldwater angling, which would then tend to concentrate angler economic impacts in those areas (e.g. Two Harbors, Ely, Elba).

The future of coldwater angling demand may be possible to predict from this analysis as well. It does not appear from the evidence gathered that Minnesota is viewed as a major destination for coldwater angling in the U.S. Most of the anglers are Minnesota residents or from surrounding states. Areas where fishing pressure may increase, however, would include the Boundary Waters in the winter. The use of dog sleds, although estimated to be only .2% of total access, could easily accommodate dramatic increases with targeted marketing, partnerships, and the development of package products. The experience gained from dog sledding in the boundary waters would likely appeal to more than just the die-hard angler. Added to the dog sled experience is the high quality of the fishery, making this type of angling experience very appealing to an international clientele. With one or two exceptions, no one is actively marketing this experience. One reason for this is the nature of a business characterized by high expenses and a limited season. Many current dog sled operators may be running marginal operations, with respect to income-over-expenses, thereby limiting capacity, even if this activity were to gain in popularity.

Another fishing type where demand may increase is Lake Superior by boat. Anglers only showed a slight preference for Chinook salmon over Lake Trout. Based on site visits and reviewing Lake Superior management plans, it does not appear that Minnesota will never be able to compete with salmon fishing in Wisconsin or Michigan. Yet, it could be more competitive with respect to lake trout. Creel census data indicates that lake trout fishing success increases as the summer wears on, peaking in September. Yet little information available from charter operators mentions how successful fishing for lake trout can be. "A salmon is superior" mentality may prevail. If the focus shifts to marketing what is abundant, then fishing pressure may increase, although there are other limiting factors. September is not the best time to attract the tourist market as Lake Superior tourist numbers are declining then, with the exception of the fall color period. Decreasing demand as seasons wear on is also an issue. However, even with these constraints, there does appear to be potential for increasing demand for fishing Lake Superior by boat.

The other types of coldwater fishing do not show much potential for increase over time. National figures indicate fishing demand is stagnant or in slow growth. The substantial number of Minnesota anglers surveyed who go to Wisconsin to fish for trout or salmon is another indication of the limited reach of stream and inland lake fishing for coldwater angling. Yet during site visits, it appears that fish are abundant in southeastern streams. This observation was supported by survey results, indicating relatively high satisfaction levels with the quantity of fish caught.

Finally, there are a few limitations that should be considered when interpreting the results reported in this study. First is the issue of recall bias, which is potentially problematic when asking for detailed information such as expenditures. The staggered mail survey design was employed to mitigate the problem of recall bias, but there are other methods such as the diary method, which better control for recall bias. The trade-off, however, is cost because the diary method is much more expensive to use than the staggered mail survey. The amount of recall bias that may have distorted the data is

unknown, but given how well the staggered mail back design worked, we expect it is not much of an issue. Second, the sample period for this study was not an entire year. In examining DNR angling reports (i.e. creel census, management plans), it appears that some Lake Superior fishing may be underreported. The trout and salmon fishing occurring in November through January, although not heavy, would be underrepresented in this study.

BIBLIOGRAPHY

American Sport Fishing Association website. 1996 Sport Fishing Participation and Economic Impact for Minnesota report: accessed 12/21/01. http://www.asafishing.org

Brown, T.L., D.J. Decker, W.F. Siemer, and J.W. Enck (2000). Trends in hunting participation and implications for management of game species. pp. 145-154. In: Trends in Outdoor Recreation, Leisure and Tourism. W.C. Gartner and D.W. Lime (eds.). New York, NY: CABI Publishing.

California Department of Fish and Game website: accessed 12/21/01. http://www.dfg.ca.gov/fishing/econ.sprfish.htm

Cordell, H.K. and G.R. Super (2000). Trends in Americans' Outdoor Recreation. pp. 133-144. In: Trends in Outdoor Recreation, Leisure and Tourism. W.C. Gartner and D.W. Lime (eds.). New York, NY: CABI Publishing.

Currie, L.K. and D.C. Fulton (2001). Managing Minnesota's fishing resources: A review of angler and resort owner attitudes towards bag limits. Final Project Report submitted to Minnesota Department of Natural Resources, Fisheries Division. Minnesota Cooperative Fish and Wildlife Research Unit. University of Minnesota, St. Paul, MN.

Decker, D.J., T. Brown and R. Gutierrez (1980). Further insights into the multiple satisfactions approach for hunter management. Wildlife Society Bulletin, 8: 323-331.

Ditton, R.B., A. Fedler and A. Graefe (1982). Assessing recreational satisfaction among diverse participant groups. Forest and River Recreation: Research Update. St. Paul, MN: University of Minnesota Agricultural Experiment Station Miscellaneous Publication 18: 134-39.

Ditton, R.B., S.M. Holland, and D.K. Anderson (2002). Recreational fishing as tourism. Fisheries, 27(3): 17-24.

Driver, B.L. (1985). Specifying what is produced by management of wildlife by public agencies. Leisure Sciences, 7(3): 281-295.

Driver, B.L. and P.J. Brown (1975). A socio-psychological definition of recreation demand, with implications for recreation resource planning. Assessing Demand for Outdoor Recreation. Washington, DC: National Academy of Sciences: 62-88.

Driver, B.L., H.E.A. Tinsley, and M.J. Manfredo (1991). The paragraphs about leisure and recreation experience preference scales: Results from two inventories designed to assess the breadth of the perceived psychological benefits of leisure. pp. 263-286. In: The benefits of leisure. B.L. Driver, P. Brown, and G. Peterson (eds.). State College, PA: Venture Publishing, Inc.

Driver, B.L. and R.S. Toucher (1970). Toward a behavioral interpretation of recreational engagements, with implications for planning. In: Elements of outdoor recreation planning, B.L. Driver (ed.). University of Michigan, Ann Arbor.

Fulton, D.C., J. Vlaming, J.S. Lawrence, and E.W. Price (2002). The 2000 waterfowl hunting season in Minnesota: A study of hunters' opinions and activities. Final Project Report submitted to Minnesota Department of Natural Resources, Wildlife Division. Minnesota Cooperative Fish and Wildlife Research Unit. University of Minnesota, St. Paul, MN.

Hammitt, W., C. McDonald, and F. Noe (1989). Wildlife management: Managing the hunt versus the hunting experience. Environmental Management, 13: 503-507.

Hendee, J.C. (1974). A multiple satisfaction approach to game management. Wildlife Society Bulletin, 2: 104-113.

Loomis, J. (2002). Valuing recreation and the environment: Revealed preference methods in theory and practice. Environmental & Resource Economics, 21(1): 104-105.

Manfredo, M.J., B.L. Driver and M.A. Tarrant (1996). Measuring leisure motivation: A meta-analysis of the recreation experience preference scales. Journal of Leisure Research, 28(3): 188-214.

Manfredo, M.J., C.L. Pierce, J.J. Vaske, and D. Whittaker (In Press). Experience based recreation management. In Wildlife viewing in North America: A management planning handbook. M.J. Manfredo (ed.). Sagamore Publishing, Inc, Champaign, Illinois.

Manning, R.E. (1999). Studies in outdoor recreation: Search and research for satisfaction (2nd Edition). Corvallis, OR: Oregon State University Press.

McCool, S.F. and M.E. Patterson (2000). Trends in Recreation, Tourism and Protected Area Planning. pp. 111-120. In: Trends in Outdoor Recreation, Leisure and Tourism. W.C. Gartner and D.W. Lime (eds.). New York, NY: CABI Publishing.

Minnesota Department of Natural Resources website: accessed 12/21/01. http://www.dnr.state.mn.us

Minnesota Department of Trade and Economic Development website: accessed 12/21/01. http://www.dted.state.mn.us

Potter, D., J. Hendee, and R. Clark (1973). Hunting satisfaction: Game, guns or nature. Human Dimensions in Wildlife Programs. The Wildlife Management Institute, Washington, D.C., 62-71.

U.S. Census Bureau (2000) American FactFinder: Minnesota: DP – 1 Profile of General Demographic Characteristics: 2000 and QT – 03. Profile of Selected Economic Characteristics: 2001.

U.S. Department of Commerce: National Telecommunications & Information Administration and Economics and Statistics Administration (2002). A nation online: How Americans are expanding their use of the Internet. Washington DC.

U.S. Fish and Wildlife Service (2002). 2001 National Survey of Fishing, Hunting, and Wildlife-Associated Recreation. Arlington, VA.

U.S. Fish and Wildlife Service (1997). 1996 National Survey of Fishing, Hunting, and Wildlife-Associated Recreation. Arlington, VA.

Witter, D. P. Haverland, L. Belusz, and C. Hicks (1982). Missouri trout park anglers: Their motives and opinions of management. Forest and River Recreation: Research Update. St. Paul, MN: University of Minnesota Agricultural Experiment Station Miscellaneous Publication 18, 69-73.

APPENDIX A
QUESTIONNAIRE

Trout and Salmon Fishing Survey

Section I: This first section deals with your MOST RECENT trip to fish for trout or salmon in Minnesota.

1: Where did your MOST RECENT trip to fish for trout or salmon in Minnesota take place?

Please put an "X" on the map where you last fished for trout or salmon.

2: When did your MOST RECENT trip to fish for trout or salmon in Minnesota take place?

_____Month _____Year

3: Which type of fishing best describes that trip (Mark ONE)?

☐ Streams open to winter fishing in Southeast Minnesota (Jan to March 31)

☐ Streams in Minnesota during spring, summer or fall (April to October)

☐ Lake Superior shore or streams below the posted boundaries (all seasons)

☐ Lake Superior by boat

☐ Inland lakes in spring, summer or fall

☐ Inland lakes in winter (ice fishing)

4: How would you describe the fishing method you used for your MOST RECENT trip to fish for trout or salmon in Minnesota (Mark ONE)?

☐ Artificial lures (Spinners, spoons, etc.)

☐ Flyfishing

☐ Bait fishing

5: On your MOST RECENT trip to fish for trout or salmon in Minnesota, did you (Mark ONE):

☐ Keep all fish   ☐ Catch-and-release all fish

☐ Caught no fish   ☐ Keep some and release some

6: What was the MAIN purpose of that trip (Mark ONE)?

☐ Business including conference/convention

☐ Fishing

☐ Pleasure other than fishing

☐ **Other (Please explain):**
_____

7: How many people were on this trip (Including yourself)?

_____ **People**

8: How many days did you spend away from your permanent or seasonal home on that trip?

_____ Days

9: How many days on that trip did you actually fish for trout or salmon?

_____ **Days**

10: How many miles was the place you went fishing from your permanent or seasonal home?

_____ Miles

11: How did you get to the access point for your MOST RECENT fishing trip (Mark ONE)?

☐ Drove personal vehicle   ☐ Snowmobile   ☐ Was a passenger in someone else's vehicle

☐ Flew directly into destination   ☐ Dogsled   ☐ Flew into nearby community and then drove the rest of the way

☐ Hiked/walked   ☐ ATV   ☐ Other_____

12: Please record your expenses on your MOST RECENT trout or salmon fishing trip in Minnesota by where the expense took place. For example, under the "HOME" category, record those expenses that took place in your home community. For the "AWAY" category, record those expenses that occurred when you were out of your home community.

EXPENSE CATEGORY	HOME ($)	AWAY ($)
Fuel/oil		
Food (Restaurant)		
Food (Non-restaurant)		
Outfitting, charter boat or guide service		
Lodging		
Entertainment (Includes gambling)		
Shopping (Gifts, clothes, handicrafts, etc.)		
Fishing equipment (Rods, reels, waders, lures, bait, etc.)		
Transportation other than motor vehicle (Air, train, etc.)		
Other packaged trip (inclusive of meals, lodging, etc.)		
Other:		
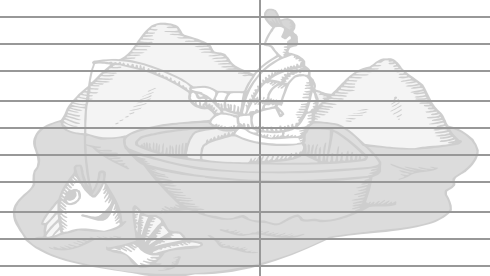
13: Below is a list of experiences anglers may have while fishing for trout/salmon.

13A: Please think about your MOST RECENT trip to fish for trout or salmon. Look over the list below and mark the number that best represents how important each experience was to your satisfaction during that trip.

13B: For each experience that you marked a 5, 6, or 7, please indicate the extent to which you were able to attain that experience during your MOST RECENT trip to fish for trout or salmon.

Experiences	13A. How important was each experience to your total satisfaction?							13B. To what extent did you attain that experience?			
	Very unimportant	Unimportant	Somewhat Unimportant	Neither	Somewhat important	Important	Very important	Did not attain	Somewhat attained	Moderately attained	Totally attained
Being with friends	1	2	3	4	5	6	7	1	2	3	4
Being alone	1	2	3	4	5	6	7	1	2	3	4
Competing with friends who fish	1	2	3	4	5	6	7	1	2	3	4
Being around other anglers	1	2	3	4	5	6	7	1	2	3	4
Using your fishing equipment	1	2	3	4	5	6	7	1	2	3	4
Being with people who are enjoying themselves	1	2	3	4	5	6	7	1	2	3	4
Learning about nature	1	2	3	4	5	6	7	1	2	3	4
Relaxing	1	2	3	4	5	6	7	1	2	3	4
Catching food for your family	1	2	3	4	5	6	7	1	2	3	4
Getting exercise	1	2	3	4	5	6	7	1	2	3	4
Enjoying nature and the outdoors	1	2	3	4	5	6	7	1	2	3	4
Catching a trophy	1	2	3	4	5	6	7	1	2	3	4
Sharing your skills and knowledge with others	1	2	3	4	5	6	7	1	2	3	4
Thinking about your personal values	1	2	3	4	5	6	7	1	2	3	4
Being in a quiet and peaceful place	1	2	3	4	5	6	7	1	2	3	4
Visiting areas you've fished in the past	1	2	3	4	5	6	7	1	2	3	4
Meeting new people	1	2	3	4	5	6	7	1	2	3	4
Doing something with your family	1	2	3	4	5	6	7	1	2	3	4
Developing your skills and abilities	1	2	3	4	5	6	7	1	2	3	4
Giving your mind a rest	1	2	3	4	5	6	7	1	2	3	4
Fishing in a wilderness setting	1	2	3	4	5	6	7	1	2	3	4
Getting away from crowds of people	1	2	3	4	5	6	7	1	2	3	4
Getting away from family for awhile	1	2	3	4	5	6	7	1	2	3	4
Catching fish	1	2	3	4	5	6	7	1	2	3	4
Keeping fish to eat	1	2	3	4	5	6	7	1	2	3	4
Keeping trophy fish	1	2	3	4	5	6	7	1	2	3	4
Catching a particular species of fish	1	2	3	4	5	6	7	1	2	3	4
Catching at least one fish	1	2	3	4	5	6	7	1	2	3	4
The size of fish you catch	1	2	3	4	5	6	7	1	2	3	4
Catching your limit	1	2	3	4	5	6	7	1	2	3	4
Catching more than one kind of trout/salmon	1	2	3	4	5	6	7	1	2	3	4
Keeping enough fish for a meal	1	2	3	4	5	6	7	1	2	3	4
Releasing all fish you catch	1	2	3	4	5	6	7	1	2	3	4

14: For your MOST RECENT trip to fish for trout or salmon IN MINNESOTA, how satisfied or dissatisfied were you with the following (Please mark appropriate response in the table below)?

	Very Dissatisfied	Dissatisfied	Neither Satisfied nor Dissatisfied	Satisfied	Very Satisfied
The overall fishing experience you had	1	2	3	4	5
The size of the trout or salmon you caught	1	2	3	4	5
The number of trout or salmon you caught	1	2	3	4	5

15: For your MOST RECENT trip to fish for trout or salmon IN MINNESOTA, how would you rate the overall QUALITY of the trout/salmon fishing (Please mark the appropriate response in the table below)?

	Very Low	Low	About Average	High	Very High
The overall quality of trout or salmon fishing is:	1	2	3	4	5

Section II: The questions in this section relate to your fishing experiences in the LAST 12 MONTHS (excluding your MOST RECENT trip).

16: How many days during the LAST 12 MONTHS did you fish for trout or salmon in Minnesota in each of the following ways?

Streams open to winter fishing in Southeast Minnesota (Jan to March 31)	_____	Days
Streams in Minnesota during spring, summer or fall (April to October)	_____	Days
Lake Superior shore or streams below the posted boundaries (all seasons)	_____	Days
Lake Superior by boat	_____	Days
Inland lakes in spring, summer or fall	_____	Days
Inland lakes in winter (ice fishing)	_____	Days

17: Approximately how many days in the LAST 12 MONTHS did you fish for trout or salmon OUTSIDE of Minnesota?

_____ Days

17A: In what state or country did you fish most often in the LAST 12 MONTHS (excluding Minnesota)?

_____ State or Country

18: When you drive to your fishing spot what type of vehicle do you normally use (Mark ONE)?

☐ Car

☐ Pick-up truck

☐ RV

☐ Other: _____

Section III: The questions in SECTION THREE relate to the fishing experiences you may have had on specific types of fishing resources in the state of Minnesota:

For Questions 19-24:
- Rank the species you prefer to catch indicating the fish you MOST PREFER to catch in order from 1 to 3, by placing a "1" in the space to the right of the fish you MOST PREFER, a "2" next to your 2nd most preferred, and a "3" next to your 3rd most preferred
- If you do not fish that resource, mark the box labeled "I do not fish…" and move to the question indicated

19: When fishing <u>TROUT STREAMS</u> in Minnesota:

☐ I do not fish TROUT STREAMS in Minnesota (Skip to Question 20)
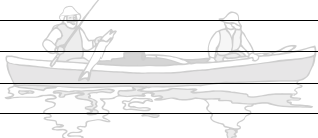
Species of Fish	Species you prefer to catch ("1" = most preferred; "2" = 2nd preference "3" = 3rd preference)
Brook Trout	
Brown Trout	
Rainbow Trout	

19A: When fishing <u>TROUT STREAMS</u> in Minnesota I prefer (Mark ONE)

☐ Wild Trout

☐ Stocked Trout

☐ Doesn't Matter

20: When fishing <u>INLAND TROUT LAKES</u> in Minnesota:
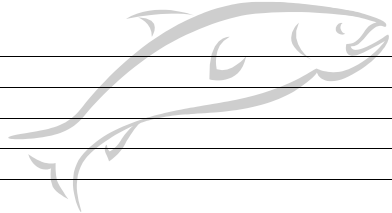
☐ I do not fish INLAND TROUT LAKES in Minnesota (Skip to Question 21)

Species of Fish	Species you prefer to catch ("1" = most preferred, "2" = 2nd preference "3" = 3rd preference)
Brook Trout	
Brown Trout	
Rainbow Trout	
Lake Trout	
Splake*	

*(A Splake is a Brook Trout/Lake Trout Hybrid)
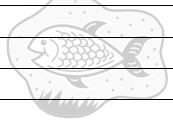
21: When fishing from <u>LAKE SUPERIOR SHORE OR STREAMS BELOW THE POSTED BOUNDARIES</u> in Minnesota:

☐ I do not fish FROM LAKE SUPERIOR SHORE OR STREAMS BELOW THE POSTED BOUNDARIES in Minnesota (Skip to Question 22)

Species of Fish	Species you prefer to catch ("1" = most preferred, "2" = 2nd preference "3" = 3rd preference)
Brook Trout	
Brown Trout	
Kamloops Rainbow	
Steelhead	
Lake Trout	
Chinook Salmon	
Coho Salmon	
Pink Salmon	

22: When fishing <u>RAINBOW TROUT ON LAKE SUPERIOR SHORES OR STREAMS</u> in Minnesota:

☐ I do not fish RAINBOW TROUT ON LAKE SUPERIOR SHORES OR STREAMS (Skip to Question 24)

Species of Fish	Species you prefer to catch ("1" = most preferred, "2" = 2nd preference "3" = 3rd preference)
Fin clipped Steelhead (stocked)	
Unclipped Steelheads (possibly wild)	
Kamloops	
Varies	
No preferences	

23: Where do you MOST OFTEN fish Lake Superior shores or streams (Mark ONE)?

☐ Between Duluth and Two Harbors

☐ Between Two Harbors and Tofte

☐ Between Tofte and the Canadian Border

23A: How many years have you been fishing for STEELHEAD and KAMLOOPS in Minnesota?

_____ Years fishing for STEELHEAD
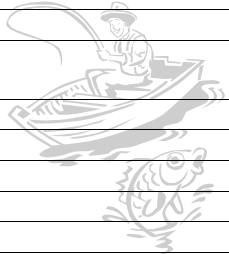
_____ Years fishing for KAMLOOPS

23B: Over this length of time do you believe the number of STEELHEAD and KAMLOOPS you have caught has (Mark ONE):

	Greatly Decreased	Decreased	Remained the Same	Increased	Greatly Increased
Steelhead	1	2	3	4	5
Kamloops	1	2	3	4	5

24: When fishing <u>LAKE SUPERIOR FROM A BOAT</u>:

☐ I do not fish LAKE SUPERIOR FROM A BOAT

Species of Fish	Species you prefer to catch ("1" = most preferred, "2" = 2nd preference "3" = 3rd preference)
Brook Trout	
Brown Trout	
Kamloops Rainbow	
Steelhead	
Lake Trout	
Chinook Salmon	
Coho Salmon	
Pink Salmon	

25: What is your age?

_____ **Years**

26: What is your gender?

□ Male   □ Female

27: What is your total household Income:

$_____

(Income To Nearest $1000)

28: Number of people in household (including yourself)

_____ **People**

29: What is your Zip Code?

_____ Zip

30: What is the HIGHEST level of education you have completed (Mark ONE)?

□ Some high school   □ Some college

□ Received high school diploma or GED   □ Received college degree

□ Some vocational or technical school   □ Some postgraduate study

□ Received vocational or technical degree   □ Received postgraduate degree(s)

31: What best describes your race or ethnicity (Mark ONE)?

□ **White**   □ **American Indian** □ **Hispanic**

□ **Black**   □ **Asian**

32: Are you a member of any of the following fishing clubs or associations (Mark ALL that apply)?

□ The Federation of Fly Fishers   □ Minnesota Trout Assn.   □ Western Lake Superior Trollers Assn.

□ The Izaak Walton League of America   □ Trout Unlimited   □ Other: _____

□ North American Fishing Club   □ Lake Superior Steelhead Assn.   □ Other: _____

33: Do you use the Internet to (Mark ALL that apply):

□ **I do not USE THE INTERNET**

□ Buy license   □ Locate your destination

□ Book Lodging   □ Purchase services in your destination area

□ Look up regulations □ Visit the DNR website

□ Other: _____

34: How many years have you been fishing for TROUT or SALMON in Minnesota?

_____ **YEARS fishing TROUT**

_____ **YEARS fishing SALMON**

35: Over this length of time do you believe the quality of TROUT or SALMON fishing has (Mark ONE):

	Greatly Decreased	Decreased	**Remained the Same**	**Increased**	**Greatly Increased**
Trout	1	2	3	4	5
Salmon	1	2	3	4	5

-End of Survey-

Please insert the completed questionnaire in the Postage paid envelope and mail as soon as possible.

Thank you very much for your help.
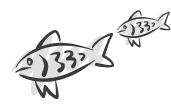
APPENDIX B
SUPPORTING TABLES

Table B-1

Mean Importance of Experiences	13A. How important was each experience to your total satisfaction?						
	Streams year round	Lake Superior shores/ streams	Lake Superior by boat	Inland lakes spr/sum/ fall	Inland lakes winter	F-test	P value
Being with friends	5.09	5.21	5.67	5.76	5.61	20.99	P<0.001
Being with people who are enjoying themselves	5.16	5.33	5.76	5.73	5.74	19.10	P<0.001
Sharing your skills and knowledge with others	4.26	4.39	4.18	4.43	4.45	2.26	P=0.061
Meeting new people	3.17	3.62	3.76	3.41	3.50	10.50	P<0.001
Doing something with your family	4.94	5.03	5.25	5.34	5.04	6.29	P<0.001
Using your fishing equipment	5.28	5.41	4.66	5.17	5.16	9.59	P<0.001
Getting exercise	4.72	4.66	3.87	4.38	4.42	17.30	P<0.001
Developing your skills and abilities	5.10	5.21	4.71	4.80	4.89	8.63	P<0.001
Learning about nature	5.45	5.38	4.81	5.20	5.14	12.61	P<0.001
Enjoying nature and the outdoors	6.29	6.26	5.91	6.16	6.14	6.07	P<0.001
Fishing in a wilderness setting	5.65	5.65	4.69	5.63	5.42	26.59	P<0.001
Relaxing	6.20	6.20	5.88	6.15	5.97	4.90	P=0.001
Being in a quiet and peaceful place	6.12	6.04	5.44	5.99	5.82	16.51	P<0.001
Giving your mind a rest	5.73	5.80	5.49	5.75	5.58	2.49	P=0.041
Getting away from crowds of people	6.01	5.88	5.30	5.88	5.74	16.05	P<0.001
Being alone	4.25	4.02	2.81	3.56	3.54	41.47	P<0.001
Thinking about your personal values	4.70	4.76	4.39	4.68	4.53	2.83	P=0.023
Visiting areas you've fished in the past	4.77	4.76	4.32	4.68	4.69	4.83	P=0.001
Getting away from family for awhile	3.87	3.70	3.50	3.57	3.76	4.66	P=0.001
Catching food for your family	2.85	3.09	3.68	3.59	3.56	27.02	P<0.001
Keeping fish to eat	3.37	3.97	4.58	4.46	4.39	57.45	P<0.001
Keeping enough fish for a meal	3.26	3.86	4.45	4.41	4.30	62.26	P<0.001
Catching a trophy	3.52	3.84	3.77	3.53	3.68	2.83	P=0.024
Keeping trophy fish	2.85	3.18	3.31	3.19	3.20	7.23	P<0.001
The size of fish you catch	4.33	4.45	4.24	4.35	4.47	0.97	P=0.425
Catching fish	5.06	5.05	5.15	5.03	5.12	0.479	P=0.751
Catching a particular species of fish	4.04	4.60	4.22	4.53	4.59	13.31	P<0.001
Catching at least one fish	5.05	5.23	5.18	5.26	5.23	2.17	P=0.070
Catching your limit	2.96	3.06	3.41	3.41	3.53	12.17	P<0.001
Catching more than one kind of trout/salmon	3.38	3.73	3.98	3.44	3.46	9.23	P<0.001
Releasing all fish you catch	4.41	4.02	3.19	3.60	3.62	52.20	P<0.001
Being around other anglers	2.63	2.75	3.43	2.98	3.06	14.64	P<0.001
Competing with friends who fish	2.58	2.68	2.92	2.81	3.23	8.05	P<0.001

Table B-2

Mean Attainment of Experiences	13B. To what extent did you attain that experience?						
	Streams year round	Lake Superior shores/ streams	Lake Superior by boat	Inland lakes spr/sum/ fall	Inland lakes winter	F-test	P value
Being with friends	3.51	3.45	3.74	3.63	3.64	6.41	P<0.001
Being with people who are enjoying themselves	3.47	3.43	3.55	3.56	3.53	2.02	P=0.089
Sharing your skills and knowledge with others	2.71	2.61	2.80	2.87	2.82	2.78	P=0.026
Meeting new people	2.54	2.56	2.78	2.61	2.65	0.88	P=0.475
Doing something with your family	3.07	3.17	3.31	3.38	3.28	6.43	P<0.001
Using your fishing equipment	3.63	3.67	3.45	3.59	3.54	2.82	P=0.024
Getting exercise	3.21	2.86	2.80	3.06	3.29	9.39	P<0.001
Developing your skills and abilities	2.88	2.78	2.93	2.94	2.90	1.30	P=0.268
Learning about nature	3.18	3.06	3.12	3.15	3.24	1.30	P=0.268
Enjoying nature and the outdoors	3.64	3.58	3.66	3.64	3.60	0.71	P=0.582
Fishing in a wilderness setting	3.18	3.04	3.06	3.36	3.34	7.54	P<0.001
Relaxing	3.49	3.58	3.63	3.53	3.51	2.24	P=0.062
Being in a quiet and peaceful place	3.45	3.20	3.38	3.42	3.25	5.90	P<0.001
Giving your mind a rest	3.38	3.32	3.49	3.38	3.36	1.49	P=0.202
Getting away from crowds of people	3.26	2.95	3.30	3.34	3.22	7.83	P<0.001
Being alone	3.17	3.00	2.73	3.02	3.00	3.04	P=0.017
Thinking about your personal values	3.09	3.00	3.11	3.09	3.11	0.45	P=0.771
Visiting areas you've fished in the past	3.33	3.21	3.29	3.38	3.45	1.58	P=0.177
Getting away from family for awhile	3.23	3.23	3.33	3.36	3.18	0.99	P=0.413
Catching food for your family	2.88	1.97	2.63	2.83	2.88	9.41	P<0.001
Keeping fish to eat	2.71	2.02	2.82	2.88	2.75	12.14	P<0.001
Keeping enough fish for a meal	2.77	1.97	2.94	2.93	2.72	13.87	P<0.001
Catching a trophy	1.64	1.51	1.61	1.83	1.73	2.30	P=0.057
Keeping trophy fish	1.67	1.53	1.52	1.66	1.93	1.34	P=0.254
The size of fish you catch	2.49	2.09	2.47	2.56	2.38	5.45	P<0.001
Catching fish	2.89	2.32	2.77	2.88	2.55	12.68	P<0.001
Catching a particular species of fish	2.92	2.41	2.70	2.80	2.74	5.76	P<0.001
Catching at least one fish	3.24	2.67	3.14	3.17	2.88	10.16	P<0.001
Catching your limit	2.46	1.73	1.71	2.54	2.45	8.28	P<0.001
Catching more than one kind of trout/salmon	2.35	1.82	2.41	2.12	2.15	3.85	P=0.004
Releasing all fish you catch	3.41	2.86	2.39	2.96	2.66	14.18	P<0.001
Being around other anglers	3.05	2.91	3.28	3.21	3.41	2.65	P=0.033
Competing with friends who fish	2.90	2.72	2.94	3.06	2.94	1.00	P=0.409

Table B-3

Streams Year Round	13A. Importance							13B. Attainment			
	Very Un-important	Un-important	Somewhat un-important	Neither	Somewhat Important	Important	Very Important	Did Not Attain	Somewhat Attained	Moderately Attained	Totally Attained
Social Affiliation											
Being with friends	7.0	8.0	4.3	12.5	13.7	27.0	27.5	5.4	5.8	20.9	67.9
Being with people who are enjoying themselves	7.2	5.2	3.3	13.7	15.4	29.5	25.7	3.8	7.2	27.7	61.3
Sharing your skills and knowledge with others	9.9	9.8	6.3	22.6	26.9	18.3	6.2	10.5	30.4	36.4	22.7
Meeting new people	22.8	17.2	9.5	29.9	13.6	5.2	1.9	18.1	30.7	30.7	20.6
Doing something with your family	8.9	5.5	2.3	20.9	15.2	22.5	24.6	16.7	10.5	21.4	51.4
Personal Achievement											
Using your fishing equipment	3.6	3.7	3.6	14.9	21.1	30.4	22.7	1.0	5.4	23.7	69.9
Getting exercise	5.8	5.6	5.8	18.8	31.3	23.5	9.3	1.1	17.8	40.6	40.6
Developing your skills and abilities	4.3	3.1	3.3	13.7	32.3	28.9	14.2	2.2	30.4	44.5	22.9
Nature Appreciation											
Learning about nature	3.3	2.1	2.8	9.9	23.5	36.7	21.7	1.2	19.8	39.1	39.9
Enjoying nature and the outdoors	2.7	0.2	0.7	1.1	7.3	33.7	54.4	1.1	4.1	24.6	70.2
Fishing in a wilderness setting	3.0	1.8	1.7	10.2	19.6	32.4	31.4	4.4	16.8	35.5	43.3
Relaxation											
Relaxing	2.3	0.6	0.3	2.3	10.7	33.9	50.0	1.0	8.0	31.5	59.4
Being in a quiet and peaceful place	2.2	0.2	0.4	2.5	15.5	34.5	44.7	1.1	10.6	30.6	57.8
Giving your mind a rest	3.0	1.6	1.4	9.3	18.3	31.2	35.3	1.0	10.3	38.8	49.9
Getting away from crowds of people	2.8	1.1	0.7	4.4	14.6	31.6	44.8	3.4	15.4	32.6	48.6
Escape											
Being alone	11.3	12.4	5.4	22.5	19.0	18.3	11.2	4.5	20.1	29.3	46.1
Thinking about your personal values	6.7	5.3	4.7	24.6	23.8	22.3	12.6	1.9	20.6	44.0	33.6
Visiting areas you've fished in the past	6.1	5.4	4.0	21.2	28.6	22.4	12.3	4.2	12.4	29.9	53.5
Getting away from family for awhile	14.0	11.7	6.4	33.7	17.4	9.3	7.5	4.9	13.9	34.1	47.1
Fishing—Food											
Catching food for your family	35.3	18.1	6.3	18.9	12.7	5.7	3.1	11.9	22.4	31.9	33.8
Keeping fish to eat	25.1	15.2	7.9	18.2	21.0	8.4	4.3	20.6	19.3	29.0	31.2
Keeping enough fish for a meal	27.6	15.9	8.0	17.4	18.2	8.8	4.2	22.4	14.5	27.3	35.9
Fishing--Trophy											
Catching a trophy	20.5	14.7	8.4	20.6	24.6	6.9	4.3	63.0	17.0	12.8	7.2
Keeping trophy fish	34.3	17.3	9.7	18.0	13.2	4.1	3.4	66.0	10.7	13.6	9.7
The size of fish you catch	7.7	8.9	8.8	19.6	32.1	18.2	4.8	18.9	28.8	36.1	16.1
Fishing Catch											
Catching fish	4.1	3.9	4.5	11.7	34.9	27.4	13.5	11.9	21.1	32.9	34.1
Catching a particular species of fish	13.4	12.2	7.1	21.3	23.5	15.0	7.4	13.3	20.3	27.8	38.6
Catching at least one fish	6.7	5.2	3.4	12.0	27.9	23.3	21.6	13.5	8.8	18.3	59.4
Catching your limit	28.4	19.2	9.6	23.4	11.9	4.9	2.6	29.5	20.2	25.1	25.1
Catching more than one kind of trout/salmon	18.5	18.4	10.0	25.3	18.2	6.6	3.1	36.9	15.1	24.5	23.5
Releasing all fish you catch	8.5	8.6	7.5	28.5	17.4	14.5	15.0	9.0	9.6	12.8	68.6
Being around other anglers	36.3	21.4	7.1	21.1	7.9	4.3	1.9	6.2	20.9	34.9	38.0
Competing with friends who fish	40.7	19.9	4.8	18.0	10.6	3.7	2.2	9.5	24.1	33.5	32.9

Table B-4

Lake Superior Shores/Streams	13A. Importance							13B. Attainment			
	Very Un-important	Un-important	Somewhat un-important	Neither	Somewhat Important	Important	Very Important	Did Not Attain	Somewhat Attained	Moderately Attained	Totally Attained
Social Affiliation											
Being with friends	7.0	5.3	2.1	15.2	16.5	23.9	30.0	5.5	10.3	18.5	65.8
Being with people who are enjoying themselves	7.1	2.5	3.3	14.2	14.6	27.1	31.3	3.4	6.1	34.7	55.8
Sharing your skills and knowledge with others	7.9	8.3	4.6	27.9	26.7	16.3	8.3	13.3	30.5	38.1	18.1
Meeting new people	16.3	12.1	8.3	35.4	16.7	7.5	3.8	16.4	34.5	25.5	23.6
Doing something with your family	8.3	2.9	4.1	24.0	12.0	20.7	28.1	11.9	13.5	19.8	54.8
Personal Achievement											
Using your fishing equipment	3.6	4.1	3.6	12.6	18.9	27.5	29.7	1.3	4.7	19.3	74.7
Getting exercise	7.6	5.8	2.7	22.4	30.5	19.7	11.2	3.4	29.3	44.8	22.4
Developing your skills and abilities	5.3	2.9	3.7	11.5	27.6	28.0	21.0	3.1	35.6	41.7	19.6
Nature Appreciation											
Learning about nature	4.1	1.7	4.6	10.0	24.5	31.5	23.7	1.8	23.5	41.6	33.1
Enjoying nature and the outdoors	3.2	0.8	1.2	2.0	4.9	30.0	57.9	2.5	5.6	23.4	68.5
Fishing in a wilderness setting	4.1	1.2	2.0	8.2	20.9	29.5	34.0	7.8	21.2	30.2	40.8
Relaxation											
Relaxing	3.3	1.6	0.4	2.9	7.0	28.0	56.8	0.5	5.2	30.4	63.9
Being in a quiet and peaceful place	3.5	0.9	1.3	3.5	10.6	33.6	46.5	4.5	16.9	32.2	46.3
Giving your mind a rest	4.9	1.8	0.4	8.5	13.9	26.5	43.9	1.2	12.1	40.6	46.1
Getting away from crowds of people	4.1	0.8	2.5	5.7	13.9	28.7	44.3	8.2	26.6	27.7	37.5
Escape											
Being alone	13.1	13.1	8.9	20.3	21.2	14.8	8.5	8.7	21.7	30.4	39.1
Thinking about your personal values	8.7	2.5	5.4	23.1	24.0	20.7	15.7	2.4	26.8	39.4	31.5
Visiting areas you've fished in the past	7.4	6.6	4.5	18.2	23.1	27.3	12.8	6.4	16.0	28.0	49.6
Getting away from family for awhile	17.6	10.5	6.3	35.3	16.8	7.1	6.3	4.9	14.8	32.8	47.5
Fishing—Food											
Catching food for your family	28.1	21.1	6.6	16.1	17.8	7.0	3.3	46.6	24.1	15.5	13.8
Keeping fish to eat	15.7	12.7	5.7	17.0	30.6	10.5	7.9	48.0	17.3	19.4	15.3
Keeping enough fish for a meal	17.6	11.1	7.4	18.4	28.7	11.1	5.7	53.8	14.3	13.2	18.7
Fishing--Trophy											
Catching a trophy	13.3	15.4	5.8	23.2	27.8	10.8	3.7	68.6	16.3	10.5	4.7
Keeping trophy fish	26.7	17.3	5.8	24.7	17.3	3.7	4.5	74.5	7.8	7.8	9.8
The size of fish you catch	6.6	8.6	6.1	20.9	33.2	19.3	5.3	37.1	27.4	25.0	10.5
Fishing Catch											
Catching fish	3.7	4.9	5.7	9.4	36.5	24.6	15.2	32.5	22.7	25.3	19.5
Catching a particular species of fish	9.4	7.0	4.5	17.2	27.0	25.0	9.8	31.0	24.8	16.3	27.9
Catching at least one fish	4.1	5.3	4.1	12.7	23.3	25.3	25.3	32.5	10.8	14.0	42.7
Catching your limit	23.1	18.2	11.1	32.0	9.3	5.3	0.9	63.3	10.0	16.7	10.0
Catching more than one kind of trout/salmon	11.5	14.4	11.1	29.2	23.5	7.0	3.3	55.9	20.6	8.8	14.7
Releasing all fish you catch	10.6	5.7	11.4	38.4	17.6	9.4	6.9	27.1	12.9	7.1	52.9
Being around other anglers	31.9	23.5	9.2	18.1	9.7	5.0	2.5	2.9	37.1	25.7	34.3
Competing with friends who fish	37.2	21.4	5.1	20.1	8.5	4.7	3.0	15.6	25.0	31.3	28.1

Table B-5

Lake Superior by Boat	13A. Importance							13B. Attainment			
	Very Un-important	Un-important	Somewhat un-important	Neither	Somewhat Important	Important	Very Important	Did Not Attain	Somewhat Attained	Moderately Attained	Totally Attained
Social Affiliation											
Being with friends	6.0	2.8	2.8	6.6	10.8	29.7	41.1	0.9	3.5	16.3	79.3
Being with people who are enjoying themselves	5.6	1.0	1.6	5.9	12.5	35.9	37.5	0.9	9.2	24.5	65.5
Sharing your skills and knowledge with others	9.1	9.1	7.4	27.5	27.9	14.8	4.4	2.4	35.8	41.5	20.3
Meeting new people	11.4	10.8	11.8	34.7	20.9	8.4	2.0	10.3	25.6	39.7	24.4
Doing something with your family	7.0	2.0	3.3	18.7	13.3	26.7	29.0	12.8	5.0	21.1	61.1
Personal Achievement											
Using your fishing equipment	11.1	6.6	3.5	21.6	17.4	20.2	19.5	1.4	11.9	26.6	60.1
Getting exercise	11.9	11.1	7.8	37.0	17.8	8.1	6.3	10.5	27.6	32.9	28.9
Developing your skills and abilities	7.4	3.7	2.3	27.5	26.5	21.5	11.1	5.2	21.9	47.7	25.2
Nature Appreciation											
Learning about nature	4.8	6.1	6.8	22.1	20.4	25.2	14.6	1.3	20.8	42.9	35.1
Enjoying nature and the outdoors	4.9	1.0	1.6	4.2	11.4	32.7	44.1	0.4	4.7	23.0	71.9
Fishing in a wilderness setting	7.1	6.8	6.8	23.0	18.6	21.3	16.6	6.3	19.4	36.1	38.2
Relaxation											
Relaxing	4.9	1.0	2.0	5.9	9.8	33.2	43.3	0.0	4.2	28.8	66.9
Being in a quiet and peaceful place	4.3	2.2	2.9	12.0	18.5	34.4	25.7	0.5	10.1	39.9	49.5
Giving your mind a rest	3.3	1.8	3.3	13.5	18.9	30.9	28.4	0.0	8.1	34.9	57.0
Getting away from crowds of people	5.6	2.0	4.3	15.3	18.3	26.9	27.6	2.6	15.8	30.6	51.0
Escape											
Being alone	31.1	23.2	6.2	23.5	6.6	7.3	2.1	20.0	25.0	17.5	37.5
Thinking about your personal values	9.5	6.8	4.4	31.4	21.3	16.2	10.5	0.8	21.3	44.3	33.6
Visiting areas you've fished in the past	8.0	6.7	8.0	29.7	24.7	16.0	7.0	2.5	13.9	36.1	47.5
Getting away from family for awhile	15.4	17.1	5.5	42.1	9.2	5.5	5.1	0.0	16.3	34.7	49.0
Fishing—Food											
Catching food for your family	18.1	16.8	6.4	20.8	20.8	9.7	7.4	19.2	27.3	25.3	28.3
Keeping fish to eat	6.9	6.9	8.7	13.7	35.4	19.5	9.0	14.3	25.3	24.7	35.7
Keeping enough fish for a meal	10.3	9.0	6.1	14.5	30.5	19.6	10.0	17.3	16.0	22.2	44.4
Fishing--Trophy											
Catching a trophy	12.6	15.6	10.0	23.6	26.6	5.3	6.3	64.7	17.6	9.8	7.8
Keeping trophy fish	19.9	19.9	9.3	26.6	12.3	8.3	3.7	73.4	10.9	6.3	9.4
The size of fish you catch	7.4	11.0	10.0	18.4	32.4	16.1	4.7	21.0	28.7	32.9	17.5
Fishing Catch											
Catching fish	4.7	1.0	6.6	8.6	36.2	27.6	15.3	15.7	23.8	28.1	32.4
Catching a particular species of fish	7.2	14.0	8.5	22.1	23.8	17.3	7.2	18.6	21.7	31.0	28.7
Catching at least one fish	6.3	4.0	4.3	8.6	27.4	27.1	22.4	15.9	11.1	15.5	57.5
Catching your limit	13.9	22.0	7.3	30.8	19.8	4.0	2.2	61.3	21.0	3.2	14.5
Catching more than one kind of trout/salmon	9.6	14.6	8.3	24.6	27.6	9.3	6.0	27.6	25.9	25.0	21.6
Releasing all fish you catch	17.4	17.4	10.7	43.5	6.0	4.0	1.0	39.3	10.7	21.4	28.6
Being around other anglers	21.9	16.2	7.1	24.6	16.5	9.4	4.4	5.3	11.8	32.9	50.0
Competing with friends who fish	30.8	19.9	5.5	24.7	12.7	2.7	3.8	10.4	25.0	25.0	39.6

Table B-6

Inland Lakes spr/sum/fall	13A. Importance							13B. Attainment			
	Very Un-important	Un-important	Somewhat un-important	Neither	Somewhat Important	Important	Very Important	Did Not Attain	Somewhat Attained	Moderately Attained	Totally Attained
Social Affiliation											
Being with friends	4.2	4.2	1.8	6.9	9.3	30.9	42.5	1.5	4.9	22.6	71.0
Being with people who are enjoying themselves	3.6	2.8	2.2	7.5	12.9	34.5	36.5	0.7	6.8	28.4	64.1
Sharing your skills and knowledge with others	7.8	6.9	5.9	25.3	30.3	15.5	8.3	3.7	29.4	42.7	24.1
Meeting new people	17.8	14.5	10.2	34.8	14.2	5.6	2.9	15.4	32.1	28.8	23.7
Doing something with your family	6.9	4.2	2.0	15.7	13.5	21.7	36.0	8.7	7.6	20.5	63.2
Personal Achievement											
Using your fishing equipment	4.4	4.0	5.1	15.0	22.2	27.1	22.3	1.2	6.0	25.2	67.6
Getting exercise	7.7	8.0	6.4	28.0	24.6	17.1	8.1	2.7	23.8	38.7	34.8
Developing your skills and abilities	5.7	6.0	3.7	21.3	27.6	21.9	13.7	3.4	26.1	43.7	26.8
Nature Appreciation											
Learning about nature	3.7	3.1	3.2	16.3	26.6	27.7	19.5	1.0	19.7	42.9	36.5
Enjoying nature and the outdoors	2.9	0.5	1.1	2.8	9.5	31.8	51.3	0.3	4.7	25.3	69.6
Fishing in a wilderness setting	3.5	1.6	3.0	10.9	18.0	27.6	35.5	4.6	12.7	25.0	57.7
Relaxation											
Relaxing	3.3	0.7	1.3	2.6	7.7	33.0	51.4	0.7	8.5	27.9	62.8
Being in a quiet and peaceful place	2.7	0.6	0.9	5.0	15.8	31.2	43.7	1.6	12.5	27.8	58.1
Giving your mind a rest	2.5	1.7	2.2	9.1	18.5	28.3	37.7	1.1	11.7	35.8	51.5
Getting away from crowds of people	3.0	1.2	1.4	8.0	14.1	29.8	42.5	3.6	13.1	28.8	54.6
Escape											
Being alone	21.5	17.3	6.0	22.6	12.5	11.9	8.3	7.7	21.3	32.1	38.9
Thinking about your personal values	6.6	6.3	4.0	27.1	21.2	21.2	13.7	1.2	22.2	42.4	34.2
Visiting areas you've fished in the past	5.9	5.9	5.4	25.8	24.0	19.5	13.4	4.9	10.8	25.4	58.9
Getting away from family for awhile	19.4	14.9	6.1	32.6	10.6	8.5	7.9	2.7	11.4	33.0	53.0
Fishing—Food											
Catching food for your family	19.0	16.5	7.4	21.0	21.0	9.6	5.6	18.4	15.7	30.2	35.7
Keeping fish to eat	8.5	9.0	5.4	16.3	35.5	16.3	8.9	17.6	16.4	26.5	39.5
Keeping enough fish for a meal	9.9	9.5	5.6	17.2	30.8	16.8	10.1	18.6	12.8	25.4	43.2
Fishing--Trophy											
Catching a trophy	17.9	15.9	9.7	23.4	22.8	5.0	5.2	56.6	14.6	17.7	11.1
Keeping trophy fish	24.1	20.6	6.8	21.9	17.5	5.2	3.7	65.4	11.5	14.8	8.2
The size of fish you catch	6.7	9.0	7.2	20.2	36.8	16.2	3.9	19.5	27.1	31.6	21.8
Fishing Catch											
Catching fish	4.5	4.0	3.9	11.5	36.0	27.5	12.5	14.9	16.9	33.0	35.2
Catching a particular species of fish	6.5	10.8	5.4	19.8	27.6	18.2	11.7	18.1	18.1	29.8	34.0
Catching at least one fish	4.4	3.8	3.3	10.1	31.3	22.0	25.0	15.5	10.1	16.6	57.8
Catching your limit	18.8	17.1	8.5	29.2	17.2	5.0	4.1	30.5	16.4	21.5	31.6
Catching more than one kind of trout/salmon	16.0	18.3	8.5	32.6	15.4	5.8	3.5	45.9	15.7	19.2	19.2
Releasing all fish you catch	12.2	12.2	10.8	44.6	11.0	6.4	2.9	15.8	20.3	15.8	48.1
Being around other anglers	30.3	21.0	5.8	20.6	12.3	5.6	4.4	2.7	16.0	39.3	42.0
Competing with friends who fish	32.6	21.2	4.7	23.0	12.9	3.5	2.0	6.2	20.0	35.4	38.5

Table B-7

Inland Lakes winter	13A. Importance							13B. Attainment			
	Very Un-important	Un-important	Somewhat un-important	Neither	Somewhat Important	Important	Very Important	Did Not Attain	Somewhat Attained	Moderately Attained	Totally Attained
Social Affiliation											
Being with friends	3.9	4.8	3.5	5.6	13.9	33.8	34.6	1.2	4.3	23.9	70.6
Being with people who are enjoying themselves	3.2	2.7	1.4	6.8	13.6	40.7	31.7	1.8	7.8	25.9	64.5
Sharing your skills and knowledge with others	6.7	5.8	9.0	26.0	28.7	14.3	9.4	5.1	35.7	31.6	27.6
Meeting new people	15.0	18.2	8.6	30.9	17.7	6.4	3.2	10.9	39.1	23.9	26.1
Doing something with your family	5.0	7.2	4.1	22.5	15.3	16.2	29.7	11.3	7.0	24.3	57.4
Personal Achievement											
Using your fishing equipment	5.5	4.1	3.2	15.0	23.2	26.4	22.7	0.7	9.4	25.4	64.5
Getting exercise	9.3	9.3	5.6	21.0	25.2	19.6	9.8	0.0	15.8	39.6	44.6
Developing your skills and abilities	5.0	5.0	5.0	19.5	26.8	23.6	15.0	4.8	24.6	46.8	23.8
Nature Appreciation											
Learning about nature	4.1	2.7	5.0	19.2	20.5	29.2	19.2	3.1	13.7	38.9	44.3
Enjoying nature and the outdoors	2.2	1.3	1.7	1.3	11.2	33.6	48.7	0.5	6.8	24.6	68.1
Fishing in a wilderness setting	3.1	5.3	2.7	13.8	16.4	27.6	31.1	6.1	12.8	22.3	58.8
Relaxation											
Relaxing	3.5	0.9	2.2	5.7	9.6	32.5	45.6	1.2	7.6	30.8	60.5
Being in a quiet and peaceful place	2.3	2.7	1.4	5.4	19.8	30.2	38.3	3.0	17.2	32.0	47.9
Giving your mind a rest	3.2	2.3	2.3	12.6	19.4	26.1	34.2	1.3	9.1	42.2	47.4
Getting away from crowds of people	2.7	1.8	2.7	6.7	21.9	26.3	37.9	7.8	13.8	27.5	50.9
Escape											
Being alone	18.8	17.4	7.5	25.8	13.6	11.3	5.6	10.0	15.0	40.0	35.0
Thinking about your personal values	7.6	6.7	4.4	28.4	21.8	21.8	9.3	1.0	17.5	51.5	30.1
Visiting areas you've fished in the past	5.4	5.0	5.4	24.4	29.0	20.8	10.0	2.7	10.7	25.9	60.7
Getting away from family for awhile	14.9	14.9	3.6	34.4	17.2	8.1	6.8	1.6	19.7	37.7	41.0
Fishing—Food											
Catching food for your family	19.9	17.6	6.8	19.9	20.8	7.7	7.2	14.7	20.6	26.5	38.2
Keeping fish to eat	9.1	9.6	5.9	17.8	30.1	20.5	6.8	17.1	23.8	25.7	33.3
Keeping enough fish for a meal	7.8	10.0	8.3	20.0	31.7	16.1	6.1	21.9	21.9	18.1	38.1
Fishing--Trophy											
Catching a trophy	16.2	21.2	4.1	18.5	25.2	6.3	8.6	58.4	16.9	18.2	6.5
Keeping trophy fish	22.7	22.7	9.5	20.9	11.8	5.5	6.8	52.2	19.6	10.9	17.4
The size of fish you catch	5.0	7.7	9.1	20.0	37.3	13.2	7.7	26.6	26.6	29.4	17.4
Fishing Catch											
Catching fish	2.7	4.0	3.1	10.7	41.8	23.6	14.2	24.5	20.6	29.7	25.2
Catching a particular species of fish	6.3	7.2	8.6	18.5	29.3	19.4	10.8	22.0	14.7	30.3	33.0
Catching at least one fish	3.5	2.7	4.4	10.6	35.4	22.6	20.8	23.7	10.3	20.5	45.5
Catching your limit	13.8	15.7	17.1	27.6	14.7	5.1	6.0	33.3	19.6	15.7	31.4
Catching more than one kind of trout/salmon	14.0	18.9	9.9	32.9	15.3	6.8	2.3	46.3	12.2	22.0	19.5
Releasing all fish you catch	11.7	13.0	9.0	45.3	13.5	4.0	3.6	26.3	15.8	23.7	34.2
Being around other anglers	30.5	18.2	6.4	21.4	11.8	6.8	5.0	0.0	14.6	29.3	56.1
Competing with friends who fish	25.6	18.3	6.4	21.9	16.4	7.8	3.7	10.4	18.8	37.5	33.3