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**COMPLETION REPORT: LAKE SUPERIOR**  
**SPRING CREEL SURVEY**  
**2013**

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## Abstract

Annual spring creel surveys called for in the Rainbow Trout Chapter of the Fisheries Management Plan for the Minnesota Waters of Lake Superior (Schreiner et al. 2006) are useful tools for examining long-term trends in fishing pressure, catch, and catch rates of rainbow trout. A stratified random creel survey has been conducted annually on 17 tributaries along the Minnesota shore since 1992 and at McQuade Safe Harbor/Talmadge River since 2010, typically from early April through late May. The estimated number of hours anglers fished for rainbow trout in 2013 (24,792) was approximately 10,000 hours less than 2012 and 7,000 less than average, and barely within the interquartile range. The reduction in pressure and catch is largely attributed to the extremely late spring. Rivers remained frozen until nearly May, and many anglers may have opted to skip fishing for rainbow trout in North Shore streams and instead simply waited for the inland fishing opener. The estimated catch of unclipped steelhead and clipped rainbow trout (Kamloops) 16 inches and greater was 3,603 and 1,657, respectively. The shorewide catch of unclipped steelhead was above the long-term average of 2,572 and within the interquartile range (1,028-3,761), while the catch of clipped rainbow trout was below the average of 2,691 and below the interquartile range (1,722-3,798). An experimental six-day shore-angler creel survey prior to ice-out and the start of the traditional creel survey indicated there were periods of heavy angling pressure in the lake targeted at Kamloops that the traditional creel may miss in many years. This angling activity is not reflected in the traditional creel survey and suggests the catch of Kamloops was underestimated and likely has been in recent years. The 2013 shorewide catch rate for unclipped rainbow trout 16 inches and greater (0.145 fish/a-hr) was the third highest in the past 22 years, and the catch rate for clipped rainbow trout (0.067) fish/a-hr was the highest since 2005 but still well below the catch rates of the late 1990s – early 2000s.

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## Introduction

Several species of anadromous sport fish have been introduced into Lake Superior. Among these species, rainbow trout (*Oncorhynchus mykiss*) provide a popular sport fishery. The state of Minnesota manages two strains of rainbow trout in Lake Superior; steelhead, a naturalized strain derived of sea-run rainbow trout from the west coast, and Kamloops, a domesticated hatchery strain. Other west coast salmonids that have been introduced into Lake Superior include the Chinook salmon (*O. tshawytscha*), coho salmon (*O. kisutch*), and pink salmon (*O. gorbuscha*). These species are seldom caught in tributaries during the spring creel survey, but coho salmon are sometimes caught by anglers fishing in Lake Superior near river mouths. Brown trout (*Salmo trutta*), native to Europe, have been stocked in some tributaries of Lake Superior, and occasionally contribute to the spring shore fishery. Brook trout (*Salvelinus fontinalis*), native to Lake Superior, also contribute substantially at times to the spring fishery. Public interest in brook trout has increased as agencies around the lake examine protection and restoration strategies of brook trout populations (Newman et al. 2003; Schreiner et al. 2008). Lake trout (*Salvelinus namaycush*), white suckers (*Catostomus commersoni*), longnose suckers (*Catostomus catostomus*), and round whitefish (*Prosopium cylindraceum*) are also periodically caught at river mouths in spring.

Annual spring creel surveys, called for in the Rainbow Trout Chapter in the Fisheries Management Plan for the Minnesota Waters of Lake Superior (Schreiner et al. 2006), are useful for examining long-term trends in fishing pressure, catch, and catch rates of rainbow trout. The spring creel survey was designed to target anglers fishing for naturalized and stocked rainbow trout that migrate up tributaries to spawn. Other species that contribute to the fishery are also recorded. Spring creel surveys were conducted in April and May from 1961 through 1967 by Hassinger et al. (1974) and in 1981 and 1982 by Close and Siesennop (1984). The Lake Superior Area Fisheries staff has conducted annual spring creel surveys since 1985, except in 1991. From 1985 to 1990, the spring creel surveys were non-uniform probability surveys, which provided good shorewide information but did not permit statistically valid estimates for individual tributaries. Therefore, the survey design was changed to a stratified random survey in 1992 to also obtain information from specific tributaries (Ostazeski and Morse 2002). A modified bus-route format was implemented in 1995, 2002, and for part of 2003 to enable a survey to be

conducted with two clerks, when three clerks were unavailable. Data within this report will be summarized and compared from 1992 to present (22 years) based on the stratified random design used in the creel survey throughout this time period.

## **Methods**

The 2013 survey period was from May 1<sup>st</sup> through June 4<sup>th</sup>. The spring creel survey begins once tributaries thaw and anglers can fish them. In 2013, an experimental six-day “Kamloops creel” was conducted prior to ice-out from April 25<sup>th</sup> through April 30<sup>th</sup> by the lower shore clerk and targeted shore anglers fishing for Kamloops. These data were analyzed separately to maintain consistency with previous creel surveys.

Separate estimates of catch and catch rate were made for rainbow trout 16 inches and greater, and rainbow trout less than 16 inches in order to isolate the influence of emigrating juvenile steelhead from the analyses. Unless otherwise specified in this report, estimates for rainbow trout are for fish 16 inches or greater in all tables and figures. References to a ‘long-term’ average in this report refer to the 1992-2012 time period. Interquartile ranges refer to numbers falling between the 25<sup>th</sup> and 75<sup>th</sup> percentiles, or “middle fifty”.

In 2013 all clipped rainbow trout caught were Kamloops strain rainbow trout. There are no longer any adipose-clipped steelhead remaining from stocking events in the early 2000s. Kamloops possess an adipose fin clip making them legal for anglers to harvest. The majority of unclipped steelhead (no adipose fin clip) caught were steelhead produced in the wild, but some unclipped steelhead were produced in the hatchery and possess a maxillary clip that is difficult for anglers to identify. These fish were reported as unclipped steelhead by anglers. The greatest impact these maxillary clipped steelhead have on catch and catch rate is at the Knife River which received all of the stocked (maxillary clipped) steelhead from 2003-2007. These stocked fish will likely return as adults to the Knife River from 2005 through 2012, so it is unlikely they contributed much to the fishery in 2013.

Most fish lengths recorded by clerks were angler estimates because the steelhead fishery is catch-and-release by regulation and generally 30-40% of Kamloops are voluntarily released. No individual fish weights were obtained during the creel, but estimates were developed using regression relationships

derived from Knife River adult trap data. All other methods are summarized in Ostazeski (2004).

The Minnesota shore is divided into two geographic regions. Sampling stations are shown in Figure 1. The area from the Lester River to the Split Rock River is referred to as the lower shore and contains nine tributaries that are sampled, while the area from the Beaver River to the Brule River is referred to as the upper shore and also contains nine tributaries that are sampled. Estimates from the lower and upper shore are collectively referred to as shorewide estimates. Pressure, catch, and catch rate estimates are determined for individual tributaries and also summarized as lower shore, upper shore, and shorewide estimates. Anglers fishing in the tributaries are considered “stream” anglers and those fishing in Lake Superior near the tributary mouths are considered “lake” anglers.

The number of anglers that participate in the spring anadromous fishery on Lake Superior is estimated annually. Angler population estimates were determined on a daily basis with the cumulative number of ‘new’ anglers (not previously interviewed) and the cumulative number of ‘recap’ anglers (anglers previously interviewed) providing the data. The days each year in which either the creel was not conducted or no anglers were interviewed were removed from the analysis. The Schnabel modification of the Lincoln-Petersen estimator was used to calculate daily estimates of angler abundance and its variance. The estimates generally increase throughout the first half of the survey period, and then stabilize. The average of the last nine estimates with variances was used to calculate a final estimate and 95% confidence intervals. Extreme outliers were excluded from the final estimate calculation. One assumption of this method that cannot be met is that anglers represent a closed population. Violation of this assumption may result in bias leading to overestimation or underestimation of the population size. Prior to 1996, the question “Have you previously been interviewed by a creel clerk this spring?” was not asked, so estimates could not be determined from 1992-1995.

## **Results**

### ***Sampling***

A total of 1,023 interviews were conducted in 2013; 835 on the lower shore and 188 on the upper shore (Table 1). There were 27% fewer interviews conducted in 2013 compared to 2012 (1,393 interviews). On the lower shore, the most anglers were interviewed at the Lester River (174) while the

least were interviewed at the Gooseberry River (14) (Table1). On the upper shore, the most anglers were interviewed at the Baptism River (39) while the least were interviewed at the Poplar River (9). Shorewide, 79% of anglers fished in a tributary while 21% fished the lake (Table 1). Anglers fishing the upper shore rarely fished the lake (3%) whereas 25% of interviewed lower shore anglers fished the lake. Fifty-nine percent of all anglers fished between 6:00 am and 1:30 pm, while 41% fished between 1:30 and 9:30 pm. Forty-four percent fished weekdays and 56% fished weekends.

During the Kamloops creel, 232 interviews were conducted (Table 1). Most interviews were conducted at the French River and McQuade Harbor/Talmadge River. Fifty-six percent of anglers fished between 6:00 am and 1:30 pm, while 44% fished between 1:30 and 9:30 pm. Weekday anglers outnumbered weekend anglers 61% to 39%.

### ***Fishing pressure***

The total estimated shorewide angling pressure was 24,792 angler-hours (a-hrs), with 18,400 a-hrs in tributaries and 6,392 a-hrs in the lake (Table 2). Pressure decreased by approximately 10,000 hours compared to 2012 (Table 3). Total pressure was also approximately 7,000 hours less than average (31,862 a-hrs) and the lowest since 2003 (Table 3, Figure 2), but still within the interquartile range (24,061-38,298 a-hrs). Lower shore stations received more pressure (78%) when compared to the upper shore stations (22%), which was almost identical to the distribution in 2012. The Lester River received the highest pressure (3,588 a-hrs) among lower shore stations, followed by the Sucker River (3,566 a-hrs), and the French River (3,544 a-hrs). The Brule River had the highest pressure among upper shore stations (963 a-hrs), followed by the Baptism River (866 a-hrs) and the Devil Track River (857 a-hrs).

The total estimated pressure during the Kamloops creel was 4,140 a-hrs (Table 2). Fifty-four percent of the pressure occurred at the French River and 31% at McQuade Harbor/Talmadge River. The Lester River and Sucker River received little pressure and there was no angling activity at the mouth of the Knife River during the Kamloops creel.

### ***Rainbow trout catch***

The estimated shorewide catch included 3,603 unclipped steelhead and 1,657 clipped rainbow trout



for a total of 5,260 rainbow trout (Table 4). The shorewide unclipped steelhead catch of 3,603 fish was above the long-term average of 2,572 and within the interquartile range (1,028-3,761) (Figure 3). The lower shore unclipped steelhead catch of 2,527 was above the long-term average (1,809) and within the interquartile range (475-2,742), and the upper shore catch of 1,076 was above both the long-term average (764) and interquartile range (420-991). The shorewide clipped rainbow trout catch of 1,657 was considerably below the long-term average (2,691) and below the interquartile range (1,722-3,798) (Figure 4). The clipped rainbow trout catch of 1,543 on the lower shore was also considerably below the average (2,513) and below the interquartile range (1,627-3,608), while the catch of clipped rainbow trout on the upper shore (114) was within the interquartile range (94-218).

On the lower shore, the highest catch of unclipped steelhead was at the Lester River (678), followed by the Stewart (515), Sucker (357), and Split Rock (300) rivers (Table 5). On the upper shore, the highest catch of unclipped steelhead was at the Baptism River (262), followed by the Brule River (231), Devil Track River (197) and Kadunce Creek (125). Shorewide, the highest catch of clipped rainbow trout was at the French River (549), followed by the Sucker River (305), and McQuade Harbor/Talmadge River (281). Clipped rainbow trout were caught at 13 of the 18 creel stations.

Catch and release of small steelhead (<16 inches) occurred at ten of the creel stations, which resulted in an estimated catch of 316 juvenile steelhead (Table 6). Juvenile steelhead emigrate downstream in late April and early May and are often caught by anglers. An estimated 44 sub-legal Kamloops (<16 inches) were caught during the 2013 spring creel survey. Starting in the early 1980s Kamloops yearlings were stocked upstream in the Lester River in mid-May and were, at times, caught in great numbers in the creel. In 2010 new stocking policies were enacted that resulted from fish in Lake Superior testing positive for Viral Hemorrhagic Septicemia (VHS). Since 2010, Kamloops stocking now occurs adjacent to the mouth of the Lester River in Lake Superior in summer when most anglers are done fishing for rainbow trout.

During the Kamloops creel, an estimated 306 Kamloops and 66 steelhead were caught (Table 4). Most Kamloops were caught at the French River (186), followed by McQuade Harbor/Talmadge River (48), and the Lester River (6) (Table 5). Most steelhead were also caught at the French River (34), followed by McQuade Harbor/Talmadge River (19), and the Lester River (13). No fish were reported by

anglers at the Sucker River. An additional 17 sub-legal Kamloops were also caught.

### ***Rainbow trout catch rates***

The shorewide catch rate for all rainbow trout combined was 0.212 fish/a-hr (4.7 angling-hours per fish; Table 7). The unclipped steelhead catch rate for the lower shore was 0.131 fish/a-hr and the catch rate for the upper shore was 0.196 fish/a-hr (Figure 5). The clipped rainbow trout catch rate for the lower shore was 0.080 fish/a-hr and 0.021 fish/a-hr for the upper shore (Figure 6). Shorewide, the unclipped steelhead catch rate (0.145 fish/a-hr, 6.9 angling-hours per fish) was above 0.10 fish/a-hr for seven of the past eight years, and the catch rate for clipped rainbow trout (0.067 fish/a-hr, 14.9 angling hours per fish) was the highest since 2005, but still relatively low compared to the late 1990s – early 2000s (Figure 7).

The unclipped steelhead catch rate was highest on the lower shore at the Gooseberry River (0.548 fish/a-hr), followed by Silver Creek (0.427 fish/a-hr), and the Stewart River (0.273 fish/a-hr) (Table 5). On the upper shore, the highest catch rate for unclipped steelhead was at the Beaver River (0.349 fish/a-hr), followed by the Baptism River (0.303 fish/a-hr) and the Brule River (0.240 fish/a-hr). The clipped rainbow trout catch rate was highest at the French River (0.155 fish/a-hr), followed by McQuade Harbor/Talmadge River (0.117 fish/a-hr), and the Sucker River (0.086 fish/a-hr).

During the Kamloops creel, the catch rate of Kamloops was 0.058 fish/a-hr (17.2 angling-hours per fish), and 0.016 fish/a-hr (62.5 angling-hours per fish) for steelhead (Table 5). The catch rate was highest for Kamloops at the French River (0.083 fish/a-hr). The catch rate of steelhead was low for all stations, but highest at the Lester River (0.036 fish/a-hr).

### ***Length, weight, age, and yield data***

Most unclipped and clipped rainbow trout caught ranged from 22-26 inches (Figure 8). The estimated average length and weight of unclipped steelhead was 24.0 inches and 4.6 pounds (Table 8). Despite a catch-and-release only regulation for unclipped steelhead, the creel clerks observed one illegally harvested fish of 28 inches. Clipped rainbow trout averaged 23.1 inches and 4.8 pounds. The majority of clipped rainbow trout caught were age-4 (58%; Table 9). An estimated 1,226 clipped rainbow trout totaling 5,897 pounds were harvested during the 2013 spring creel (Table 8). Of all legal sized clipped

rainbow trout caught in 2013, 74% were harvested. Of all legal sized Kamloops caught during the Kamloops creel, 93% were harvested.

### ***Rainbow trout catch rates in streams versus lake***

The term “lake” refers to Lake Superior waters near tributary mouths and includes McQuade Harbor. On a shorewide basis, unclipped steelhead catch rates in the tributaries (0.193 fish/a-hr) were 24 times higher than those in the lake (0.008 fish/a-hr) (Table 10). Therefore, it took 5.2 hours to catch an unclipped steelhead in a tributary, compared to a staggering 125 hours in the lake. Clipped rainbow trout catch rates in tributaries were 0.048 fish/a-hr, while those in the lake were 0.122 fish/a-hr. Therefore, it took 20.8 hours to catch a clipped rainbow trout in a tributary compared to 8.2 hours in the lake.

### ***Estimated number of anglers***

The estimated number of anglers that participate in the spring anadromous fishery on the Minnesota shore of Lake Superior generally increased from 2002-2011, but decreased the past two years. An estimated 1,325 anglers participated in the spring fishery in 2013 (Table 11, Figure 9). The number of unique angler interviews was 656, the fewest since 2003. It should be noted that this estimate is likely biased low. These data exclude interviews from the Kamloops creel. Some anglers interviewed during the standard creel undoubtedly answered “yes” to being previously interviewed, but were referring to being interviewed during the Kamloops creel. This inflates the number of repeat interviews, resulting in an underestimate of unique anglers. If Kamloops creel angler data is combined with the standard creel data, the angler estimate is 1,625 (95% confidence interval: 943-2307). The estimated number of anglers that fished during the Kamloops creel was 392 anglers (95% CI: 284-557).

Rainbow trout are by far the most sought after species in the spring. Steelhead and Kamloops were the primary targeted species in 60% and 33% of interviews, respectively. Twenty-seven percent of anglers listed steelhead as their secondary target species and 50% listed Kamloops as their secondary species.

### ***Creel results and trap returns***

The spring creel census provides long-term trend data of the unclipped and clipped rainbow trout populations through time across the entire shore, while the fish traps on the French and Knife Rivers provide data on these two individual rivers, including run size and important population dynamics information that helps guide the management of rainbow trout in Lake Superior. There is a strong positive correlation between the shorewide catch rate of unclipped steelhead  $\geq 16$  inches and returns of unclipped steelhead at the Knife River trap ( $p=0.001$ ,  $r=0.73$ ; Figure 10). Maxillary clipped steelhead at the Knife River trap are included in the number of unclipped steelhead for this analysis, because maxillary clipped steelhead are identified as unclipped fish in the creel survey. The Knife River trap was not operated in 2013 due to flood damage from 2012. There is also a positive correlation between the shorewide catch rate of clipped rainbow trout  $\geq 16$  inches and returns of clipped rainbow trout to the French River trap (Figure 11). Though not as strong ( $r=0.66$ ), the relationship is statistically significant ( $p=0.003$ ).

### ***Other species***

Numbers for other species observed are generally too small to produce reliable station estimates. Lower, upper, and shorewide estimates of catch and catch rate were determined for these species (Table 12). After rainbow trout, suckers (longnose and white) were the most frequently caught species with 611 caught shorewide (Table 12). Brook trout are commonly caught during the spring creel and have been caught in all surveys conducted in the past 22 years. An estimated 226 brook trout were caught during the survey, with an average length of 11.7 inches and a range of 6 to 16 inches (Table 8, Figure 12). Regulations require release of all brook trout less than 20 inches in length below posted tributary boundaries and in Lake Superior. No illegally harvested brook trout were observed by the creel clerks this year. Only 16 coho salmon were caught in 2013, which was considerably fewer than the 379 caught in 2012. Average length and weight of coho salmon were 16.0 inches and 1.4 pounds. Coho salmon were listed as the primary target species in 2% of interviews and given as the secondary target species 15% of the time. All coho salmon were caught at the French River.

## Discussion

### ***Fishing Pressure***

Shorewide fishing pressure decreased by approximately 10,000 hours between 2012 and 2013, and the percent decrease was slightly higher along the upper shore (33%) compared to the lower shore (28%). Shorewide pressure was approximately 7,000 hours below the long-term mean and barely within the interquartile range. The decrease in fishing pressure is likely the result of the extremely late spring. Unlike 2012, when rivers were flowing in March, all rivers were still locked in ice until nearly May. Because of the late spring, the 2013 spring creel did not begin until May 1<sup>st</sup>, which is by far the latest the spring creel survey has started during the past 22 years. The previous latest start date was April 20<sup>th</sup> in 1996. With rivers thawing so late, many anglers may have opted not to fish for rainbow trout along the North Shore and waited for the inland gamefish season to open instead.

### ***Unclipped steelhead***

The shorewide, lower, and upper shore catch rates for unclipped steelhead have all remained above the level of 0.02 fish/a-hr since 1998, which is considered poor fishing in the 1996 Fisheries Management Plan for the Minnesota Waters of Lake Superior (Schreiner et. al 1996). The upper shore catch rate has remained above 0.10 fish/a-hr since 2002, while the lower shore and shorewide catch rates have been above 0.10 fish/a-hr for seven of the past eight years. The lower shore catch rate was the second highest and the shorewide catch rate was the third highest during the past 22 years. Furthermore, catch rates were above 0.10 fish/a-hr at fourteen of the survey stations. It is possible that catch rates were high partially because a greater percentage of anglers fishing in 2013 may have been seasoned, serious steelhead anglers who did not skip the steelhead season even though it occurred so late in the spring. Regardless, those who did fish had good steelhead angling.

The catch and catch rate displayed an increasing trend from the late 1990s through 2011. Over the past two years the catch has fallen from the record highs observed in 2010 and 2011, mostly due to less fishing pressure, not poorer catch rates. The shorewide catch rate remains high, but has not increased substantially during the past eight years. The overall positive trend in catch and catch rate since the late 1990s suggests that the population has increased, and/or individually unclipped steelhead are caught

multiple times. It is possible that given the current available forage base in Lake Superior and the general lack of suitable spawning and rearing habitat in rivers, a substantial increase in the steelhead stock may not occur.

The catch-and-release regulation for unclipped steelhead has been in effect since August 1997. The regulated release of unclipped steelhead has likely contributed to increased catch and catch rates observed in the spring creel by making a fish available to more than one angler, and in multiple seasons. Steelhead that spawn in multiple years are a critical component of the spawning run in Minnesota tributaries. Based on the presence of spawn checks on scale samples taken from steelhead captured at the Knife River trap, approximately 62% of the fish captured have been repeat spawners. Many of these fish would have been harvested prior to their first or second spawning season if restrictive regulations were not in place.

Steelhead regulation compliance was generally good in 2013, and only one illegally harvested unclipped steelhead was observed by the creel census clerks. Unfortunately illegal behavior (adipose fin clipping) by anglers unhappy with the catch-and-release regulation is still occurring. Clerks did not observe any steelhead with freshly cut adipose fins, but in most years a small number of steelhead with freshly cut adipose fins are observed at the Knife and French River fish traps.

### ***Clipped rainbow trout***

The stocking location of Kamloops explains much of the catch distribution of Kamloops in the spring creel. The Lester and French rivers and the McQuade Harbor/Talmadge River area are the only locations stocked with Kamloops to reduce potential negative impacts of Kamloops spawning with unclipped steelhead (Miller et al. 2004; Schreiner et al. 2006; Page et al. 2011). Because Kamloops are stocked only along the lower shore, the catch and catch rate for the lower shore are expected to be relatively high for clipped rainbow trout, but have remained below average for the eighth consecutive year. However, it is evident from the brief Kamloops creel that there are periods of heavy fishing pressure and harvest prior to ice-out. While this angling pressure may not affect the catch rate of Kamloops, it indicates the catch of Kamloops is higher than what is reflected in the standard creel survey. A late winter/early spring creel would be beneficial to better determine the extent of fishing pressure,

catch, and catch rate of Kamloops prior to ice-out on the rivers.

The decline in the catch and catch rate for clipped rainbow trout is attributed to the poor return rates of the 2002 through 2007 year-classes of Kamloops. Year-class strength for stocked yearlings is determined in part by stocking size, timing of stocking, stocking location, predation, forage availability, temperature, and other lake factors that combine to cause fluctuations in survival as is seen in many fish populations. It is uncertain which, if any, of these factors has caused the decline. The most likely factor that can be partially controlled is stocking date, which has been shifted from June to mid-July in recent years. Kamloops stocked in mid-July are larger than those stocked earlier, and a larger stocking size has been shown to have a strong influence on return rates (Negus et. al 2012). Also, bioenergetics modeling has shown that Lake Superior is near its predatory species carrying capacity, especially in nearshore waters where Kamloops reside (Negus et al. 2008). Stable isotope analyses suggest that Kamloops include a higher percentage of fish in their diet than previously estimated (Negus and Hoffman 2013), and there may be increased competition for this prey source with the other salmonid predators than in the past.

Stocking larger Kamloops at the mouth of the Lester River and McQuade Harbor/Talmadge River has occurred since 2010. The downside of stocking larger fish at the mouth of the Lester River and McQuade Harbor/Talmadge River is that they may have already imprinted on French River Coldwater Hatchery water and therefore may not return to the Lester River or McQuade Harbor/Talmadge River and instead return to the French River. Some anglers expressed frustration this year when fishing the Lester River, reporting good steelhead catches but poorer catches of Kamloops. The creel data show some support for this concern. The Lester River had the highest catch of steelhead, but only the fourth highest catch of Kamloops behind the French River, McQuade Harbor/Talmadge River, and the Sucker River. Furthermore, the percentage of the lower shore Kamloops catch that was caught in the Lester River was 17% in 2013, whereas in prior years the percentage was generally 20-35%.

Kamloops provide anglers with the opportunity to harvest a rainbow trout. On average over the past 22 years, 37% of Kamloops  $\geq 16$  inches have been voluntarily released. In 2013, only 26% were released. It is possible that with a low catch rate for Kamloops, anglers were reluctant to release a harvestable fish.

### ***Creel results and trap returns***

Spring trap returns at the French and Knife Rivers and catch rates from the spring creel are two methods of indexing unclipped steelhead and clipped rainbow trout. The shorewide catch rates of unclipped steelhead  $\geq 16$  inches are significantly correlated with returns of unclipped steelhead at the Knife River trap. Shorewide angler catch rates for clipped rainbow trout  $\geq 16$  inches are significantly correlated with returns of clipped rainbow trout at the French River trap. The relationship for clipped rainbow trout is weaker than for unclipped steelhead, most likely because trap data is compared to shorewide creel data. Most clipped rainbow trout are caught from the lower shore, whereas steelhead are caught across the entire shore. Nevertheless, these relationships suggest that the spring creel is fairly accurately reflecting rainbow trout population trends. Occasionally there are years that are anomalies and trap catches don't correlate well with catch rates in the creel. Additional information on French and Knife River trap returns can be found in Blankenheim (2013) and Peterson and Blankenheim (2013).

### ***Other species***

Brook trout were the most commonly caught salmonid behind rainbow trout. Current regulations only allow harvest of brook trout greater than 20 inches below tributary posted boundaries and in Lake Superior, and brook trout up to 16 inches were caught in 2013. No illegal harvest of brook trout was observed by the creel census clerks this year. Coaster brook trout rehabilitation is a management priority and regulation compliance is essential for this to occur.

Unlike 2012, few coho salmon were caught in 2013. Coho salmon are a short-lived species, so fluctuations in their abundance are to be expected. Seventeen percent of interviewed anglers stated coho salmon was their primary or secondary species targeted, indicating it is a desirable species for anglers who are fishing the lake. All coho salmon are naturally reproduced wild fish and this shows that coho salmon stocking is not necessary to produce a successful fishery.



## Summary

The 2013 creel survey start date was the latest the survey has started in the past 22 years due to rivers being locked in ice until nearly May. Shorewide angling pressure was the lowest since 2003. Shorewide angling pressure decreased by approximately 10,000 hours compared to 2012 and was 7,000 hours below the long-term mean, but still just within the interquartile range. The very late spring was likely the main reason for the reduction in fishing pressure. The shorewide catch of unclipped steelhead was above average and within the interquartile range, while the catch rate was the third highest in the past 22 years. The catch rate of unclipped steelhead has been relatively high the past eight years, but has not increased substantially during this time. The shorewide catch of clipped rainbow trout was well below average and below the interquartile range. The catch rate of clipped rainbow trout was the highest since 2005, but still relatively low compared to the catch rates observed in the late 1990s – early 2000s. A six-day experimental “Kamloops creel” prior to both ice-out and the traditional creel indicated there were periods of heavy fishing pressure in the lake for Kamloops. This pressure suggests the catch of Kamloops in the traditional creel survey may have been underestimated in recent years. Brook trout were the most common salmonid caught after rainbow trout and fish up to 16 inches were reported. No illegally harvested brook trout were observed by the creel census clerks. The coho salmon catch was much lower than in 2012, but fluctuations are common in fish species with relatively short life cycles.

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Minnesota  
F13AF00322  
R29G60F29RP31  
Segment 31-1  
Study 4  
Job 918

MINNESOTA DEPARTMENT OF NATURAL RESOURCES  
DIVISION OF FISHERIES

**COMPLETION REPORT: LAKE SUPERIOR**  
**SPRING CREEL SURVEY**  
**2013**

Completed by:  
Josh Blankenheim

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Area Supervisor

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Date

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Regional Fisheries Approval

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Date

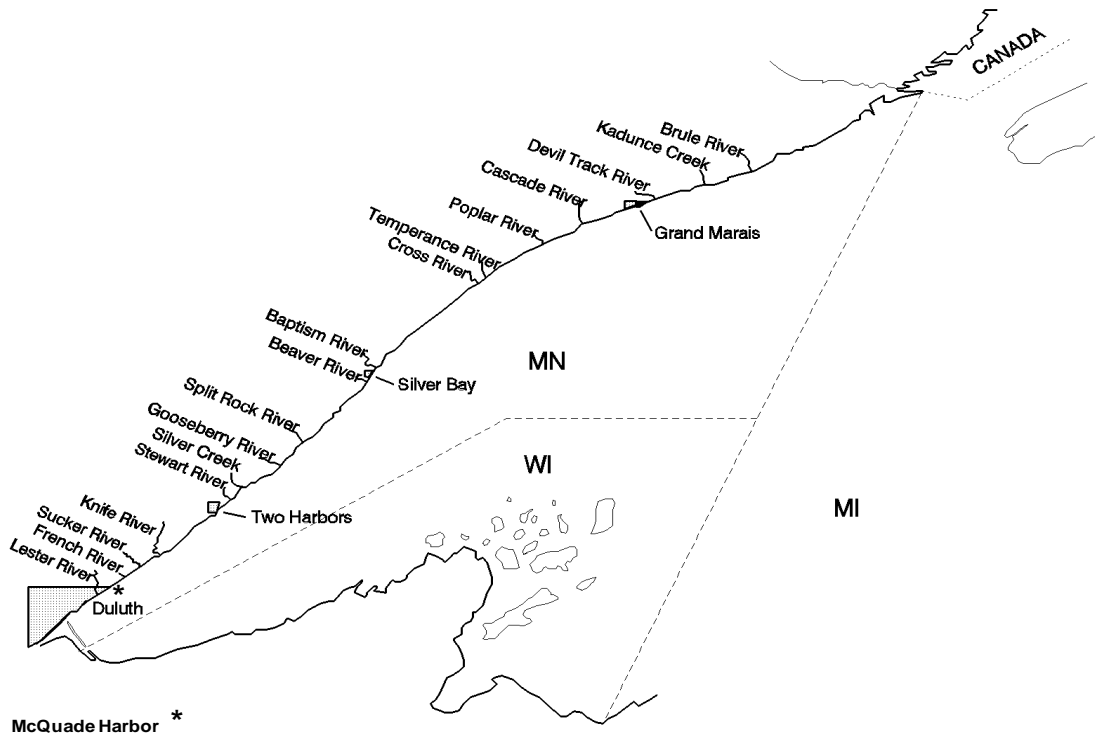


Figure 1. Map of sampling stations for the 2013 Lake Superior spring creel survey.

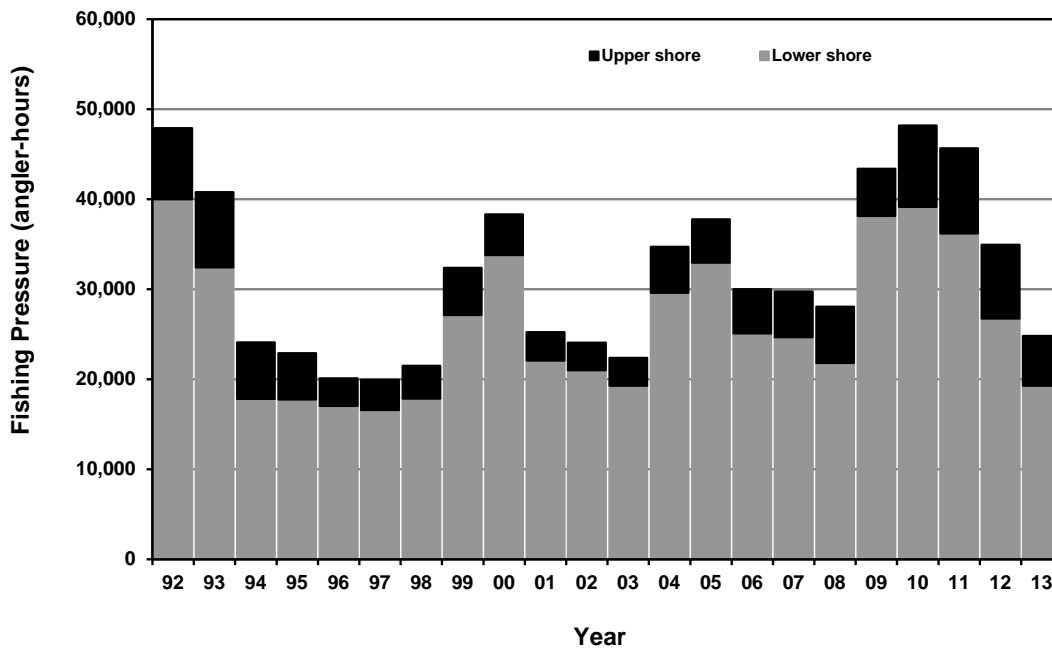


Figure 2. Shorewide, lower shore, and upper shore fishing pressure (angler-hours) from the Lake Superior spring creel survey, 1992-2013.

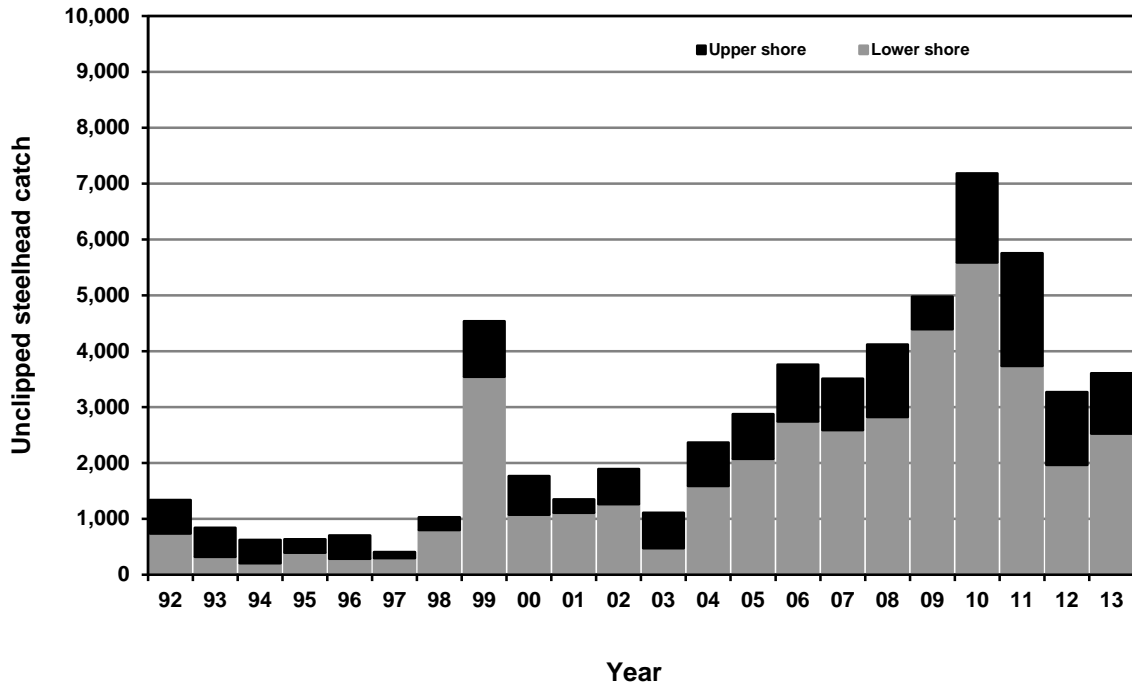


Figure 3. Shorewide, lower shore, and upper shore catch of unclipped steelhead  $\geq 16''$  from the Lake Superior spring creel survey, 1992-2013.

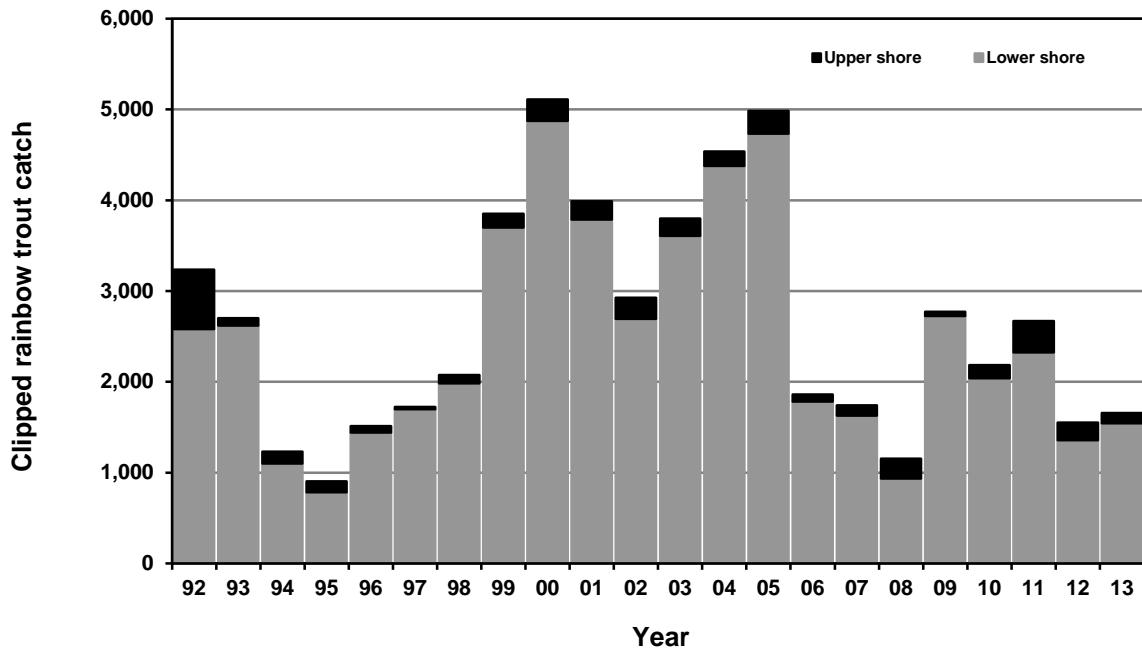


Figure 4. Shorewide, lower shore, and upper shore catch of clipped rainbow trout  $\geq 16''$  from the Lake Superior spring creel survey, 1992-2013.

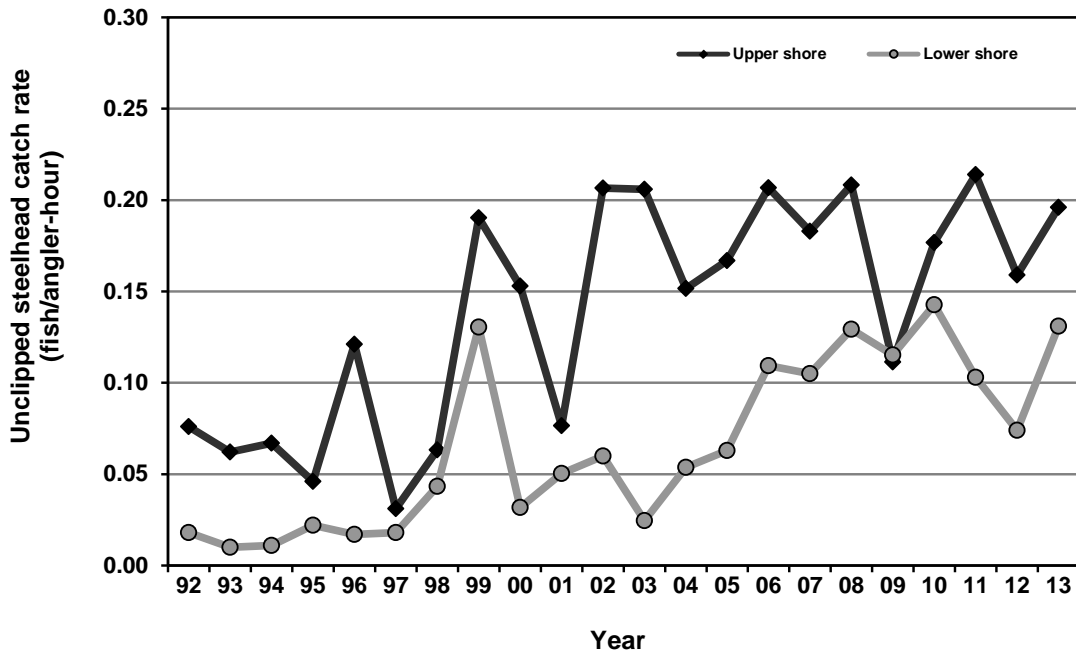


Figure 5. Lower shore and upper shore catch rate (fish/angler-hour) of unclipped steelhead  $\geq 16$ " from the Lake Superior spring creel survey, 1992-2013.

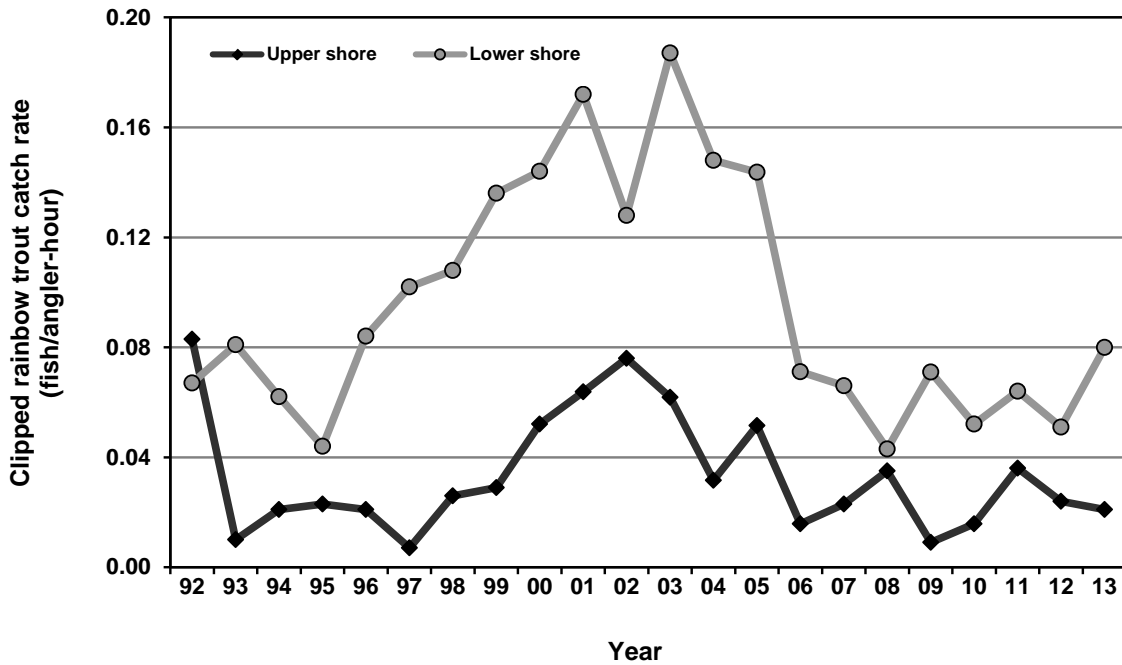


Figure 6. Lower shore and upper shore catch rate (fish/angler-hour) of clipped rainbow trout  $\geq 16$ " from the Lake Superior spring creel survey, 1992-2013.

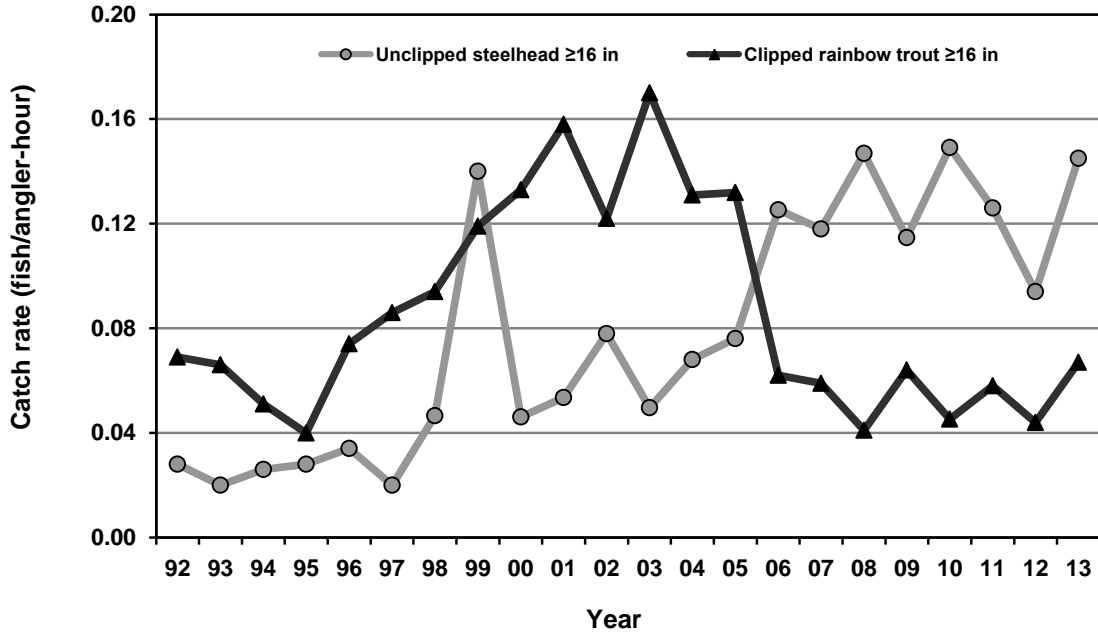


Figure 7. Shorewide catch rate (fish/angler-hour) of unclipped steelhead and clipped rainbow trout  $\geq 16$ " from the Lake Superior spring creel survey, 1992-2013.

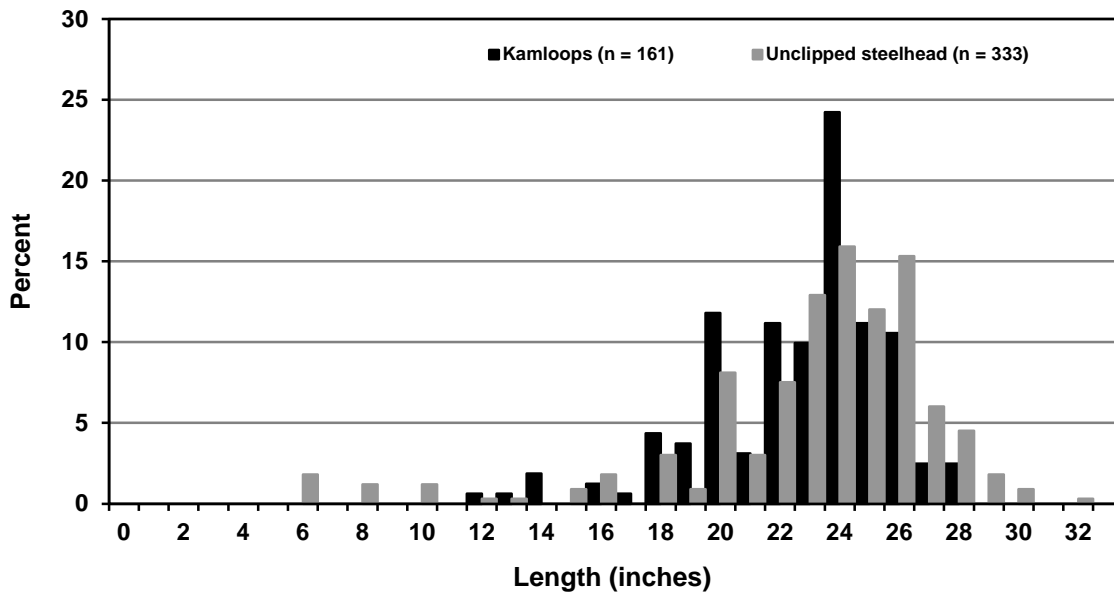
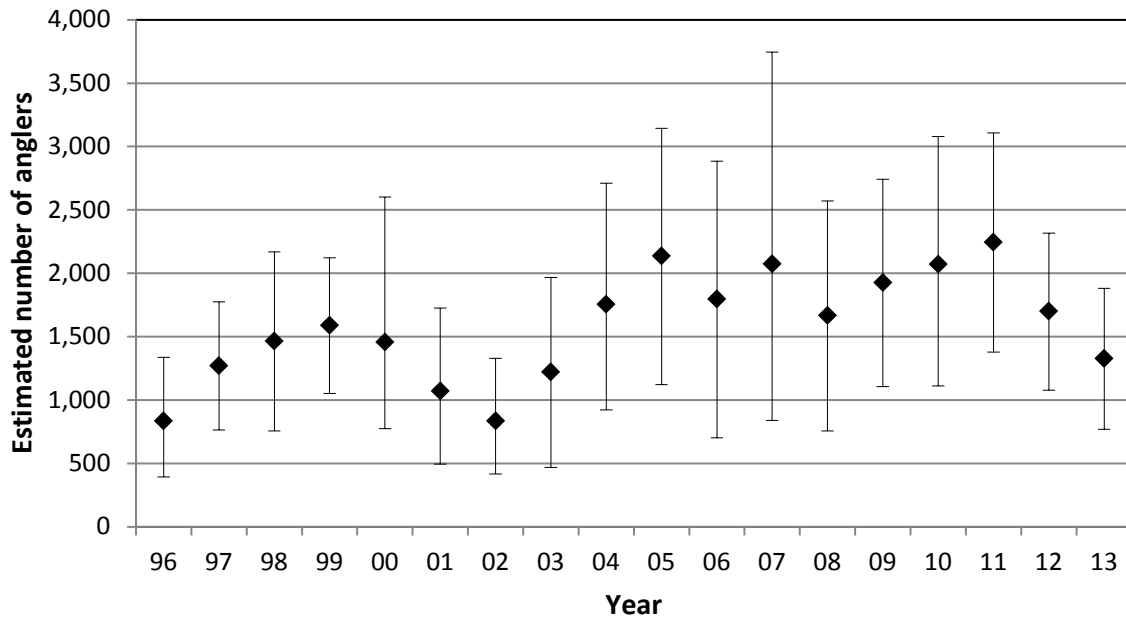
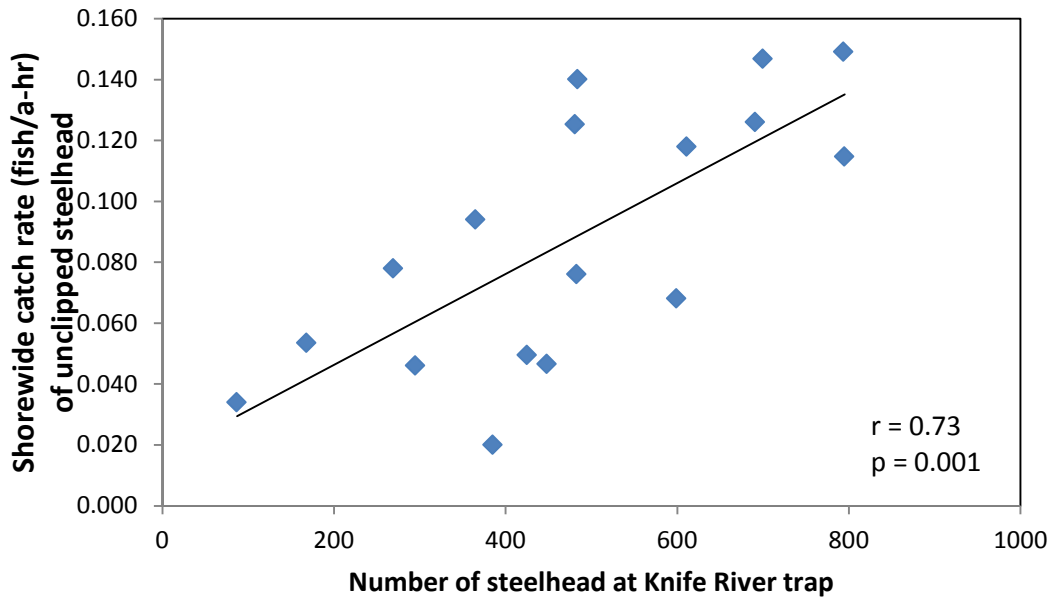


Figure 8. Length frequency of unclipped steelhead and clipped rainbow trout (Kamloops) in the 2013 Lake Superior spring creel survey. These include both measured and angler reported lengths.

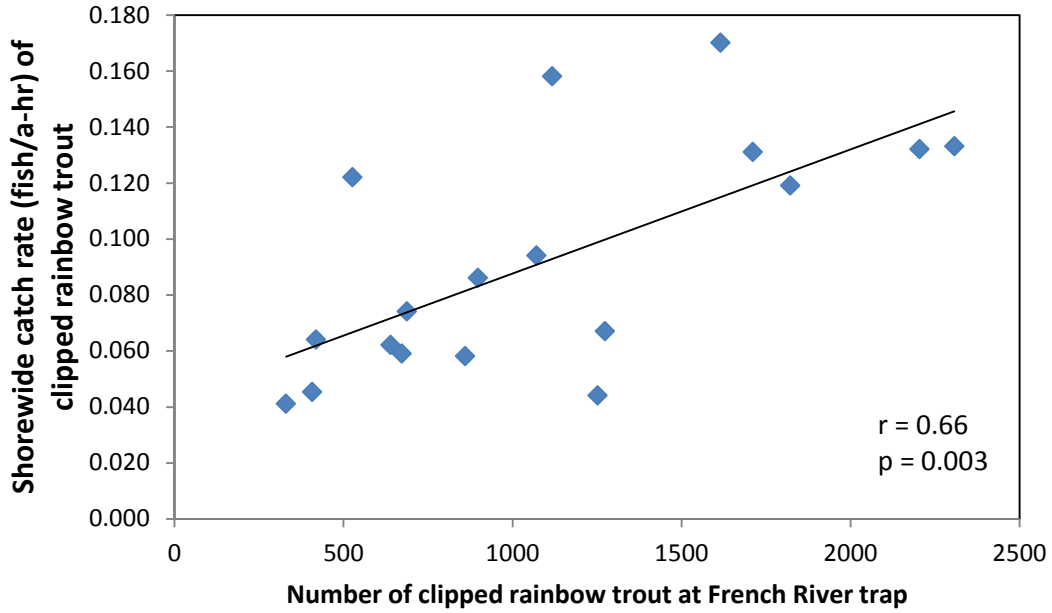


**Figure 9. The estimated number of anglers that have participated in the spring anadromous fishery, 1996-2013.**

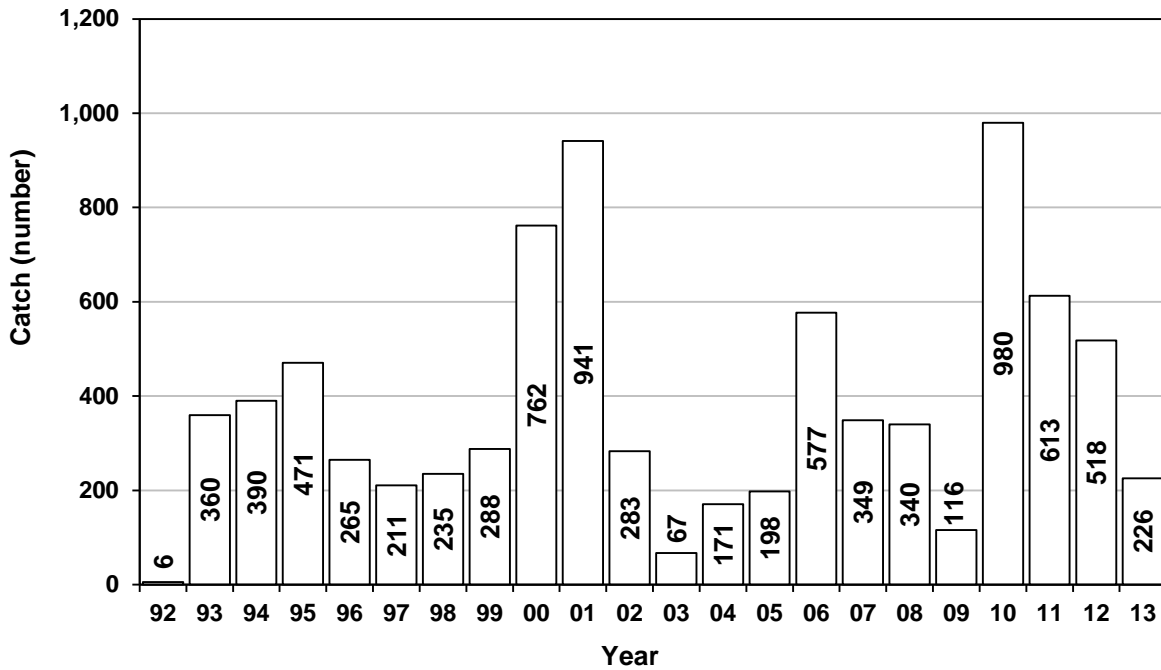


**Figure 10. The number of unclipped and maxillary clipped steelhead captured at the Knife River trap and the shorewide catch rate (fish/a-hr) of unclipped steelhead  $\geq 16$ " in the Lake Superior spring creel, 1996-2013.**





**Figure 11.** The number of clipped rainbow trout captured at the French River trap and the shorewide catch rate (fish/a-hr) of clipped rainbow trout  $\geq 16$ " in the Lake Superior spring creel, 1996-2013.



**Figure 12.** Brook trout catch estimates from the Lake Superior spring creel survey, 1992-2013.

**Table 1. Number of visits and interviews at each station for each day type, time period type, and angler type, 2013 Lake Superior spring creel survey.**

<b>Standard Spring Creel</b>																			
Station	Weekdays			Weekends			Interview s												
	Number of visits			Number of visits			Angler type				Time period type				Day type				Total
	Early	Late	Total	Early	Late	Total	Stream		Lake		Early		Late		Weekdays		Weekends		
							N	%	N	%	N	%	N	%	N	%	N	%	
<b>Lower Shore</b>																			
Lester River	7	7	14	6	4	10	168	97%	6	3%	108	62%	66	38%	84	48%	90	52%	174
McQuade/Talmadge	7	7	14	6	4	10	20	33%	41	67%	35	57%	26	43%	34	56%	27	44%	61
French River	7	7	14	6	4	10	0	0%	145	100%	91	63%	54	37%	84	58%	61	42%	145
Sucker River	7	7	14	6	4	10	164	98%	3	2%	100	60%	67	40%	83	50%	84	50%	167
Knife River	7	7	14	6	4	10	77	100%	0	0%	54	70%	23	30%	22	29%	55	71%	77
Stewart River	6	6	12	5	5	10	74	95%	4	5%	48	62%	30	38%	29	37%	49	63%	78
Silver Creek	7	5	12	3	5	8	18	100%	0	0%	6	33%	12	67%	11	61%	7	39%	18
Gooseberry River	5	6	11	6	4	10	14	100%	0	0%	13	93%	1	7%	5	36%	9	64%	14
Split Rock River	6	7	13	6	4	10	95	94%	6	6%	60	59%	41	41%	44	44%	57	56%	101
<b>Upper Shore</b>																			
Beaver River	6	5	11	5	3	8	13	100%	0	0%	9	69%	4	31%	4	31%	9	69%	13
Baptism River	5	6	11	5	4	9	39	100%	0	0%	22	56%	17	44%	11	28%	28	72%	39
Cross River	3	7	10	4	4	8	11	92%	1	8%	2	17%	10	83%	4	33%	8	67%	12
Temperance River	4	5	9	4	2	6	13	76%	4	24%	7	41%	10	59%	4	24%	13	76%	17
Poplar River	3	5	8	4	3	7	9	100%	0	0%	5	56%	4	44%	1	11%	8	89%	9
Cascade River	4	4	8	5	3	8	11	92%	1	8%	5	42%	7	58%	2	17%	10	83%	12
Devil Track River	4	6	10	4	5	9	27	100%	0	0%	12	44%	15	56%	5	19%	22	81%	27
Kadunce Creek	4	6	10	5	4	9	28	100%	0	0%	5	18%	23	82%	17	61%	11	39%	28
Brule River	3	7	10	4	4	8	31	100%	0	0%	21	68%	10	32%	5	16%	26	84%	31
<b>Lower Shore</b>	59	59	118	50	38	88	630	75%	205	25%	515	62%	320	38%	396	47%	439	53%	835
<b>Upper Shore</b>	36	51	87	40	32	72	182	97%	6	3%	88	47%	100	53%	53	28%	135	72%	188
<b>Shorewide</b>	95	110	205	90	70	160	812	79%	211	21%	603	59%	420	41%	449	44%	574	56%	1023

<b>Kamloops Creel</b>															
Station	Weekdays			Weekends			Number of interview s								
	Number of visits			Number of visits			Time period type				Day type				Total
	Early	Late	Total	Early	Late	Total	Early		Late		Weekdays		Weekends		
							N	%	N	%	N	%	N	%	
<b>Lower Shore</b>															
Lester River	2	1	3	1	1	2	15	65%	8	35%	8	35%	15	65%	23
McQuade/Talmadge	2	1	3	1	1	2	34	46%	40	54%	42	57%	32	43%	74
French River	2	1	3	1	1	2	73	62%	45	38%	86	73%	32	27%	118
Sucker River	2	1	3	1	1	2	9	53%	8	47%	5	29%	12	71%	17
Knife River	2	1	3	1	1	2	0	--	0	--	0	--	0	--	0
<b>Total</b>	10	5	15	5	5	10	131	56%	101	44%	141	61%	91	39%	232

**Table 2. Fishing pressure estimates (angler-hours) from the 2013 Lake Superior spring creel survey. Standard errors are in italics.**

<b>Standard Spring Creel</b>						
<b>Station</b>	<b>Stream Pressure</b>	<b>(SE)</b>	<b>Lake Pressure</b>	<b>(SE)</b>	<b>Total Pressure</b>	<b>(SE)</b>
<b>Lower Shore</b>						
Lester River	3,369	<i>457</i>	219	<i>83</i>	3,588	<i>464</i>
McQuade/Talmadge	591	<i>168</i>	1,816	<i>377</i>	2,407	<i>413</i>
French River			3,544	<i>875</i>	3,544	<i>875</i>
Sucker River	3,238	<i>496</i>	328	<i>242</i>	3,566	<i>552</i>
Knife River	1,903	<i>657</i>	0	<i>0</i>	1,903	<i>657</i>
Stewart River	1,861	<i>480</i>	24	<i>24</i>	1,885	<i>481</i>
Silver Creek	131	<i>75</i>	0	<i>0</i>	131	<i>75</i>
Gooseberry River	325	<i>147</i>	0	<i>0</i>	325	<i>147</i>
Split Rock River	1,780	<i>412</i>	160	<i>77</i>	1,940	<i>419</i>
<b>Upper Shore</b>						
Beaver River	304	<i>93</i>	0	<i>0</i>	304	<i>93</i>
Baptism River	866	<i>281</i>	0	<i>0</i>	866	<i>281</i>
Cross River	467	<i>174</i>	58	<i>58</i>	525	<i>183</i>
Temperance River	420	<i>155</i>	210	<i>100</i>	630	<i>184</i>
Poplar River	420	<i>147</i>	0	<i>0</i>	420	<i>147</i>
Cascade River	263	<i>107</i>	33	<i>33</i>	296	<i>112</i>
Devil Track River	857	<i>251</i>	0	<i>0</i>	857	<i>251</i>
Kadunce Creek	642	<i>197</i>	0	<i>0</i>	642	<i>197</i>
Brule River	963	<i>318</i>	0	<i>0</i>	963	<i>318</i>
<b>Lower Shore</b>	13,198	<i>1,158</i>	6,091	<i>990</i>	19,289	<i>1,524</i>
<b>Upper Shore</b>	5,202	<i>615</i>	301	<i>120</i>	5,503	<i>626</i>
<b>Shorewide</b>	18,400	<i>1,311</i>	6,392	<i>997</i>	24,792	<i>1,647</i>

<b>Kamloops Creel</b>		
<b>Station</b>	<b>Lake Pressure</b>	<b>(SE)</b>
<b>Lower Shore</b>		
Lester River	360	<i>99</i>
McQuade/Talmadge	1,314	<i>249</i>
French River	2,250	<i>652</i>
Sucker River	216	<i>79</i>
Knife River	0	<i>0</i>
<b>Total</b>	4,140	<i>709</i>

**Table 3. Pressure estimates (angler-hours) from Lake Superior spring creel surveys, 2002-2013. The 1992-2012 range is included.**

Station	Standard Spring Creel												Range 92-12
	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	
<b>Lower Shore</b>													3,450 - 10,476
Lester River	5231	4526	6830	7415	5312	5105	5315	10476	9892	6644	4928	3588	1,399 - 3,938
McQuade/Talmadge									1399	2996	3938	2407	2,112 - 8,544
French River	4278	3036	3480	3535	2112	4610	2456	6068	6505	3206	3015	3544	3,132 - 12,990
Sucker River	4464	6266	7960	6845	7066	3385	3823	6376	6824	4620	6008	3566	1,225 - 6,253
Knife River	3122	1562	4150	4255	2887	2635	2508	6253	4885	3565	3308	1903	720 - 5,782
Stewart River	1420	720	2050	5031	3134	2808	3991	3957	4079	5782	1557	1885	326 - 1,996
Silver Creek	326	527	1112	968	880	1299	1256	1230	930	1996	818	131	300 - 2,475
Gooseberry River	1026	1213	1538	1860	887	886	493	1728	1418	1994	1076	325	1,145 - 5,400
Split Rock River	1145	1436	2490	3041	2798	3956	1973	2050	3212	5400	2087	1940	
<b>Upper Shore</b>													
Beaver River	429	307	549	619	466	594	362	481	776	824	820	304	307 - 1,159
Baptism River	725	524	1,734	1,990	2,198	1,046	1,506	1,198	3,570	2,771	2,662	866	448 - 3,570
Cross River	72	83	135	203	260	151	432	444	559	900	383	525	53 - 900
Temperance River	306	224	371	195	181	198	472	651	434	488	170	630	77 - 788
Poplar River	270	278	424	173	338	548	580	291	439	888	383	420	168 - 1,347
Cascade River	347	474	339	194	455	774	767	346	675	488	905	296	194 - 939
Devil Track River	237	590	698	372	242	1,089	818	447	1,264	1,050	1,163	857	75 - 1,264
Kadunce Creek	369	270	236	258	228	79	502	581	259	746	500	642	79 - 1,365
Brule River	293	329	617	806	560	557	796	800	1,059	1,283	1,206	963	207 - 1,505
<b>Lower Shore</b>	21,013	19,286	29,610	32,950	25,075	24,684	21,816	38,137	39,142	36,203	26,735	19,289	16,584 - 39,994
<b>Upper Shore</b>	3,048	3,079	5,103	4,810	4,927	5,036	6,235	5,238	9,035	9,438	8,192	5,503	3,046 - 9,438
<b>Shorewide</b>	24,061	22,365	34,713	37,760	30,003	29,719	28,051	43,375	48,177	45,641	34,927	24,792	19,928 - 48,177

**Table 4. Catch estimates for rainbow trout from the Lake Superior spring creel survey, 2002-2013. The 1992-2012 range is included.**

		<b>Standard Spring Creel</b>												
Rainbow trout	Area	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	Range 92-12
Unclipped Steelhead	Low er Shore	1,259	475	1,589	2,071	2,742	2,588	2,822	4,391	5,587	3,733	1,967	2,527	203 - 5,587
	Shorewide	1,889	1,109	2,363	2,874	3,761	3,509	4,119	4,974	7,184	5,754	3,269	3,603	403 - 7,184
Clipped Rainbow Trout	Low er Shore	2,694	3,608	4,377	4,735	1,783	1,627	937	2,726	2,039	2,326	1,358	1,543	784 - 4,873
	Upper Shore	231	190	161	248	78	114	218	46	143	342	193	114	24 - 653
	Shorewide	2,925	3,798	4,538	4,983	1,861	1,741	1,155	2,773	2,181	2,668	1,551	1,657	905 - 5,108
All Rainbow Trout	Low er Shore	3,961	4,083	5,966	6,806	4,526	4,215	3,759	7,117	7,626	6,059	3,325	4,070	1,207 - 7,626
	Upper Shore	860	824	935	1,051	1,096	1,035	1,516	629	1,740	2,363	1,495	1,190	143 - 2,363
	Shorewide	4,822	4,907	6,901	7,857	5,622	5,249	5,274	7,747	9,365	8,422	4,820	5,260	1,584 - 9,365

<b>Kamloops Creel</b>		
Rainbow trout	Area	2013
		Number
Unclipped Steelhead	Low er Shore	66
Clipped Rainbow Trout	Low er Shore	240
All Rainbow Trout	Low er Shore	306

**Table 5. Rainbow trout catch and catch rate estimates by station, 2013 Lake Superior spring creel survey. Standard errors (SE) are shown.**

		Standard Spring Creel											
		Unclipped steelhead (n = 333 )						Clipped rainbow trout (n = 161)					
Station		Catch			Rate			Catch			Rate		
		All	inches	(SE)	All	inches	(SE)	All	inches	(SE)	All	inches	(SE)
Lester River	harvested	0	0	0	0.000	0.000	0.000	162	162	52	0.045	0.045	0.014
	released	678	678	175	0.189	0.189	0.043	101	101	43	0.028	0.028	0.012
	total	678	678	175	0.189	0.189	0.043	263	263	82	0.073	0.073	0.021
McQuade Harbor	harvested	0	0	0	0.000	0.000	0.000	211	211	107	0.088	0.088	0.052
	released	200	177	85	0.083	0.074	0.055	70	70	53	0.029	0.029	0.024
	total	200	177	85	0.083	0.074	0.055	281	281	151	0.117	0.117	0.071
French River	harvested	0	0	0	0.000	0.000	0.000	459	459	140	0.130	0.130	0.003
	released	25	25	14	0.007	0.007	0.004	106	90	54	0.030	0.025	0.014
	total	25	25	14	0.007	0.007	0.004	565	549	170	0.159	0.155	0.030
Sucker River	harvested	11	11	11	0.003	0.003	0.003	221	221	76	0.062	0.062	0.020
	released	368	347	79	0.103	0.097	0.017	105	84	43	0.029	0.024	0.012
	total	378	357	84	0.106	0.100	0.019	326	305	98	0.091	0.086	0.025
Knife River	harvested	0	0	0	0.000	0.000	0.000	28	28	24	0.015	0.015	0.011
	released	254	240	101	0.133	0.126	0.031	0	0	0	0.000	0.000	0.000
	total	254	240	101	0.133	0.126	0.031	28	28	24	0.015	0.015	0.011
Stewart River	harvested	0	0	0	0.000	0.000	0.000	47	47	19	0.025	0.025	0.008
	released	574	515	183	0.305	0.273	0.078	47	47	28	0.025	0.025	0.014
	total	574	515	183	0.305	0.273	0.078	94	94	42	0.050	0.050	0.018
Silver Creek	harvested	0	0	0	0.000	0.000	0.000	9	9	7	0.069	0.069	0.033
	released	56	56	44	0.427	0.427	0.222	0	0	0	0.000	0.000	0.000
	total	56	56	44	0.427	0.427	0.222	9	9	7	0.069	0.069	0.033
Gooseberry River	harvested	0	0	0	0.000	0.000	0.000	0	0	0	0.000	0.000	0.000
	released	223	178	119	0.686	0.548	0.227	0	0	0	0.000	0.000	0.000
	total	223	178	119	0.686	0.548	0.227	0	0	0	0.000	0.000	0.000
Split Rock River	harvested	0	0	0	0.000	0.000	0.000	14	14	11	0.007	0.007	0.006
	released	307	300	104	0.158	0.155	0.054	7	0	0	0.004	0.000	0.000
	total	307	300	104	0.158	0.155	0.054	21	14	11	0.011	0.007	0.006

**Table 5. (continued) Rainbow trout catch and catch rate estimates by station, 2013 Lake Superior spring creel survey. Standard errors (SE) are shown.**

		Standard Spring Creel											
		Unclipped steelhead						Clipped rainbow trout					
Station		Catch ≥16			Rate ≥16			Catch ≥16			Rate ≥16		
		All	inches	(SE)	All	inches	(SE)	All	inches	(SE)	All	inches	(SE)
Beaver River	harvested	0	0	0	0.000	0.000	0.000	0	0	0	0.000	0.000	0.000
	released	106	106	61	0.349	0.349	0.174	0	0	0	0.000	0.000	0.000
	total	106	106	61	0.349	0.349	0.174	0	0	0	0.000	0.000	0.000
Baptism River	harvested	0	0	0	0.000	0.000	0.000	9	9	9	0.010	0.010	0.010
	released	262	262	177	0.303	0.303	0.174	0	0	0	0.000	0.000	0.000
	total	262	262	177	0.303	0.303	0.174	9	9	9	0.010	0.010	0.010
Cross River	harvested	0	0	0	0.000	0.000	0.000	29	29	19	0.055	0.055	0.029
	released	88	88	58	0.168	0.168	0.087	0	0	0	0.000	0.000	0.000
	total	88	88	58	0.168	0.168	0.087	29	29	19	0.055	0.055	0.029
Temperance River	harvested	0	0	0	0.000	0.000	0.000	27	27	25	0.043	0.043	0.043
	released	27	27	30	0.043	0.043	0.056	0	0	0	0.000	0.000	0.000
	total	27	27	30	0.043	0.043	0.056	27	27	25	0.043	0.043	0.043
Poplar River	harvested	0	0	0	0.000	0.000	0.000	0	0	0	0.000	0.000	0.000
	released	56	0	0	0.133	0.000	0.000	0	0	0	0.000	0.000	0.000
	total	56	0	0	0.133	0.000	0.000	0	0	0	0.000	0.000	0.000
Cascade River	harvested	0	0	0	0.000	0.000	0.000	10	10	5	0.034	0.034	0.015
	released	40	40	29	0.135	0.135	0.079	0	0	0	0.000	0.000	0.000
	total	40	40	29	0.135	0.135	0.079	10	10	5	0.034	0.034	0.015
Devil Track River	harvested	0	0	0	0.000	0.000	0.000	0	0	0	0.000	0.000	0.000
	released	215	197	106	0.251	0.230	0.105	0	0	0	0.000	0.000	0.000
	total	215	197	106	0.251	0.230	0.105	0	0	0	0.000	0.000	0.000
Kadunce Creek	harvested	0	0	0	0.000	0.000	0.000	0	0	0	0.000	0.000	0.000
	released	141	125	54	0.220	0.195	0.063	0	0	0	0.000	0.000	0.000
	total	141	125	54	0.220	0.195	0.063	0	0	0	0.000	0.000	0.000
Brule River	harvested	0	0	0	0.000	0.000	0.000	0	0	0	0.000	0.000	0.000
	released	289	231	108	0.300	0.240	0.082	39	39	45	0.040	0.040	0.046
	total	289	231	108	0.300	0.240	0.082	39	39	45	0.040	0.040	0.046
Lower Shore Total	harvested	11	11	11	0.001	0.001	0.001	1,151	1,151	202	0.060	0.060	0.011
	released	2,685	2,516	339	0.139	0.130	0.020	436	392	101	0.023	0.020	0.005
	total	2,695	2,526	340	0.140	0.131	0.020	1,587	1,543	265	0.082	0.080	0.015
Upper Shore Total	harvested	0	0	0	0.000	0.000	0.000	75	75	33	0.014	0.014	0.006
	released	1,224	1,076	257	0.222	0.196	0.052	39	39	45	0.007	0.007	0.008
	total	1,224	1,076	257	0.222	0.196	0.052	114	114	56	0.021	0.021	0.010
Shorewide Total	harvested	11	11	11	0.000	0.000	0.000	1,226	1,226	204	0.049	0.049	0.009
	released	3,909	3,592	425	0.158	0.145	0.020	475	431	111	0.019	0.017	0.005
	total	3,919	3,602	426	0.158	0.145	0.020	1,701	1,657	271	0.069	0.067	0.012

**Table 5. (continued) Rainbow trout catch and catch rate estimates by station, 2013 Lake Superior spring creel survey. Standard errors (SE) are shown.**

		Kamloops Creel											
		Unclipped steelhead (n = 10)						Clipped rainbow trout (n = 42)					
Station		Catch ≥16			Rate ≥16			Catch ≥16			Rate ≥16		
		All	inches	(SE)	All	inches	(SE)	All	inches	(SE)	All	inches	(SE)
Lester River	harvested	0	0	0	0.000	0.000	0.000	6	6	4	0.017	0.017	0.007
	released	13	13	7	0.036	0.036	0.015	0	0	0	0.000	0.000	0.000
	total	13	13	7	0.036	0.036	0.015	6	6	4	0.017	0.017	0.007
McQuade Harbor	harvested	0	0	0	0.000	0.000	0.000	48	48	21	0.037	0.037	0.014
	released	19	19	20	0.014	0.014	0.015	0	0	0	0.000	0.000	0.000
	total	19	19	20	0.014	0.014	0.015	48	48	21	0.037	0.037	0.014
French River	harvested	0	0	0	0.000	0.000	0.000	169	169	53	0.075	0.075	0.009
	released	34	34	16	0.015	0.015	0.005	34	17	8	0.015	0.008	0.003
	total	34	34	16	0.015	0.015	0.005	203	186	56	0.090	0.083	0.007
Sucker River	harvested	0	0	0	0.000	0.000	0.000	0	0	0	0.000	0.000	0.000
	released	0	0	0	0.000	0.000	0.000	0	0	0	0.000	0.000	0.000
	total	0	0	0	0.000	0.000	0.000	0	0	0	0.000	0.000	0.000
Knife River	harvested	0	0	0	0.000	0.000	0.000	0	0	0	0.000	0.000	0.000
	released	0	0	0	0.000	0.000	0.000	0	0	0	0.000	0.000	0.000
	total	0	0	0	0.000	0.000	0.000	0	0	0	0.000	0.000	0.000
Lower Shore Total	harvested	0	0	0	0.000	0.000	0.000	223	223	57	0.054	0.054	0.017
	released	66	66	27	0.016	0.016	0.007	34	17	8	0.008	0.004	0.002
	total	66	66	27	0.016	0.016	0.007	257	240	60	0.062	0.058	0.018

**Table 6. Size distribution of rainbow trout above and below the legal size limit, 2013 Lake Superior spring creel survey.**

Category	Standard Spring Creel				Category	Kamloops Creel			
	Less than 16 inches		16 inches or greater			Less than 16 inches		16 inches or greater	
	N	%	N	%		N	%	N	%
Unclipped Steelhead	316	8%	3,603	92%	Unclipped Steelhead	0	0%	66	100%
Clipped Steelhead	0	0%	0	0%	Clipped Steelhead	0	0%	0	0%
Kamloops	44	3%	1,657	97%	Kamloops	17	7%	240	93%
All Rainbow Trout	360	6%	5,260	94%	All Rainbow Trout	17	5%	306	95%



**Table 7. Catch rates (fish/angler-hour) for rainbow trout, Lake Superior spring creel survey, 2002-2013. The 1992-2012 range is included.**

		Standard Spring Creel												
		2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	Range 92-12
Unclipped steelhead	Lower Shore	0.060	0.025	0.054	0.063	0.109	0.105	0.129	0.115	0.143	0.103	0.074	0.131	0.010 - 0.143
	Upper Shore	0.206	0.206	0.152	0.167	0.207	0.183	0.208	0.111	0.177	0.214	0.159	0.196	0.031 - 0.214
	Shorewide	0.078	0.050	0.068	0.076	0.125	0.118	0.147	0.115	0.149	0.126	0.094	0.145	0.020 - 0.149
Clipped rainbow trout	Lower Shore	0.128	0.187	0.148	0.144	0.071	0.066	0.043	0.071	0.052	0.064	0.051	0.080	0.043 - 0.187
	Upper Shore	0.076	0.062	0.032	0.052	0.016	0.023	0.035	0.009	0.016	0.036	0.024	0.021	0.007 - 0.083
	Shorewide	0.122	0.170	0.131	0.132	0.062	0.059	0.041	0.064	0.045	0.058	0.044	0.067	0.040 - 0.170
All rainbow trout	Lower Shore	0.188	0.212	0.202	0.207	0.180	0.171	0.172	0.186	0.195	0.167	0.125	0.211	0.068 - 0.270
	Upper Shore	0.282	0.268	0.183	0.218	0.222	0.206	0.243	0.120	0.193	0.250	0.183	0.216	0.042 - 0.292
	Shorewide	0.200	0.220	0.199	0.208	0.187	0.177	0.188	0.179	0.194	0.184	0.138	0.212	0.070 - 0.262

**Table 8. Mean length, weight, and yield of selected species, 2013 Lake Superior spring creel survey. Standard errors are in italics. Rainbow trout length and weight numbers exclude sub-legal fish.**

	Standard Spring Creel									
	Unclipped Steelhead		Clipped Rainbow Trout		Brook Trout		Suckers		Coho Salmon	
	>16"	(SE)	>16"	(SE)	Trout	(SE)		(SE)	Salmon	(SE)
Number reported in creel	3,603	426	1,657	271	226	69	611	210	16	11
<b>Length (in)</b>										
Harvested	28.0	0.0	23.2	0.3					16.0	0.5
Released	23.9	0.2	23.1	0.5	11.7	0.8	15.7	0.3		
All	24.0	0.2	23.1	0.2	11.7	0.8	15.7	0.3	16.0	0.5
<b>Weight (lb)</b>										
Harvested	6.8	0.0	4.8	0.1					1.4	0.1
Released	4.6	0.1	4.8	0.2	0.6		1.8	0.1		
All	4.6	0.1	4.8	0.1	0.1		1.8	0.1	1.4	0.1
Estimated number harvested	11	11	1226	204	0	0	0	0	16	11
<b>Yield (lb)</b>	75	74.8	5,897	413.2	0	0.0	0	0.0	22	11.0

**Table 9. The estimated age distribution of Kamloops caught in the 2013 Lake Superior spring creel survey. Ages were assigned based on the age distribution of fish captured in the French River trap.**

Age	Standard Spring Creel															
	2		3		4		5		6		7		8		Total	
	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%
Number	67	4%	295	17%	990	58%	253	15%	77	5%	19	1%	0	0%	1701	100%

**Table 10. Catch rates of unclipped steelhead and clipped rainbow trout (≥16 inches) in streams and the lake, 2013 Lake Superior spring creel survey. Standard errors (SE) of catch and catch rates are in italics.**

<b>Standard Spring Creel</b>								
	<b>Unclipped Steelhead</b>				<b>Clipped Rainbow Trout</b>			
	Stream	<i>SE</i>	Lake	<i>SE</i>	Stream	<i>SE</i>	Lake	<i>SE</i>
<b>Lower Shore</b>								
Catch	2,473	<i>339</i>	53	<i>33</i>	761	<i>140</i>	782	<i>225</i>
Catch Rate (Fish/a-hour)	0.187	<i>0.030</i>	0.009	<i>0.006</i>	0.058	<i>0.012</i>	0.128	<i>0.042</i>
<b>Upper Shore</b>								
Catch	1,076	<i>257</i>	0	<i>0</i>	114	<i>56</i>	0	<i>0</i>
Catch Rate (Fish/a-hour)	0.207	<i>0.055</i>	0.000	<i>0.000</i>	0.022	<i>0.011</i>	0.000	<i>0.000</i>
<b>Shorewide</b>								
Catch	3,549	<i>425</i>	53	<i>33</i>	875	<i>151</i>	782	<i>225</i>
Catch Rate (Fish/a-hour)	0.193	<i>0.027</i>	0.008	<i>0.005</i>	0.048	<i>0.009</i>	0.122	<i>0.040</i>

**Table 11. The estimated number of anglers that have participated in the Lake Superior spring anadromous fishery 1996-2013. The 95% confidence limits are shown.**

<b>Standard Spring Creel</b>		
Year	Angler Estimate	95% CI
96	832	393 - 1,336
97	1,269	764 - 1,775
98	1,463	756 - 2,170
99	1,587	1,051 - 2,122
00	1,454	775 - 2,601
01	1,069	494 - 1,725
02	833	416 - 1,329
03	1,218	468 - 1,968
04	1,752	923 - 2,712
05	2,133	1,122 - 3,145
06	1,794	703 - 2,885
07	2,073	840 - 3,744
08	1,664	757 - 2,571
09	1,923	1,106 - 2,741
10	2,070	1,112 - 3,080
11	2,243	1,379 - 3,107
12	1,698	1,078 - 2,318
13	1,325	769-1,882

**Table 12. Catch and catch rate estimates for brook trout, coho salmon, and suckers in the 2013 Lake Superior spring creel survey. Standard errors are in italics.**

		<b>Standard Spring Creel</b>					
		Brook trout	<i>(SE)</i>	Coho salmon	<i>(SE)</i>	Suckers	<i>(SE)</i>
<b>Lower Shore</b>							
Catch	Harvested	0	<i>0</i>	16	<i>11</i>	0	<i>0</i>
	Released	31	<i>20</i>	0	<i>0</i>	273	<i>93</i>
	Total	31	<i>20</i>	16	<i>11</i>	273	<i>93</i>
Catch Rate	Harvested	0.000	<i>0.000</i>	0.001	<i>0.001</i>	0.000	<i>0.000</i>
	Released	0.002	<i>0.001</i>	0.000	<i>0.000</i>	0.014	<i>0.005</i>
	Total	0.002	<i>0.001</i>	0.001	<i>0.001</i>	0.014	<i>0.005</i>
<b>Upper Shore</b>							
Catch	Harvested	0	<i>0</i>	0	<i>0</i>	0	<i>0</i>
	Released	195	<i>66</i>	0	<i>0</i>	338	<i>189</i>
	Total	195	<i>66</i>	0	<i>0</i>	338	<i>189</i>
Catch Rate	Harvested	0.000	<i>0.000</i>	0.000	<i>0.000</i>	0.000	<i>0.000</i>
	Released	0.035	<i>0.013</i>	0.000	<i>0.000</i>	0.061	<i>0.035</i>
	Total	0.035	<i>0.013</i>	0.000	<i>0.000</i>	0.061	<i>0.035</i>
<b>Shorewide</b>							
Catch	Harvested	0	<i>0</i>	16	<i>11</i>	0	<i>0</i>
	Released	226	<i>69</i>	0	<i>0</i>	611	<i>210</i>
	Total	226	<i>69</i>	16	<i>11</i>	611	<i>210</i>
Catch Rate	Harvested	0.000	<i>0.000</i>	0.001	<i>0.000</i>	0.000	<i>0.000</i>
	Released	0.009	<i>0.003</i>	0.000	<i>0.000</i>	0.025	<i>0.009</i>
	Total	0.009	<i>0.003</i>	0.001	<i>0.000</i>	0.025	<i>0.009</i>