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MINNESOTA DEPARTMENT OF NATURAL RESOURCES
DIVISION OF FISH AND WILDLIFE
SECTION OF FISHERIES

COMPLETION REPORT
LAKE SUPERIOR SUMMER CREEL SURVEY
2015

by
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Abstract

Minnesota-based fishing effort in the Minnesota waters of Lake Superior in the summer creel survey for 2015 was 204,881 angler hours, which was a 27% increase from 2014. Fishing effort was at its highest level since 1993. Anglers fished 97.8% of the time from boats and 2.2% of the time from the shore. Boat fishing effort was greatest in the Duluth area in August, and shore fishing was greatest in the McQuade-Two Harbors area in July. Unlike the cold start in 2014, the fishing season in 2015 began normally and progressed up the shoreline through the summer.

Anglers caught 36,863 salmonids, of which 33,864 were harvested. Anglers caught 38% more salmonids than in 2015. Salmonid catch and harvest rates in 2015 were 0.1799 and 0.1653 fish per angler hour, respectively, which were about 10-15% higher than in 2014.

Anglers caught 29,077 Lake Trout, of which 26,627 were harvested. Lake Trout accounted for 79% of all salmonids caught and 79% of all salmonids harvested. Wild fish comprised 92.1% of the harvested Lake Trout, up from 89.5% in 2014. Anglers kept 0.13 and released 0.0119 Lake Trout per angler hour. Anglers caught 0.1419 Lake Trout per angler hour, which was 3% higher than in 2014 despite the warmer spring temperatures and substantial increase in effort.

Coho, Chinook, and Pink Salmon, and steelhead Rainbow Trout also contributed to the 2015 summer Lake Superior fishery. Anglers harvested 4,016 Coho Salmon at a rate of 0.0196 fish per angler hour, which was 72% higher than the rate of 0.0114 fish per angler hour in 2014. Anglers harvested 1,834 Chinook Salmon at a rate of 0.0090 fish per angler hour, which was similar to the harvest rate of 0.0094 fish per angler hour in 2014. The average length of a harvested Chinook Salmon was 24.7 inches in 2015, which is 2.9 inch longer than in 2014. Salmon catches were lower in the Upper Shore area than in the Lower Shore area, as usual. Anglers caught 41 Pink Salmon in 2015. Anglers also kept 7 and released 373 steelhead, kept 107 and released 14 other salmonids which included Brook Trout, Brown Trout, and Kamloops Rainbow Trout, kept 19 Lake Whitefish and 9 Cisco, and kept 110 and released 72 Walleyes.

Wisconsin-based sport anglers who fished in the Minnesota Waters of Lake Superior, excluding Charter anglers, fished for an additional 5,577 hours and caught an additional 696 Lake Trout, 63 Siscowet Lake Trout, 222 Coho Salmon, 54 Chinook Salmon, 15 Brown Trout, 3 Northern Pike, 18 Rainbow Trout, and 15 Walleyes.

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Introduction

Lake Superior and the portions of its tributaries available to anadromous fishes offer unique habitats that support fisheries, which contribute to the diversity of angling opportunities in Minnesota. Several salmonids, including Lake Trout *Salvelinus namaycush*, Rainbow Trout *Oncorhynchus mykiss*, Coho Salmon *O. kisutch*, and Chinook Salmon *O. tshawytscha*, provide recreational fisheries along the North Shore of Lake Superior throughout the year.

During the first half of the 20th century, Lake Trout was the mainstay of the Lake Superior sport fishery and, along with Cisco *Coregonus artedi*, supported an important commercial fishery. By the late 1940s the Lake Trout harvest began to decline as a result of overfishing (Hansen et al. 1995). During the 1950s the Sea Lamprey *Petromyzon marinus* became established in Lake Superior and preyed heavily on Lake Trout. Lake Trout could not withstand the additional mortality caused by Sea Lamprey, and both sport and commercial fisheries collapsed. By the early 1960s, effective control of Sea Lamprey had been achieved. Minnesota and other states and provinces began salmonid stocking programs to rehabilitate the depleted Lake Trout stocks and to introduce new strains of salmon species to diversify the fishery. Creel surveys have been used to monitor the recreational fishery in Minnesota waters of Lake Superior for more than 40 years. Creel surveys have been conducted annually during late spring–early autumn since 1969. This report presents results from Minnesota's 2015 Lake Superior summer creel survey. All data are from anglers who fished in Minnesota waters and returned to a Minnesota access, unless noted otherwise.

Methods

The summer Lake Superior creel survey is access-based and follows a stratified random statistical design. The basic statistical method and formulas are described by Bindman and Mach (1997), and more detail of the design of the Lake Superior summer creel survey is described by Halpern (1995a, b). The survey included two types of anglers, which were boaters from charter docks, public accesses, and marinas, and also shore anglers at the public accesses and marinas. The survey included only anglers who fished in Lake Superior and excluded angling that occurred in the St Louis Estuary or in tributaries. The St Louis Estuary was surveyed separately in open water season of 2015 and is reported by Varian (2016). Previous creel surveys were conducted from the

Memorial Day weekend through September 30. However, the Lake Trout season was extended through the first full weekend in October beginning in 2011 at anglers' requests. Unlike the previous two years in 2013 and 2014, spring arrived at the normal pace in 2015. The 2015 survey began on Memorial Day weekend (May 25) and ended when the Lake Trout season ended (October 4). May data are included in the June estimates and October data are included in the September estimates. The creel clerks visited the stations and groups of stations, or Clusters, that are described in Table 1. Clusters 1 and 2 are to the south and comprise the Lower Shore, whereas Clusters 3 and 4 are to the north and comprise the Upper Shore. Halpern (2003) describes the general mechanics of the creel survey in more detail.

Age distribution of Lake Trout caught in the Lake Superior summer creel survey was determined using an age-length key based on all aged Lake Trout, both stocked and wild, captured in assessments during 2011-2015. References to 2014 creel numbers are from Reeves (2015).

Results and Discussion

Fishing Effort

Recreational fishing effort (effort) from anglers who used Minnesota accesses or fished from the Minnesota shoreline was estimated from 569 activity counts for the Lower Shore and 536 activity counts for the Upper Shore (Table 2). Effort along the North Shore was measured on 121 out 135 days during the season. The estimated total fishing effort for Minnesota waters of Lake Superior during the 2015 summer creel survey was 210,458 angler hours (AH: Table 3), which includes 204,881 AH from Minnesota-based anglers and 5,577 AH from Wisconsin-based anglers (WIDNR data). Effort increased by 27% from 2014 to 2015 (Figure 1) and was at its highest level since 1993. In 1994, the survey design was changed to exclude shoreline angling at select stations that produced few fish in most years. Since 1994, effort has varied between about 138,000 and 180,000 AH (Figure 1) except for 2007 when effort exceeded 202,000 AH and in 2015 as noted previously. Effort in the Lower Shore area in 2015 accounted for 78% of total Minnesota summer angling effort on Lake Superior (Table 3).

Lake Superior boat anglers accounted for 97.8% of the effort and shore anglers accounted for 2.2% of the effort. Overall summer boat effort was similar between the Duluth and McQuade-Two Harbors areas and lowest in the Grand Marais area (Table 4). Monthly effort from boats was greatest from the McQuade-Two Harbor area in

the May-June period, was similar between the Duluth and McQuade-Two Harbors areas in July, shifted back to the Duluth area in August, and shifted again to the McQuade-Two Harbors area in the September-October period (Table 3). Boating effort at the northern-most stations was relatively low again in 2015 (Table 3).

Shoreline anglers fished for 4,545 AH in 2015 (Table 3), which is a 90% increase from 2,386 AH in 2014. Shore angling continues to comprise a small fraction of summer angling effort on Lake Superior. The highest shore angling effort (70%) was observed in the McQuade-Two Harbors area in Cluster 2 (Table 4).

Catch and Catch Rates

Salmonids

Anglers caught 36,864 salmonids in 2015, which was 40% higher than the relatively low catch of 26,261 salmonids in 2014. Anglers released 9% of their catch (Table 5). Anglers caught 0.1799 salmonids per AH and they kept 0.1653 salmonids per AH (Table 6) in 2015. These rates were 9-13% higher than in 2014 and reflect a slight increase in Lake Trout and Salmon catch rates since 2014 (Figure 2). Wisconsin anglers kept an additional 1,068 salmonids (WIDNR data).

Lake Trout

Anglers caught 29,077 Lake Trout in 2015, a 31% increase from 2014. Anglers caught 10% more Lake Trout in 2015 than the average of 26,414 fish in 2006-2014. Anglers also released 2,450 fish, or 8% of their catch of Lake Trout (Table 5). Anglers harvested 26,627 Lake Trout, which was 36% higher than in 2014 and close to the high harvest levels in 2007, 2010, and 2011 (Figure 3). Lake Trout accounted for 79% of all salmonids caught and 79% of all salmonids harvested. Sixty-nine percent of the harvested Lake Trout were from the Lower Shore area. Anglers caught 0.1419 Lake Trout per AH and harvested 0.13 fish per AH (Table 6). Among Minnesota boating parties, 57% caught one or more Lake Trout, 40% caught two or more, and 29% caught at least three Lake Trout per trip (Table 7).

Wisconsin-based anglers harvested an additional 696 Lake Trout in Minnesota waters in 2015 (WIDNR data) and these fish were harvested at a rate of 0.1248 fish per AH, which was 55% higher than the rate of 0.0803 fish per AH in 2014. Wisconsin-based anglers caught Lake Trout at a lower rate than Minnesota anglers fishing the same area, Cluster 1, which was 0.1664 fish per AH (Table 6). This may have occurred because Minnesota's creel

survey includes charter boats, whereas Wisconsin's creel survey does not, and the catch rates from charter boats are typically higher than for other boats.

Most harvested Lake Trout were between 17.5 and 25.4 inches in length, which is slightly smaller than in 2014, and the clerks measured no fish longer than 37.4 inches. The average length of harvested Lake Trout in 2015 was 21.4 inches (Table 8) and the average length released was 20.6 inches (Table 9). Anglers released 10% of Lake Trout that were 25 inches or longer (Table 9). The average harvested Lake Trout weighed 3.31 pounds (Table 10), which was a 5% decrease from 2014. The average harvested Lake Trout on the Upper Shore weighed 3.27 pounds, compared to a heavier average weight of 3.53 pounds on the Upper Shore (Table 10). Lake Trout yield in the sport fishery increased by 20% from 71,260 pounds in 2014 to 89,846 pounds in 2015 (Table 11). The increased yield was due to more, but smaller, fish in 2015 than in 2014. The yield in 2015 was very similar to the yield of 88,799 pounds in 2013.

The age distribution of harvested Lake Trout was determined for stocked and wild Lake Trout combined. Six, seven and eight year old fish made up about half (48%) of the Lake Trout that were harvested. Six, seven, eight, and nine-year old fish each comprised at least 10% of the harvest. (Table 12); this represents a slight shift to younger ages than in 2014, which was also slightly younger than in 2013. Older Lake Trout, at least nine years old, made up 49% of the harvest by number, which is slightly less than the 56% of older fish in 2013 and similar to 47% in 2014. The presence of many adult year classes continues to indicate that the Lake Trout population has been rehabilitated. However, the age distribution should be monitored to ensure that spawner abundance is adequate to sustain the fishery.

In 2015, creel clerks checked 999 Lake Trout and observed no fin clips on 92% of harvested fish, which indicates that the fish were wild and not stocked. By catch location, fish in the Grand Marais area were 99% wild, fish in the Duluth area were 89% wild, and fish from the McQuade-Two Harbors and the Twin Points-Tofte areas were intermediate. Overall, the proportion of wild fish in the summer creel survey was the highest percentage of wild Lake Trout that has been observed since Lake Trout rehabilitation efforts began (Figure 4). In statistical districts MN-2 and MN-3, the criteria established in the Lake Trout Rehabilitation Plan (Hansen 1996) and the Fisheries Management Plan for the Minnesota Waters of Lake Superior (Schreiner et al. 2006) to discontinue

stocking were met. Lake Trout were stocked in the Lower Shore through 2015 and were not stocked in the Upper Shore area after 2003.

Siscowet

Siscowet Lake Trout (deepwater form) have generally contributed little to the sport fishery; however, anglers in 2015 noted an upturn in siscowet catches. In 2015, anglers kept 1,232 siscowet, nearly all (1,209) in the Lower Shore area. More boat angling parties (12%) caught at least one siscowet in 2015 compared to 2014 (0.3%; Table 7). Wisconsin anglers also reported keeping more siscowet, 63 fish, in 2015 compared to just 8 in 2014.

Coho Salmon

Anglers kept 4,016 and released 29 Coho Salmon in 2015 (Table 5). The catch increased by 119% from 2014. Anglers harvested 0.0196 Coho Salmon per AH in 2015 (Table 6), which was 72% higher than the rate of 0.0114 fish per AH in 2014 and less than half of the maximum rate of 0.0428 Coho Salmon per AH in 2013. Most (59%) Coho Salmon were caught in the McQuade-Two Harbors area. Generally, Coho Salmon are first caught in the Lower Shore area and then later in the Upper Shore; this pattern was repeated in 2015, unlike in 2014 when few salmon were caught in the Upper Shore area. Among boating parties, only 12% caught one or more Coho Salmon and only 4% caught two or more Coho Salmon (Table 7). Wisconsin anglers harvested 222 Coho Salmon in Minnesota waters in 2015, which is a 178% increase from 2014. The average length of Coho Salmon harvested in Minnesota waters of Lake Superior in 2015 was 20.1 inches (Table 8), which was about 3.2 inches longer than the average length of 16.9 inches in 2014, and the average weight increased from 1.46 pounds in 2014 to 2.54 pounds in 2015 (Table 10). Anglers harvested 10,033 pounds of Coho Salmon in 2015 (Table 11), which is an increase of 282% from the yield of 2,627 pounds in 2014 and was near the recent maximum yields of 10,676 pounds in 2012 and 13,964 pounds in 2013. The harvest of Coho Salmon has varied considerably among years (Figure 5). The variations reflect naturally fluctuating year-class strength. The high yield in 2015 was produced from a moderate catch and a large average size of Coho Salmon. Coho Salmon were last stocked in 2006 by the Michigan DNR and last stocked in Minnesota waters in 1974; thus, all Coho Salmon caught in Lake Superior are the product of natural reproduction.

Chinook Salmon

Anglers kept 1,834 and released 46 Chinook Salmon in 2015 (Table 5). The catch increased by 20% from the 1,525 fish in 2014 (Figure 6). The Lower Shore accounted for 55% of the catch of Chinook Salmon in 2015; within the Lower Shore, catches were distributed relatively evenly between the Duluth and McQuade-Two Harbors areas. Creel clerks examined 80 fish for stocking clips and observed 3 clipped fish, two in the Duluth area and one in the Twin Points-Tofte area, which indicates that Chinook Salmon stocking in other jurisdictions contributes little to the Minnesota salmon fishery. However, the presence of three clipped fish warrants attention in future surveys.

Anglers kept 0.0090 Chinook Salmon per AH in 2015, which is very similar to the harvest rate of 0.0094 fish per AH in 2014 (Table 6). Chinook Salmon harvest rates in 2015 were greatest, at 0.0209 fish per AH, in the Grand Marais area. Wisconsin anglers harvested an additional 54 Chinook Salmon in Minnesota waters in 2015, which was similar to their harvest of 67 Chinook Salmon in 2014. The 2015 Chinook Salmon harvest rate for Wisconsin anglers was 0.0097 fish per AH (WIDNR data). Among Minnesota boating parties, 11% caught one or more Chinook Salmon, 2.6% caught two or more, and 0.6% caught three or more Chinook Salmon per trip (Table 7).

The mean length of harvested Chinook Salmon in 2015 was 24.7 inches (Table 8), which was 2.9 inch longer than in 2014. Their average weight increased to 4.92 pounds (Table 10). Anglers kept 8,702 pounds of Chinook Salmon in 2015, which was 81% higher than 4,851 pounds in 2014.

Steelhead Rainbow Trout

Minnesota-based anglers caught 380 steelhead (anadromous Rainbow Trout) in 2015 (Table 5), which was 38% higher than their catch of 276 steelhead in 2014. The largest steelhead catches occurred in the Twin Points-Tofte area (Table 5). Anglers kept just seven steelhead in the summer of 2015.

Pink Salmon

Anglers caught 41 Pink Salmon *Oncorhynchus gorbuscha* in 2015 (Table 5). Pink Salmon catches have fluctuated considerably over time, ranging from 0 fish in the late 1980s to 4,139 fish in 2010. Pink Salmon reproduce naturally in Lake Superior (Schreiner et al. 2006) and the fluctuations in catch reflect the fluctuations in reproductive success of Pink Salmon along the North Shore.

Other Species

Other species are generally caught in low numbers during the summer creel survey. In 2015, anglers reported keeping one Brown Trout *Salmo trutta*, two Brook Trout *Salvelinus fontinalis*, two Kamloops Trout, and releasing one Brook Trout. Catch data for the infrequently-caught salmonids were combined and reported as 121 other salmonids (Table 5). The combined catch rate for other salmonids was 0.0006 fish per AH. Minnesota anglers also kept an estimated 110 Walleye *Sander vitreus*, 19 Lake Whitefish *Coregonus clupeaformis*, and 9 Cisco (Table 5). Anglers reported keeping one Northern Pike *Esox lucius*. Wisconsin-based anglers caught an estimated 15 Brown Trout, 18 Rainbow Trout, 3 Northern Pike, and 15 Walleyes.

Summary

The Lake Superior creel survey continues to provide essential information on the fishery in Minnesota waters of Lake Superior. This is vital to the future management of Lake Superior fish stocks and for coordinated management among Lake Superior fisheries management agencies. After two cold years in 2013 and 2014, fishing effort and success patterns were more similar to previous years. The warmer weather and slightly higher catch rates may have produced the high effort in 2015. The Lake Trout catches and catch rates were not as high as their maximum levels in 2011, and the salmon catches and catch rates were also not at their maximum levels, however the combination of high effort and decent fishing led to high catches of salmonids overall. The Lake Trout are now mostly (92%) wild, not clipped, and this is especially true in the Upper Shore where 99% of the harvested fish were wild. Salmon and nonnative trout are less adapted to the cold waters of Lake Superior than are native Lake Trout and their catch was lower overall than prior to 2013. Following the two cold years in 2013 and 2014, the warmer season in 2015 may lead to better conditions for salmon and nonnative trout and better fishing in the coming years.

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Table 1. Creel survey clusters and stations in the 2015 Lake Superior summer creel survey.

Shore	Cluster	Station	Description
Lower	1-Duluth	1	Charter Dock
		2	Lakehead Boat Basin
		3	Rice's Point Landing
	2-McQuade to Two Harbors	4	McQuade Public Access
		5	Knife River-Knife River Marina
		6	Two Harbors-Agate Bay Access
Upper	3-Twin Points to Tofte	7	Twin Points Access
		8	Silver Bay Access and Marina
		9	Taconite Harbor, Temperance and Cross Rivers
	4-Grand Marais to Hovland	10	Grand Marais Access and Marina
		11	Devil Track and Brule Rivers, Hovland Access

Table 2. Frequency of visits and number of activity counts and interviews for each cluster and day type in the 2015 Lake Superior summer creel survey.

Cluster	Day type	Days Visited	Activity Counts	Number of Days With Fishing Interviews		Number of Interviews[1]	
				Boat	Shore	Boat	Shore
1 – Duluth	Weekday	31	186	22	0	63	0
	Weekend	25	143	22	0	96	0
	Total	56	329	44	0	159	0
2 – McQuade to Two Harbors	Weekday	22	132	19	15	124	27
	Weekend	18	108	17	13	160	35
	Total	40	240	36	28	284	62
3 – Twin Points to Tofte	Weekday	30	186	24	4	73	5
	Weekend	26	150	15	3	84	3
	Total	56	336	39	7	157	8
4 – Grand Marais to Hovland	Weekday	23	115	20	14	117	24
	Weekend	17	85	15	13	98	22
	Total	40	200	35	27	215	46
Lower Shore	Weekday	53	318	42	15	189	27
	Weekend	43	251	38	13	254	35
	Total	96	569	80	28	443	62
Upper Shore	Weekday	53	301	45	18	195	29
	Weekend	43	235	29	16	177	25
	Total	96	536	74	34	372	54
Total	Weekday	78	607	64	41	384	56
	Weekend	43	498	34	30	431	60
	Total	121	1105	98	71	815	116

[1] 3 angling parties refused to be interviewed

Table 3. Fishing effort estimates, in angler-hours[1], in the 2015 Lake Superior summer creel survey[2]. SE in parentheses.

	Boat Anglers					Shore Anglers[2]					All Anglers				
Cluster	June	July	Aug	Sept	Summer	June	July	Aug	Sept	Summer	June	July	Aug	Sept	Summer
1-Duluth	15,163	18,965	26,195	13,183	73,506	0	0	0	0	0	15,163	18,965	26,195	13,183	73,506
	(2,173)	(2,930)	(2,817)	(1,490)	(4,844)						(2,173)	(2,930)	(2,817)	(1,490)	(4,844)
2-McQuade- Two Harbors	20,042	20,052	14,025	16,252	70,371	523	533	509	1,613	3,178	20,565	20,585	14,535	17,865	73,549
	(5,214)	(6,444)	(3,378)	(3,079)	(9,466)	(100)	(224)	(218)	(456)	(562)	(5,239)	(6,466)	(3,345)	(3,211)	(9,526)
3-Twin Points-Tofte	2,779	13,043	12,581	6,881	35,284	59	60	18	22	159	2,838	13,103	12,599	6,902	35,443
	(844)	(2,074)	(2,468)	(1,372)	(3,603)	(40)	(43)	(18)	(14)	(63)	(840)	(2,082)	(2,472)	(1,376)	(3,612)
4-Grand Marais-Hovland	1,356	6,226	7,889	5,702	21,173	470	267	244	229	1,210	1,826	6,493	8,133	5,931	22,383
	(393)	(797)	(1,300)	(1,198)	(1,978)	(218)	(85)	(77)	(75)	(257)	(430)	(806)	(1,272)	(1,174)	(1,957)
Lower Shore	35,205	39,017	40,220	29,435	143,877	523	533	509	1,613	3,178	35,728	39,550	40,729	31,048	147,055
	(5,649)	(7,079)	(4,399)	(3,421)	(10,634)	(100)	(224)	(218)	(456)	(562)	(5,672)	(7,099)	(4,373)	(3,592)	(10,687)
Upper Shore	4,135	19,269	20,470	12,583	56,457	529	327	262	251	1,369	4,664	19,596	20,731	12,834	57,826
	(931)	(2,222)	(2,789)	(1,821)	(4,111)	(222)	(95)	(79)	(76)	(265)	(944)	(2,233)	(2,780)	(1,841)	(4,108)
Total Shore	39,340	58,286	60,690	42,018	200,334	1,052	860	771	1,864	4,547	40,392	59,146	61,461	43,882	204,881
	(5,725)	(7,420)	(5,208)	(3,875)	(11,401)	(243)	(243)	(232)	(462)	(621)	(5,750)	(7,442)	(5,182)	(3,975)	(11,449)

[1] Estimates were rounded to the nearest whole number.

[2] Wisconsin anglers fished an additional 5,577 hours on the Minnesota waters of Lake Superior.

[3] All shore fishing in Cluster 1 occurs in the St. Louis Estuary, not in Lake Superior, and is not included.

Table 4. Monthly distribution of fishing effort, as a percentage of angler-hours[1], in the 2015 Lake Superior summer creel survey. SE in parentheses.

		Boat Anglers					Shore Anglers[2]					All Anglers				
Cluster	Station	June	July	Aug	Sept	Summer	June	July	Aug	Sept	Summer	June	July	Aug	Sept	Summer
1-Duluth		38.6	32.5	43.2	31.4	36.7	0	0	0	0	0	37.6	32.1	42.7	30.1	35.9
	1	18.2	13.7	27.5	23.6	20.8	0	0	0	0	0	17.7	13.5	27.2	22.6	20.5
	2	14.4	16.6	13.5	4.6	12.7	0	0	0	0	0	14.1	16.4	13.3	4.4	12.5
	3	6.0	2.2	2.1	3.2	3.1	0	0	0	0	0	5.8	2.2	2.1	3.1	3.2
2-McQuade-Two Harbors		50.9	34.4	23.1	38.7	35.1	49.7	62.1	66.0	86.6	69.9	50.9	34.8	23.6	40.7	35.9
	4	25.2	9.9	7.1	15.0	13.1	22.1	21.2	5.4	2.9	11.2	25.1	10.1	7.0	14.4	13.0
	5	17.0	11.7	7.8	12.2	11.6	0	0	0	0	0	16.5	11.5	7.7	11.7	11.3
	6	8.8	12.8	8.3	11.5	10.4	27.7	40.9	60.6	83.6	58.7	9.3	13.2	8.9	14.6	11.4
3-Twin Points-Tofte		7.1	22.4	20.7	16.4	17.6	5.6	6.9	2.3	1.1	3.5	7.0	22.2	20.5	15.7	17.3
	7	0.7	6.5	3.9	3.0	3.8	3.5	7.0	0	0	2.1	0.7	6.5	3.9	2.9	3.7
	8	3.3	8.8	10.4	8.7	8.2	0	0	0	0	0	3.2	8.7	10.3	8.4	8.1
	9	3.1	7.1	6.4	4.6	5.6	2.1	0	2.3	1.1	1.3	3.1	7.0	6.3	4.5	5.5
4-Grand Marais-Hovland		3.4	10.7	13.0	13.6	10.6	44.7	31.0	31.6	12.3	26.6	4.5	11.0	13.2	13.5	10.9
	10	3.2	9.7	10.8	9.0	8.6	12.9	24.1	17.0	8.9	14.1	3.5	9.9	10.9	9.0	8.7
	11	0.2	0.9	2.2	4.5	1.9	31.7	7.0	14.6	3.4	12.5	1.0	1.0	2.4	4.5	2.2
Lower Shore		89.5	66.9	66.3	70.1	71.8	49.7	62.1	66.0	86.6	69.9	88.5	66.9	66.3	70.8	71.8
Upper Shore		10.5	33.1	33.7	29.9	28.2	50.3	37.9	34.0	13.4	30.1	11.5	33.1	33.7	29.2	28.2

[1] Estimates were rounded to the nearest whole number. Therefore, totals might not equal the sum of the individual estimates.

[2] All shore fishing in Cluster 1 occurs in the St. Louis Estuary and not in Lake Superior.

Table 5. Catch estimates[1], for boat and shore angling combined, in the 2015 Lake Superior summer creel survey. SE in parentheses.

		Lake Trout	Coho Salmon	Chinook Salmon	Steelhead	Siscowet	Pink Salmon	Other[2] Salmonids	Total Salmonids	Walleye
1-Duluth	Harvested	12,117	699	549	0	678	0	0	14,043	56
		(1,214)	(161)	(127)	(0)	(184)	(0)	(0)	(1,245)	(52)
	Released	116	0	0	0	0	0	0	116	72
		(67)	(0)	(0)	(0)	(0	(0)	(0)	(67)	(46)
	Total	12,333	699	549	0	678	0	0	14,159	128
		(1,216)	(161)	(127)	(0)	(184)	(0)	(0)	(1,247)	(70)
2-McQuade-Two Harbors	Harvested	6,333	2,364	447	0	531	18	18	9,711	18
		(1,005)	(657)	(130)	(0)	(141)	(22)	(20)	(1,216)	(22)
	Released	1,016	18	46	46	0	0	0	1,126	0
		(298)	(17)	(38)	(40)	(0)	(0)	(0)	(304)	(0)
	Total	7,349	2,382	493	46	531	18	18	10,837	18
		(1,048)	(658)	(135)	(40)	(141)	(22)	(20)	(1,254)	(22)
3-Twin Points – Tofte	Harvested	4,923	848	370	0	0	23	29	6,193	0
		(858)	(352)	(90)	(0)	(0)	(25)	(21)	(932)	(0)
	Released	626	11	0	256	87	0	0	980	0
		(288)	(9)	(0)	(94)	(72)	(0)	(0)	(312)	(0)
	Total	5,549	859	370	256	87	23	29	7,173	0
		(905)	(352)	(90)	(94)	(82)	(25)	(21)	(983)	(0)
4-Grand Marais-Hovland	Harvested	3,254	105	468	7	23	0	60	3,917	36
		(490)	(35)	(105)	(8)	(10)	(0)	(65)	(507)	(31)
	Released	692	0	0	71	0	0	14	777	0
		(238)	(0)	(0)	(27)	(0)	(0)	(14)	(240)	(0)
	Total	3,946	105	468	78	23	0	74	4,694	36
		(545)	(35)	(105)	(28)	(10)	(0)	(67)	(560)	(31)
Lower Shore	Harvested	18,450	3,063	996	0	1,209	18	18	23,754	74
		(1,576)	(677)	(182)	(0)	(232)	(22)	(20)	(1,741)	(57)
	Released	1,132	18	46	46	0	0	0	1,242	72
		(306)	(20)	(38)	(40)	(0)	(0)	(0)	(311)	(46)
	Total	19,582	3,081	1,042	46	1,209	18	18	24,996	146
		(1,606)	(677)	(186)	(40)	(232)	(22)	(20)	(1,768)	(73)
Upper Shore	Harvested	8,177	953	838	7	23	23	89	10,110	36
		(988)	(354)	(138)	(8)	(10)	(25)	(68)	(1,061)	(31)
	Released	1,318	11	0	327	87	0	14	1,757	0
		(373)	(9)	(0)	(98)	(72)	(0)	(14)	(393)	(0)
	Total	9,495	964	838	334	110	23	103	11,867	36
		(1,056)	(354)	(138)	(98)	(73)	(25)	(70)	(1,131)	(31)
Total	Harvested	26,627	4,016	1,834	7	1,232	41	107	33,864	110
		(1,860)	(764)	(229)	(8)	(232)	(33)	(71)	(2,039)	(65)
	Released	2,450	29	46	373	87	0	14	2,999	72
		(483)	(20)	(38)	(106)	(72)	(0)	(14)	(501)	(46)
	Total	29,077	4,045	1,880	380	1,319	41	121	36,863	182
		(1,922)	(764)	(232)	(106)	(243)	(33)	(73)	(2,099)	(79)

[1] Wisconsin anglers who fished Minnesota waters of Lake Superior also caught an estimated 696 Lake Trout, 63 Siscowet, 222 Coho Salmon, 54 Chinook Salmon, 15 Brown Trout, 3 Northern Pike, 18 Rainbow Trout, and 15 Walleyes.

[2] Other Salmonids include Brown Trout (11), Brook Trout (74), and Kamloops Rainbow Trout (36). Anglers also kept an estimated 19 Lake Whitefish and 9 Lake Herring.

Table 6. Catch rate (number of fish per hour) estimates, for boat and shore angling combined, in the 2015 Lake Superior summer creel survey. SE in parentheses.

		Lake Trout	Coho Salmon	Chinook Salmon	Steelhead	Siscowet	Pink Salmon	Other[2] Salmonids	Total Salmonids	Walleye
1-Duluth	Harvested	0.1648	0.0095	0.0075	0	0.0092	0	0	0.1910	0.0008
		(0.0198)	(0.0023)	(0.0018)	(0)	(0.0026)	(0)	(0)	(0.0211)	(0.0007)
	Released	0.0016	0	0	0	0	0	0	0.0016	0.001
		(0.0009)	(0)	(0)	(0)	(0)	(0)	(0)	(0.0009)	(0.0006)
	Total	0.1664	0.0095	0.0075	0	0.0092	0	0	0.1926	0.0017
		(0.0199)	(0.0023)	(0.0018)	(0)	(0.0026)	(0)	(0)	(0.0212)	(0.001)
2-McQuade-Two Harbors	Harvested	0.0861	0.0321	0.0061	0	0.0072	0.0002	0.0002	0.1320	0.0002
		(0.0176)	(0.0099)	(0.0019)	(0)	(0.0021)	(0.0003)	(0.0003)	(0.0237)	(0.0003)
	Released	0.0138	0.0002	0.0006	0.0006	0	0	0	0.0153	0
		(0.0044)	(0.0002)	(0.0005)	(0.0005)	(0)	(0)	0	(0.0046)	(0)
	Total	0.0999	0.0324	0.0067	0.0006	0.0072	0.0002	0.0002	0.1473	0.0002
		(0.0192)	(0.0099)	(0.002)	(0.0005)	(0.0021)	(0.0003)	(0.0003)	(0.0255)	(0.0003)
3-Twin Points – Tofte	Harvested	0.1389	0.0239	0.0104	0	0	0.0006	0.0008	0.1747	0
		(0.0280)	(0.0102)	(0.0028)	(0)	(0)	(0.0007)	(0.0006)	(0.0317)	(0)
	Released	0.0177	0.0003	0	0.0072	0.0025	0	0	0.0277	0
		(0.0083)	(0.0003)	(0)	(0.0028)	(0.0021)	(0)	(0)	(0.0082)	(0)
	Total	0.1566	0.0242	0.0104	0.0072	0.0025	0.0006	0.0008	0.2024	0
		(0.0301)	(0.0102)	(0.0028)	(0.0028)	(0.0021)	(0.0007)	(0.0006)	(0.0345)	(0)
4-Grand Marais-Hovland	Harvested	0.1454	0.0047	0.0209	0.0003	0.001	0	0.0027	0.1750	0.0016
		(0.0254)	(0.0016)	(0.0050)	(0.0004)	(0.0004)	(0)	(0.0029)	(0.0275)	(0.0014)
	Released	0.0309	0	0	0.0032	0		0.0006	0.0347	0
		(0.0110)	(0)	(0)	(0.0012)	(0)	(0)	(0.0006)	(0.0111)	(0)
	Total	0.1763	0.0047	0.0209	0.0035	0.001	0	0.0033	0.2097	0.0016
		(0.029)	(0.0016)	(0.005)	(0.0013)	(0.0004)	(0)	(0.003)	(0.0312)	(0.0014)
Lower Shore	Harvested	0.1255	0.0208	0.0068	0	0.0082	0.0001	0.0001	0.1615	0.0005
		(0.0141)	(0.0048)	(0.0013)	(0)	(0.0017)	(0.0001)	(0.0001)	(0.0166)	(0.0004)
	Released	0.0077	0.0001	0.0003	0.0003	0	0	0	0.0084	0.0005
		(0.0022)	(0.0001)	(0.0003)	(0.0003)	(0)	(0)	(0)	(0.0022)	(0.0003)
	Total	0.1332	0.0210	0.0071	0.0003	0.0082	0.0001	0.0001	0.1700	0.0010
		(0.0146)	(0.0048)	(0.0014)	(0.0003)	(0.0017)	(0.0001)	(0.0001)	(0.0172)	(0.0005)
Upper Shore	Harvested	0.1414	0.0165	0.0145	0.0001	0.0004	0.0004	0.0015	0.1748	0.0006
		(0.0198)	(0.0062)	(0.0026)	(0.0001)	(0.0002)	(0.0004)	(0.0012)	(0.0222)	(0.0005)
	Released	0.0228	0.0002	0	0.0057	0.0015	0	0.0002	0.0304	0
		(0.0067)	(0.0002)	(0)	(0.0017)	(0.0013)	(0)	(0.0002)	(0.0071)	(0)
	Total	0.1642	0.0167	0.0145	0.0058	0.0019	0.0004	0.0018	0.2052	0.0006
		(0.0217)	(0.0062)	(0.0026)	(0.0017)	(0.0013)	(0.0004)	(0.0012)	(0.0244)	(0.0005)
Total	Harvested	0.1300	0.0196	0.0090	0	0.0060	0.0002	0.0005	0.1653	0.0005
		(0.0116)	(0.0039)	(0.0012)	(0)	(0.0012)	(0.0002)	(0.0003)	(0.0136)	(0.0003)
	Released	0.0119	0.0001	0.0002	0.0018	0.0004	0	0.0001	0.0146	0.0004
		(0.0024)	(0.0001)	(0.0002)	(0.0005)	(0.0004)	(0)	(0.0001)	(0.0026)	(0.0002)
	Total	0.1419	0.0197	0.0092	0.0018	0.0064	0.0002	0.0006	0.1799	0.0009
		(0.0123)	(0.0039)	(0.0012)	(0.0005)	(0.0012)	(0.0002)	(0.0004)	(0.0143)	(0.0004)

[1] Wisconsin anglers who fished Minnesota waters of Lake Superior also caught an estimated 696 Lake Trout, 63 Siscowet, 222 Coho Salmon, 54 Chinook Salmon, 15 Brown Trout, 3 Northern Pike, 18 Rainbow Trout, and 15 Walleyes.

[2] Other Salmonids include Brown Trout (11), Brook Trout (74), and Kamloops Rainbow Trout (36). Anglers also kept an estimated 19 Lake Whitefish and 9 Lake Herring.

Table 7. Percent of angling parties catching specific numbers of fish in the 2015 Lake Superior summer creel survey.

	Lake Trout		Coho Salmon		Chinook Salmon		Steelhead		Siscowet		Pink Salmon		Total Salmonids	
Number of Fish Caught	Boat	Shore	Boat	Shore	Boat	Shore	Boat	Shore	Boat	Shore	Boat	Shore	Boat	Shore
0	43.0	97.1	89.5	100	88.6	100	97.4	92.3	88.5	100	99.8	100	355	97.1
1	17.5		6.3		8.8		2.0	7.7	2.7		0.2		17.2	
2	10.2	2.9	1.4		2.0		0.4		7.7				10.9	2.9
3	7.7		0.9		0.4		0.2		0.6				9.3	
4	5.6		1.0		0.1				0.1				6.3	
5	4.0		0.1		0.1				0.2				4.9	
6	2.7		0.4						0.1				3.7	
7	2.4												3.5	
8	2.1		0.2						0.1				2.2	
9	1.7												1.6	
10	0.7												1.2	
11	0.4		0.2										0.4	
>=12	2.0												3.3	

Table 8. Length-frequency distribution of harvested salmonids, by boat and shore angling combined, in the 2015 Lake Superior summer creel survey.

Length(in)	N=	Lake Trout	Coho Salmon	Chinook Salmon	Kamloops	Steelhead
6.5 - 7.4						
7.5 - 8.4						
8.5 - 9.4						
9.5 - 10.4						
10.5 - 11.4		1				
11.5 - 12.4						
12.5 - 13.4		1	1			
13.5 - 14.4		6				
14.5 - 15.4		9				
15.5 - 16.4		38	1			
16.5 - 17.4		75	1			
17.5 - 18.4		100	15	1		
18.5 - 19.4		115	37	1		
19.5 - 20.4		85	34	4		
20.5 - 21.4		120	34	2		
21.5 - 22.4		103	9	1		
22.5 - 23.4		94	8	11	1	
23.5 - 24.4		53	6	14		
24.5 - 25.5		57	2	16	1	
25.5 - 26.4		37		12		
26.5 - 27.4		33		12		
27.5 - 28.4		21		4		
28.5 - 29.4		11		2		
29.5 - 30.4		12				
30.5 - 31.4		6				
31.5 - 32.4		7				
32.5 - 33.4		2				
33.5 - 34.4		2				
34.5 - 35.4		3				
35.5 - 36.4		1				
36.5 - 37.4		1				
37.5 - 38.4						
38.5 - 39.4						
39.5 - 40.4						
40.5 - 41.4						
Average Length (in)		21.4	20.1	24.7	24.0	

Table 9. Length-frequency distribution of released salmonids, by boat and shore angling combined, in the 2015 Lake Superior summer creel survey.

Length(in)	N =	Lake Trout 122	Coho Salmon 2	Chinook Salmon 2	Pink Salmon 0	Steelhead 27
6.5 - 7.4						
7.5 - 8.4						
8.5 - 9.4						
9.5 - 10.4				1		
10.5 - 11.4						
11.5 - 12.4		5		1		
12.5 - 13.4		4				
13.5 - 14.4		11				
14.5 - 15.4		12	1			
15.5 - 16.4		20				
16.5 - 17.4		9				
17.5 - 18.4		1				
18.5 - 19.4		21	1			
19.5 - 20.4		12				
20.5 - 21.4						
21.5 - 22.4		12				1
22.5 - 23.4		1				1
23.5 - 24.4		4				2
24.5 - 25.5		2				4
25.5 - 26.4		5				6
26.5 - 27.4		2				9
27.5 - 28.4		4				3
28.5 - 29.4						
29.5 - 30.4		4				
30.5 - 31.4						
31.5 - 32.4						
32.5 - 33.4						
33.5 - 34.4						1
34.5 - 35.4		1				
35.5 - 36.4		2				
36.5 - 37.4		1				
37.5 - 38.4						
38.5 - 39.4		1				
39.5 - 40.4						
40.5 - 41.4						
Average Length (in)		20.6	17	11		26.3

Table 10. Average weight (pounds) of harvested fish in the 2015 Lake Superior summer creel survey. SE in parentheses.

Cluster	Lake Trout	Coho Salmon	Chinook Salmon	Pink Salmon[1]
Sample Size (n)	715	130	70	1
1 – Duluth	3.28	1.96	3.71	-
	(0.11)	(0.10)	(0.53)	-
2 - McQuade - Two Harbors	3.26	2.52	5.43	1.31
	(0.15)	(0.06)	(0.37)	-
3 - Twin Points - Tofte	3.69	2.69	5.00	-
	(0.56)	(0.22)	(0.42)	-
4 - Grand Marais - Hovland	3.46	3.96	5.10	-
	(0.39)	(0.48)	(0.22)	-
Lower Shore	3.27	2.42	4.73	1.31
	(0.09)	(0.06)	(0.34)	-
Upper Shore	3.53	3.64	5.08	-
	(0.32)	(0.39)	(0.19)	-
Total Shore	3.31	2.54	4.92	1.31
	(0.09)	(0.07)	(0.19)	-

[1]Only one Pink Salmon was measured.

[2]Thirty-four (34) siscowet Lake Trout were measured in 2015. The average weight was 3.41 pounds.

Table 11. Yield (pounds) estimates[1], for boat and shore angling combined, in the 2015 Lake Superior summer creel survey. SE values are in parentheses.

Cluster	Lake Trout	Coho Salmon	Chinook Salmon	Siscowet	Pink Salmon	Total Salmonids[2]
1 - Duluth	39,717	1,373	2,037	2,372	-	45,499
	(3,982)	(128)	(264)	(512)	-	(3,947)
2 - McQuade - Two Harbors	20,672	5,966	2,428	1,734	24	30,824
	(2,711)	(521)	(290)	(202)	-	(2,665)
3 - Twin Points – Tofte	18,186	2,279	1,850	0	-	22,315
	(2,802)	(301)	(183)	(0)	-	(2,671)
4 - Grand Marais – Hovland	11,271	415	2,387	0	-	14,073
	(1,889)	(84)	(169)	(0)	-	(1,809)
Lower Shore	60,389	7,339	4,465	4,106	24	76,323
	(3,482)	(412)	(274)	(403)	-	(3,433)
Upper Shore	29,457	2,694	4,237	0	-	36,388
	(2,367)	(247)	(174)	(0)	-	(2,262)
Total Shore	89,846	10,033	8,702	4,106	24	112,977
	(3,035)	(361)	(228)	(403)	-	(2,963)

[1] Estimates are rounded to the nearest pound.

[2] Anglers also harvested steelhead (34 pounds), Kamloops (132 pounds), Brook Trout (66 pounds), and Brown Trout (34 pounds).

Table 12. Age distribution, by percent, of harvested lake trout (wild and stocked) in the 2015 Lake Superior summer creel survey. n=822.

	Age												
	4	5	6	7	8	9	10	11	12	13	14	15	16+
%	0.12	2.68	12.17	17.52	18.25	11.80	9.85	8.27	6.08	3.65	1.95	2.07	5.60

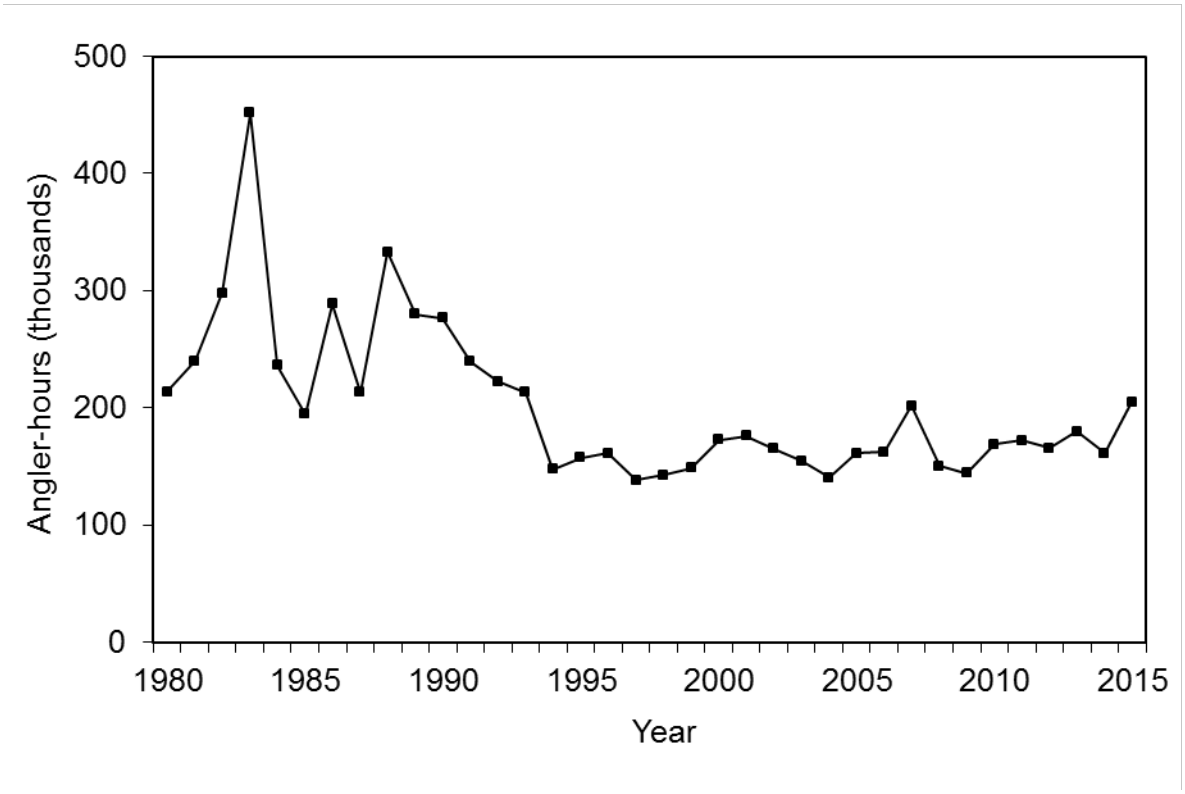

Figure 1. Angling effort in the Lake Superior summer creel survey, 1980-2015. The design of the summer Lake Superior creel survey was changed in 1994 (Halpern 1995a,b).

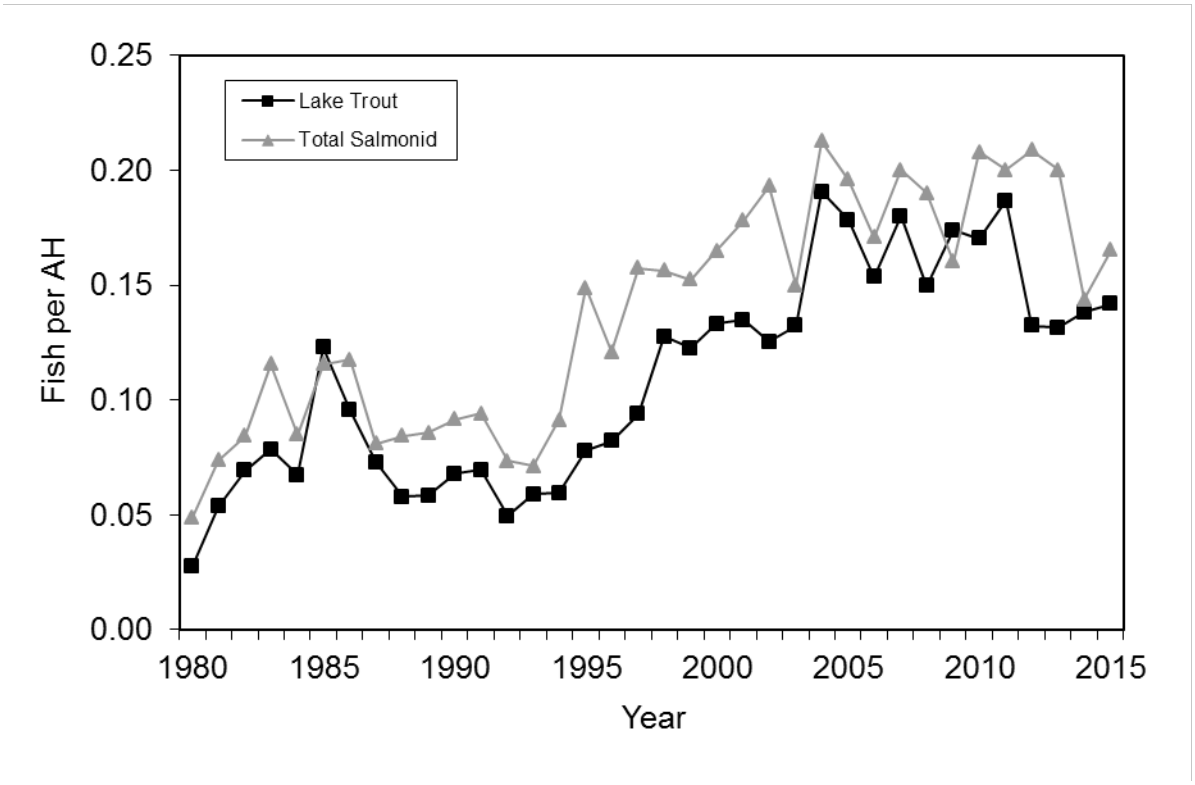

Figure 2. Harvest rate for Lake Trout and all Salmonids combined in the Lake Superior summer creel survey, 1980-2015.

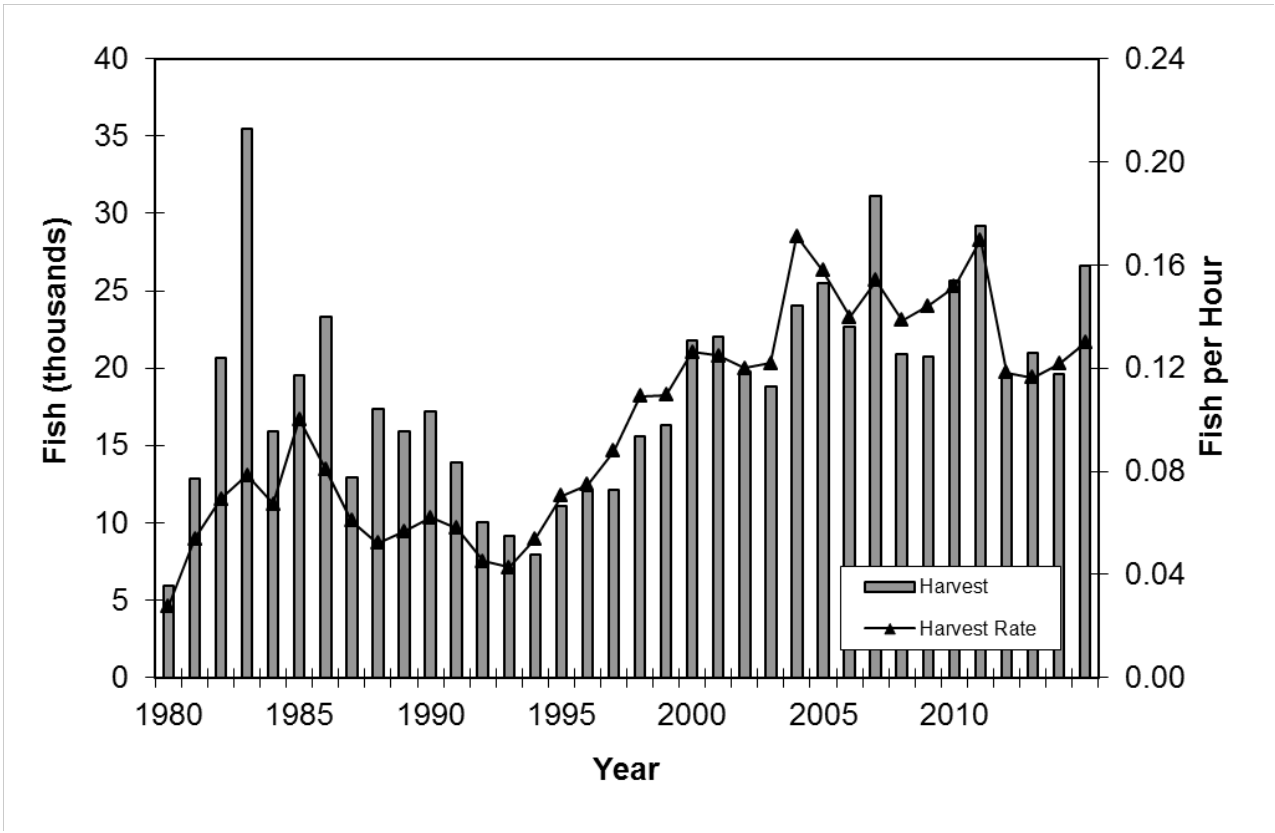

Figure 3. Lake Trout harvest and harvest rate in the Lake Superior summer creel survey, 1980-2015.

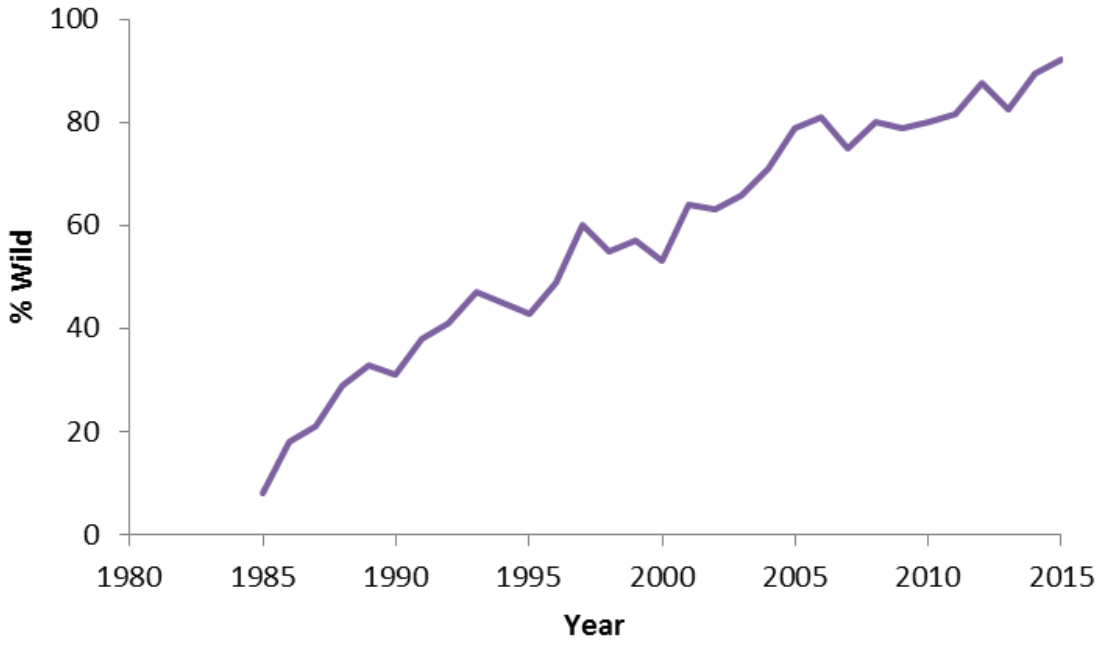

Figure 4. Percent wild Lake Trout observed by creel clerks in the Lake Superior summer creel survey, 1985-2015.

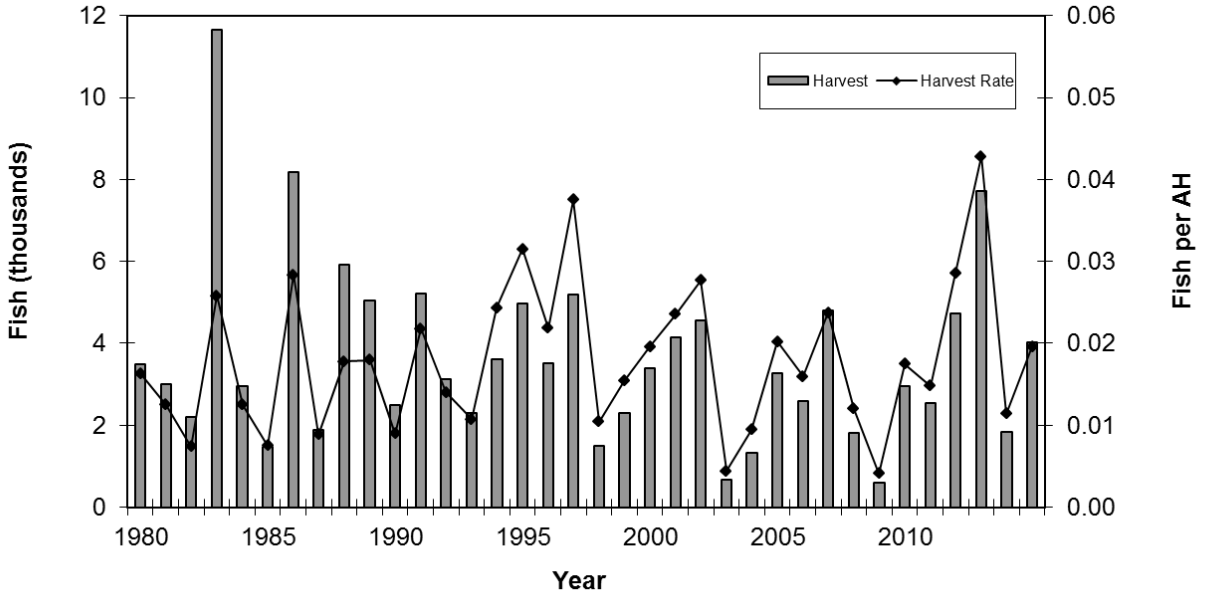

Figure 5. Coho Salmon harvest and harvest rate in the Lake Superior summer creel survey, 1980-2015.

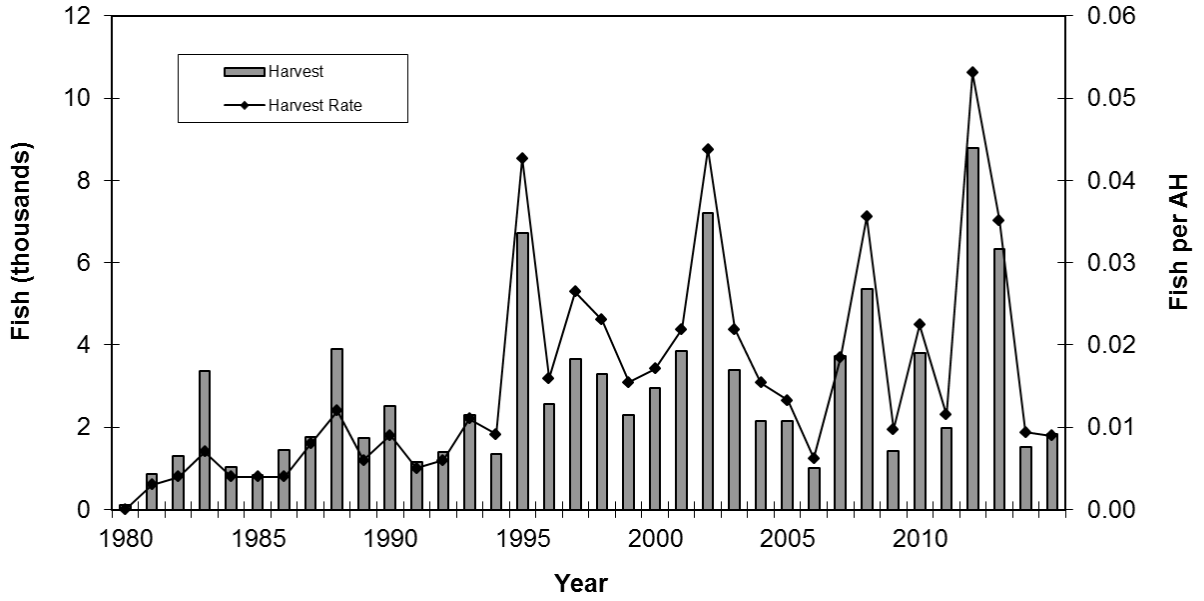

Figure 6. Chinook Salmon harvest and harvest rate in the Lake Superior summer creel survey, 1980-2015.