

## KNIFE RIVER FISH TRAP REPORT 2021



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## Purpose & Methods

The Minnesota Department of Natural Resources (MNDNR) Knife River fish trap is used to monitor the abundance and health of migratory fishes in Minnesota waters of Lake Superior (particularly of migratory Rainbow Trout [steelhead]), and to monitor Sea lamprey control efforts in Lake Superior. The trap captures adult fish migrating upstream and adult and juvenile fish migrating downstream from the Knife River to Lake Superior. The adult trap is operated during annual spawning runs of steelhead in the spring and many other trout (Brook and Brown Trout) and salmon (Coho, Chinook, and Pink Salmon) in the fall.

All adult fish are measured, weighed, and checked for external signs of disease and lamprey wounds. All adult steelhead Rainbow Trout, Brown Trout, or Brook Trout are given a uniquely numbered grey Floy® Tag to identify individual fish for mark-recapture population estimates. All Kamloops Rainbow Trout (clipped, hatchery product) and salmon are given an unnumbered colored plastic tag to indicate when and where they were first captured. Non-lethal scale samples are collected from all adults and a subset of juveniles to evaluate age and growth. All fish are passed upstream of the trap after workup, except for Kamloops Rainbow Trout to limit reproductive and genetic risks associated with introgression into steelhead populations (Miller et al. 2020).



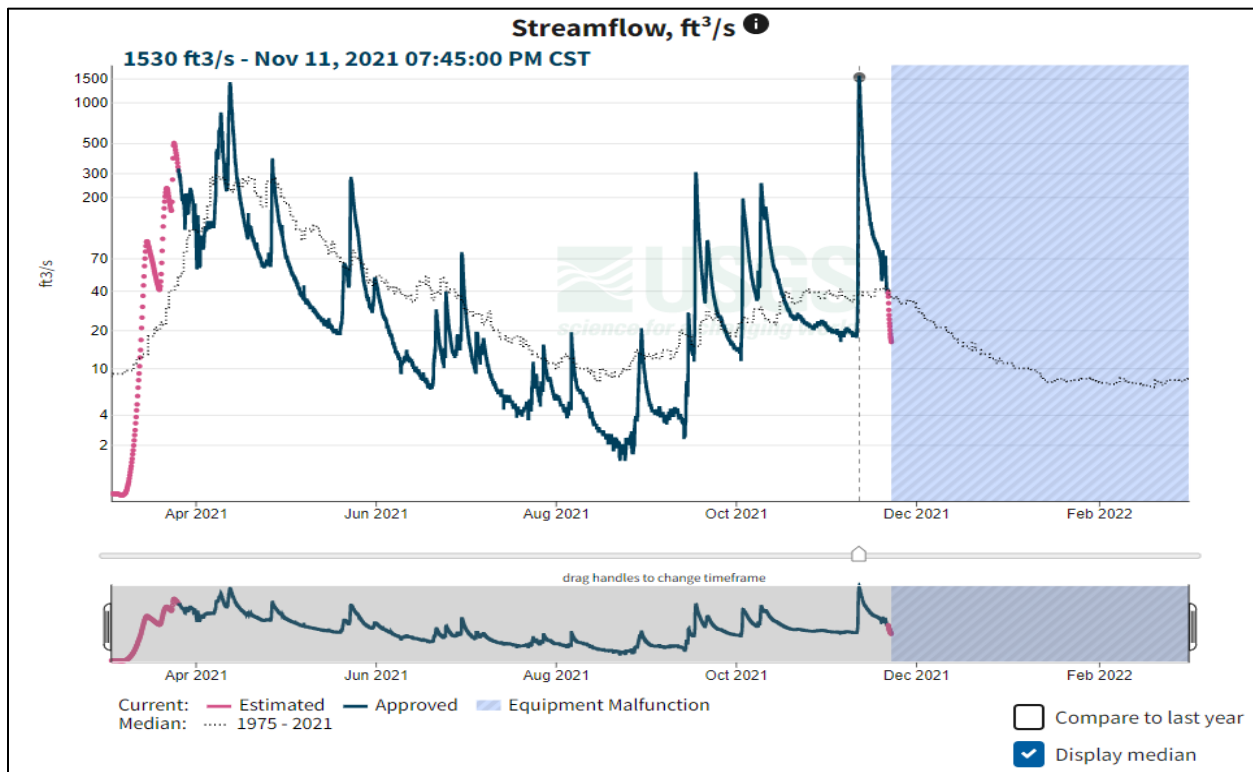
The number of juvenile fish captured in the juvenile trap each day is adjusted to account for daily flow conditions that might have allowed juvenile fish to bypass the trap. The total number of fish caught per day is adjusted using the average trap efficiency from all mark-recapture trials conducted in previous years (0.58) on all days when the gauge height at the trap was 0.20 or greater. Likewise, the number of adult steelhead captured in the trap is adjusted to account for fish that bypass the trap on their upstream migration. A population estimate is calculated during the spring spawning season using the number of adult steelhead tagged in the adult trap and put upstream, and the number of tagged and untagged steelhead recaptured in the juvenile trap headed back to Lake Superior after spawning. Population estimates for unclipped (wild-produced) steelhead are provided in this report.



## Trap Operation Dates and Environmental Conditions Summary

The Knife River traps were not operated in 2020 due to a state lockdown and the COVID pandemic. A fish bypass gate was opened in spring 2020 to allow adult steelhead to bypass the Knife River traps and spawn. Environmental Troubleshooters, Inc. donated their equipment and time to remove the bypass gate and reinstall it later in the fall. Many adult steelhead were observed jumping the bypass falls throughout the spring.

Trap operations continued in 2021 with personnel limitations and social distancing measures due to the COVID pandemic. Ice out occurred on approximately March 26 and the traps were opened on April 1. The traps were open for 187 days in 2021; 84 days in the spring (Apr. 1–Jun. 24), closed for 74 days in mid-summer (Jun. 25–Sept. 6), and then reopened for 56 days in the fall (Sept. 7–Nov. 1) (Tables 1 and 2). The winter and late-spring of 2021 provided decent amounts of snow and rain to sustain adequate stream flows in the spring. However, air temperatures were well above normal for a week or two in the early-spring and significantly reduced snow in the watershed. Streamflow in the spring peaked on April 12 (1,410 ft<sup>3</sup>/s) and remained lower than the historic median throughout the spring season. Stream conditions remained low and warm throughout the summer months and into the fall. A few rainfall events that maintained around average streamflow in the fall and peak streamflow in one event in the fall (Nov. 11, 1,570 ft<sup>3</sup>/s) exceeded peak streamflow in the spring. The traps were closed prior to this peak streamflow event due to ice formation prior to this date. Streamflow data was provided by the U.S. Geological Survey (monitoring location: [04015330](#); Figure 1).

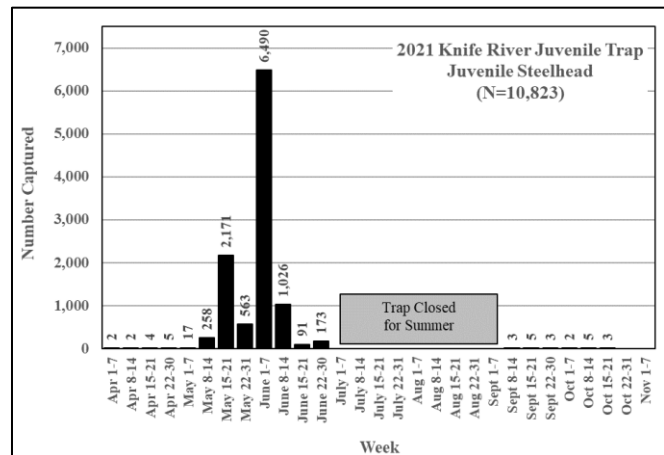


**Figure 1.** Knife River streamflow (ft<sup>3</sup>/s) data provided by the U.S. Geological Survey (monitoring location: [04015330](#)).

## Catch Summary by Species

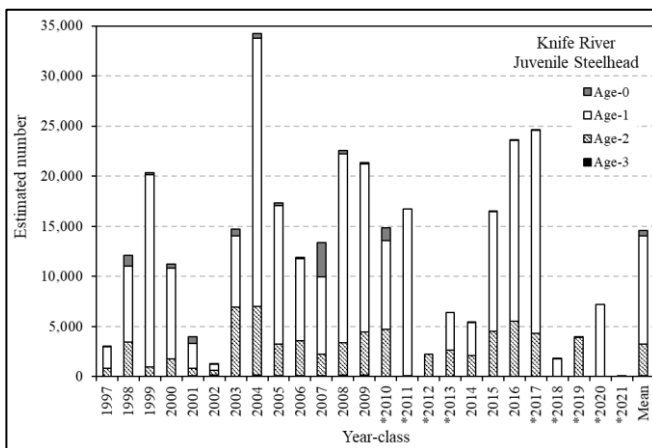
### ***Unclipped (wild-produced) Steelhead***

Unclipped (wild-produced) steelhead were the most abundant juvenile steelhead captured in 2021 (99% of total catch). In total, 10,823 juvenile steelhead were captured in 2021 which was lower than the historic average of 12,837 (range: 1,856-23,971). The population estimate after accounting for daily trap efficiencies was 11,139, which was slightly below the historic average of 14,324 (range: 2,069-34,108). Almost all juvenile steelhead were captured in May (28%, 3,009) and June (72%, 7,708)(Figure 2). Approximately 66% (7,101) were age-1, 34% (3,707) were age-2, and 1% or less were age-0 (5) and age-3 (4) (Figure 3).

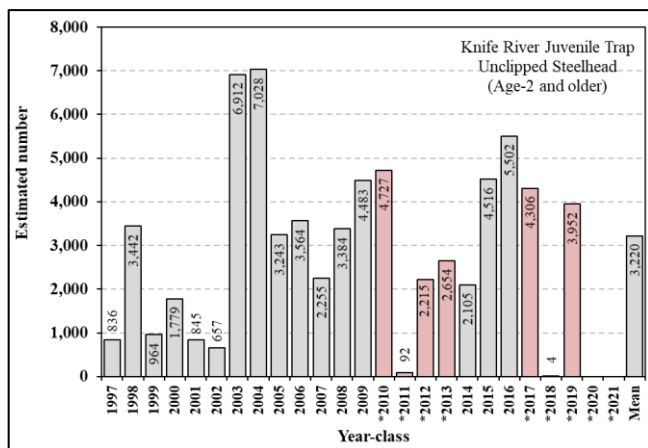


**Figure 2.** The number of unclipped (wild-produced) juvenile steelhead captured in the Knife River juvenile fish trap by week in 2021.

Age-2 and older steelhead smolts are very important because they survive significantly better in Lake Superior than younger or smaller age-1 parr. Age-2 smolts are most likely imprinted to Knife River and will comprise most of the adult steelhead that return to Knife River in subsequent years. The estimated number of age-2 and older emigrants has been higher than the historic average (3,220) in the last four trap years (Figure 4). Total smolt production was high for the 2015, 2016 and 2017 year classes and corresponded to three consecutive years of above average adult steelhead returns in those years (Table 1). In 2021, 69% (471) of all unclipped adults that were captured at the trap were from these three year classes. Most fish were age-6 from the 2015 year-class (233), the first of the three large age-2 year-classes. Additionally, the 2019 year-class also provided above average age-2 smolts (Figure 4). Adult steelhead returns should continue to be good as adults from these year-classes continue to return to Knife River over the next few years.

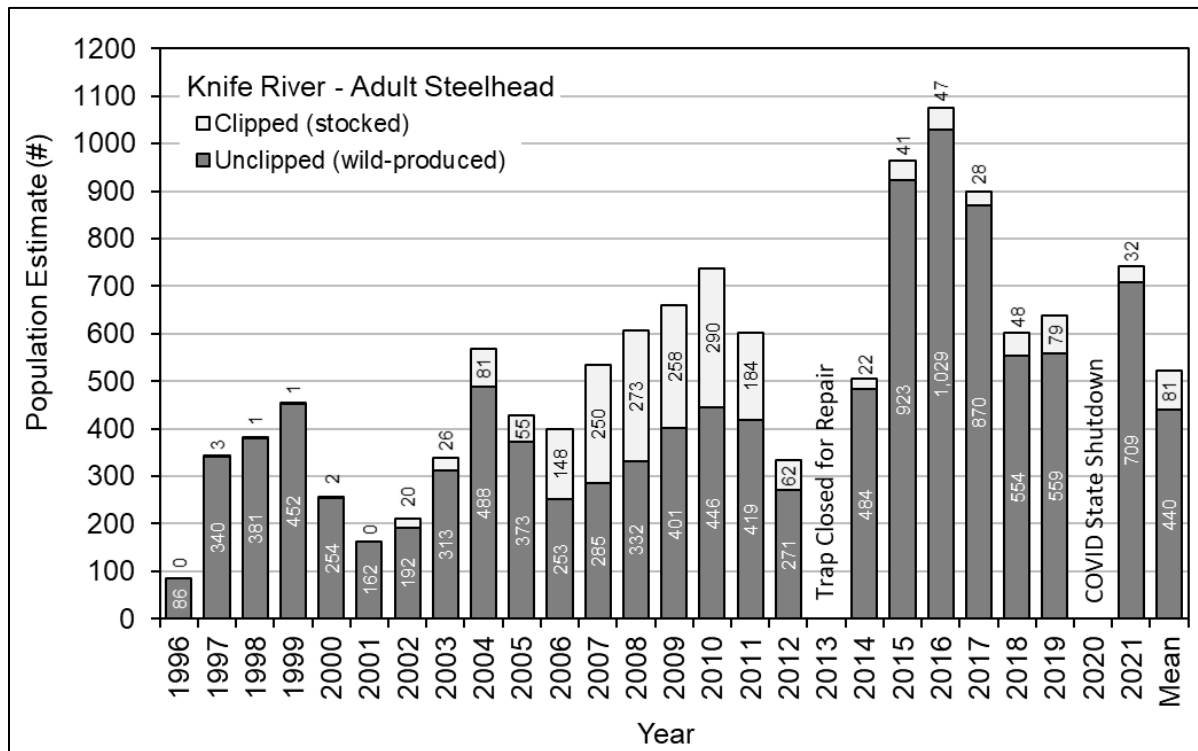


**Figure 3.** Estimated number of juvenile steelhead emigrants in the Knife River by year-class. The historic average (Mean) excludes all incomplete year-classes shown with an asterisks (\*).



**Figure 4.** Estimated number of age-2 and older unclipped juvenile steelhead emigrants in the Knife River by year-class. The historic average (Mean) excludes all incomplete year-classes shown with an asterisks (\*).

A total of 655 unclipped (wild-produced) adult steelhead were captured in spring 2021 excluding within-year recaptures. The population estimate after accounting for fish that bypassed the trap during upstream migration was 709 (95% C.I.: 691-727) (Table 1; Figure 5). Approximately 86% (621) of all unclipped steelhead returned in April, 13% (95) in May, and 1% (7) in June. Adult steelhead ranged from age-2 through age-12. Approximately 10% (64) were age-4 or younger, 53% were age-5 (117) or age-6 (231), and 37% (243) were age-7 or older. Average size of females was 25 inches (range: 19-30) and 5.1 pounds (range: 2.3-8.0). Average size of males was 24 inches (range: 12-30) and 4.0 pounds (range: 0.5-7.5). Approximately 26% (173) had a numbered Floy® tag from a previous year, and 3% (21) had a tag stub or mark that indicated tag loss.



**Figure 5.** Number of unclipped (wild-produced) and clipped (stocked) adult steelhead that returned to the Knife River in the spring by year from 1996 to 2021.

An additional 31 unclipped steelhead were captured in the fall. Eight were female, 3 were male, and 20 were sex unknown. Average total length of unclipped steelhead captured in the fall was 17 inches (range: 8-26) and 2.0 pounds (range: 0.4-5.2) (Table 2). Adult steelhead abundances at Knife River have continued to improve over time and this population is able to produce adequate adult returns maintained solely by wild-reproduction under the current management framework (Goldsworthy et al. 2016).

***Clipped (stocked) Steelhead & Kamloops***

A total of 44 clipped steelhead were captured in spring and five different fin clips were found: 29 right-maxillary (RM), 8 left-pelvic (LR), 4 right-pectoral (RF), 2 adipose plus left-rear (ALR), and 1 adipose plus right-pelvic (ARR)(Table 1, Figure 1). All RM clipped steelhead were originally captured as age-1 parr at the Knife River smolt trap, transported to the French River Coldwater Hatchery, clipped, and spawned to produce fry and clipped yearlings for stocking. All Knife River captive adult broodstock were released to Lake Superior in 2018 or earlier. Twenty-two were age-6, 5 were age-7, and 2 were age-8. Eighteen were females that measured from 21 to 26 inches and weighed 2.7 to 6.7 pounds. Eleven were males that measured from 22 to 26 inches and weighed 3.5 to 5.9 pounds. No RM clipped steelhead were captured in the fall (Table 2).

All 12 LR and RF clipped steelhead were captured in the spring. These fish were adult returns from the Lake Superior Steelhead Associations (LSSA) Steelhead Relocation Project. These fish were originally captured at the Knife River juvenile fish trap as age-1 parr, brought back to French River Hatchery, fin clipped, and reintroduced back into a few coldwater tributaries in the upper Knife River watershed. Two LR clipped steelhead were age-5, 3 were age-6, 2 were age-7, and 1 was age-8. Five LR clipped steelhead were females that ranged in size from 22 to 27 inches and 5.0 to 5.7 pounds, and 3 were males that were between 22 and 25 inches and 2.9 to 4.6 pounds. Among the 4 RF clipped steelhead captured, one was age-4, two were age-7, and 1 was age-8. Three were females that measured 21 to 26 inches and weighed 2.7 to 6.7 pounds, and one was a male that was 27 inches and 5.5 pounds. No LR or RF clipped steelhead were captured in the fall (Table 2).

Two ALR and one ARR clipped steelhead were captured that strayed from where they were stocked above barriers in the Lester or French Rivers. These fish were from approximately 60,000 clipped steelhead stocked above barriers in both the Lester and French Rivers each year (120,000 total stocking quota). Both of the ALR clipped steelhead captured in 2021 were 4 years old (2017 year-class) and originally stocked in 2018. Both fish were females that measured 17 and 21 inches and weighed 1.6 to 2.7 pounds, respectively. The ARR clipped steelhead was a 3 year-old male that measured 16 inches and 1.4 pounds and was originally stocked in 2019. No ALR or ARR clipped steelhead were captured in the fall (Table 2).

Fifteen clipped Kamloops were captured in the spring (Table 2). Six were females and 9 were males. Twelve Kamloops were age-6 and three were age-7. Average total length of females was 24 inches (range: 24-25) and males was 26 inches (range: 24-27). No Kamloops were captured in the fall. The last year-class of Kamloops was stocked in the French and Lester rivers in 2017 (2016 year-class). Anglers should expect to catch few to no Kamloops and more clipped (stocked) steelhead in 2022 and beyond.



***Brook Trout***

Brook Trout are a primary management species in the Knife River and populations are currently supported solely by natural reproduction. One-hundred twenty-seven Brook Trout were captured in the juvenile trap traveling downstream in 2021, 120 (94%) in the spring and 7 (6%) in the fall. Average total length was 7.0 inches (range: 4.4-10.7). Seven were age-1, 110 were age-2, 9 were age-3, and 1 was age-4.

Seven Brook Trout were captured in the adult trap in spring (Table 1). One was age-2 and 6 were age-3. Sex was unknown for all fish but one female. Average total length was 10 inches (range: 8–11) and 0.4 pounds (range: 0.1-0.5). A small left pectoral fin clip was collected from most Brook Trout for the [Coaster Genetics Project](#), and 5 fish were given a pink numbered Floy® Tag. No Brook Trout were captured in the adult trap in the fall (Table 2).

***Splake (Brook Trout x Lake Trout hybrid) & Lake Trout***

One Splake (Lake Trout x Brook Trout hybrid) was captured in the fall. This fish had an adipose fin clip and was stocked by the Wisconsin DNR in Lake Superior as a yearling and strayed to Knife River, presumably to spawn. The fish was a female that measured 22 inches and weighed 3.4 pounds and was age-4. This fish clearly had eggs but she was still green and not quite ready to spawn. This fish was provided to the Environmental Protection Agency to test for per- and polyfluoroalkyl substances (PFAS).

One small Lake Trout was captured at the Knife River adult trap on June 21. It is very rare to catch Lake Trout in rivers. It is unknown what this fish was doing, where it was going, or why it decided to immigrate to Knife River. This description is included in this report to document this rare occurrence.



### ***Brown Trout***

Brown Trout are a primary management species in the Knife River and populations are currently supported solely by natural reproduction. Ninety-two juvenile Brown Trout were captured in the juvenile trap in 2021, 80 (87%) in the spring and 12 (13%) in the fall. Average total length was 5.8 inches (range: 3.7-9.1). Ten were age-1, 81 were age-2, and 1 was age-3.



One small adult Brown Trout was captured in the adult trap in spring that measured 13 inches and weighed 0.7 pounds; sex was unknown. Twenty-eight adult Brown Trout were captured in the fall, 24 were captured in September and 4 were captured in October. Average age was age-5 (range: age-3+ to age-8+). Eighteen were females and 10 were males. Average size of females was 21 inches (range: 16-26) and 3.2 pounds (range: 2.1-5.8), and males was 24 inches (range: 21-26) and 4.3 pounds (range: 3.0-5.5). Six Brown Trout were recaptures (repeat spawners) tagged at the Knife River trap in previous years.

### ***Chinook, Coho and Pink Salmon***

Chinook Salmon are not a primary management species in Knife River and any fish captured here are likely produced in other jurisdictions. No juvenile or adult Chinook Salmon were captured in 2021. Juvenile and adult Chinook salmon are very rare at Knife River and the historic annual average return is only 2 fish (Table 2).

Coho Salmon are not a primary management species in Knife River and adult returns rely solely on limited reproduction here or strays from other jurisdictions. Nineteen juvenile Coho salmon were captured in 2021 and all were age-1. Juveniles were captured on 7 days between May 15 and June 1. Six adult Coho Salmon were captured in fall 2021. The first fish was captured on September 22 and all others were captured in early- to mid-October. Three were females, two were males, and sex was unknown for one fish that measured 13 inches and weighed 1.0 pound. Average size of females was 20 inches (range: 19-21) and 2.5 pounds (range: 1.7-3.1), and average size of males was 15 inches (range: 12-19) and 1.4 pounds (range: 0.5-2.2). Two were age-1+, two were age-2+, and two were age-3+. Coho salmon are not abundant at Knife River (historic annual average=14 fish), however two of the largest adult returns happened in 2018 (53 fish) and 2019 (32 fish)(Table 2).



Pink salmon are not a primary management species in Knife River and adult returns rely solely on limited reproduction here or strays from other jurisdictions. No juvenile Pink salmon were captured in the trap in 2021. Ninety-four adult Pink Salmon were captured in fall 2021. The first Pink salmon were captured on September 18 and most (98%) were captured in only 4 days (Sept. 18-22) with only two fish captured in October. Fifty-one were female and 45 were male. Average size of females was 15 inches (range: 13-17) and 0.9 pounds (range: 0.7-1.3) and males was 15 inches (range: 14-17) and 1.0 pounds (range: 0.7-1.5). All adult fish were age-1+. Pink salmon runs at Knife River continue to be sporadic and larger runs occur on a two to three year cycle (Table 2).

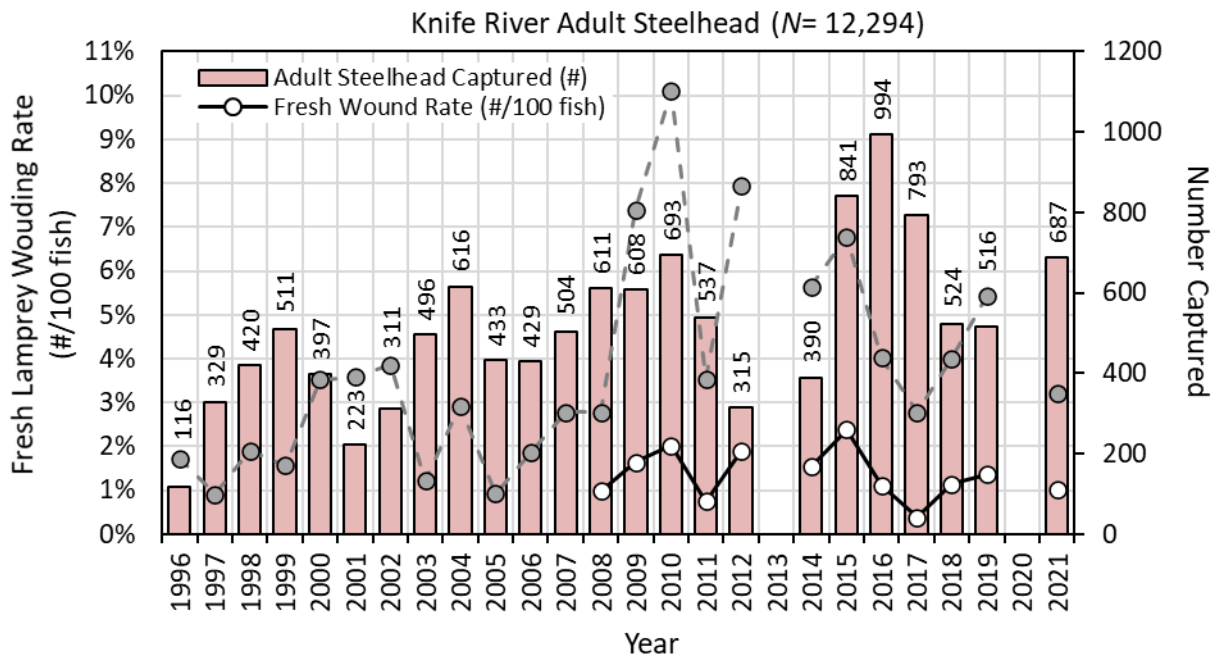
## Sea Lamprey Wounding Rates

In 2006, the Great Lakes Fishery Commission produced a field guide for classifying Sea Lamprey marks (wounds) on fish. This guide was originally produced for Lake Trout but has been used extensively by agencies throughout Lake Superior to classify wounds on other fish species. This guide has been used by Minnesota DNR at the Knife River traps since 2008. Prior to 2008, lamprey wounds were recorded but without any sort of classification system.



In total, 27 lamprey wounds were found on fish collected at the Knife River traps in 2021. Seven were classified as fresh wounds (A1-A3 type) and 15 as 'old' wounds (A4-B4 type). Lamprey wounds were most prevalent on steelhead (22 wounds total; 7 fresh and 15 old), and all were found on steelhead captured in the spring. Four old (B3 and B4-type) wounds were found on Kamloops Rainbow Trout, one Brown Trout captured in the fall had an old B2-type wound, and no wounds were found on salmon.

Approximately 3.2% of all steelhead captured in 2021 had lamprey a wound (any type), which was lower than 2018 (4.0%) and 2019 (5.4%). The average annual fresh wound rate on steelhead from 2008 to 2021 has remained low (0.8%; range: 0.4-2.4%). The historic average wound rate that includes all wound types is much higher (4.0%; range: 0.9 to 10.1%)(Figure 6). Overall, wounding rates at the Knife River are remain low and below maximum target wound rates for other species (e.g., annual fresh wound standards for Lake Trout is less than 3.0%; Goldsworthy et al. 2017).



**Figure 6.** Fresh lamprey wounding rate (#/100 fish with A1-A3 wounds), all lamprey wound rate (#/100 fish), and the number of adult steelhead captured and evaluated for lamprey marks by year.

SUPPLEMENTAL REPORT

Knife River Fish Trap Report  
2021

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Regional Fisheries Supervisor: Neil Vanderbosch Digitally signed by Neil Vanderbosch  
Date: 2022.11.18 13:46:33 -06'00'

**Table 1.** Operation dates and total number of adult fish collected at the Knife River adult trap in the spring by year and species, including the historic averages (Average) from 1996 to 2021. The trap was being repaired and not operated in spring 2013 and in 2020 due to a state lockdown and COVID pandemic.

Year	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	Mean
Date trap was opened	4/23	4/14	3/25	4/7	3/26	4/18	4/14	4/21	4/7	4/10	4/6	4/15	4/16	4/12	3/28	4/18	3/25	—	4/28	4/13	3/27	4/5	4/24	4/5	—	4/1	4/10
Date trap was closed	6/5	6/30	6/22	6/30	6/30	6/30	6/30	6/28	6/30	6/30	5/25	6/26	6/30	6/22	5/31	6/20	6/1	—	7/7	7/6	7/19	7/14	7/5	7/12	—	6/24	6/26
Days trap was open	43	77	89	84	96	73	77	68	84	81	49	72	75	71	64	63	68	—	70	85	115	101	68	99	—	84	77
Brook Trout	0	3	3	7	3	11	1	0	0	0	1	0	0	0	0	4	6	—	0	7	39	5	14	5	—	7	5
Brown Trout	0	2	0	1	2	4	2	0	1	0	0	0	0	0	0	0	1	—	0	5	4	0	2	0	—	1	1
Chinook Salmon	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	—	0	0	0	0	0	0	—	0	0
Kamloops (clipped)	37	48	48	82	65	108	44	72	120	97	27	22	21	46	26	29	20	—	29	17	19	44	43	58	—	15	49
Steelhead (clipped)	29	28	20	43	120	40	76	111	201	136	204	284	274	258	290	182	62	—	21	47	47	28	48	71	—	44	114
<i>Adipose + Left-pelvic (ALR)</i>	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0	—	2	0
<i>Adipose + Right-pelvic (ARR)</i>	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0	—	1	0
<i>Left-pelvic (LR)</i>	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0	3	—	8	2
<i>Right-pectoral (RF)</i>	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	2	—	4	2
<i>Right-pelvic (RR)</i>	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	2	1	—	0	2
<i>Right-maxillary (RM)</i>	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	45	64	—	29	55
Steelhead (unclipped) <sup>1</sup>	86	340	381	452	254	162	192	313	488	373	253	285	332	401	446	419	271	—	484	923	1,029	870	554	559	—	709	429
<b>All Species</b>	<b>153</b>	<b>426</b>	<b>480</b>	<b>585</b>	<b>477</b>	<b>334</b>	<b>357</b>	<b>568</b>	<b>862</b>	<b>656</b>	<b>562</b>	<b>593</b>	<b>627</b>	<b>705</b>	<b>765</b>	<b>634</b>	<b>360</b>	<b>—</b>	<b>533</b>	<b>999</b>	<b>1,138</b>	<b>947</b>	<b>661</b>	<b>693</b>	<b>—</b>	<b>776</b>	<b>614</b>

<sup>1</sup> Numbers estimated using a mark-recapture population estimate.



**Table 2.** Operation dates and total number of adult fish species collected at the Knife River adult trap in the fall by year and species, including the historic averages (Average) from 1996 to 2021. The trap was being repaired and not operated in fall 2012 and 2013, and in 2020 due to a state lockdown and COVID pandemic.

Year	1996	1997	1998	1999	2000	2001	2002	2003	2004 <sup>1</sup>	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	Average
Date trap was opened	8/19	8/18	8/17	8/9	8/4	8/13	8/16	9/8	9/8	9/5	9/5	9/5	9/2	9/21	9/13	9/19	—	—	9/9	9/9	9/6	8/25	9/4	8/30	—	9/7	8/30
Date trap was closed	11/8	11/7	11/6	11/12	11/10	11/16	11/8	11/7	11/5	11/4	11/4	11/2	11/7	11/7	11/5	11/4	—	—	11/6	11/18	11/16	11/6	11/7	11/6	—	11/1	11/7
Days trap was open	81	81	81	95	98	95	84	60	58	60	60	58	66	47	53	46	—	—	58	71	72	74	63	62	—	56	69
Brook Trout	0	2	3	1	0	3	2	0	3	2	0	1	1	0	0	1	—	—	1	1	1	3	2	0	—	0	1
Brown Trout	32	67	43	61	58	20	45	30	27	26	9	7	17	8	7	1	—	—	7	5	5	0	15	23	—	28	23
Chinook Salmon	4	1	9	9	2	0	2	0	0	0	0	11	5	0	0	0	—	—	1	3	0	1	3	1	—	0	2
Coho Salmon	6	16	37	10	5	1	16	0	3	3	0	9	11	9	71	0	—	—	0	8	17	5	53	32	—	6	14
Kamloops	4	0	12	1	4	1	0	0	0	0	0	5	7	0	3	10	—	—	0	2	0	0	1	0	—	0	2
Pink Salmon	0	9	20	39	48	0	3	0	0	2	7	10	0	2	258	103	—	—	0	1	4	207	2	10	—	94	33
Rainbow Trout - unknown type <sup>2</sup>	0	0	0	0	0	0	0	0	14	0	0	0	0	0	0	0	—	—	0	0	0	0	0	0	—	0	1
Splake (Brook Trout x Lake Trout)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	—	—	0	1	0	0	1	4	—	1	0
Steelhead Rainbow Trout (clipped)	2	0	16	6	9	0	2	0	0	7	0	22	10	5	2	0	—	—	0	5	3	1	10	7	—	0	5
Adipose + Left-pelvic (ALR)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0	2	—	0	1
Adipose + Right-pelvic (ARR)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0	0	—	0	0
Left-pelvic (LR)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	0	—	0	1
Right-pectoral (RF)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0	2	—	0	1
Right-pelvic (RR)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0	0	—	0	0
Right-maxillary (RM)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	9	3	—	0	6
Steelhead Rainbow Trout (unclipped)	60	16	105	17	37	19	23	6	49	9	1	50	49	21	18	2	—	—	8	155	22	25	35	53	—	31	35
<b>All Species</b>	<b>108</b>	<b>111</b>	<b>245</b>	<b>144</b>	<b>163</b>	<b>44</b>	<b>93</b>	<b>36</b>	<b>96</b>	<b>49</b>	<b>17</b>	<b>115</b>	<b>100</b>	<b>45</b>	<b>359</b>	<b>117</b>	<b>—</b>	<b>—</b>	<b>17</b>	<b>181</b>	<b>52</b>	<b>242</b>	<b>122</b>	<b>130</b>	<b>—</b>	<b>160</b>	<b>118</b>

<sup>1</sup> Counts made from fishway and video surveillance; <sup>2</sup> Specific clips/strains were not identifiable on videotape