

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

SUPPLEMENTAL REPORT



**French River Juvenile and Adult Fish Trap Report
2017**

Mark Gottwald
Nick Peterson

This report provides an annual update of juvenile and adult fish trap operations at the French River. These traps provide valuable information for assessment and management of Rainbow Trout in Minnesota waters of Lake Superior. The French River adult fish trap was installed approximately 0.1 miles upstream of the confluence of the French River in 1970, and was reconfigured to its current design in 1982. The adult trap has been used to evaluate adult returns from stocking events in the French River, and to collect gametes for the Kamloops and steelhead stocking programs. The French River juvenile fish trap was constructed approximately 0.2 miles upstream of the mouth of the French River in 1994 (Dexter and Schliep 2007, Figure 1). The juvenile trap has been used to gather information about juvenile fish survival, growth, mortality, and movement patterns, to evaluate stocking programs, and to determine how these metrics influence adult returns to French River. Sampling procedures for the juvenile and adult trap are described in Ward and Blankenheim (2006) and Blankenheim (2007).

The French River is an average size stream on the Minnesota shore of Lake Superior. It flows for 14.3 miles and enters Lake Superior approximately 14 miles northeast of Duluth, Minnesota (Figure 1). The presence of Rainbow Trout juveniles upstream of mile 0.2 is solely the result of stocking, and the lower 9.4 miles of the river have been used as nursery habitat for stocked juvenile steelhead prior to their emigration to Lake Superior. The French River is also currently managed to maintain native Brook Trout and introduced Brown Trout populations upstream of mile 0.2. More information about the French River fishery and its management can be found in the French River Historic Index Station Summary 2016 (Pinkerton 2017) and the French River Management Plan 2011.

French River Stocking Update

Approximately 26,174 Kamloops Rainbow Trout yearlings (age-1, 2016 year-class) were stocked on April 24 (13,520) and April 25, 2017 (12,654) in the French River at McQuade Road. The average size of Kamloops stocked was 5.085 inches, which was a targeted pre-smolt size (less than 5.91 inches; Negus 2003) to allow them the opportunity to imprint on French River water. All Kamloops were given an adipose and right pelvic fin clip before they were stocked to distinguish them from steelhead that were stocked as fry without fin clips. These fish were offspring of adult Kamloops that returned to French River in spring 2016, and were raised in outdoor ponds at the Spire Valley Coldwater Hatchery near Remer, Minnesota.

Approximately 181,783 Steelhead Rainbow Trout fry were stocked in the French River on June 30 (98,671) and July 11, 2017 (83,112). Locations and percent of total stocked at each were Pioneer Rd. (10%), Private Drive (20%), Lakewood Rd. (30%), Cant Rd. (30%), and McQuade Rd. (10%). All fry were offspring of feral (wild) adult Steelhead that returned to French River in spring 2017. Eggs were fertilized and raised to the eyed-egg stage at the French River Coldwater Hatchery. They were then transported in coolers on ice to the Spire Valley Coldwater Hatchery where they were hatched and grown to swim-up fry (hatched from the egg and used up its attached food source-called a yolk sac) size.

Environmental Conditions

Environmental conditions and habitat (i.e., adequate water levels and water temperatures) are primary factors that dictate whether steelhead will remain in tributaries for at least two years and reach an age/size that is needed to survive in Lake Superior. Ample precipitation in the fall and snowfall during the winter months helps to maintain overwintering habitat for fish by recharging water sources (e.g., wetlands) and insulating stream temperatures from excessive ice formation that can decrease overwinter survival.

Environmental conditions were good for juvenile trout entering the winter of 2016/2017. Spring arrived in 2017 as ice started to clear in streams near Duluth in late March and early April. Stream conditions were relatively favorable for juvenile trout during the summer of 2017. Late summer and fall of 2017 had much wetter conditions and higher flows in the river. Air temperatures and precipitation totals were generally similar to the historic averages throughout the summer. Abnormally dry conditions briefly appeared in late-May into mid-June. Flows were higher in August, September, and in October flows returned to normal rates and stayed there for the rest of the year. The North Shore was free of drought conditions from mid-June through December.

Juvenile Trap

The juvenile trap was open for 204 days between April 8 and November 3, 2017 (Table 1). A total of 6,363 juvenile salmonids were captured throughout 2017, of which 66% (4,184) were Kamloops Rainbow Trout, 32% (2,043) were Steelhead Rainbow Trout, 2% (105) were Brown Trout, and less than 1% (31) were Brook Trout. Eighty-four percent (5,350) of all

salmonids were captured in spring (April-June), 12% (774) were captured in summer (July-August), and 4% (239) were captured in fall (September-November).

A total of 2,043 juvenile steelhead were captured in 2017, which was lower than the historic average (3,326) but within the interquartile range (1,752 to 4,599, Table 1, Figure 2). Seventy-three percent (1,492) emigrated in spring, 18% (370) in summer, and 9% (181) in fall. Less than 1% (1) were age-0, 78% (1,601) were age-1, 21% (433) were age-2, and less than 1% were age-3 (7) and age-4 (1) (Table 1; Figure 3).

Only 16% (2,043) of all age-1 Kamloops stocked upstream in April were captured leaving the French River in 2017. The fate of the other 84% of Kamloops stocked that did not leave the French River in 2017 will be realized after the 2018 trap season. Trap catches in 2018 will determine if the Kamloops that were not captured in 2017 had remained in the river and survived the winter, or did not survive to emigrate at age-2. More age-1 Kamloops left the French River at age-1 than steelhead (Figure 4). However, age-1 Kamloops were 29% larger (on average) than age-1 steelhead when they left the French River; mean total length at capture was 6.4 inches (162 mm) for age-1 Kamloops and 4.8 inches (121 mm) for age-1 steelhead. Kamloops maintained a larger average size than age-1 steelhead throughout the entire trap season, but the average growth rate over time was not different between the two strains (Figure 5).

A total of 31 Brook Trout were captured in 2017, of which 65% (20) were captured in spring, 19% (6) in summer, and 16% (5) in fall. Approximately 26% (8) were age-0, 45% (14) were age-1, 23% (7) were age-2, and 6% were age-3 (2). One-hundred five Brown Trout were captured in 2017, of which 40% (42) were captured in spring, 44% (46) in summer, and 16% (17) in fall. Approximately 7% (7) were age-0, 84% (88) were age-1, and 9% (10) were age-2. Ten other non-gamefish species were also captured in 2017 (Table 2).

Adult Trap

The French River adult trap was opened on March 27th in 2017, eighteen days earlier than the mean start date for trap operation (Table 3). The trap was closed on May 8th, which was eighteen days earlier than normal. Seining in the pool downstream of the adult trap was conducted eight times with the trap checked more frequently throughout (Table 4). Trapping and seining did not take place in the fall of 2017, as fall migratory runs are no longer monitored.

Timing of Adult Returns

The spring thaw was early in 2017 with fish first sampled on March 27th. Seventy-seven percent of all Kamloops and 62% of all steelhead were captured by April 15th. Ninety-eight percent of all Kamloops and 97% of all steelhead were captured by May 1, 2017 (Table 4, Figure 6).

Kamloops

A total of 1564 Kamloops were captured at the French River in the spring of 2017. This was above the 25 year average and interquartile range (Mean=935; IR=463-1351; Table 5, Figure 7).

Historically, seventy-two percent of Kamloops returns at the French River are age-4 and age-5. In 2017 fewer returns consisted of age-4 and age-5 Kamloops. The Kamloops in 2017 ranged from age-2 to age-7, with a large portion of the return consisting of age-3 (31%), age-4 (49%), and age-5 (11%) fish. (Table 5, Figure 8). Females and males comprised 57% and 43% of Kamloops returns in 2017, respectively. Just over 3% of returning Kamloops were recaptures which was lower than the long-term mean of 4% and within the interquartile range (IR= 2.9%-5.4%; Table 5). 49% of the recaptures had the previous spring's tag. The overall mean total length was 582 mm (22.9 in.) and mean weight was 2.1 kg (4.7 lbs.).

Steelhead

There were 145 steelhead captured at the French River in 2017, which is above the interquartile range (Mean=89, IR=56.5-111; Table 7, Figure 10). Three of these fish were captured and tagged at the Knife River adult trap, one in 2016, and two in early 2017. Additionally, one former Knife River brood stock steelhead was collected. Steelhead collected in 2017 ranged from age-3 through age-11 (Table 7, Figure 8). One unknown sex steelhead is reported here, but is not included in further analysis. Forty-three percent of all mature individuals were age-4. Ten percent (N=15) of the steelhead collected in 2017 had tags from previous years, which is an above average return of repeat spawners (Table 7). Among the tags found, ten were applied in 2016, one was applied in 2015, and one was applied in 2012. The average length of steelhead was 596 mm (23.5 in.) and the average weight was 2.3 kg (4.5 lbs.) The maximum size collected was 722 mm (28.4 in., Table 6).

Literature Cited

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FRENCH RIVER ADULT/JUVENILE TRAP REPORT

2017

Prepared by:

Mark Gottwald
Nick Peterson

Field crew leaders:

Nick Peterson, Rebecca Reiche

Project Leader: *Rebecca Reiche* Date: *4/16/18*

Regional Fisheries Supervisor: *Dan R. McCann* Date: *4/24/18*

Table 1. Descriptive statistics (number [N] and percentage [%]) for juvenile steelhead data collected at the French River juvenile trap by age and year. Frylings were stocked instead of fry in 2009 and 2011-2013.

| Year | 2007 ² | | 2008 | | 2009 | | 2010 | | 2011 | | 2012 | | 2013 | | 2014 | | 2015 | | 2016 | | 2017 | | Mean 1994 - 2017 | |
|---|-------------------|----------|--------------|----------|--------------|----------|--------------|----------|--------------|----------|--------------|----------|--------------|----------|----------------|----------|----------------|----------|----------------|----------|--------------|----------|-----------------------|-------------------------|
| Date trap was opened | 4/15 | | 4/16 | | 4/17 | | 3/28 | | 4/18 | | 3/25 | | 5/7 | | 4/28 | | 4/15 | | 4/12 | | 4/8 | | 4/13 | |
| Date trap was closed | 11/2 | | 11/6 | | 11/6 | | 10/29 | | 11/3 | | 10/29 | | 11/7 | | 10/31 | | 11/16 | | 11/16 | | 11/3 | | 11/5 | |
| Number of days trap was open | 193 | | 204 | | 203 | | 215 | | 178 | | 165 | | 184 | | 185 | | 215 | | 210 | | 204 | | 201 | |
| Emigrants by Age | N | % | N | % | N | % | N | % | N | % | N | % | N | % | N | % | N | % | N | % | N | % | N | % |
| Age-0 | 408 | 9% | 382 | 12% | 173 | 4% | 0 | 0% | 0 | 0% | 176 | 15% | 50 | 7% | 4 | 0% | 217 | 14% | 9 | 0% | 1 | 0% | 270 | 8% |
| Age-1 | 2,795 | 61% | 2,064 | 66% | 3,140 | 79% | 1,844 | 57% | 0 | 0% | 976 | 84% | 623 | 84% | 1,204 | 67% | 659 | 42% | 2,077 | 84% | 1,601 | 78% | 2,327 | 70% |
| Age-2 | 1,347 | 29% | 659 | 21% | 609 | 15% | 1,338 | 42% | 333 | 95% | 0 | 0% | 71 | 10% | 558 | 31% | 664 | 43% | 374 | 15% | 433 | 21% | 704 | 21% |
| Age-3 | 65 | 1% | 14 | 0% | 29 | 1% | 34 | 1% | 18 | 5% | 11 | 1% | 0 | 0% | 29 | 2% | 11 | 1% | 18 | 1% | 7 | 0% | 26 | 1% |
| Age-4 | 0 | 0% | 0 | 0% | 1 | 0% | 0 | 0% | 1 | 0% | 0 | 0% | 0 | 0% | 0 | 0% | 0 | 0% | 0 | 0% | 1 | 0% | 0 | 0% |
| Total | 4,615 | | 3,119 | | 3,952 | | 3,216 | | 352 | | 1,163 | | 744 | | 1,795 | | 1,551 | | 2,478 | | 2,043 | | 3,326 | |
| Emigrants by Year-Class | N | % | N | % | N | % | N | % | N | % | N | % | N | % | N | % | N | % | N | % | N | % | N ¹ | (%) ¹ |
| Age-0 | 408 | 13% | 382 | 8% | 173 | 7% | 0 | -- | 0 | 0% | 176 | 13% | 50 | 3% | 4 | -- | 217 | -- | 9 | -- | 1 | -- | 328 | 9% |
| Age-1 | 2,064 | 66% | 3,140 | 64% | 1,844 | 78% | 0 | -- | 976 | 91% | 623 | 46% | 1,204 | 62% | 659 | -- | 2,077 | -- | 1,601 | -- | ** | -- | 2,566 | 70% |
| Age-2 | 609 | 20% | 1,338 | 27% | 333 | 14% | 0 | -- | 71 | 7% | 558 | 41% | 664 | 34% | 374 | -- | 433 | -- | ** | -- | ** | -- | 721 | 20% |
| Age-3 | 34 | 1% | 18 | 0% | 11 | 0% | 0 | -- | 29 | 3% | 11 | 1% | 18 | 1% | 7 | -- | ** | -- | ** | -- | ** | -- | 27 | 1% |
| Age-4 | 1 | 0% | 0 | 0% | 0 | 0% | 0 | -- | 0 | 0% | 0 | 0% | 1 | 0% | ** | -- | ** | -- | ** | -- | ** | -- | 0 | 0% |
| Total | 3,116 | | 4,878 | | 2,361 | | 0 | | 1,076 | | 1,368 | | 1,937 | | 1,044** | | 2,727** | | 1,610** | | 1** | | 3,643 | |
| Percent Emigrants per Year-Class | 2007 | | 2008 | | 2009 | | 2010 | | 2011 | | 2012 | | 2013 | | 2014 | | 2015 | | 2016 | | 2017 | | Average | |
| Number of fry stocked | 121,740 | | 109,324 | | 53,214 | | 0 | | 55,013 | | 55,032 | | 55,596 | | 39,856 | | 99,908 | | 193,308 | | 181,783 | | 103,190 | |
| Number of fry stocked/ha | 16,291 | | 14,630 | | 7,121 | | 0 | | 7,362 | | 7,364 | | 7,440 | | 5,334 | | 13,321 | | 25,878 | | 24,335 | | 13,808 | |
| Age-0 | 0.3% | | 0.3% | | 0.3% | | -- | | 0.0% | | 0.3% | | 0.1% | | 0.0% | | 0.2% | | 0.0% | | 0.0% | | 0.3% | |
| Age-1 | 1.7% | | 2.9% | | 3.5% | | -- | | 1.8% | | 1.1% | | 2.2% | | 1.7% | | 2.1% | | 0.8% | | ** | | 2.7% | |
| Age-2 | 0.5% | | 1.2% | | 0.6% | | -- | | 0.1% | | 1.0% | | 1.2% | | 0.9% | | 0.4% | | ** | | ** | | 0.7% | |
| Age-3 | 0.0% | | 0.0% | | 0.0% | | -- | | 0.1% | | 0.0% | | 0.0% | | 0.0% | | ** | | ** | | ** | | 0.0% | |
| Age-4 | 0.0% | | 0.0% | | 0.0% | | -- | | 0.0% | | 0.0% | | 0.0% | | ** | | ** | | ** | | ** | | 0.0% | |
| Cumulative Survival Index | 2.6% | | 4.5% | | 4.4% | | -- | | 2.0% | | 2.5% | | 3.5% | | 2.6% | | 2.7% | | 0.8% | | 0.0% | | 3.8% | |

¹ Values shown for only the year classes that have completely emigrated

² Some individuals were subsampled in 2007

** Data not yet complete for the given year-class

Table 2. Other fish species collected in the French River juvenile trap in 2017.

| Species | Month | | | | | | | | Total |
|------------------------|----------|-----------|-----------|-----------|-----------|-----------|----------|----------|-----------|
| | April | May | June | July | August | September | October | November | |
| Blacknose Dace | | | 1 | 13 | 14 | 3 | | | 31 |
| Brook Stickleback | | | | 1 | | | | | 1 |
| Central Mudminnow | | 1 | | | | | | | 1 |
| Creek Chub | | 11 | 6 | 11 | 7 | 1 | 1 | | 37 |
| Fathead Minnow | | 1 | 7 | 1 | | | | | 9 |
| Longnose Dace | | | 2 | | 1 | | | | 3 |
| Northern Redbelly Dace | | | 2 | | | | | | 2 |
| Pearl Dace | | | | | 3 | | | | 3 |
| White Sucker | | | | | | 1 | | | 1 |
| Finescale Dace | | | | | 1 | | | | 1 |
| Total | 0 | 13 | 18 | 26 | 26 | 5 | 1 | 0 | 89 |

Table 3. Opening date, closing date, and days of operation of the French River adult trap by season and year.

| Spring | | | | Fall | | | |
|------------------|--------------|--------------|-------------------|------------------|--------------|--------------|-------------------|
| Year | Opening date | Closing date | Days of operation | Year | Opening date | Closing date | Days of operation |
| 1993 | 4/12 | 5/17 | 37 | 1993 | 8/18 | 11/10 | 85 |
| 1994 | 4/18 | 5/23 | 36 | 1994 | 9/13 | 11/21 | 70 |
| 1995 | 4/17 | 5/26 | 40 | 1995 | 9/7 | 11/21 | 76 |
| 1996 | 4/26 | 6/14 | 50 | 1996 | 9/6 | 11/13 | 69 |
| 1997 | 4/16 | 6/2 | 48 | 1997 | 9/16 | 11/6 | 52 |
| 1998 | 4/5 | 5/26 | 52 | 1998 | 9/14 | 11/3 | 51 |
| 1999 | 4/12 | 5/17 | 36 | 1999 | 9/6 | 11/9 | 65 |
| 2000 | 3/27 | 5/22 | 57 | 2000 | 9/1 | 11/15 | 76 |
| 2001 | 4/16 | 5/23 | 38 | 2001 | 9/10 | 11/15 | 67 |
| 2002 | 4/16 | 5/20 | 35 | 2002 | 9/9 | 11/12 | 65 |
| 2003 | 4/23 | 5/28 | 36 | 2003 | 9/11 | 11/4 | 55 |
| 2004 | 4/13 | 5/19 | 37 | 2004 | 8/31 | 11/8 | 70 |
| 2005 | 4/11 | 5/27 | 47 | 2005 | 9/7 | 11/17 | 72 |
| 2006 | 4/6 | 5/19 | 44 | 2006 | 9/1 | 10/30 | 60 |
| 2007 | 4/15 | 5/25 | 41 | 2007 | 9/6 | 11/3 | 59 |
| 2008 | 4/17 | 5/24 | 35 | 2008 | 8/28 | 11/10 | 75 |
| 2009 | 4/21 | 5/29 | 39 | 2009 | 9/8 | 11/6 | 60 |
| 2010 | 3/28 | 5/18 | 52 | 2010 | Closed | | |
| 2011 | 4/18 | 5/27 | 40 | 2011 | | | |
| 2012 | 3/26 | 5/16 | 52 | 2012 | | | |
| 2013 | 5/6 | 6/7 | 33 | 2013 | | | |
| 2014 | 5/5 | 7/3 | 60 | 2014 | | | |
| 2015 | 4/13 | 6/12 | 60 | 2015 | | | |
| 2016 | 4/5 | 5/16 | 33 | 2016 | | | |
| 2017 | 3/27 | 5/8 | 43 | 2017 | | | |
| Mean (1993-2017) | 4/13 | 5/26 | 43 | Mean (1993-2009) | 9/5 | 11/10 | 66 |

Table 4. Total catch by date for all fish species collected during the French River adult trap operations in 2017.

| Date | All Species | Kamloops Rainbow Trout | Steelhead Rainbow Trout |
|--------------|--------------------|-------------------------------|--------------------------------|
| 3/27/2017 | 396 | 367 | 29 |
| 4/7/2017 | 308 | 282 | 26 |
| 4/12/2017 | 468 | 444 | 24 |
| 4/13/2017 | 95 | 86 | 9 |
| 4/14/2017 | 26 | 24 | 2 |
| 4/16/2017 | 93 | 83 | 10 |
| 4/17/2017 | 130 | 109 | 21 |
| 4/20/2017 | 49 | 41 | 8 |
| 4/23/2017 | 5 | 5 | |
| 4/24/2017 | 85 | 77 | 8 |
| 4/25/2017 | 1 | 1 | |
| 5/1/2017 | 21 | 17 | 4 |
| 5/4/2017 | 9 | 8 | 1 |
| 5/5/2017 | 2 | 2 | |
| 5/8/2017 | 21 | 18 | 3 |
| Total | 1709 | 1564 | 145 |

Table 5. Annual returns, number of repeat spawners, and year-class strength indices of Kamloops Rainbow Trout collected at the French River.

| Year of Sampling | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|------------------|------|-----|------|-----|------|-----|------|-----|------|-----|------|-----|------|-----|------|-----|------|-----|------|-----|------|-----|------|-----|------|-----|------|-----|------|-----|----------------|-----|
| Year | 2003 | | 2004 | | 2005 | | 2006 | | 2007 | | 2008 | | 2009 | | 2010 | | 2011 | | 2012 | | 2013 | | 2014 | | 2015 | | 2016 | | 2017 | | Mean 1993-2017 | |
| Age | F | M | F | M | F | M | F | M | F | M | F | M | F | M | F | M | F | M | F | M | F | M | F | M | F | M | F | M | F | M | | |
| Age-2 | 0 | 126 | 0 | 3 | 0 | 11 | 0 | 0 | 0 | 52 | 0 | 2 | 2 | 15 | 0 | 47 | 0 | 4 | 0 | 17 | 0 | 50 | 0 | 3 | 0 | 47 | 3 | 157 | 3 | 65 | 0 | 41 |
| Age-3 | 33 | 72 | 57 | 77 | 14 | 0 | 12 | 11 | 121 | 93 | 39 | 41 | 6 | 15 | 15 | 47 | 148 | 104 | 59 | 77 | 46 | 173 | 12 | 26 | 4 | 22 | 75 | 146 | 267 | 215 | 52 | 63 |
| Age-4 | 364 | 273 | 326 | 172 | 711 | 463 | 58 | 59 | 180 | 72 | 142 | 53 | 190 | 102 | 108 | 54 | 261 | 108 | 624 | 258 | 478 | 258 | 175 | 114 | 193 | 108 | 193 | 122 | 465 | 295 | 285 | 158 |
| Age-5 | 195 | 127 | 345 | 205 | 208 | 119 | 190 | 155 | 65 | 29 | 24 | 6 | 45 | 8 | 71 | 27 | 117 | 66 | 119 | 52 | 148 | 40 | 39 | 40 | 287 | 122 | 331 | 164 | 87 | 78 | 145 | 84 |
| Age-6 | 41 | 10 | 125 | 21 | 194 | 138 | 53 | 16 | 26 | 10 | 5 | 1 | 13 | 10 | 23 | 4 | 18 | 8 | 20 | 14 | 44 | 13 | 15 | 13 | 48 | 49 | 227 | 62 | 37 | 14 | 55 | 23 |
| Age-7 | 20 | 55 | 14 | 3 | 49 | 27 | 29 | 3 | 0 | 5 | 2 | 1 | 1 | 1 | 3 | 3 | 11 | 5 | 2 | 0 | 5 | 9 | 0 | 0 | 5 | 1 | 0 | 0 | 28 | 10 | 14 | 9 |
| Age-8 | 22 | 0 | 9 | 0 | 6 | 2 | 3 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 1 |
| Age-9 | 13 | 0 | 4 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 |
| Sex total | 688 | 663 | 880 | 484 | 1182 | 760 | 345 | 244 | 394 | 261 | 212 | 104 | 257 | 151 | 220 | 182 | 555 | 295 | 824 | 418 | 721 | 543 | 241 | 196 | 537 | 349 | 829 | 651 | 887 | 677 | 554 | 381 |
| Grand total | 1351 | | 1364 | | 1942 | | 589 | | 655 | | 316 | | 408 | | 402 | | 850 | | 1242 | | 1264 | | 437 | | 886 | | 1480 | | 1564 | | 935 | |
| 1x repeat | 30 | | 80 | | 76 | | 46 | | 24 | | 14 | | 22 | | 12 | | 19 | | 55 | | 61 | | 19 | | 40 | | 114 | | 42 | | 35 | |
| 2x repeat | 2 | | 5 | | 12 | | 11 | | 1 | | 1 | | 2 | | 3 | | 0 | | 6 | | 9 | | 1 | | 5 | | 7 | | 5 | | 3 | |
| 3x repeat | 1 | | 0 | | 0 | | 1 | | 1 | | 0 | | 0 | | 1 | | 0 | | 0 | | 1 | | 1 | | 0 | | 1 | | 0 | | 0 | |
| 4x repeat | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | |
| % repeat | 2.4% | | 6.2% | | 4.5% | | 9.8% | | 4.0% | | 4.7% | | 5.9% | | 4.0% | | 2.2% | | 4.9% | | 5.6% | | 4.8% | | 5.1% | | 8.2% | | 3.0% | | 4.2% | |
| Fall tag | 2 | | 0 | | 57 | | 36 | | 4 | | 2 | | 4 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 4 | |
| K.R. tag | 1 | | 0 | | 7 | | 5 | | 0 | | 3 | | 1 | | 0 | | 1 | | 0 | | 0 | | 2 | | 0 | | 0 | | 0 | | 3 | |

Complete Year-classes

| Year-class | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 90-09 mean |
|-----------------------|--------|--------|--------|--------|--------|--------|--------|--------|--------|------------|
| Stocked | 52,850 | 61,871 | 49,906 | 49,772 | 45,796 | 36,474 | 33,337 | 36,589 | 61,032 | 50,038 |
| Returned | 1818 | 236 | 344 | 504 | 551 | 417 | 676 | 1,403 | 1052 | 917 |
| % return ¹ | 3.44% | 0.38% | 0.69% | 1.01% | 1.20% | 1.14% | 2.03% | 3.64% | 1.72% | 1.86% |

Incomplete Year-classes

| Year-class | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 |
|-----------------------|--------|--------|--------|--------|--------|--------|--------|--------|
| Stocked | 45,906 | 30,050 | 39,712 | 36,374 | 55,111 | 45,446 | 65,018 | 54,239 |
| Returned | 1223 | 884 | 344 | 268 | 161 | 9 | 37 | - |
| % return ¹ | 2.66% | 2.94% | 0.87% | 0.74% | 0.29% | 0.02% | 0.06% | - |

¹: percent return of stocked yearlings returned to the French River trap as adults

Table 6. Length-frequency distribution of all fish measured by species at the French River in adult trap operations 2017.

| Length Group (10mm) | Kamloop Rainbow Trout | Steelhead Rainbow Trout |
|---------------------|-----------------------|-------------------------|
| 340 | 4 | |
| 350 | 6 | 1 |
| 360 | 5 | |
| 370 | 4 | 2 |
| 380 | 4 | |
| 390 | 2 | 1 |
| 400 | 7 | 1 |
| 410 | 14 | 1 |
| 420 | 6 | |
| 430 | 10 | |
| 440 | 4 | |
| 450 | 3 | |
| 460 | 3 | |
| 470 | 6 | 1 |
| 480 | 3 | 2 |
| 490 | 14 | |
| 500 | 25 | |
| 510 | 41 | 3 |
| 520 | 61 | 1 |
| 530 | 65 | 4 |
| 540 | 76 | 8 |
| 550 | 90 | 6 |
| 560 | 106 | 10 |
| 570 | 138 | 13 |
| 580 | 128 | 4 |
| 590 | 109 | 7 |
| 600 | 110 | 11 |
| 610 | 128 | 12 |
| 620 | 91 | 14 |
| 630 | 75 | 11 |
| 640 | 64 | 5 |
| 650 | 48 | 6 |
| 660 | 47 | 5 |
| 670 | 27 | 6 |
| 680 | 17 | 2 |
| 690 | 8 | 2 |
| 700 | 9 | 2 |
| 710 | 3 | 3 |
| 720 | 1 | 1 |
| 730 | 2 | |
| Grand Total | 1564 | 145 |

Table 7. Annual returns, number of repeat spawners, and year-class strength indices of mature unclipped steelhead Rainbow Trout collected at the French River adult trap.

| Year | Year of Sampling | | | | | | | | | | | | | | | | | | | | | | | | | | | | Mean (93-17) | | | |
|-----------|------------------|----|------|----|------|----|------|----|------|----|------|----|------|----|------|----|------|----|------|----|------|----|------|----|------|----|------|----|--------------|------|----|----|
| | 2003 | | 2004 | | 2005 | | 2006 | | 2007 | | 2008 | | 2009 | | 2010 | | 2011 | | 2012 | | 2013 | | 2014 | | 2015 | | 2016 | | | 2017 | | |
| Age | F | M | F | M | F | M | F | M | F | M | F | M | F | M | F | M | F | M | F | M | F | M | F | M | F | M | F | M | F | M | F | M |
| 2 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 1 | 0 | 0 | 0 | 0 | |
| 3 | 0 | 9 | 0 | 1 | 1 | 0 | 1 | 13 | 2 | 9 | 0 | 0 | 0 | 1 | 1 | 2 | 0 | 0 | 0 | 3 | 0 | 6 | 0 | 2 | 0 | 1 | 0 | 9 | 1 | 7 | 1 | 4 |
| 4 | 10 | 12 | 8 | 6 | 7 | 4 | 3 | 4 | 24 | 21 | 7 | 7 | 4 | 3 | 0 | 1 | 8 | 8 | 7 | 8 | 6 | 9 | 6 | 3 | 1 | 4 | 3 | 15 | 41 | 21 | 8 | 7 |
| 5 | 20 | 21 | 27 | 10 | 34 | 19 | 12 | 4 | 10 | 9 | 26 | 14 | 29 | 15 | 6 | 6 | 14 | 9 | 27 | 30 | 32 | 27 | 5 | 1 | 12 | 5 | 39 | 29 | 40 | 7 | 19 | 12 |
| 6 | 14 | 8 | 50 | 25 | 32 | 23 | 14 | 5 | 9 | 3 | 5 | 4 | 4 | 10 | 35 | 9 | 12 | 8 | 19 | 8 | 33 | 9 | 3 | 4 | 26 | 16 | 9 | 4 | 11 | 9 | 17 | 9 |
| 7 | 3 | 3 | 21 | 20 | 13 | 4 | 8 | 7 | 7 | 4 | 1 | 0 | 3 | 1 | 10 | 18 | 12 | 9 | 2 | 1 | 11 | 7 | 0 | 0 | 18 | 12 | 28 | 9 | 4 | 1 | 9 | 6 |
| 8 | 0 | 0 | 12 | 3 | 2 | 3 | 1 | 1 | 3 | 0 | 1 | 1 | 2 | 0 | 2 | 3 | 3 | 2 | 1 | 0 | 1 | 0 | 0 | 0 | 13 | 4 | 7 | 2 | 1 | 0 | 3 | 2 |
| 9 | 0 | 0 | 1 | 1 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 1 | 1 | 2 | 0 | 0 | 1 | 0 |
| 10 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 |
| 11 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 |
| Sex total | 48 | 53 | 120 | 66 | 91 | 53 | 39 | 35 | 55 | 47 | 40 | 26 | 42 | 31 | 54 | 40 | 49 | 36 | 56 | 50 | 83 | 58 | 14 | 10 | 72 | 45 | 87 | 72 | 99 | 45 | 56 | 41 |
| Total | 101 | | 186 | | 144 | | 74 | | 102 | | 66 | | 73 | | 94 | | 85 | | 106 | | 141 | | 24 | | 117 | | 159 | | 145 | | 98 | |

| Year | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 | Mean (03-17) |
|-----------|------|------|-------|-------|------|-------|------|------|------|------|-------|------|-------|------|------|--------------|
| 1x repeat | 0 | 14 | 37 | 13 | 3 | 10 | 2 | 9 | 7 | 8 | 16 | 1 | 16 | 4 | 8 | 10 |
| 2x repeat | 0 | 0 | 1 | 1 | 0 | 0 | 1 | 0 | 0 | 2 | 3 | 1 | 2 | 3 | 0 | 1 |
| 3x repeat | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 4x repeat | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| % Repeat | 0.0% | 7.5% | 27.1% | 18.9% | 2.9% | 15.2% | 4.1% | 9.6% | 8.2% | 9.4% | 13.5% | 8.3% | 15.4% | 4.4% | 5.5% | 11.1% |

| Year-class | Complete year-classes | | | | | | | | | | | | | Mean (90-08) |
|-----------------------|-----------------------|--------|---------|---------|---------|--------|--------|---------|---------|---------|---------|---------|---------|--------------|
| | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | |
| Stocked | 42,571 | 60,669 | 100,281 | 201,156 | 109,427 | 48,311 | 64,932 | 117,596 | 250,100 | 135,202 | 122,776 | 121,740 | 109,324 | 114,160 |
| Returned | 56 | 84 | 143 | 133 | 100 | 44 | 42 | 139 | 131 | 42 | 68 | 120 | 105 | 93 |
| % return ¹ | 0.13% | 0.14% | 0.14% | 0.07% | 0.09% | 0.09% | 0.06% | 0.12% | 0.05% | 0.03% | 0.06% | 0.10% | 0.10% | 0.09% |
| 1x repeat | 7 | 7 | 7 | 6 | 4 | 0 | 3 | 5 | 5 | 1 | 5 | 15 | 11 | 6 |
| 2x repeat | 0 | 0 | 2 | 0 | 2 | 0 | 0 | 1 | 0 | 0 | 1 | 4 | 3 | 1 |
| 3x repeat | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 |

| Year-class | Incomplete year-classes | | | | | | | | |
|-----------------------|-------------------------|------|--------|--------|--------|--------|--------|---------|---------|
| | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 |
| Stocked | 53,214 | 0 | 55,013 | 55,032 | 55,596 | 39,856 | 99,908 | 193,308 | 181,783 |
| Returned | 99 | 50 | 94 | 65 | 73 | 9 | 1 | 6 | -- |
| % return ¹ | 0.19% | -- | 0.17% | 0.12% | 0.13% | 0.02% | 0.00% | -- | -- |
| 1x repeat | 4 | 0 | 1 | 0 | 0 | 0 | -- | -- | -- |
| 2x repeat | 1 | 0 | 0 | 0 | 0 | 0 | -- | -- | -- |
| 3x repeat | 0 | 0 | 0 | 0 | 0 | 0 | -- | -- | -- |

¹percent return of stocked fry or fingerlings to the French River trap as adults

Figure 1. Map of the French River and the locations of the adult and juvenile fish traps.

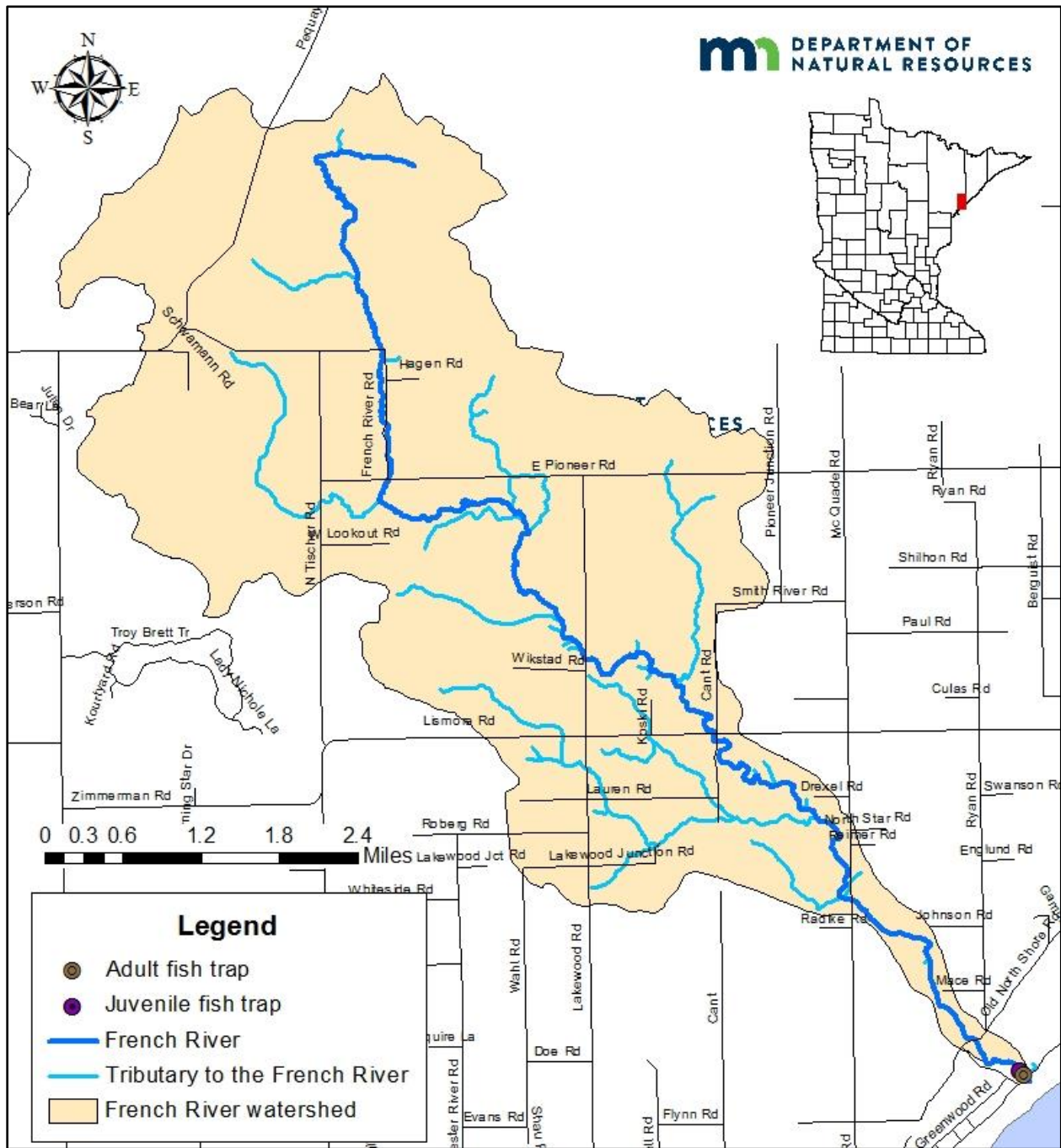


Figure 2. Number of juvenile steelhead emigrants captured in the French River juvenile trap by year. Mean is the historic average from 1994-2017 (± 1 standard error).

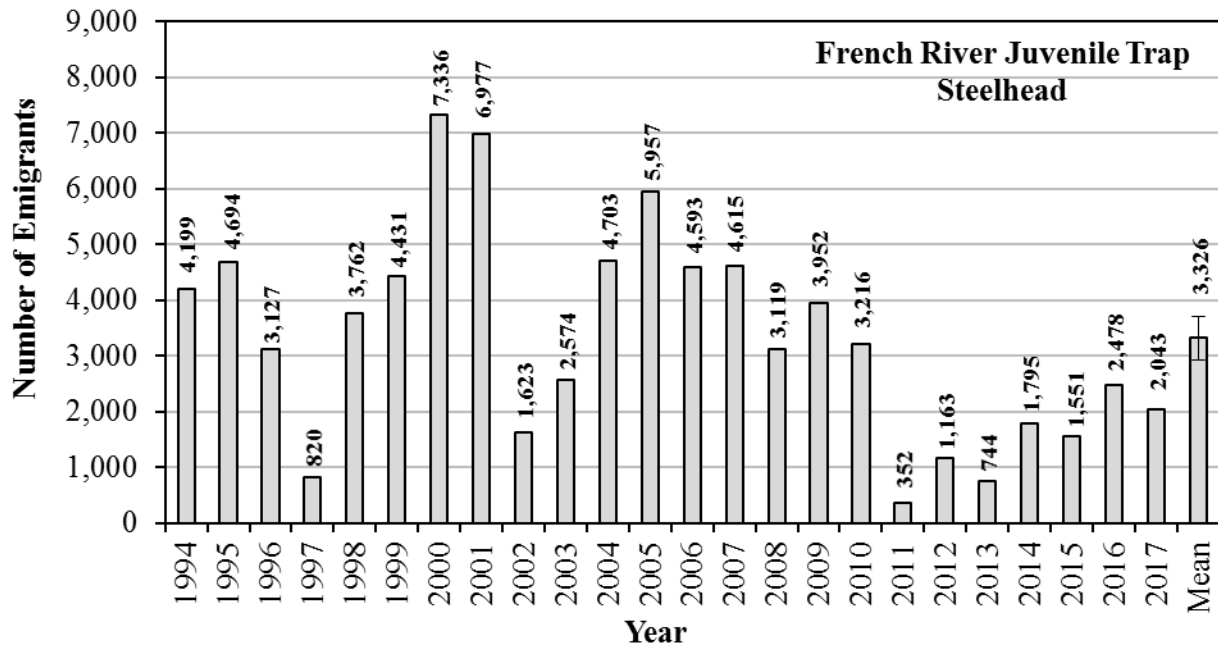


Figure 3. Percent of all juvenile steelhead collected in the French River juvenile trap that were age-0 through age-4 by year.

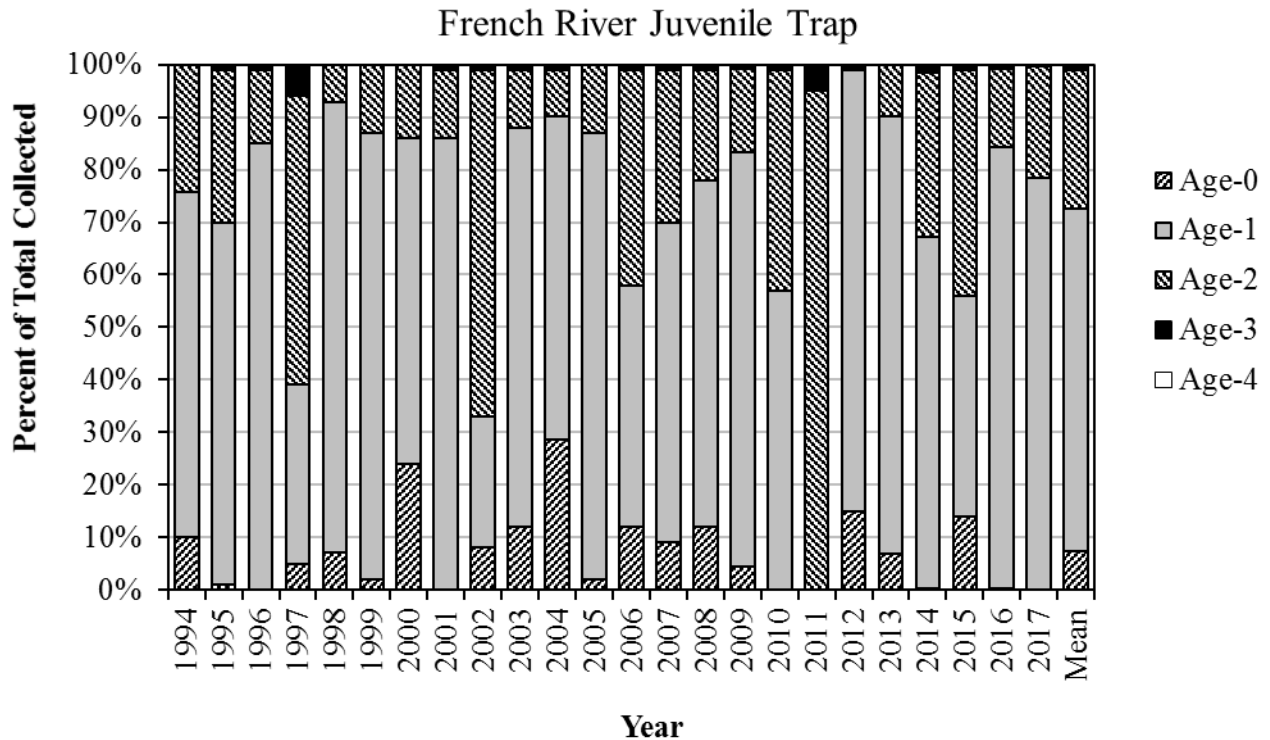


Figure 4. Number of age-1 (2016 year-class) Kamloops and steelhead captured in the French River juvenile trap by month and week in 2017.

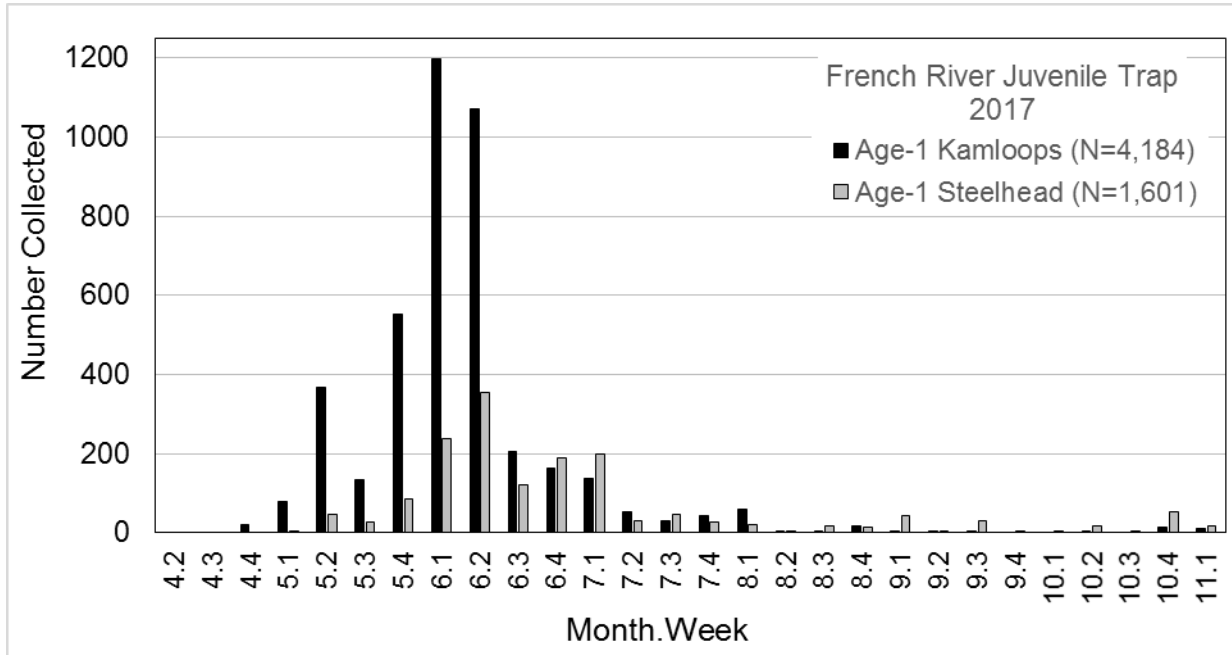


Figure 5. Mean total length (inches) of age-1 (2016 year-class) Kamloops and steelhead captured at the French River juvenile trap by month and week in 2017. The linear trendline for both Kamloops and steelhead is also shown.

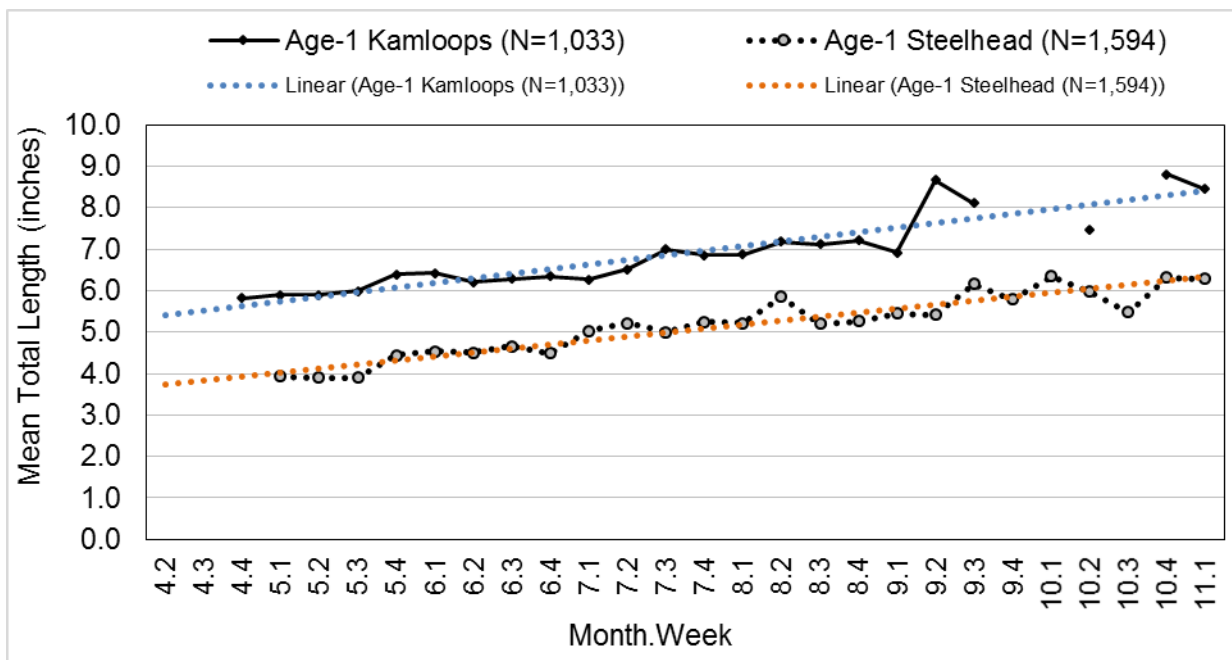


Figure 6. Number of Kamloops Rainbow Trout and steelhead Rainbow Trout collected by date during French River adult trap operations in 2017.

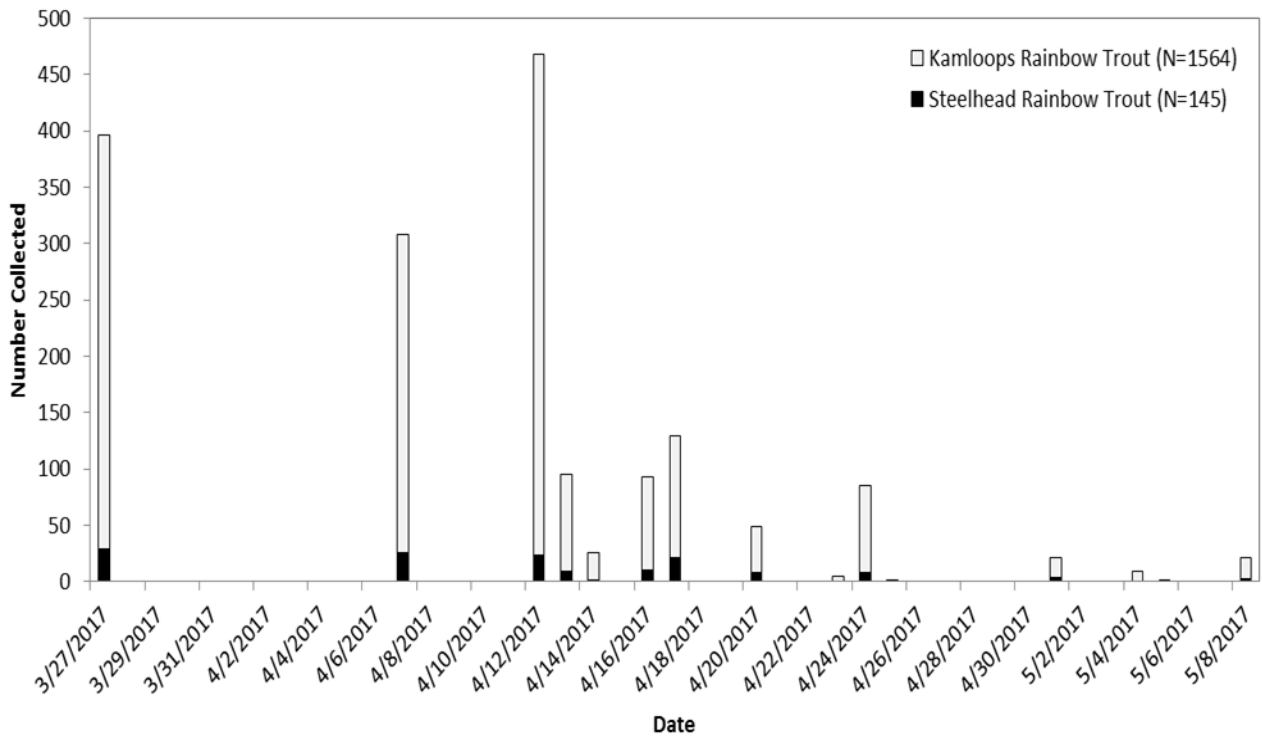


Figure 7. Number of adult Kamloops Rainbow Trout captured at the French River from 1993 to 2017.

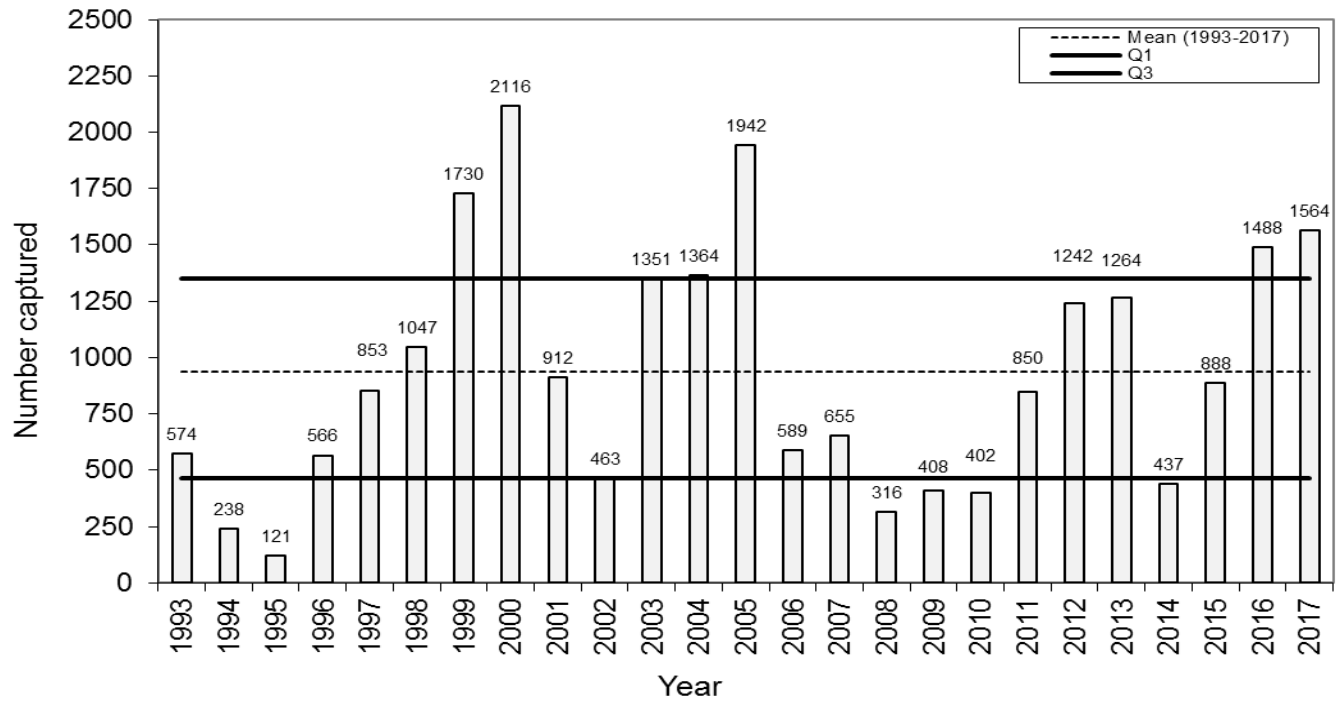


Figure 8. Age-frequency distributions of Kamloops and steelhead Rainbow Trout collected at the French River adult trap in 2017.

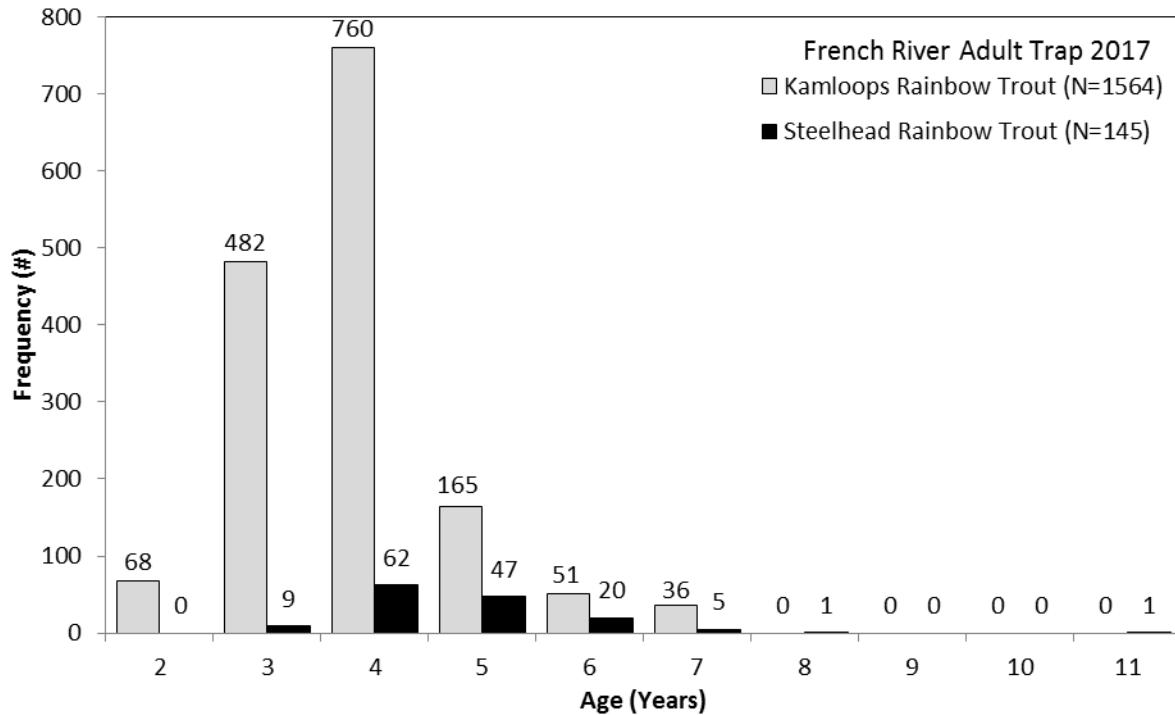


Figure 9. Length-frequency distributions of Kamloops Rainbow Trout captured in the spring at the French River in 2014, 2015, 2016, and 2017.

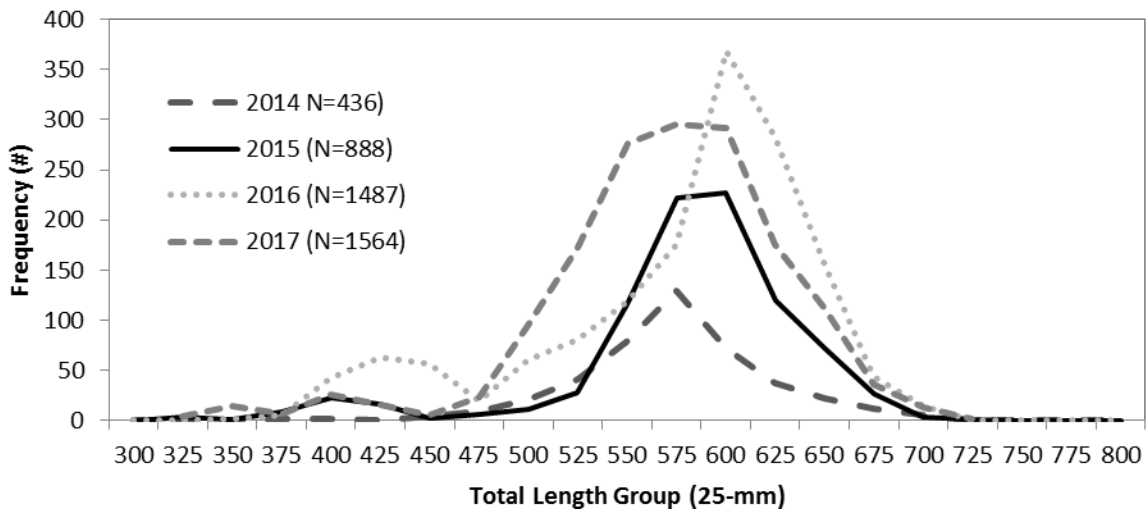


Figure 10. Number of steelhead Rainbow Trout collected at the French River from 1993 to 2017. The historic average (Mean) with 25th (Q1) and 75th (Q3) percentiles are also provided.

