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

SUPPLEMENTAL REPORT

French River Juvenile and Adult Fish Trap Report 2019

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Background

This report provides an annual update of juvenile and adult fish trap operations and Rainbow Trout stocking evaluations at the French River. These traps provide valuable information for assessment and management of steelhead and Kamloops Rainbow Trout in Minnesota waters of Lake Superior. The French River adult 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 is opened each spring immediately after ice leaves the river and flow rates decline sufficiently to permit safe access (typically by mid-April). 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 Rainbow Trout 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 provides information about growth, recruitment and survival of juvenile fish to help evaluate fish stocking programs. The juvenile trap is opened each spring immediately after ice leaves the river and flow rates decline sufficiently to permit safe access (typically mid-April). The trap is monitored at least three times each week until emigration rates begin to exceed 1 fish/day and the water temperatures exceeded 5°C (late-April or early-May), then daily through June, and on weekdays thereafter until the trap is closed in late October or early November. Juveniles captured in the trap are enumerated, measured, weighed, and scale sampled for age determinations (Ward and Blankenheim 2006, Blankenheim 2007). At normal flows which occur for most of the spring through fall, all the river water flows through the juvenile trap. At high flows immediately following snow-melt or after heavy rain events, surface water spills over the dam adjacent to the juvenile trap, but trap catches are typically very low or zero at these times suggesting little fish movement during high flows (MNDNR, unpublished data).

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 fisheries management in the French River can be found in the 2011 French River Management Plan. Steelhead management in Minnesota waters of Lake Superior is outlined in the 2016 Fisheries Management Plan for the Minnesota Waters of Lake Superior (Goldsworthy et al. 2016), and available on the Lake Superior Area Fisheries website (https://www.dnr.state.mn.us/areas/fisheries/lakesuperior/index.html).

2019 French River Steelhead Stocking

A total of 70,301 clipped yearling steelhead from the 2018 year-class were stocked in the French River on April 22 (29,205), April 29 (28,432) and May 6, 2019 (12,664). Fish were stocked at 3 locations: 40% (28,432) at Can't Road, 30% (21,006) at Lakewood Road, and 30% (20,863) at Pioneer Road. Fish measured approximately 4 inches when stocked, which was a targeted pre-smolt size (less than 5.91 inches; Negus 2003) to allow fish an opportunity to acclimate, grow and imprint in French River water before they emigrate to Lake Superior. All steelhead were given adipose and right pelvic fin clips (ARR) to distinguish them from steelhead fry (no clips), and clipped steelhead and Kamloops stocked in previous years. An additional 69,768 ARR clipped steelhead were stocked in the Lester River in 2019. Clipped steelhead

stocked in 2019 were offspring of genetically-screened, adult Knife River captive steelhead broodstock previously maintained at the French River Coldwater Hatchery. All KCB were released to Lake Superior after spawning in spring 2018. Fertilized eggs were transported in coolers on ice to the Spire Valley Coldwater Hatchery near Remer, Minnesota. They were initially reared indoors and then transferred to outdoor ponds on August 22, 2018 (at an average size of 2.1 inches, 264.7 fish/lb) for their final growing period prior to being clipped and stocked (M. Novak, MNDNR Spire Valley Hatchery).

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 long enough to reach a size that is conducive for survival 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 2018/2019. Winter lasted into April in 2019 as ice started to clear streams near Duluth in mid-April. Stream conditions were relatively favorable for juvenile trout during the summer of 2019. May 2019 through September 2019 saw above average air temperatures. Summer precipitation totals were just below average with late fall being wetter than average keeping stream flows above normal going into winter. The Duluth North Shore area was free of drought conditions most of the year with the exception of abnormally dry (D0) conditions August 6th through September 10th.

French River Juvenile Trap

2019 French River Juvenile Trap Summary

The juvenile trap was open for 162 days between April 16 and November 6, 2019. The trap was closed and the water bypass valve was open from July 25 through August 26 (33 days) to excavate rock, silt and other debris upstream of the water control structure (Table 1). A total of 6,781 juvenile salmonids were captured in 2019, of which 99% were steelhead Rainbow Trout (6,750) and 1% or less were Brown Trout (16) and Brook Trout (15). Ninety-one percent (6,194) of all fish were captured in spring (April-June), 8% (561) were captured in summer (July-August), and less than 1% (26) were captured in fall (September-November).

The total catch of juvenile Rainbow Trout (clipped and unclipped) captured in 2019 (6,750) was nearly double the historic average of 3,413 (Table 1, Figure 2). Approximately 92% (6,175) were captured in spring, 8% (557) in summer, and less than 1% (18) in fall (Figure 3). Emigration timing of juvenile Rainbow Trout in 2019 was similar to previous years and followed typical annual timing caused by diminishing stream flow and increasing water temperatures. Eighty-nine percent (5,987) were age-1, 11% (762) were age-2, and less than 1% (1) were age-3. The catch of age-1 Rainbow Trout in 2019 was much higher than the historic average of 2,422, and the number of age-2 and older Rainbow Trout was similar to the historic average of 708 (Table 1).

Clipped steelhead comprised 97% (6,524) of all Rainbow Trout captured in 2019; 8% (537) were adipose left-pelvic (ALR) clipped steelhead from the 2017 year-class (age-2), and 89% (5,987) were adipose right-pelvic (ARR) clipped steelhead from the 2018 year-class (age-1); zero were ARR clipped Kamloops from the 2016 year-class (age-3). Unclipped steelhead comprised only 3% (226) of all Rainbow Trout captured in 2019; almost all (225, 99%) were

from the 2017 year-class (age-2) and one was from the 2016 year-class (age-3). The number of age-2 and older unclipped steelhead was lower than 2017 (441) and 2018 (818). More information about clipped and unclipped steelhead is provided in the stocking evaluation summaries (below).

Fifteen Brook Trout were captured in 2019, 10 were captured in spring, 3 in summer and 2 in fall. Three were from the 2019 year-class (age-0), 11 were from the 2018 year-class (age-1), and one was from the 2017 year-class (age-2). Mean total length at capture by age group was 2.8 inches at age-0, 5.1 inches at age-1, and 11.7 inches at age-2.

Sixteen Brown Trout were captured in 2019, 9 were captured in spring, 1 in summer, and 6 in fall. One was from the 2019 year-class (age-0), 11 were from the 2018 year-class (age-1), 3 were from the 2017 year-class (age-2), and 1 was from the 2016 year-class (age-3). Mean total length at capture by age group was 4.4 inches at age-0, 5.8 inches at age-1, 7.1 inches at age-2, and 12.0 inches at age-3.

Seven non-gamefish species were also captured in 2019 (Table 3).

Unclipped Steelhead Fry Stocking Evaluation

Most steelhead stocked in the French River over the past three decades were “swim-up” fry that hatched in late May to early June and were stocked when yolk sacs were absorbed and they were ready to begin exogenous feeding (size approx. 24 mm, 0.15 g). Fry stocking in the French River provided decent smolt–adult return rates to traps and anglers, and the lowest cost per returning adult compared to other stocking programs (Negus 2012); however, significantly more fry have to be stocked to compensate for high mortality when stocking at this size and life-stage. The Kamloops stocking program, that provided harvest opportunities for Rainbow Trout in Minnesota waters of Lake Superior, was terminated in 2016 after genetics confirmed introgression of stocked Kamloops in naturalized steelhead populations (Miller et al. 2020). A clipped steelhead stocking program was started to maintain harvest opportunities for clipped Rainbow Trout, and regulations for unclipped (naturally produced) steelhead were maintained as catch and release only. Fry are too small to be fin clipped and would be indistinguishable from unclipped steelhead, so could not be legally harvested, and egg supply is often limited from wild (feral) steelhead returns to French River, the sole source for steelhead stocking programs after closure of the French River Hatchery. Therefore, the fry stocking program was suspended after 2017 and gametes could be used for a clipped steelhead yearling (pre-smolt) stocking program (described below). The last three year classes of steelhead fry stocked in French River (2015-2017) provide a useful comparison of growth, survival and adult returns among stocking strategies, somewhat similar to an evaluation by Negus (2012), which will be useful information for the next revision of the 2016 Fisheries Management Plan for Minnesota Waters of Lake Superior (Goldsworthy et al. 2016).

A total of 5,985 of 474,999 steelhead stocked as fry in 2015 through 2017 have been recaptured in the French River smolt trap; 4% (227) were recaptured at age-0, 72% (4,281) at age-1, 25% (1,473) at age-2, and less than 1% (4) at age-3. Cumulative total survival of these year classes averaged 1.5% (range: 0.5% to 2.7%), with the highest survival in 2015 when only fry were stocked in French River. Average total length at emigration among all fry stocked year-classes was 5.0 inches (range: 4.8 to 5.3), and average length by age group was 2.5 inches at age-0, 4.6 at age-1, 6.4 at age-2, and 10.9 at age-3 (Table 2). The steelhead fry stocking program will continue to be evaluated by returns of unclipped adult steelhead to the French River adult trap.

Clipped Steelhead Yearling (Pre-Smolt) Stocking Evaluation

A clipped steelhead yearling (pre-smolt) stocking program was initiated in 2018 to maintain harvest opportunities for Rainbow trout in Minnesota waters after discontinuation of the Kamloops stocking program. The annual stocking quota for clipped steelhead was set at 60,000 for both the French and Lester rivers (total annual quota: 120,000; Goldsworthy et al. 2017). Annual stocking quotas for clipped steelhead yearlings at French and Lester rivers were met in the first two years of the program, and a combined total of 123,308 were stocked in French River in 2018 and 2019 (Table 2).

The clipped yearling steelhead stocking program in French River began with 53,081 ALR clipped steelhead yearlings stocked in 2018 (2017 year-class). Over the past two years, 4,704 ALR clipped steelhead were recaptured in the smolt trap. Peak emigrations for 2 year old or older steelhead smolts typically occurs in late-May and early-June when water temperatures exceed 50°F, and in June or later for 1 year olds when water temperatures exceed 60°F. Peak emigrations of ALR clipped steelhead over the past two years has mimicked these patterns with over 94% (4,433) of all ALR clipped steelhead captured in May and June. Cumulative survival of the 2017 year-class through age-2 was 8.9%, with 7.9% (4,167) that survived to emigrate at age-1 and 1.0% (537) that survived to emigrate at age-2. Mean total length of all ALR clipped steelhead measured was 5.7 inches (range: 3.4–9.8); 5.2 inches (range: 3.4–7.8) at age-1 in 2018, and 6.6 inches (range: 4.4–9.8) at age-2 in 2019. The sizes of ALR steelhead from the 2017 year-class was slightly larger than year-classes stocked as fry through age-2 (Table 2).

The second year of the clipped steelhead program stocked 70,301 ARR clipped yearling steelhead in French River in 2019 (2018 year-class). A total of 5,987 ARR steelhead were captured in the smolt trap in 2019, and over 90% (5,433) were captured in May and June. Survival of the 2018 year-class through age-1 was 8.5%, and was already similar to the cumulative survival of ALR clipped steelhead stocked in 2018 (2017 year-class). Mean total length was 5.1 inches (range: 2.4-7.9) at age-1, which was similar to the ALR steelhead and fry stocked year-classes at this age (Table 2). The wider range in sizes of age-1 ARR steelhead compared to ALR steelhead was not surprising because ARR steelhead were a wider range in sizes when stocked in French River.

Clipped steelhead not recaptured in the smolt trap likely died upstream. Potential sources of mortality are inter- and intraspecific competition, disease, abiotic stressors (i.e., water temperatures), lack of connectivity and access to thermal refuge due to stream blockages or beaver dams, and overwinter mortality. It is possible for fish to bypass the smolt trap over the dam during high water events, however trap avoidance is assumed to be low based on historic daily trap catch and gauge data. An evaluation of the sources of mortality, seasonal movements and habitat use, and a reevaluation of trap capture efficiencies is warranted and are areas for future research. The clipped steelhead stocking program will continue to be evaluated with traps at French River and the MNDNR Lake Superior spring creel survey.

Clipped Kamloops Yearling (Pre-Smolt) Stocking Evaluation

The Kamloops stocking program was discontinued after 2017 because of negative impacts to naturalized steelhead populations in Minnesota and other jurisdictions in Lake Superior (Miller et al. 2020). A total of 26,174 ARR clipped yearling Kamloops were stocked upstream in the French River in 2017 (2016 year-class), and all were stocked at McQuade Road. Prior to 2017, most Kamloops were stocked in Lake Superior near the mouth of the French River at a larger size (average size range: 7 to 9 inches).

A total of 4,238 Kamloops were recaptured in the smolt trap over the last three years. Cumulative survival of Kamloops through age-3 was 16.2%, with 16.0% (4,184) that survived to emigrate at age-1, 0.2% (54) to age-2, and zero to age-3. No Kamloops were captured upstream in the French River trout index station at Can't Road in 2018 or 2019 (J. Pinkerton, MNDNR). Mean total length of all ARR clipped Kamloops measured was 6.5 inches (range: 4.3–10.4); 6.4 inches (range: 4.3–10.4) at age-1 in 2018, and 8.3 inches (range: 5.4-10.3) at age-2 in 2019. Age-1 Kamloops were 29% larger on average than age-1 steelhead (stocked as fry in 2016) when they left the French River, and maintained a larger average size over time than all unclipped or clipped steelhead though age-1 (Gottwald and Peterson 2017). Although few Kamloops emigrated at age-2 or older, 76% (787) of all that emigrated at age-1 met or exceeded minimum smolt size of 5.9 inches (Negus 1999); 77% (839) of all Kamloops that emigrated exceeded 5.9 inches (Table 2).

The adult returns from this Kamloops stocking program is difficult to predict given changes to stocking locations and size at emigration observed between juvenile Kamloops and steelhead. Kamloops that left at age-1 were more similar in size to age-2 and older steelhead than age-1 steelhead. Less than 1% of juvenile steelhead that emigrate from the French River at age-1 (avg. size $\leq$ 4.6 inches) return as adults, and returns improve nearly 100 fold (to approximately 10%) if they emigrate at age-2 or older (avg. size $\geq$ 6.8 inches). Assuming that survival is similar for Kamloops and steelhead emigrants in Lake Superior, and taking into consideration the size at emigration (not solely age at emigration), Kamloops that left at age-1 could be expected to return at a rate intermediate to age-1 and age-2 steelhead (between 3 and 10% return rate); if true, 128 to 424 adult Kamloops will be produced from the 2016 year-class. Most Kamloops stocked in previous years have returned as adults at age-4 and age-5, so harvest and returns from the 2016 year-class should be realized after spring 2021.

French River Adult Trap

The French River adult trap was operated for 34 days from April 24 through May 28, 2019. The trap season was eight days short of the mean season length (Table 4). Seining in the pool downstream of the adult trap was conducted eight times with the trap checked more frequently throughout the trap season. The first fish were sampled on April 26th, and close to 85% (234) of all fish were captured in the first 2 weeks of the trap season (April 26th through May 10). Approximately 90% of all Kamloops and steelhead were captured by May 10th (Table 5, Figure 4).

Genetics Monitoring Program

Lake Superior Area Fisheries initiated a genetics monitoring program at the French River Hatchery in 2016 to reduce or eliminate the unintended anthropogenic hybridization of Kamloops and steelhead during annual spawning operations. Hybridization is a great concern shared by anglers and MNDNR because Kamloops and Kamloops x steelhead hybrid offspring show significantly reduced survival in Minnesota streams than steelhead offspring (Negus 1999, Miller et al. 2020). Negus (1999) and Miller et al. (2004) found a 45 to 70% reduction in cumulative annual survival of Kamloops and hybrids versus steelhead. The program requires that all unclipped Rainbow Trout and Rainbow trout with questionable clips captured at French River are genotyped prior to being spawned or released to Lake Superior. Rainbow Trout with questionable clips were either poorly clipped before they were stocked, were clipped by an angler after they were stocked, or partially regrew a fin after they were stocked. Each fish is assigned as a Kamloops, hybrid (Kamloops x steelhead cross), or steelhead based on genotypes

using microsatellite genetic markers. All Kamloops and hybrids are removed from the gene pool and sacrificed for annual disease testing. Only fish genotyped as steelhead are used in spawning operations. The genetics monitoring program will continue until few Kamloops or hybrids are found among unclipped Rainbow Trout at French River.

Only one questionable clipped adult Rainbow Trout was captured in 2019. It genotyped as a steelhead so was included with data for unclipped steelhead. Excluding this fish, all questionable clipped Rainbow Trout captured over the last three years genotyped as Kamloops; data for these fish were included in annual data summaries for Kamloops (Table 6). An additional 11 right-maxillary (RM) clipped steelhead were captured in 2019. All RM clipped steelhead were brood fish previously held at French River Coldwater Hatchery that were released in Lake Superior after that hatchery was decommissioned. All RM clipped steelhead were genotyped prior to release in Lake Superior.

Among all unclipped Rainbow Trout captured in 2019 (68), 88% (60) genotyped as steelhead and 12% (8) as hybrids. The proportions of hybrids found among unclipped Rainbow Trout in 2019 (12%) was similar to 2016 (14%), 2017 (13%), and 2018 (15%) (Table 7). Data for all unclipped Rainbow Trout genotyped as Kamloops or hybrids were included in data for unclipped Rainbow Trout to allow valid comparisons among years prior to the genetics monitoring program.

Unclipped Rainbow Trout

There were 68 unclipped Rainbow Trout captured at the French River in 2019, which was below the historic average (94) (Table 7, Figure 5). Unclipped Rainbow Trout ranged from age-3 through age-8, and approximately half (51%) were age-5 or age-6 (Table 7, Figure 6). The average return rate of unclipped Rainbow Trout year-classes has remained low and averaged 0.09% since 1992 (Tables 8, 9). Approximately 18% (12) had a tag from a previous year, which was above the historic average (10.1%) (Table 9). Two recaptures were initially tagged in 2016, six were tagged in 2017, and four were tagged in 2018. The average length was 22.4 inches (570 mm) and the largest measured 28.6 inches (727 mm) (Table 10).

Clipped Rainbow Trout

Eleven right-maxillary (RM) clipped Rainbow Trout that were previously Knife River Captive broodstock released to Lake Superior were captured in 2019, seven were females and 4 were males. Females averaged 23.8 inches (range: 21-24) and males 20.6 inches (range: 20-21) (Table 10).

Kamloops Rainbow Trout

A total of 275 Kamloops were captured in 2019, which was below the 26 year average and below the interquartile range (Mean=925; IR=489-1329) (Table 6, Figure 7). Historically, 72% of Kamloops returns at the French River are age-4 and age-5. In 2019, Kamloops ranged from age-3 to age-8 and 91% of the returns consisted of age-4(59%) and age-5(32%) fish (Figure 6). The average return rate of Kamloops year-classes has remained low and averaged 1.9% since 1990 (Table 11). Females and males comprised 67% and 33% of Kamloops returns in 2019, respectively (Table 6). Approximately 16% (43) of returning Kamloops were recaptures with a colored tag from a previous year, which was higher than the long-term mean of 4% (Table 12). Two Kamloops had a tag stub or mark that indicated tag loss, and approximately 2.5% (7) had at least one lamprey wound. The overall mean total length for Kamloops was 23.4 inches (595 mm) and the largest measured 28.7 inches (728 mm) (Table 10, Figure 8).

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Table 1. Trap operation dates and catch summary (number [*N*] and percentage [%]) of juvenile steelhead Rainbow Trout captured at the French River juvenile trap by year and year-class.

Year	**2009**		**2010**		**2011**		**2012**		**2013**		**2014**		**2015**		**2016**		**2017**		**2018**		**2019**		**Mean 1994 - 2019**	
Date trap was opened	4/17		3/28		4/18		3/25		5/7		4/28		4/15		4/12		4/8		4/24		4/16		4/14	
Date trap was closed	11/6		10/29		11/3		10/29		11/7		10/31		11/16		11/16		11/3		11/6		11/6		11/5	
Number of days trap was open	203		215		178		165		184		185		215		210		204		188		162		199	
Number per Year	***N***	**%**	***N***	**%**	***N***	**%**	***N***	**%**	***N***	**%**	***N***	**%**	***N***	**%**	***N***	**%**	***N***	**%**	***N***	**%**	***N***	**%**	***Mean N***	***Mean %***
Age-0	173	4%	0	0%	0	0%	176	15%	50	7%	4	0%	217	14%	9	0%	1	0%	0	0%	0	0%	259	8%
Age-1	3140	79%	1,844	57%	0	0%	976	84%	623	84%	1,204	67%	659	42%	2,077	84%	1,601	78%	4,770	85%	5,987	89%	2,422	71%
Age-2	609	15%	1,338	42%	333	95%	0	0%	71	10%	558	31%	664	43%	374	15%	433	21%	815	15%	762	11%	708	21%
Age-3	29	1%	34	1%	18	5%	11	1%	0	0%	29	2%	11	1%	18	1%	7	0%	3	0%	1	0%	25	1%
Age-4	1	0%	0	0%	1	0%	0	0%	0	0%	0	0%	0	0%	0	0%	1	0%	0	0%	0	0%	0	0%
Total	**3,952**		**3,216**		**352**		**1,163**		**744**		**1,795**		**1,551**		**2,478**		**2,043**		**5,588**		**6,750**		**3,413**	
Number per Year-Class	***N***	**%**	***N***	**%**	***N***	**%**	***N***	**%**	***N***	**%**	***N***	**%**	***N***	**%**	***N***	**%**	***N***	**%**	***N***	**%**	***N***	**%**	***Mean N***	**Mean %**
Age-0	173	7%	0	--	0	0%	176	13%	50	3%	4	0%	217	8%	9	0%	1	--	0	--	0	--	294	9%
Age-1	1,844	78%	0	--	976	91%	623	46%	1,204	62%	659	63%	2,077	76%	1,601	66%	4,770	--	5,987	--	**		2,410	70%
Age-2	333	14%	0	--	71	7%	558	41%	664	34%	374	36%	433	16%	815	34%	762	--	**		**		697	20%
Age-3	11	0%	0	--	29	3%	11	1%	18	1%	7	1%	3	0%	1	0%	**		**		**		24	1%
Age-4	0	0%	0	--	0	0%	0	0%	1	0%	0	0%	0	0%	0	0%	**		**		**		0	0%
Total	**2,361**		**0**		**1,076**		**1,368**		**1,937**		**1,044**		**2,730**		**2,426**		**5,533****		**5,987****		**0****		**3,425**	

** Data not yet complete for the given year-class - year class values excluded from historic averages.

Year-class totals provided here include all steelhead from each year-class regardless of clip or size at stocking.

Stocked as frylings (~2 inch TL): 2009, 2011-2013.

Stocked as fry: 1994-2008, 2010, and 2014-2017.

Stocked as clipped yearlings: (~ 4 inches TL): 2018 and 2019.

Table 2. Growth and survival of juvenile Rainbow Trout stocked in the French River since 2015.

						Number Recaptured					Mean Total Length at Emigration (inches)					Survival (%)				
Year Stocked	Year Class	Strain	Life Stage	Clip	Total Stocked (#)	Total	*Age-0*	*Age-1*	*Age-2*	*Age-3*	Overall	*Age-0*	*Age-1*	*Age-2*	*Age-3*	Overall	*Age-0*	*Age-1*	*Age-2*	*Age-3*
2015	2015	Steelhead	Fry	No clip	99,908	2,730	*217*	*2,077*	*433*	*3*	4.9	*2.5*	*4.7*	*6.8*	*10.8*	2.7%	0.2%	2.1%	0.4%	0.0%
2016	2016	Steelhead	Fry	No clip	193,308	2,426	*9*	*1,601*	*815*	*1*	5.3	*2.7*	*4.8*	*6.4*	*10.9*	1.3%	0.0%	0.8%	0.4%	0.0%
2017	2017	Steelhead	Fry	No clip	181,783	829	*1*	*603*	*225*	--	4.8	*2.4*	*4.3*	*6.0*	--	0.5%	0.0%	0.3%	0.1%	--
2017	2016	Kamloops	Pre-Smolt Yearling	ARR	26,174	4,238	--	*4,184*	*54*	*0*	6.5	--	*6.4*	*8.3*	--	16.2%	--	16.0%	0.2%	0.0%
2018	2017*	Steelhead	Pre-Smolt Yearling	ALR	53,081	4,704	--	*4,167*	*537*	--	5.7	--	*5.2*	*6.6*	--	8.9%	--	7.9%	1.0%	--
2019	2018*	Steelhead	Pre-Smolt Yearling	ARR	70,301	5,987	--	*5,987*	--	--	5.1	--	*5.1*		--	8.5%	--	8.5%	--	--

**Data is not yet complete for the 2017 and 2018 year classes.*

Table 3. Other fish species collected in the French River juvenile trap by month in 2019.

Species / Month	April	May	June	July	August	September	October	November	All
Blacknose Dace	0	5	12	10	0	0	0	0	27
Brook Stickelback	0	0	1	1	0	0	0	0	2
Creek Chub	0	1	4	1	0	4	1	0	11
Fathead Minnow	0	1	1	0	0	0	0	0	2
Longnose Dace	0	2	4	5	0	0	0	0	11
Northern Redbelly Dace	0	0	3	1	0	1	0	0	5
White Sucker	0	0	0	1	0	0	0	0	1
Total	**0**	**9**	**25**	**19**	**0**	**5**	**1**	**0**	**59**

Table 4. Spring opening date, closing date, and days of operation of the French River adult trap by year.

Spring			
Year	Opening date	Closing date	Days of operation
1993	4/12	5/17	37
1994	4/18	5/23	36
1995	4/17	5/26	40
1996	4/26	6/14	50
1997	4/16	6/2	48
1998	4/5	5/26	52
1999	4/12	5/17	36
2000	3/27	5/22	57
2001	4/16	5/23	38
2002	4/16	5/20	35
2003	4/23	5/28	36
2004	4/13	5/19	37
2005	4/11	5/27	47
2006	4/6	5/19	44
2007	4/15	5/25	41
2008	4/17	5/24	35
2009	4/21	5/29	39
2010	3/28	5/18	52
2011	4/18	5/27	40
2012	3/26	5/16	52
2013	5/6	6/7	33
2014	5/5	7/3	60
2015	4/13	6/12	60
2016	4/5	5/16	33
2017	3/27	5/8	43
2018	4/29	5/21	22
2019	4/24	5/28	34
Mean (1993-2019)	4/14	5/26	42

Table 5. Total catch of all adult trout species captured at French River Adult Trap by date in 2019.

Date	COS	Kamloops Rainbow Trout	Unclipped Rainbow Trout	RM Clipped KCB Broodstock Steelhead	All Species
4/26/2019	0	25	7	5	37
4/27/2019	0	7	0	0	7
4/28/2019	0	1	0	0	1
4/29/2019	0	106	26	0	132
5/1/2019	0	16	7	1	24
5/5/2019	0	2	0	0	2
5/6/2019	0	34	0	0	34
5/7/2019	0	2	0	0	2
5/8/2019	1	41	20	3	65
5/13/2019	0	22	5	1	28
5/15/2019	0	2	0	0	2
5/16/2019	0	1	0	0	1
5/17/2019	0	2	0	0	2
5/24/2019	0	1	0	0	1
5/28/2019	0	13	3	1	17
Grand Total	1	275	68	11	355

Table 6. Number of Kamloops Rainbow Trout and questionable clipped Rainbow Trout (KAM_Q) captured by age and sex, and number of genotypes assigned (Kamloops, Hybrid [Kamloops x steelhead], or steelhead) for all questionable clipped Rainbow Trout genotyped at French River by year.

Year	2009		2010		2011		2012		2013		2014		2015		2016		2017		2018		2019		Mean (1993-2019)	
Age / Sex	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	2	15	0	47	0	4	0	17	0	50	0	3	0	47	3	157	3	65	2	12	0	0	**0**	**40**
Age-3	6	15	15	47	148	104	59	77	46	173	12	26	4	22	75	146	267	215	70	83	2	3	**50**	**62**
Age-4	190	102	108	54	261	108	624	258	478	258	175	114	193	108	193	122	465	295	180	75	107	56	**274**	**151**
Age-5	45	8	71	27	117	66	119	52	148	40	39	40	287	122	331	164	87	78	83	37	58	30	**140**	**81**
Age-6	13	10	23	4	18	8	20	14	44	13	15	13	48	49	227	62	37	14	64	55	17	2	**54**	**24**
Age-7	1	1	3	3	11	5	2	0	5	9	0	0	5	1	0	0	28	10	8	2	0	0	**14**	**9**
Age-8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0	0	**3**	**1**
Age-9	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	257	151	220	182	555	295	824	418	721	543	241	196	537	349	829	651	887	677	410	264	184	91	**535**	**366**
Unknown Sex	0		0		0		0		0		0		0		8		0		0		0		**0**	
Total Catch	**408**		**402**		**850**		**1,242**		**1,264**		**437**		**886**		**1,489**		**1,564**		**674**		**275**		**901**	
Total KAM_Q Captured	--		--		--		--		--		--		--		15		10		5		1		**8**	
Total KAM_Q Genotyped	--		--		--		--		--		--		--		1		10		5		1		**4**	
Kamloops Genotype	--		--		--		--		--		--		--		*1*		*10*		*5*		--		***5***	
Hybrid Genotype	--		--		--		--		--		--		--		*0*		*0*		*0*		--		***0***	
Steelhead Genotype	--		--		--		--		--		--		--		*0*		*0*		*0*		*1*		***0***	

KAM_Q = Rainbow Trout with questionable clips, unknown strain or hatchery source

Table 7. Number of unclipped Rainbow Trout captured by age and sex, and number of genotypes assigned (Kamloops, Hybrid [Kamloops x steelhead], or steelhead) for all unclipped Rainbow Trout genotyped at French River by year.

Year	2009		2010		2011		2012		2013		2014		2015		2016		2017		2018		2019		Mean (1993-2019)	
Age / Sex	**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	1	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	**0**	**0**
Age-3	0	1	1	2	0	0	0	3	0	6	0	2	0	1	0	4	1	7	1	9	1	9	**1**	**5**
Age-4	4	3	0	1	8	8	7	8	6	9	6	3	1	4	3	15	41	21	10	14	6	4	**8**	**8**
Age-5	29	15	6	6	14	9	27	30	32	27	5	1	12	5	38	31	38	5	17	5	11	10	**19**	**12**
Age-6	4	10	35	9	12	8	19	8	33	9	3	4	26	16	9	6	11	8	6	5	11	3	**16**	**9**
Age-7	3	1	10	18	12	9	2	1	11	7	0	0	18	12	26	11	3	1	4	1	6	4	**8**	**6**
Age-8	2	0	2	3	3	2	1	0	1	0	0	0	13	4	6	2	1	0	0	1	2	0	**3**	**2**
Age-9	0	0	0	1	0	0	0	0	0	0	0	0	2	1	1	2	0	0	0	0	0	0	**1**	**0**
Age-10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	**0**	**0**
Age-11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	**0**	**0**
Sex total	42	31	54	40	49	36	56	50	83	58	14	10	72	45	83	72	96	42	39	34	37	30	**55**	**41**
Unknown Sex	0		0		0		0		0		0		0		7		1		0		1		**0**	
Total Catch	**73**		**94**		**85**		**106**		**141**		**24**		**117**		**162**		**139**		**73**		**68**		**94**	
Unclipped RBT Not Genotyped	--		--		--		--		--		--		--		9		18		0		0		**7**	
Total Unclipped RBT Genotyped	--		--		--		--		--		--		--		153		121		73		68		**104**	
Steelhead Genotype	--		--		--		--		--		--		--		*131*		*102*		*62*		*60*		***89***	
Hybrid Genotype	--		--		--		--		--		--		--		*17*		*13*		*10*		*8*		***12***	
Kamloops Genotype	--		--		--		--		--		--		--		*5*		*2*		*1*		*0*		***2***	
Unknown Genotype	--		--		--		--		--		--		--		*0*		*4*		*0*		*0*		***1***	

Table 8. Number of unclipped Steelhead Rainbow Trout stocked as fry, number that returned, percent that returned, return status (complete or incomplete), and the number stocked at French River by year-class. The historic average (Mean) is shown for only complete year classes.

Year-stocked	Year-class	Stocked (#)	Returned (#)	Return (%)	Return status
1990	1990	233,720	34	0.01%	Complete
1991	1991	277,585	88	0.03%	Complete
1992	1992	179,981	124	0.07%	Complete
1993	1993	129,685	132	0.10%	Complete
1994	1994	56,928	85	0.15%	Complete
1995	1995	98,636	74	0.08%	Complete
1996	1996	42,571	56	0.13%	Complete
1997	1997	60,669	84	0.14%	Complete
1998	1998	100,281	143	0.14%	Complete
1999	1999	201,156	133	0.07%	Complete
2000	2000	109,427	100	0.09%	Complete
2001	2001	48,311	44	0.09%	Complete
2002	2002	64,932	42	0.06%	Complete
2003	2003	117,596	139	0.12%	Complete
2004	2004	250,100	131	0.05%	Complete
2005	2005	135,202	42	0.03%	Complete
2006	2006	122,776	69	0.06%	Complete
2007	2007	121,740	120	0.10%	Complete
2008	2008	109,324	105	0.10%	Complete
2009	2009	0	--	--	Complete
2010	2010	0	--	--	Complete
2011	2011	0	1	--	Incomplete
2012	2012	0	7	--	Incomplete
2013	2013	0	9	--	Incomplete
2014	2014	39,856	25	0.06%	Incomplete
2015	2015	99,908	11	0.01%	Incomplete
2016	2016	193,308	20	0.01%	Incomplete
2017	2017	181,783	3	0.00%	Incomplete
Mean		**129,506**	**92**	**0.09%**	

Table 9. Data for repeat spawning of unclipped Rainbow Trout captured at the French River by year.

Year	Total Catch	Number of Repeat Spawn Events				Total Repeats	Repeats (%)
		1x	2x	3x	4x		
1993	50	2	0	0	0	2	4.0%
1994	35	0	0	0	0	0	0.0%
1995	50	14	1	0	0	15	30.0%
1996	40	4	1	0	0	5	12.5%
1997	63	5	0	1	0	6	9.5%
1998	141	9	0	0	0	9	6.4%
1999	235	20	0	0	0	20	8.5%
2000	69	2	0	0	0	2	2.9%
2001	45	7	1	0	0	8	17.8%
2002	47	2	0	0	0	2	4.3%
2003	101	0	0	0	0	0	0.0%
2004	186	14	0	0	0	14	7.5%
2005	144	37	1	1	0	39	27.1%
2006	74	13	1	0	0	14	18.9%
2007	102	3	0	0	0	3	2.9%
2008	66	10	0	0	0	10	15.2%
2009	73	2	1	0	0	3	4.1%
2010	94	9	0	0	0	9	9.6%
2011	85	7	0	0	0	7	8.2%
2012	106	8	2	0	0	10	9.4%
2013	141	16	3	0	0	19	13.5%
2014	24	1	1	0	0	2	8.3%
2015	117	16	2	0	0	18	15.4%
2016	162	4	3	0	0	7	4.3%
2017	139	8	0	0	0	8	5.8%
2018	73	5	1	0	0	6	8.2%
2019	68	10	2	0	0	12	17.6%
Mean	**94**	**8**	**1**	**0**	**0**	**9**	**10.1%**

Table 10. Length-frequency distribution of all fish measured by species at the French River in 2019.

Length Group (10 mm)	Coho Salmon	Kamloops Rainbow Trout	Unclipped Rainbow Trout	Clipped KCB Broodstock Steelhead	All Species
320	0	0	1	0	1
330	0	0	0	0	0
340	0	0	0	0	0
350	0	0	1	0	1
360	0	0	0	0	0
370	0	0	1	0	1
380	0	0	2	0	2
390	0	0	1	0	1
400	0	0	0	0	0
410	0	0	3	0	3
420	1	1	1	0	3
430	0	0	1	0	1
440	0	0	0	0	0
450	0	0	0	0	0
460	0	0	0	0	0
470	0	1	1	0	2
480	0	0	2	0	2
490	0	4	3	0	7
500	0	8	2	1	11
510	0	3	2	0	5
520	0	11	2	2	15
530	0	6	2	1	9
540	0	10	2	1	13
550	0	9	0	0	9
560	0	15	3	1	19
570	0	19	0	1	20
580	0	21	0	3	24
590	0	26	3	0	29
600	0	27	2	1	30
610	0	32	4	0	36
620	0	20	5	0	25
630	0	18	3	0	21
640	0	23	4	0	27
650	0	9	2	0	11
660	0	3	3	0	6
670	0	3	7	0	10
680	0	2	2	0	4
690	0	0	1	0	1
700	0	1	0	0	1
710	0	1	0	0	1
720	0	2	2	0	4
730	0	0	0	0	0
740	0	0	0	0	0
750	0	0	0	0	0
Grand Total	**1**	**275**	**68**	**11**	**355**

Table 11. Number of Kamloops Rainbow Trout stocked, number that returned, percent that returned, and return status (complete or incomplete) at French River by year-class. The historic average (Mean) is shown for only complete year classes.

Year stocked	Year-class	Stocked (#)	Returned (#)	Return (%)	Return status
1991	1990	50,099	277	0.6%	Complete
1992	1991	49,510	363	0.7%	Complete
1993	1992	46,721	856	1.8%	Complete
1994	1993	68,945	1,070	1.6%	Complete
1995	1994	58,403	1,094	1.9%	Complete
1996	1995	50,759	1,236	2.4%	Complete
1997	1996	49,746	1,667	3.4%	Complete
1998	1997	49,630	1,023	2.1%	Complete
1999	1998	45,906	1,108	2.4%	Complete
2000	1999	51,934	1,618	3.1%	Complete
2001	2000	49,484	1,018	2.1%	Complete
2002	2001	52,850	1,818	3.4%	Complete
2003	2002	61,871	236	0.4%	Complete
2004	2003	49,906	344	0.7%	Complete
2005	2004	49,772	504	1.0%	Complete
2006	2005	45,796	551	1.2%	Complete
2007	2006	36,474	417	1.1%	Complete
2008	2007	33,337	676	2.0%	Complete
2009	2008	38,589	1,403	3.6%	Complete
2010	2009	61,032	1,052	1.7%	Complete
2011	2010	45,906	1,264	2.8%	Complete
2012	2011	30,050	945	--	Incomplete
2013	2012	39,712	628	--	Incomplete
2014	2013	36,374	1,167	--	Incomplete
2015	2014	55,111	985	--	Incomplete
2016	2015	65,018	384	--	Incomplete
2017*	2016	54,239	19	--	Incomplete
Mean		**49,841**	**933**	**1.9%**	
* In 2017 26,174 pre-smolt size (< 5 inches) Kamloops Rainbow Trout were stocked at McQuade Road. All other Kamloops stockings were below the French River adult trap.					
*No Kamloops stocked after 2017.					

Table 12. Data for repeat spawning of Kamloops Rainbow Trout captured at the French River by year.

Year	Total Catch	Number of Repeat Spawners				Total Repeats	Repeats (%)	Fall tag	K.R. tag
		1	2	3	4				
1993	574	12	0	0	1	13	2.3%	0	0
1994	238	5	1	0	0	6	2.5%	0	0
1995	121	6	0	0	0	6	5.0%	0	0
1996	566	0	0	0	0	0	0.0%	0	0
1997	853	4	0	0	0	4	0.5%	0	3
1998	1,047	54	3	0	0	57	5.4%	0	6
1999	1,730	54	3	0	0	57	3.3%	0	16
2000	2,116	18	2	1	0	21	1.0%	0	13
2001	912	48	2	0	0	50	5.5%	4	6
2002	463	11	3	0	0	14	3.0%	0	3
2003	1,351	30	2	1	0	33	2.4%	2	1
2004	1,364	80	5	0	0	85	6.2%	0	0
2005	1,942	76	12	0	0	88	4.5%	57	7
2006	589	46	11	1	0	58	9.8%	36	5
2007	655	24	1	1	0	26	4.0%	4	0
2008	316	14	1	0	0	15	4.7%	2	3
2009	408	22	2	0	0	24	5.9%	4	1
2010	402	12	3	1	0	16	4.0%	0	0
2011	850	19	0	0	0	19	2.2%	0	1
2012	1,242	55	6	0	0	61	4.9%	0	0
2013	1,264	61	9	1	0	71	5.6%	0	0
2014	437	19	1	1	0	21	4.8%	0	2
2015	886	40	5	0	0	45	5.1%	0	0
2016	1,489	114	7	1	0	122	8.2%	0	0
2017	1,564	42	5	0	0	47	3.0%	0	0
2018	674	54	1	0	0	55	8.2%	0	0
2019	275	34	4	0	0	38	13.8%	0	0
Mean	**901**	**35**	**3**	**0**	**0**	**39**	**4.7%**	**4**	**2**

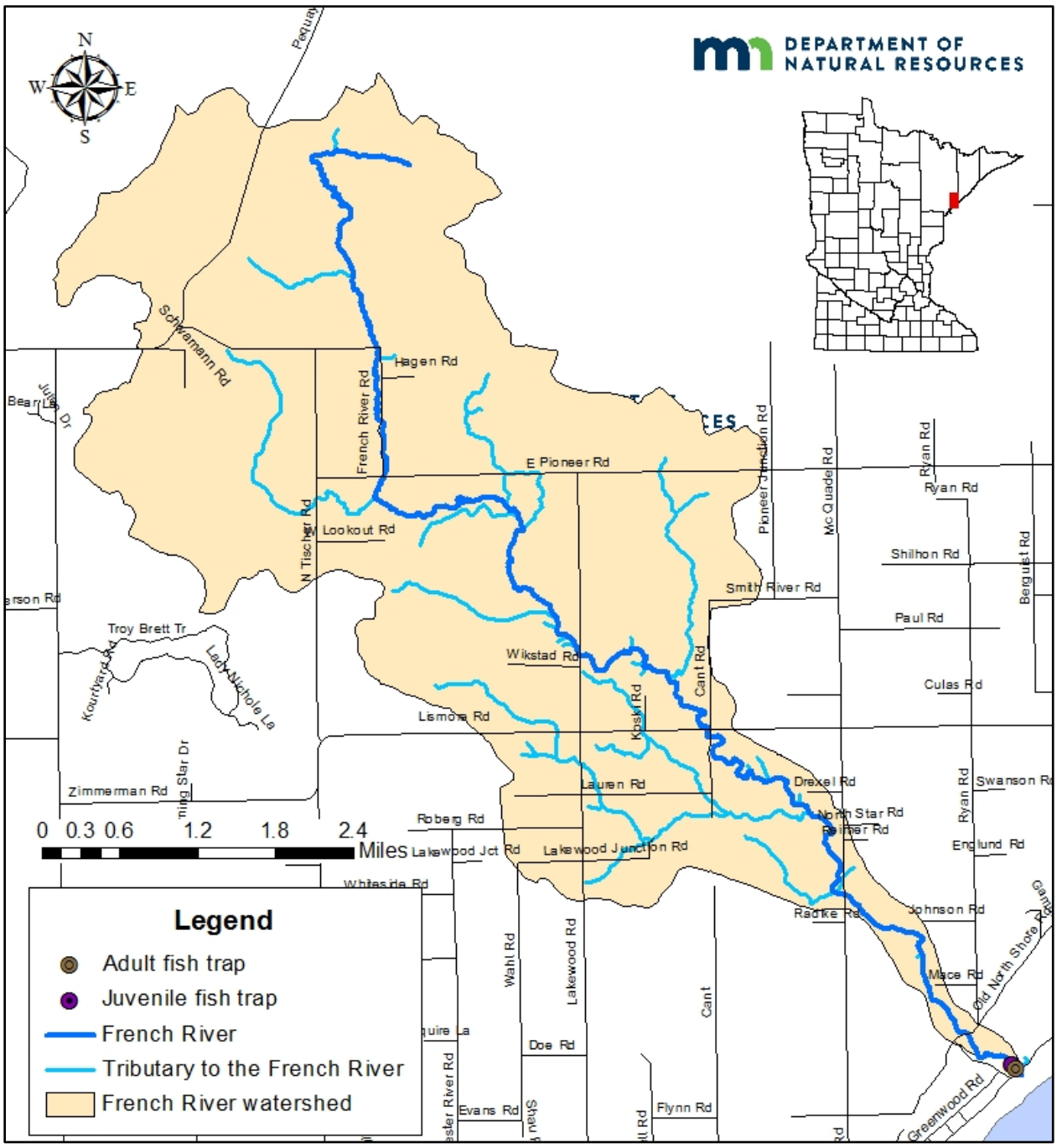

Figure 1. Map of the French River and the locations of the adult and juvenile fish traps.

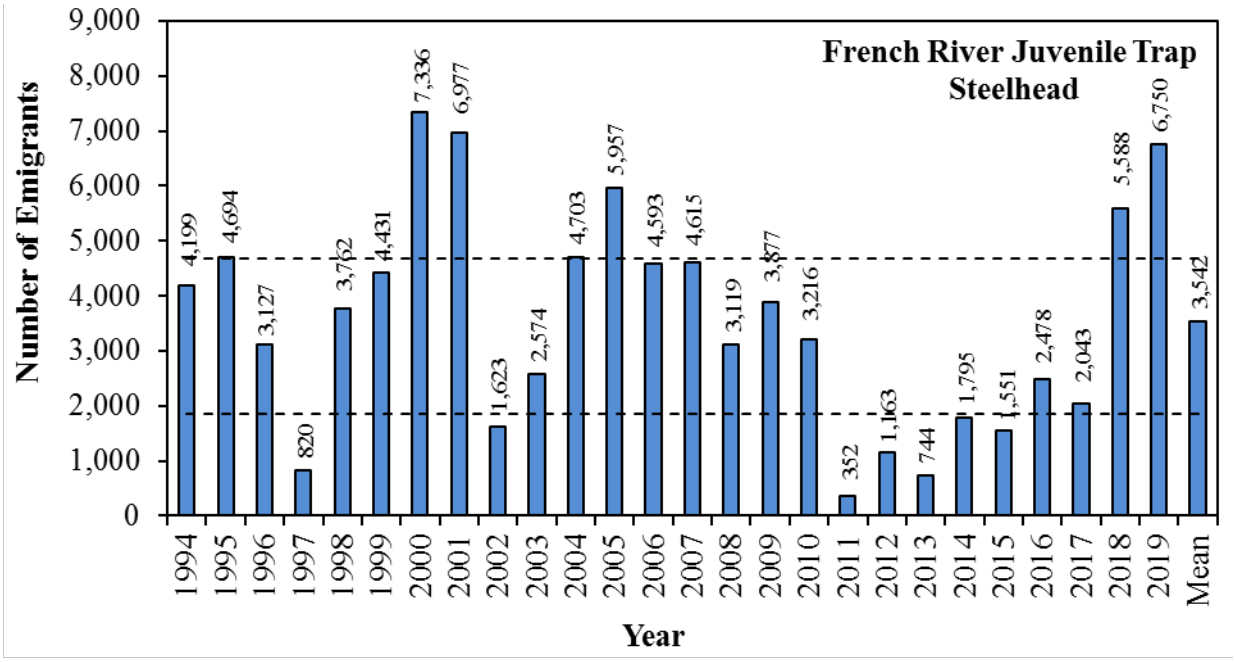

Figure 2. Number of juvenile steelhead captured in the French River juvenile trap by year. The historic average (Mean) from 1994 through 2019 is shown with 25th and 75th quartiles (dashed lines). Totals provided here include all steelhead from all year-classes regardless of clip or size at stocking.

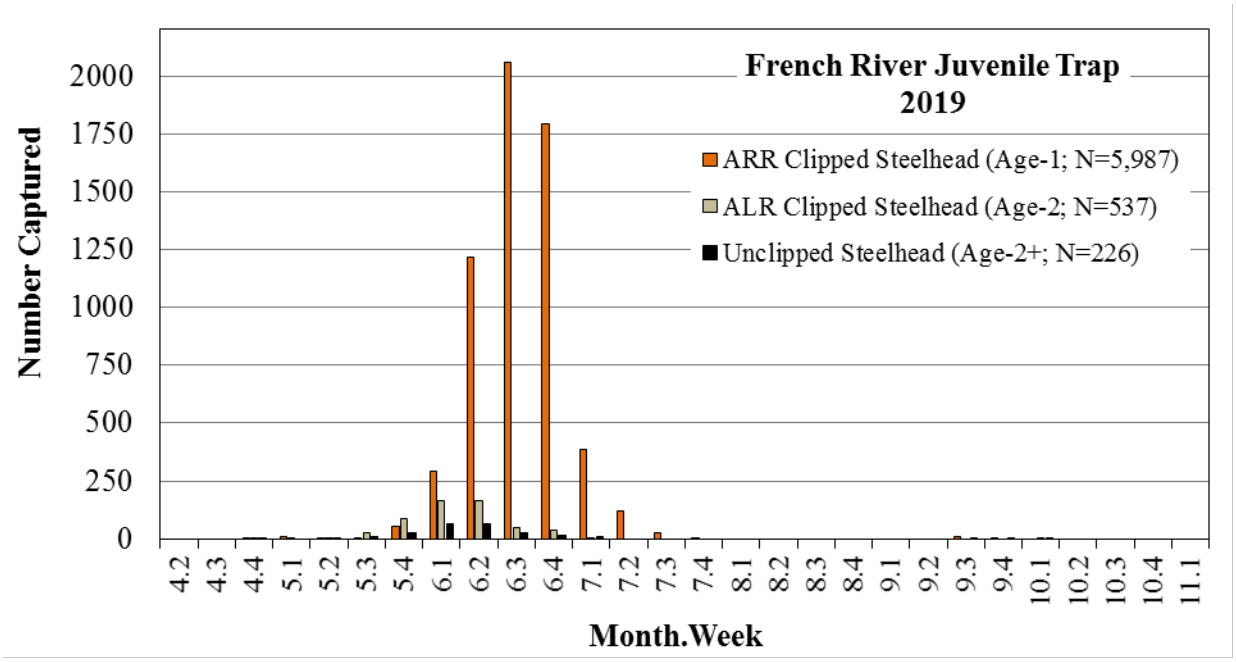

Figure 3. Number of adipose right-pelvic (ARR) clipped steelhead, adipose left-pelvic (ALR) clipped steelhead, and unclipped steelhead captured in the French River juvenile trap by month and week in 2019.

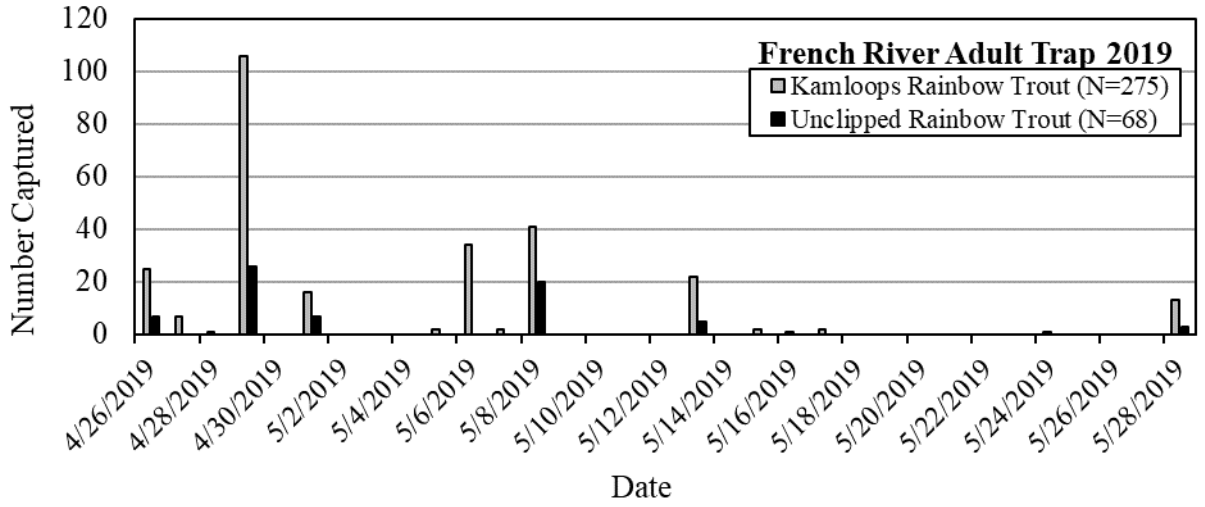

Figure 4. Number of Kamloops Rainbow Trout (clipped) and unclipped Rainbow Trout captured at French River by date in 2019.

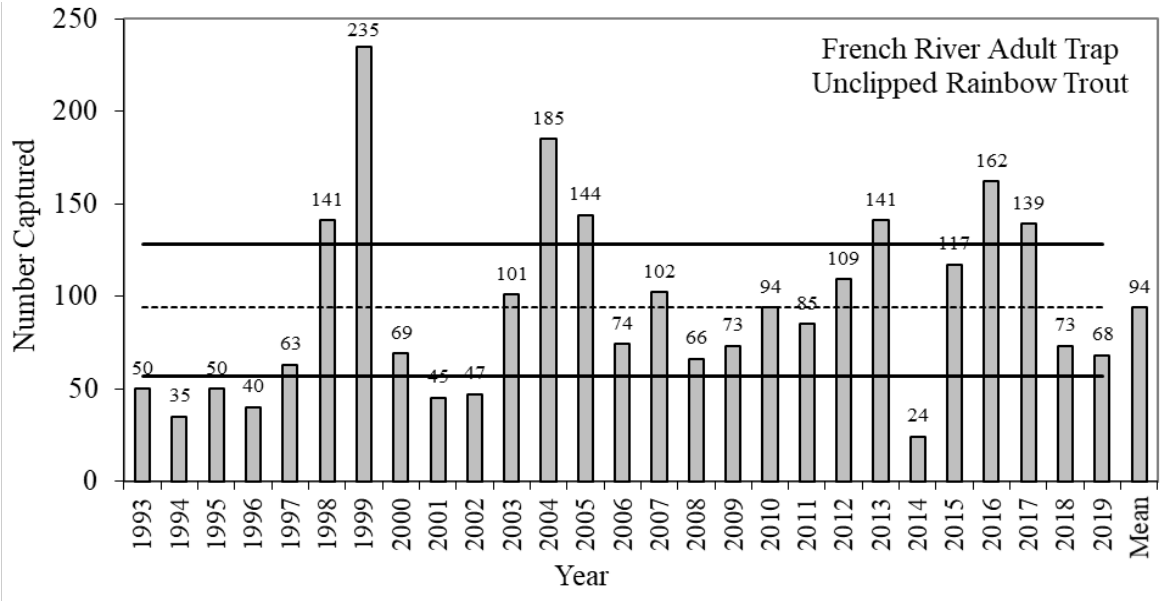

Figure 5. Number of unclipped Rainbow Trout captured at French River by year. The historic average (Mean; dashed line) from 1993 through 2019 is shown with 25th and 75th quartiles (black lines).

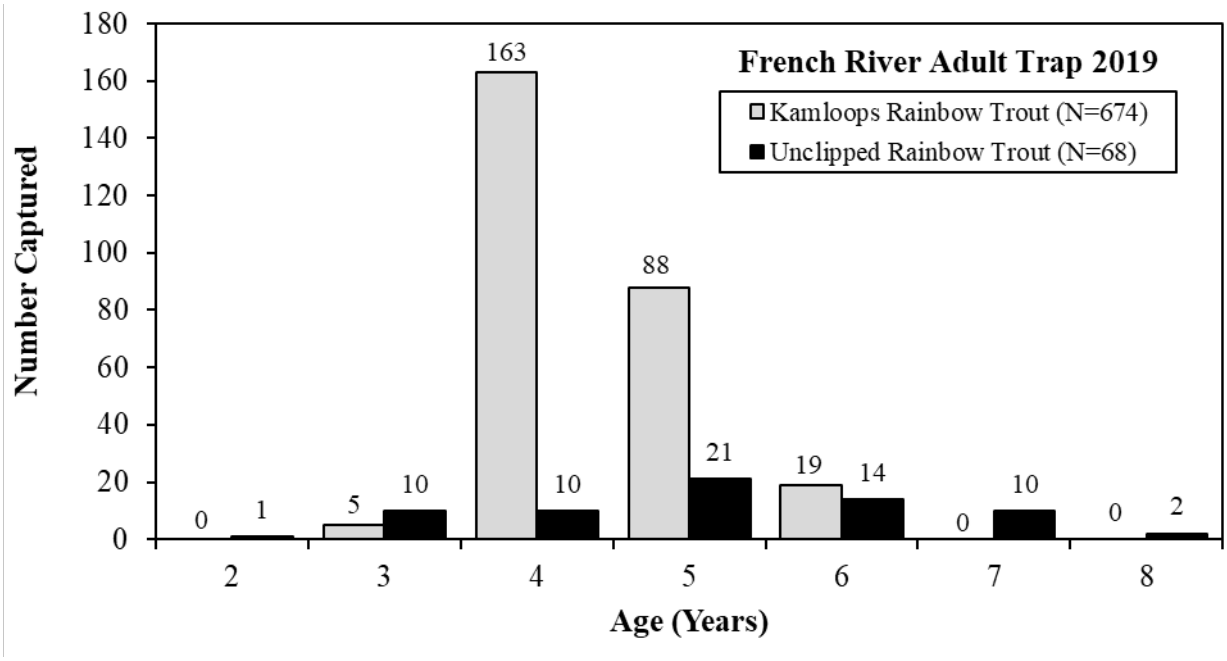

Figure 6. Number of Kamloops Rainbow Trout (clipped) and unclipped Rainbow Trout captured by age at French River in 2019.

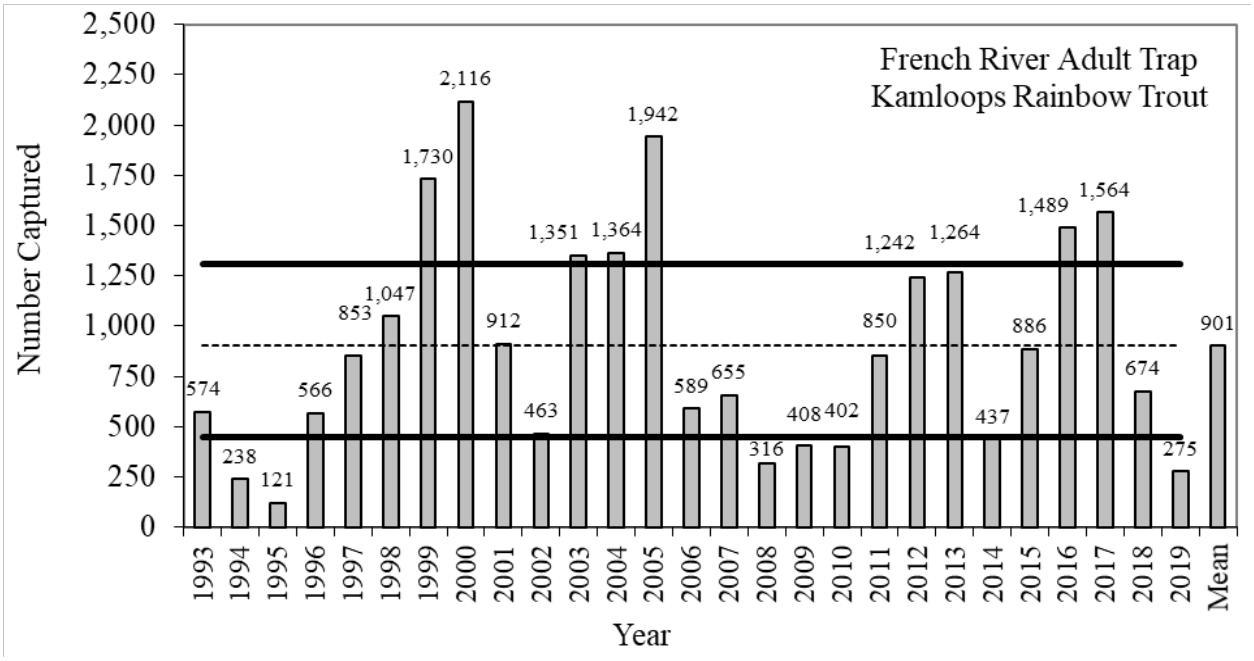

Figure 7. Number of Kamloops Rainbow Trout captured at French River by year. The historic average (Mean; dashed line) is shown with 25th and 75th quartiles (black lines).

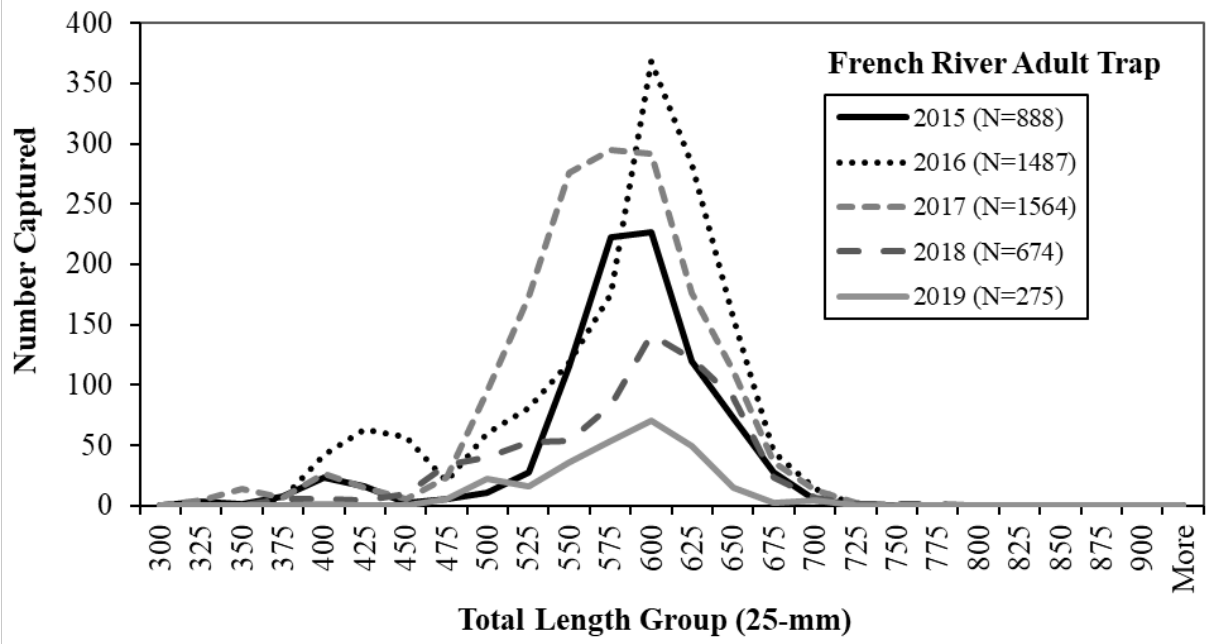

Figure 8. Number of Kamloops Rainbow Trout captured by 25-mm length group at the French River in 2015, 2016, 2017, 2018 and 2019.