

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

SUPPLEMENTAL REPORT



**French River Juvenile and Adult Fish Trap Report
2018**

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Background

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 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 is used to gather information about juvenile trout population characteristics and movement patterns, to evaluate fish stocking programs, and to determine how these metrics influence adult fish 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 fisheries management in the French River can be found in the 2011 French River Management Plan. More information about 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.

Fish Stocking

A total of 53,081 clipped steelhead from the 2017 year-class were stocked in the French River on April 27 (13,520), May 1 (7,109) and May 7, 2018 (23,845). Fish were stocked at 3 locations: 14% (7,448) at Can't Road, 56% (29,948) at Lakewood Road, and 30% (15,685) 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 leave for Lake Superior. All steelhead were given adipose and left pelvic fin clips (ALV) to distinguish them from steelhead fry (no clips) and Kamloops (ARR clips) stocked in previous years. An additional 60,290 ALV clipped steelhead were stocked in the Lester River in 2018. All clipped steelhead were offspring of genetically-screened, wild adult steelhead captured at the French River in spring 2017, and/or genetically screened Knife River Captive Steelhead Broodstock. All steelhead stocked in 2018 started as eggs collected and fertilized at the French River. The 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 when they were approximately 2.3 inches long (203.5 fish /pound) for their final growing period prior to being 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 2017/2018. Winter lasted into April in 2018 as ice started to clear streams near Duluth in mid-April. Spring was brief as we entered the warmest May on record. Stream conditions were relatively favorable for juvenile trout during the summer of 2018. May 2018 through September 2018 saw above average air temperatures. Precipitation totals were just below average with late summer and late fall being wetter than average keeping stream flows above normal going into winter. The Duluth North Shore area was free of drought conditions the entire year.

French River Juvenile Trap

The juvenile trap was open for 188 days between April 24 and November 6, 2018. The trap did not fish on June 8 (1 day) due to a gate malfunction, and was closed from October 11 through 18 (8 days) because a giant tree trunk was lodged in the trap (Table 1). A total of 5,742 juvenile salmonids were captured in 2018, of which 97% were steelhead Rainbow Trout (5,588) and 1% or less were Kamloops Rainbow Trout (54), Brown Trout (50), and Brook Trout (50). Ninety-three percent (5,364) of all fish were captured in spring (April-June), 6% (321) were captured in summer (July-August), and 1% (57) were captured in fall (September-November).

The total catch of juvenile Rainbow Trout (clipped and unclipped) captured in 2018 was higher than the historic average of 3,413 (Table 1, Figure 2). Ninety-four percent (5,242) were captured in spring, 5% (307) in summer, and 1% (39) in fall. Eighty-five percent (4,770) were age-1, 15% (815) were age-2, and less than 1% (3) were age-3. The catch of age-1 Rainbow Trout in 2018 (4,770) was 65% higher than the historic average of 2,425. The number of age-2 and older Rainbow Trout (818) was slightly higher than the historic average of 733 (Table 1). Clipped steelhead comprised 75% of all age-1 Rainbow Trout captured in 2018.

A total of 50 Brook Trout were captured in 2018, 43 were captured in spring, 4 in summer and 3 in fall. Two were from the 2018 year class (age-0), 42 were from the 2017 year class (age-1), and 6 were from the 2016 year class (age-2). Fifty Brown Trout were captured in 2018, 26 were captured in spring, 9 in summer, and 15 in fall. Six were from the 2018 year class (age-0), 38 were from the 2017 year class (age-1), and 6 were from the 2016 year class (age-2). Ten non-gamefish species were also captured in 2018 (Table 2).

Unclipped Steelhead Fry Stocking Evaluation

The steelhead fry stocking program at French River was suspended after 2017 so that gametes could be used for the clipped steelhead yearling (pre-smolt) stocking program. A total of 1,421 unclipped juvenile steelhead were captured in 2018, which was lower than the historic average of 3,326. The majority of unclipped steelhead were captured in the last week of May (Figure 3). A total of 603 (43%) were age-1 from the 2017 year class, 815 (57%) were age-2 from the 2016 year class, and 3 (<1%) were age-3 from the 2015 year class. The number of age-2 and older unclipped steelhead (818) was 85% higher than 2017 (441) and 12% higher than the historic average (733). Favorable stream conditions and increased stocking densities of steelhead fry in the French River over the last 3 years likely resulted in the higher than average catch of

age-2 and older steelhead in 2018. The unclipped steelhead stocking program will continue to be evaluated using the French River traps.

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 the discontinuation of the Kamloops stocking program. Approximately 8% (4,167) of the 53,081 ALR clipped yearlings stocked in 2018 (Table 7) were recaptured leaving the French River the same year. Approximately 94% (3,907) were captured in spring (April-June), 6% (249) in summer (July-August) and less than 1% (11) in fall (September-November) (Figure 3). All clipped steelhead were age-1 from the 2017 year class. Mean total length at capture was 5.2 inches (range: 3.4 to 7.8).

Clipped steelhead maintained a slight size advantage over steelhead stocked as fry. Average length of clipped steelhead was larger than age-1 unclipped steelhead in all months of the trap season; however, growth rates were similar (Figure 4). The clipped steelhead stocking program will continue to be evaluated in years to come using the French River traps and the MNDNR Lake Superior spring creel survey.

Clipped Kamloops Yearling (Pre-Smolt) Stocking Evaluation

The Kamloops stocking program was discontinued after 2016 because of negative impacts to naturalized steelhead populations in Minnesota and other jurisdictions in Lake Superior (Miller et al., *in prep*). This was the second year to evaluate the 2016 year class of adipose right-rear clipped (pre-smolt sized) yearling Kamloops that were stocked upstream in the French River in 2017. Approximately 16% (4,184) of 26,174 Kamloops stocked upstream in April 2017 were captured leaving the French River the same year at age-1 (Gottwald and Peterson 2017). Only 54 Kamloops were captured leaving the French River in 2018 at age-2 (Figure 3). A large proportion of Kamloops stocked upstream did not survive to emigrate at age-2, are still in the river and could emigrate next year, have become river residents, or bypassed the smolt trap over the falls during a high water event or when the trap was closed. It is unlikely that many Kamloops remain in the river because most of these fish now exceed typical smolt size (5.9 inches), the latest capture of a Kamloops at the trap was in early summer (July 6), and zero Kamloops were captured upstream at the French River trout index station at Can't Road on August 23, 2018 (J. Pinkerton, MNDNR).

Less than 1% of steelhead stocked as fry that leave the French River at age-1 size will return as adults, and returns improve nearly 100 fold to approximately 10% for juveniles that leave at age-2 size. Mean total length at age for steelhead emigrants averages 4.6 inches (range: 2.2 to 8.8) at age-1 and 6.8 inches (range: 4.7 to 10.3) at age-2 (MNDNR unpublished data). One might assume that the Kamloops that left at age-1 will return at low rates, similar to age-1 steelhead emigrants.



Picture 1. An unclipped steelhead Rainbow Trout (left) that was stocked as a fry in 2016 and an adipose right-rear clipped Kamloops Rainbow Trout (right) that was stocked as a yearling (pre-smolt) in 2017. Both fish were the same age (age-1) and captured at the same location in the French River in 2017.

However, this may not be true given growth differences observed between the two strains over the last two years.

In 2017, age-1 Kamloops were 29% larger on average than age-1 steelhead (stocked as fry in 2016) when they left the French River, and they maintained the larger average size at emigration throughout the entire trap season (Figure 5). Kamloops that left at age-1 were more similar in size to age-2 and older steelhead than age-1 steelhead. Mean total length at age for Kamloops emigrants was 6.4 inches (range: 4.3 to 10.4) at age-1 in 2017 and 8.3 inches (range: 5.4 to 10.3) at age-2 in 2018. Therefore, Kamloops that left at age-1 will likely return at a rate intermediate to age-1 and age-2 steelhead (between 3 and 10% return rate). The Kamloops stocking program will continue to be evaluated in years to come using the French River traps and the MNDNR Lake Superior spring creel survey.

French River Adult Trap

The French River adult trap was operated for 22 days from April 29 through May 21, 2018. The trap season was the shortest on record in twenty five years of trap operations due to an extended winter (Table 3). 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 30th, and close to 90% (666) of all fish were captured in the first 2 weeks of the trap season (April 30 through May 10). Approximately 90% of all Kamloops and steelhead were captured by May 10th (Table 4, Figure 6). Traps remain closed in the fall because few salmon or trout return to French River in fall.

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 alike because Kamloops and Kamloops x steelhead hybrid offspring show significantly reduced survival in Minnesota streams than steelhead offspring (Negus 1999, Miller et al. *in prep*). 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 had partially regrew a fin after they were stocked. Each fish is assigned as a Kamloops, hybrid (Kamloops x steelhead cross), or steelhead using microsatellite genetic markers. All Kamloops and hybrids are removed from the gene pool and used for 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.

Five questionable clipped Rainbow Trout were captured in 2018, and all fish were genotyped as Kamloops. All questionable clipped Rainbow Trout captured over the last three years genotyped as Kamloops (Table 5). Data for these fish were included in annual data summaries for Kamloops because MNDNR initially assumed they were likely Kamloops based on physical appearance.

Among all unclipped Rainbow Trout captured in 2018, 85% (62) genotyped as steelhead, 14% (10) as hybrids, and 1% (1) as Kamloops. The proportions of Kamloops and hybrids found among unclipped Rainbow Trout in 2018 (15%) was similar to 2016 (14%), 2017 (13%), and the

3-year historic average (15%) (Table 6). 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 73 unclipped Rainbow Trout captured at the French River in 2018, which is similar to the historic average (95) (Table 6, Figure 7). Unclipped Rainbow Trout ranged from age-3 through age-8, and most (63%) were age-4 or age-5 (Table 6, Figure 8). The average return rate of stocked unclipped Rainbow Trout year-classes has remained low and averaged 0.09% since 1992 (Tables 8, 9). Approximately 8% (6) had a tag from previous year, which was slightly below the historic average (9%) (Tables 10). Four recaptures were initially tagged in 2016 and two were tagged in 2017. The average length was 23.2 inches (590 mm) and the largest measured 29.8 inches (757 mm) (Table 9).

Clipped Rainbow Trout

One-hundred-thirty-four right-maxillary (RM) clipped Rainbow Trout were captured in 2018, of which 133 were immediately returned to the lake (no data collected). Data was collected for one RM broodstock and genetic testing verified it was a steelhead (Table 11). Most RM broodstock steelhead were not measured given time constraints and because recent data was likely already available for these fish. All broodstock at French River Coldwater Hatchery were measured and genetically tested prior to being released in 2018. It was likely that most (if not all) of the RM broodstock captured in 2018 were fish released this spring.

Kamloops Rainbow Trout

A total of 674 Kamloops were captured in 2018, which was below the 25 year average but within the interquartile range (Mean=925; IR=489-1329) (Table 5, Figure 9). Historically, 72% of Kamloops returns at the French River are age-4 and age-5. In 2018, 56% of the returns consisted of age-4 and age-5 Kamloops. Kamloops ranged from age-2 to age-8, and a large portion of the return consisted of age-3 (23%), age-4 (38%), and age-5 (18%) fish (Figure 8). The average return rate of Kamloops year-classes has remained low and averaged 1.9% since 1990 (Table 12). Females and males comprised 61% and 39% of Kamloops returns in 2018, respectively (Table 5). Approximately 8% (55) of returning Kamloops were recaptures with a colored tag from a previous year, which was higher than the long-term mean of 4% (Table 13). No Kamloops had a tag stub or mark that indicated tag loss, and approximately 3.1% (21) had at least one lamprey wound. The overall mean total length for Kamloops was 23.5 inches (596 mm) and the largest measured 31.1 inches (790 mm) (Table 11, Figure 10).

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

Year	2008		2009 ¹		2010 ²		2011 ¹		2012 ¹		2013 ¹		2014		2015		2016		2017		2018 ³		Mean 1994 - 2018			
Date trap was opened	4/16		4/17		3/28		4/18		3/25		5/7		4/28		4/15		4/12		4/8		4/24		4/13			
Date trap was closed	11/6		11/6		10/29		11/3		10/29		11/7		10/31		11/16		11/16		11/3		11/6		11/5			
Number of days trap was open	204		203		215		178		165		184		185		215		210		204		188		201			
Number per Year	<i>N</i>	%	<i>N</i>	%	<i>N</i>	%	<i>N</i>	%	<i>N</i>	%	<i>N</i>	%	<i>N</i>	%	<i>N</i>	%	<i>N</i>	%	<i>N</i>	%	<i>N</i>	%	<i>N</i>	%	<i>Mean N</i>	<i>Mean %</i>
Age-0	382	12%	173	4%	0	0%	0	0%	176	15%	50	7%	4	0%	217	14%	9	0%	1	0%	0	0%	259	8%		
Age-1	2064	66%	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%	2,422	71%		
Age-2	659	21%	609	15%	1,338	42%	333	95%	0	0%	71	10%	558	31%	664	43%	374	15%	433	21%	815	15%	708	21%		
Age-3	14	0%	29	1%	34	1%	18	5%	11	1%	0	0%	29	2%	11	1%	18	1%	7	0%	3	0%	25	1%		
Age-4	0	0%	1	0%	0	0%	1	0%	0	0%	0	0%	0	0%	0	0%	0	0%	1	0%	0	0%	0	0%		
Total	3,119		3,952		3,216		352		1,163		744		1,795		1,551		2,478		2,043		5,588		3,413			
Number per Year-Class	<i>N</i>	%	<i>N</i>	%	<i>N</i>	%	<i>N</i>	%	<i>N</i>	%	<i>N</i>	%	<i>N</i>	%	<i>N</i>	%	<i>N</i>	%	<i>N</i>	%	<i>N</i>	%	<i>N</i>	%	<i>Mean N</i>	<i>Mean %</i>
Age-0	382	8%	173	7%	0	--	0	0%	176	13%	50	3%	4	0%	217	--	9	--	1	--	0	--	312	9%		
Age-1	3,140	64%	1,844	78%	0	--	976	91%	623	46%	1,204	62%	659	63%	2,077	--	1,601	--	4,770	--	**	**	2,467	70%		
Age-2	1,338	27%	333	14%	0	--	71	7%	558	41%	664	34%	374	36%	433	--	815	--	**	**	**	**	704	20%		
Age-3	18	0%	11	0%	0	--	29	3%	11	1%	18	1%	7	1%	3	--	**	**	**	**	**	**	26	1%		
Age-4	0	0%	0	0%	0	--	0	0%	0	0%	1	0%	0	0%	**	**	**	**	**	**	**	**	0	0%		
Total	4,878		2,361		0		1,076		1,368		1,937		1,044		2,730**		2,425**		4,771**		0**		3,510			

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

¹ Frylings (~2 inch TL) were stocked instead of fry in 2009 and 2011-2013.

² No fish were stocked in 2010.

³ Clipped yearlings (pre-smolts, ~4 inches TL) were stocked in 2018.

Note: The 2007 through 2017 year classes contain an unknown mix of stocked fry and frylings of the same year-class.

Table 2. Other fish species collected in the French River juvenile trap in 2018.

Species	Month								
	April	May	June	July	August	September	October	November	All
Black Bullhead	0	0	0	0	0	0	0	0	0
Blacknose Dace	0	9	9	33	13	1	0	0	65
Brook Stickelback	0	16	7	0	0	0	0	0	23
Central Mudminnow	0	6	0	0	0	0	0	0	6
Creek Chub	2	6	12	9	9	1	4	0	43
Fathead Minnow	0	4	1	1	0	0	0	0	6
Longnose Dace	0	8	5	9	5	0	0	0	27
Northern Redbelly Dace	0	20	9	9	4	0	0	0	42
Pearl Dace	0	0	0	0	2	0	0	0	2
White Sucker	0	0	0	0	0	1	0	0	1
Total	2	69	43	61	33	3	4	0	215

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			
2018	4/29	5/21	22	2018			
Mean (1993-2018)	4/14	5/25	42	Mean (1993-2009)			

Table 4. Total catch of all trout species captured at French River by date in 2018.

Date	Brown Trout	Kamloops Rainbow Trout	Unclipped Rainbow Trout	RM Clipped KCB Broodstock Steelhead	All Species
4/30/2018	0	155	0	0	155
5/1/2018	0	2	8	1	11
5/2/2018	0	199	0	0	199
5/3/2018	0	7	26	1	34
5/4/2018	0	20	0	3	23
5/7/2018	0	152	8	71	231
5/8/2018	0	5	0	3	8
5/9/2018	1	54	25	8	88
5/10/2018	0	4	0	0	4
5/13/2018	0	7	0	23	30
5/14/2018	0	16	2	11	29
5/15/2018	0	2	0	1	3
5/16/2018	0	22	0	11	33
5/17/2018	0	0	1	1	2
5/18/2018	0	4	0	0	4
5/21/2018	0	25	0	0	25
5/23/2018	0	0	3	0	3
Grand Total	1	674	73	134	882

Table 5. 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	2008		2009		2010		2011		2012		2013		2014		2015		2016		2017		2018		Mean (1993-2018)	
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	2	2	15	0	47	0	4	0	17	0	50	0	3	0	47	3	157	3	65	2	12	0	40
Age-3	39	41	6	15	15	47	148	104	59	77	46	173	12	26	4	22	75	146	267	215	70	83	52	64
Age-4	142	53	190	102	108	54	261	108	624	258	478	258	175	114	193	108	193	122	465	295	180	75	281	155
Age-5	24	6	45	8	71	27	117	66	119	52	148	40	39	40	287	122	331	164	87	78	83	37	143	83
Age-6	5	1	13	10	23	4	18	8	20	14	44	13	15	13	48	49	227	62	37	14	64	55	55	24
Age-7	2	1	1	1	3	3	11	5	2	0	5	9	0	0	5	1	0	0	28	10	8	2	14	9
Age-8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	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	212	104	257	151	220	182	555	295	824	418	721	543	241	196	537	349	829	651	887	677	410	264	549	376
Unknown Sex	0		0		0		0		0		0		0		0		8		0		0		0	
Total Catch	316		408		402		850		1,242		1,264		437		886		1,489		1,564		674		925	
Total KAM _Q Captured	--		--		--		--		--		--		--		--		15		10		5		10	
Total KAM _Q Genotyped	--		--		--		--		--		--		--		--		1		10		5		1	
<i>Kamloops Genotype</i>	--		--		--		--		--		--		--		--		1		10		5		5	
<i>Hybrid Genotype</i>	--		--		--		--		--		--		--		--		0		0		0		0	
<i>Steelhead Genotype</i>	--		--		--		--		--		--		--		--		0		0		0		0	

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

Table 6. 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	2008		2009		2010		2011		2012		2013		2014		2015		2016		2017		2018		Mean (1993-2018)	
	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	0	0	1	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0
Age-3	0	0	0	1	1	2	0	0	0	3	0	6	0	2	0	1	0	4	1	7	1	9	1	4
Age-4	7	7	4	3	0	1	8	8	7	8	6	9	6	3	1	4	3	15	41	21	10	14	8	8
Age-5	26	14	29	15	6	6	14	9	27	30	32	27	5	1	12	5	38	31	38	5	17	5	19	12
Age-6	5	4	4	10	35	9	12	8	19	8	33	9	3	4	26	16	9	6	11	8	6	5	16	9
Age-7	1	0	3	1	10	18	12	9	2	1	11	7	0	0	18	12	26	11	3	1	4	1	9	6
Age-8	1	1	2	0	2	3	3	2	1	0	1	0	0	0	13	4	6	2	1	0	0	1	3	2
Age-9	0	0	0	0	0	1	0	0	0	0	0	0	0	0	2	1	1	2	0	0	0	0	1	0
Age-10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
Age-11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0
Sex total	40	26	42	31	54	40	49	36	56	50	83	58	14	10	72	45	83	72	96	42	39	34	56	41
Unknown Sex	0		0		0		0		0		0		0		0		7		1		0		0	
Total Catch	66		73		94		85		106		141		24		117		162		139		73		95	
Unclipped RBT Not Genotyped	--		--		--		--		--		--		--		--		9		18		0		9	
Total Unclipped RBT Genotyped	--		--		--		--		--		--		--		--		153		121		73		116	
<i>Steelhead Genotype</i>	--		--		--		--		--		--		--		--		131		102		62		99	
<i>Hybrid Genotype</i>	--		--		--		--		--		--		--		--		17		13		10		13	
<i>Kamloops Genotype</i>	--		--		--		--		--		--		--		--		5		2		1		3	
<i>Unknown Genotype</i>	--		--		--		--		--		--		--		--		0		4		0		1	

Table 7. Number of clipped Rainbow Steelhead Trout stocked as Pre-Smolts, return status (complete or incomplete), and fin clip.

Year-stocked	Year-class	Stocked (#)	Returned (#)	Return (%)	Return status	Fin Clip Applied
2018	2017	53,081	0	--	Incomplete	Adipose + Left pelvic
2019	2018					Adipose + Right pelvic
2020	2019					Adipose + Left pelvic
2021	2020					Adipose + Right pelvic
Mean	Mean	#REF!	#REF!	#REF!		

Table 8. Number of unclipped Rainbow Steelhead Trout stocked as frylings, number that returned, percent that returned, return status (complete or incomplete), fin clip, 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	Fin Clip Applied
2008	2008	5,336	0	0.00%	Complete	Right-pelvic
2009	2009	53,214	99	0.19%	Complete	No clip
2010	2010	0	--	--	Complete	No clip
2011	2011	55,013	94	0.17%	Incomplete	No clip
2012	2012	55,032	77	0.14%	Incomplete	No clip
2013	2013	55,596	95	0.17%	Incomplete	No clip
Mean		19,517	50	0.09%		

Table 9. 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	--	--	Incomplete
2012	2012	0	--	--	Incomplete
2013	2013	0	--	--	Incomplete
2014	2014	39,856	9	0.02%	Incomplete
2015	2015	99,908	1	0.00%	Incomplete
2016	2016	193,308	10	0.01%	Incomplete
2017	2017	181,783	2	0.00%	Incomplete
Mean		129,506	92	0.09%	

Table 10. 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%
Mean	95	8	1	0	0	9	9.8%

Table 11. Length-frequency distribution of all fish measured by species at the French River in 2018.

Length Group (10 mm)	Brown Trout	Kamloops	Unclipped	Clipped KCB	All Species
		Rainbow Trout	Rainbow Trout	Broodstock Steelhead	
380	0	4	0	0	4
390	0	1	1	0	2
400	0	3	0	0	3
410	0	1	1	0	2
420	0	1	0	1	2
430	0	3	0	0	3
440	0	1	0	0	1
450	0	3	0	0	3
460	0	3	1	0	4
470	0	7	2	0	9
480	1	14	4	0	19
490	0	17	0	0	17
500	0	9	1	0	10
510	0	18	2	0	20
520	0	22	1	0	23
530	0	17	4	0	21
540	0	27	1	0	28
550	0	24	6	0	30
560	0	15	3	0	18
570	0	27	5	0	32
580	0	29	3	0	32
590	0	42	5	0	47
600	0	41	2	0	43
610	0	60	4	0	64
620	0	56	4	0	60
630	0	52	2	0	54
640	0	55	4	0	59
650	0	44	5	0	49
660	0	29	0	0	29
670	0	23	1	0	24
680	0	8	5	0	13
690	0	8	0	0	8
700	0	4	3	0	7
710	0	0	1	0	1
720	0	4	1	0	5
730	0	0	0	0	0
740	0	0	0	0	0
750	0	1	1	0	2
760	0	0	0	0	0
770	0	0	0	0	0
780	0	0	0	0	0
790	0	1	0	0	1
800	0	0	0	0	0
Grand Total	1	674	73	1	749

Table 12. 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	--	Incomplete
2012	2011	30,050	945	--	Incomplete
2013	2012	39,712	628	--	Incomplete
2014	2013	36,374	1,148	--	Incomplete
2015	2014	55,111	897	--	Incomplete
2016	2015	65,018	221	--	Incomplete
2017*	2016	54,239	14	--	Incomplete
Mean		50,038	917	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.					

Table 13. 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
Mean	925	35	3	0	0	39	4.3%	4	3

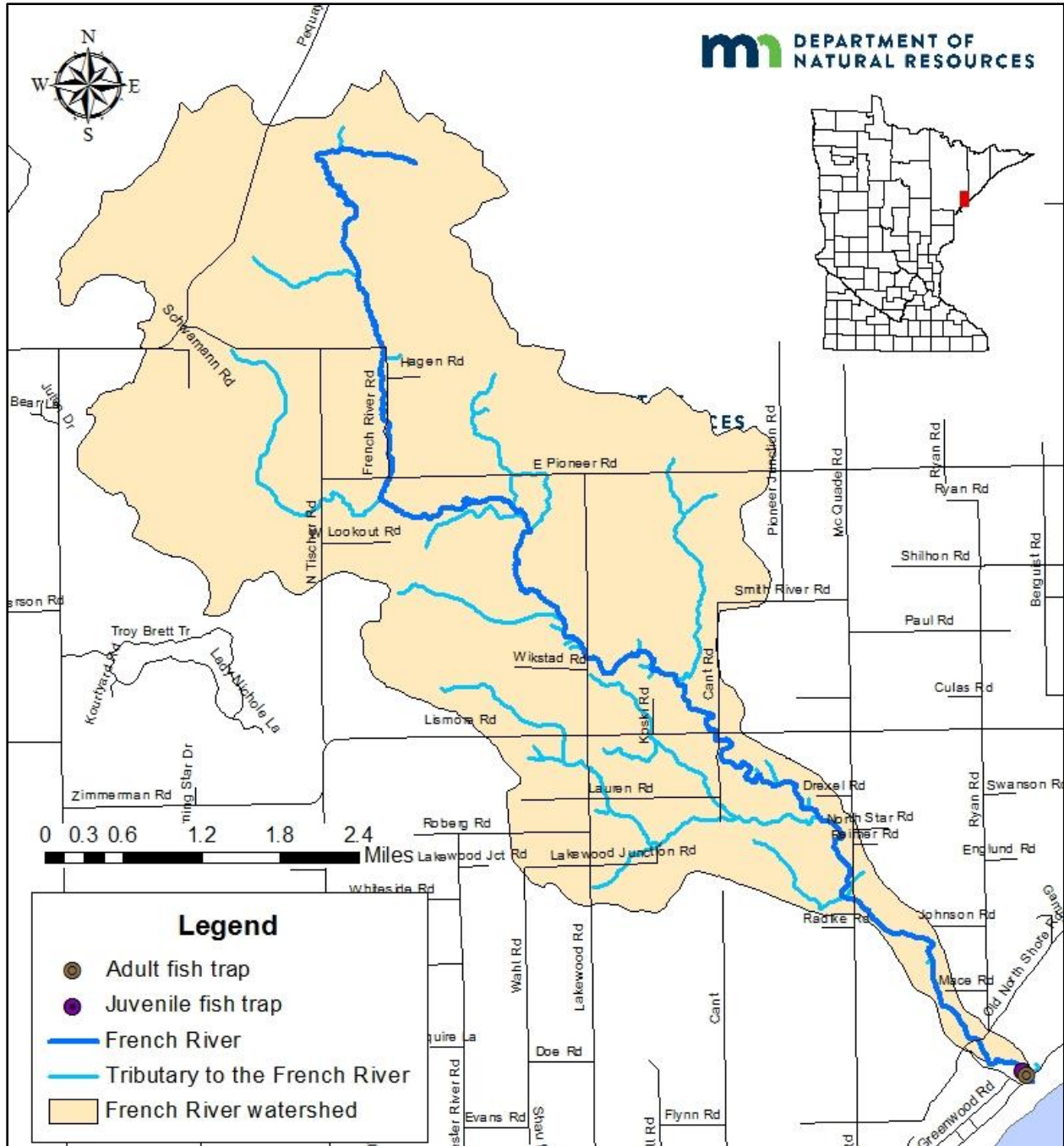


Figure 1. Map of the French River and the locations of the adult and juvenile fish traps.

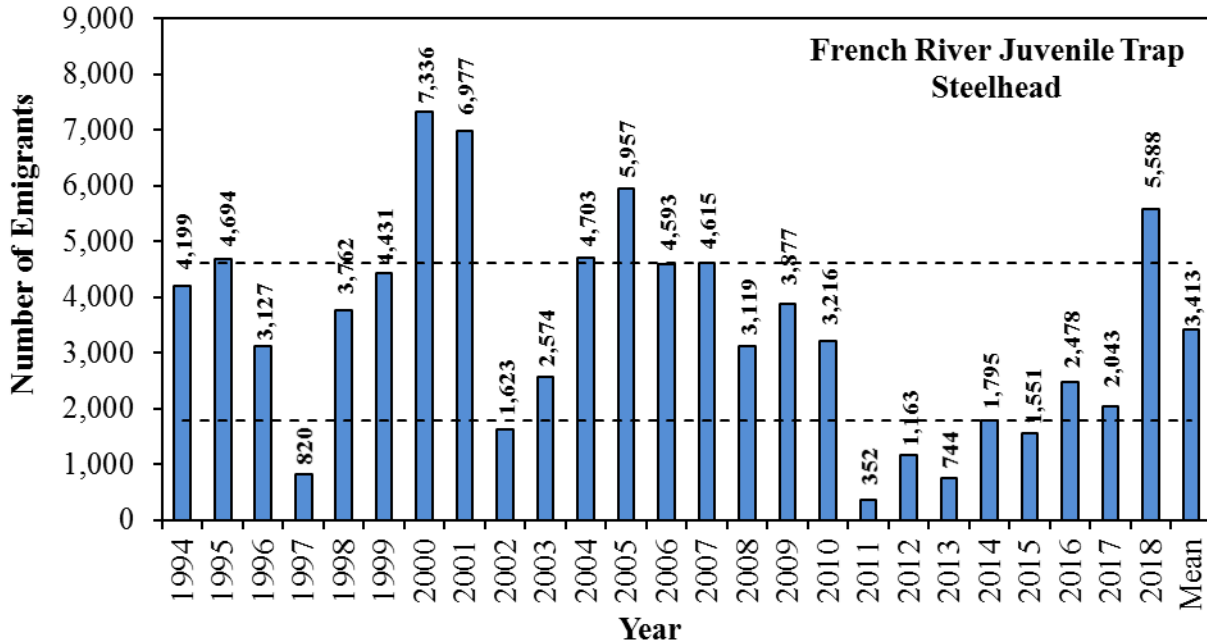


Figure 2. Number of juvenile steelhead captured in the French River juvenile trap by year. The historic average (Mean) from 1994 through 2018 is shown with 25th and 75th quartiles (dashed lines).

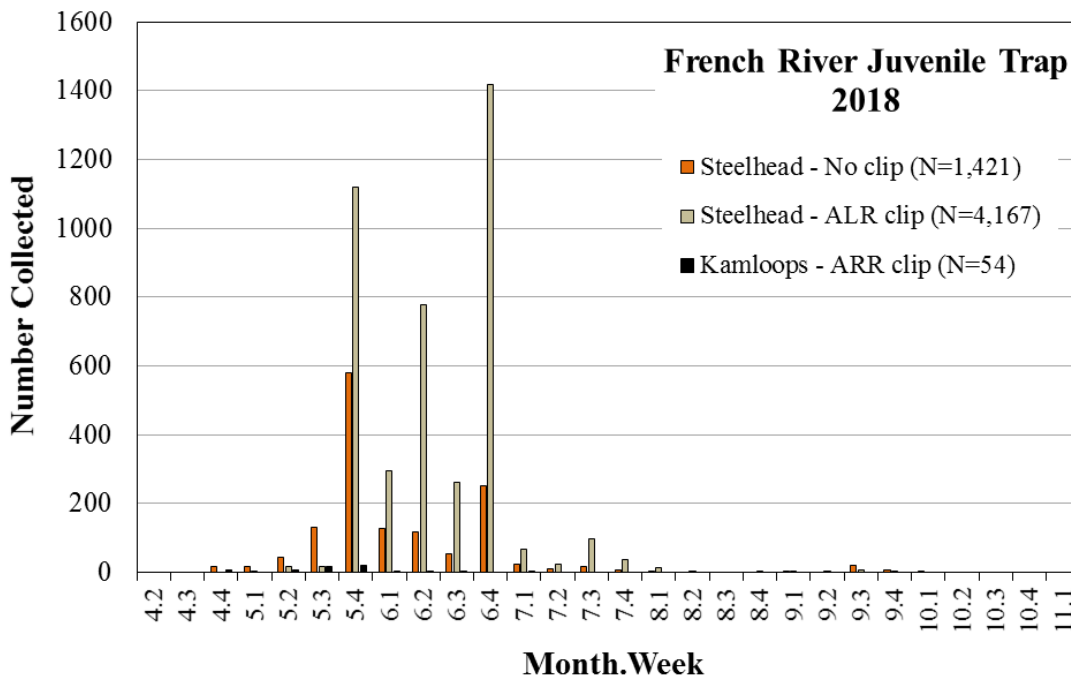


Figure 3. Number of unclipped steelhead (ages 1, 2 and 3), adipose left-pelvic (ALR) clipped steelhead (age-1), and adipose right-pelvic (ARR) clipped Kamloops (age-2) captured in the French River juvenile trap by month and week in 2018.

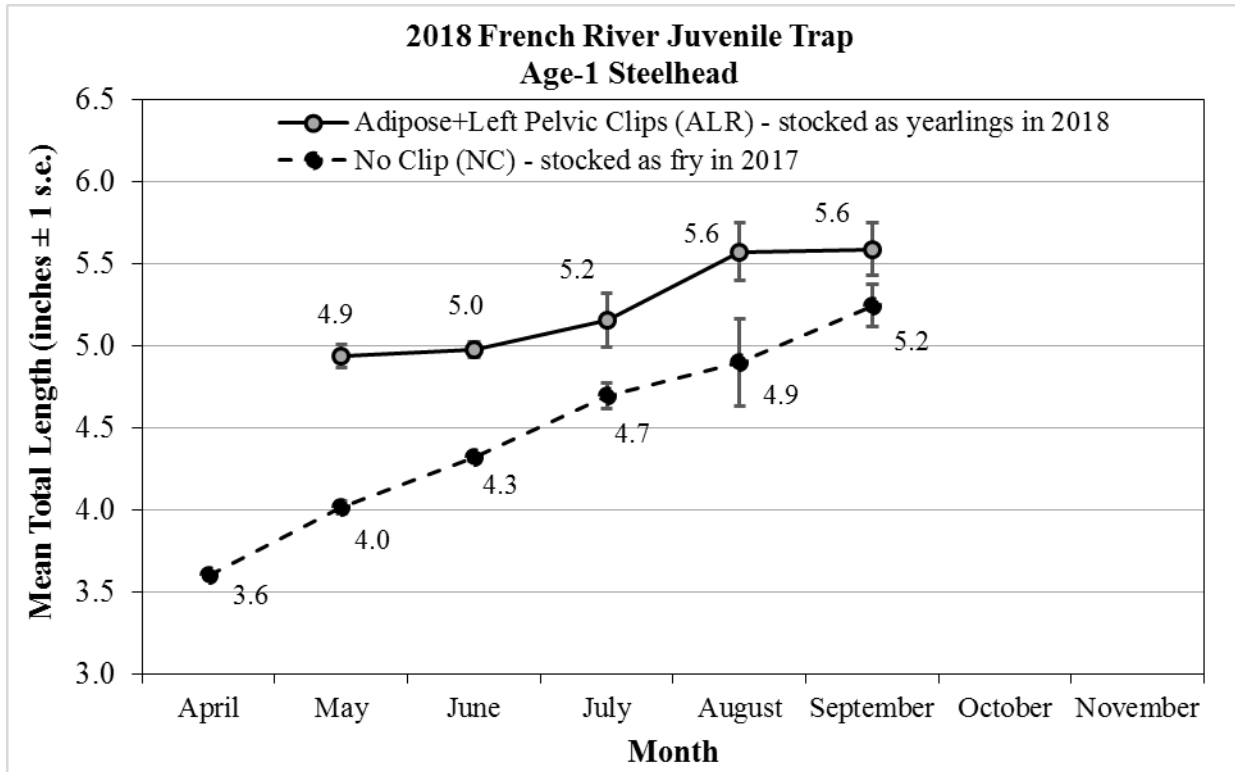


Figure 4. Mean total length (inches; \pm standard error) of adipose left-rear clipped steelhead (stocked as yearlings in 2018) and unclipped steelhead (stocked as fry in 2017) captured at the French River juvenile trap by month in 2018. Both were age-1 and from the 2017 year class.

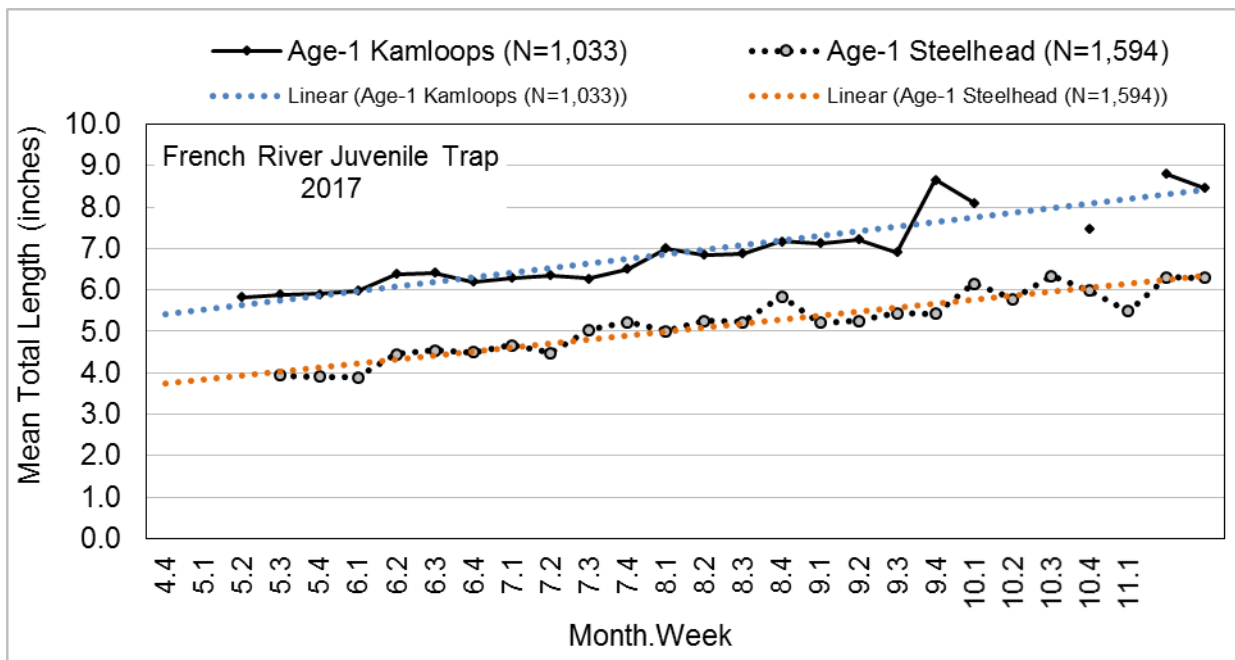


Figure 5. Mean total length (inches) of age-1 (2016 year-class) Kamloops and steelhead captured at the French River juvenile trap by month and week in 2017. The linear trend lines for both Kamloops and steelhead show similar growth rates over time.

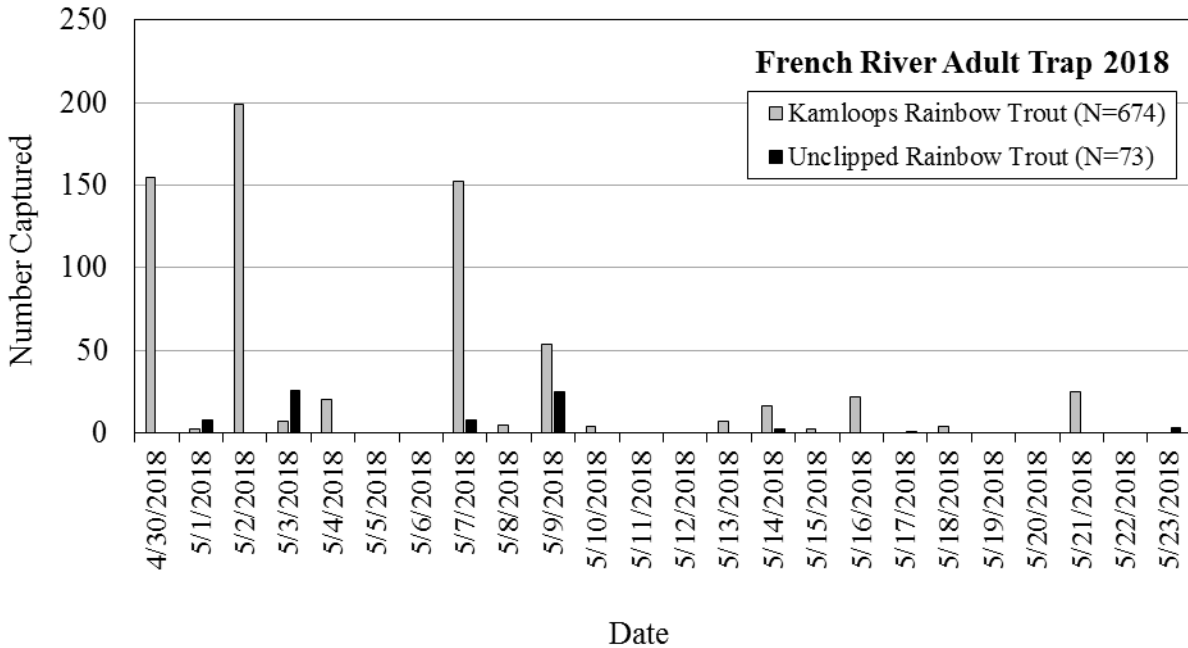


Figure 6. Number of Kamloops Rainbow Trout (clipped) and unclipped Rainbow Trout captured at French River by date in 2018.

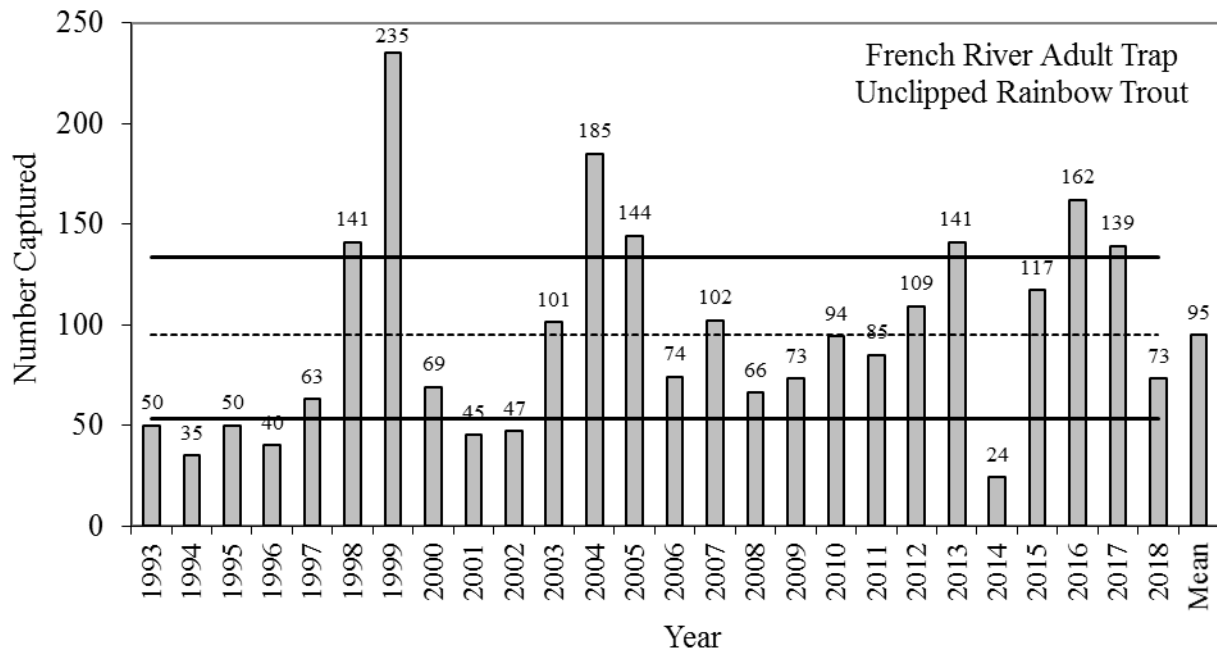


Figure 7. Number of unclipped Rainbow Trout captured at French River by year. The historic average (Mean; dashed line) from 1993 through 2018 is shown with 25th and 75th quartiles (black lines).

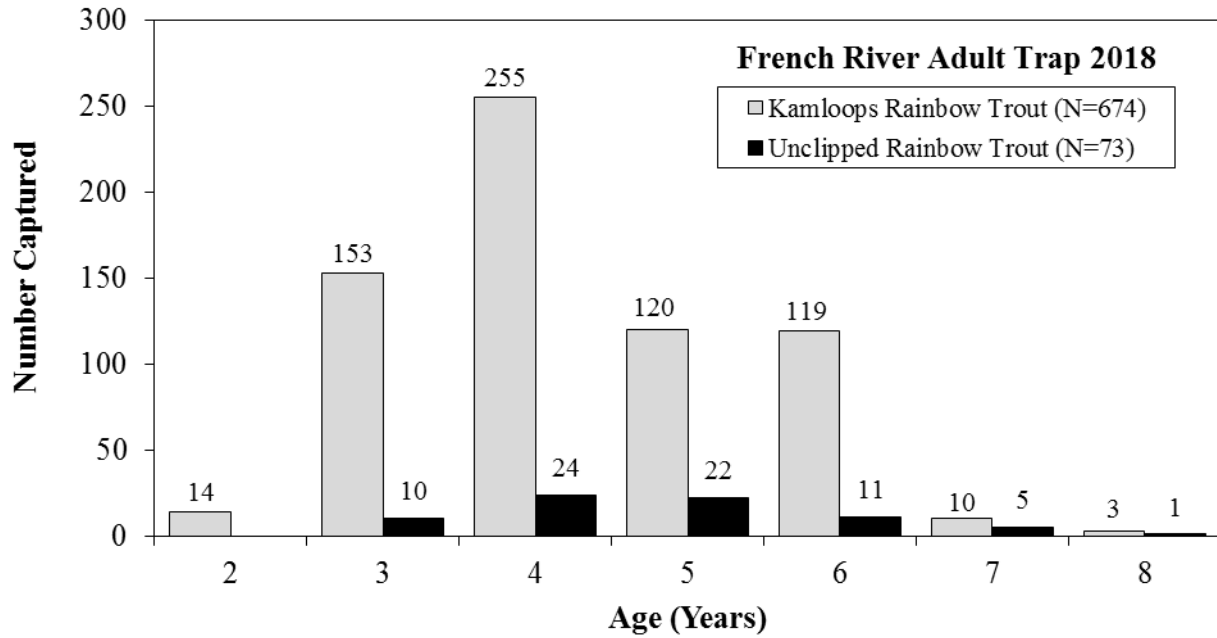


Figure 8. Number of Kamloops Rainbow Trout (clipped) and unclipped Rainbow Trout captured by age at French River in 2018.

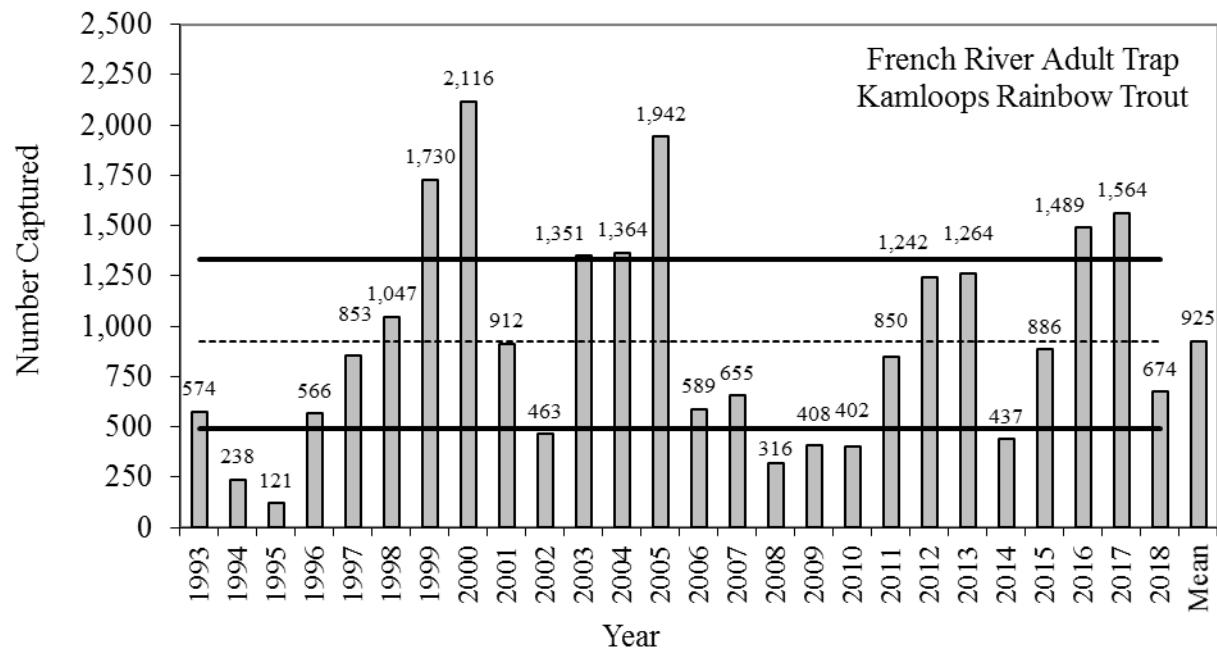


Figure 9. Number of Kamloops Rainbow Trout captured at French River by year. The historic average (Mean; dashed line) is shown with 25th and 75th quartiles (black lines).

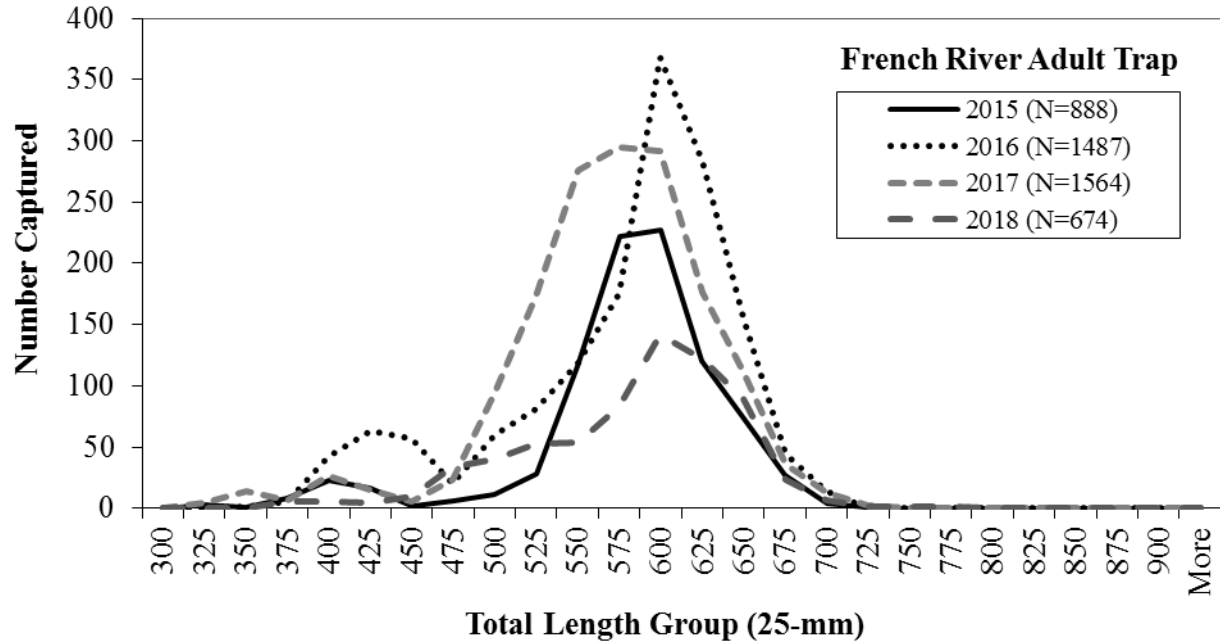


Figure 10. Number of Kamloops Rainbow Trout captured by 25-mm length group at the French River in 2015, 2016, 2017 and 2018.