Monitoring Program 2020 Final Annual Report

Sacramento Municipal Utility District

Hydro License Implementation • May 2021

Upper American River Project

FERC Project No. 2101

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Acronyms and Abbreviations

Acronym	Definition
BLM	U.S. Bureau of Land Management
BMI	Benthic macroinvertebrate
CDFW	California Department of Fish and Wildlife
cfs	Cubic Feet Per Second
CSCI	California Stream Condition Index
CVRWQCB	Central Valley Regional Water Quality Control Board
DWR	California Department of Water Resources
ENF	El Dorado National Forest
EPT	Ephemeroptera, Trichoptera and Plecoptera
FERC	Federal Energy Regulatory Commission
FL	fork length
ft	feet
FYLF	Foothill yellow-legged frog
GIS	Geographic Information System
GPS	Global Positioning System
LWD	Large woody debris
mm	Millimeters
MMI	Multi-metric index
new license	The FERC License for the Upper American River Project 2101 issued July 2014 for which new flow regimes and other terms and conditions were implemented beginning in October 2014
O/E	Observed-to-expected
old license	The original FERC License for Upper American River Project 2101 which concluded in July 2014 for which a different minimum flow regime and other terms and conditions were in place
Plan(s)	Trout Monitoring Plan, Aquatic Macroinvertebrate Monitoring Plan, Geomorphology Monitoring Plan, Riparian Vegetation Monitoring Plan, Bald Eagle Monitoring Plan, Hardhead Monitoring Plan, Amphibian and Aquatic Reptile Monitoring Plan, Sierra Nevada Yellow-legged Frog Monitoring, Bear Monitoring Plan, Large Woody Debris Monitoring Plan, and Water Temperature Monitoring Plan
PG&E	Pacific Gas and Electric Company
QC	Quality control

Acronym	Definition
Report	Annual Monitoring Report
RWB	Reach-wide benthos
SAFIT	Southwestern Association of Freshwater Invertebrate Taxonomists
SFAR	South Fork American River
Sierra IBI	Sierra Index of Biological Integrity
SL	Standard Length
SMUD	Sacramento Municipal Utility District
SNYLF	Sierra Nevada Yellow-legged Frog
SWAMP	Surface Water Ambient Monitoring Program
SWRCB	State Water Resources Control Board
TL	total length
UARP	Upper American River Project
USGS	U.S. Geological Survey
USFS	U.S. Department of Agriculture, Forest Service
USFWS	U.S. Fish and Wildlife Service
VESs	Visual Encounter Surveys
WPT	Western pond turtle
YOY	Young-of-year

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1.0 INTRODUCTION AND BACKGROUND

This Annual Monitoring Report (Report) addresses monitoring requirements set forth in Sacramento Municipal Utility District's (SMUD) Trout Monitoring Plan, Aquatic Macroinvertebrate Monitoring Plan, Bald Eagle Monitoring Plan, Hardhead Monitoring Plan, Amphibian and Aquatic Reptile Monitoring Plan, Bear Monitoring Plan, Large Woody Debris Monitoring Plan, and Water Temperature Monitoring Plan (Plans). Requirements of the Plans are found in State Water Resources Control Board (SWRCB) Conditions 8 and 10, and U.S. Department of Agriculture, Forest Service (USFS) 4(e) Condition 31 and 35, located in Appendices A and B, respectively, of the Federal Energy Regulatory Commission's (FERC) Order Issuing New License for the Upper American River Project (UARP; FERC Project No. 2101), dated July 23, 2014 (FERC 2014) and the USFS section 4(e) Conditions 14 and 15 for the Slab Creek Flow Facility Project License Amendment (USFS 2015). The Plans were developed in consultation with the SWRCB, USFS, California Department of Fish and Wildlife (CDFW), and U.S. Fish and Wildlife Service (USFWS). This Report presents the results of implementing the Plans in 2020.

SMUD owns and operates the UARP which is licensed by FERC. The UARP lies within El Dorado and Sacramento counties, primarily within lands of Eldorado National Forest (ENF). The UARP consists of three major storage reservoirs: Loon Lake, Union Valley, and Ice House (with a combined capacity of approximately 379,000 acre-feet), eight smaller regulating or diversion reservoirs, and eight powerhouses. The UARP also includes recreation facilities containing over 700 campsites, five boat ramps, hiking paths, and bicycle trails at the reservoirs.

All minimum streamflows required by the 2014 FERC License were implemented in October 2014; therefore, Year 1 as it pertains to the Monitoring Program is 2015. Pre- and post-2014 minimum streamflow requirements (i.e., "old" license and "new" license) are provided in Appendix A1.

This Report summarizes results of Monitoring Year 6 (2020). Refer to Section 1.2 of this report for information about the frequency of resource-specific monitoring efforts required by the License. Some monitoring activities have specific reporting requirements and deadlines in lieu of this Report.

For context in considering the monitoring results, the California Department of Water Resources (DWR) May Bulletin 120 forecast the 2020 water year type as Dry, and the UARP was operated under this scenario for the remainder of the water year. The final 2020 water year type remained classified as Dry based on DWR's Full Natural Flow record for the American River at Folsom in October 2020.

1.1 MONITORING SITES

Monitoring sites are depicted in Figure 1-1 through Figure 1-3 for all 2020 study locations.

1.2 MONITORING FREQUENCY

The Monitoring Program covers monitoring to be conducted during all years until a new license is issued. Table 1-1 describes the monitoring frequencies for the first eight years of the License. As noted in Section 1.3, some monitoring activities have specific reporting requirements and deadlines in lieu of this Report.

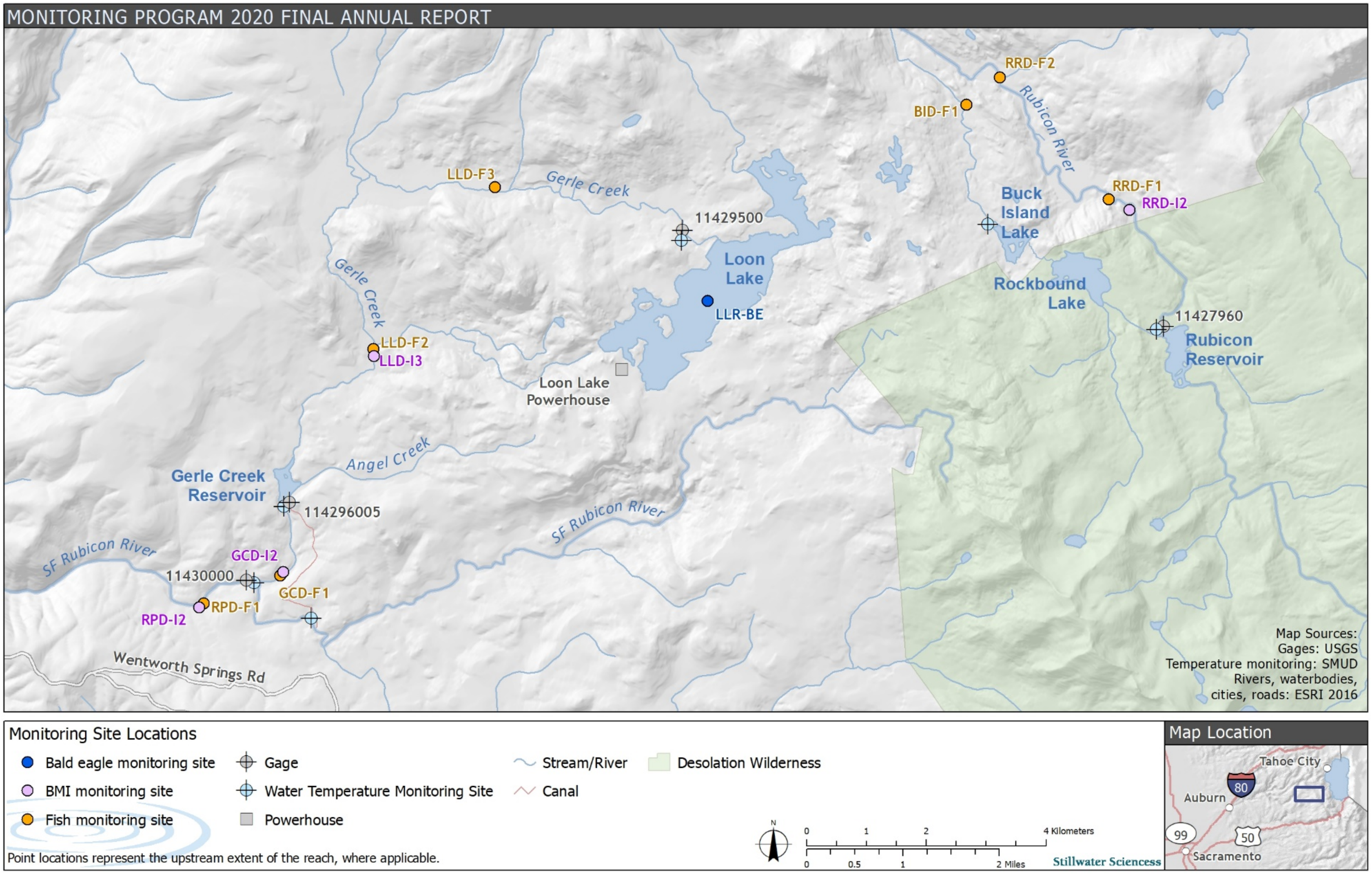


Figure 1-1. Monitoring locations downstream of Rubicon Reservoir, Buck Island Lake, Loon Lake, and Gerle Creek Reservoir.

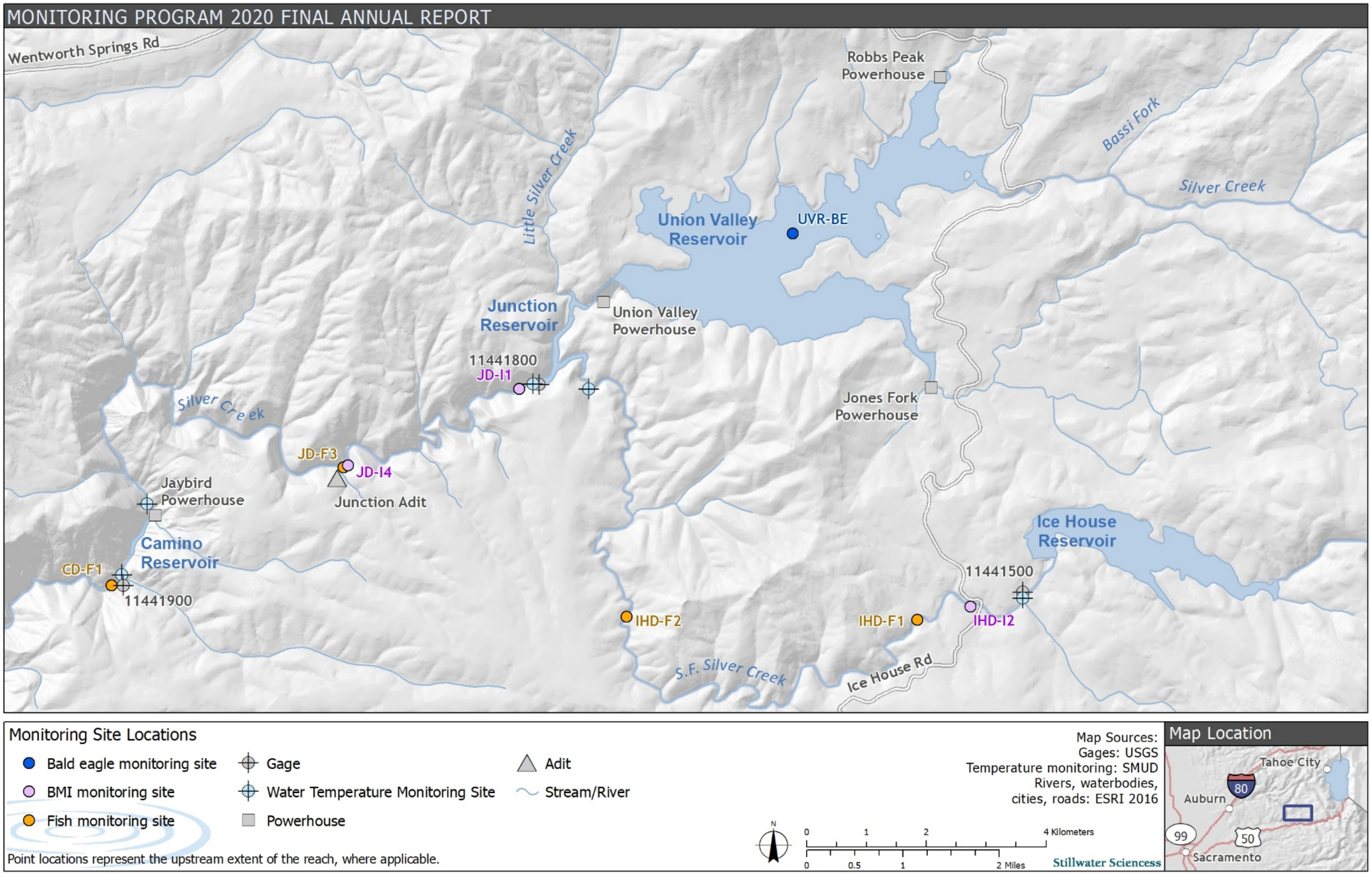


Figure 1-2. Monitoring locations downstream of Ice House Reservoir, Union Valley Reservoir, Junction Reservoir, and Camino Reservoir.

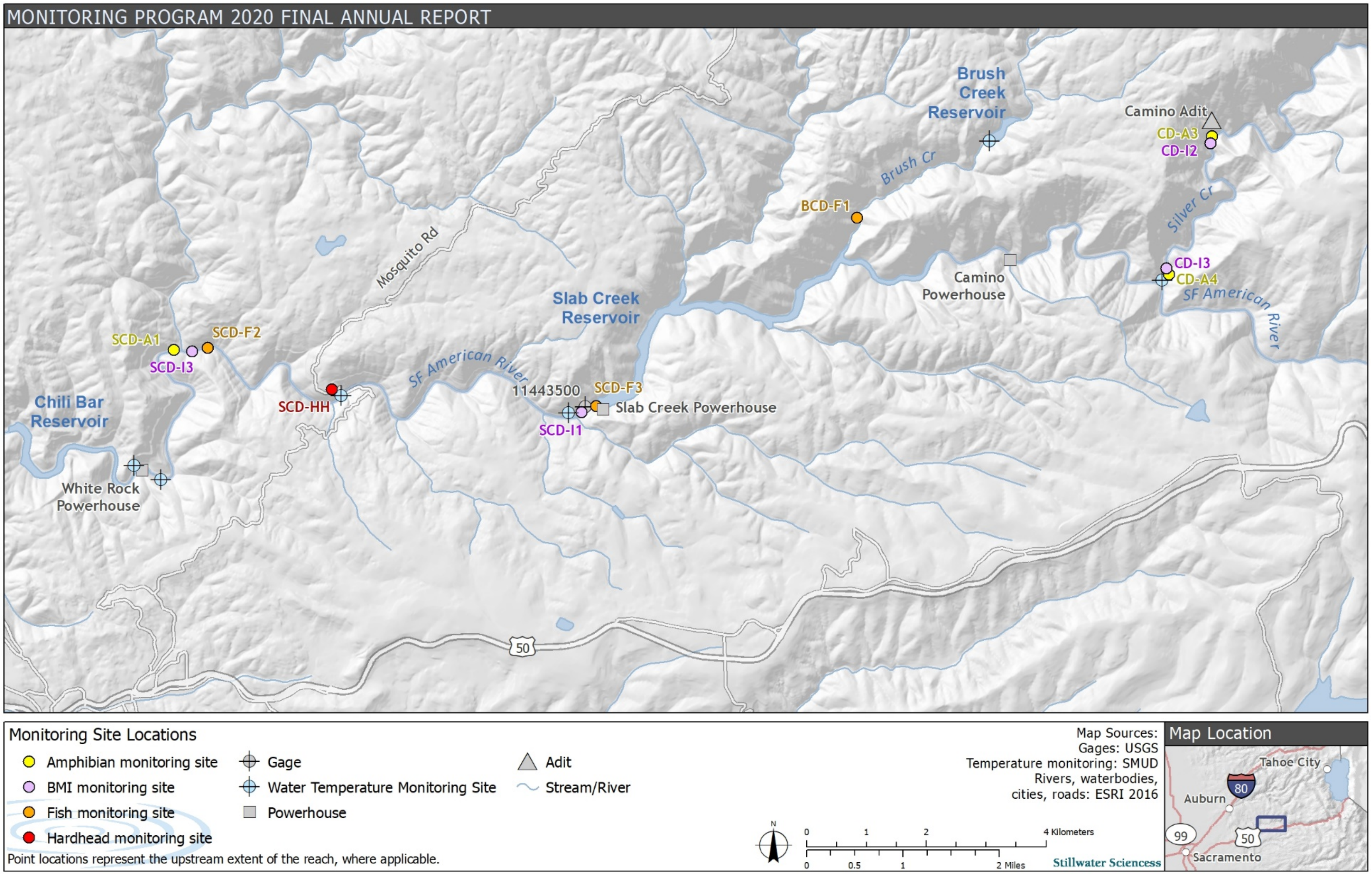


Figure 1-3. Monitoring locations downstream of Camino Reservoir (continued), Brush Creek Reservoir, and Slab Creek Reservoir.

Table 1-1. Monitoring Program Frequency First Eight Years.

Monitoring Effort	License Monitoring Year							
	1 (2015)	2 (2016)	3 (2017)	4 (2018)	5 (2019)	6 (2020)	7 (2021)	8 (2022)
Trout Population Monitoring					X	X		
Hardhead Population Monitoring		X	X		X	X		
Aquatic Macroinvertebrate					X	X		
Amphibian and Aquatic Reptile Monitoring (including Foothill Yellow-legged Frog) [1]		X	X	X	X	X	X	
Sierra Nevada Yellow-legged Frog (formerly Mountain Yellow-legged Frog) Monitoring					X			
Riparian Vegetation Monitoring					X			
Algae Species Identification and Monitoring		X						
Geomorphology (Sensitive Site Investigation and Mitigation Plan Development)	X	X						
Geomorphology (Continuing Evaluation of Representative Channel Areas)					X			
Water Temperature		X	X	X	X	X	X	X
In Situ Water Quality	X	X	X	X	X	X	X	X
Bacteria Monitoring	X	X	X	X	X	X	X	X
Metals bioaccumulation		X					X	
Water General Chemistry			X					X
Robbs Peak Powerhouse Entrainment	X	X	X					

Monitoring Effort	License Monitoring Year							
	1 (2015)	2 (2016)	3 (2017)	4 (2018)	5 (2019)	6 (2020)	7 (2021)	8 (2022)
Bear Management Monitoring		X	X	X	X	X	X	X
Bald Eagle Monitoring		X	X	X	X	X	X	X
Large Woody Debris	X	X	X	X	X	X	X	X

[1] Amphibian and Aquatic Reptiles Monitoring began in 2016.

1.3 LITERATURE CITED

FERC (Federal Energy Regulatory Commission). 2014. Federal Energy Regulatory Commission Order 148 FERC 62,070 Issuing New License for the Sacramento Municipal Utility District Upper American River Hydroelectric Project No. 2101. Issued July.

2.0 TROUT

2.1 MONITORING PLAN OBJECTIVES

The objective of the Trout Monitoring Plan is to evaluate changes in trout populations throughout the UARP area related to implementation of new minimum streamflows required under the 2014 FERC License (SMUD 2016).

2.2 METHODS

Site locations are shown in Figure 1-1 through Figure 1-3, and methods are described in Section 4.0 of the Trout Monitoring Plan (SMUD 2016). The following methodological variations were implemented during the 2020 monitoring and analysis:

- As in 2019, sites JD-F3 and SCD-F2 were surveyed via snorkeling rather than electrofishing due to access constraints (inability to safely transport gear to the site) and safety concerns caused by high flow conditions, respectively.
- There was no flow at Site BID-F1 during the sampling period. Therefore, survey of the entire site as described in the Trout Monitoring Plan was not possible. However, a large, isolated pool in the upper segment of Site BID-F1 was surveyed. The lower segment of the site was opportunistically shocked where pooling water was observed. Additionally, two isolated pools immediately downstream of Site BID-F1 were electrofished; fish captured in these pools are not included in the quantitative analyses below but are described qualitatively in Section 2.3.3.

2.3 RESULTS

Eight fish species were documented during the 2020 surveys, including six native and two non-native species. This was similar to 2019 (nine species) but fewer than the 12 species previously documented during the 2002–2005 pre-licensing surveys (Table 2-1, Figure 2-1). Detailed fish survey data are provided in Appendix B1 through B6.

The distribution of species observed among sites in 2020 was similar to that of 2019 but remained reduced compared to prior sampling years (2002–2005). Rainbow trout (*Oncorhynchus mykiss*) was the most widely distributed fish species during the 2020 monitoring survey, with observations occurring in nine of the ten survey reaches. Changes in trout distribution from 2019 included new observations of rainbow and brown trout (*Salmo trutta*) in the Junction Dam Reach and brown trout in the Camino Dam Reach. Brown trout were not observed in the Slab Creek Dam Reach for the first time since trout monitoring began in 2002. Slab Creek Dam and Rubicon River Dam reaches had the greatest number (richness) of species for all survey reaches in 2020 (Figure 2-1.).

Table 2-1. Fish Species Composition for the SMUD UARP Study Reaches, 2002–2020.[a]

Fish Species		Stream Reach[b]									
		RRD	BID	LLD	GCD	RPD	IHD	JD	BCD[c]	CD	SCD
Native											
California roach	*Hesperoleucus symmetricus*	● □ X	● □ X								●
Hardhead	*Mylopharodon conocephalus*										●
Hitch	*Lavina exilicauda*	●									
Rainbow trout	*Oncorhynchus mykiss*	● □ X	●	● □ X	● □ X	● □ X	● □ X	● X	● X	● □ X	● □ X
Riffle sculpin	*Cottus gulosus*										●
Sacramento pikeminnow	*Ptychocheilus grandis*										● □ X
Sacramento sucker	*Catostomus occidentalis*	●	□				● □ X	●		●	● □ X
Sculpin spp.	*Cottus* spp.										● □ X
Speckled dace	*Rhinichthys osculus*	● □ X									●
Non-native											
Brook trout	*Salvelinus fontinalis*	●									
Brown trout	*Salmo trutta*	● □ X		● □ X	● □ X	● □ X	● □ X	● X	● X	● X	● □
Golden shiner	*Notemigonus crysoleucas*		● □ X								
Smallmouth Bass	*Micropterus dolomieu*										●
Sunfish spp.	*Lepomis* spp.										□

[a] ● 2002, 2003, 2004, and/or 2005 Surveys □ 2019 surveys **X** 2020 Surveys
[b] BCD = Brush Creek Dam; BID = Buck Island Dam; CD = Camino Dam; GC = Gerle Creek Dam; IHD = Ice House Dam; JD = Junction Dam; LLD = Loon Lake Dam; RPD = Robbs Peak Dam; RRD = Rubicon Dam; SCD = Slab Creek Dam
[c] Not surveyed in 2019 per the monitoring plan

Overall, rainbow and brown trout remained the dominant fish species throughout the UARP study area in 2020, and the number of trout observations increased at all sites except Site SCD-F2 (Figure 2-1). A few species were observed at some sites for the first time in 2020, including brown trout at sites RRD-F2 and JD-F3, Sacramento pikeminnow (*Ptychocheilus grandis*) at Site SCD-F2, and rainbow trout at Site JD-F3 (Figure 2-1). Site LLD-F2 transitioned back to brown trout dominant after becoming rainbow trout dominant in 2019 (Figure 2-1).

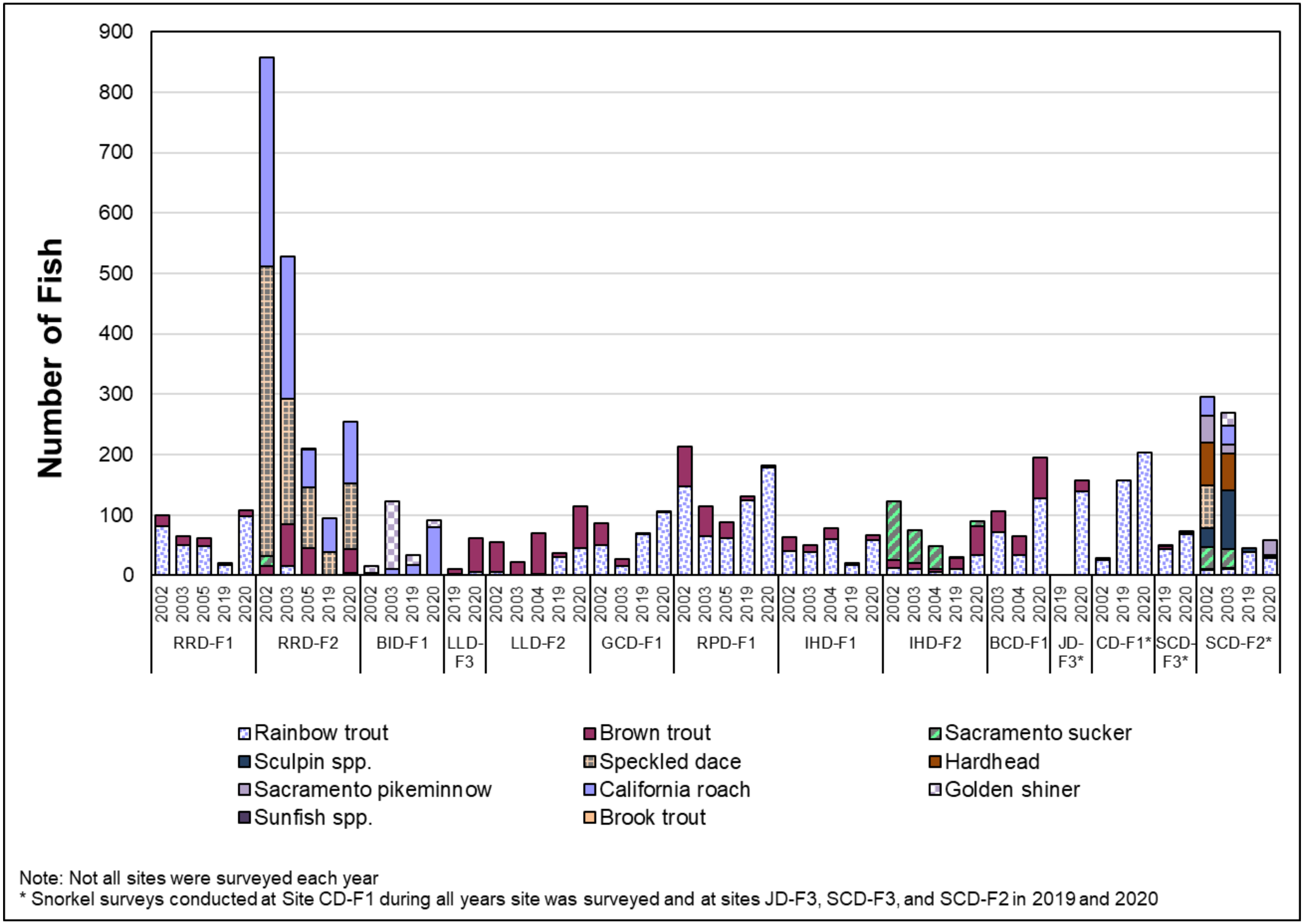


Figure 2-1. Fish species abundance and composition among UARP trout monitoring sites, 2002–2020.

Trout (rainbow and brown, combined) density was estimated for sites that were sampled by multiple-pass electrofishing and snorkeling surveys, and trout biomass was estimated for sites that were sampled by multiple-pass electrofishing surveys. The average trout density for 2020 was the highest of all sampling years (Table 2-2). Across sites, 2020 trout densities were either higher than or within range of previous survey years, with most sites having the highest densities of all survey years. The largest increases in trout density from 2019 to 2020 were observed at upper- and mid-elevation sites. Similarly, average trout biomass increased in 2020 compared to 2019 and was within the range of 2002–2005 estimates (Table 2-2). Compared to previous survey years, 2020 trout biomass was highest at sites LLD-F3, IHD-F2, and BCD-F1, lowest at sites IHD-F1 and BID-F1, and within the range of prior surveys at all other sites (Figure 2-3). Detailed trout density and biomass data are provided in Appendix B2.

Table 2-2. Average Trout Density and Biomass at Fourteen Sites in the UARP Area, 2002–2020.[a,b]

	2002	2003	2004	2005	2019	2020
Density (trout/acre)	278.2	293.0	432.9	348.5	167.9	473.1
Biomass (lbs/acre)	20.4	13.4	30.2	13.7	9.4	18.0

lbs = pounds

[a] Averages for the monitoring years 2002–2005 exclude sites which were not surveyed in 2019 and 2020.

[b] Average density was computed from sites that were surveyed by electrofishing and snorkel methods (i.e., sites RRD-F1, RRD-F2, BID-F1, LLD-F3, LLD-F2, GCD-F1, RPD-F1, IHD-F1, IHD-F2, BCD-F1, JD-F3, CD-F1, SCD-F3, and SCD-F2), while biomass included sites that were electrofished (i.e., sites RRD-F1, RRD-F2, BID-F1, LLD-F3, LLD-F2, GCD-F1, RPD-F1, IHD-F1, IHD-F2, and BCD-F1).

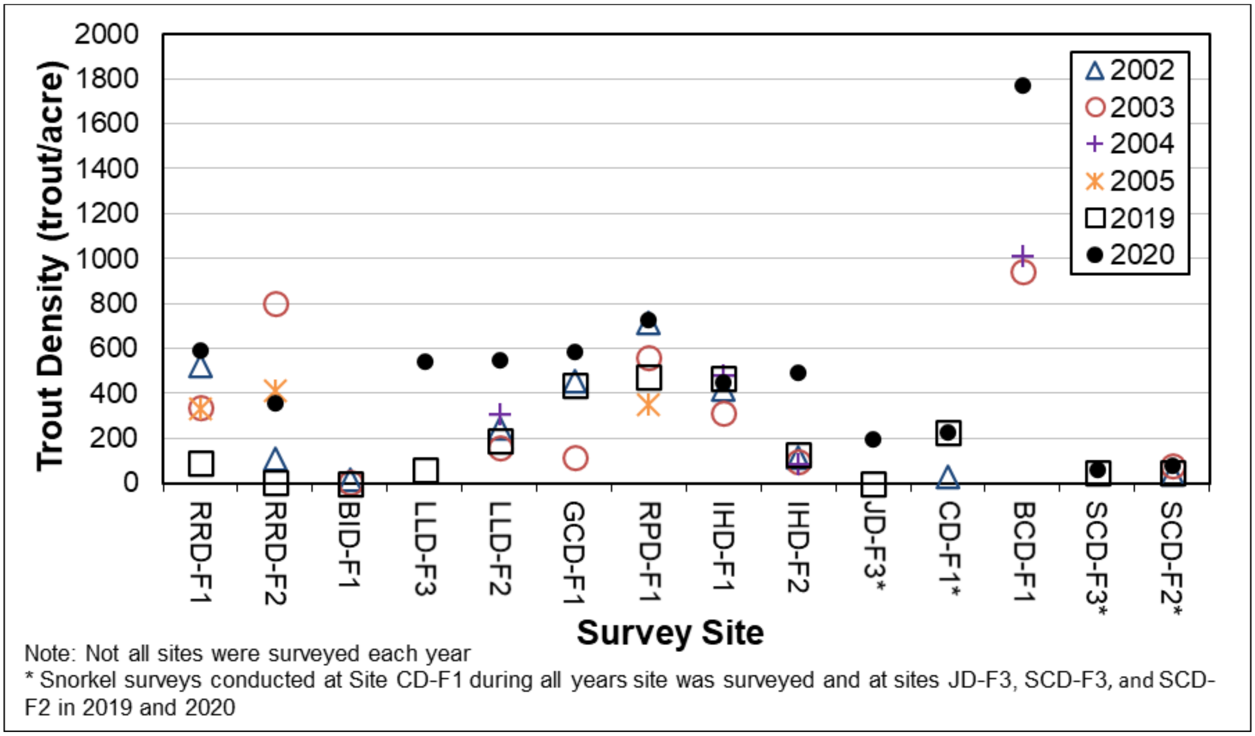


Figure 2-2. Trout density in the UARP study area by site, arranged left to right by decreasing elevation, 2002–2020.

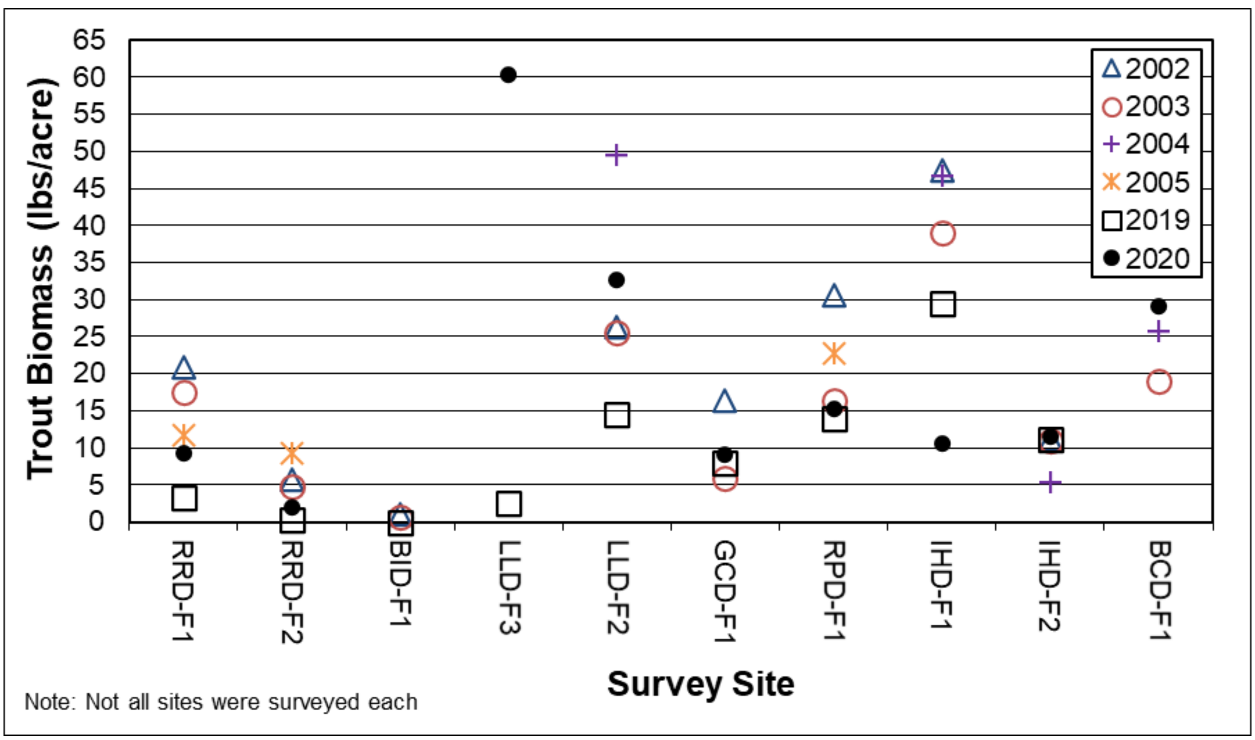
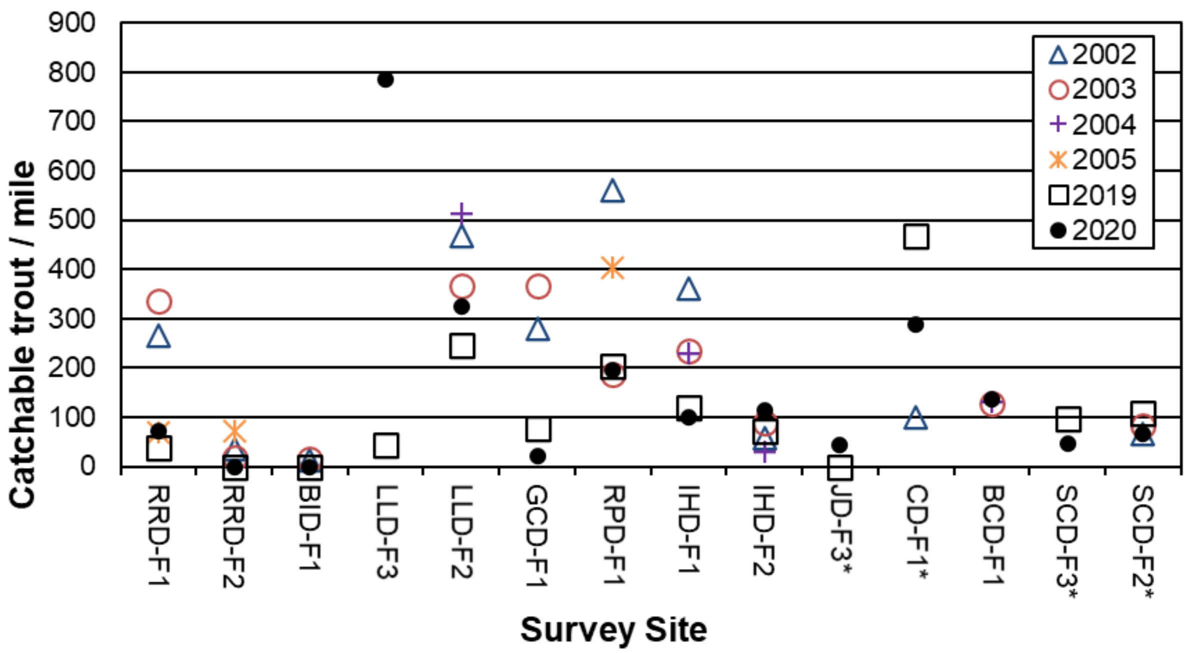


Figure 2-3. Trout biomass in the UARP study area by site, arranged left to right by decreasing elevation, 2002–2020.

The number of catchable trout per mile (trout that are greater than 152 millimeters [mm; 6 inches]) generally increased in 2020 compared to 2019 at mid-elevation streams and decreased at upper and lower elevation streams. Across sites, the number of catchable trout in 2020 was generally within range of previous survey years. Site LLD-F3 was a notable outlier, with the number of catchable trout per mile increasing nearly eight-fold in 2020 compared to 2019 (Figure 2-4).



Note: Not all sites were surveyed each year
* Snorkel surveys conducted at Site CD-F1 during all years site was surveyed and at sites JD-F3, SCD-F3, and SCD-F2 in 2019 and 2020

Figure 2-4. Number of catchable trout (>152 mm) per mile in the UARP study area by site, arranged left to right by decreasing elevation, 2002–2020.

Condition factors (K-values) indicate that rainbow trout and brown trout were generally in good condition in 2020[1]; however, the average condition factor for all sites was slightly lower than prior survey years (Table 2-3). Condition factors for rainbow trout in 2020 were generally lower at upper-elevation sites and within range of previous years for mid- to lower-elevation sites, while condition factors for brown trout were typically lower than prior survey years (Figures 2-5 and 2-6, Table 2-3, Appendix B3).

[1] Condition factors in western Sierran streams typically range from 0.8 to 2.0, with a mean condition factor generally 1.2 or below (Beak 1991, EA 1986, Ebasco Environmental 1993, Wilcox 1994, Hanson Environmental 2005). Rabe (1967) reported the condition factor to be between 0.9 and 1.1 for rainbow trout in Alpine lakes. Arismendi et al. (2011) cites broader ranges (0.5 to 2.0); however, condition is dependent on the time of sampling, the species, the strain of trout, state of sexual maturity, and the metric used to define fish length (e.g., fork length [FL], TL, or SL), which is not often documented with the results. Total length has been used as the standard of measurement throughout the 2002–2020 UARP trout monitoring surveys.

Table 2-3. Condition Factors for Rainbow and Brown Trout in the UARP Study Area by Site, 2002–2020.[a]

Year	Survey Site									
	RRD -F1	RRD -F2	LLD -F3	LLD -F2	GCD -F1	RPD -F1	IHD -F1	IHD -F2	BCD-F1	Average
Rainbow trout										
2020	0.93	0.81	0.93	0.91	0.90	0.92	0.92	0.91	0.87	**0.90**
2019	1.08	0.89	0.97	0.96	0.84	0.87	0.99	0.89	--	**0.94**
2005	1.16	0.96	--	--	--	0.98	--	--	--	**1.03**
2004	--	--	--	1.14	--	--	1.08	0.98	0.95	**1.04**
2003	1.08	1.19	--	0.85	0.99	0.97	0.98	0.91	0.97	**0.99**
2002	1.00	1.00	--	0.91	0.82	0.98	0.90	1.01	--	**0.95**
Average	**1.05**	**0.97**	**0.95**	**0.95**	**0.89**	**0.94**	**0.97**	**0.94**	**0.93**	**--**
Brown trout										
2020	0.95	0.88	0.97	0.96	0.84	1.03	1.01	0.93	0.89	**0.94**
2019	1.10	--	1.18	0.94	1.00	1.01	0.98	0.99	--	**1.03**
2005	1.10	0.97	--	--	--	--	--	--	--	**1.04**
2004	--	--	--	1.09	--	0.98	1.02	1.03	1.04	**1.03**
2003	1.02	1.07	--	0.97	1.25	1.05	0.95	0.99	0.96	**1.03**
2002	0.98	0.97	--	1.05	0.97	1.00	0.86	1.06	--	**0.98**
Average	**1.03**	**0.97**	**1.08**	**1.00**	**1.02**	**1.01**	**0.96**	**1.00**	**0.96**	**--**

-- = not sampled
[a] Condition factors calculated using total length (TL) as the metric for length.

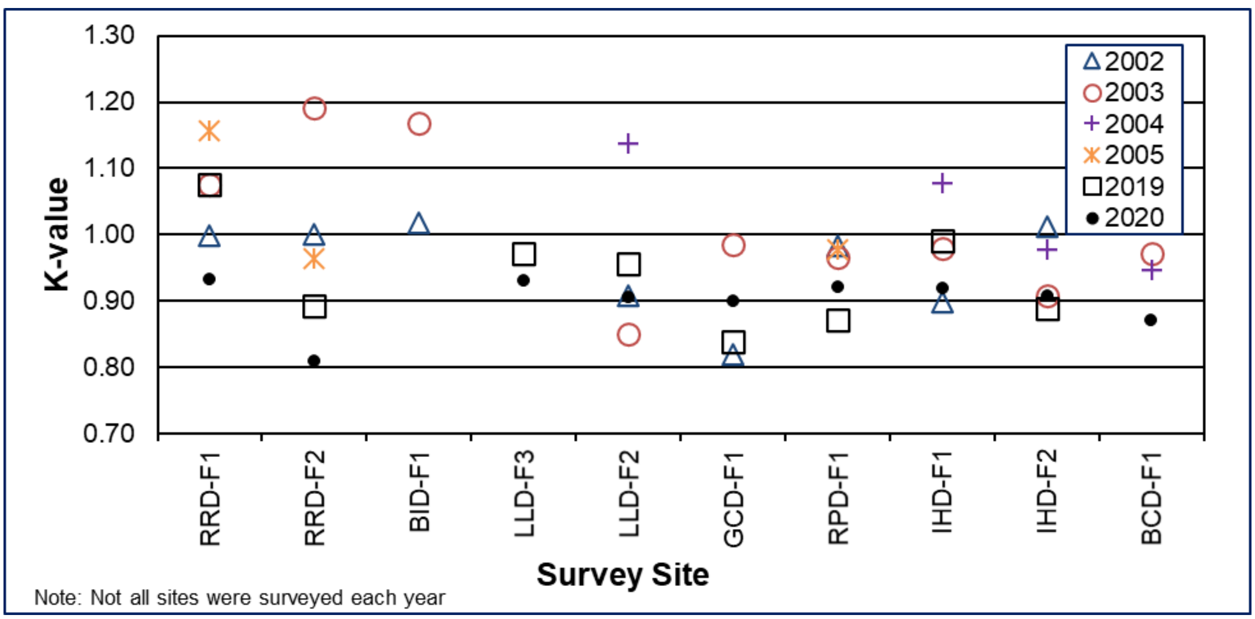


Figure 2-5. Condition factors for rainbow trout captured by electrofishing in the UARP study area by site, arranged left to right by decreasing elevation, 2002–2020.

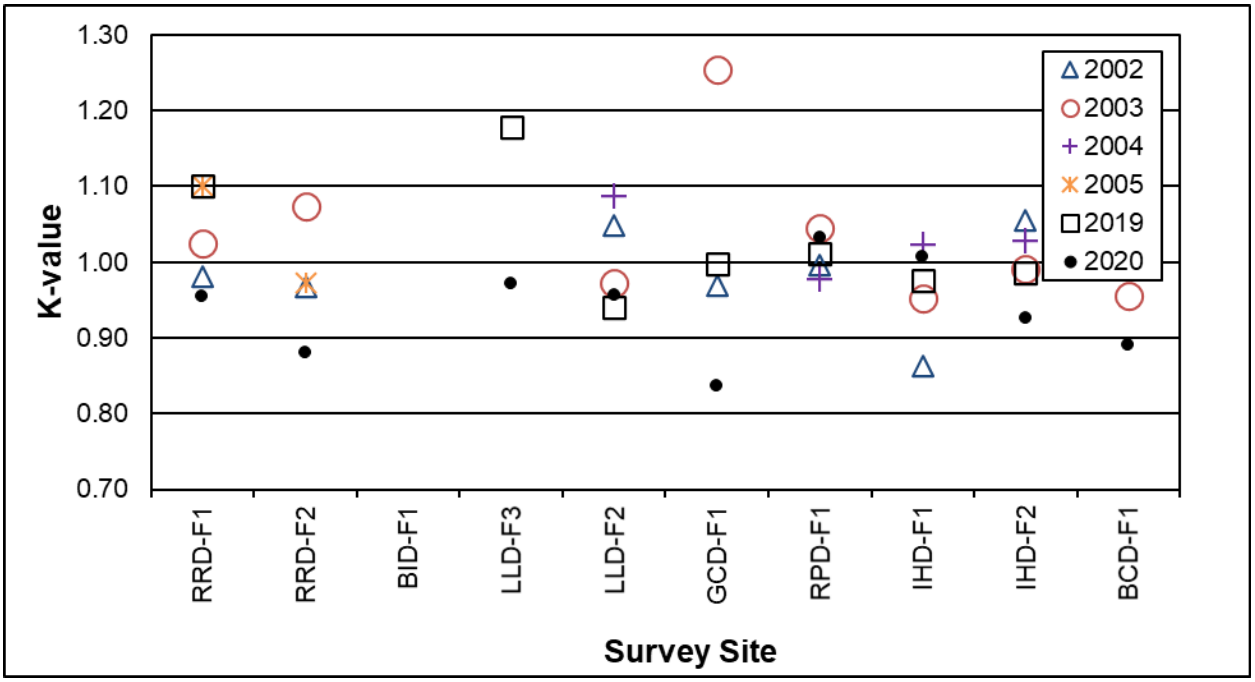


Figure 2-6. Condition factors for brown trout captured by electrofishing in the UARP study area by site, arranged left to right by decreasing elevation, 2002–2020.

Length-at-age data used to determine approximate age classes of each trout species are provided in Table 2-4. Scale data from representative fish from all sites were combined for the analysis to supplement length-at-age data from the literature. Scale analysis data are provided in Appendix B4.

Table 2-4. Trout Length-at-Age Summary.

Reference	Length-at-Age (mm TL)				
	YOY	1+	2+	3+	4+
Rainbow trout					
Snider and Linden (1981), Moyle (2002)	<100	130–170	180–220	230–260	--[a]
2020 Scale Analysis	70–100 (n=9)	105–175 (n=26)	150–219 (n=4)	179–257 (n=3)	--[a]
Brown trout					
Moyle (2002)	<70	70–220	130–360	230–450	--
2020 Scale Analysis	70–96 (n=16)	117–168 (n=10)	174–210 (n=6)	252 (n=1)	324–363 (n=2)

mm=millimeters; TL=total length; YOY=young-of-year
[a] No fish in this size class collected

The following sections describe results from individual reaches and sites. Site photos and habitat data are provided in Appendix B5 and Appendix B6, respectively.

2.3.1 Site RRD-F1

This sampling site is located approximately 1.6 miles downstream of Rubicon Dam, just upstream of Rubicon Springs. This site included bedrock and boulder-dominated run and glide complexes with a small amount of pool habitat. The upper segment of this site was almost entirely pool habitat in 2002 and 2003, transitioning to run dominant with a small amount of pool habitat in 2019 and 2020. This site was surveyed via electrofishing in 2002, 2003, 2005, 2019, and 2020. It was divided into upper and lower segments during sampling in all years for sampling efficiencies, although the data are presented for the entire site.

Rainbow and brown trout were captured at this site in all survey years, with rainbow trout as the dominant species and little change in composition across years (Figure 2-1). Trout density and biomass in 2020 increased sharply from 2019; density was the highest of all years sampled (Figure 2-7).

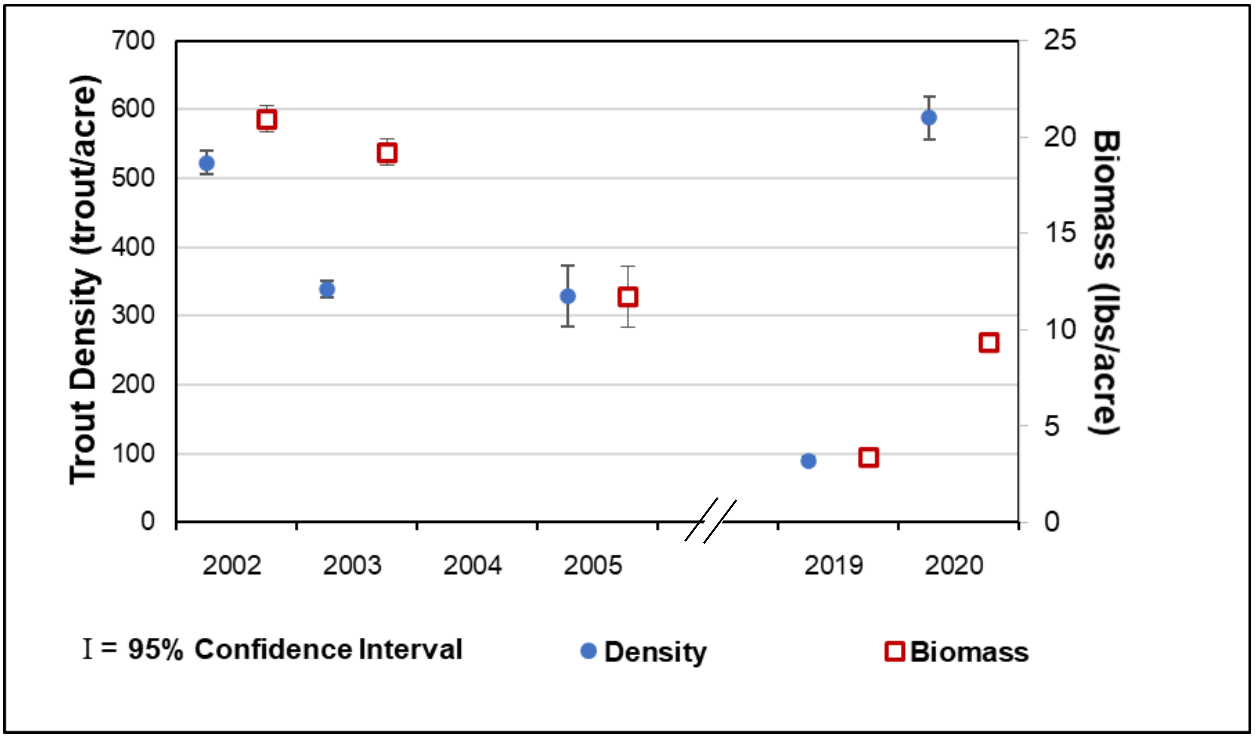


Figure 2-7. Trout density and biomass at Site RRD-F1, Rubicon River, Rubicon Dam Reach, 2002–2020.

Rainbow trout ranged in age from young-of-year (YOY) to age 2+ in 2020 (Figure 2-8). There was a typical distribution among age classes, where the highest number were YOY and fewer numbers were observed in each subsequent age class, indicating strong recruitment in 2020 (Figure 2-8). This contrasts with the low recruitment observed in 2019, which was evidenced by a flat age class distribution for that year (Figure 2-8).

Ten brown trout were observed at Site RRD-F1 in 2020 and ranged from YOY to age 1+, with a greater number of YOY present, indicating successful recruitment in early 2020 and survival from 2019. Small numbers of trout were observed in the 1+, 2+, and 3+ age classes in previous monitoring years, which indicated poor recruitment and low survival in those years (Figure 2-9).

The average condition factors for rainbow and brown trout (K=0.93 and 0.95, respectively) suggests that trout were in good condition; however, they were the lowest of all years surveyed (Table 2-3, Figure 2-5, and Figure 2-6).

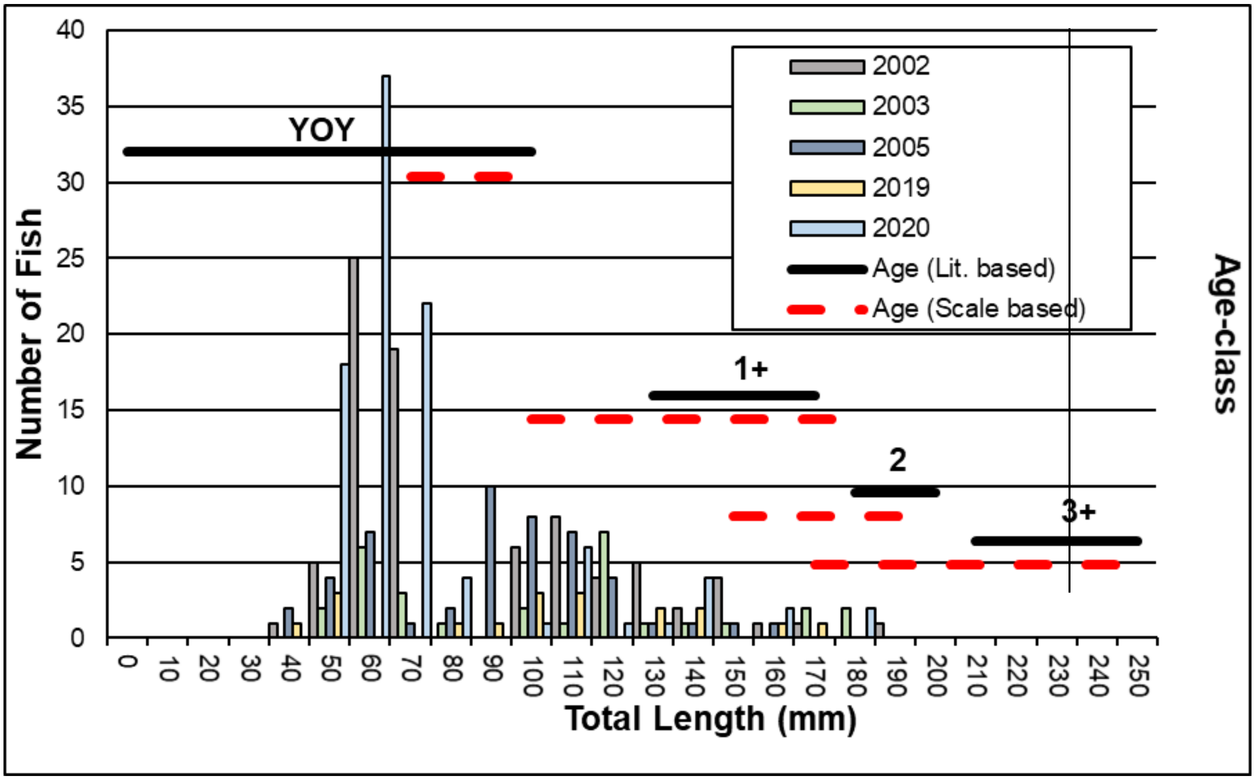


Figure 2-8. Length-frequency and age-class distribution of rainbow trout at Site RRD-F1, Rubicon River, Rubicon Dam Reach, 2002–2020.

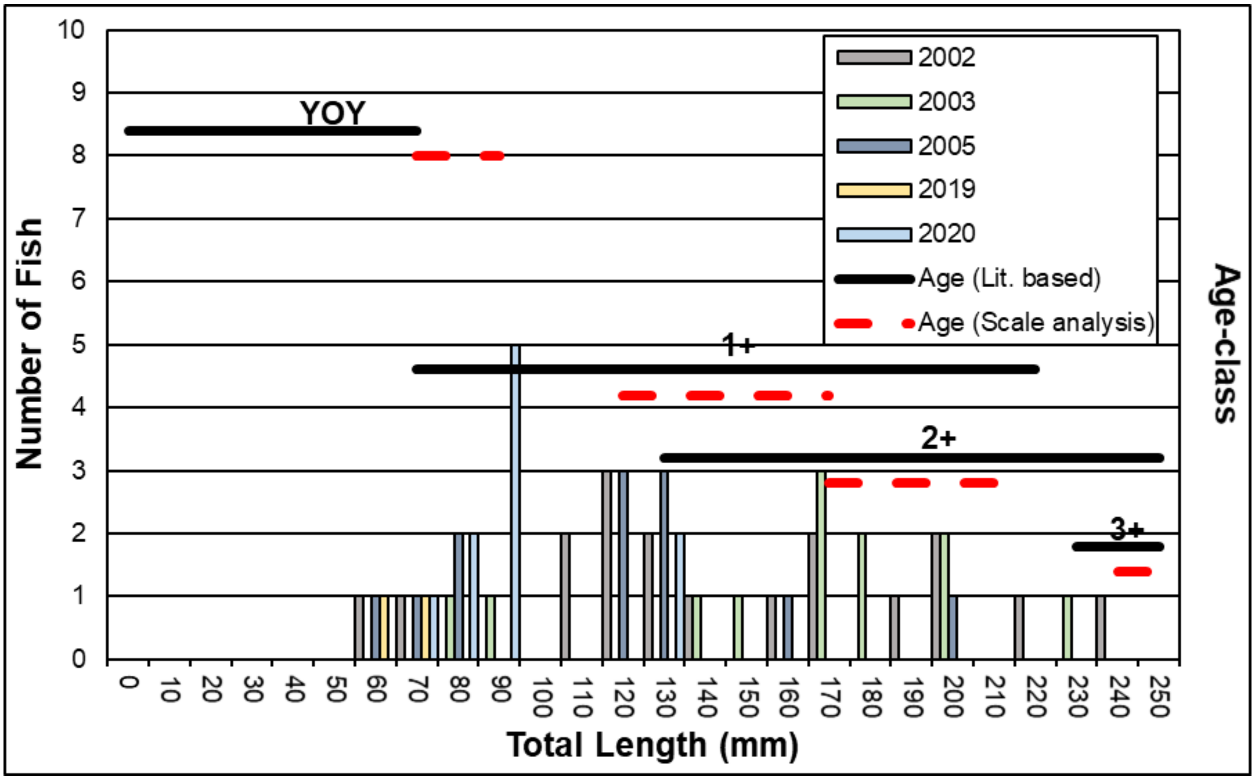


Figure 2-9. Length-frequency and age-class distribution of brown trout at Site RRD-F1, Rubicon River, Rubicon Dam Reach, 2002–2020.

2.3.2 Site RRD-F2

This sampling site is located at the downstream end of Rubicon Springs Valley, at the confluence of the Rubicon River and Miller Creek, 3.5 miles downstream of Rubicon Dam. The site included gravel-dominated pool and run habitat with a small amount of riffle habitat. The presence of a beaver dam within the site increased the percentage of pool habitat from 2019. The site has been surveyed via electrofishing during every year of monitoring and was combined into a single segment for the 2019 and 2020 monitoring years.

Consistent with previous monitoring years, speckled dace (*Rhinichthys osculus*) and California roach (*Hesperoleucus symmetricus*) were the dominant fish in 2020, and rainbow and brown trout were captured in lesser numbers (Figure 2-1). Trout density and biomass increased from 2019. Trout density in 2020 was within range of densities observed in 2002–2005, whereas biomass was lower in 2020 compared to 2002–2005 (Figure 2-10).

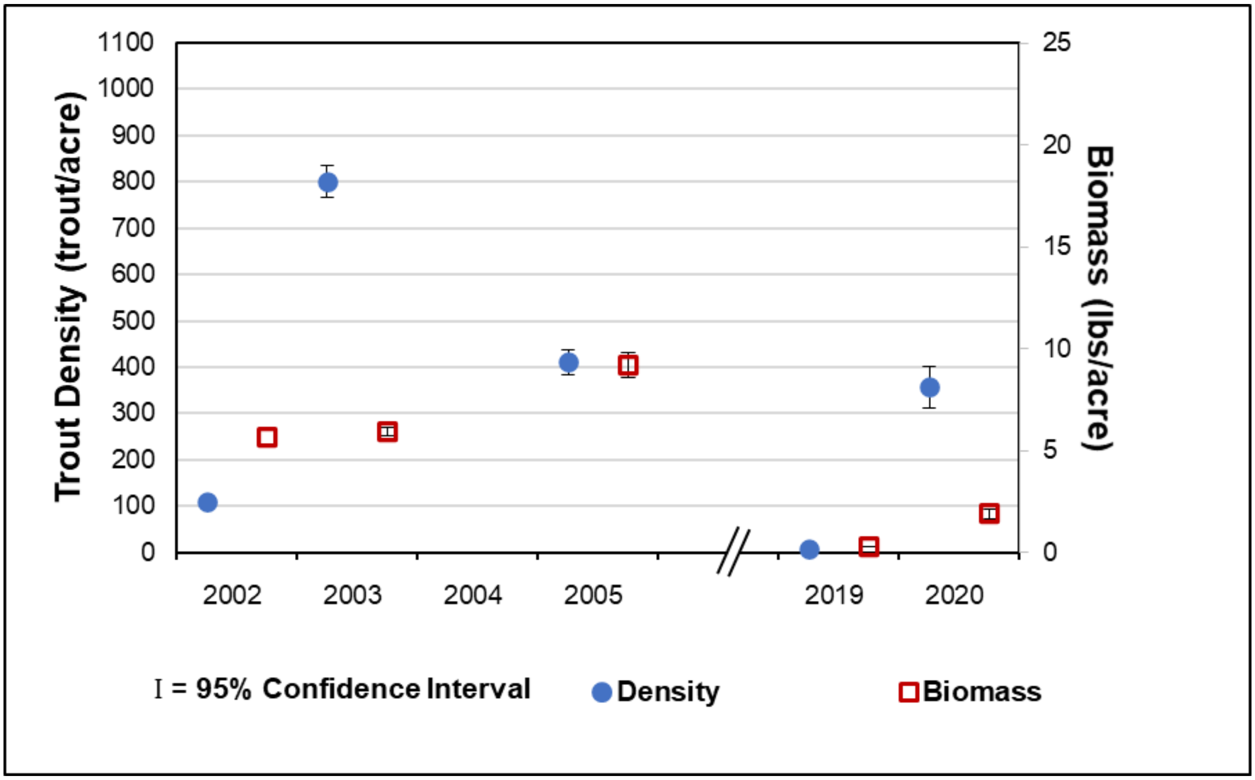


Figure 2-10. Trout density and biomass at Site RRD-F2, Rubicon River, Rubicon Dam Reach, 2002–2020.

Four rainbow trout were captured at Site RRD-F2 in 2020; all belonged to the YOY age class (Figure 2-11). This was an increase in number from the single rainbow trout (age 1+) captured in 2019 and indicated that recruitment improved at this site in 2020. Brown trout primarily belonged to the YOY age class in 2020 which indicated strong recruitment and was a substantial increase from 2019 when no brown trout were captured (Figure 2-12).

Rainbow and brown trout were in good condition (K=0.81 and 0.88, respectively), although average condition factors for both species were the lowest of all years sampled (Figures 2-5 and 2-6, Table 2-3).

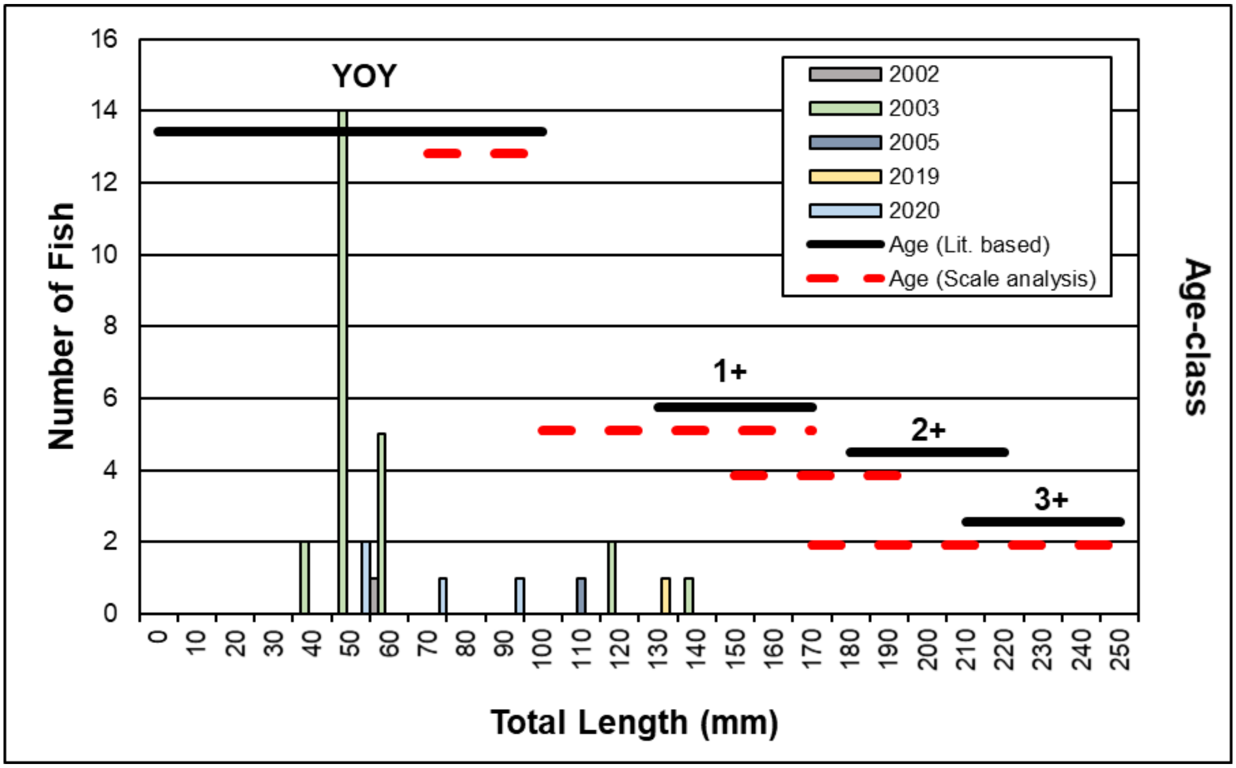


Figure 2-11. Length-frequency and age-class distribution of rainbow trout at Site RRD-F2, Rubicon River, Rubicon Dam Reach, 2002–2020.

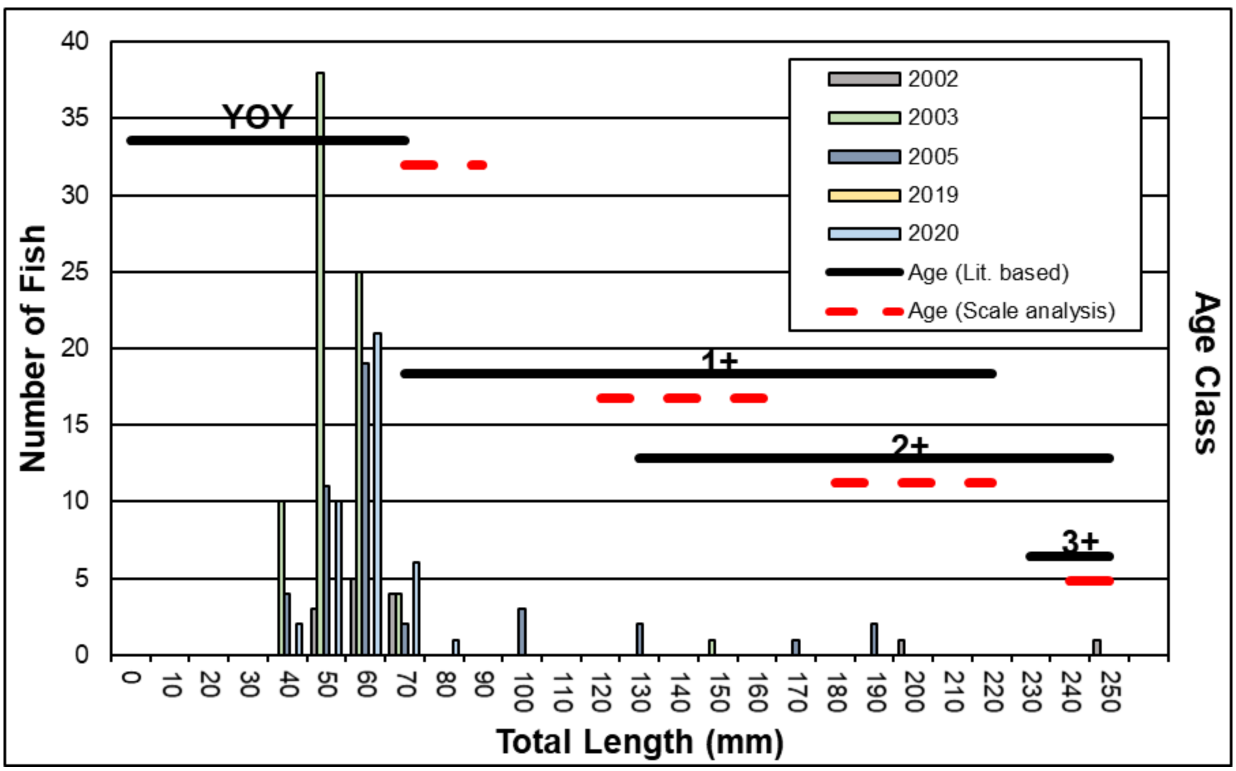


Figure 2-12. Length-frequency and age-class distribution of brown trout at Site RRD-F2, Rubicon River, Rubicon Dam Reach, 2002–2020.

2.3.3 Site BID-F1

This sampling site is located 1.5 miles downstream of Buck Island Dam at a 90-degree bend in the channel and at the base of a short bedrock slab, which resulted in a large boulder and bedrock dominant backwater scour pool in the upper segment. The narrower, higher-gradient lower segment contained riffle and run habitat in 2019 and 2020. This site was surveyed by electrofishing in 2002, 2003, 2019, and 2020.

In 2020, there was no surface flow at Site BID-F1 at the time of trout monitoring, primarily due to dry conditions within the watershed and an unexpected late closure of the tunnel between Buck Island and Loon Lake reservoirs caused by rapidly changing flow conditions that resulted in low storage levels within Buck Island Reservoir near the end of August. Isolated pools remained in the site, including the large scour pool making up the upper segment and smaller pools within the lower segment. Methods were modified to include opportunistic electrofishing in the scour pool and in two pools immediately downstream of the site to qualitatively assess species composition.

Consistent with 2019 observations, California roach, golden shiner (*Notemigonus crysoleucas*), and Sacramento sucker (*Catostomus occidentalis*) were observed at and in the vicinity of Site BID-F1 in 2020. Rainbow trout were present in small numbers at this site in 2002 and 2003 but were absent in 2019 and 2020 (Figure 2-1). Trout densities, biomass, length-frequencies, and age-class distributions for the 2002–2020 monitoring years are provided in Figure 2-13 and Figure 2-14.

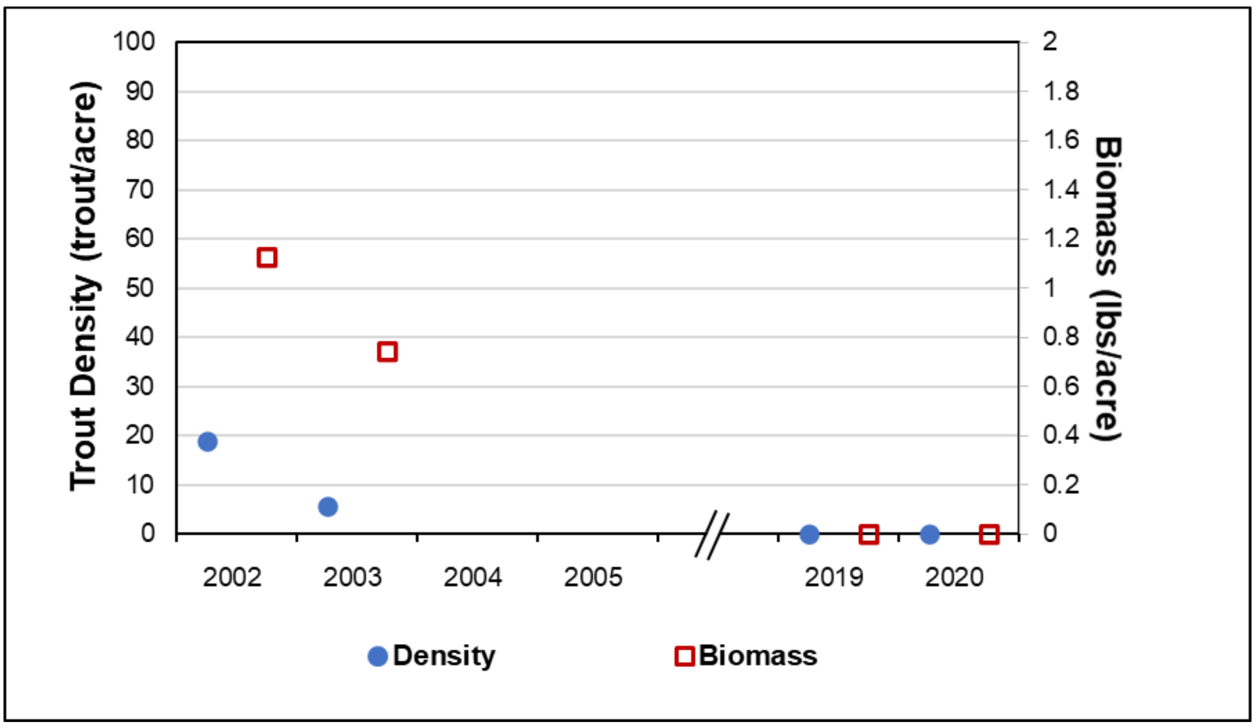


Figure 2-13. Trout density and biomass at Site BID-F1, Little Rubicon River, Buck Island Dam Reach, 2002–2020.

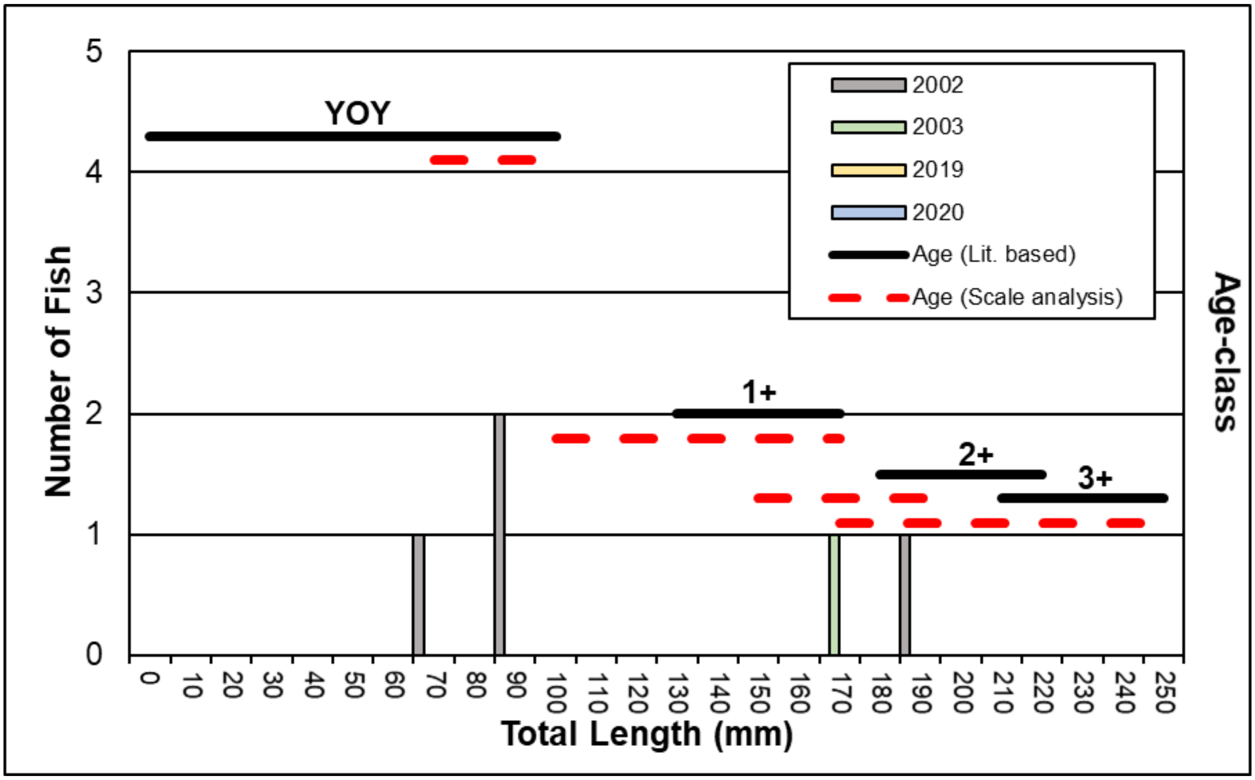


Figure 2-14. Length-frequency and age-class distribution of rainbow trout at Site BID-F1, Little Rubicon River, Buck Island Dam Reach, 2002–2020.

2.3.4 <u>Site LLD-F3</u>

Site LLD-F3 was surveyed in 2019 and 2020. It was selected as a replacement for Site LLD-F1 in 2019 because Site LLD-F1 is located on private land where access has been restricted. Site LLD-F3 was determined to be a reasonable substitute for Site LLD-F1 because it is in close proximity to Site LLD-F1, contains multiple habitat types (run, pool, etc.), is of similar size and gradient to the area around Site LLD-F1, and is located on public land. This sampling site is located approximately 3 miles downstream of Loon Lake Dam and 0.5 miles downstream of Wentworth Springs. The site is composed primarily of cobble-dominated run habitat with a small number of riffles and glides and a small amount of boulder substrate. It was surveyed via electrofishing and was divided into upper and lower segments during surveying.

Rainbow and brown trout were observed in 2020 (Figure 2-1). Trout density and biomass increased substantially from 2019, and the number of catchable trout per mile was the highest of all sites surveyed in 2020 (Figure 2-4 and Figure 2-15). A small number of rainbow trout were captured, and all belonged to the 1+ age-class, indicating poor recruitment in 2020 and some survival from 2019 (Figure 2-16). Brown trout ranged from YOY through age 4+. Most brown trout in 2020 belonged to the 1+ and 2+ age classes which suggests recruitment of brown trout in 2019 may have been good despite few YOY observed that year (Figure 2-17). Few YOY were observed in 2020 which suggests poor recruitment; however, the observation of older age classes (3+)

indicates survival may be strong (Figure 2-17). Rainbow and brown trout were in good condition (K=0.93 and 0.97, respectively) (Figures 2-5 and 2-6, Table 2-3).

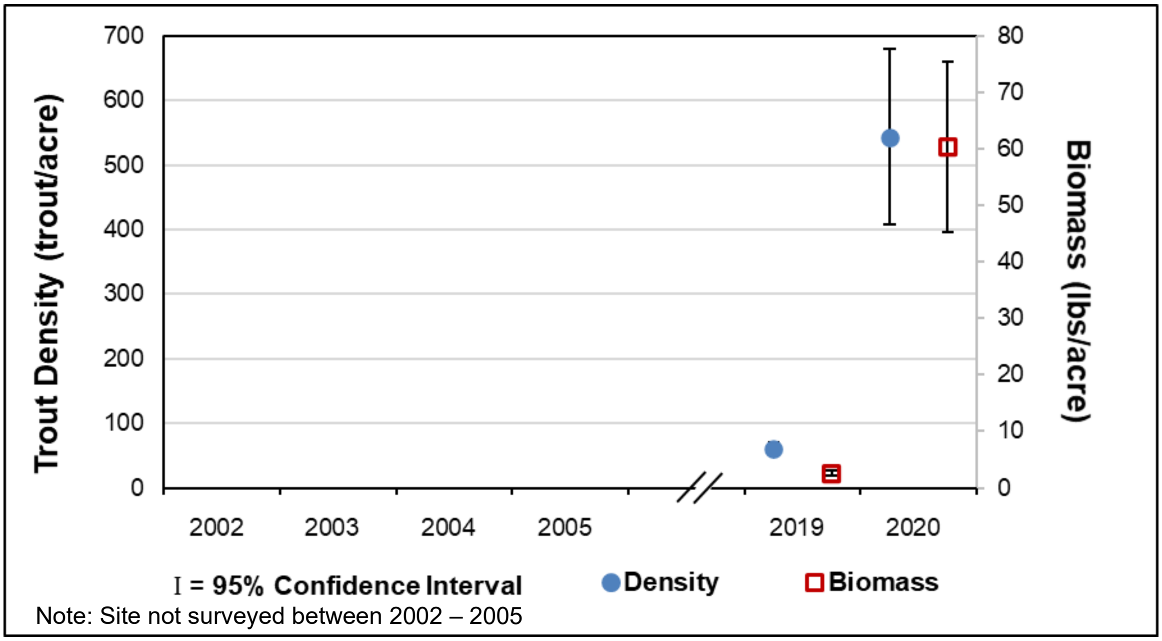


Figure 2-15. Trout density and biomass at Site LLD-F3, Gerle Creek, Loon Lake Dam Reach, 2019–2020.

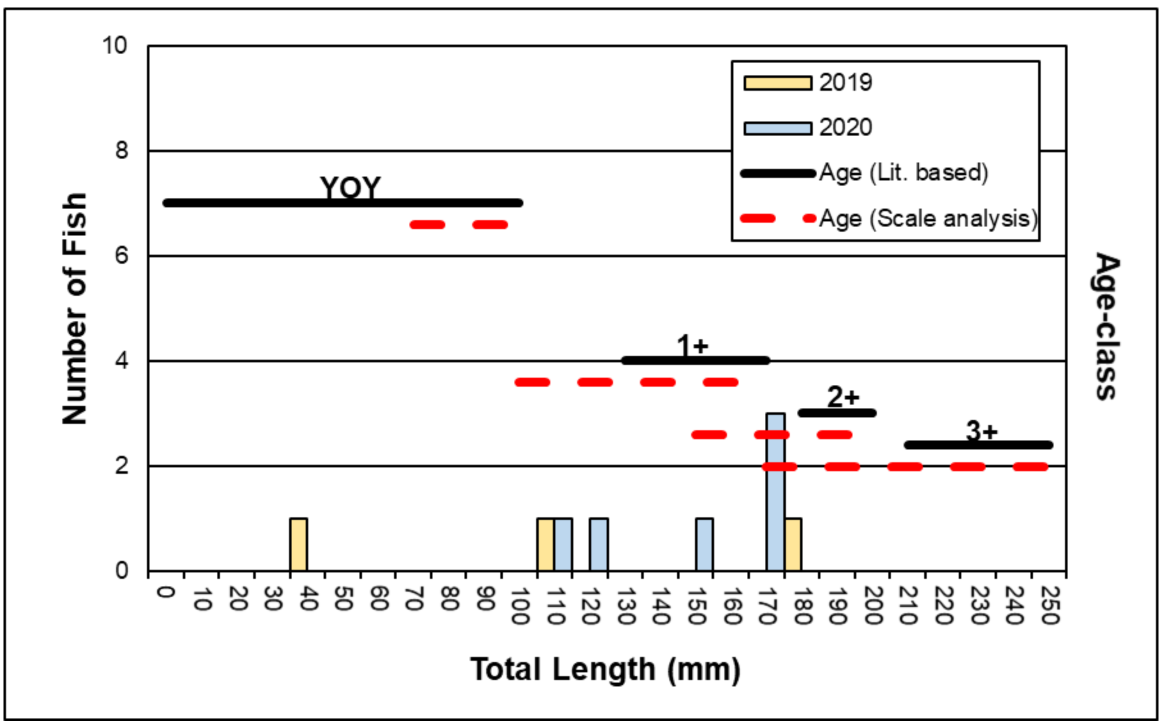


Figure 2-16. Length-frequency and age-class distribution of rainbow trout at Site LLD-F3, Gerle Creek, Loon Lake Dam Reach, 2019–2020.

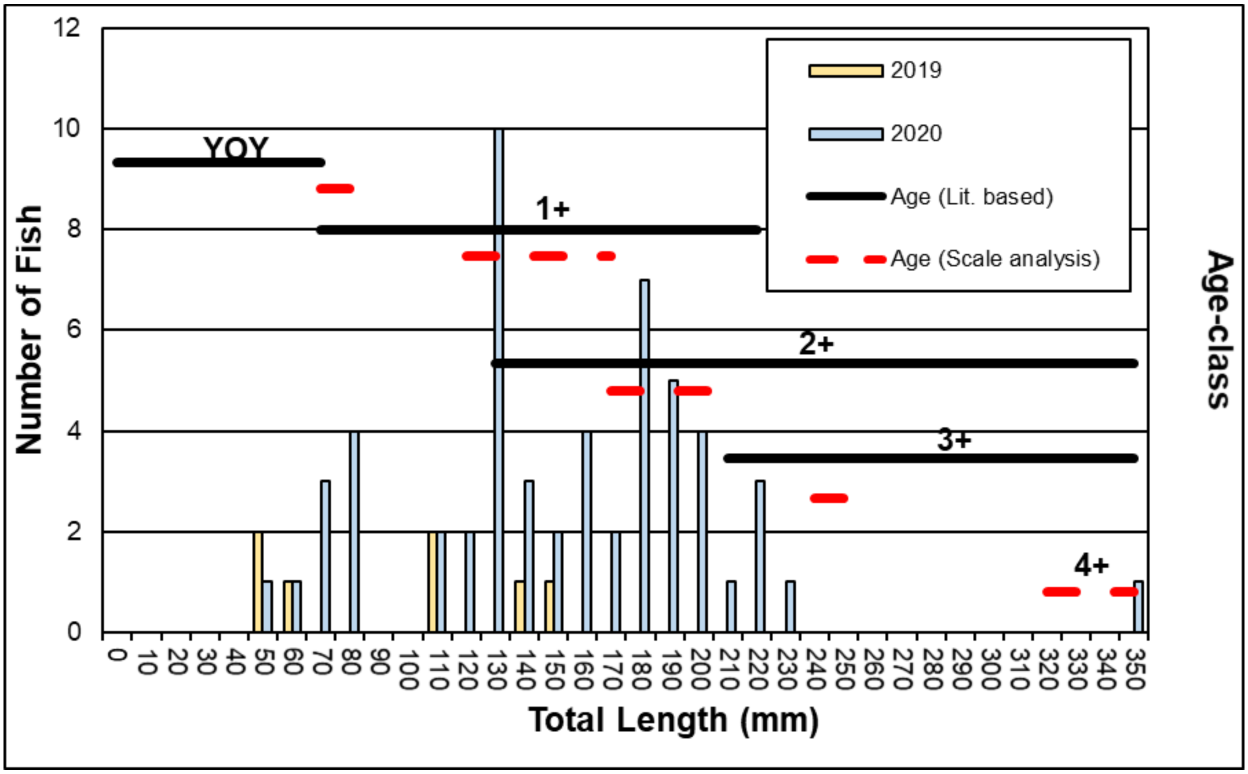


Figure 2-17. Length-frequency and age-class distribution of brown trout at Site LLD-F3, Gerle Creek, Loon Lake Dam Reach, 2019–2020.

2.3.5 Site LLD-F2

Site LLD-F2 is located at the confluence of Gerle Creek with Rocky Basin Creek, approximately 4 miles downstream of Site LLD-F3 and 7 miles downstream of Loon Lake Dam. The site contained long runs with intermittent riffle, pool, and glide habitat among boulder- and cobble-dominated substrate. Pool and riffle habitat increased at the site in 2020 relative to previous monitoring years. It was surveyed via electrofishing in 2002, 2003, 2004, 2019, and 2020 and was divided into upper and lower segments during sampling.

Rainbow and brown trout have been observed at this site during all monitoring years. The site transitioned back to rainbow trout dominant in 2020 after being largely brown trout dominant in 2019 (Figure 2-1). Trout density was the highest and biomass was within range of all other monitoring years, and both increased sharply from 2019 (Figure 2-18). The number of catchable trout per mile increased in 2020 from 2019 but was less than 2002–2004 (Figure 2-4).

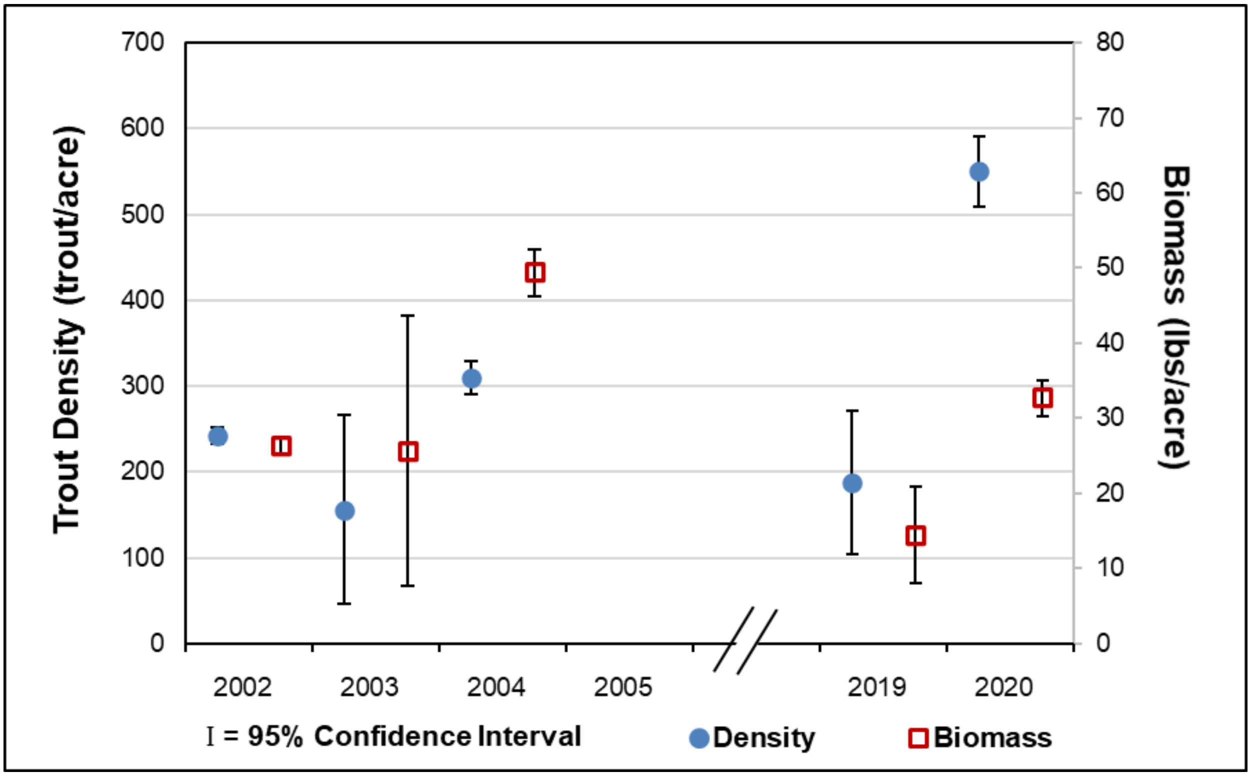


Figure 2-18. Trout density and biomass at Site LLD-F2, Gerle Creek, Loon Lake Dam Reach, 2002–2020.

Rainbow trout ranged from YOY through age 3+ in 2020. There was a typical age-class distribution, with high numbers of YOY fish followed by lesser amounts of subsequent age classes, indicating strong recruitment in 2020. Poor recruitment was observed in 2019. However, it appears there was successful survival into 2020, as shown by the typical age-class distribution of 2020. The age-class distribution was flat across the 2002–2004 monitoring years with a lack of older age classes, indicating both limited recruitment and survival success during that time (Figure 2-19).

Brown trout belonged to the YOY through 4+ age classes in 2020. There was a relatively flat distribution of age 1+ through 4+ fish, which may be a reflection of the low recruitment observed in 2019. The length-frequency distributions of previous monitoring years, particularly 2002 and 2004, documented a more typical age-class distribution with high recruitment and survival levels into subsequent age classes (Figure 2-20).

Rainbow and brown trout were in relatively good condition (K=0.91 and 0.96, respectively), which was consistent with previous monitoring years (Table 2-3, Figures 2-5 and 2-6).

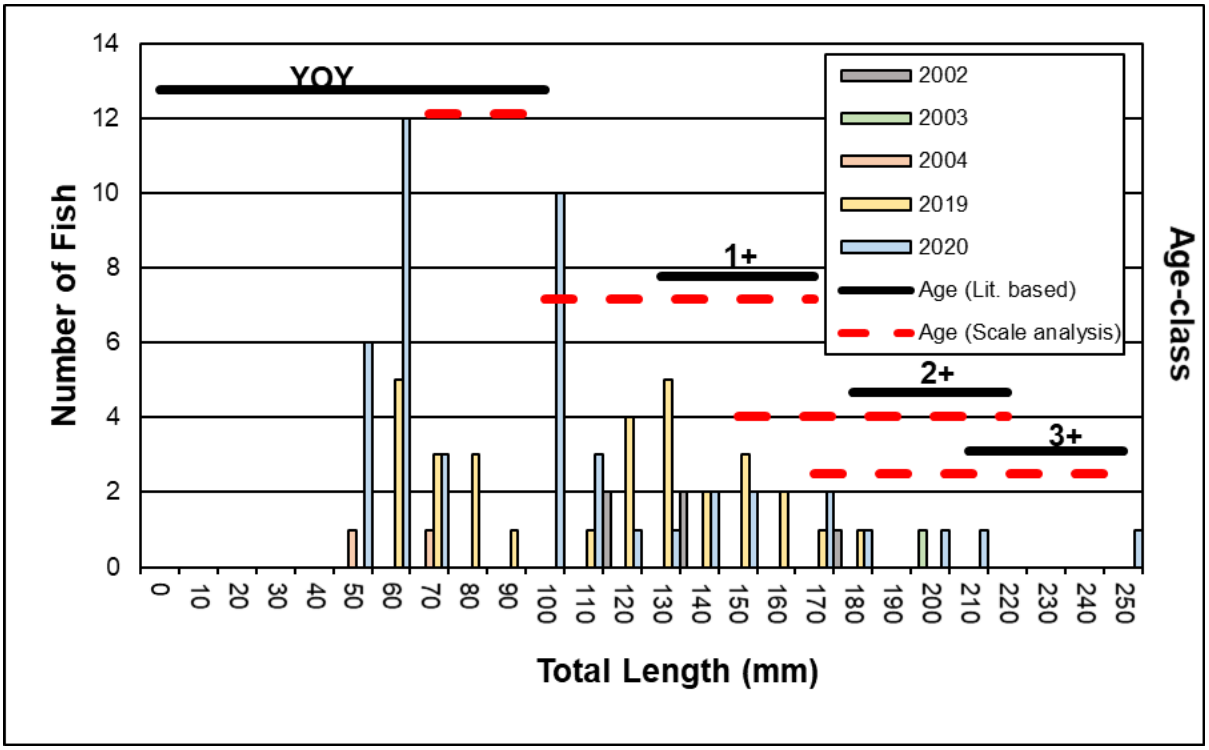


Figure 2-19. Length-frequency and age-class distribution of rainbow trout at Site LLD-F2, Gerle Creek, Loon Lake Dam Reach, 2002–2020.

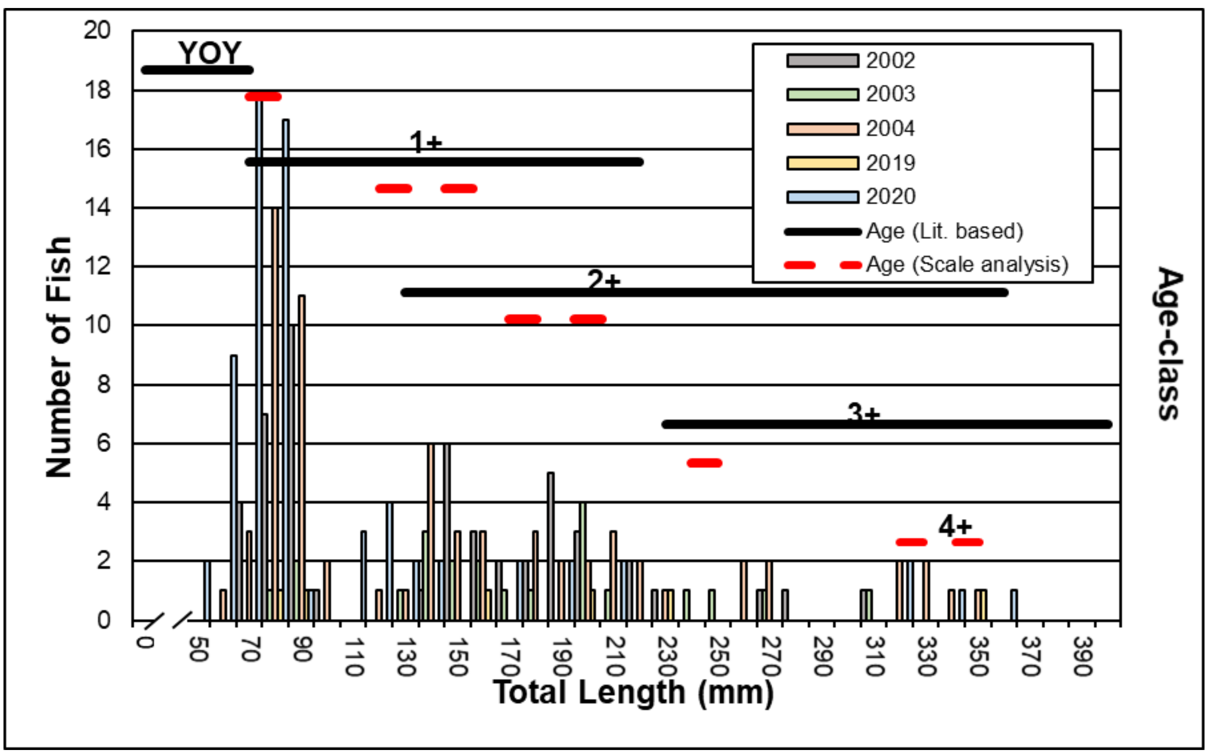


Figure 2-20. Length-frequency and age-class distribution of brown trout at Site LLD-F2, Gerle Creek, Loon Lake Dam Reach, 2002–2020.

2.3.6 Site GCD-F1

Site GCD-F1 is located approximately 1 mile downstream of Gerle Creek Dam and 0.25 miles upstream of the confluence with the South Fork Rubicon River. The site was characterized primarily by run and glide habitat and contained a large pool in the upper segment. It was surveyed via electrofishing in 2002, 2003, 2019, and 2020 and was divided into upper and lower segments during sampling.

Rainbow trout and brown trout have been the only species collected across all four survey years, with rainbow trout being the most abundant each year (Figure 2-1). Trout density in 2020 was the highest of all monitoring years, and biomass was within the range of levels observed from 2002–2019 (Figure 2-21). The number of catchable trout per mile was the lowest in 2020 of all years sampled (Figure 2-4).

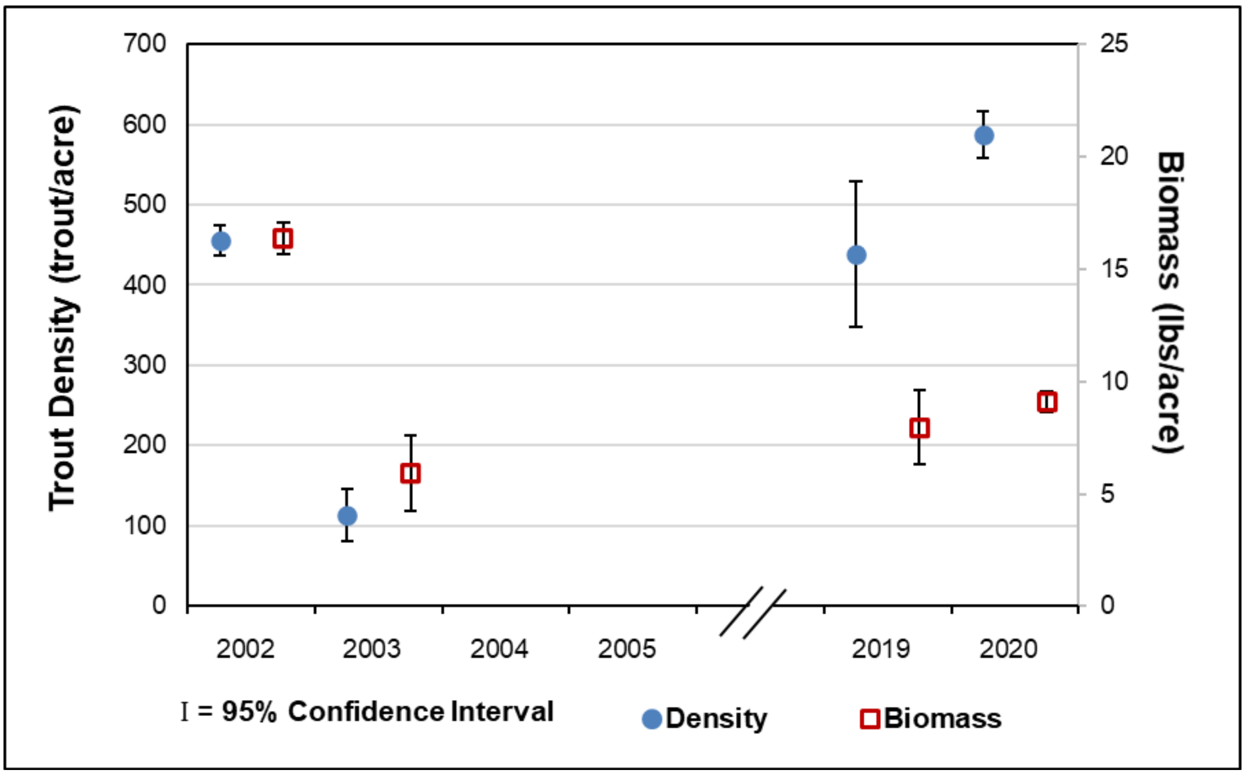


Figure 2-21. Trout density and biomass at Site GCD-F1, Gerle Creek, Gerle Creek Dam Reach, 2002–2020.

In 2020, rainbow trout ranged in age from YOY to age 3+ with a typical age-class distribution, indicating successful recruitment and survival of older age classes. Similar length-frequency distributions occurred at this site in previous sampling years (Figure 2-22). As in 2019, only one brown trout belonging to the YOY age-class was observed at Site GCD-F1 in 2020. In prior years, brown trout had a typical age-class distribution ranging up to age 3+ (Figure 2-23).

Rainbow trout were in good condition at this site and the average condition factor (K=0.90) was within range of previous survey years at this site (K= 0.82–0.99) (Figure

2-5, Table 2-3). The single brown trout observed had a condition factor of 0.84 (Table 2-3).

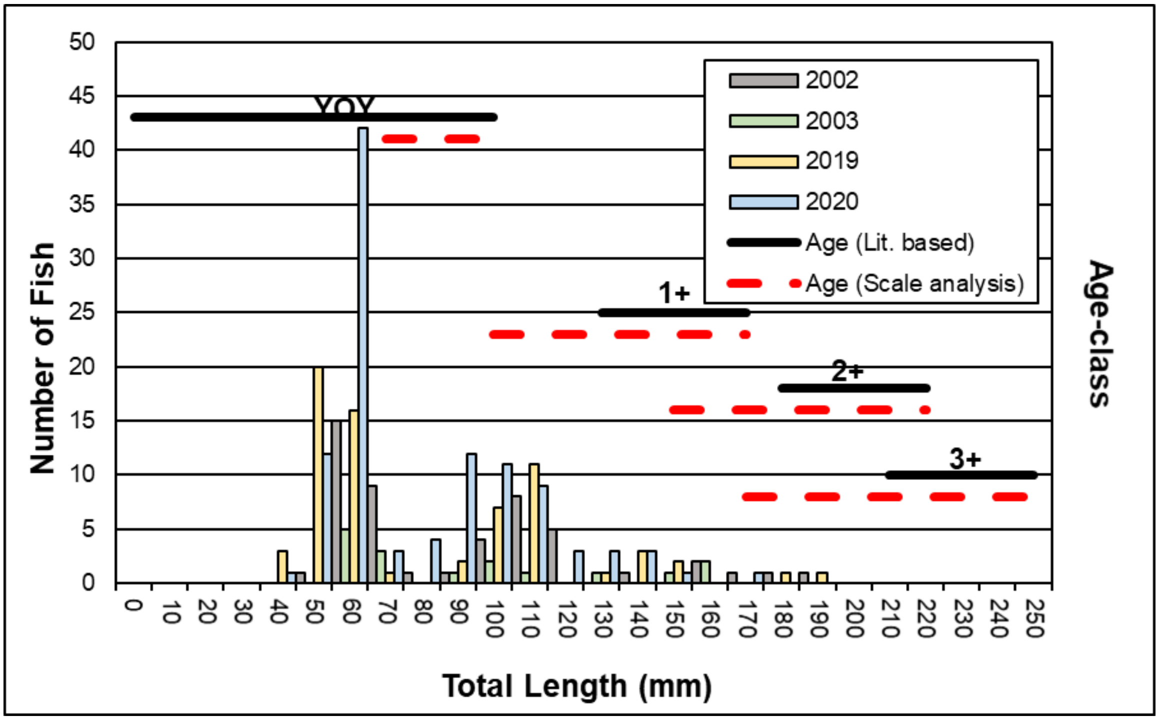


Figure 2-22. Length-frequency and age-class distribution of rainbow trout at Site GCD-F1, Gerle Creek, Gerle Creek Dam Reach, 2002–2020.

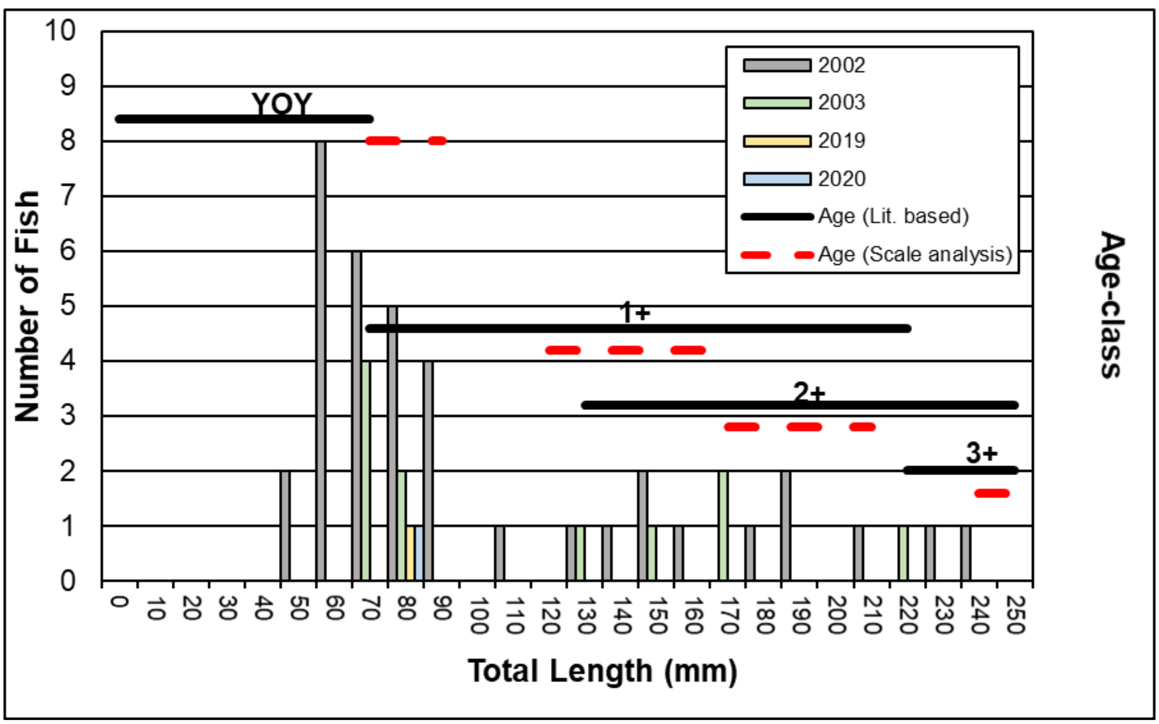


Figure 2-23. Length-frequency and age-class distribution of brown trout at Site GCD-F1, Gerle Creek, Gerle Creek Dam Reach, 2002–2020.

2.3.7 Site RPD-F1

Site RPD-F1 is located 3.5 miles downstream of Robbs Peak Dam and 0.75 miles below the confluence with Gerle Creek. It was surveyed via electrofishing in 2002, 2003, 2005, 2019, and 2020 and was divided into upper and lower segments during sampling. There was a large amount of run and glide habitat at this site, with small riffles interspersed throughout.

Rainbow trout and brown trout have been the only species observed at Site RPD-F1 in all years surveyed (Figure 2-1). Trout density increased from 2019 and was the highest across all monitoring years (Figure 2-24). Biomass was similar to that of 2019 and was slightly lower than prior years; however, biomass was in the upper range of all sites surveyed in 2020 (Figure 2-24). The number of catchable trout per mile followed a similar trend as biomass (Figure 2-4).

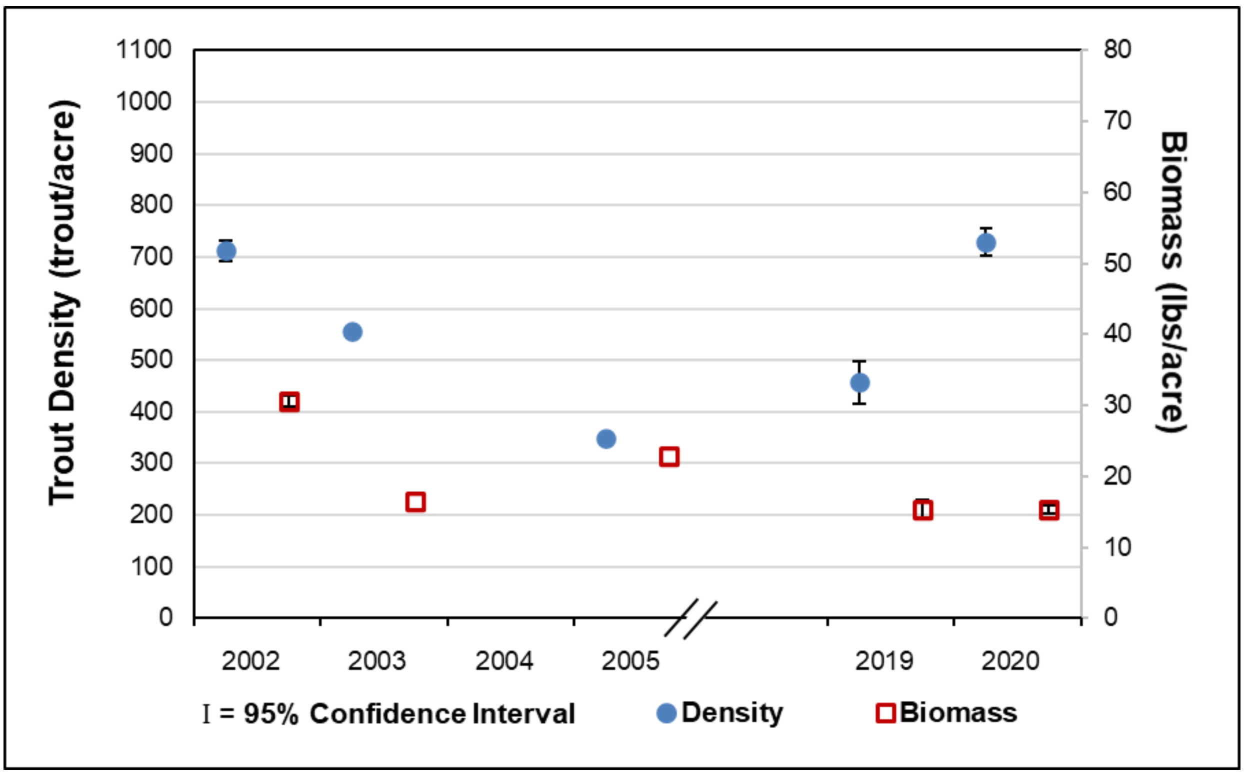


Figure 2-24. Trout density and biomass at Site RPD-F1, S.F. Rubicon River, Robbs Peak Dam Reach, 2002–2020.

Rainbow trout ranged from YOY through age 2+ in 2020 with a typical length-frequency distribution, suggesting strong recruitment and survival from previous age classes, which was similar to prior years (Figure 2-25). Brown trout ranged from YOY through age 3+ in 2020, with a flat length-frequency distribution suggesting poor recruitment compared to prior years, which had more typical distributions (Figure 2-26).

Rainbow trout and brown trout were in good condition (K=0.92 and 1.03, respectively) in 2020 (Table 2-3). Rainbow trout condition was higher than in 2019 but slightly lower than in previous sampling years, whereas brown trout were of similar condition (K=1.03) to prior years (Figures 2-5 and 2-6).

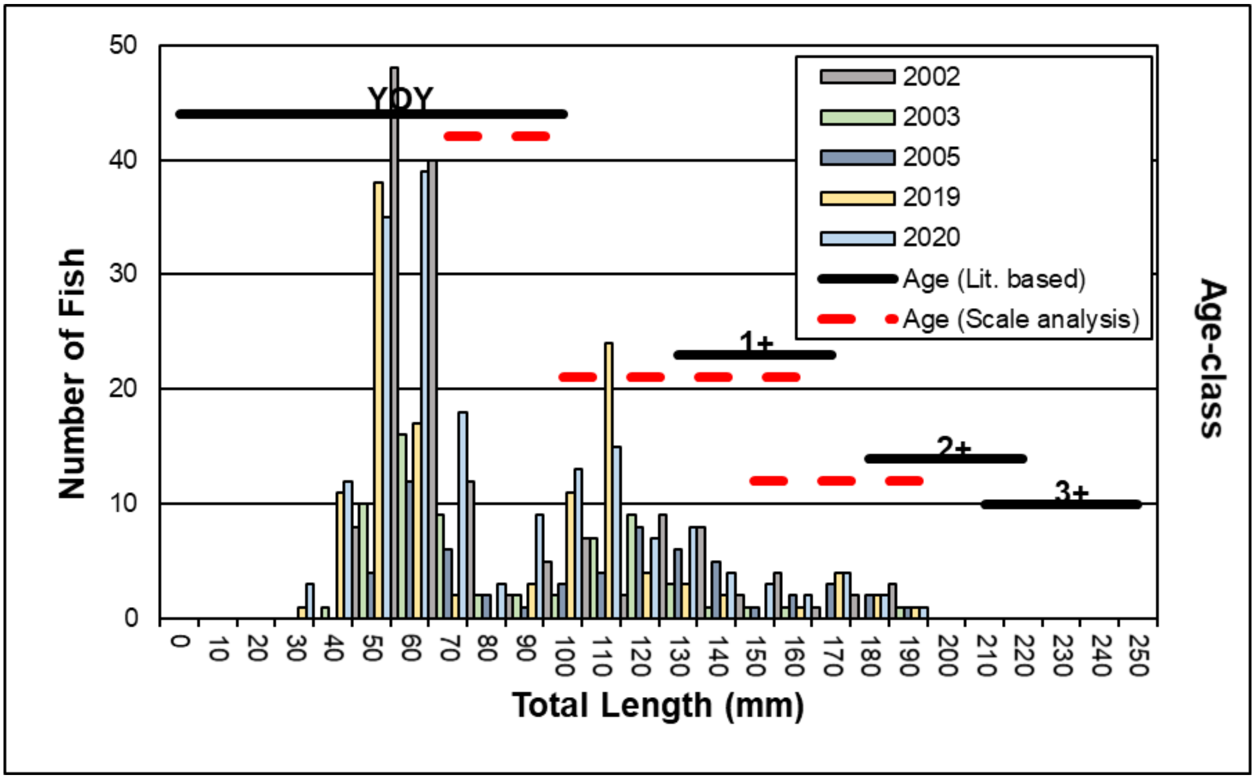


Figure 2-25. Length-frequency and age-class distribution of rainbow trout at Site RPD-F1, S.F. Rubicon River, Robbs Peak Dam Reach, 2002–2020

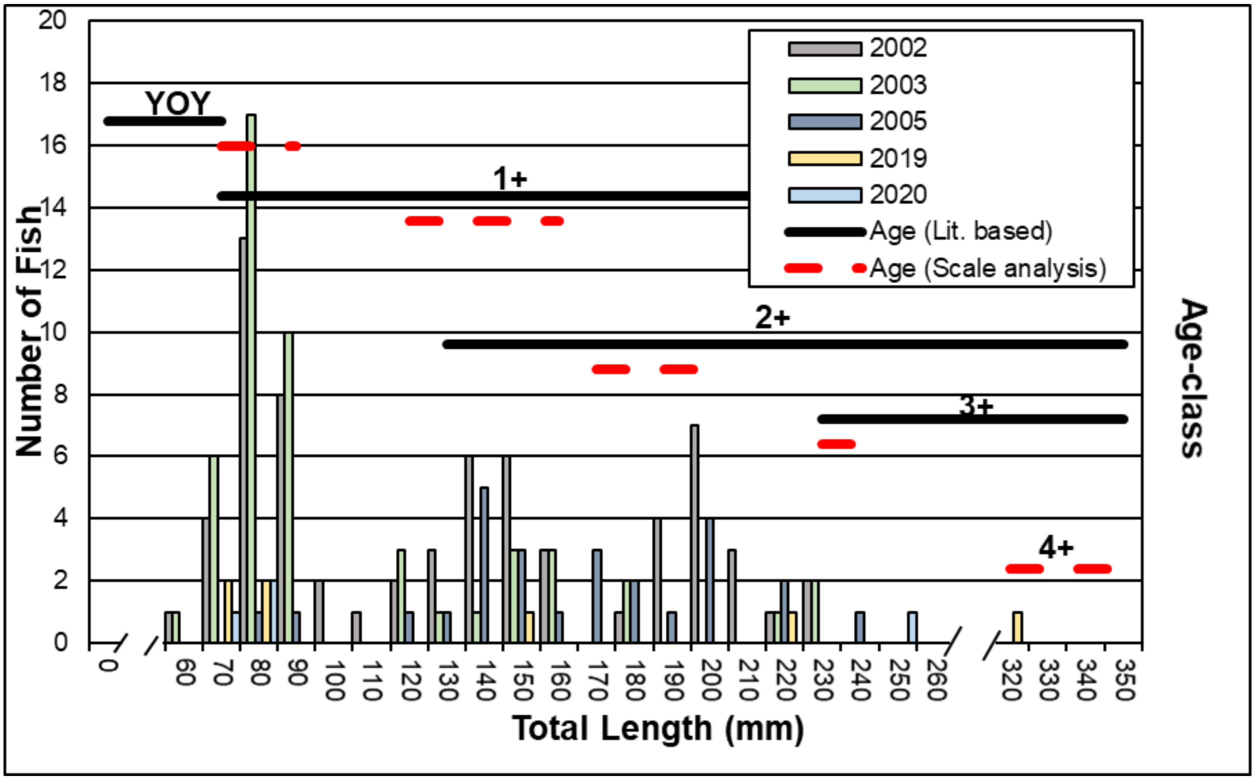


Figure 2-26. Length-frequency and age-class distribution of brown trout at Site RPD-F1, S.F. Rubicon River, Robbs Peak Dam Reach, 2002–2020.

2.3.8 Site IHD-F1

Site IHD-F1 is located approximately 0.25 miles downstream of Silver Creek Campground and 2.0 miles downstream of Ice House Dam. The site contained run and glide habitat with some riffles and pools. The site was split into two segments during sampling and surveyed via electrofishing in 2002, 2003, 2004, 2019, and 2020.

Rainbow trout and brown trout have been the only species observed across all survey years, and rainbow trout was consistently the more abundant of the two (Figure 2-1). Trout density was relatively similar among survey years (Figure 2-2), but trout biomass and the number of catchable trout per mile were the lowest of all years surveyed (Figures 2-4 and 2-27).

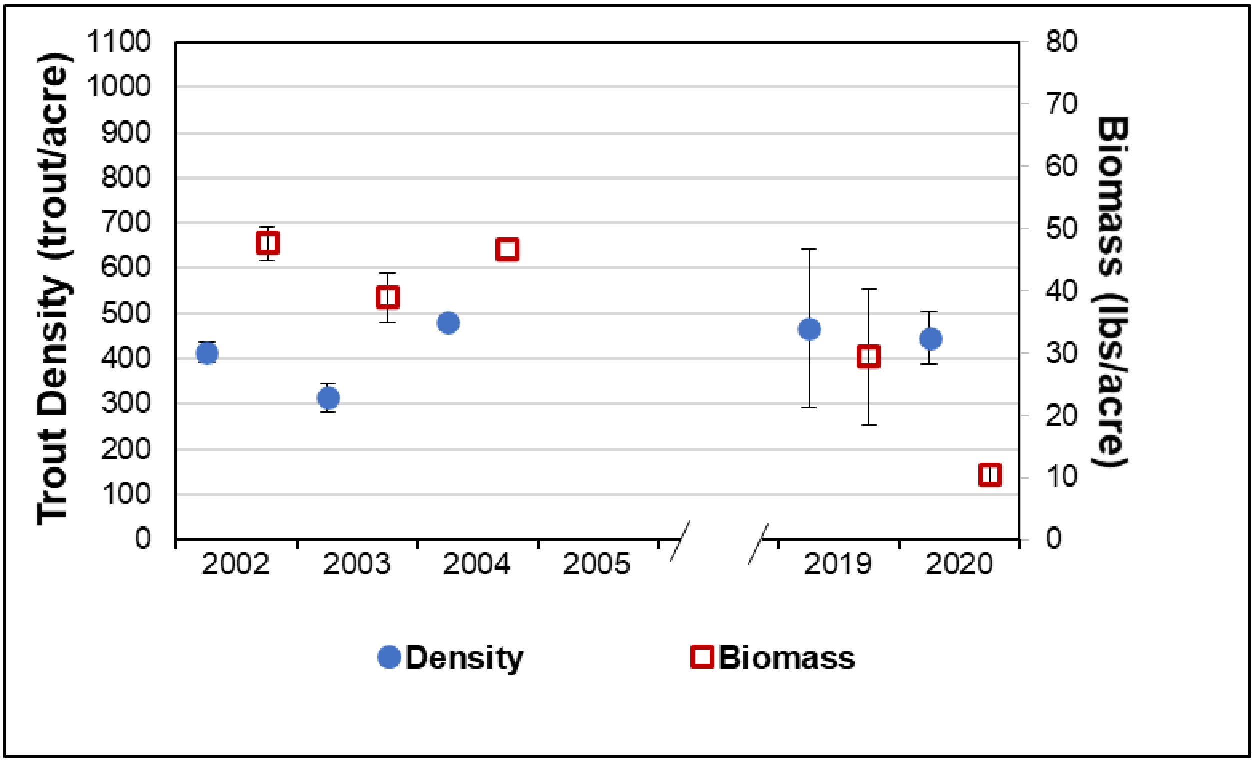


Figure 2-27. Trout density and biomass at Site IHD-F1, S.F. Silver Creek, Ice House Dam Reach, 2002–2020.

Rainbow trout ranged from YOY through age 2+ in 2020. There was a typical age-class distribution with a large number of YOY, pointing to strong recruitment in 2020 (Figure 2-28). Only seven brown trout were observed in 2020, and all belonged to the 1+ and 2+ age classes. The absence of a YOY age class in 2020 and the relatively flat age-class structure across all years indicate limited brown trout recruitment (Figure 2-29).

The condition of rainbow and brown trout (K=0.92 and 1.01, respectively) suggests that trout were in good condition in 2020 (Table 2-3, Figures 2-5 and 2-6).

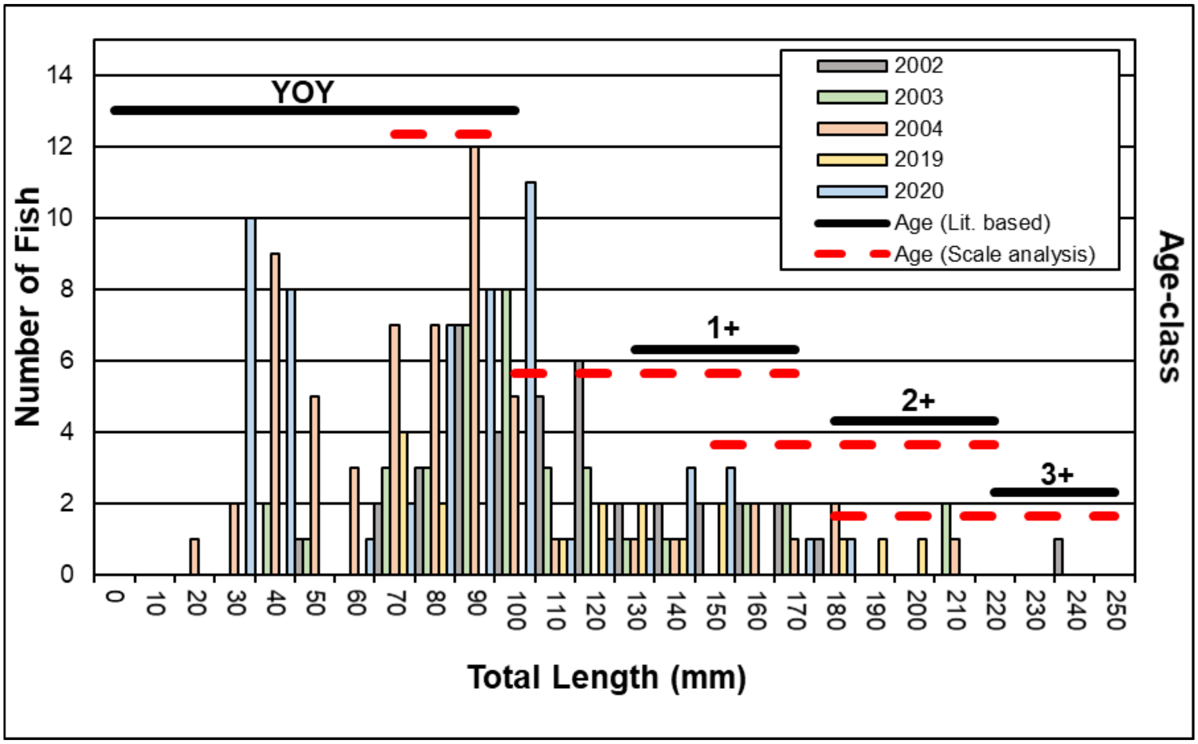


Figure 2-28. Length-frequency and age-class distribution of rainbow trout at Site IHD-F1, S.F. Silver Creek, Ice House Dam Reach, 2002–2020.

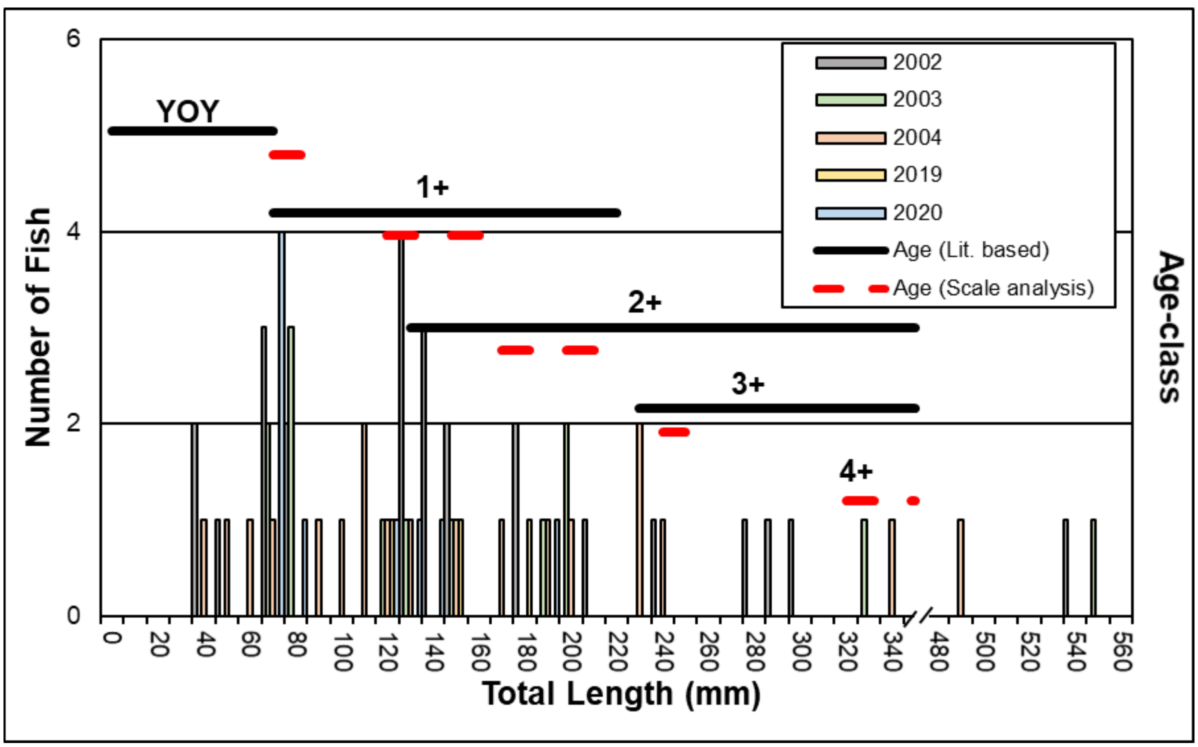


Figure 2-29. Length-frequency and age-class distribution of brown trout at Site IHD-F1, S.F. Silver Creek, Ice House Dam Reach, 2002–2020.

2.3.9 Site IHD-F2

Site IHD-F2 is located 7.5 miles downstream of Ice House Dam. There was a large amount of run and glide habitat with several riffles interspersed throughout. The substrate was composed mostly of bedrock with smaller amounts of boulder and cobble. The site was split into two segments during electrofishing in 2002, 2003, 2004, 2019, and 2020.

Rainbow trout, brown trout, and Sacramento sucker were observed during all five survey years. This site has transitioned from being Sacramento sucker dominant to trout dominant between the 2002–2004 and 2019–2020 survey years, with brown trout being in greatest abundance the past two years (Figure 2-1). Trout density greatly increased in 2020, while biomass and the number of catchable trout were slightly higher than previous survey years (Figures 2-2, 2-3, 2-4 and 2-30). The number of catchable trout per mile was the highest of all years surveyed (Figure 2-4).

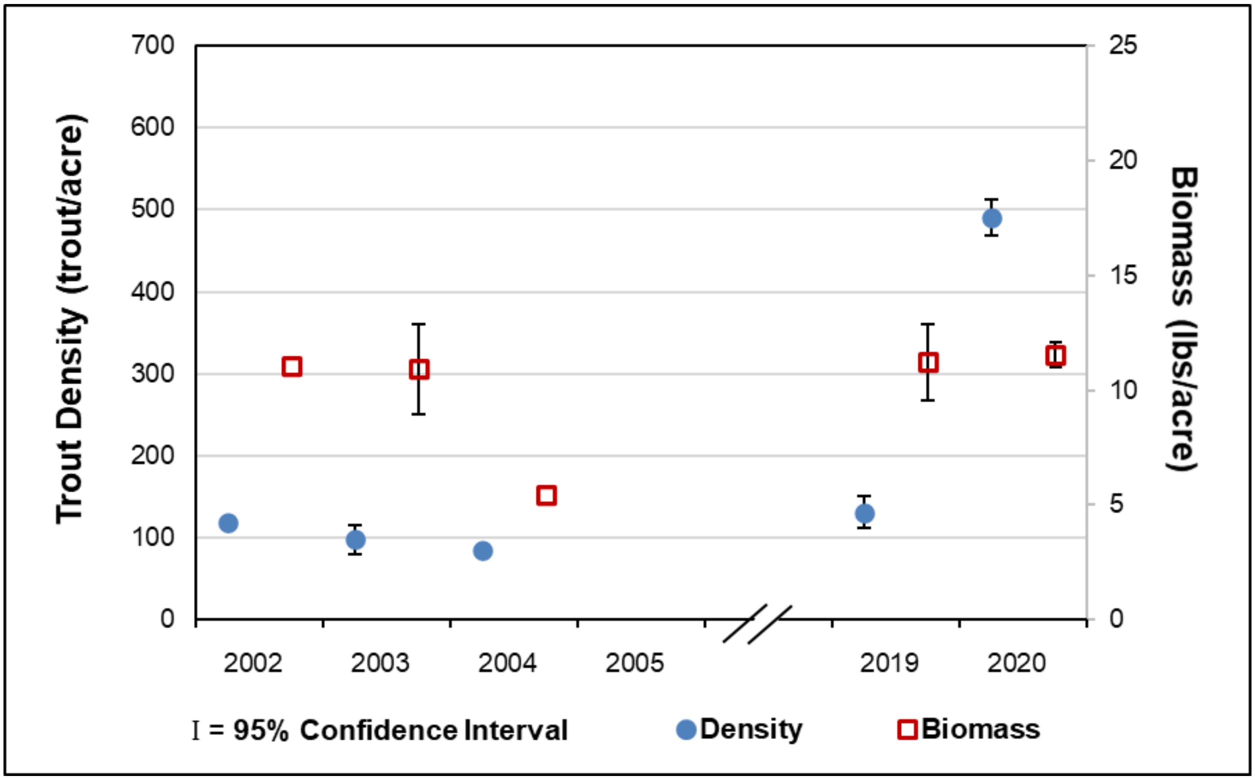


Figure 2-30. Trout density and biomass at Site IHD-F2, S.F. Silver Creek, Ice House Dam Reach, 2002–2020.

Rainbow trout ranged from YOY through age 2+ in 2020 and had a typical age-class distribution, suggesting strong recruitment and survival. Previous monitoring years had distributions with higher numbers of age 1+ and 2+ than YOY, suggesting limited recruitment but moderate survival (Figure 2-31). Brown trout ranged from YOY through age 2+ and had a typical distribution, suggesting successful recruitment and strong survival of older age classes (Figure 2-32).

Rainbow and brown trout were in generally good condition at this site in 2020 (K=0.91 and 0.93, respectively) (Table 2-3, Figures 2-5 and 2-6).

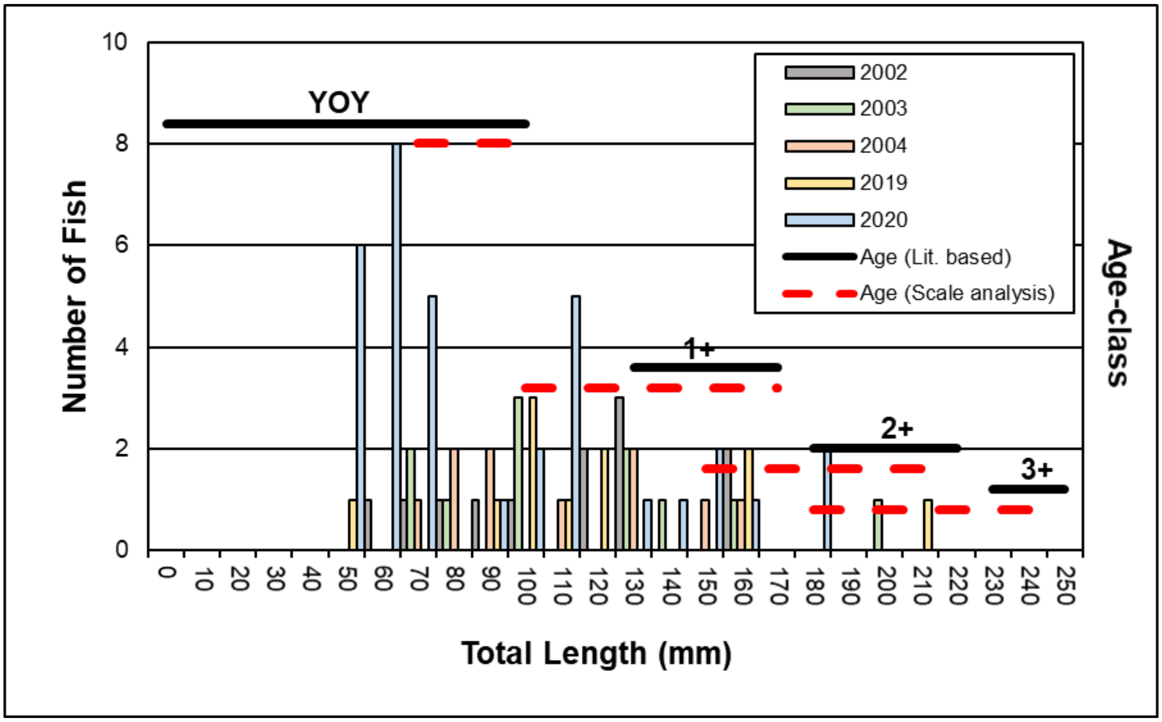


Figure 2-31. Length-frequency and age-class distribution of rainbow trout at Site IHD-F2, South Fork Silver Creek, Ice House Dam Reach, 2002–2020.

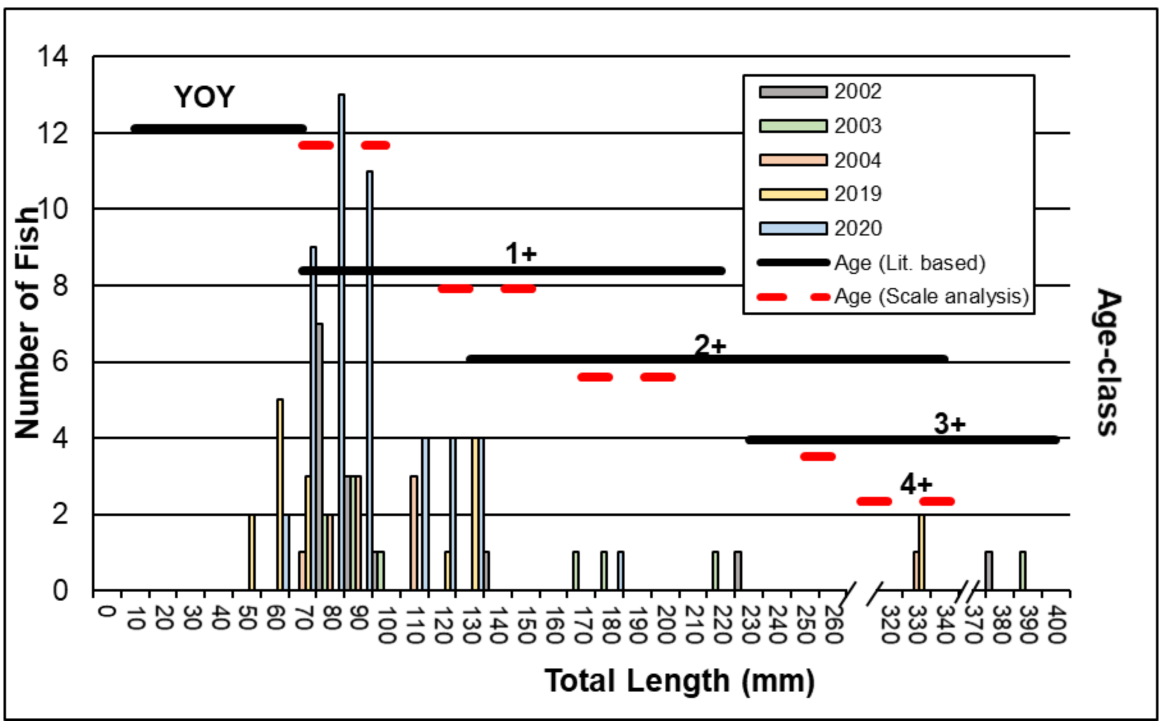


Figure 2-32. Length-frequency and age-class distribution of brown trout at Site IHD-F2, South Fork Silver Creek, Ice House Dam Reach, 2002–2020.

2.3.10 Site BCD-F1

Site BCD-F1 is located 2.0 miles downstream of Brush Creek Dam and 0.3 miles upstream of the influence of Slab Creek Reservoir. This site was surveyed by electrofishing methods in 2003, 2004, and 2020.[2] There was a large amount of run and riffle habitat with small pools interspersed, and the substrate was composed of a relatively even distribution of boulder, cobble, and gravel.

Rainbow trout and brown trout were observed during all three survey years. Trout density, biomass, and the number of catchable trout per mile were all greater than previous survey years, and density was significantly higher than all sites surveyed in 2020 (Figures 2-2, 2-4, and 2-33).

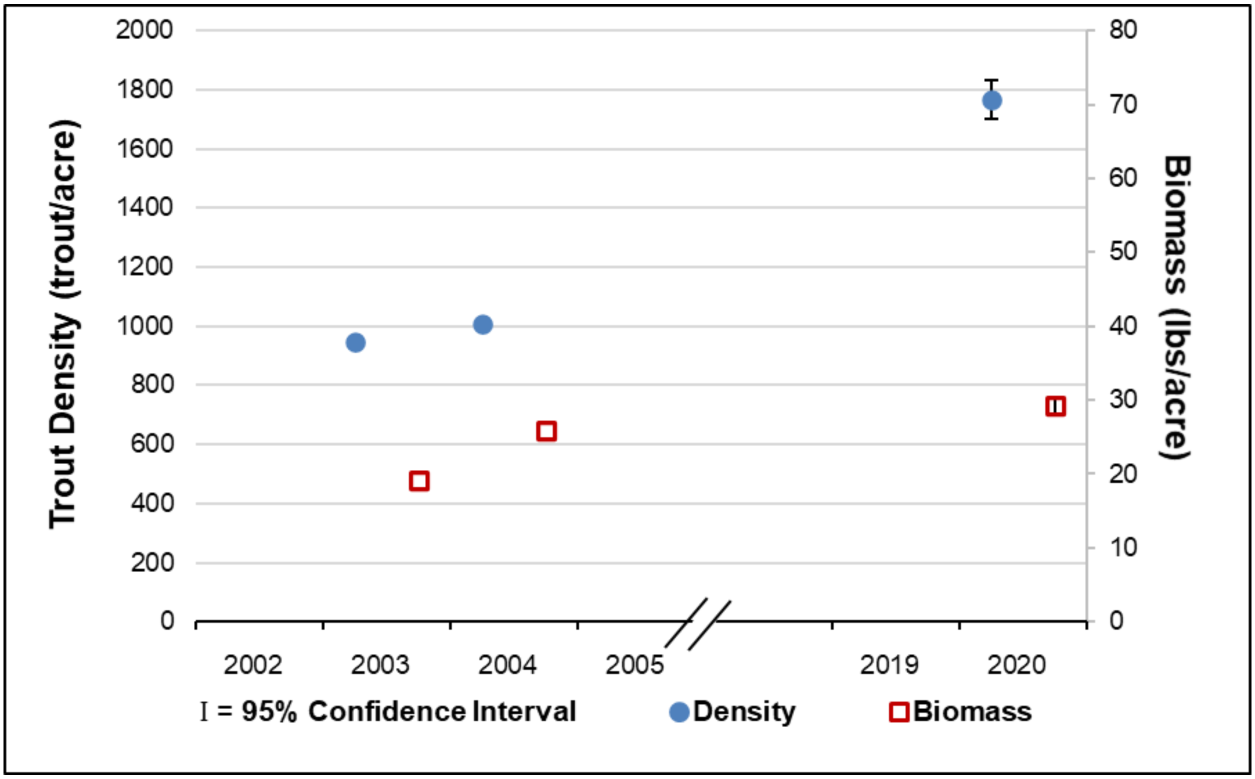


Figure 2-33. Trout density and biomass at Site BCD-F2, Brush Creek, Brush Creek Dam Reach, 2003–2020.

Rainbow trout ranged from YOY through age 3+ in 2020. There was a typical age class distribution, indicating successful recruitment and survival across age classes. Previous survey years showed similar distributions (Figure 2-34). Brown trout ranged from YOY though age 1+. Nearly all fish were YOY, indicating successful recruitment in 2020 (Figure 2-35).

[2] Per the Trout Monitoring Plan, Site BCD-F1 is surveyed once every 10 years after license issuance. Site BCD-F1 was surveyed in 2020 to complete this monitoring requirement.

Rainbow trout and brown trout condition in 2020 (K=0.87 and 0.89, respectively) were within typical range for west-slope Sierra trout, but condition factors were lower than in 2003 and 2004 (Table 2-3).

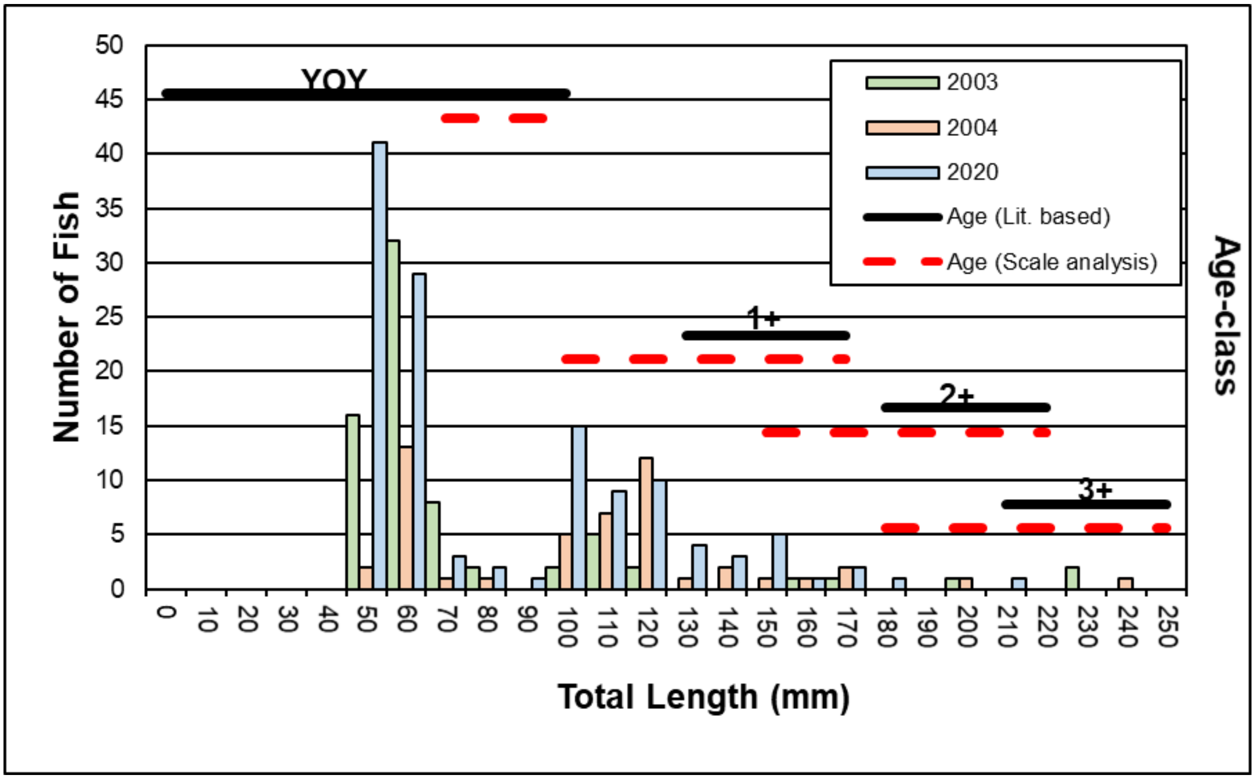


Figure 2-34. Length-frequency and age-class distribution of rainbow trout at Site BCD-F1, Brush Creek, Brush Dam Reach, 2003–2020.

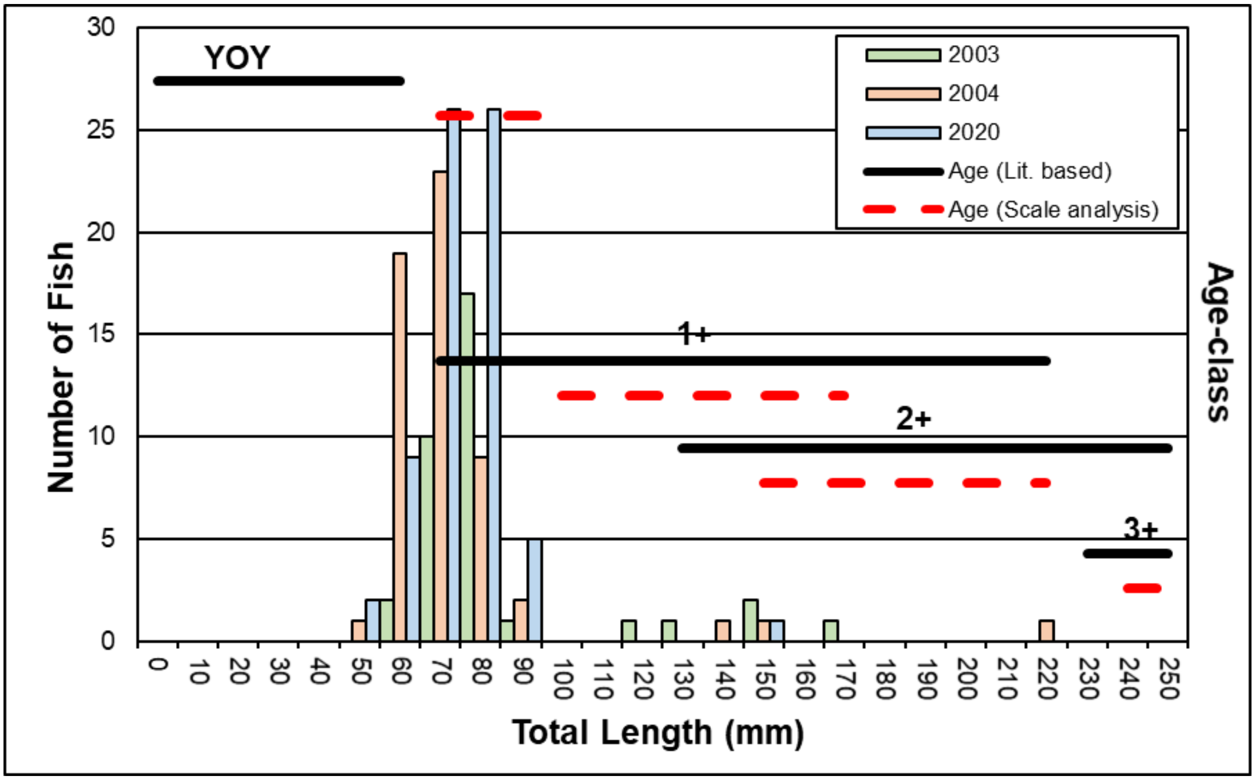


Figure 2-35. Length-frequency and age-class distribution of brown trout at Site BCD-F1, Brush Creek, Brush Dam Reach, 2003–2020.

2.3.11 Site JD-F3

Site JD-F3 was sampled for the second time in 2020. It replaced Site JD-F1, which is located on private land with restricted access. Site JD-F3 is a reasonable substitute because it exhibits characteristics of other transitional sections in the reach and is on public land where access is available.

Site JD-F3 is located on Silver Creek, approximately 3.5 miles downstream of Junction Dam. It is split into four habitat units that were surveyed by snorkel methods in 2019 and 2020. The habitat units consisted of a run; a high-gradient riffle; a long, deep pool; and a long, split-channel riffle.

Rainbow trout and brown trout were observed at this site in 2020, with rainbow trout observed in greater numbers. No fish were observed during snorkel surveys at this site in 2019. A river otter was observed foraging within the site during the 2019 snorkel survey, which likely influenced the results. The estimated minimum trout density was similar to that of Site CD-F1, located on Silver Creek downstream of Site JD-F3, and the number of catchable trout per mile was comparable to other sites sampled via snorkel methods in 2020 (Figures 2-2 and 2-4)

Rainbow trout ranged from YOY through Age 3+ during the 2020 survey. There was a typical age-class distribution, indicating strong recruitment and high survival through age classes (Figure 2-36). Brown trout ranged from YOY through age 3+. There was a typical age distribution between YOY and Age 1+ fish, indicating strong recruitment in 2020 and survival from 2019. There were no Age 2+ fish and a small number of Age 3+ fish observed in 2020, which suggests poor recruitment and/or survival in 2017 and 2018 (Figure 2-37).

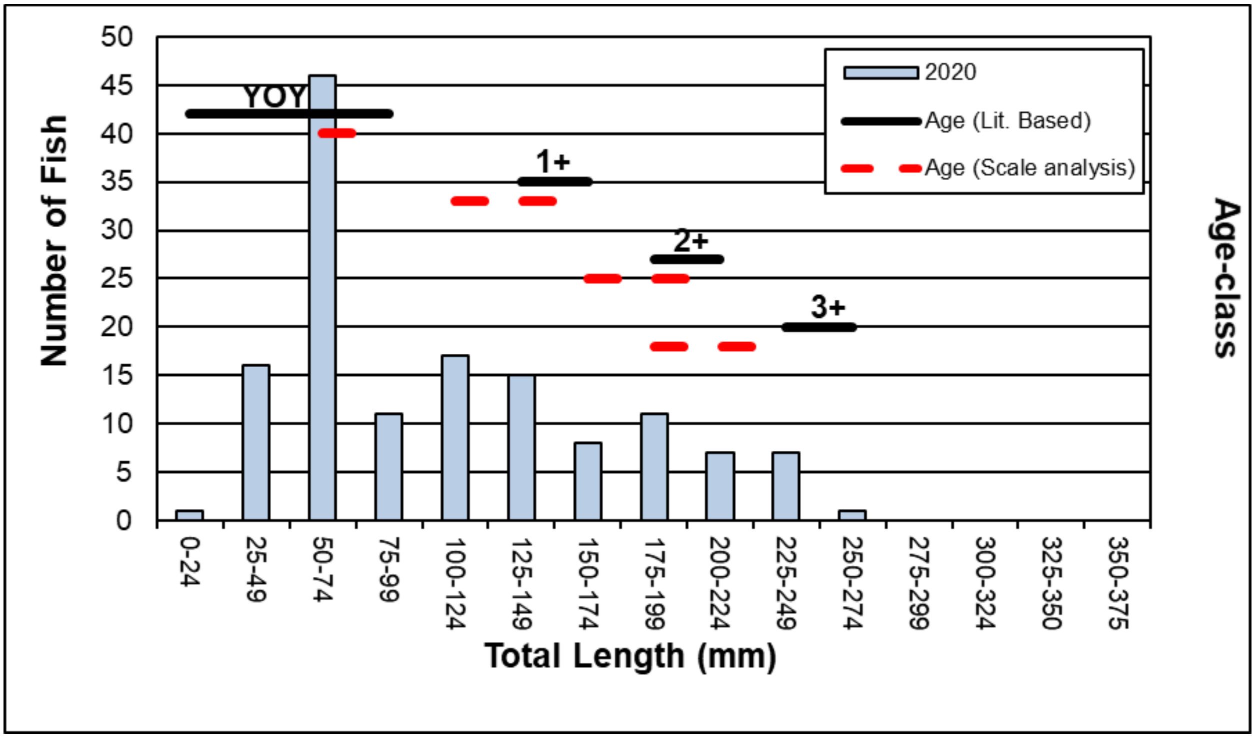


Figure 2-36. Length-frequency and age-class distribution of rainbow trout at Site JD-F3, Silver Creek, Junction Dam Reach, 2020.

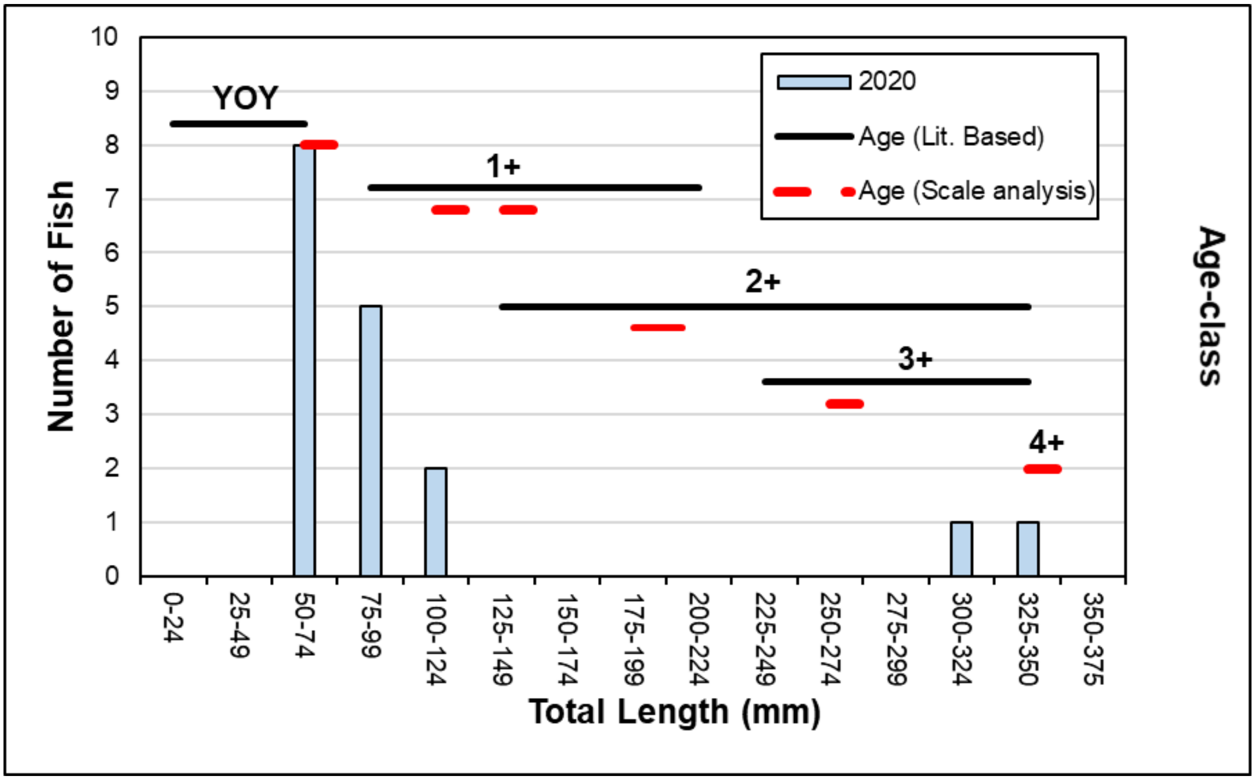


Figure 2-37. Length-frequency and age-class distribution of brown trout at Site JD-F3, Silver Creek, Junction Dam Reach, 2020.

2.3.12 Site CD-F1

Site CD-F1 was surveyed via snorkel methods in 2002, 2019, and 2020. It is located on Silver Creek, approximately 0.5 miles downstream of Camino Dam, and consisted of seven habitat units (all pool and riffle).

Rainbow trout were the only species observed at this site in 2019 and 2020; in 2002, brown trout were also observed. The estimated minimum trout density was less than what was observed in 2019; however, increased relative to 2002 (Figures 2-2 and 2-4). Rainbow trout age classes ranged from YOY through age 3+, and the age-class distribution was similar to 2019. Age 1+ fish had the greatest representation among all age classes, which could indicate poor recruitment. However, habitat at this site (larger pools and riffles) would favor older age classes, and YOY fish are more difficult to observe in larger rivers during snorkel surveys. Length-frequency was distributed more evenly in 2002 among the YOY through 3+ age classes, although the number of trout observed was low (Figure 2-38).

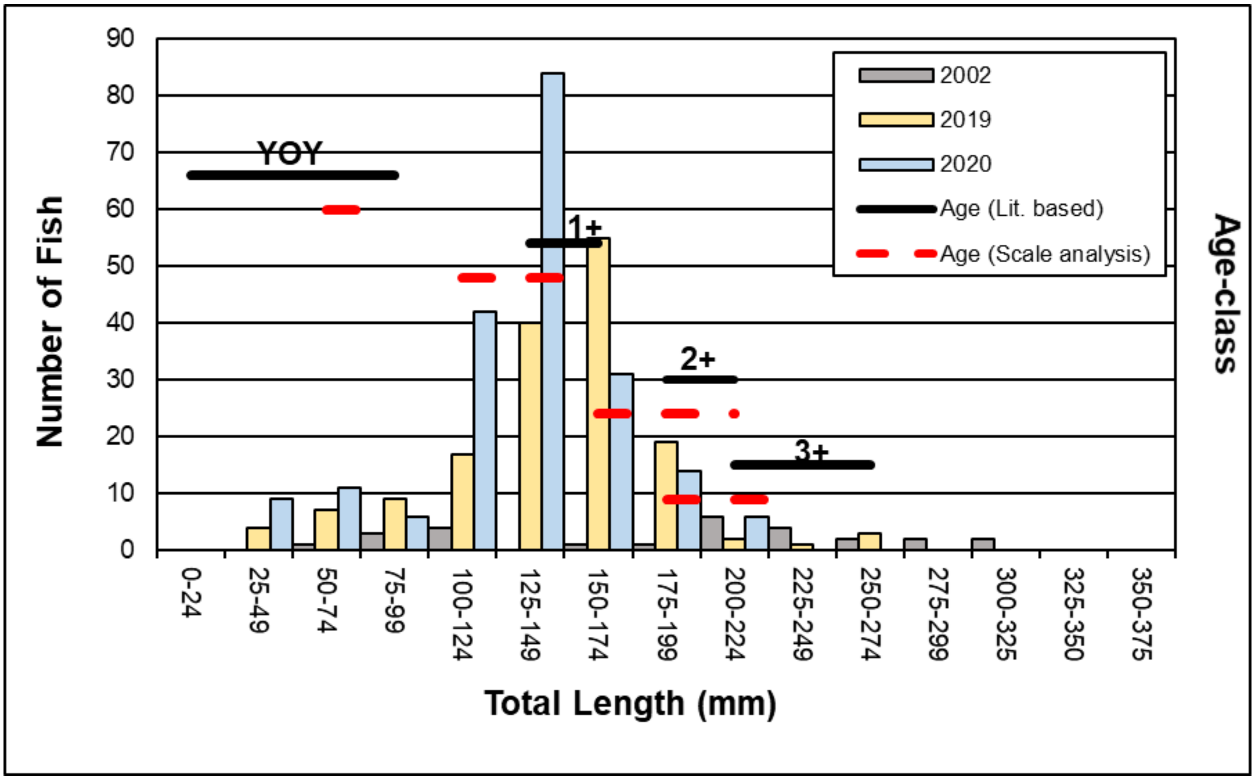


Figure 2-38. Length-frequency and age-class distribution of rainbow trout at Site CD-F1, Silver Creek, Camino Dam Reach, 2002–2020.

2.3.13 Site SCD-F3

The USFS 4(e) Condition No. 14 for the Slab Creek Flow Facility Project License Amendment (USFS 2015) specified that a new sampling site be established on the South Fork American River (SFAR) in the 0.25-mile reach between Slab Creek Dam and the proposed Slab Creek Flow Facility. Site SCD-F3 was located immediately downstream of the plunge pool below Slab Creek Dam and was surveyed for the first time in 2019 via snorkel methods; it was surveyed again using snorkel methods in 2020. The site begins at a section of pocket water just upstream of Iowa Canyon Creek and included the large, deep pool under the pedestrian bridge, as well as the high-gradient riffle and run habitat downstream of the plunge pool.

Rainbow trout, brown trout, and Sacramento pikeminnow were observed at this site in 2020, with rainbow trout being most abundant. The estimated minimum trout density was similar to 2019 and was comparable to downstream Site SCD-F2 during all monitoring years (Figure 2-2). The number of catchable trout per mile (based on snorkel observations) was slightly less than what was observed in 2019 (Figure 2-4). During 2018 channel construction activities within the site area, Sacramento sucker, Sacramento pikeminnow, hardhead (*Mylopharodon conocephalus*), and green sunfish (*Lepomis cyanellus*) were relocated from this site before dewatering (Stillwater Sciences 2018).

After completion of the snorkel survey, the margins of Site SCD-F3 were electrofished opportunistically to confirm species identification of juvenile fishes and to survey for species which may have been difficult to detect via snorkeling. Rainbow trout, Sacramento sucker, and speckled dace were captured via electrofishing; all rainbow trout belonged to the YOY age class.

Rainbow trout age classes ranged from YOY through age 3+. The 2+ and 3+ age classes had the greatest representation, suggesting strong survival from 2019 (Figure 2-39). YOY fish were observed in lesser numbers, which would suggest limited recruitment in 2020; however, snorkel methods could bias against YOY fish, as they are more difficult to observe in larger rivers.

Only two brown trout were observed in 2020, and both belonged to the 3+ age class (Figure 2-40). A lack of YOY fish and limited numbers of older age classes suggests poor recruitment and/or survival between years.

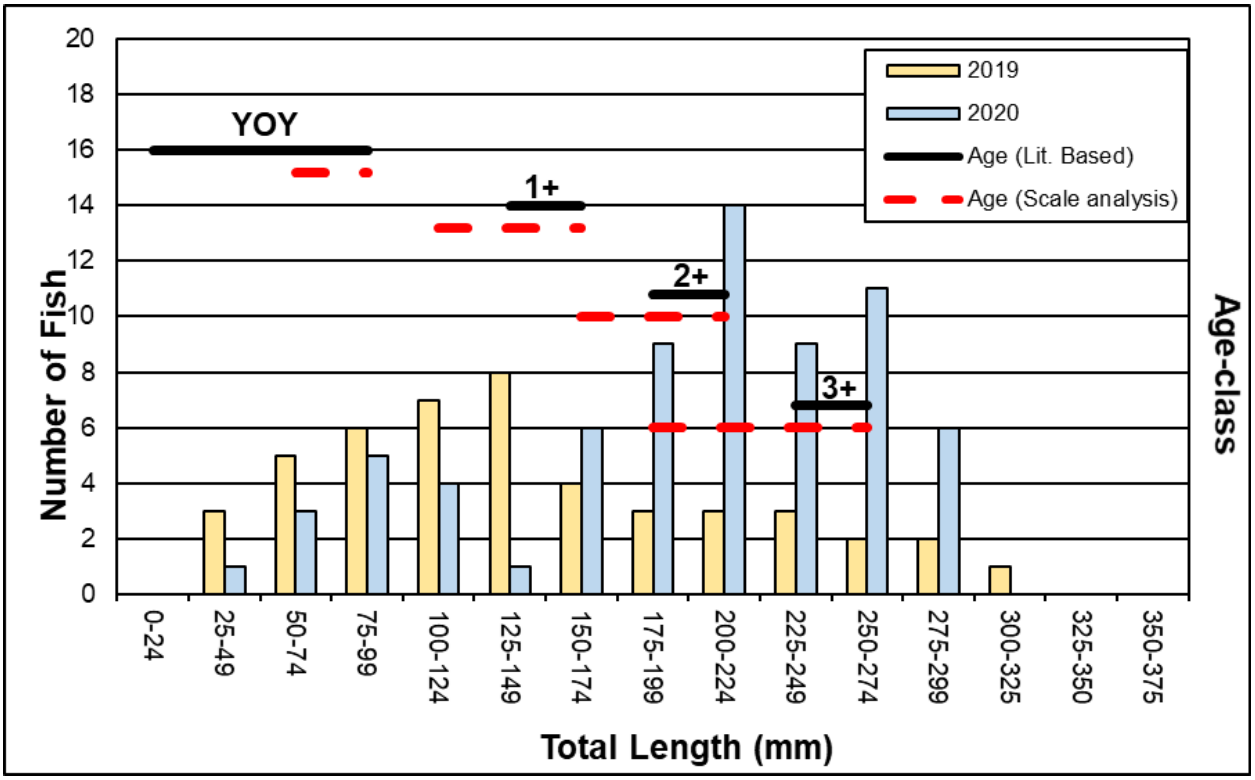


Figure 2-39. Length-frequency and age-class distribution of rainbow trout at Site SCD-F3, South Fork American River, Slab Creek Dam Reach, 2019–2020.

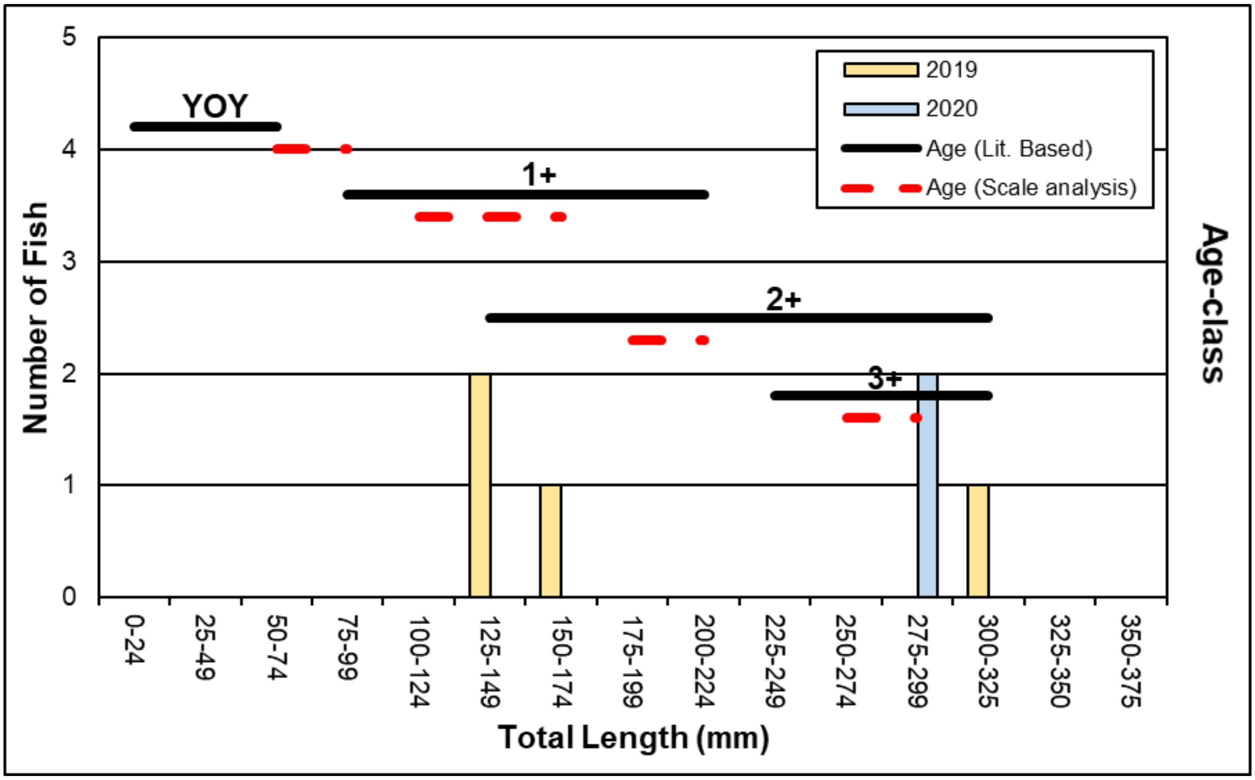


Figure 2-40. Length-frequency and age-class distribution of brown trout at Site SCD-F3, South Fork American River, Slab Creek Dam Reach, 2019–2020.

2.3.14 Site SCD-F2

Site SCD-F2 was surveyed by electrofishing in 2002 and 2003. The site was surveyed via snorkel methods in 2019 and 2020 because higher baseflows prevented effective electrofishing due to increased depths and water velocities. The site is located on the SFAR approximately 5.5 miles downstream of Slab Creek Dam and 0.2 miles upstream of the confluence with Rock Creek. It was split into five units, including two runs, two pools, and one riffle.

Species composition in 2020 was identical to 2019 and included rainbow trout, sculpin (*Cottus* spp.), Sacramento sucker, and Sacramento pikeminnow, with rainbow trout being most abundant. In prior years, California roach, brown trout, hardhead, speckled dace, and smallmouth bass (*Micropterus dolomieu*) were also observed (Figure 2-1). The estimated minimum trout density and number of catchable trout per mile (based on snorkel observations) were similar to prior survey years (Figures 2-4 and 2-41). Brown trout were observed at this site during 2002 and 2003 in low numbers (n=1 and n=2, respectively) but were not observed in 2019 or 2020. After completion of the snorkel survey, the margins were electrofished opportunistically to confirm species identification and to survey for species which may have been difficult to detect via snorkeling. Five YOY Sacramento pikeminnow, six YOY Sacramento suckers, and 10 sculpin spp. were observed during electrofishing.

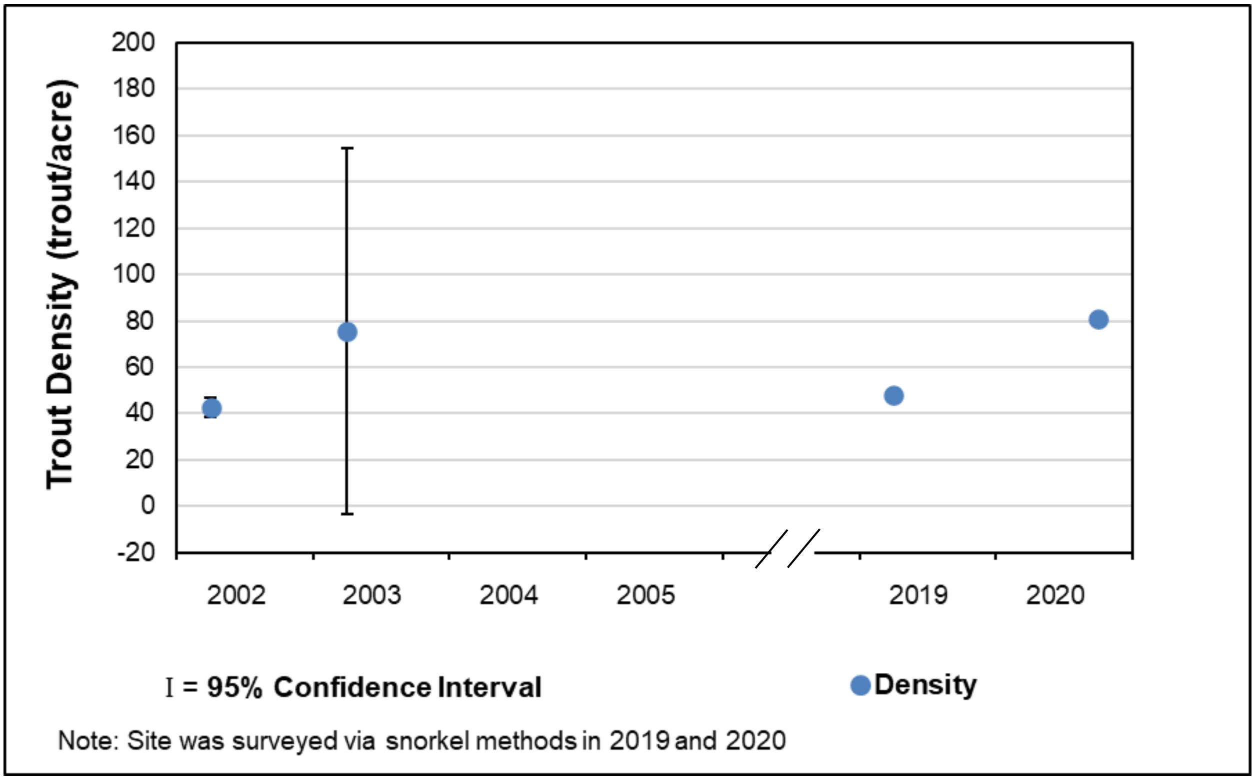


Figure 2-41. Trout density at Site SCD-F2, South Fork American River, Slab Creek Dam Reach, 2002–2020.

Rainbow trout age classes ranged from YOY through age 3+. The length-frequency distribution was atypical, with the highest number of fish belonging to the 2+ and 3+ age classes. This suggests poor recruitment in 2020, high survival of older age classes, and low survival of 2019 YOY rainbow trout, although YOY fish can be difficult to observe in larger rivers during snorkel surveys (Figure 2-42).

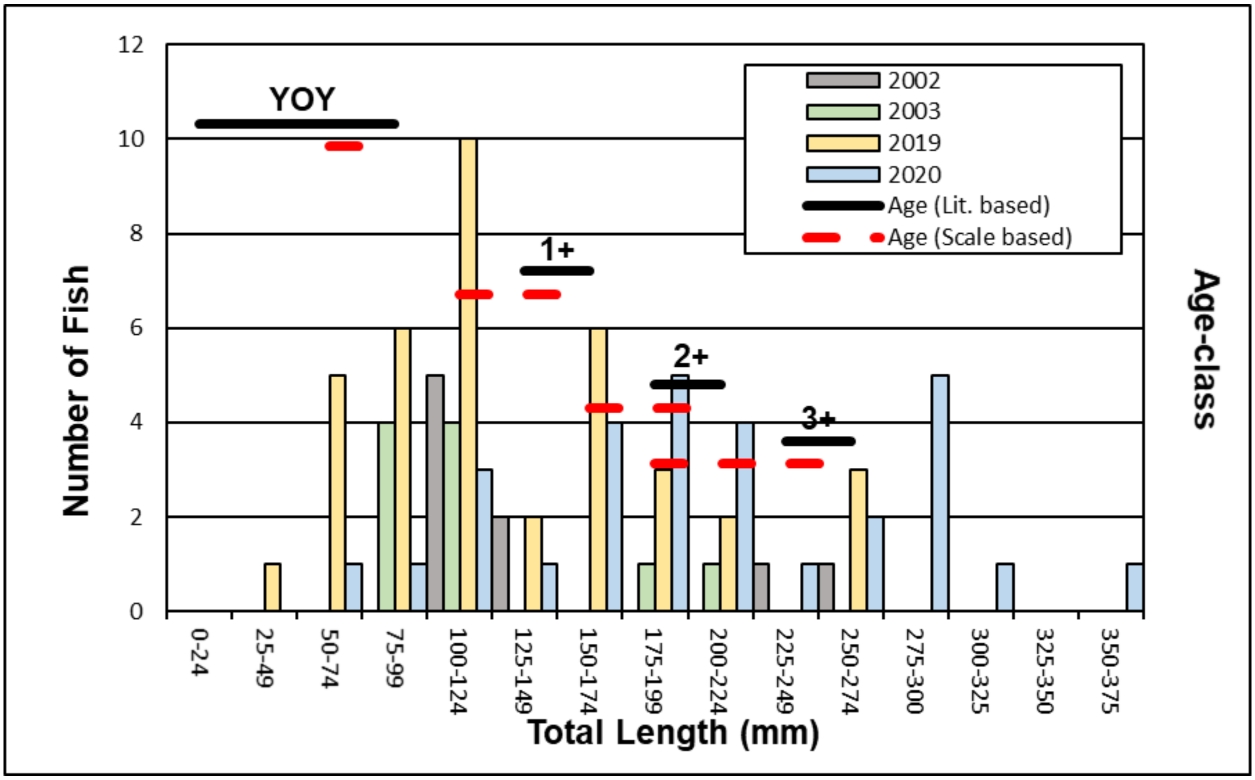


Figure 2-42. Length-frequency and age-class distribution of rainbow trout at Site SCD-F2, South Fork American River, Slab Creek Dam Reach, 2002–2020.

2.4 DISCUSSION

Fish species richness was lower throughout the UARP in 2020 compared to the 2002–2005 pre-license monitoring years, although results varied on a site-by-site basis. Species richness decreased from 12 species documented during the 2002–2005 surveys to 8–9 species during the 2019 and 2020 surveys[3] (Table 2-1, Figure 2-43). Decreases in species richness were particularly evident in the Rubicon River Dam and Slab Creek Dam reaches. The total number of species observed at Site RRD-F2 in the Rubicon River Dam Reach ranged from 6 species during the 2002–2005 survey period to 4 species during 2019–2020 (Table 2-1, Figure 2-1). At Site SCD-F2 in the Slab Creek Dam Reach, the total number of species observed ranged from 9 during the 2002–2005 survey period to 4 during 2019–2020 (Table 2-1, Figure 2-1).[4]

[3] Species richness was essentially the same during the 2019 and 2020 surveys; the 9th species documented in 2019 was an unidentified sunfish, of which only a single individual was observed during a snorkel survey at Site SCD-F3 (Figure 2-1).

[4] The Slab Creek Dam Reach was surveyed via electrofishing in 2002–2005 and snorkeling in 2019–2020, which may have affected the number of species observed.

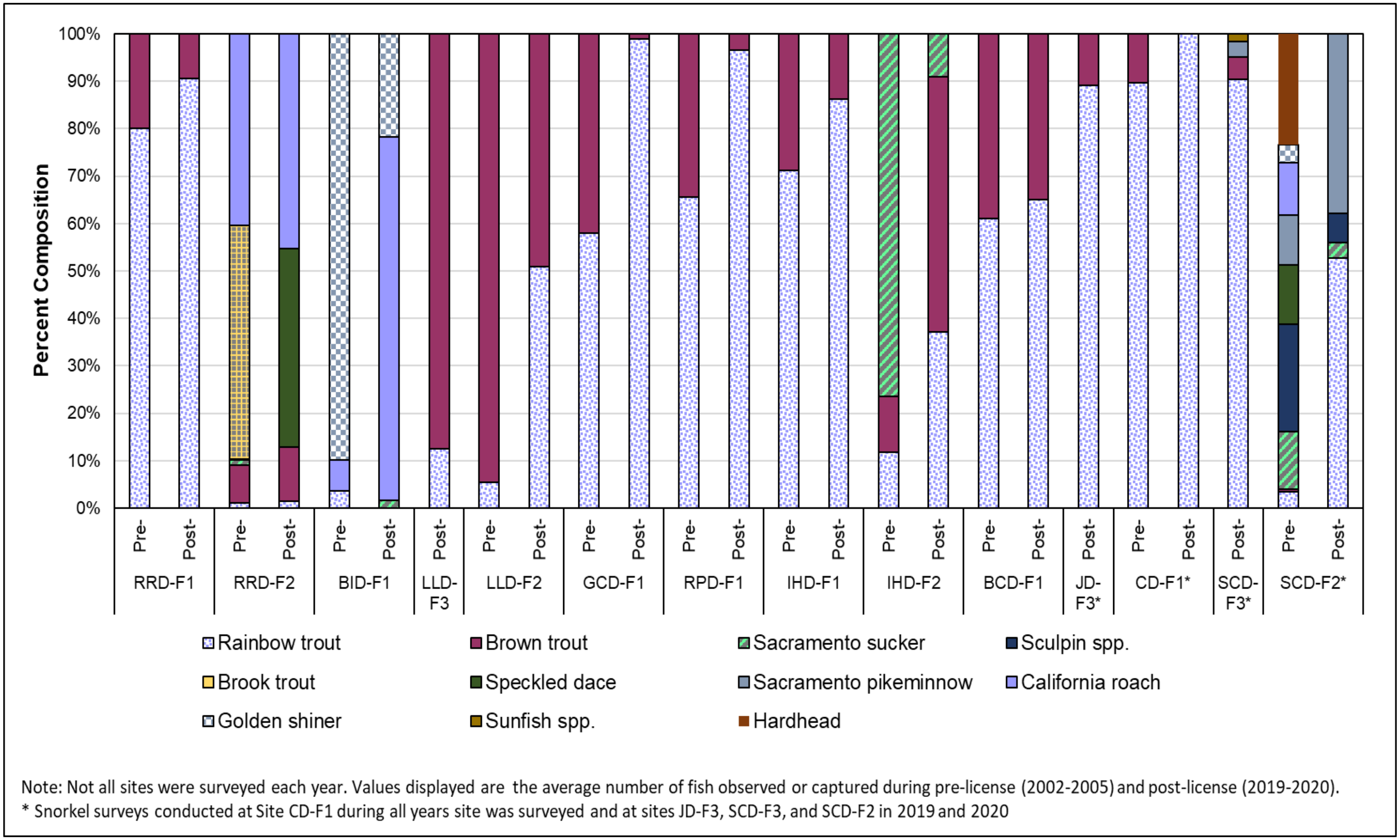


Figure 2-43. Average fish species composition among UARP trout monitoring sites pre-license (2002-2005) and post-license (2019–2020).

Trout populations varied across reaches in 2020 relative to previous surveys. Trout density increased at most sites in 2020 compared to 2019, particularly those located at the upper and mid-elevations; eight sites had the highest densities of all survey years (Figure 2-2). Sites located in the upper elevation reaches (sites RRD-F1, RRD-F2, LLD-F3, and LLD-F2) showed the greatest increase in density in 2020; sites located in the mid-elevation reaches (sites GCD-F1, RPD-F1, IHD-F1, and IHD-F2) showed moderate increases; and sites within the lower elevation reaches (sites JD-F3, CD-F1, BCD-F1, SCD-F3, and SCD-F2) either increased or were within range of previous monitoring years (Figure 2-2). Trout biomass increased across most sites in 2020 compared to 2019 (except for Site IHD-F1), although, biomass was typically within range of the pre-licensing studies (Table 2-2, Figure 2-3).

Trout populations throughout the UARP, particularly in the upper and mid-elevation sites, may have benefited from the reduction in naturally occurring peak storm runoff flows that occurred in 2020 (a Dry water year) compared to prior years. For example, in the Rubicon Dam Reach (sites RRD-F1 and RRD-F2), trout density was lowest among all survey years in 2019 but showed a strong increase in 2020 (Figure 2-2). The magnitude and frequency of spill events during 2020 were reduced in this reach compared to 2015–2019 (Figure 2-44). One spill event occurred in 2020 with a maximum daily discharge of 148 cubic feet per second (cfs); by comparison, maximum daily discharge recorded in 2016–2018 was 1,621, 2,388, and 1,495, respectively (Figure 2-44). Multiple years of large magnitude spills between 2016 – 2018 (Figure 2-44) may have depressed recruitment and trout density in 2019.

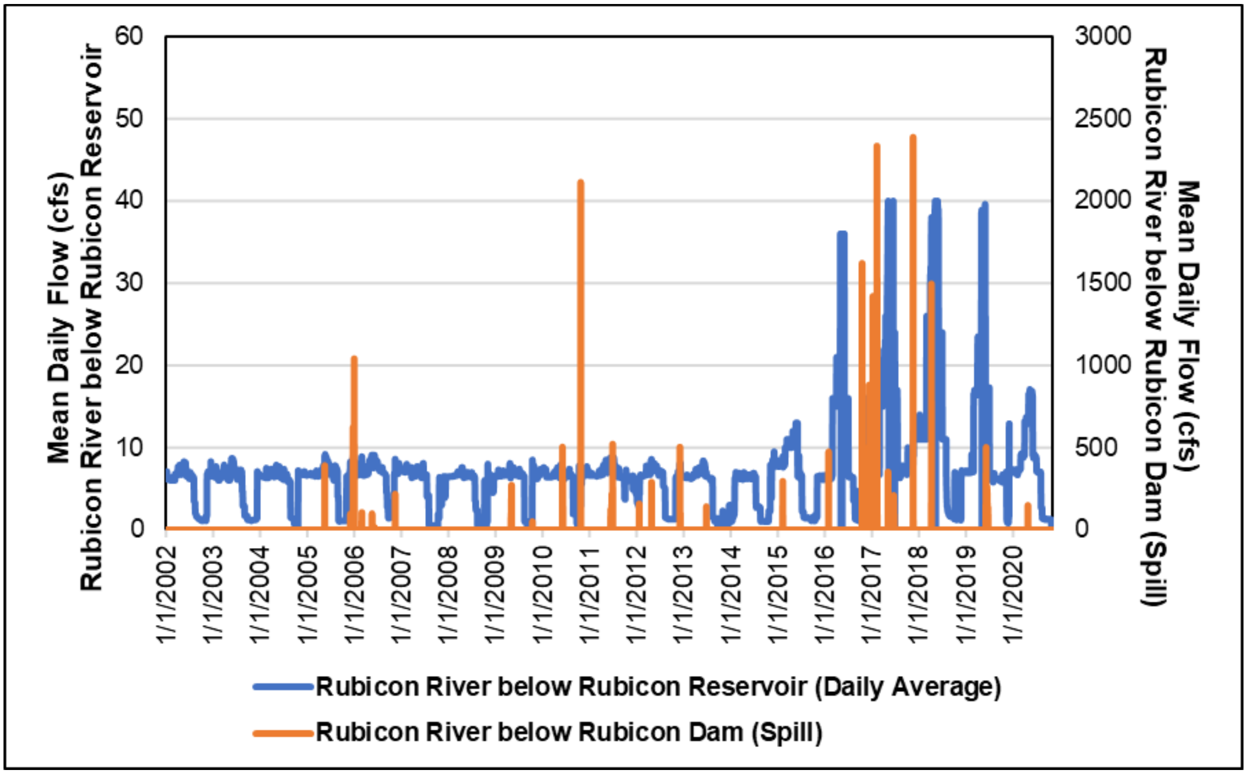


Figure 2-44. Mean daily releases (USGS gage 11427960) and spill flows (USGS gage 11427958) in the Rubicon River below Rubicon Dam, 2002–2020.

Similarly, trout density and biomass in the Loon Lake Dam Reach on Gerle Creek (sites LLD-F3 and LLD-F2), increased in 2020 relative to 2019 (Figures 2-2 and 2-3). In 2020, trout density was the highest of all monitoring years for both sites in the Loon Lake Dam Reach, and trout biomass was the highest at Site LLD-F3 and the second highest at Site LLD-F2 (2004 was higher). The 2014 License includes managed pulse flows for sediment management in this reach. Managed pulse flows were provided in spring of 2016 and 2019 which may have reduced recruitment and densities observed in 2019; no managed pulse flow events occurred in 2020 (Figure 2-45).

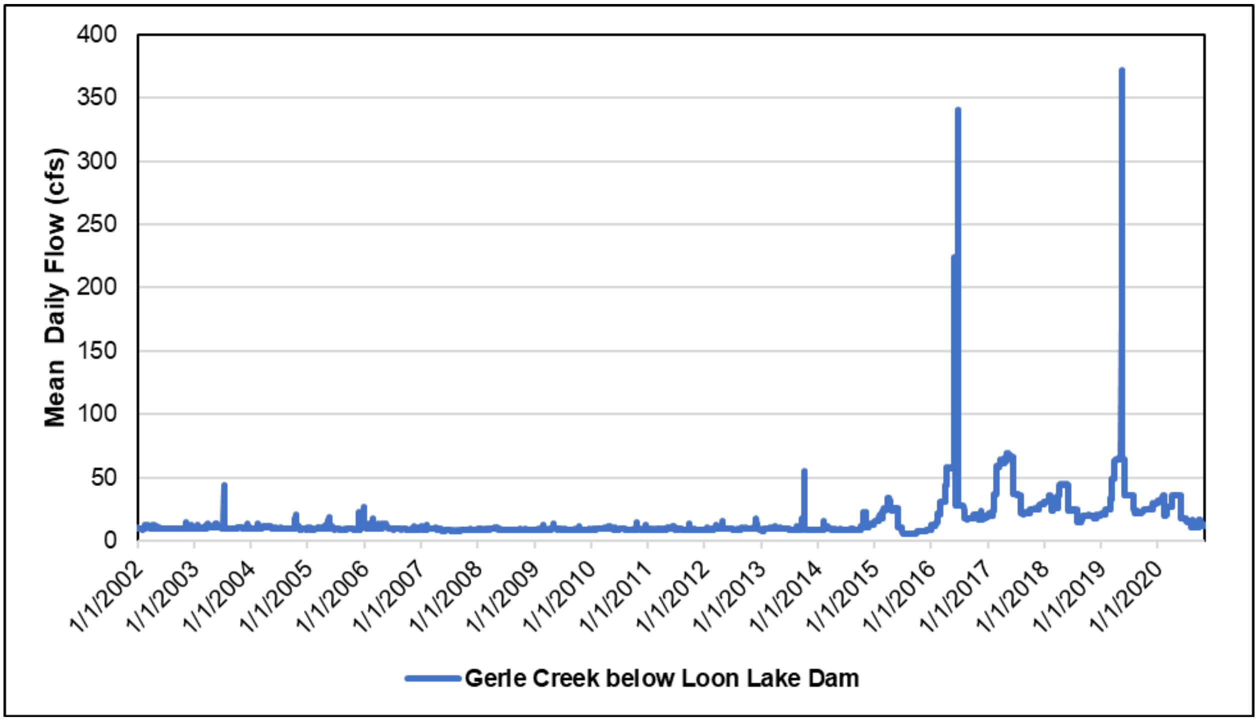


Figure 2-45. Mean daily flow of Gerle Creek below Loon Lake Dam, 2002–2020 (USGS gage 11429500).

2.4.1 Fisheries Objectives

The UARP and Chili Bar Hydroelectric Project Rationale Report for the Relicensing Settlement Agreement (SMUD 2007) identifies ecological resource objectives and trout biomass goals (derived from Gerstung [1973] and SMUD 2004) for the UARP study reaches. These Fisheries Objectives aim to maintain, restore, or recover ecological conditions for all life stages of rainbow trout, other native fishes, and desired non-native fishes (namely brown trout) in their approximate range and habitat, accomplished by meeting components articulated in the “Fish Community Assessment Metrics” (SMUD 2004). Biomass for combined rainbow and brown trout is included as a metric because these species occupy the same ecological niche (SMUD 2004) and for consistency among reaches. Individual species are also evaluated based on relative abundance and other factors, such as recruitment success.

The Fisheries Objectives include goals of increasing trout populations and meeting biomass targets, but also include goals for maintaining species diversity in some reaches (Table 2-5). Generally, both trout biomass and species diversity declined in 2019–2020 compared to the pre-licensing surveys, and only one site met the fisheries objectives specified in the Rationale Report for the Settlement Agreement; however, four sites met the trout biomass or catchable trout goals derived from Gerstung (1973). Most monitoring sites have not met the biomass goals derived from Gerstung during the pre- and post-license implementation studies; however, only two years of data have been collected since implementation of new minimum flow requirements under the 2014 FERC License. Further, the biomass goals derived from Gerstung were based on mean biomass estimates collected from 102 north Sierran streams assumed to be representative of California’s cold-water streams and may not be attainable in some UARP reaches.

Table 2-5. Fisheries Objectives as Specified in the Rationale Report for the Settlement Agreement (Adapted from SMUD 2007).

Stream Reach	Site Name	Stream Width (ft)	Populations		Trout Biomass or Catchable Trout		
			Objective (SMUD 2007)	Post-license status	Goal [a,b]	Pre-license (2002–2005 Mean) status	Post-license (2019–2020 Mean) status
Rubicon River Below Rubicon Dam	RRD-F1	29	Increase rainbow trout	Declined	Biomass ≥24 lbs/acre	16.7 lbs/acre	6.4 lbs/acre
Rubicon River Below Rubicon Dam	RRD-F2	24	Increase rainbow trout	Declined	Biomass ≥33 lbs/acre	6.9 lbs/acre	1.1 lbs/acre
Little Rubicon River Below Buck Island Dam	BID-F1	27	Reduce or eliminate golden shiners and increase rainbow trout	Golden shiner reduced from 2003 levels (nearly equal to 2002); rainbow trout decreased	Reduce or eliminate golden shiners; move toward 33 lbs/acre	0.9 lbs/acre	0 lbs/acre
Gerle Creek Below Loon Lake Dam	LLD-F3	22	--	--	Biomass ≥33 lbs/acre	--	31.4 lbs/acre
	LLD-F2	33	Increase rainbow trout and maintain brown trout	Rainbow trout and brown trout increasing	Biomass ≥24 lbs/acre	33.1 lbs/acre	23.6 lbs/acre
Gerle Creek Below Gerle Dam	GCD-F1	34	Increase rainbow trout and maintain brown trout	Rainbow trout increased; brown trout decreased	Biomass ≥24 lbs/acre	11.1 lbs/acre	8.6 lbs/acre
SF Rubicon Downstream of Robbs Peak Dam	RPD-F1	40	Increase rainbow trout and maintain brown trout	Rainbow trout increased; brown trout decreased	Biomass ≥24 lbs/acre	23.2 lbs/acre	15.3 lbs/acre
SF Silver Creek Below Ice House Dam	IHD-F1	27	Increase rainbow trout	Rainbow trout decreased	Biomass ≥24 lbs/acre	44.5 lbs/acre	20 lbs/acre
SF Silver Creek Below Ice House Dam	IHD-F2	26	Increase rainbow trout	Rainbow trout declined slightly	Biomass ≥24 lbs/acre	9.13 lbs/acre	11.4 lbs/acre
Silver Creek Below Junction Dam	JD-F3	38	--	--	--	--	106.2 trout/mile
Silver Creek Below Camino Dam	CD-F1	39	Increase rainbow trout	Rainbow trout increased	Catchable trout 278/mile	100.5 trout/mile	378 trout/mile

Stream Reach	Site Name	Stream Width (ft)	Populations		Trout Biomass or Catchable Trout		
			Objective (SMUD 2007)	Post-license status	Goal [a,b]	Pre-license (2002–2005 Mean) status	Post-license (2019–2020 Mean) status
SF American River below Slab Creek Dam	SCD-F3	43	--	--	--	--	179.5 trout/mile
SF American River below Slab Creek Dam	SCD-F2	47	Healthy age class distribution of transitional fishes, including hardhead	General decline of species richness; fewer observations of transitional fishes, hardhead absent[c]	Catchable trout 278/mile[d]	76 trout/mile	230.4 trout/mile

[a] Biomass in lbs/acre; goal based on Gerstung (1973)
[b] Number of catchable trout per mile; goal based on Gerstung (1973)
[c] Although hardhead were not observed at this site, they were observed upstream during 2020 hardhead study (Section 7.0, *Hardhead*)
[d] Trout biomass was listed as the goal in the rationale document. However, biomass estimates were not possible because SCD-F2 was snorkeled in 2020, so catchable trout per mile was used instead.

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3.0 BENTHIC MACROINVERTEBRATES

3.1 MONITORING PLAN OBJECTIVES

The primary goal of the Aquatic Macroinvertebrate Monitoring Plan (Macroinvertebrate Plan) is to monitor benthic macroinvertebrate (BMI) assemblages and utilize an aquatic ecosystem health index as an indicator of stream conditions during implementation of the modified streamflows required by 2014 License conditions (SMUD 2016). The initial two years of license implementation monitoring were conducted consecutively in 2019 and 2020.

3.2 METHODS

3.2.1 Benthic Macroinvertebrate Sampling and Physical Habitat Data Collection

Sampling was conducted using procedures based on the standard reach-wide benthos (RWB) method for documenting and describing BMI assemblages and physical habitat outlined by the Surface Water Ambient Monitoring Program (SWAMP; Ode et al. 2016). Sites were placed as close as possible to those stream sections sampled during the relicensing study (SMUD and PG&E 2005); however, in most cases site locations were adjusted slightly upstream or downstream to comply with contiguity of sampleable habitat recommendations described in the SWAMP protocol (Ode et al. 2016).

The SWAMP protocol was developed for wadeable streams and, as stated in the Macroinvertebrate Plan, collection procedures were modified as necessary to accommodate current stream conditions in the UARP. Modifications included crew members wearing dry suits instead of waders to increase accessibility, adjusting the standard length (SL) of the sample reach at some sites (typically based on average wetted width), and occasionally partitioning sample reaches within a site (e.g., adjusting transect placement to omit inaccessible or unsampleable habitat) for one or more of the following reasons: safe accessibility limitations (e.g., swift water), influence of tributary streams, and lack of contiguously sampleable aquatic habitat (e.g., large deep pools).

Sites were divided into 11 equidistant transects arranged perpendicular to the direction of flow and a single inter-transect was located between main transects. A total of 11 (1 per main transect) BMI subsamples were collected with a D-frame kicknet fitted with 0.02-inch-diameter (0.5 mm) mesh to form a single RWB composite sample for each site (only physical habitat data were collected at inter-transects). Physical habitat and water quality parameters as described in the Macroinvertebrate Plan were also recorded. Additional detail on BMI and physical habitat data collection procedures is provided in the Macroinvertebrate Plan. Physical habitat data (e.g., substrate size) from points along transects that were not safely accessible (e.g., in a rapid) were not collected and were noted as inaccessible on the datasheet.

3.2.2 Laboratory Methods

As described in the Macroinvertebrate Plan, laboratory methods followed procedures outlined in the Standard Operating Procedures for Laboratory Processing and Identification of BMIs in California (Woodard et al. 2012). At least 600 BMIs were subsampled from each composite sample and identified using standard aquatic BMI identification keys (e.g., Merritt et al. 2008, Stewart and Stark 2002, Thorp and Covich 2001, Wiggins 1996) and other appropriate references. All organisms from the subsample were identified to a minimum level 1 taxonomic effort as specified in the Southwestern Association of Freshwater Invertebrate Taxonomists (SAFIT; Richards and Rogers 2011) and an independent laboratory was contracted to conduct an external quality control (QC) of the BMI identification for 10 percent of the samples. Additional detail on standard laboratory procedures is provided in the Macroinvertebrate Plan.

3.2.3 Data Analysis

A suite of standard metrics describing richness, composition, and other characteristics that are often used to describe BMI assemblages (Karr and Chu 1999) was calculated for each sample; a detailed list of these metrics is provided in the Macroinvertebrate Plan. The Macroinvertebrate Plan describes using a subset of these metrics to calculate the Sierra Index of Biological Integrity (Sierra IBI) developed by Rehn (2009 and 2010). The more contemporary California Stream Condition Index (CSCI), also developed by Rehn et al. (2015), was calculated instead to maintain consistency with the current practices for BMI sample evaluation recommended by SWAMP (Rehn, pers comm, 2020). The CSCI is based on predictive modeling generated from a state-wide BMI database and is a more robust and computationally complex analytical tool than the Sierra IBI, requiring use of Geographic Information System (GIS) software and the statistical software R (R Core Team 2020) for its calculation (Rehn et al. 2015). The CSCI is used as a composite biological response variable to evaluate aquatic habitat quality at sites and identify overall trends related to stream condition as reflected by the BMI community.

The CSCI integrates two measures for evaluating sites: BMI taxonomic completeness, which is based on an observed-to-expected (O/E) ratio, and a multi-metric index (MMI). The O/E is a measure of taxonomic completeness between observed (O) taxa collected at a site and expected (E) taxa generated through predictive modeling from the input of site-specific environmental variables (e.g., climate, topography, and geology) that are known to influence BMI communities (Rehn et al. 2015). Based on these site-specific environmental variables, the MMI component of the CSCI generates anticipated values for six metrics[5] demonstrated to have a high signal to noise response (Rehn et al. 2015) and compares results with empirical values from the BMI sample collected from a given site. As observed taxa and metric values deviate from those predicted from reference sites using the site-specific environmental variables described above, scores for each measure (i.e., MMI and O/E) decrease. Conversely, as observed taxa and metric values

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[5] Percent Clinger Taxa; Percent Coleoptera Taxa; Percent Ephemeroptera, Plecoptera, and Trichoptera (EPT) Taxa; Percent Intolerant Individuals; Shredder Taxa Richness and Taxonomic Richness.

approach similar distributions of expected taxa and metric values from reference sites, scores for each measure increase.

CSCI calculation integrates O/E taxonomic richness and MMI results into a single score typically ranging from 0.1 (great deviation from reference condition) to 1.4 (exceeding quality of reference condition). CSCI scores are further divided into three thresholds, based on the 30th, 10th, and 1st percentiles of CSCI scores at reference sites in the state-wide database. These three thresholds divide the CSCI scoring range into four categories of biological condition:

- ≥0.92 = likely intact condition,
- 0.91 to 0.80 = possibly altered condition,
- 0.79 to 0.63 = likely altered condition, and
- ≤0.62 = very likely altered condition (Rehn et al. 2015).

CSCI scores were calculated for BMI samples collected in 2020 and compared with CSCI scores for samples collected in 2019 as part of the new license study (SMUD 2020). For purposes of historical comparison, scores were averaged from both years where data for more than one sample were available for a given site (e.g., the site was sampled in 2019 and 2020). If a BMI sample was not collected from a current site during the relicensing study (i.e., sites JD-I4 and SCD-I3), data from the most proximal historical site were used as a comparative analogue. Additional information regarding data evaluation conducted as part of the BMI study, including standardization procedures for historical data and further description of individual metrics calculated is provided in the Macroinvertebrate Plan.

3.2.4 <u>Variances and Problems Encountered</u>

Variances from the Macroinvertebrate Plan referenced in previous sections of the methods included:

- Adjusting the length of the sample reach (typically based on average wetted width) due to safe accessibility limitations (e.g., swift water), influence of tributary streams, and/or lack of contiguously sampleable aquatic habitat (e.g., large, deep pools) at the following sites: JD-I1, JD-I4, CD-I2, CD-I3, SCD-I1, and SCD-I3.
- Partitioning sample reaches (i.e., adjustments to transect placement) at sites CD-I2 and CD-I3 to avoid inaccessible or unsampleable habitat.
- Calculating the CSCI instead of the Sierra IBI for to maintain consistency with contemporary SWAMP analytical procedures, which have been updated since the Macroinvertebrate Plan was written.
- In 2020, the downstream end of the sample reach (i.e., Transect A) at two sites (RPD-I2 and IHD-I2) and the placement of sample segments at one site (CD-I2) were adjusted slightly to increase sampleable habitat.

These variances were made in consultation with authors of the current SWAMP collection and analytical procedures (Ode, pers comm, 2019 and Rehn, pers comm, 2020).

Additionally, during an initial site assessment performed in 2019, one site described in the Macroinvertebrate Plan was determined to not be safely sampleable using the SWAMP methodology under the new minimum flow regime. This site, co-located with Site SCD-I1a, was identified as SCD-I1b in the Macroinvertebrate Plan and was replaced with an alternate (Site SCD-I3) farther downstream in the Slab Creek Dam Reach (Figure 1-1, Table 3-1). Accordingly, what was described as Site SCD-I1a in the Macroinvertebrate Plan is more simply referred to as Site SCD-I1 in this document and previous annual monitoring reports containing BMI results (SMUD 2020).

3.3 RESULTS

A total of 11 samples and one replicate were collected from 11 sites within the UARP (Figures 1-1 through 1-3 and Table 3-1).

Table 3-1. Benthic Macroinvertebrate Sites Sampled in 2020 for the Upper American River Project.

Site Code	Sample Date (2020)	Stream (Reach)	Description	Coordinates (Northing/ Easting)[1]	Elevation (m)	Reach Length[2] (m)
RRD-I2	10/12	Rubicon River (Rubicon Dam)	Upstream of Rubicon Springs	740001/ 4321159	1,865	150
LLD-I3	9/28	Gerle Creek (Loon Lake Dam)	Upstream of Rocky Basin Creek Confluence	727272/ 4318674	1,653	150
GCD-I2	9/29	Gerle Creek (Gerle Creek Dam)	Upstream of South Fork Rubicon River	725682/ 4314970	1,532	150
RPD-I2	9/28	South Fork Rubicon River (Robbs Peak Dam)	Downstream of Gerle Creek Confluence	724272/ 4314506[3]	1,495	150
IHD-I2	9/20	South Fork Silver Creek (Ice House Dam)	Downstream of Ice House Reservoir	727724/ 4299851[3]	1,596	150
JD-I1	9/19	Silver Creek (Junction Dam)	Downstream of Junction Reservoir	720200/ 4303286	1,303	150
JD-I4[4]	9/19	Silver Creek (Junction Dam)	Near Jaybird Adit access	737319/ 4302088	1,211	150
CD-I2	9/18	Silver Creek (Camino Dam)	Near Camino Adit access	710090/ 4298471	730	90
CD-I3	9/18	Silver Creek (Camino Dam)	Upstream of South Fork American River Confluence	709334/ 4296211	628	100
SCD-I1[5]	9/15	South Fork American River (Slab Creek Dam)	Downstream of Slab Creek Dam, upstream of Iowa Canyon Creek	699540/ 4293960	502	80
SCD-I3[6]	9/16	South Fork American River (Slab Creek Dam)	Upstream of Rock Creek Confluence	692949/ 4295026	335	150

Notes: m=meter

[1] UTM, NAD83; located at Transect A as described in the SWAMP protocol and may differ slightly from historical site coordinates.

[2] See Section 3.2.1 for discussion on determining factors for reach length.

[3] Site location (i.e., downstream end of sample reach) differs slightly from 2019 site coordinates (SMUD 2020).

[4] As described in the Macroinvertebrate Plan, this site was not sampled during relicensing and was added to replace historical Site JD-I2 (SMUD and PG&E 2005), which is located on private property with unreliable access.

[5] Identified as Site SCD-I1a in the Macroinvertebrate Plan; Site SCD-I1b was relocated farther downstream (see table note #6 below), therefore this sample location is referred to more simply as Site SCD-I1 herein.

[6] Site not sampled during relicensing: replacement for Site SCD-I1b described in the Macroinvertebrate Plan which was determined to be unsafe to sample using SWAMP methodology during site assessment in 2019 (SMUD 2020).

3.3.2 Water Quality

Water quality parameters recorded at sites during BMI collection are shown in Table 3-2. Additional information and discussion on water quality within UARP stream reaches can be found in the annual water quality report (SMUD 2021).

Table 3-2. Water Quality Data by Site for Benthic Macroinvertebrate Samples Collected in 2020 for the Upper American River Project.

Site Code	Water Temperature (°C)	pH (s.u.)	Alkalinity (mg/L)	Dissolved Oxygen (% sat.)	Dissolved Oxygen (mg/L)	Specific Conductance (µS/cm)
RRD-I2	11.7	7.4	12	90	9.7	21.7
LLD-I3	13.5	7.1	16	87	9.1	11.2
GCD-I2	13.3	7.2	15[1]	86	9.0	13.3
RPD-I2	15.0	7.3	12	91	9.1	14.5
IHD-I2	7.8	7.2	16	99	11.8	14.2
JD-I1	8.8	6.9	18	96	11.1	13.5
JD-I4	11.7	7.2	16	99	10.8	16.1
CD-I2	15.7	7.6	16	93	9.2	21.2
CD-I3	17.0	7.6	18	103[2]	10.0	25.3
SCD-I1	12.1	7.2	19	105[2]	11.2	20.7
SCD-I3	14.8	7.7	18	107[2]	10.4	23.9

Notes: °C=degrees Celsius, s.u. = standard unit, mg/L = milligram per liter, % sat. = percent saturation, µS/cm=microsiemens per centimeter

1 Value reported was collected at the site during 2019 sampling; alkalinity was not measured at the site in 2020 due to equipment malfunction.

2 High value may be attributable to elevated oxygen production by photosynthetic organisms (e.g., algae) throughout the day, increased aeration by cascades/falls, or rapid rises in temperature.

3.3.3 Physical Habitat Assessment

Physical habitat data are summarized by site in Tables 3-3 and 3-4. Photographs of the sites are presented in Appendix C1. Physical habitat among sampling sites was diverse, ranging from lower gradient pools to high gradient riffles and rapids with associated substrate size classes ranging from cobble/course gravel to bedrock/boulder (Table 3-3). Boulder was the primary instream habitat complexity element, and its abundance was scored from sparse to heavy (Table 3-4). Other instream habitat complexity components including filamentous algae, aquatic macrophytes/emergent vegetation woody debris, undercut banks, overhang vegetation, live tree roots, and artificial structures were sparse or absent at most sites (Table 3-4). Average canopy cover was variable across sites, ranging from 0 to 46 percent (Table 3-3). At most sites, the upper and lower canopies were sparse to moderate and ground cover was moderate at all sites. Stream banks at all sites were categorized as stable except for a few transects at sites LLD-I3 and GCD-I2 where slight erosion was noted.

Due to remoteness, evidence of in-channel human disturbance was minimal at most sites; although, land use within the surrounding watershed generally became increasingly developed with decreasing elevation. Localized mining activity including evidence of suction dredging was noted at Site CD-I2 within Silver Creek. Site SCD-I1 has a pedestrian bridge at the upstream end of the site, a public river access trail on the north side of the river, and is proximate to the recently constructed South Fork Powerhouse. Site SCD-I3 is near Rock Creek Powerhouse on the north side of the channel and, although the access road is gated, the site is used by the public for river access. At other sites, evidence of human disturbance was limited to minor amounts of trash.

Table 3-3. Physical Habitat Data Collected by Site during Benthic Macroinvertebrate Sampling in 2020 for the Upper American River Project.

Site Code	Gradient (%)[1]	Discharge (cfs)[2]	Average Wetted Width (m)[3]	Average Canopy Cover (%)	Dominant Habitat (subdominant)	Dominant Substrate (subdominant)
RRD-I2	1.1	1.3	9.1	46	Riffle (Pool)	Cobble (Course Gravel)
LLD-I3	3.1	13.4	10.4	19	Run (Pool)	Bedrock (Cobble)
GCD-I2	2.2	10.0	9.3	31	Pool (Riffle)	Cobble (Bedrock)
RPD-I2	2.8	6.0	10.6	38	Pool (Rapid)	Bedrock (Fine gravel)
IHD-I2	1.8	11.0	10.3	46	Run (Pool)	Bedrock (Small Boulder)
JD-I1	4.9	11.0	17.0	19	Run (Riffle)	Cobble (Small Boulder)
JD-I4	3.2	10.5	19.1	34	Run (Pool)	Small Boulder (Cobble)
CD-I2	2.0	13.5	9.7	8[4]	Pool (Run)	Bedrock (Cobble)
CD-I3	2.7	8.9	9.7	43	Riffle (Run)	Cobble (Small Boulder)
SCD-I1	1.3	80.0	14.4	0	Riffle (Run)	Small Boulder (Large Boulder)
SCD-I3	1.8	91.2	34.5	4	Run (Pool)	Cobble (Large Boulder)

Notes: %=percent, cfs=cubic feet per second, m=meter

[1] Calculated using satellite imagery and the USGS National Elevation Dataset Digital Elevation Model.

[2] Estimated by discharge transect in field or recorded by nearest gage data.

[3] Averaged across 11 main transects.

[4] Value reported was measured in 2019; canopy cover data was not recorded in 2020 due to a reduced crew and limited time at the site. Overall riparian cover is low at the site and no significant changes were observed between 2019 and 2020.

Table 3-4. Instream Habitat Complexity and Riparian Vegetation Cover Data Collected by Site during Benthic Macroinvertebrate Sampling in 2020 for the Upper American River Project.

Site	Instream Habitat Complexity Elements[1]									Riparian Cover[1]		
	Filamentous Algae	Aquatic Macrophytes/ Emergent Vegetation	Boulders	Woody Debris (>0.3 m)	Woody Debris (<0.3 m)	Undercut Banks	Overhang Vegetation	Live Tree Roots	Artificial Structures	Upper Canopy (>5m)	Lower Canopy (0.5–5 m)	Ground Cover (<0.5 m)
RRD-I2	Sparse	Sparse	Sparse	Absent	Sparse	Sparse	Sparse	Sparse	Absent	Moderate	Moderate	Moderate
LLD-I3	Absent	Sparse	Moderate	Sparse	Sparse	Sparse	Sparse	Sparse	Absent	Moderate	Moderate	Moderate
GCD-I2	Sparse	Sparse	Moderate	Absent	Sparse	Sparse	Sparse	Sparse	Absent	Sparse	Moderate	Moderate
RPD-I2	Absent	Sparse	Sparse	Absent	Sparse	Sparse	Sparse	Sparse	Absent	Sparse	Sparse	Moderate
IHD-I2	Sparse	Sparse	Moderate	Sparse	Sparse	Sparse	Moderate	Sparse	Absent	Sparse	Moderate	Moderate
JD-I1	Sparse	Sparse	Heavy	Sparse	Sparse	Absent	Sparse	Absent	Absent	Moderate	Moderate	Moderate
JD-I4	Sparse	Sparse	Heavy	Sparse	Sparse	Sparse	Sparse	Sparse	Absent	Moderate	Sparse	Moderate
CD-I2	Sparse	Sparse	Moderate	Absent	Sparse	Sparse	Sparse	Sparse	Absent	Sparse	Sparse	Moderate
CD-I3	Sparse	Sparse	Heavy	Moderate	Sparse	Sparse	Sparse	Sparse	Absent	Sparse	Sparse	Moderate
SCD-I1	Sparse	Absent	Heavy	Sparse	Sparse	Absent	Sparse	Sparse	Absent	Sparse	Moderate	Moderate
SCD-I3	Sparse	Sparse	Moderate	Sparse	Sparse	Sparse	Sparse	Sparse	Absent	Sparse	Moderate	Moderate

Notes: m=meter
[1] Presence averaged across 11 main transects: Absent = 0%, Sparse = <10%, Moderate = 10–40%, Heavy = 41–75%, Very Heavy = >75%

3.3.4 Benthic Macroinvertebrate Assemblage Evaluation

A total of 7,559 BMIs representing 118 distinct taxa identified to a minimum level 1 taxonomic effort as specified in SAFIT (Richards and Rogers 2011) were processed from the 11 composite samples and one replicate collected from the UARP BMI study sites in 2020. All composite samples contained more than the minimum 600 organism subsample size, and the average subsample size was 630 organisms (range: 607 to 660). Inter-laboratory Quality Control (QC) indicated no sorting or counting errors and three minor taxonomic discrepancies (Appendix C2). QC parameters for all samples were well within the standardly accepted threshold for error rate. A complete taxonomic list with associated functional feeding group and tolerance value designations is presented in Appendix C3. Commonly reported metrics (e.g., the Shannon-Weaver Diversity Index) including those that comprise the MMI component of the CSCI (Percent Clinger Taxa; Percent Coleoptera Taxa; Percent Ephemeroptera, Plecoptera, and Trichoptera [EPT] Taxa; Percent Intolerant Individuals; Shredder Taxa Richness and Taxonomic Richness) are presented in Appendix C4.

Results of the application of the CSCI to the BMI samples collected in 2020 are presented in Table 3-5 and Figure 3-1. CSCI scores ranged from 0.66 to 1.24 with scores for samples collected from most (eight) of the sites exceeding the threshold for the highest categorical interpretation of the score, described as “likely intact” (Rehn et al. 2015). Scores for three other sites ranked within the next two lower categorical tiers of “possibly altered” condition (0.80 to 0.91) or “likely altered” condition (0.63 to 0.79). None of the samples collected scored within the lowest tier, described as “very likely altered” condition (≤0.62) (Rehn et al. 2015).

The range of CSCI scores for samples collected across sites in 2020 (0.66 to 1.24) was very similar to the range for samples collected across sites in 2019 (0.71 to 1.26), and average scores were almost equal between years (0.94 and 0.95, respectively). Scores for samples collected from all sites in 2020 fell either within the same or a higher condition category in comparison to scores for samples collected in 2019 (Table 3-5 and Figure 3-2). Samples collected from nine sites scored within the same categorical tier during both monitoring years. Samples collected from two sites (IHD-I2 and CD-I2) in 2020 ranked in a higher categorical tier than samples collected from the site in 2019, with scores at both sites improving from “possibly altered” condition (0.80 to 0.91) to “likely intact” condition (≥0.92). Despite the improvement in categorical ranking, however, the quantitative difference between the scores of samples collected from each site between years was minor (0.08 and 0.07, respectively), emphasizing the overall similarity of results between the two monitoring events.

Table 3-5. California Stream Condition Index (CSCI) Scores for Benthic Macroinvertebrate Samples Collected for the Upper American River Project in 2019 and 2020.

Site	CSCI Scores[1]	
	2019	**2020**
RRD-I2	1.16	1.16
LLD-I3	1.26	1.24
GCD-I2	1.00	1.08
RPD-I2	1.07	1.14
IHD-I2	0.85	0.93
JD-I1	0.71	0.67
JD-I4	1.06	0.96
CD-I2	0.88	0.95
CD-I3	0.99	1.04
SCD-I1	0.71	0.66
SCD-I3	0.74	0.75
SCD-I3 (replicate)	0.82	0.83

[1] CSCI categories of biological condition (Rehn et al. 2015): ≥0.92 = likely intact condition, 0.91 to 0.80 = possibly altered condition, 0.79 to 0.63 = likely altered condition, ≤0.62 = very likely altered condition.

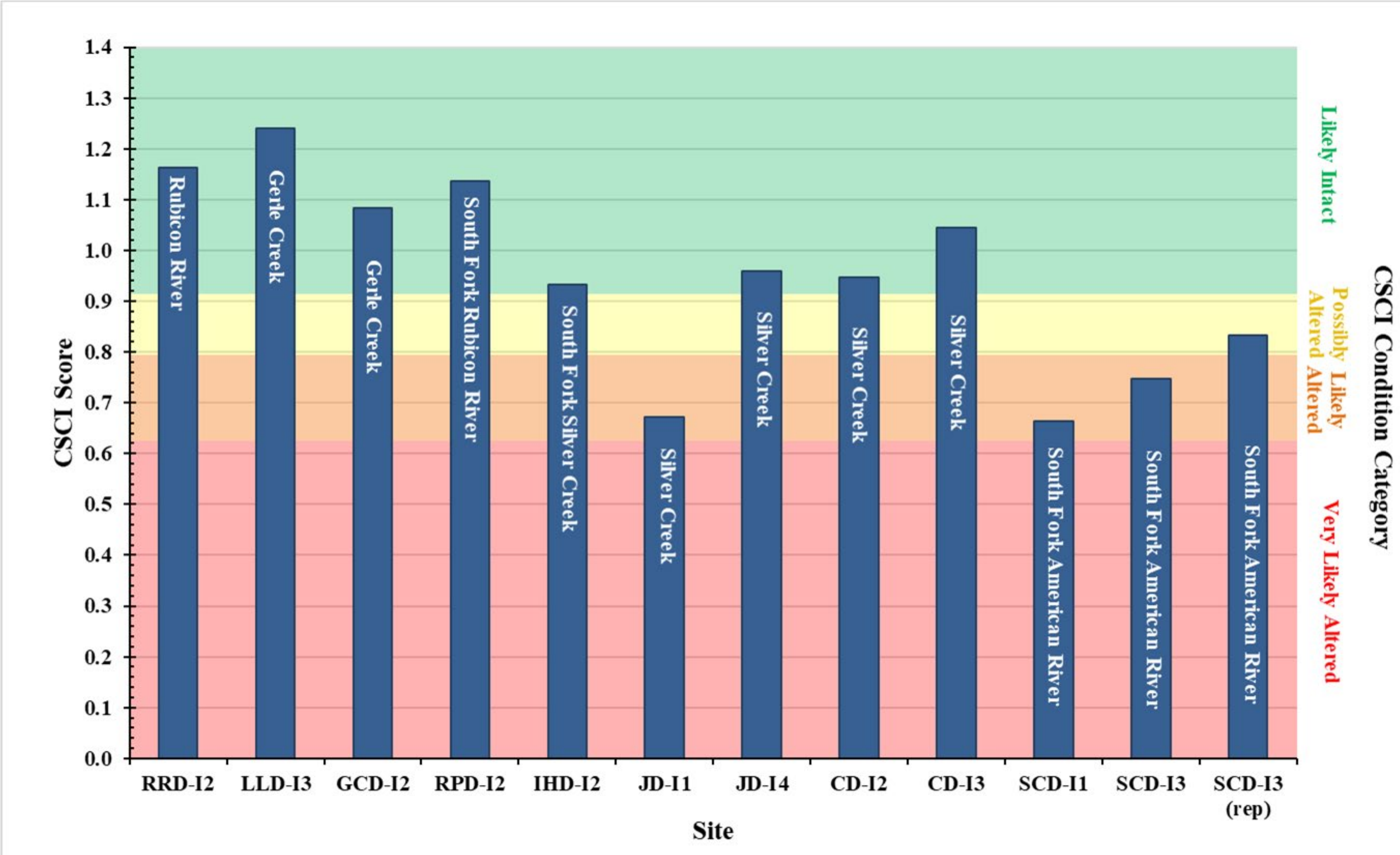

Figure 3-1. California Stream Condition Index scores and condition categories for Benthic Macroinvertebrate samples collected for the Upper American River Project in 2020.

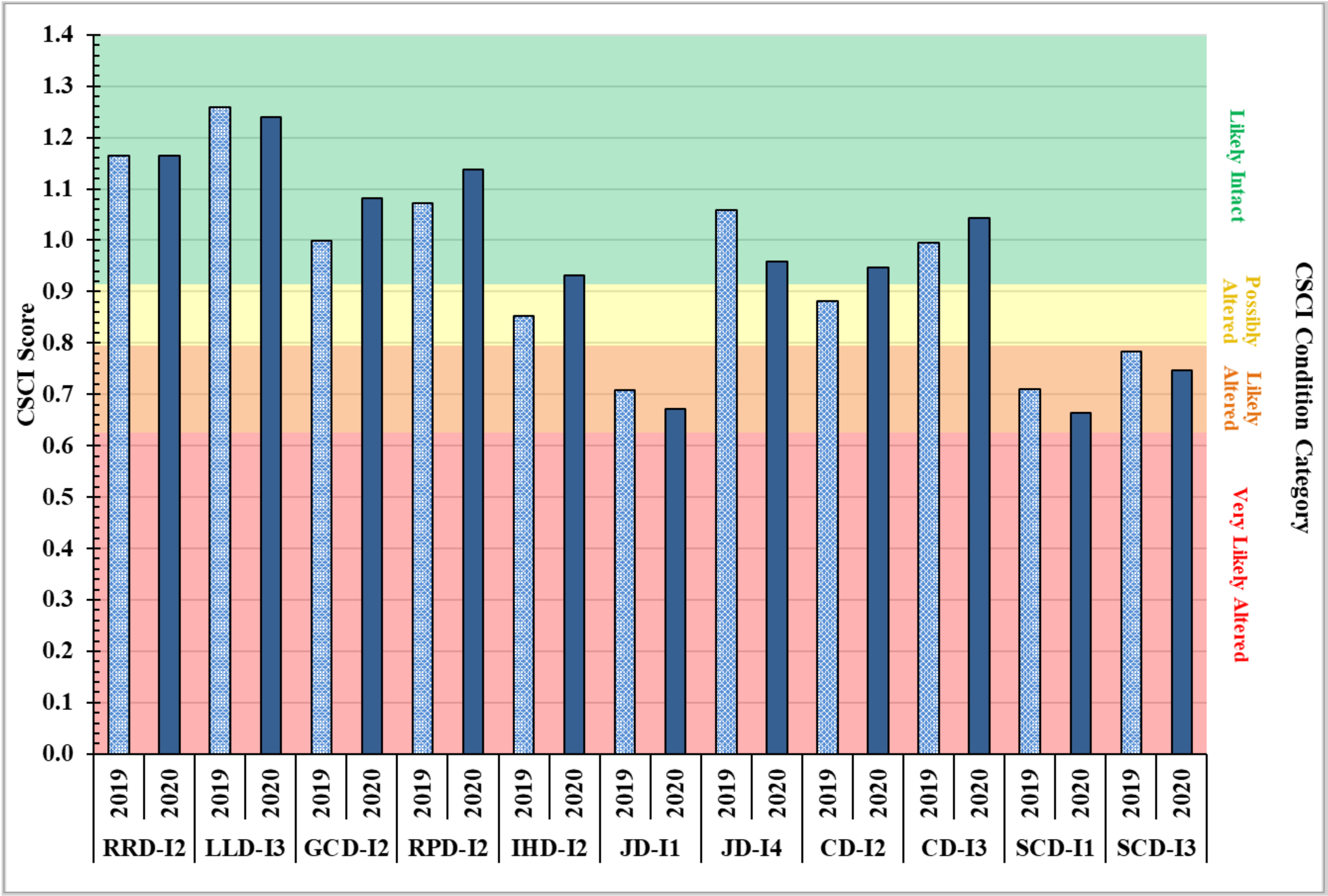

Figure 3-2. California Stream Condition Index scores and condition categories for Benthic Macroinvertebrate samples collected for the Upper American River Project in 2019 and 2020.

3.4 DISCUSSION

3.4.1 License Implementation Monitoring

BMI assemblages collected from the UARP during the initial two years of license implementation monitoring in 2019 and 2020 were generally indicative of healthy stream condition as indicated by CSCI scores; over 50 percent of the samples collected in each year ranked within the highest condition category ("likely intact") of the index (Table 3-5 and Figure 3-2). As described in Section 3.3.3, overall CSCI scores for samples collected in 2020 compared to 2019 reflect a similar range and comparable averages. This comparability of CSCI scores between years is likely attributable to similarity of stream conditions and consistency in the overall quality of aquatic habitat at sample sites between years. In the UARP the water year type was Wet in 2019 and Dry in 2020 (CDWR 2019 and 2020), which resulted in lower discharge and slightly narrower wetted widths at most sites in 2020 compared to 2019 (the average difference at sites with a decrease in wetted width between years was 1 meter). There was little variation in other physical (e.g., substrate), biological (e.g., macrophytes), or chemical (e.g., dissolved oxygen) habitat conditions at the monitoring sites between the two monitoring years (Section 3.3.3. and Tables 3-2 through 3-4 in SMUD 2020).

In both 2020 and 2019, CSCI scores for samples collected from sites in higher elevation reaches were typically higher than for those collected from sites in lower elevation reaches, which could be attributable to anthropogenic factors (e.g., increased development in surrounding areas and/or relative ease of river access in comparison to more remote sites) affecting regulated UARP stream reaches and associated unregulated tributaries at lower elevation (Tables 3-1 and 3-5, Figure 3-2). Additionally, variation in CSCI scores for samples collected from the UARP in 2019 and again in 2020 demonstrate a documented trend regarding the effects of hydropower projects on BMI assemblages in which relatively low biological index values (e.g., CSCI) typically occur immediately downstream of large reservoirs but increase with distance downstream from the dam (Rehn et al. 2007). Both trends (i.e., higher CSCI scores at higher elevations and depressed CSCI scores immediately below large dams that increase with distance downstream) were also evident in CSCI scores for historical samples collected in 2002 and 2003 during relicensing studies for the UARP (SMUD and PG&E 2005) and are discussed further in Section 3.4.2.

3.4.2 Historical Comparison

CSCI scores for samples collected during the initial two years of license implementation monitoring (i.e., 2019 and 2020) and for historical samples collected prior to implementation of the new minimum flow regime reflect similar ranges and averages (0.69–1.25 [0.96] and 0.64–1.13 [0.92], respectively). Average scores for samples collected during both periods predominately exceeded the threshold for the "likely intact" condition category (Table 3-6 and Figure 3-3) with exceptions at sites that are located immediately downstream of a large impoundment and/or at lower elevation in the watershed (i.e., sites JD-I1, IHD-I2, SCD-I1, and SCD-I3). Average scores for samples collected during the initial two years of license implementation monitoring ranked within the same or a higher condition category in comparison to average scores for historical samples collected under previous license conditions at all sites except those in Slab Creek Dam Reach (Table 3-6 and Figure 3-3), which is discussed in further detail below.

Table 3-6. Average California Stream Condition Index (CSCI) Scores for Benthic Macroinvertebrate Monitoring in the Upper American River Project.

Site	CSCI Scores[1]	
	Historical (2002/2003)[2]	License Implementation (2019/2020)
RRD-I2	1.06	1.16
LLD-I3	1.13	1.25
GCD-I2	0.98	1.04
RPD-I2	1.06	1.11
IHD-I2	0.90	0.89
JD-I1	0.64	0.69
JD-I4[3]	0.87	1.01
CD-I2	0.92	0.91
CD-I3	0.74	1.02
SCD-I1[4]	0.95	0.69
SCD-I3[3]	0.84	0.79

[1] CSCI categories of biological condition (Rehn et al. 2015): ≥0.92 = likely intact condition, 0.91 to 0.80 = possibly altered condition, 0.79 to 0.63 = likely altered condition, ≤0.62 = very likely altered condition.
[2] 2002 and 2003 were both classified as Below Normal water years for the UARP (CDWR 2002, 2003).
[3] Site was not sampled during relicensing study (SMUD 2015); data from proximal relicensing study site used for historical comparison (JD-I2 for JD-14 and SCD-I2 for SCD-I3).
[4] Historical data for this site include an additional sample collected in 2010 (ECORP 2011).

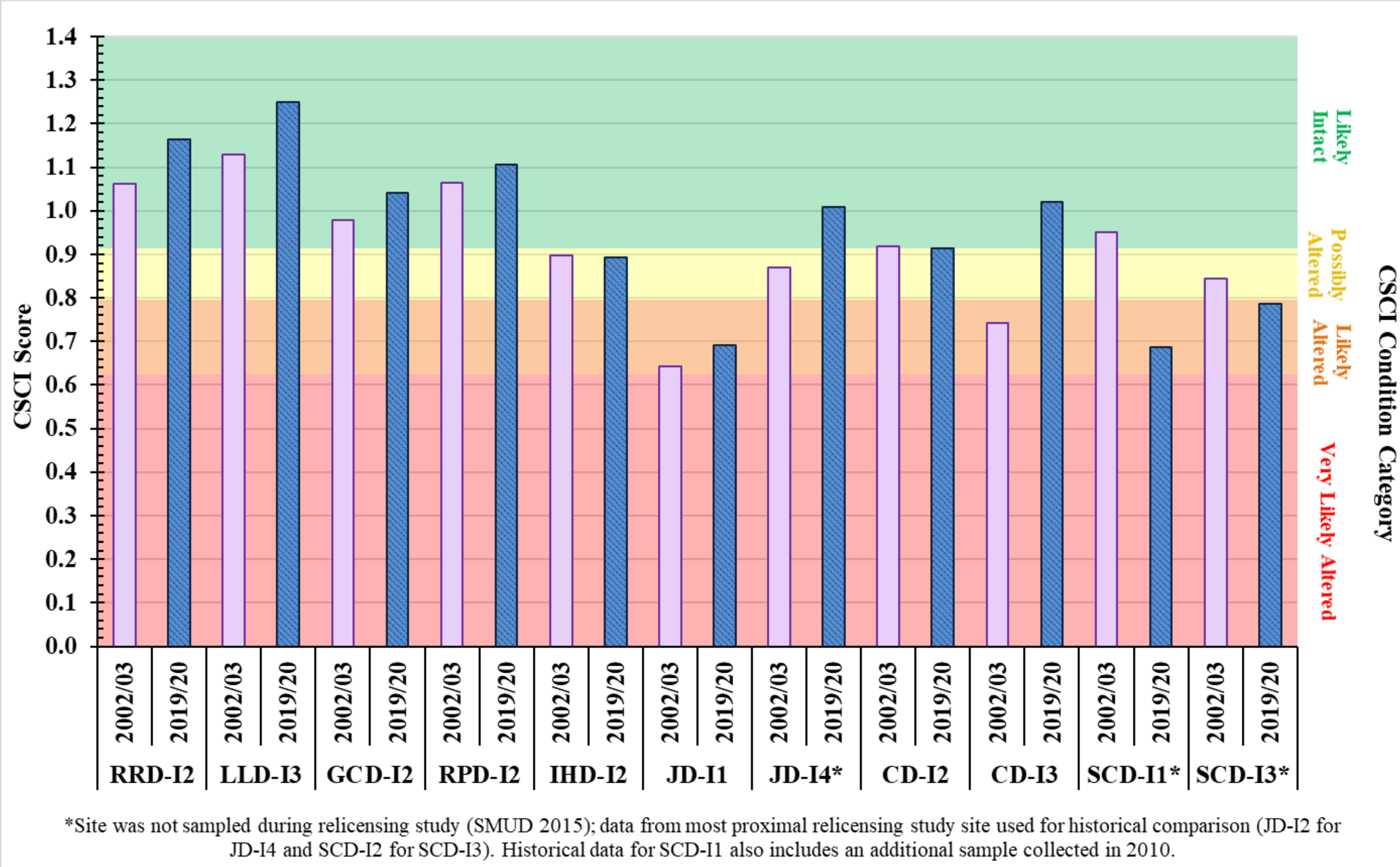

Figure 3-3. Average California Stream Condition Index scores and condition categories for samples collected during Benthic Macroinvertebrate monitoring for the Upper American River Project (historical: 2002/2003 and license implementation: 2019/2020).

Similar to samples collected during license implementation monitoring (2019/2020), variation in CSCI scores for samples collected during relicensing studies (2002/2003) studies also reflected the previously described trend associated with hydropower projects in which biological index values tend to be low immediately downstream of large reservoirs but increase with distance downstream from the dam (Rehn et al. 2007). In the UARP, average CSCI scores for samples collected from the sites most proximal to Junction Reservoir (Site JD-I1) and Ice House Reservoir (Site IHD-I2) ranked within the "likely altered" and "possibly altered" condition categories, respectively, during both the historical and license implementation monitoring periods (Table 3-6 and Figure 3-3).The average CSCI score for historical samples collected at Site SCD-I1 immediately below Slab Creek Dam, however, ranked in a higher condition category ("likely intact") in comparison to the average score for samples collected during license implementation monitoring which fell in the "likely altered" condition category and is, therefore, more reflective of the trend described in the hydropower study (Rehn et al. 2007). The lower scores for the 2019 and 2020 samples collected from Site SCD-I1 are also likely related to activities (including channel bed disturbance and dewatering) associated with the recently constructed South Fork Powerhouse. Aquatic ecosystem health as reflected by the BMI community at this site may increase over time now that construction is complete; however, the CSCI score for the historical sample[6] collected from this site in 2010 prior to construction of the powerhouse also fell within a condition category indicating possible impairment, suggesting that proximity to Slab Creek Dam is also a factor.

Average CSCI scores increased with distance downstream between sites JD-I1 and JD-I4 in the Junction Dam Reach in both the historical and license implementation monitoring periods (Table 3-6 and Figure 3-3). The license implementation monitoring only includes one site in Ice House Dam Reach (IHD-I2 approximately 1 mile below the dam); however, attenuation with distance downstream was documented in this reach during the relicensing study in which the biological index used for analysis was lowest at the site immediately below Ice House Dam (Site IHD-I1) and gradually increased with distance downstream at sites IHD-I2 through IHD-I4 (SMUD and PG&E 2005). Attenuation was not as apparent in the Slab Creek Dam Reach and average score trends varied between monitoring periods (Table 3-6 and Figure 3-3). Average CSCI scores for historical samples collected in this reach decreased with distance downstream between sites SCD-I1 and SCD-I3. The average score for samples collected during license implementation monitoring was slightly higher for samples collected at the downstream site (SCD-I3); however, it was also indicative of potential impairment.

CSCI scores for samples collected at sites in higher elevation reaches were typically higher than CSCI scores for samples collected at sites in lower elevation reaches for both the historical and license implementation monitoring periods (Table 3-6 and Figure

[6] The historical sample from Site SCD-I1 was collected in 2010 to inform the license amendment request for the South Fork Powerhouse (ECORP 2011); the CSCI score for the sample was 0.84, which ranks in the "possibly altered" condition category.

3-3). During both periods, average CSCI scores for samples collected from monitoring sites at higher elevation (RRD-I2, LLD-I3, GCD-I2, and RPD-I2) exceeded the threshold for the highest condition category (“likely intact”) of the index, and average scores for the lowest elevation site in the UARP (SCD-I3) fell within condition categories indicative of possible impairment (Table 3-6 and Figure 3-2). The differences in CSCI scores may be partially attributable to increased human activity (e.g., dispersed recreation) at lower elevation sites that are less remote and more accessible and development in the surrounding watersheds affecting regulated UARP stream reaches and associated unregulated tributaries. This trend is consistent with results of both historical and license implementation studies conducted in the Reach Downstream of Chili Bar on the SFAR in which attenuation is not as evident with distance downstream of Chili Bar Reservoir and sample sites have a similar level of surrounding development and exhibit lower CSCI scores (PG&E and SMUD 2020 and 2021).

High-flow events (e.g., high-volume spill episodes and recreational flow releases) that are known to influence BMI assemblages (Allan 2004, Kennedy et al. 2016, Olden and Naiman 2010, and Steel et al. 2018) periodically occur in the Slab Creek Dam Reach. Both types of high-flow events occurred in 2019. In 2020, Slab Creek Dam spilled from January through April, with flows ranging from approximately 250 to 2,250 cfs, but recreational flow releases did not occur. Despite this variation in type of high-flow events, CSCI scores for samples and replicates collected at Site SCD-I3 in 2019 (0.74, 0.82 [replicate]) and 2020 (0.75, 0.83 [replicate]) were nearly equal and fell within the same condition categories of the index (Table 3-5 and Figure 3-2). Average CSCI scores for historical samples collected at this site prior to the implementation of recreational flow releases also fell within a lower condition category (Table 3-6 and Figure 3-3). The consistency of the data at this site within and between monitoring periods despite variation in flow regime and occurrence of recreational releases suggests that high-volume spill events and/or other unrelated factors (e.g., increased development at lower elevations) may be larger contributors to potential impairment of stream conditions at this site. Data from future monitoring under the new license may provide further insight into possible causes of the observed results.

3.4.3 Conclusion and Future Monitoring

Overall CSCI scores for historical samples versus those for samples collected during the initial two years of license implementation monitoring were generally similar and indicative of healthy stream conditions within and between monitoring periods. CSCI scores in both periods predominantly exceeded the threshold for the “likely intact” condition category with exceptions at a few sites located immediately below impoundments and/or at lower elevation in the watershed. This suggests that the general health of the stream ecosystem and overall quality of aquatic habitat in the UARP stream reaches as reflected by the BMI community has not changed significantly with implementation of the new minimum flow regime under the current license. Additional BMI samples collected in future years will further facilitate identification of changes at monitoring sites or new system-wide trends in stream condition over time. In accordance with the frequency described in the Macroinvertebrate Plan, BMI samples will be collected again from the UARP in the following years: 2024, 2025, 2029, 2030, and thereafter for two consecutive years every 10 years for the term of the license.

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4.0 BALD EAGLE

4.1 MONITORING PLAN OBJECTIVES

The primary objectives of the bald eagle monitoring program are to monitor bald eagle nesting activity in the study area (see Section 1.0) and ensure that bald eagle nest sites are not adversely affected by activities related to the UARP. The results of the monitoring are intended to inform future bald eagle management in the UARP area (SMUD 2015).

4.2 METHODS

Bald eagle field surveys were performed during the 2020 breeding season at Loon Lake Reservoir. Periodic field visits were also conducted at Union Valley Reservoir in 2020; however, observations discussed in this report were primarily made via cameras installed by SMUD and the USFS at the bald eagle nest in Sunset Campground. Field surveys at Loon Lake were conducted in accordance with protocols described in the *Protocol for Evaluating Bald Eagle Habitat and Populations in California* (Jackman and Jenkins 2004) and *Bald Eagle Breeding Survey Instructions* (CDFG 2010). Access at Loon Lake was limited during the first half of the breeding season (February through April) due to snow and road conditions, and the onset of the COVID-19 pandemic during this time further complicated the initiation of surveys. The first of three required breeding season surveys was performed in early May with two subsequent surveys occurring in early and late June.

Surveys typically began at dawn and concluded in the late afternoon. Nest and roost sites documented during the previous survey years were revisited (SMUD 2019) and other areas with suitable habitat surrounding the reservoir, including historical nest sites documented during relicensing surveys (SMUD 2004), were evaluated for signs of bald eagle nesting activity. Observations were made using binoculars and/or a spotting scope from a boat and land-based vantage points accessed by vehicle and/or foot (Figure 4-1). Detailed notes on the location, age class, activity, movement, and behavior of bald eagles were taken, and incidental observations of other avian species and recreational activities on the day of the survey were recorded (Appendix D1). Bald eagle perches and nests located during the surveys were mapped using a handheld Global Positioning System (GPS) unit. Using the California Bald Eagle Nesting Territory Form (CDFG 2010), a detailed summary of bald eagle observations made during surveys was submitted to CDFW at the end of the breeding season (Appendix D2).

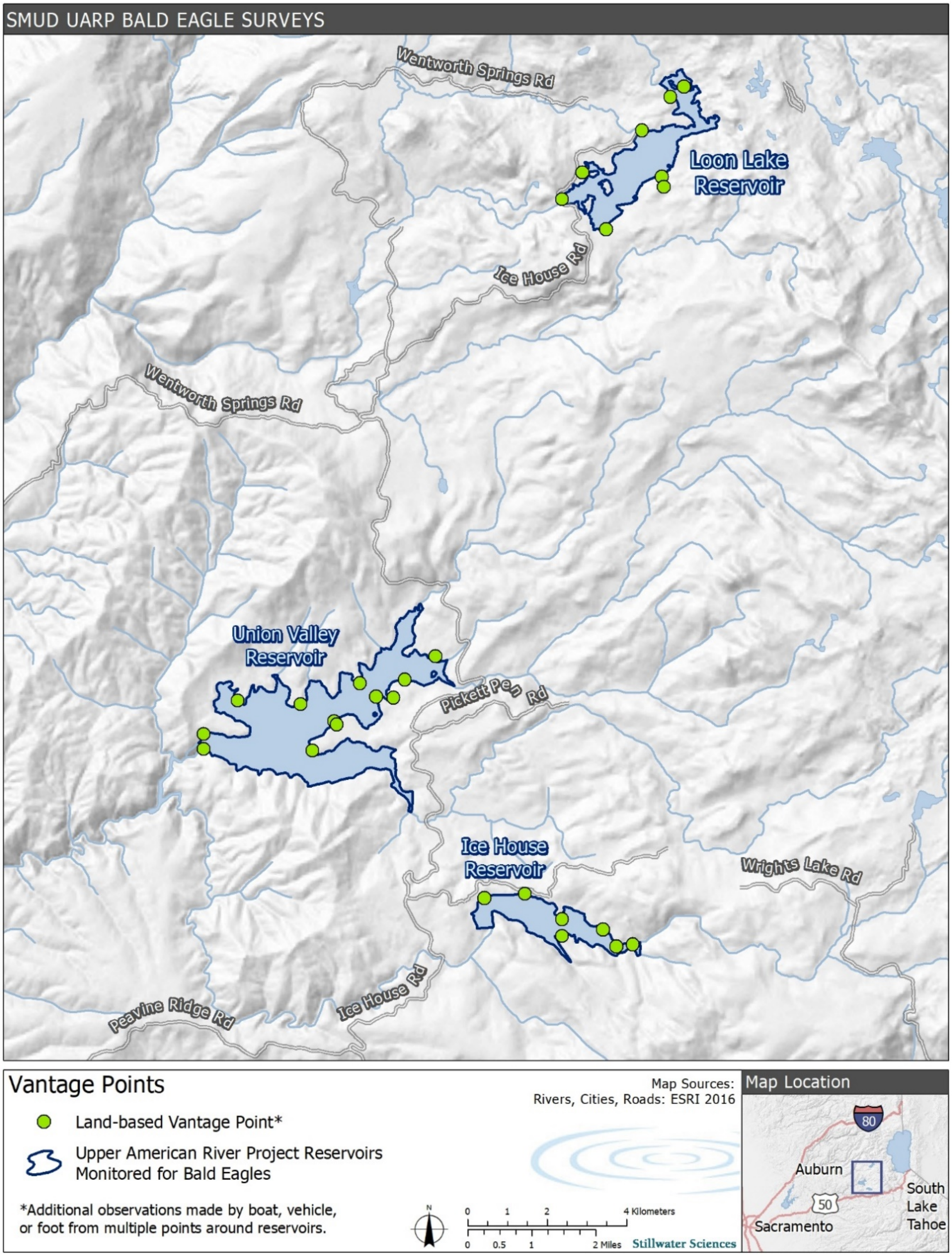

Figure 4-1. Land-based vantage points used for monitoring in the Upper American River Project bald eagle study area (Loon Lake Reservoir was surveyed in 2020).

4.3 RESULTS

4.3.1 Loon Lake Reservoir

Surveys for bald eagles during the 2020 breeding season were conducted at Loon Lake Reservoir on 15 May, 19 June, and 30 June. Table 4-1 summarizes bald eagle observations made during the surveys.

Table 4-6. Bald Eagle Observations During the 2020 Breeding Season Surveys at Loon Lake Reservoir.

Date (Time)	Number of Eagles	Age Class	Notes
05/15/20 (07:00)	2	Adult Juvenile	Adult (female) observed in nest on south side of reservoir and single chick barely visible above edge of nest.
05/15/20 (07:40)	1	Adult	Adult (female) departing nest tree on south side of reservoir, flying southwest, and returning to nest three minutes later (likely nearby food delivery from male).
05/15/20 (09:00)	2	Adults	Adult (male) joining female at nest, remaining for approximately five minutes, then departing to the southwest.
05/15/20 (12:40)	3	Adults Juvenile	Two adults (male and female) and single chick observed in nest; based on feeding posture of female a second chick may have been present, but not visible.
06/19/20 (08:04)	1	Adult	Adult (female) flying northeast to southwest, then perching in lodgepole pine north of spillway.
06/19/20 (08:05)	1	Adult	Adult (male) flying northeast to southwest, then perching in dominant Jeffrey pine north of spillway.
6/19/20 (08:15)	1	Adult	Adult (female) departing perch in lodgepole pine, flying south over the reservoir, and landing in fir approximately 0.2 miles northwest of nest tree.
6/19/20 (08:18)	1	Adult	Third adult observed flying west over knoll on south side of reservoir near boat launch.
6/19/20 (08:22)	1	Adult	Adult (female) departing perch in fir on south side of reservoir, flying south to unknown location.
6/19/20 (08:28)	1	Adult	Adult (male) departing perch in Jeffrey pine, flying south, and perching in fir approximately 0.2 miles northwest of nest tree (where female had previously been).
6/19/20 (08:55)	1	Adult	Adult (male) departing perch in fir, flying south to unknown location.
06/30/20 (13:15)	1	Adult	Adult observed flying north to south over Pleasant Lake (northeast end of Loon Lake Reservoir).

Results of the first survey conducted in the 2020 breeding season at Loon Lake Reservoir indicated reproductive activity and nest occupancy. Two adult bald eagles and a single chick were observed at the nest on the south side of the reservoir that has been used in previous seasons (Table 4-1, Figures 4-2 and 4-3). Subsequent surveys, however, indicated that the reproductive attempt was not successful. Adult bald eagles were observed during the second survey (Table 4-1 and Figure 4-4) but were not seen at the nest tree. The nest was partially disassembled and unoccupied and what appeared to be partially obscured juvenile tail feathers were observed through the spotting scope among the nest remnants, suggesting possible predation. During the final survey, remains of the juvenile consisting of a feather spot and several broken-off juvenile tail feathers were located approximately 0.1 miles east of the nest tree. A single adult bald eagle was observed flying over the northeast side of the reservoir (i.e., Pleasant Lake). Several new perches (two near the spillway to Gerle Creek on the north side of the reservoir and one on the south side near the nest tree) were identified (Figures 4-2 and 4-4), but no additional evidence of nesting was observed during the 2020 breeding season. Additional detail regarding surveys conducted at Loon Lake Reservoir in 2020 is provided in Appendix D2.

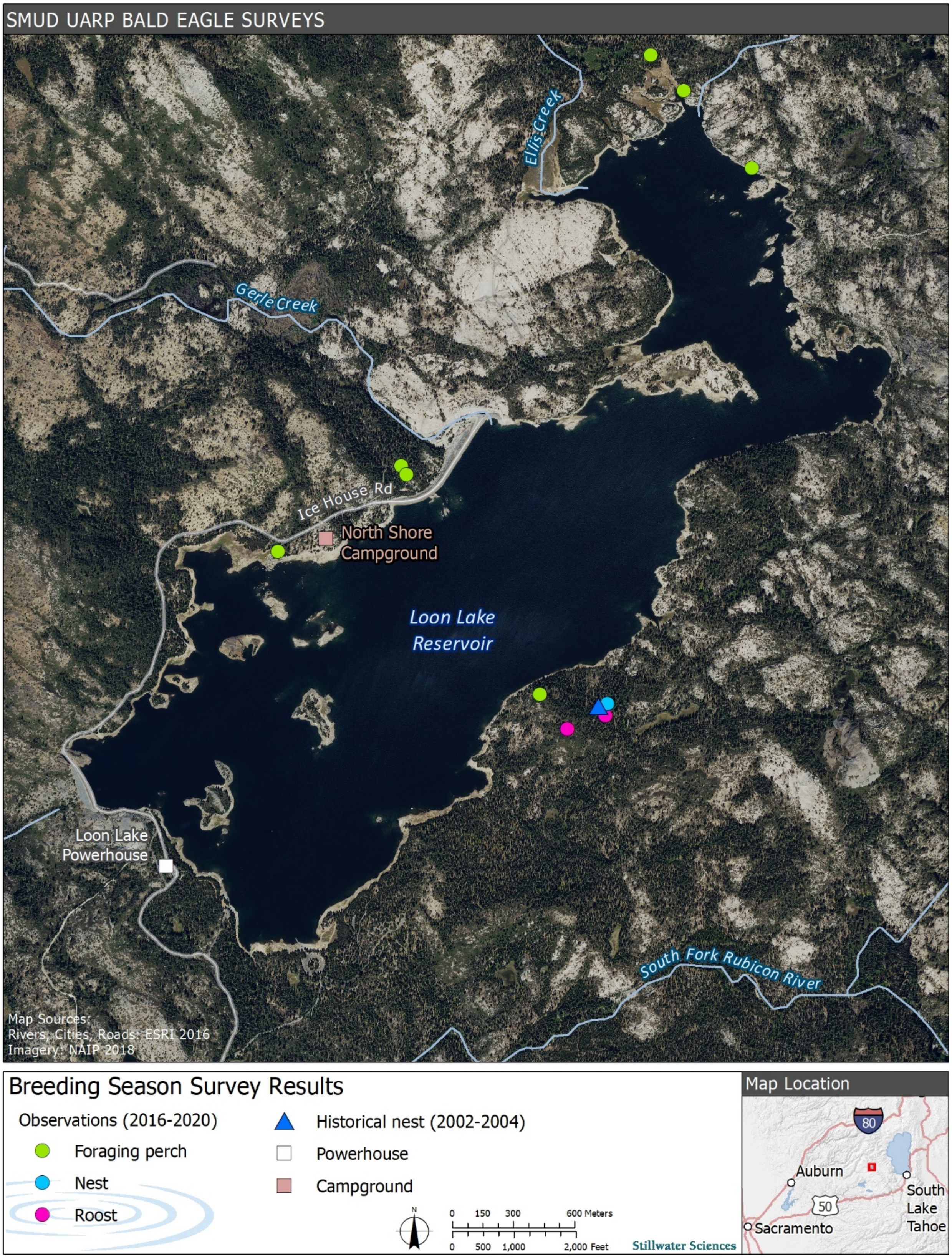

Figure 4-2. Bald eagle activity sites at Loon Lake Reservoir.

Figure 4-3. Adult bald eagle in nest tree on south side of Loon Lake Reservoir (May 2020).

Figure 4-4. Adult bald eagle in perch on north side of Loon Lake Reservoir (June 2020).

4.3.2 Union Valley Reservoir

Observations made via the cameras and microphone installed at the nest tree at Sunset Campground on Union Valley Reservoir indicated nest occupancy and a reproductive attempt in the early breeding season. Two adult bald eagles were periodically seen at the nest (Figure 4-5), and the female was observed in incubation position in early March. In mid-March, a large storm brought over four feet (ft) of snow over the course of three days. The female remained in the nest through most of the storm but on the third day abandoned the egg(s) (Figure 4-6). After the weather abated the pair were occasionally observed at the nest making repairs and feeding or heard in the area; they did not engage in further breeding activity (Figures 6-7 through 6-9). Periodic ground checks were performed at Union Valley Reservoir during the breeding season and, although evidence of continued roosting was noted at Granlees Point approximately 1 mile east of Sunset Campground, no evidence of bald eagle nesting was observed there or elsewhere on the reservoir in 2020.

Figure 4-5. Adult bald eagles at nest in Sunset Campground on Union Valley Reservoir (February 2020).

Figure 4-6. Adult bald eagle following nest abandonment in Sunset Campground on Union Valley Reservoir (March 2020).

Figure 4-7. Adult bald eagle at nest tree in Sunset Campground on Union Valley Reservoir following failed reproductive attempt (March 2020).

Figure 4-8. Adult bald eagle at nest tree in Sunset Campground on Union Valley Reservoir during the mid-breeding season (April 2020).

Figure 4-9. Adult bald eagles at nest tree in Sunset Campground on Union Valley Reservoir during the mid-breeding season (April 2020).

4.4 DISCUSSION

4.4.1 Loon Lake Reservoir

There is a limited season of suitable bald eagle reproductive habitat around Loon Lake Reservoir due to its high elevation (approximately 6,500 ft). The duration of this season varies with weather conditions from year to year. The 2020 water year was dry in the UARP area (CDWR 2020a), and considering elevation, weather conditions at Loon Lake Reservoir were relatively moderate during winter months, although several notable storms occurred in March and early April. Cumulative rainfall at Loon Lake Reservoir during the 2020 breeding season was approximately 21 inches, with the majority (17 inches) occurring before the middle of April and an additional 4 inches falling during precipitation events in May and June (CDWR 2020b [Station ID: LON]). Snowpack (as measured by water content) at the nearby Van Vleck Gage (CDWR 2020b [Station ID: VVL]) averaged approximately 16 inches early in the breeding season but increased to a peak of 31 inches with late season storms in March and early April. Minimum air temperatures regularly dropped below freezing through late April (CDWR 2020b [Station ID: LON]), after which snowpack declined precipitously, melting completely before mid-May (CDWR 2020b [Station ID: VVL]). Reservoir levels during the breeding season remained relatively consistent, ranging from approximately 6,385 to 6,409 ft above mean sea level (CDWRb 2020 [Station ID: LON]).

During the 2020 breeding season, bald eagles initiated breeding activity at Loon Lake Reservoir utilizing the previously documented nest on the south side of the lake and successfully hatched one chick despite notable late season snow accumulation. Based on the estimated age of the chick when first observed in early May and the timing of the second survey during which the nest was unoccupied, it is unlikely the juvenile fledged. More likely, it either fell or was taken out of the nest; juvenile tail feathers observed via spotting scope among the remnants of the nest suggest the latter.

Recreational activity on or around the reservoir was low during the first survey and moderate during the mid- and late breeding season surveys; off-road jeep activity was particularly high during the mid-breeding season survey (Appendix D2). Surveyors noted moderate noise associated with helicopter activity during the initial survey; however, the flight path of the air traffic was routed to avoid the southern side of the reservoir where eagles have been known to nest. Maintenance activities performed by SMUD during the 2020 breeding season were routine and did not involve significant noise generation. No observations of bald eagles exhibiting agitation or appearing disturbed due to recreational, helicopter, and/or maintenance activity at Loon Lake Reservoir were noted during the surveys.

4.4.2 Union Valley Reservoir

Bald eagles continue to use the habitat surrounding Union Valley Reservoir, although the reproductive attempt in 2020 was unsuccessful. A significant snowfall event over the course of three days in mid-March caused the bald eagle pair to abandon the nest at Sunset Campground and, although the eagles remained in the area, they did not make a subsequent reproductive attempt. Prior to the snowfall event, snowpack (as measured by water content) at Robbs Peak Powerhouse remained relatively low, averaging approximately 2.5 inches throughout February and melting entirely by early March; however, over the course of the storm during which the eagles abandoned the nest it increased to 5.3 inches or approximately 4 ft of snow, depending on water content (CDWR 2020b [Station ID: RBP]). Another notable storm occurred in early April, resulting in a maximum snowpack of 7.3 inches that quickly dissipated by the middle of the month (CDWR 2020b [Station ID: RBP]) when minimum air temperatures began to regularly exceed freezing (CDWR 2020b [Station ID: RBP]).

Cumulative precipitation during the breeding season as measured at Moratinni Flat (the closest gage to Union Valley Reservoir with available data) was approximately 25 inches (CDWR 2020b [Station ID: MFT]) with the majority falling in the storms between mid-March and mid-April. Only approximately 2 inches of precipitation occurred from mid-May through the end of the breeding season. The 2020 water year was therefore drier than average with cumulative precipitation in the region approximately 55% of normal (CDWR 2020a). Regardless, reservoir levels remained relatively consistent during the breeding season, gradually increasing from approximately 4,825 ft above mean sea level in March to approximately 4,870 ft by the end of May (CDWR 2020b [Station ID: UNV]) and were therefore unlikely to have affected bald eagle nesting success.

Recreational activity on and around the Union Valley Reservoir during the breeding season was low and consisted of occasional fishing and boating (Appendix D2). No non-routine maintenance or construction activities involving noise-generating equipment were performed at the reservoir during the 2020 breeding season, and the eagles at Sunset Campground were not observed on camera exhibiting agitation or appearing disturbed due to noise activity.

4.5 LITERATURE CITED

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5.0 HARDHEAD

5.1 MONITORING PLAN OBJECTIVES

The objective of the Hardhead Monitoring Plan is to evaluate long-term trends in longitudinal distribution and relative abundance of hardhead (*Mylopharodon conocephalus*) in response to higher minimum streamflow required by 2014 License conditions in the SFAR downstream of Slab Creek Dam (Slab Creek Dam Reach; SMUD 2016). This new flow regime increased summer baseflows from the previous minimum of 36 cfs up to 63 cfs–90 cfs, depending on the month (i.e., lower flows occurring in late summer) and water year type. Long-term trends are being evaluated by a series of 2 consecutive survey years (2016 and 2017, 2019 and 2020, 2024 and 2025, 2029 and 2030), and thereafter for 2 consecutive years during every 10 years for the term of the license.

5.2 METHODS

5.2.1 Field Surveys

The hardhead monitoring area is presented in Figure 1-3. Detailed survey site locations are depicted in Figure 5-1. Site locations and field methods were described in Sections 3.1 and 4.1 of the Hardhead Monitoring Plan (SMUD 2016). Consistent survey locations and methods have been used during monitoring in 2016, 2017, 2019, and 2020 (SMUD 2017, 2018, 2020).

5.2.2 Data Analysis

Detailed analytical methods are in Section 4.2 of the Plan (SMUD 2016).

5.3 RESULTS

Snorkel surveys were conducted on 13 and 14 August 2020. Conditions during the surveys included calm weather, mostly clear skies, and water visibility (estimated with a Secchi disk) that ranged from approximately 10 to 26 ft. Discharge from Slab Creek Dam during the survey effort was 87 cfs.

5.3.1 Habitat Characteristics

Survey sites ranged from approximately 180–428 ft in length and included at least two habitat units (e.g., run, pool, or pocket water). Most habitat units were dominated by boulder substrate (Table 5-1). Fish cover, primarily in the form of large boulders, was present in all units; other forms of cover included overhanging and instream vegetation, undercut bank, and bubble curtains (Table 5-1). Water quality conditions during the sampling effort included high dissolved oxygen levels (average 92.9%), cool water temperatures (ranging from 14.2 °C [57.6 °F] to 18.6 °C [65.5 °F]), and low conductivity (ranging from 18.1 to 20.0 microsiemens per centimeter [µS/cm]; Table 5-2).

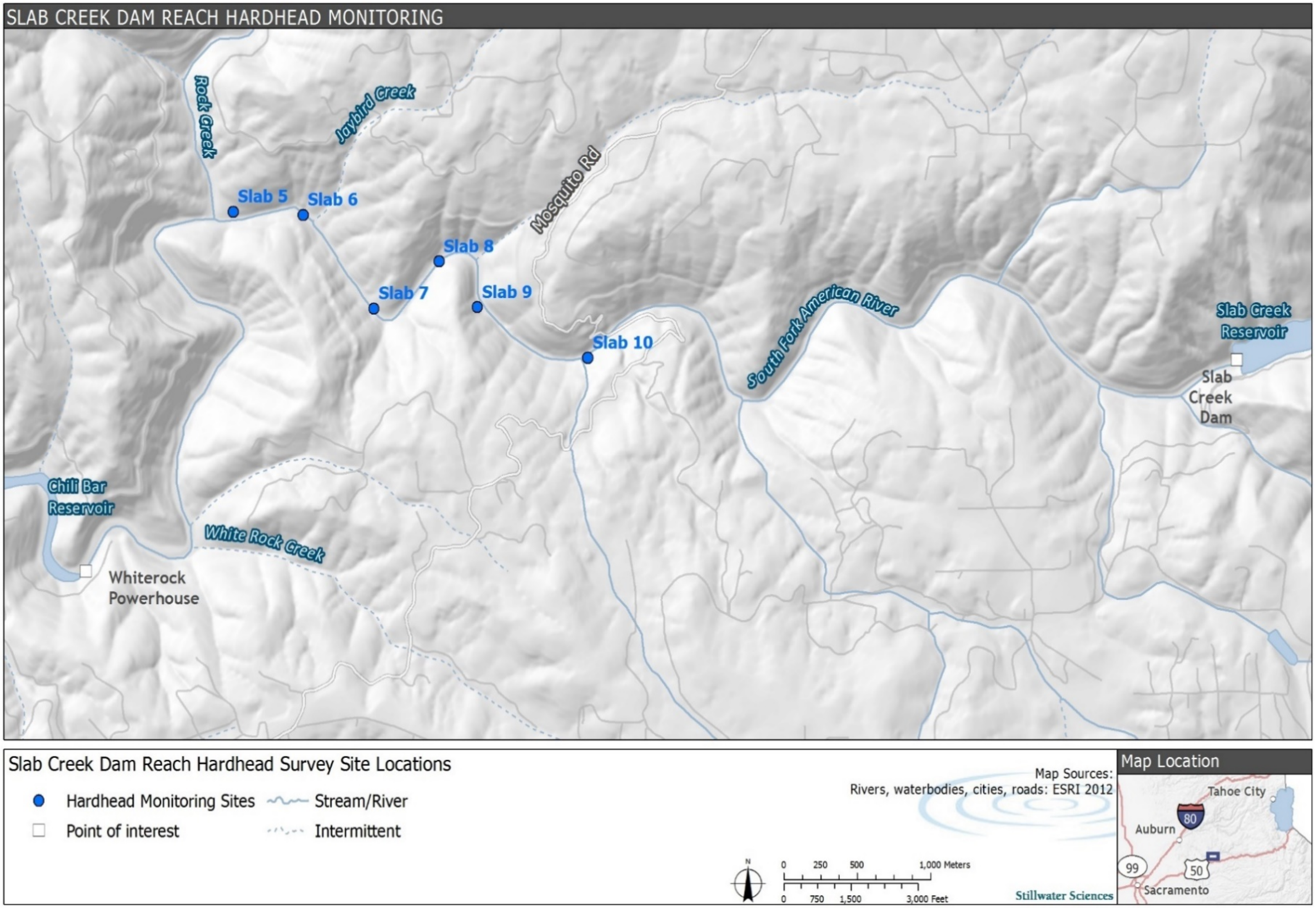

Figure 5-1. Hardhead survey site locations in the Slab Creek Dam Reach of the South Fork American River.

Table 5-7. Physical Characteristics at Survey Sites during Hardhead Monitoring in the Slab Creek Dam Reach, August 2020.

Survey Site	Habitat Type	Substrate		Cover			Average Width (ft)	Unit Length (ft)
		Dominant	Sub-dominant	Dominant	Sub-dominant	Total %		
Slab 5	Pool	Boulder	Bedrock	Boulder	Over-hanging Vegetation	20	57	91
	Run	Boulder	Cobble			25	77	221
Slab 6	Run	Boulder	Cobble	Boulder	Undercut Bank	25	65	114
	Pool	Boulder	Cobble		Over-hanging Vegetation	20	65	314
Slab 7	Pool 1	Boulder	Bedrock	Boulder	Over-hanging Vegetation	10	64	79
	Pool 2	Boulder	Cobble		Bubble Curtain	11	76	69
Slab 8	Pool	Boulder	Cobble	Boulder	Instream Vegetation	25	68	217
	Run 1	Boulder	Cobble		Bubble Curtain	15	66	125
	Run 2	Boulder	Bedrock		Bubble Curtain	10	49	59
Slab 9	Run	Boulder	Bedrock	Boulder	Bubble Curtain	10	52	85
	Pool	Bedrock	Boulder		Bubble Curtain	10	42	95
Slab 10	Run	Boulder	Bedrock	Boulder	Over-hanging Vegetation	20	54	165
	Pocket Water	Cobble	Boulder		Over-hanging Vegetation	10	60	68

ft = feet

Table 5-8. Water Quality Conditions at Survey Sites during Monitoring for Hardhead in the Slab Creek Dam Reach, August 2020.

Survey Site	Habitat Unit	Conductivity (µS/cm)	Temp (°C/°F)	Dissolved Oxygen	
				%	mg/L
Slab 5	Pool	20.0	18.4/65.1	90.4	8.7
	Run				
Slab 6	Run	19.9	18.5/65.3	95.6	9.0
	Pool				
Slab 7	Pool 1	19.8	18.6/65.5	93.4	8.8
	Pool 2				
Slab 8	Pool	19.2	16.9/62.4	94.0	9.0
	Run 1				
	Run 2				
Slab 9	Run	18.8	15.5/59.9	94.1	9.4
	Pool				
Slab 10	Run	18.1	14.2/57.6	89.9	9.2
	Pocket Water				

°C = degrees Celsius
°F = degrees Fahrenheit
µS/cm =microsiemens per centimeter
mg/L = milligrams per liter

5.3.2 Snorkel Surveys

Four fish species were observed in the Slab Creek Dam Reach during the 2020 survey: hardhead, rainbow trout (*Oncorhynchus mykiss*), Sacramento sucker (*Catostomus occidentalis*), and sculpin (*Cottus* spp.). YOY cyprinids[7] (<50 mm total length [TL]) which were too small for positive identification were also observed and are referred to herein as Cyprinid spp. (Figure 5-2).

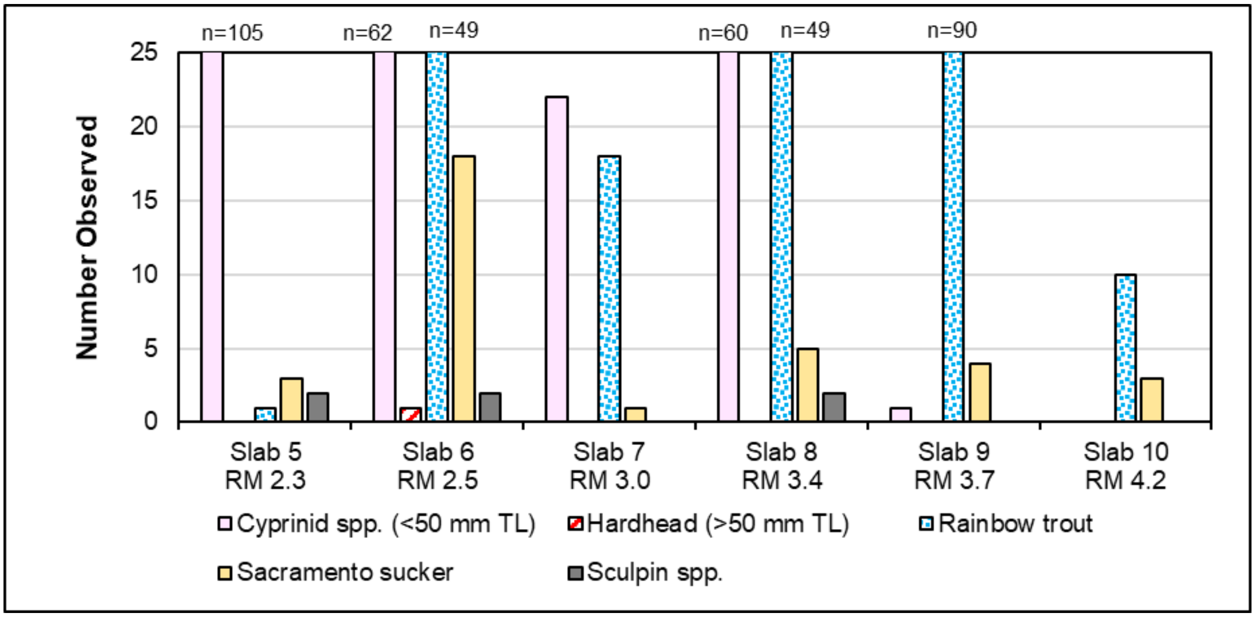

Figure 5-2. Fish species observed during snorkel surveys in the Slab Creek Dam Reach in August 2020.

[7] Likely Sacramento pikeminnow (*Ptychocheilus grandis*) or hardhead based on past observations of older life stages in the reach, but California roach (*Hesperoleucus symmetricus*) and speckled dace (*Rhinichthys osculus)* are also a possibility.

5.3.3 Cyprinids

Cyprinids were observed at every survey site except for Site Slab 10 (Figure 5-2). A single adult hardhead, estimated to be in the 350–375 mm TL size class, was observed at Site Slab 6 (Figure 5-3). One adult hardhead and three adult Sacramento pikeminnow (*Ptychocheilus grandis*) were incidentally observed in a large pool located between sites Slab 6 and Slab 7.

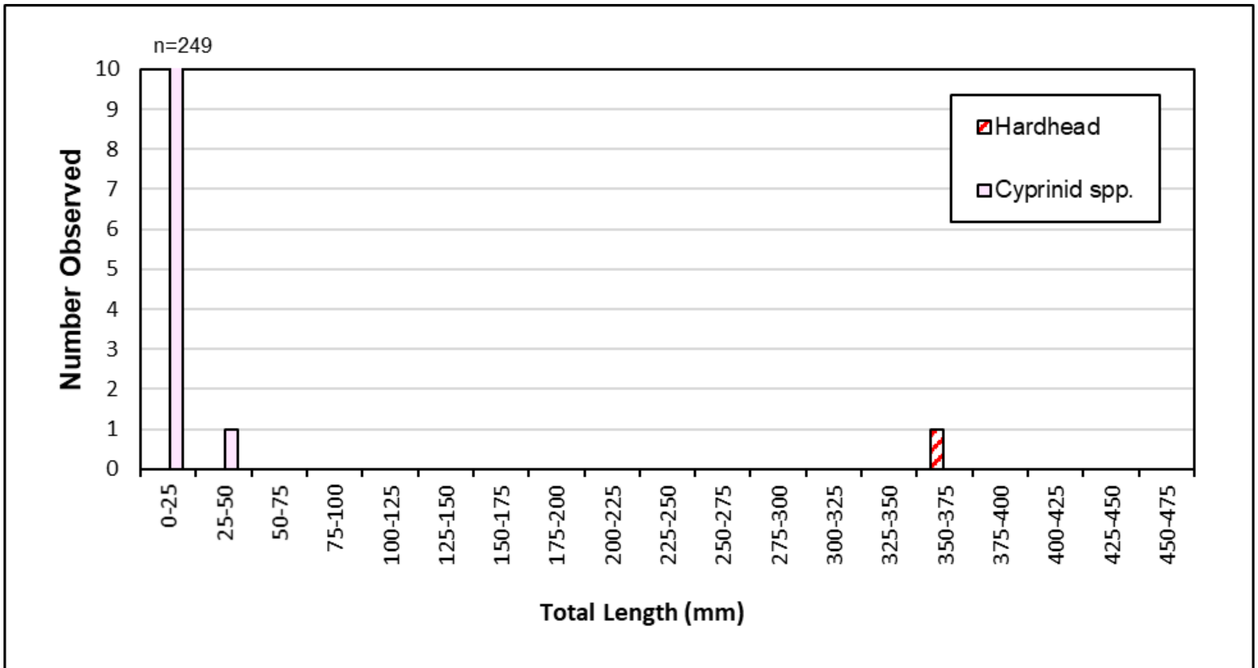

Figure 5-3. Length-frequency histogram for cyprinids observed during snorkel surveys in the Slab Creek Dam Reach in August 2020.

5.3.4 Salmonids

Rainbow trout were encountered at every site within the study reach, with most observations occurring at sites Slab 6 through Slab 9 (Figure 5-2). A total of 217 rainbow trout representing multiple age classes were observed, ranging from 25–375 mm TL (Figure 5-4). One brown trout was incidentally observed in a large pool located between sites Slab 6 and Slab 7.

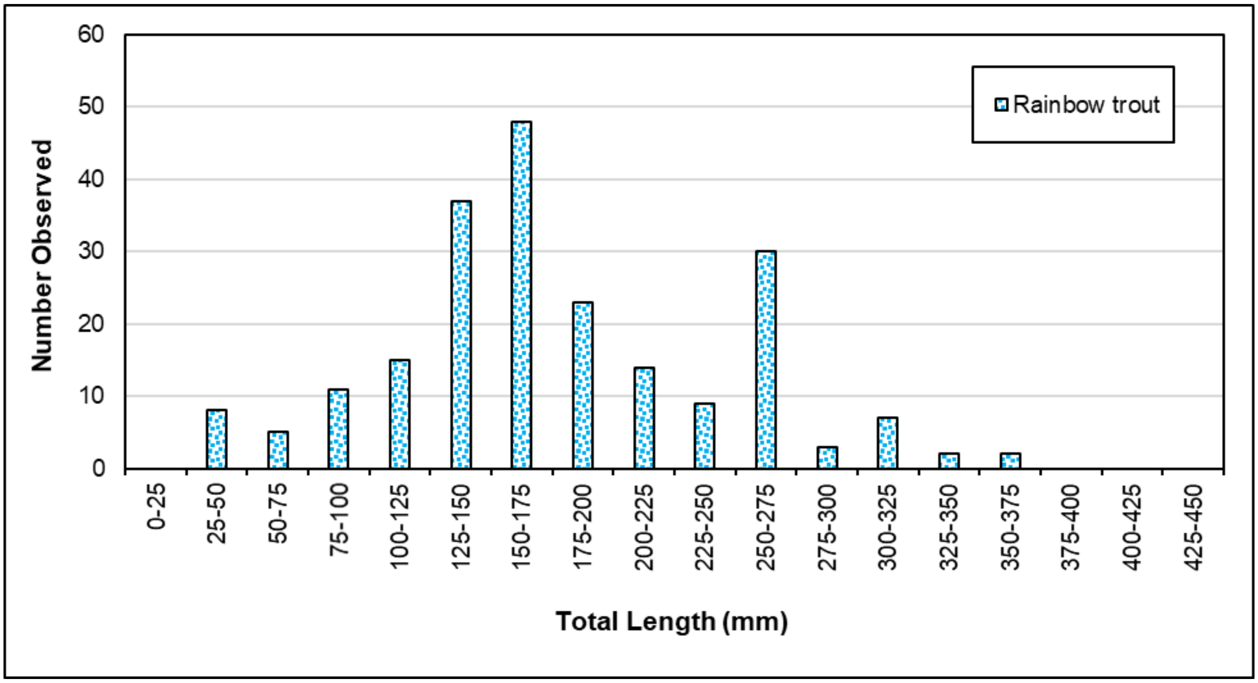

Figure 5-4. Length-frequency histogram for salmonids observed during snorkel surveys in the Slab Creek Dam Reach in August 2020.

5.3.5 Additional Species

Additional taxa observed included Sacramento sucker and sculpin[8] (Figure 5-2). Sacramento sucker were observed at every survey site. A total of 34 Sacramento sucker were observed across all sites, half of which were adults ranging from 275–375 mm TL. The remaining sucker observations were YOY ranging between less than 25 mm TL and 75 mm TL (Figure 5-5). Sculpin (n=6) were observed at sites Slab 5, Slab 7, and Slab 8 and ranged from 25–75 mm TL (Figures 5-2 and 5-5).

[8] Riffle sculpin and prickly sculpin have historically been documented in the Slab Creek Dam Reach during electrofishing surveys (SMUD 2006); however, these species cannot typically be differentiated during snorkel surveys.

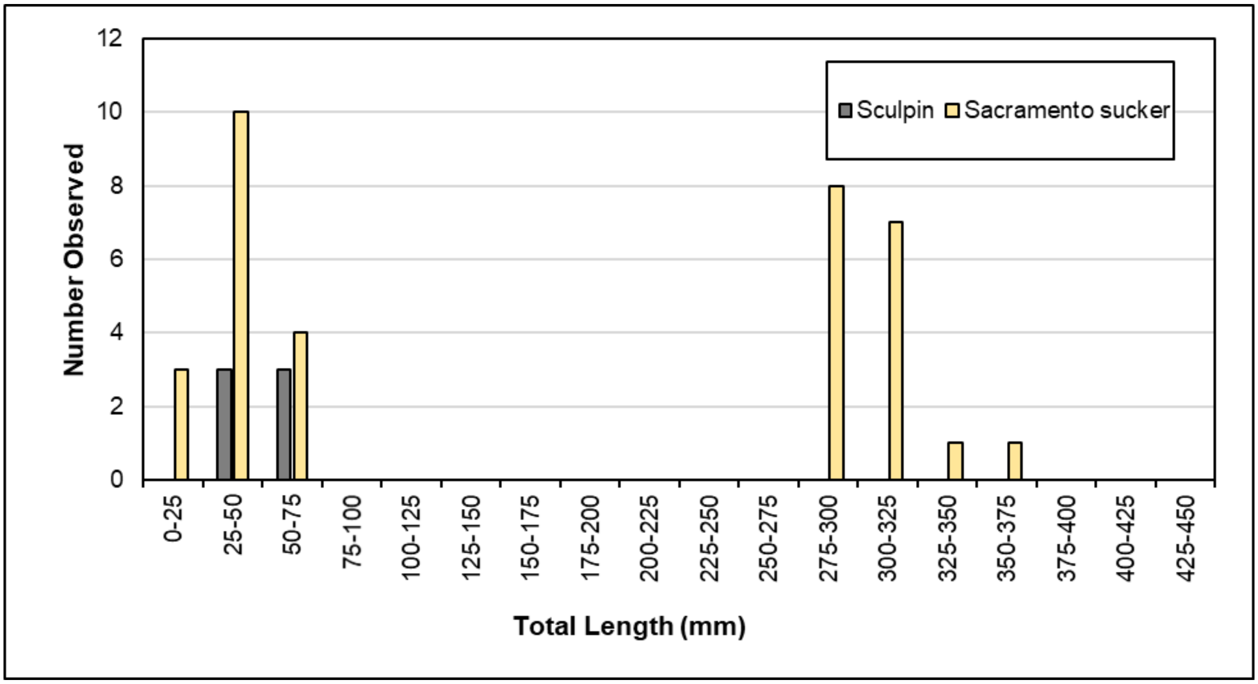

Figure 5-5. Length-frequency histogram for sculpin and Sacramento sucker observed during snorkel surveys in the Slab Creek Dam Reach in August 2020.

5.3.6 Historical Comparison

The 2020 hardhead surveys documented decreased species diversity and shifting species composition compared to previous surveys. In previous survey years, species observations included Sacramento pikeminnow (2004, 2007, 2016, 2017, and 2019), California roach (*Hesperoleucus symmetricus*; 2004), brown trout (*Salmo trutta*; 2007, 2016, and 2017), speckled dace (*Rhinichthys osculus*; 2007, 2016, and 2017), and smallmouth bass (*Micropterus dolomieu*; 2007); however, none of these species were encountered during the 2020 surveys (Figure 5-6). Rainbow trout continued to represent the majority (84%) of non-YOY species observations in 2020 (Figure 5-6). The 2020 survey year was the first in which no Sacramento pikeminnow were confirmed; however, the number of YOY cyprinid observations was the second highest of all survey years (Figures 5-6 and 5-7). Rainbow trout, Sacramento sucker, YOY cyprinids, and sculpin distribution remained similar to previous survey years (Figure 5-6). Unlike previous survey years, very few Sacramento sucker smaller than 50 mm TL were observed in 2020 (Figure 5-7).

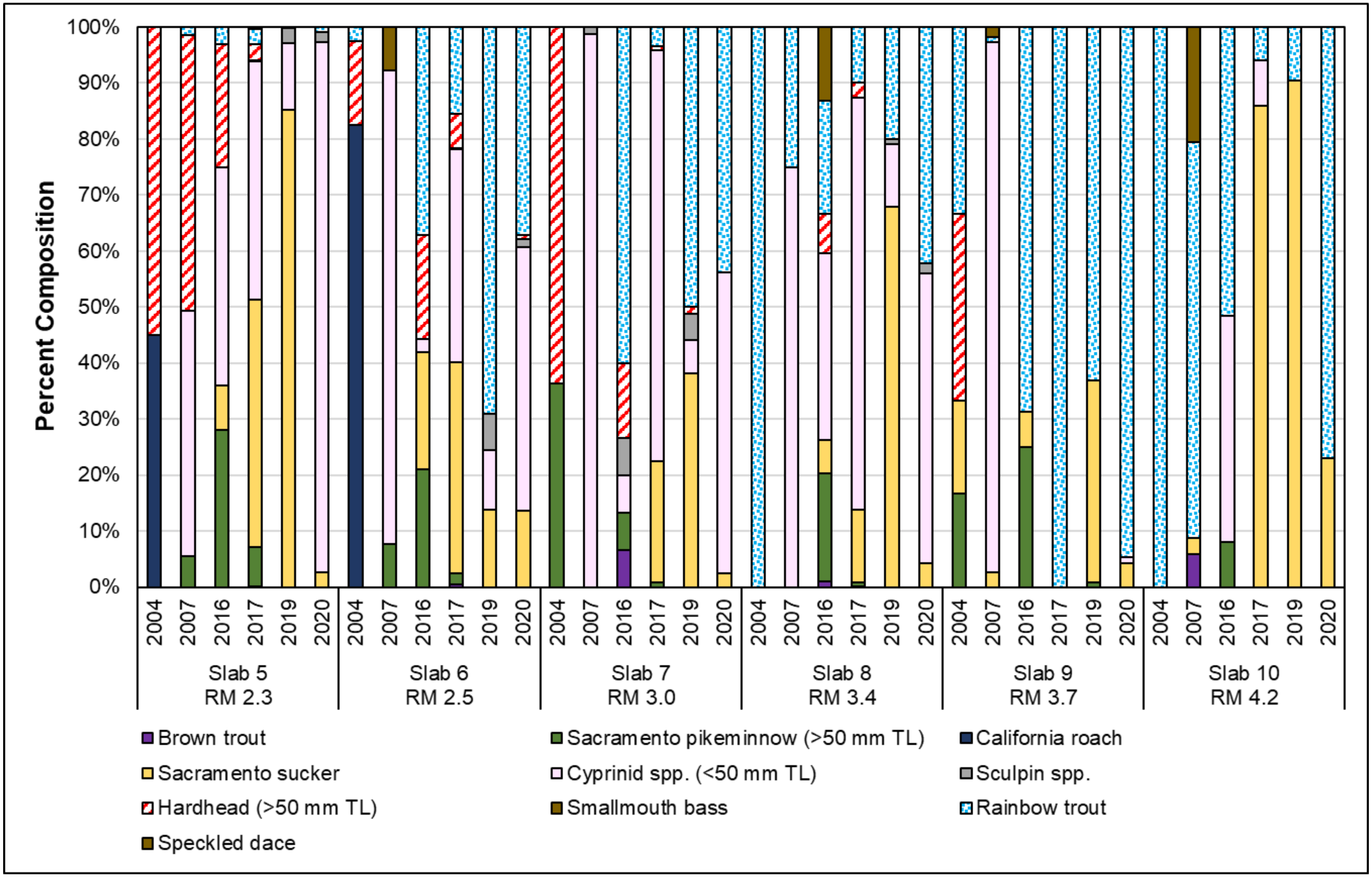

Figure 5-6. Species composition and distribution of fish observed during snorkel surveys conducted in fall 2004 and summer 2007, 2016, 2017, 2019, and 2020.

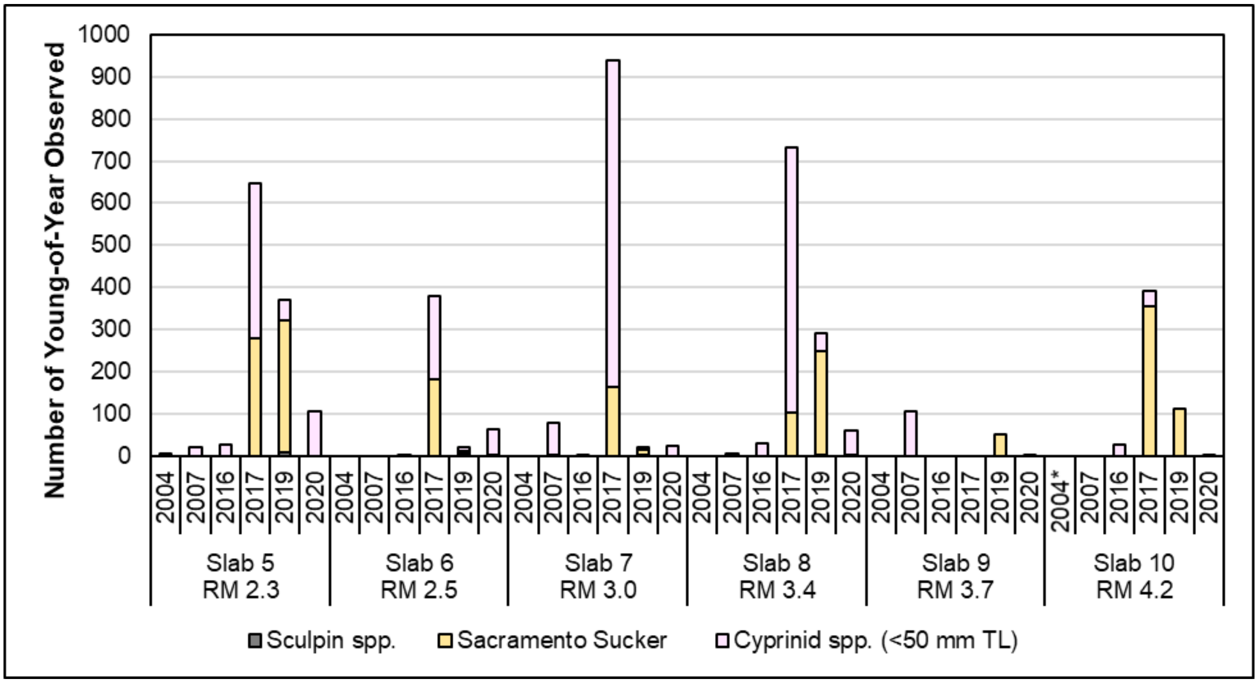

Figure 5-7. Abundance and distribution of YOY fish (<50 mm TL) observed during snorkel surveys conducted in fall 2004 and summer 2007, 2016, 2017, 2019, and 2020.

Hardhead abundance has, on average, declined since surveys began in 2004, although there have been "rebound" years (e.g., 2017). Across survey years, the abundance of hardhead observed were comparable in 2004 and 2017 and in 2007 and 2016 (Figure 5-8). In 2019 and again in 2020 there was only one hardhead observation, representing the lowest number of observations across survey years (Figure 5-8). Prior to 2019, the total number of hardhead observations across sites ranged from 31 in 2016 to 93 in 2004 (Figure 5-8).

The distribution of hardhead observed in the Slab Creek Dam Reach has become increasingly restricted since the 2017 surveys. In 2016–2017, hardhead observations were contiguous between sites Slab 5 and Slab 8; however, in 2019 and 2020 hardhead observations were limited to sites Slab 6 and Slab 7 (Figure 5-9). During the pre-license survey years, hardhead observations were distributed between sites Slab 5 and Slab 9 in 2004 and were limited to Site Slab 5 in 2007 (Figure 5-9).

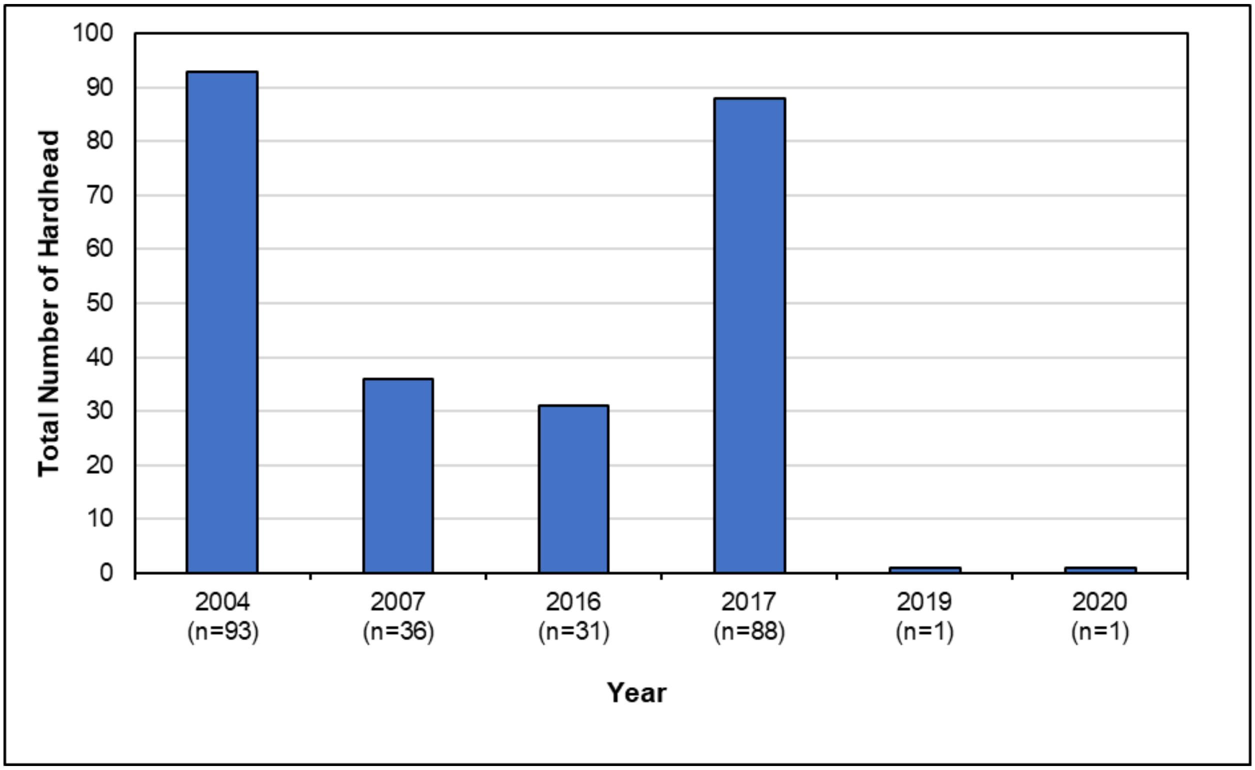

Figure 5-8. Total number of hardhead (>50 mm TL) observed by year across survey sites within the Slab Creek Dam Reach in fall 2004 and summer 2007, 2016, 2017, 2019, and 2020.

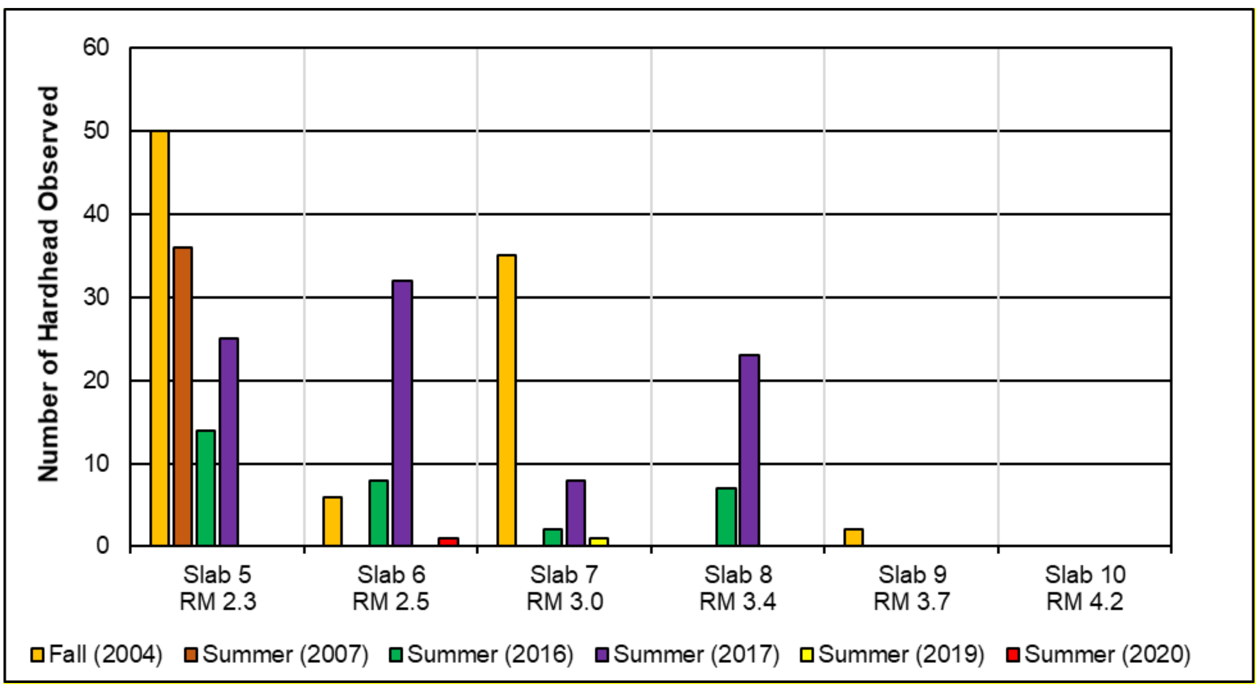

Figure 5-9. Longitudinal distribution of hardhead (>50 mm TL) by site within the Slab Creek Dam Reach in fall 2004 and summer 2007, 2016, 2017, 2019, and 2020.

Under the new flow regime, reach-wide densities of hardhead have gone down, but results are variable by site. Comparing pre-license (2004, 2007) and post-license (2016, 2017, 2019, 2020) monitoring years, high-density sites (i.e., sites Slab 5 and Slab 7) have declined under the new flow regime (Figure 5-10). At lower density sites, such as Slab 6 and Slab 8, pre-license and post-license density trends were mixed, with densities of hardhead observations increasing in 2016 and 2017 but decreasing in 2019 and 2020 (Figure 5-10). Regardless of flow regime, during years of higher reach-wide hardhead density, such as 2004 and 2017, hardhead densities trend downward as river miles increase (i.e., with distance upstream).

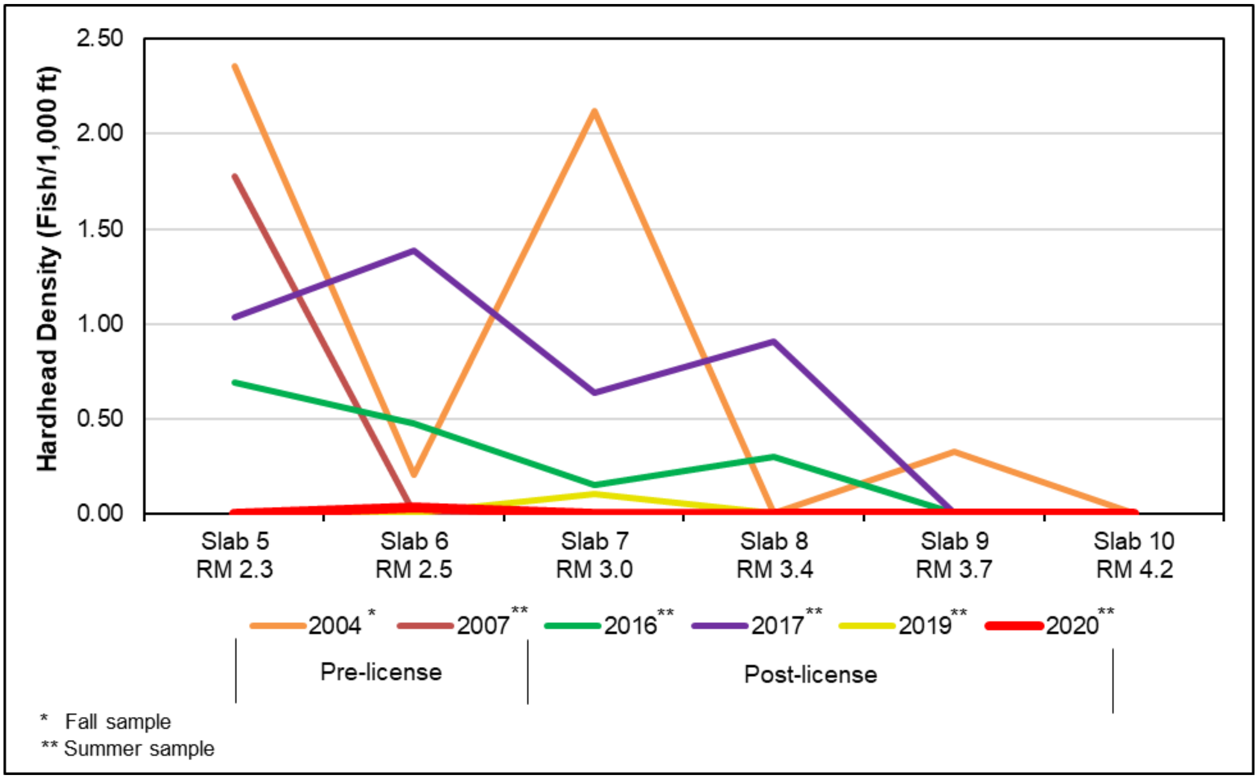

Figure 5-10. Hardhead (>50 mm TL) density by site within the Slab Creek Dam Reach in fall 2004 and summer 2007, 2016, 2017, 2019, and 2020.

5.4 DISCUSSION

A new minimum streamflow regime was implemented in the Slab Creek Dam Reach following FERC license issuance in July 2014. As a result, the thermal regime changed, and mean summer water temperatures decreased (Figures 5-11 and 5-12). It was previously hypothesized by members of the Relicensing Aquatic Technical Work Group that there may be a change in hardhead distribution as a result, which was the primary reason for developing the monitoring plan.

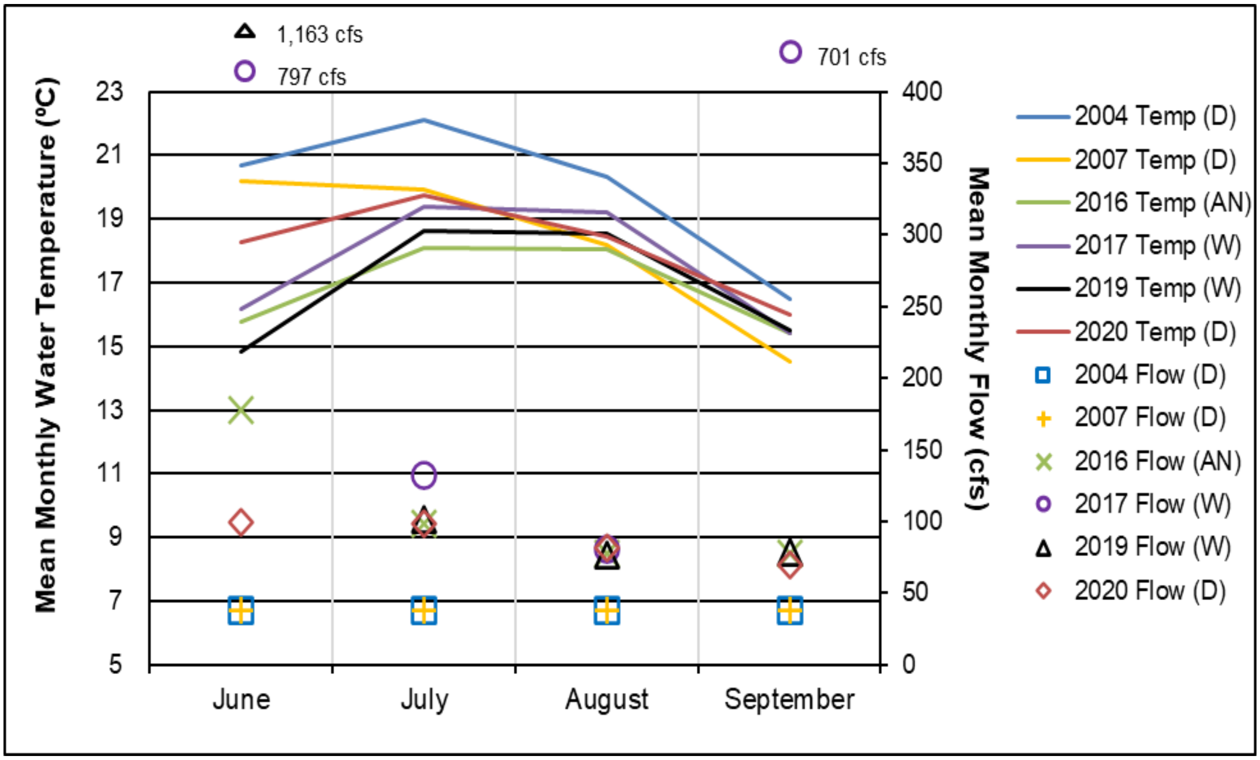

Figure 5-11. Mean monthly water temperatures and water year type (“D” = Dry, “AN” = Above Normal, “W” = Wet) in the South Fork American River above White Rock Powerhouse (SMUD Gage SFAR15, RM 0.0) and mean monthly flow below Slab Creek Dam, before (2004–2007) and after (2016–2020) the new minimum flow regime.

Note: The June 2017 water temperature is an estimate generated by subtracting the monthly temperature differential between June and July 2018 (a similar water year) from July 2017, necessitated by temperature logger loss.

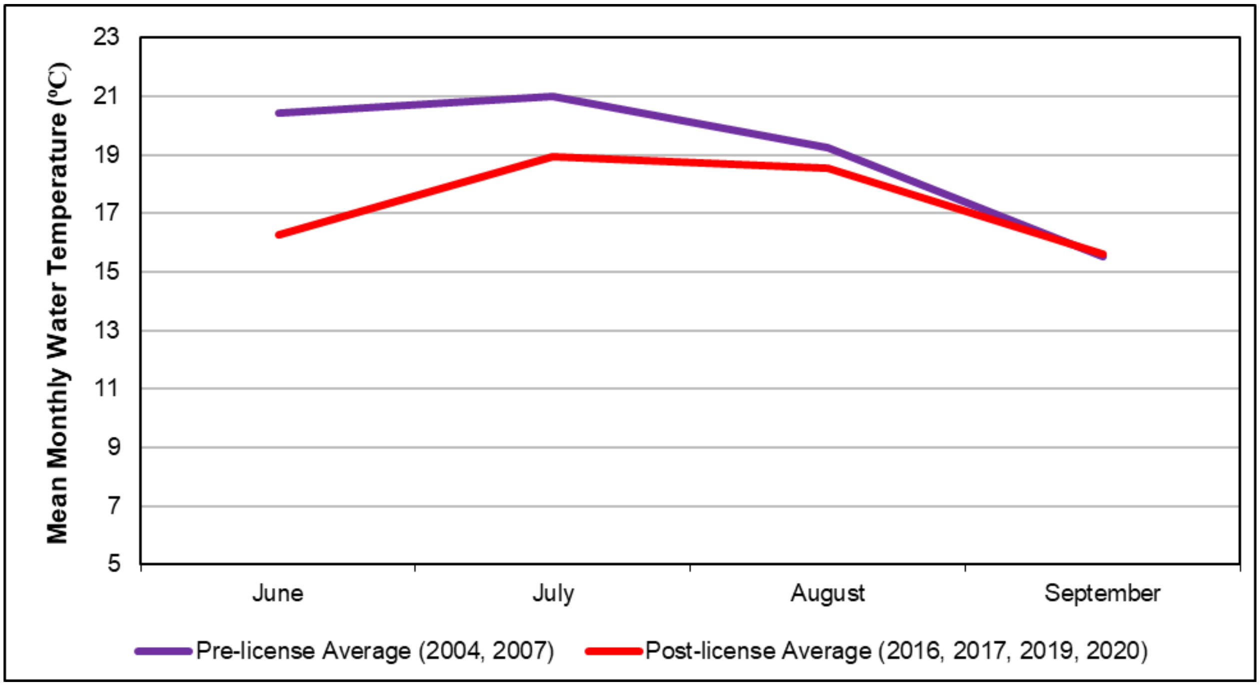

Figure 5-12. Mean monthly water temperatures in the South Fork American River above White Rock Powerhouse (SMUD Gage SFAR15, RM 0.0) before and after the new minimum flow regime.

Hardhead have experienced a decline in numbers and density in the study reach in the years since the new minimum instream flow regime was implemented, particularly in 2019 and 2020 when only one adult hardhead was observed each year (Figures 5-8 and 5-10). Age-class distributions during the post-license monitoring years were atypical and skewed towards older age classes, particularly in 2017, when a majority of observed hardhead were age 2+ or older, and in 2019 and 2020, when the two hardhead observed were both age 3+ or older (Figure 5-13), which suggests limited recruitment during those years.

Hardhead reach maturity at age two and spawn in the spring, mainly in April and May, although spawning may continue into August in foothill streams (Moyle 2002). The 2017 and 2019 water years were categorized as wet, with high flows occurring from January through June 2017, September 2017 through January 2018, and in May through June 2019 (Figure 5-14). Streams containing hardhead typically have summer temperatures in excess of 20 °C, and optimal temperatures are 24–28 °C (Moyle 2002). Average mean monthly water temperatures above White Rock Powerhouse (the bottom and warmest portion of the Slab Creek Dam Reach) under the old flow regime were approximately 20 °C in June and 21 °C in July and decreased by 4 °C and 2 °C, respectively, under the new regime (Figure 5-12). These colder water temperatures and/or high flow periods cited above likely reduced the reproductive success of hardhead, leading to lower numbers in the study reach and associated reduction in their longitudinal distribution in the SFAR below Slab Creek Dam.

Notably, low numbers of age 1+ hardhead in 2017 (which would have reached reproductive maturity in 2018) could have had a cumulative negative effect on hardhead density in subsequent years by lowering the density of reproductive adults. Additionally, June 2019 had the highest mean monthly flow and lowest mean monthly water temperature compared to June of other monitoring years, which may have further limited reproductive success (Figure 5-11) prior to years when the lowest number of hardhead were observed (2019 and 2020).

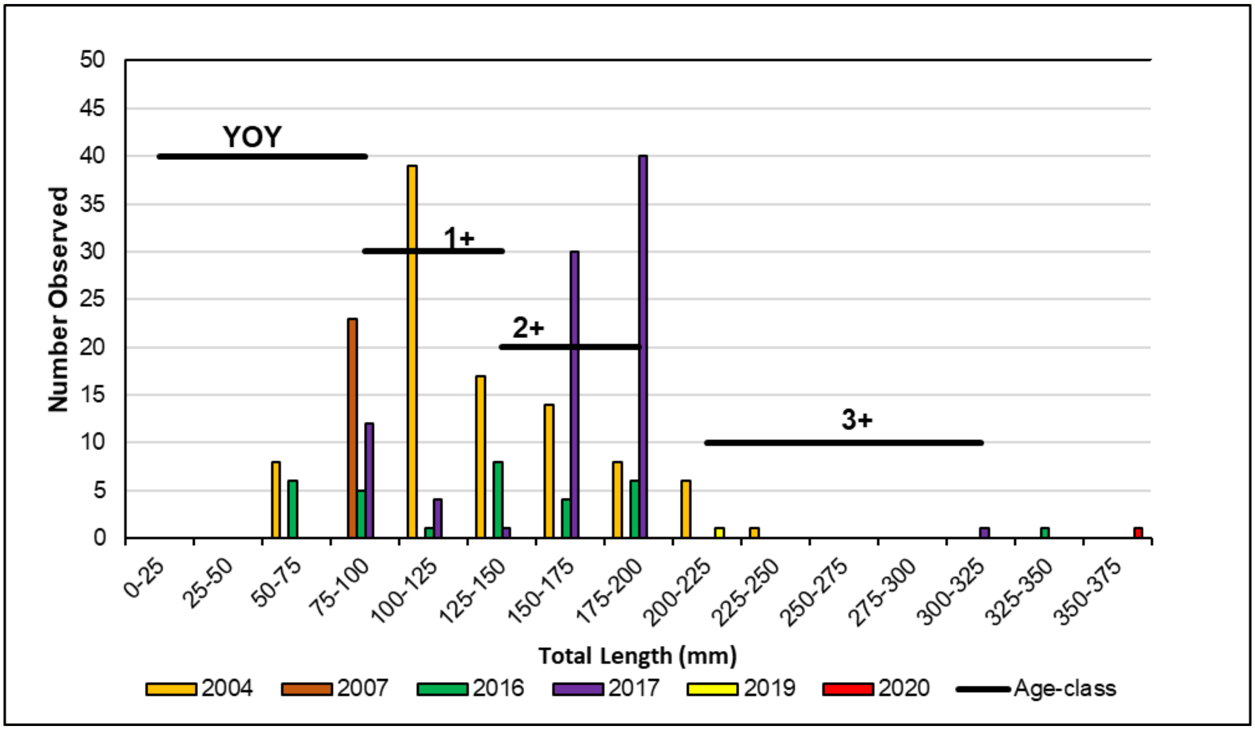

Figure 5-13. Age-class (Moyle 2002) and length-frequency distribution of hardhead in the Slab Creek Dam Reach in fall 2004 and summer 2007, 2016, 2017, 2019, and 2020.

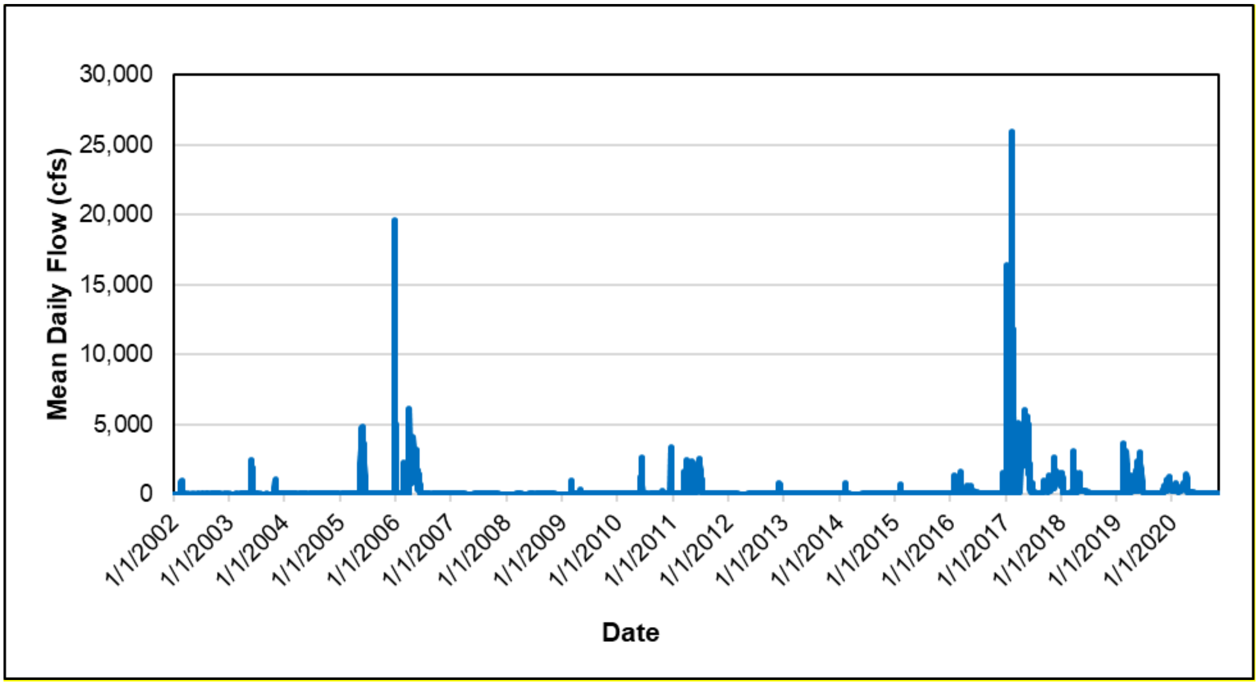

Figure 5-14. Mean daily flow below Slab Creek Dam, 2002–2020 (USFS Gage 11443500).

Increased minimum flow has decreased mean monthly temperatures within the reach compared to the pre-license survey years (Figures 5-11 and 5-14); if this is the primary causal mechanism for the decline of hardhead within the study reach, it would be consistent with the original hypothesis of the Relicensing Aquatic Technical Work Group.[9]

The 2020 hardhead survey was the fourth year of monitoring since implementation of the new flow regime. The upcoming surveys in 2024 and 2025 will provide further insight into the degree the new minimum flows are affecting the hardhead population within the reach, and whether the hardhead declines observed to date are a permanent consequence of the flow change or simply a multi-year anomaly in the population trend.

[9] Seasonally high flows are not unusual in the Slab Creek Dam Reach, or in other areas inhabited by hardhead (e.g., SFAR above Slab Creek Reservoir), and data collection to date has occurred during multiple water year types. Thus, the water temperature effects of the new flow regime (particularly given the known temperature preferences of hardhead), as opposed to seasonal high flows, are considered the more likely factor for the observed reduction in hardhead numbers in the study reach.

5.5 LITERATURE CITED

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6.0 AMPHIBIAN AND AQUATIC REPTILE

6.1 MONITORING PLAN OBJECTIVES

The main objectives of the Amphibian and Aquatic Reptile Monitoring Plan (SMUD 2016) are to monitor for and document the presence and distribution of sensitive amphibians and aquatic reptiles, focused primarily on foothill yellow-legged frog (*Rana boylii*) (FYLF) and western pond turtle (*Actinemys marmorata*) (WPT), over the term of the License (SMUD 2016a). Monitoring is being conducted to help determine if populations of these species in Project-affected streams are increasing or decreasing in response to higher minimum streamflows required by the 2014 License conditions or other streamflow fluctuations; additional details of the objectives are presented in the monitoring plan. The monitoring plan also includes stream water temperature monitoring at sites with known breeding or suitable breeding habitat for FYLF. Temperature monitoring is intended to provide information about the relationship between water temperature and the initiation of FYLF breeding.

6.2 FIELD METHODS

6.2.1 Monitoring Sites

In accordance with the monitoring plan, three monitoring sites within two Project reaches[10] were surveyed during License Year 6 (2020), as listed in Table 6-1 and illustrated in Figure 6-1. These sites include locations with either documented FYLF presence (Camino Dam sites CD-A3 and CD-A4) or potential habitat (Site SCD-A1), as described in the monitoring plan. Three additional monitoring sites (JD-A15, RC-A1, and RPD-A1) within three Project reaches were surveyed during License Years 2–5 (2016–2019), as scheduled per the 2014 License conditions (Table 6-1 and Figure 6-1). FYLF and WPT observed during relicensing studies (2003–2004) and license implementation studies (2016–2020) are documented in Table 6-2. Results from the first five years implementing the monitoring plan (2016–2020) are also summarized in Section 6.4 and discussed in Section 6.5.

[10] “Project reach” is a term used in this report to describe a segment of stream downstream of a dam (e.g., “Camino Dam Reach” is Silver Creek downstream of Camino Dam)

Table 6-1. Amphibian and Aquatic Reptile Monitoring Sites, 2016–2020 (gray shading denotes sites not scheduled for 2020 monitoring).

Project Reach	Site Code	Site Description	UTM Coordinates[a]		Site Length[b,c]	Elevation[b,d]
			Downstream End	Upstream End		
Camino Dam Reach	CD-A3	Silver Creek below Camino Reservoir Dam (near Camino Adit)	4298484 N/ 710087 E	4298651 N/ 710236 E	735 ft/ 0.14 mi	2,336 ft
	CD-A4	Silver Creek below Camino Reservoir Dam (at confluence with South Fork American River)	4296233 N/ 709331 E	4296310 N/ 709424 E	404 ft/ 0.08 mi	2,067 ft
Slab Creek Dam Reach	SCD-A1	South Fork American River below Slab Creek Reservoir Dam	4292873 N/ 692573 E	4295022 N/ 692931 E	10,404 ft/ 2.0 mi	1,007 ft
Junction Dam Reach	JD-A15	Silver Creek below Junction Reservoir Dam	4302306 N/ 713564 E	4302466 N/ 713444 E	653 ft/ 0.12 mi	3,045 ft
Rock Creek Reach	RC-A1	Rock Creek	4294981 N/ 692886 E	4296217 N/ 693204 E	4,954 ft/ 1.0 mi	1,102 ft
Robbs Peak Dam Reach	RPD-A1	South Fork Rubicon River below Gerle Creek	4315114 N/ 722291 E	4314923 N/ 725341 E	11,883 ft/ 2.25 mi[e]	4,505 ft

[a] Projection: North American Datum 1983 (NAD83) Universal Transverse Mercator (UTM) Zone 10 North, N = Northing, E = Easting
[b] Site lengths and elevations are calculated in geographic information systems (GIS) (projection: NAD83 UTM Zone 10 North)
[c] Site lengths are reported in feet (ft) and miles (mi)
[d] Elevation is for the most downstream survey location at the site
[e] Only 2.25 mi of the 4.8-mi Robbs Peak Dam Reach (originally described in the Plan) was surveyed during 2016 due to unsafe access conditions in the rest of the reach

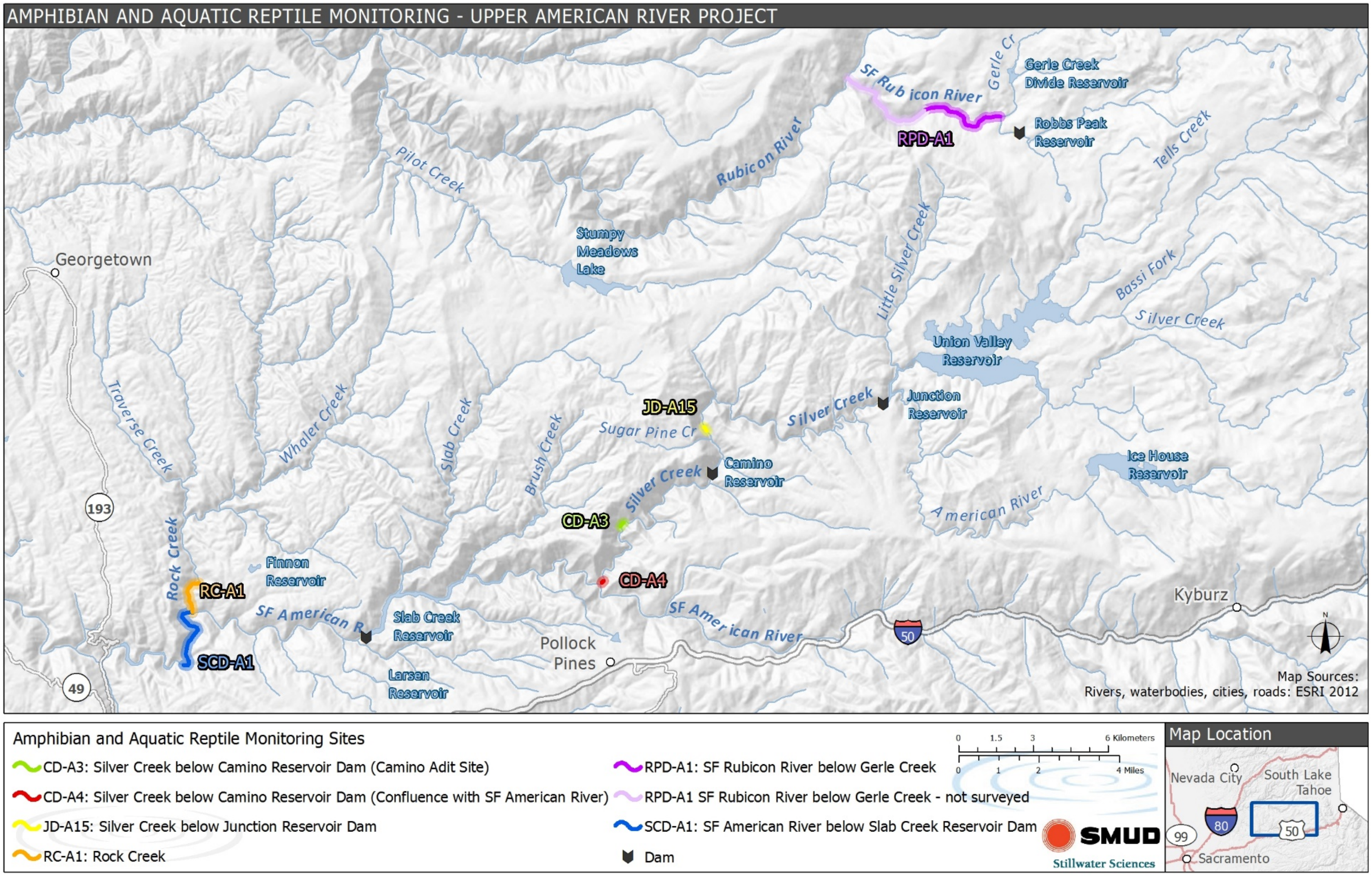

Figure 6-1. Amphibian and aquatic reptile monitoring sites and study area overview, 2016–2020.

Table 6-2. Foothill Yellow-legged Frog and Western Pond Turtle Observations at Amphibian and Aquatic Reptile Monitoring Sites (gray shading denotes sites not scheduled for 2020 monitoring).

Project Reach	Site Code	Foothill Yellow-legged Frogs Observed[a]						Western Pond Turtles Observed[a]						Water Temperature Monitoring
		2003/ 2004	2016	2017	2018	2019	2020	2003/ 2004	2016	2017	2018	2019	2020	
Camino Dam Reach	CD-A3	Yes	Yes	Yes	Yes	Yes	Yes	No	No	No	No	No	No	Yes
	CD-A4	Yes	No	No	Yes	No	Yes	No	No	No	No	No	No	Yes
Slab Creek Dam Reach	SCD-A1	No	No	No	No	No	No	Yes	Yes	Yes	No	Yes	Yes	Yes
Junction Dam Reach	JD-A15	No	No	No	--[b]	No	--[b]	No	No	No	--[b]	No	No	No
Rock Creek Reach	RC-A1	No	No	No	No	--[b]	--[b]	No	No	No	No	--[b]	--[b]	No
Robbs Peak Dam Reach	RPD-A1	No	No	--[b]	--[b]	--[b]	--[b]	No	No	--[b]	--[b]	--[b]	--[b]	No

[a] Relicensing studies (2003–2004), and the first 5 years of license implementation studies (2016–2020)
[b] Monitoring not conducted per the 2014 License monitoring schedule and FERC-approved Amphibian and Aquatic Reptile Monitoring Plan

6.2.2 Foothill Yellow-legged Frog

6.2.2.1 Visual Encounter Surveys

Visual Encounter Surveys (VESs) were performed in all safely accessible and permissible areas within each site, following protocols outlined in the Visual Encounter Survey Protocol for *Rana boylii* in Lotic Environments (Peek et al. 2017), as well as protocols like those outlined in Heyer et al. (1994), Lind (1997), and Pacific Gas and Electric Company (PG&E) (2002a, 2002b). In addition to FYLF, all other amphibian and reptile species observed during the surveys were recorded, as well as any potential predators (e.g., fish, crayfish, and bullfrogs). The survey methodology specific for each species and site follows methods first described in the monitoring plan (SMUD 2016a) and expanded on in the 2017 and 2018 Annual Monitoring Reports (SMUD 2018 and 2019).

Five focused VESs were conducted at each site in 2020 as follows:

- two egg mass surveys during the late breeding and early tadpole development period (between June and early July)
- two tadpole surveys during the tadpole development period (between July and early September), and
- one survey for newly metamorphosed (YOY [11]) FYLF in fall (between September and October).

One additional survey was conducted at Site CD-A3 to help determine the end of the oviposition (breeding). Survey dates for each site are listed in Table 6-3. VESs were conducted once crews were able to safely navigate study reaches downstream of dam infrastructure without risk of uncontrolled spill events.

[11] An individual was classified as a young-of-year (YOY) based on size (snout-to-vent length which can measure from 22 to 27 millimeters [mm] [0.8 to 1 in], but typically from 22 to 24 mm [0.8 to 0.9 in] [Nussbaum et al. 1983, Zeiner et al. 1988, PG&E 2002a]) and possible evidence of tail absorption; in addition, young-of-year are present in fall only.

Table 6-3. Amphibian and Aquatic Reptile Monitoring Survey Dates, 2020.

Site Code	Site Description	Survey Date (2020)					
		VES 1	VES 2	VES 2b	VES 3	VES 4	VES 5
CD-A3	Silver Creek below Camino Reservoir Dam (near Camino Adit)	6/19[a]	6/30	7/13	8/13[b]	9/1	9/29
CD-A4	Silver Creek below Camino Reservoir Dam (near confluence with South Fork American River)	6/17[a]	6/29	--[c]	8/11[b]	9/18	10/14
SCD-A1	South Fork American River below Slab Creek Reservoir Dam	6/18	7/14	--[c]	8/12[b]	9/2	9/30

[a] Adaptive management survey following a Camino Dam spill event

[b] Focused western pond turtle surveys were conducted at all sites during mid-August surveys (though incidental WPT sightings were recorded during all VESs)

[c] An additional survey to determine oviposition (egg-laying) timing was not conducted because egg masses were not found at sites CD-A4 and SCD-A1.

6.2.2.2 Water Temperature Monitoring

The monitoring plan (SMUD 2016a) requires five years of thalweg and edgewater temperature monitoring as an indicator of FYLF breeding initiation at the two sites below Camino Reservoir Dam (historical breeding sites CD-A3 and CD-A4) and below Slab Creek Reservoir Dam (suitable breeding Site SCD-A1) during years 2 through 6 of the License.

Two Onset Hobo© Pro v2 water temperature loggers ("temperature loggers") were deployed at each temperature monitoring site during October 2019 and remained installed until June 2020 (until April 2020 for Site CD-A3), labeled as follows: CD-A3-1 and CD-A3-2 (at Site CD-A3), CD-A4-1 and CD-A4-2 (at Site CD-A4), and SCD-A1-5 and SCD-A1-6 (at Site SCD-A1). These temperature loggers remained deployed over winter to ensure water temperature data were collected during the onset of the 2020 breeding season (April–June), anticipating site conditions in spring could preclude safe access for temperature logger installation. A total of six edgewater temperature loggers were then deployed at each site in either April or June and remained until September or October 2020, in addition to one thalweg temperature logger deployed at Site CD-A3. The approximate temperature monitoring locations are depicted in Figure 6-2 through Figure 6-4. Temperature logger location photos are provided in Appendix E. Temperature logger deployment materials and methods follow those described in the monitoring plan (SMUD 2016a) and expanded on in the 2017 and 2018 monitoring reports (SMUD 2018 and 2019).

Figure 6-2. Temperature logger locations at amphibian and aquatic reptile monitoring Site CD-A3, 2020.

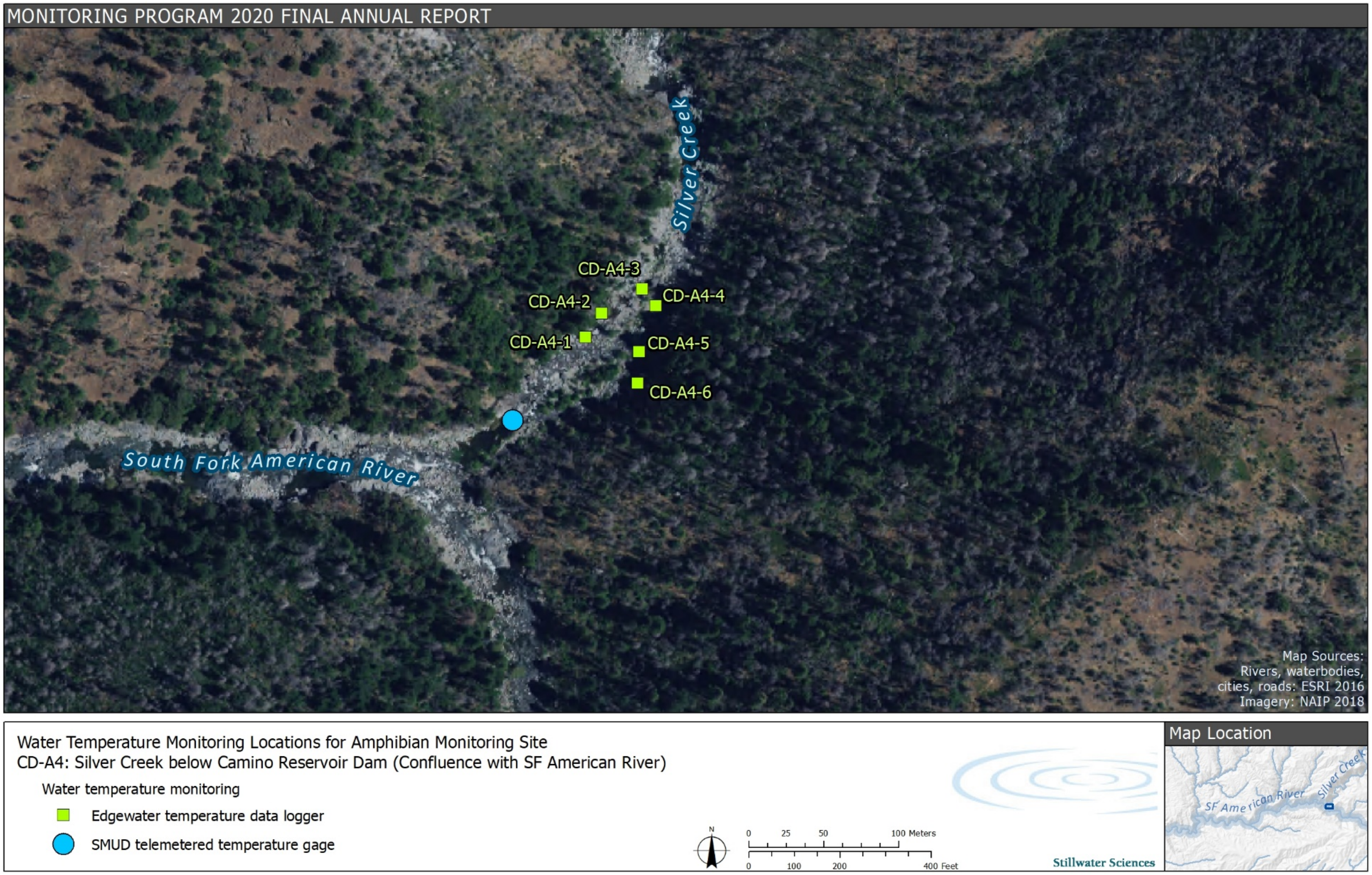

Figure 6-3. Temperature logger locations at amphibian and aquatic reptile monitoring Site CD-A4, 2020.

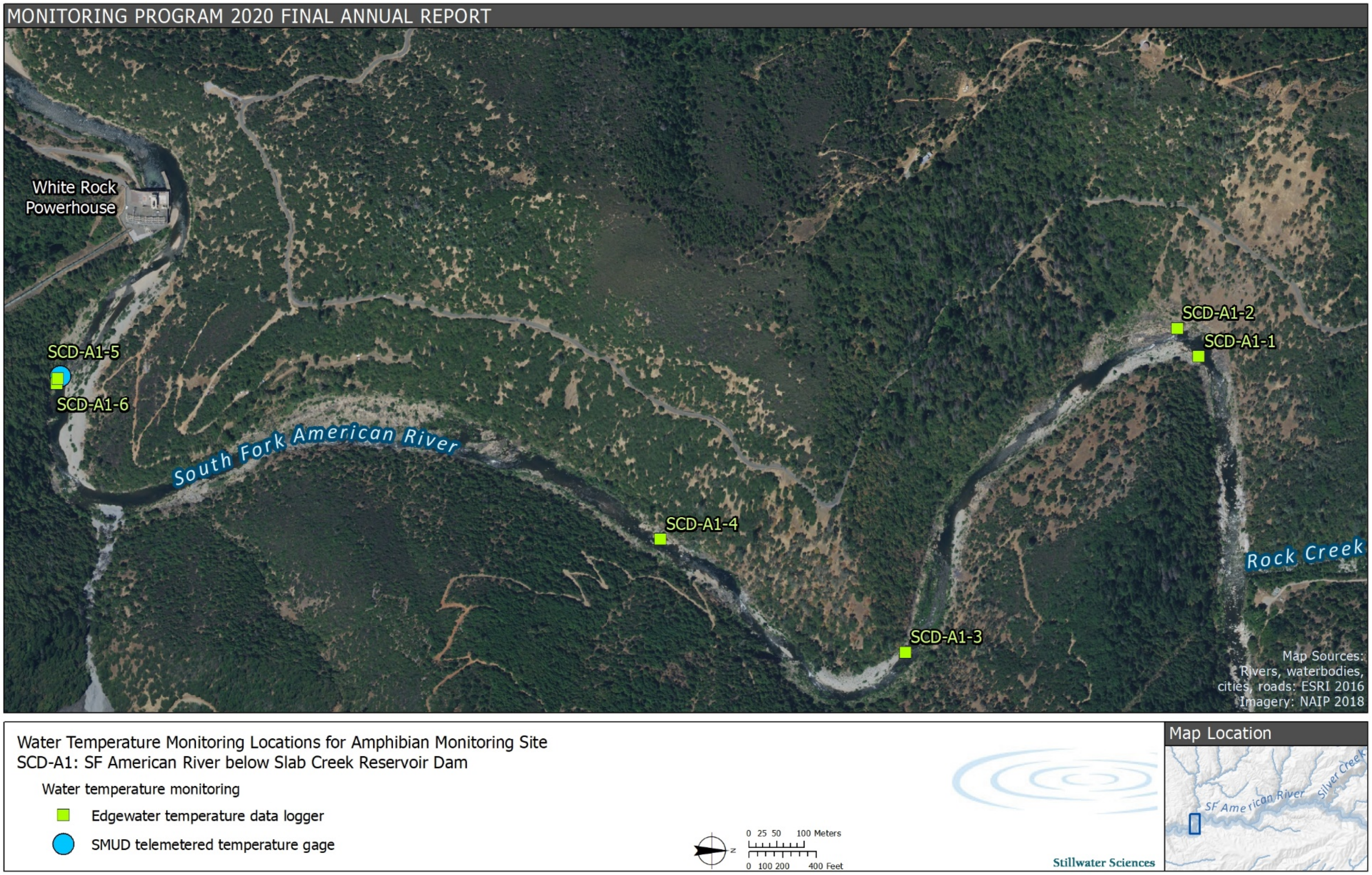

Figure 6-4. Temperature logger locations at amphibian and aquatic reptile monitoring Site SCD-A1, 2020.

6.2.2.3 Adaptive Management Monitoring

As part of adaptive management, the Amphibian and Aquatic Reptile Monitoring Plan outlines requirements for SMUD to monitor FYLF following spill events at Camino and Slab Creek reservoirs, and during flow fluctuations from Camino Dam (SMUD 2016a). Monitoring for effects to FYLF include looking for evidence of damage, displacement, or scouring of egg mass or larvae, as well as evidence of egg mass or larval stranding/desiccation.

There was a spill event that occurred after temperatures exceeded a daily mean of 12°C for a 7-day moving average that triggered adaptive management monitoring at the Silver Creek monitoring sites. The spill event occurred at Camino Reservoir during dewatering of the Camino Adit needed for Camino Tunnel operations and maintenance. Mean daily flows in Silver Creek during the spill event ranged between 209 and 270 cfs. Adaptive management monitoring coincided with VES 1.

SMUD's Block of Water Plan (2016b) describes possible requirements to monitor for FYLF if block water releases are required in wet water year types to maintain water temperatures in Silver Creek below Camino Reservoir Dam. No block releases were required and thus no FYLF monitoring was conducted per the Block of Water Plan in 2020.

6.2.3 Western Pond Turtle

Focused WPT surveys were conducted concurrently with the mid-summer (mid-August) FYLF surveys (Table 6-3), where one dedicated surveyor looked for WPT (for the survey on the SFAR there were two dedicated WPT surveyors due to the larger river channel width). In addition, any incidental WPT sightings were recorded (and morphological data recorded for captured turtles) during all other VESs. The survey methodology follows methods described in the monitoring plan (SMUD 2016a) and 2017, 2018, and 2019 monitoring reports (SMUD 2018, 2019, and 2020).

6.3 RESULTS (2020)

Table 6-4 provides survey start and end times, along with water and air temperatures recorded during VESs at each site. Representative monitoring site habitat photos are included in Appendix E.

Table 6-4. Foothill Yellow-legged Frog and Western Pond Turtle Survey Conditions, 2020.

Site Code	Survey Date (2020)	VES #	Time		Temperature Ranges	
			Start Time (hours)	End Time (hours)	Water (°C)	Air (°C)
CD-A3	6/19	1	1115	1350	14–15	26–34
	6/30	2	1015	1240	14–15	25–26.5
	7/13	2b	1448	1631	18–19	31.5–37
	8/13	3	1055	1215	17–18	27–28
	9/1	4	1500	1600	18.5	26
	9/29	5	1450	1647	16–17	27–34
CD-A4	6/17	1	1130	1324	14–16	25.5–26
	6/29	2	1200	1345	17–17.5	25.5–29.5
	8/11	3	1350	1435	23–23.5	32.5–34
	9/18	4	1445	1600	17	21–22
	10/14	5	1030	1126	11–12	17–21
SCD-A1	6/18	1	1000	1826	14–19	21–24
	7/14	2	940	1524	16–20.5	22–33
	8/12	3	1015	1610	15–20	28–30.5
	9/2	4	945	1545	15–18	24–24.5
	9/30	5	1040	1700	13.5–16	26–28

VES # = Visual Encounter Survey number
°C = degrees Celsius

6.3.1 Foothill Yellow-legged Frog

6.3.1.1 Visual Encounter Surveys

FYLFs were found at monitoring sites CD-A3 and CD-A4 (Silver Creek below Camino Reservoir Dam and Silver Creek near the SFAR confluence, respectively) during 2020 VESs, similar to prior years. No FYLFs were documented at Site SCD-A1 (SFAR below Slab Creek Reservoir Dam). FYLFs have only ever been documented at sites CD-A3 and CD-A4 during relicensing studies (2003–2004) and during the first four years of license implementation studies (2016–2019) (Table 6-2).

All FYLF life stages were observed at sites CD-A3 and CD-A4, including: two egg masses, up to an estimated 126 tadpoles, 11 YOY, and 3 adults[12]. Observation locations are illustrated in Figure 6-5 and Figure 6-6. In addition, post-metamorphs (adults or YOY) were observed incidentally at Site CD-A3 during BMI monitoring, in the

12 An individual was classified as adult if it possessed secondary sexual characteristics (such as enlarged nuptial pads in males) or was equal to or greater than 37 mm (2 in) snout-to-vent length (Storer 1925, Zweifel 1955).

tributary adjacent to the foot trail to Silver Creek, and in Camino Adit by SMUD staff. Details of all FYLF observations are in the subsections below.

Egg Masses

Two FYLF egg masses were observed during 2020 surveys (Table 6-5). Both FYLF egg masses (coded as egg masses “A” and “B”) were observed at Site CD-A3 on 19 June 2020 during the first VES; their locations were monitored throughout the remaining VESs. On 19 June, the mean edgewater temperature for Site CD-A3 was 14.1º Celsius (C) and the mean daily flow was 34 cfs (water temperature monitoring is described in Section 6.3.1.2.).

Egg Mass A was already predominantly hatched; it was found on river left in a side pool connected to the main channel on its upstream end, with little flow filtering through the downstream end of the pool. The egg mass was in a deeply recessed cavity of bedrock and small boulders, with the cavity entrance facing downstream (Figure 6-7). During the survey, there was no measured flow at the cavity entrance (0.1 meters (m) (0.3 ft) deep), and the flow in the pool was 0.02–0.46 feet per second (ft/sec) (0.2–0.5 m [0.7–1.6 ft] deep). Water temperature measured at the egg mass during the survey was 15ºC. The egg mass was mostly spent, with approximately 40 FYLF tadpoles observed nearby in the same pool (see Tadpole section below). The tadpoles were 15 mm in length and estimated at Gosner stage 24–25.

Egg Mass B was also on river left in a pool, located in the main channel upstream of a riffle. The egg mass was in a deeply recessed cavity formed by small boulders, with its opening facing downstream (Figure 6-8). During the survey, the water was flowing at the cavity entrance at 0.04 ft/sec and was 0.15 m deep. The pool had a measured flow of 0.16 ft/sec, was 0.18–0.22 m deep, and 15ºC. The egg mass was partially spent and approximately ten tadpoles were in the surrounding area. The tadpoles were 15 mm in length and estimated at Gosner (1960) stage 24.

No FYLF egg masses were observed at sites CD-A4 or SCD-A1.

Figure 6-5. Foothill yellow-legged frog observation locations at or near Site CD-A3, 2020.

Figure 6-6. Foothill yellow-legged frog observation locations at Site CD-A4, 2020.

Figure 6-7. Foothill yellow-legged frog Egg Mass A (top-left) and tadpole (top-right) found in side-channel pool habitat (bottom) at Site CD-A3, 19 June 2020.

Figure 6-8. Foothill yellow-legged frog Egg Mass B (top-left) found in a pool at the top of riffle habitat (top-right, bottom) at Site CD-A3, 19 June 2020.

Table 6-5. Foothill Yellow-legged Frog Egg Mass Observation Locations and Data, 2020.

Location Description	Date (2020)	Number Observed	Location Code	Gosner Stage[a]	Habitat
Site CD-A3, Silver Creek Near Camino Adit	6/19	1	A	19+[b]	Main channel side pool
		1	B	18–19	Pool at the top of a riffle

[a] Gosner (1960)
[b] Most eggs were hatched

Suitability for breeding and tadpole-rearing was different at the two egg mass locations. Egg Mass A was in a side pool connected to the main channel with no riparian cover and good sun exposure (Figure 6-7). Flows at the pool were slower than the main channel, making it beneficial for tadpole rearing. Water temperatures in this pool (also water temperature monitoring Site CD-A3-4, edgewater 4) were up to 1ºC warmer than the thalweg temperatures during the spring and summer breeding months (edgewater temperatures are described in Section 6.3.1.2). Periphyton, a tadpole food source, was present throughout the surveys. Cobble and algae provided suitable cover for tadpoles to evade predators (e.g., garter snakes). These conditions likely helped tadpoles remain in the same location throughout the rearing season (June–September). Egg Mass B was located adjacent to the left bank along the main channel upstream of a riffle. After hatching, tadpoles were exposed to higher flows (e.g., closer to those of the main stem) (Figure 6-8). The lack of slow backwater habitat as refuge may have caused tadpoles to disperse relatively soon thereafter, likely explaining why no tadpoles were observed there after July 2020.

<u>Tadpoles</u>

A total of 180 FYLF tadpole observations in eight separate locations were recorded during 2020 surveys, all found at sites CD-A3 and CD-A4 (Table 6-6). The largest number of tadpoles found at Site CD-A3 were associated with the locations for egg masses A and B; five tadpole groups were observed at other locations along the reach (Figure 6-5). One solitary tadpole was recorded at Site CD-A4 (Figure 6-6).

Tadpoles were observed at the same location as Egg Mass A during all VESs between 19 June and 1 September 2020. This pool had measured edgewater temperature of 12.3–23ºC from 19 June through 1 September 2020 (edgewater temperatures are described in Section 6.3.1.2.). The cobble bottom of the pool developed a layer of algae that increased throughout the summer (Figure 6-9). The pool had no riparian cover, and the surrounding vegetation was limited to a few patches of sedges. Two Sierra garter snakes (*Thamnophis couchii*), predators to FYLF tadpoles, were observed in the pool on 1 September 2020 (Figure 6-10).

Tadpoles at the Egg Mass B location were observed on 19 June and 30 June 2020. The bank was lined with alders, shading the tadpole location. On 30 June 2020, tadpoles were also observed in the riffle directly downstream of the egg mass location (Figure 6-11). No tadpoles were observed at this location or in the riffle after 30 June 2020.

Three additional FYLF tadpole/tadpole groups were observed at Site CD-A3 (Figure 6-12). A single tadpole was observed on 19 June 2020 on river right in a connected side pool, the same location where one tadpole was observed in October 2019 (SMUD 2020) and three tadpoles were observed in September 2018 (SMUD 2019). Tadpole rearing conditions in this pool were much less suitable this year as compared with prior years because of lower water levels. This year, there was no hydrologic connection between this pool and the main channel; as a result, the water there was very warm (13.1–25.2ºC) and potentially anoxic (i.e., low dissolved oxygen).

A single tadpole was observed on 13 July 2020 on river left upstream of the Egg Mass A pool; this tadpole was in a deep backwater side pool next to Sierra newt (*Taricha sierrae*) larvae. The largest tadpole of 2020 was observed on 1 September, measuring at 54 mm with developed hind-legs, it was found in a backwater side pool.

One solitary tadpole was observed at Site CD-A4, located in a backwater pool on 17 June 2020 (Table 6-6). This is the only tadpole documented at Site CD-A4 during all years of license implementation surveys. The pool is located in a side channel dominated by boulders and cobbles, with a maximum depth of 0.35 m, flow of 0.06 ft/sec, and water temperature of 19ºC. The cobbles and boulders were covered in sediment.

No FYLF tadpoles were observed at Site SCD-A1.

Table 6-6. Foothill Yellow-legged Frog Tadpole Observation Locations and Data, 2020.

Location Description	Date (2020)	Number Observed[a]	Length mm (inches)[b]	Egg Mass Location (A or B)	Gosner Stage[d]	Habitat
Site CD-A3, Silver Creek Near Camino Adit	6/19	2	15 (0.6)	-	24	Backwater pool
		40	15 (0.6)	A	24–25	Main channel side pool
		10	15 (0.6)	B	24	Pool at the top of a riffle
	6/30	15	18 (0.7)	A	25	Main channel side pool
		75	13 (0.5)	B	24	Pool at the top of a riffle
	7/13	2	--[c]	--	--[c]	Run/ backwater pool
		20	33–34 (1.3)	A	25	Main channel side pool
		4	--[c]	B	--[c]	Pool at the top of a riffle
	8/13	8	45 (1.8)	A	36–37	Main channel side pool
	9/1	1	54 (2.1)	--	41	Backwater side pool
		2	--[c]	A	--[c]	Main channel side pool
Site CD-A4, Silver Creek at Confluence with South Fork American River	6/17	1	--[c]	--	24–25	Backwater pool

[a] Estimated for groups of tadpoles greater than 10
[b] mm = millimeters; lengths are approximate for groups of tadpoles, based on captured individuals
[c] No data; individual observed but not captured
[d] Gosner (1960)

Figure 6-9. Foothill yellow-legged frog tadpoles found at Site CD-A3 in pool near Egg Mass A (left), and habitat conditions on 30 June 2020 (top right), and 13 August 2020 (bottom right).

Figure 6-10. Sierra garter snake at Site CD-A3 in pool near Egg Mass A (left) and pool conditions (right), 1 September 2020.

Figure 6-11. Foothill yellow-legged frog tadpoles found at Site CD-A3 in pool near Egg Mass B (top), and upstream pool (bottom left) and downstream riffle (bottom right) habitat, 30 June 2020.

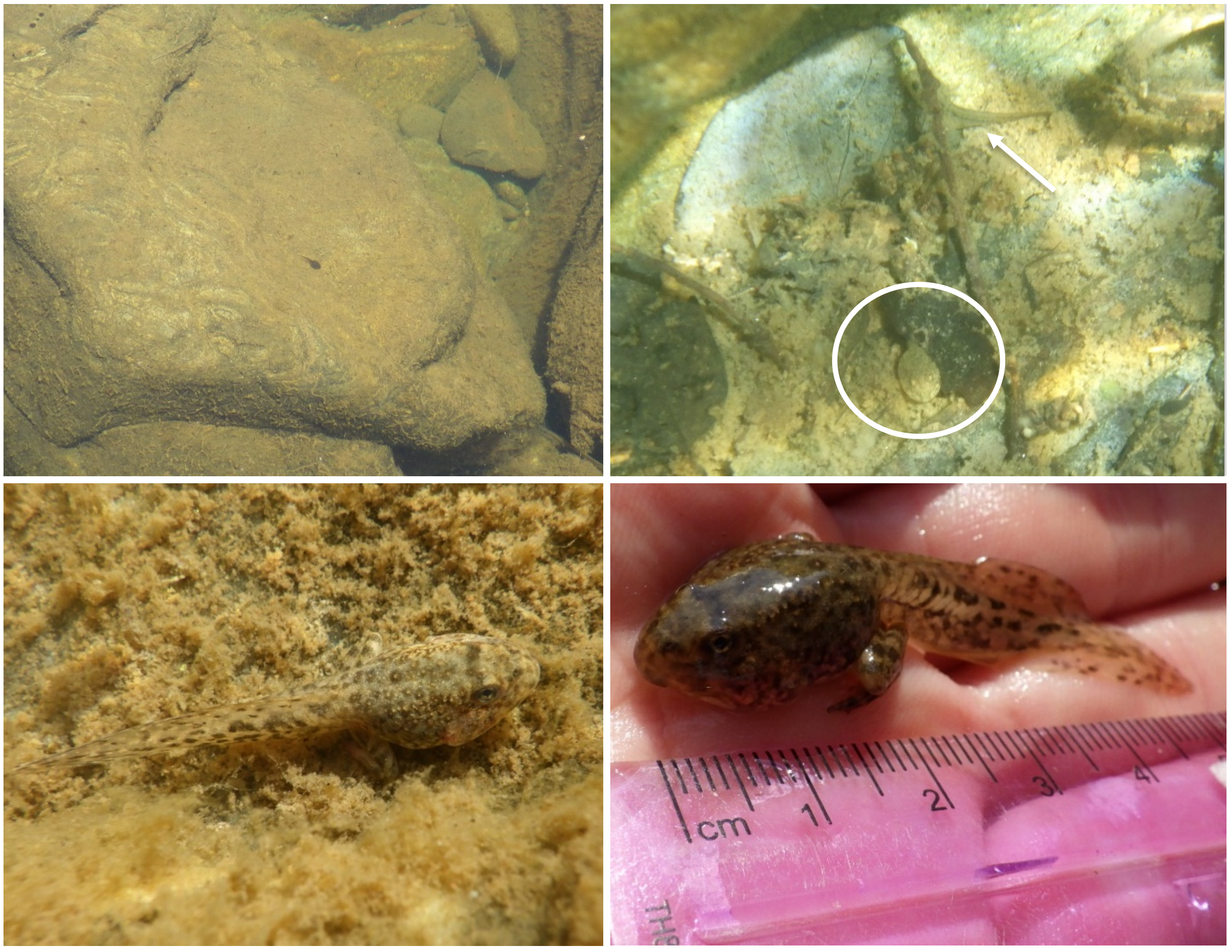

Figure 6-12. Foothill yellow-legged frog tadpoles found at Site CD-A3 (not associated with observed egg mass) on 19 June 2020 (top left), 13 July 2020 (FYLF circled, Sierra newt larvae with arrow) (top right), and 1 September 2020 (bottom).

Post-Metamorphs (Young-of-Year and Adults)

A total of 17 post-metamorphic FYLF were observed in 2020 (Table 6-7); one adult was found in June and the rest were found between September and October. All adults were observed at or near Site CD-A3, while YOYs were observed at both sites CD-A3 and CD-A4.

Four adults were observed at Site CD-A3 (Figure 6-5); one on 18 September 2020 (an incidental observation during a BMI survey) and three on 29 September (during a VES). Two adults were males (Figure 6-13) and two adults were unknown sex (not captured) (Figure 6-14 and Figure 6-15). The adults were found throughout the reach in various habitats, including a side channel pool, a cobble dominated riffle, a bedrock backwater pool, and a small pool on a bedrock island with sedges. All the individuals found on 29 September 2020 were observed partially or fully submerged in the water and shaded by boulders or vegetation.

Eleven YOY were observed at sites CD-A3 and CD-A4 (Figure 6-5 and Figure 6-6); captured individuals measured between 18 and 26 mm. Eight YOYs were observed on Site CD-A3 over the course of two surveys (18 September and 29 September 2020 [Figure 6-16 and Figure 6-15]). Three YOY were observed at Site CD-A4 over the course of two surveys (18 September and 14 October 2020 [Figure 6-16]). Of the total YOYs observed at both sites, ten were found in or adjacent to the main channel in various habitats including on the bank, on a bedrock island, in riffles, and in backwater pools. Only one YOY was found upslope (approximately 2 m) from the main channel's edge, in a small hillside seep (at Site CD-A3). The majority of the YOYs at both sites were observed in locations with some flow, while only two individuals were found in backwater pools with no observed flow.

Other areas with previous incidental FYLF sightings that were informally and opportunistically searched for FYLF during site visits in 2020 included a small tributary near the foot trail to Site CD-A3, a seep next to the access road approximately 0.5 miles southwest of Camino Adit, and the Camino Adit (Figure 6-5). These locations were visited several times throughout the monitoring season as FYLFs were observed using these habitats during monitoring in 2016 (SMUD 2017) and 2019 (SMUD 2020). One adult FYLF was observed in the tributary to Silver Creek, located near the top of Site CD-A3 on 19 June 2020 (Figure 6-18). The seep and adit were checked throughout the monitoring year and no FYLF were found during any of the VESs, though SMUD staff observed one adult female on 13 May 2020 at the adit (D. Perry, personal communication, 2020); photos of the FYLF indicate she may have been gravid.

No FYLF of any life stage were observed at Site SCD-A1.

Table 6-7. Foothill Yellow-legged Frog Post-Metamorphic Observation Locations and Data, 2020.

Location Description	Date (2020)	Foothill Yellow-legged Frog Observations			
		Life Stage/Sex[b]	Number Observed	SVL mm (inches)[c]	Habitat
Site CD-A3, Silver Creek Near Camino Adit	9/18[a]	Adult/ unknown	1	--[d]	Pool
		YOY	1	--[d]	Pool
	9/29	Adult/ Male	1	47 (1.9)	Riffle at pool
			1	52 (2)	Pool/backwater
		Adult/ unknown	1	--[d]	Run
		YOY	1	18 (0.7)	Riffle
			1	--[d]	Seep
			1	--[d]	Backwater ponded water
			1	--[d]	Pool
			1	--[d]	Pool
			1	20 (0.8)	Pool
			2	20 (0.8)	Run
Site CD-A4, Silver Creek at Confluence with South Fork American River	9/18	YOY	1	20 (0.8)	Pool
	10/14		1	26 (1.0)	Pool/backwater
			1	--[d]	Riffle
Camino Adit	5/13[a]	Adult/Female	1	--[d]	Adit
Tributary to Silver Creek, Adjacent to Foot Trail Near Site CD-A3	6/19	Adult/ unknown	1	--[d]	Tributary

[a] Incidental sighting
[b] YOY=Young of Year; sex of YOY individuals not determinable
[c] SVL=snout-to-vent length; mm = millimeters
[d] No data; individual observed but not captured

Figure 6-13. Two adult male foothill yellow-legged frogs found at Site CD-A3, 29 September 2020.

Figure 6-14. Adult foothill yellow-legged frog found at Site CD-A3, 29 September 2020.

Figure 6-15. Foothill yellow-legged frog adult (left) and young of year (right) observed incidentally at Site CD-A3 during a benthic macroinvertebrate survey, 18 September 2020.

Figure 6-16. Representative photos of young-of-year foothill yellow-legged frogs found at Site CD-A3, 29 September 2020.

Figure 6-17. Young-of-year foothill yellow-legged frogs captured at Site CD-A4, 18 September 2020 (left) and 14 October 2020 (right); respective habitats (bottom).

Figure 6-18. Adult foothill yellow-legged frog (see white arrow) observed on the tributary adjacent to the foot trail to Site CD-A3 on 19 June 2020.

Habitat Conditions

Habitat conditions along the Silver Creek sites (sites CD-A3 and CD-A4) and the SFAR site (Site SCD-A1) were similar to conditions observed during 2017, 2018, and 2019 monitoring years (SMUD 2018, 2019, 2020). Decreased cover along the channel and banks caused by the scour from high stream flows during the wet water year in 2017 persisted in 2020. Stream flows were visibly lower at all sites in 2020 than in prior years, resulting in less connectivity to side channels and pools. Suitable FYLF habitat was found at all sites (Figure 6-19 through Figure 6-21). Additional habitat photos are provided in Appendix E.

Figure 6-19. Representative photo of foothill yellow-legged frog habitat along Site CD-A3, 19 June 2020.

Figure 6-20. Representative photo of suitable foothill yellow-legged frog habitat along Site CD-A4, 29 June 2020.

Figure 6-21. Representative photo of suitable foothill yellow-legged frog habitat along Site SCD-A1, 14 July 2020.

6.3.1.2 Water Temperature Monitoring

Table 6-8 provides mean edgewater temperature data recorded at amphibian monitoring sites, summarized by month. The mean monthly edgewater temperatures for all three sites was between 11.4°C and 21.7°C during the primary FYLF breeding and rearing months of April through September[13]. Maximum daily mean edgewater temperatures for this time period ranged from 14.5°C to 24.8°C. Mean monthly water temperatures during June through September for Silver Creek were approximately 1.9°C to 2.9°C warmer at Site CD-A4 (near the confluence with the SFAR) than at Site CD-A3 (near the Camino Adit Site).

Table 6-8. Edgewater Temperature Data Summarized by Month, 2020.

Amphibian/Temperature Monitoring Site	Month (2020)	Mean Monthly Temperature (°C)	Maximum Daily Mean Temperature (°C)
Silver Creek Near Camino Adit (CD-A3)	April	11.8	15.0
	May	13.2	16.0
	June	14.6	19.2
	July	18.0	20.4
	August	19.4	24.4
	September[a]	16.9	22.6
Silver Creek at Confluence with South Fork American River (CD-A4)	April	11.4	16.3
	May	14.5	17.9
	June	17.5	21.5
	July	20.5	22.6
	August	21.7	24.8
	September	18.8	23.1
South Fork American River below Slab Creek Reservoir Dam (SCD-A1)	April	10.6	14.5
	May	14.8	18.0
	June	18.9	21.6
	July	19.5	20.5
	August	18.3	21.2
	September[b]	15.8	18.9

[a] Edgewater data used for calculations does not include the entire month of September. Data included were collected between 1 September and 28 September 2020.
[b] Edgewater data used for calculations does not include the entire month of September. Data included were collected between 1 September and 29 September 2020.

[13] Range of breeding months for FYLF populations in the Sierra Nevada Mountain foothills.

Figure 6-22 through Figure 6-24 provide plots of mean daily edgewater temperatures for all three sites, with the VES dates and dates of FYLF observations incorporated.

The following observations can be made from data obtained to-date:

- In relatively confined, steep-gradient channels lacking broad, shallow, exposed, low-velocity microhabitats, different edgewater areas tend to have similar temperatures and edgewater temperatures are similar to thalweg temperatures (Figure 6-22 [Site CD-A3] and Figure 6-23 [Site CD-A4]); however, more variation is observed during periods of lower flow in summer months (July–September).
- With the relatively low water levels in 2020 along Silver Creek and the SFAR, some edgewater locations were warmer than thalweg temperatures (Site CD-A3 edgewater 2 [Figure 6-22], Site CD-A4 edgewaters 1–3 [Figure 6-23], and Site SCD-A1 edgewater 3 [Figure 6-24]). Increased edgewater temperatures may have been attributed to lower water levels in side-pools and/or reduced or no connection to the mainstem, resulting in pools with slightly higher edgewater temperatures.

Additional analyses of water temperature data from the first five years of study implementation, including data relationships between edgewater and thalweg temperatures, is detailed in Section 6.4.1.3.

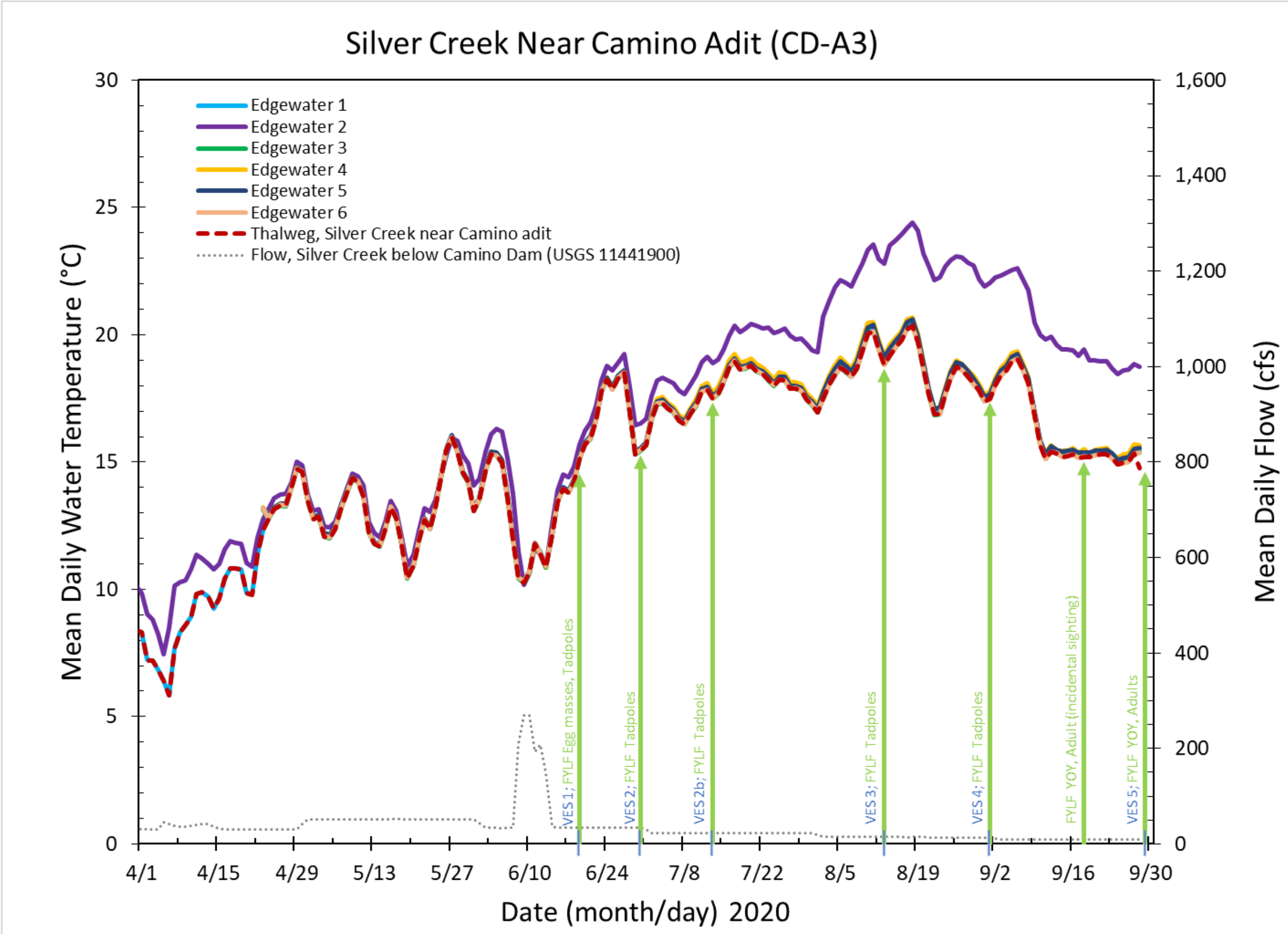

Figure 6-22. Edgewater and thalweg temperature data for Silver Creek near Camino Adit (Site CD-A3) and flow data for Silver Creek below Camino Dam, with foothill yellow-legged frog (FYLF) observations (VES = Visual Encounter Survey, YOY = young-of-year).

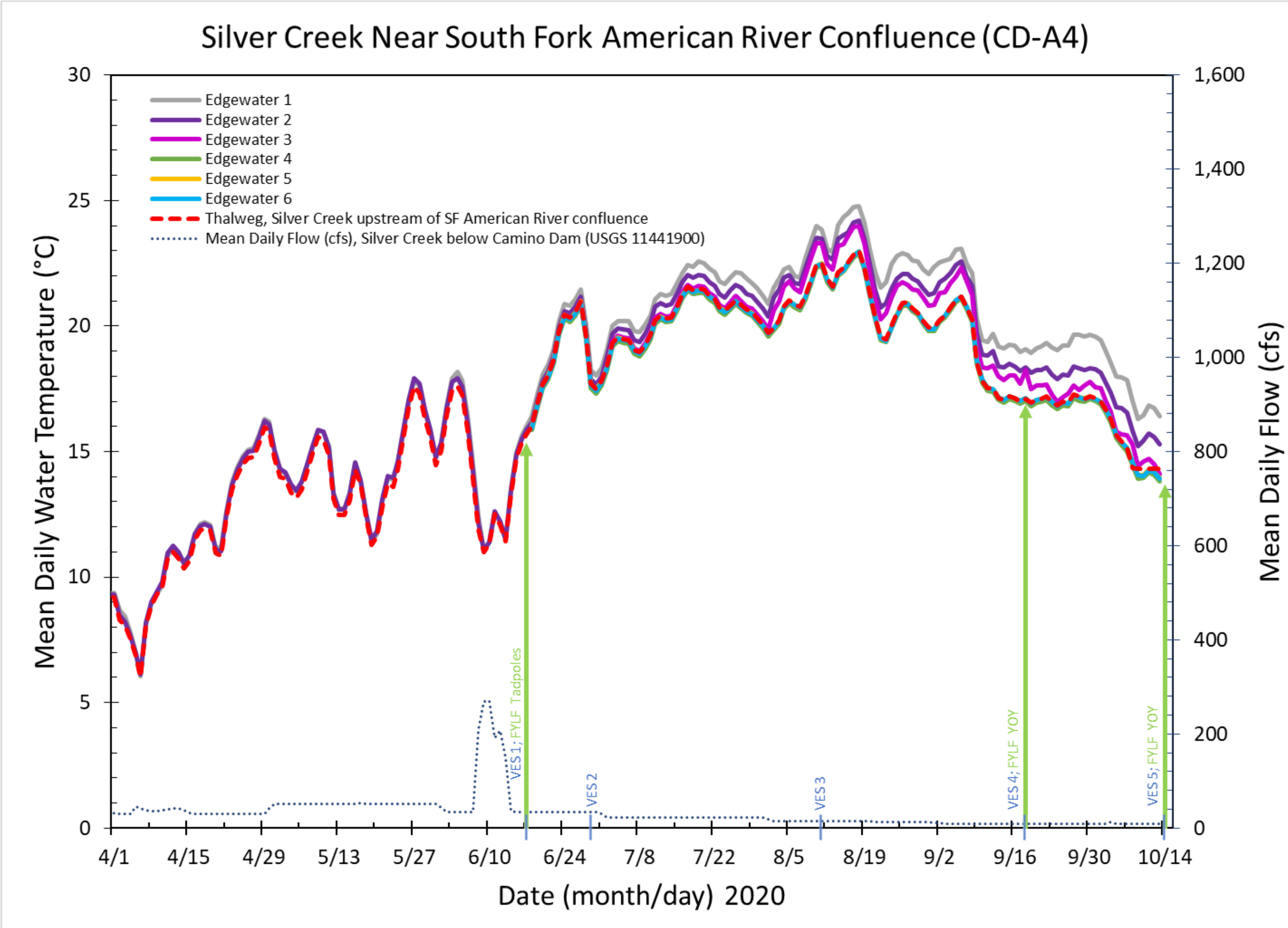

Figure 6-23. Edgewater and thalweg temperature data for Silver Creek near South Fork American River Confluence (Site CD-A4) and flow data for Silver Creek below Camino Dam, with foothill yellow-legged frog (FYLF) observations (VES = Visual Encounter Survey, YOY = young-of-year).

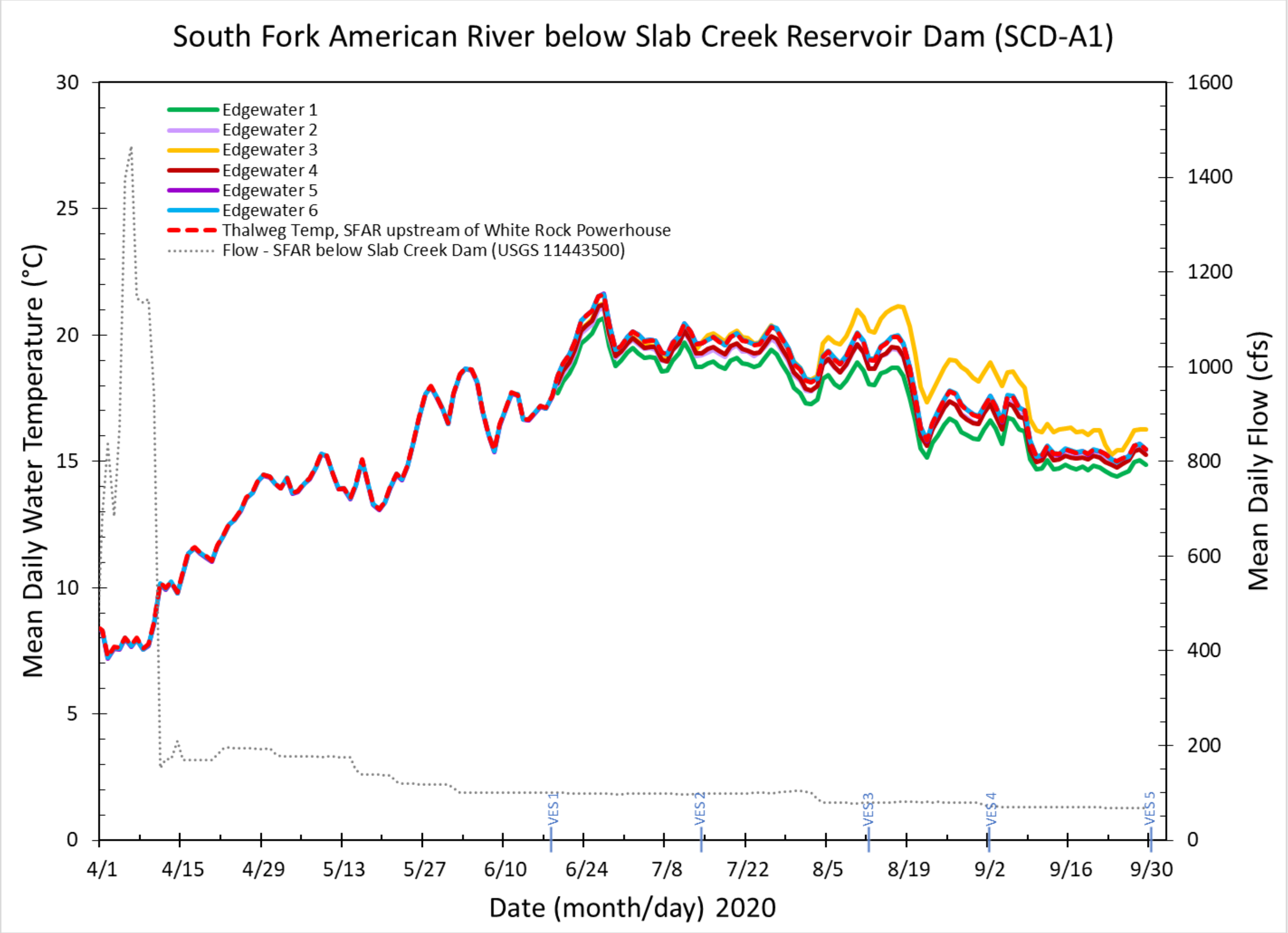

Figure 6-24. Edgewater and thalweg temperature data for the South Fork American River (SFAR) below Slab Creek Reservoir Dam (Site SCD-A1), flow data for the SFAR below Slab Creek Dam (VES = Visual Encounter Survey).

6.3.1.3 Adaptive Management Monitoring

Adaptive management monitoring followed the June spill events at Camino Reservoir (Section 6.2.2.3), which also coincided with VES 1. The results of these surveys are in Section 6.3.1.1. No evidence of damaged, displaced, or scoured egg masses were found. The two egg masses observed at Site CD-A3 were intact with newly hatched tadpoles found at the same locations. Tadpoles not associated with documented egg masses were found at sites CD-A3 and CD-A4; tadpoles appeared active and healthy with no apparent signs of injury or distress.

6.3.2 Western Pond Turtle

WPT survey conditions are documented in Table 6-4. The weather was good to ideal during all WPT surveys, with warm temperatures, sunny/clear skies, and no wind to a light breeze.

A total of nine WPT (8 adults[14], 1 juvenile, no recaptures[15]) were observed at monitoring Site SCD-A1 (SFAR below Slab Creek Reservoir Dam) (Table 6-9, Figure 6-25) in 2020; of these, six were hand-captured and morphological data recorded. Of the nine individuals observed, two were found basking while the other seven were observed underwater (swimming or perched on substrate).

The single documented juvenile WPT was found basking on 18 June 2020 (Figure 6-26). The individual was located on the silt- and sand-dominated shore of the main channel riverbank, on river left. Near the WPT, a bend in the shoreline created a connected backwater pool that was 0.06 m (0.2 ft) deep and the water temperature was 17ºC. This is the smallest and youngest[16] WPT (45mm, 1 scute ring) found on this reach during license implementation study years 2016–2020 (SMUD 2017, 2018, 2019, and 2020). The other basking WPT was also perched on river right on the shore of a backwater pool 0.5 m (1.6 ft) deep with a water temperature of 24ºC. The adult was basking underneath a willow while the juvenile was exposed with no riparian cover.

The seven adult WPTs observed underwater were located throughout the monitoring reach at depths ranging from 0.1–1.3 m (0.3–4.3 ft). The WPTs found at shallower depths (0.1–0.9 m [0.3–3 ft]) were perched on submerged riparian vegetation (commonly willows), while the WPTs at deeper depths (1.2–1.3 m [3.9–4.3 ft]) were either swimming or perched on boulders, cobble, or bedrock. The water temperature at the WPT locations ranged from 15.5–19ºC. Three of the adults were males (Figure 6-27, Figure 6-28, and Figure 6-30), two were females (Figure 6-29 and Figure 6-31), and two were not captured so no morphological data were recorded.

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[14] A carapace length of 120 mm combined with the identification of secondary sexual characteristics were used to categorize an individual as an adult versus juvenile, since western pond turtles in this region generally reach maturity at this size (Holland 1994, Germano and Bury 2001, Bury et al. 2012).

[15] No recaptures based on morphological characteristics including size, sex, scute rings, and shell markings.

[16] Evidence suggests that scute rings can be used to determine approximate age of turtle, by the assumption that one ring is deposited per year up to a certain age (Ashton et al. 2012).

There were two monitoring site locations that had multiple observations of adult WPTs. A pair of WPTs (a male and female) were observed together near the upstream end of the site on river right on 30 September 2020, in a steep-sided pool lined with alders and sedges (Figure 6-30 and Figure 6-31). Another individual was observed at the same location on 2 September 2020, swimming under a rock crevice. The other location with multiple WPT observations was near the middle of the reach in a pool with overhead cover from willow; an adult male was found there on 12 August 2020 (Figure 6-28), and another adult (unknown sex) was observed there on 2 September 2020.

Table 6-9. Western Pond Turtle Observation Locations and Data at Site SCD-A1, 2020.

Location Description	Date (2020)	Life stage/ Sex	Carapace		Number of Scute Rings	Habitat
			Length mm (inches)[b]	Width mm (inches)[b]		
South Fork American River below Slab Creek Reservoir Dam (Site SCD-A1)	6/18	Juvenile/ Unknown	45 (1.8)	40 (1.6)	1	Basking on sandy shore of riverbank
		Adult/ Male	160 (6.3)	120 (4.7)	6–7	Under water in riparian cover, shaded, near steep bank
	8/12	Adult/ Unknown	--[c]	--[c]	--[c]	Basking on riverbank, swam into algae filled backwater pool
		Adult/ Male	135 (5.3)	105 (4.1)	6–7	Under water in willow branches
	9/2	Adult/ Unknown	--[c]	--[c]	--[c]	Under water in willow branches
		Adult/ Female	165 (6.5)	120 (4.7)	8–9	Under water in pool
		Adult/ Unknown	--[c]	--[c]	--[c]	Under water in pool, swam under rock crevice
	9/30	Adult/ Male	141 (5.6)	111 (4.4)	--[d]	Under water in pool, male and female found at same location
		Adult/ Female	125 (4.9)	105 (4.1)	9	

[a] Projection: NAD83 UTM Zone 10 North
[b] mm = millimeters, in = inches
[c] No data; turtle observed but not captured
[d] Scute rings were worn and not visible

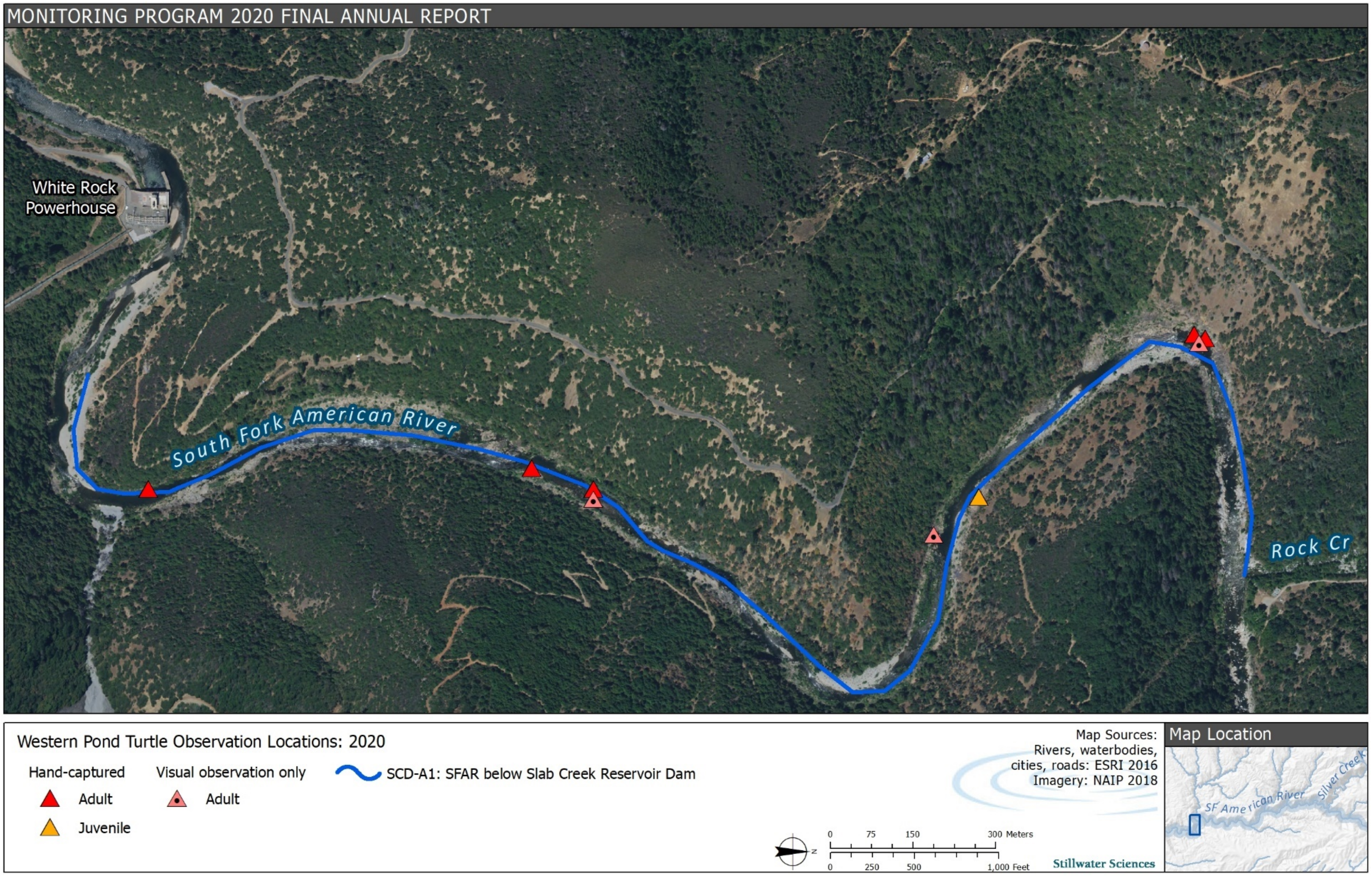

Figure 6-25. Western pond turtle observation locations at Site SCD-A1, 2020.

Figure 6-26. Juvenile western pond turtle and habitat at Site SCD-A1, 18 June 2020.

Figure 6-27. Adult male western pond turtle and habitat at SCD- A1, 18 June 2020.

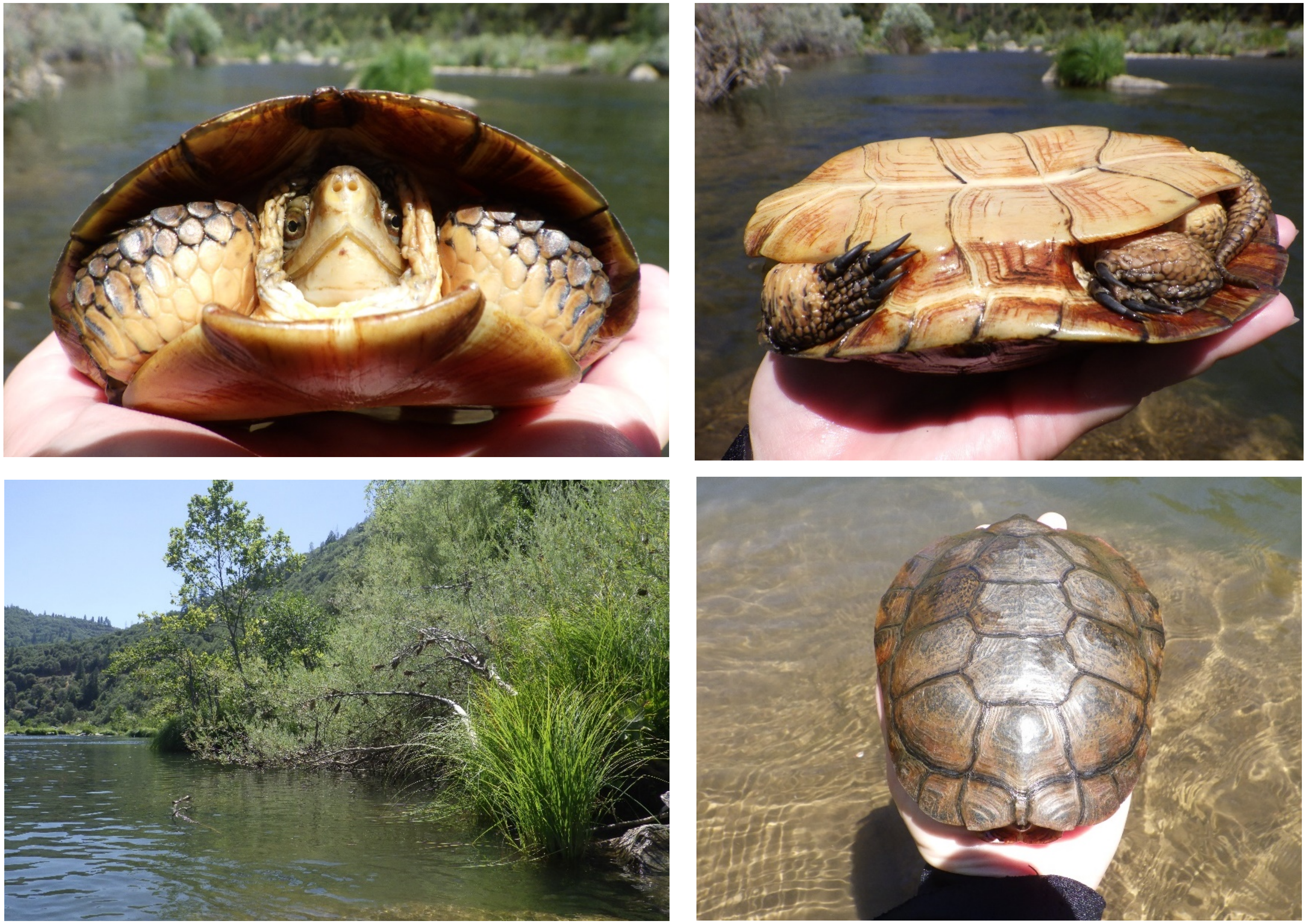

Figure 6-28. Adult male western pond turtle and habitat at SCD- A1, 12 August 2020.

Figure 6-29. Adult female western pond turtle and habitat at SCD- A1, 2 September 2020.

Figure 6-30. Adult male western pond turtle and habitat at SCD- A1, 30 September 2020 (bottom left: male on left side of image, female on right).

Figure 6-31. Adult female western pond turtle and habitat at SCD- A1, 30 September 2020 (bottom left: habitat where male and female were found together).

6.3.3 Other Amphibian and Aquatic Reptile Species

Six non-special-status amphibian and reptile species were observed throughout the study area during VESs, summarized in Table 6-10 by species, life stage, and location(s) where documented. American bullfrog (*Lithobates catesbeianus*) tadpoles and one adult were observed a Site SCD-A1 in 2020; this species is non-native, invasive, and is known to negatively interact with native herpetofauna including FYLFs and WPTs.

Table 6-10. Additional Herpetofauna Species Observed, by Life Stage, 2020.

Species Common Name (*Scientific name*)	Life Stage				Location(s) Where Species Documented
	Egg Mass	Larvae	Young-of-Year	Juv/ Adult	
Amphibians					
Sierra newt (*Taricha sierrae*)	X	X			CD-A3
Sierran treefrog (*Pseudacris sierra*)		X	X		CDA4, SCD-A1
Western toad (*Anaxyrus boreas*)		X			SCD-A1
American Bullfrog (*Lithobates catesbeianus*)		X		X	SCD-A1
Reptiles[b]					
Sierra garter snake (*Thamnophis couchii*)				X	CD-A3, SCD-A1
California striped racer (*Coluber lateralis lateralis*)				X[a]	CD-A4

Juv = Juvenile
X = Observed
[a] Observed incidentally on the access trail, outside of the VES area
[b] Incidental sightings of common terrestrial lizards (e.g., western fence lizard, alligator lizard) not included

6.4 INITIAL 5-YEAR RESULTS (2016–2020)

Of all sites surveyed during the first five years of implementing the monitoring plan (2016–2020), FYLFs were observed at two sites (each along Silver Creek [sites CD-A3 and CD-A4]), and WPTs were observed at one site (on the SFAR [Site SCD-A1]). Table 6-11 includes survey dates and summarizes habitat and flow conditions sites where these target species were found. No sensitive amphibian or aquatic reptile species were observed at the other monitoring sites in the UARP (JD-A15, RC-A1, and RPD-A1) as part of this study (Table 6-2) (SMUD 2017, 2018, 2019, 2020); therefore, the FYLF and WPT results for those sites are not described further in this section.

Table 6-11. Initial 5-year Monitoring Survey Dates, Habitat Conditions, and Foothill Yellow-legged Frog (FYLF) Breeding and Rearing and Western Pond Turtle (WPT) Observation Dates for Occupied Sites.

Year	Site	Survey Dates	Water Year Type	Habitat	Spill Events	FYLF Observation Dates (Early Life Stages)			WPT Observation Dates
						Egg Mass	Tadpole (*Gosner*[a])	Young-of-year	
2016	CD-A3	4/19, 5/26, 6/8, 6/17, 6/28, 8/10, 9/20	Above normal	Dense riparian vegetation cover; rock- slide scree filling channel	5/19–5/23	--[b]	--[b]	--[b]	--[b]
	CD-A4	4/20, 5/25, 6/7, 6/28, 8/10, 9/20		Dense riparian vegetation cover	5/19–5/23	--[b]	--[b]	--[b]	--[b]
	SCD-A1	6/16, 6/29, 8/9, 9/21		Dense riparian vegetation cover	NA	--[b]	--[b]	--[b]	6/16
2017	CD-A3	7/11, 8/3, 9/13	Wet	High flows, loss of riparian vegetation and rock-slide scree by high flows	Uncontrolled spill events through July 7	--[b]	--[b]	--[b]	--[b]
	CD-A4	7/13,8/3, 9/13		High flows, loss of riparian vegetation by high flows		--[b]	--[b]	--[b]	--[b]
	SCD-A1	7/12, 8/2		High flows, loss of riparian vegetation and muddy banks by high flows		--[b]	--[b]	--[b]	8/2
2018	CD-A3	6/4, 6/18, 7/30, 9/4, 10/2	Below Normal	Low riparian cover and sunny stream banks; dense green algae during summer	8/29	--[b]	9/4 *(37–38)*	10/2	--[b]
	CD-A4	6/6, 6/19, 7/31, 9/4, 10/3		Low riparian cover and sunny stream banks	8/29	--[b]	--[b]	--[b]	--[b]
	SCD-A1	6/5, 6/20, 8/1, 10/4		Low riparian cover and sunny stream banks; cobble habitat along banks	NA	--[b]	--[b]	--[b]	--[b]

Year	Site	Survey Dates	Water Year Type	Habitat	Spill Events	FYLF Observation Dates (Early Life Stages)			WPT Observation Dates
						Egg Mass	Tadpole (*Gosner*[a])	Young-of-year	
2019	CD-A3	7/18, 8/1, 8/27, 10/1	Wet	High flows through June; dense green algae during summer	Uncontrolled spill events through June	--	10/1 *(41)*	--	--[b]
	CD-A4	7/16, 7/30, 8/27, 10/1		High flows through June; low riparian cover and sunny stream banks		--[b]	--[b]	--[b]	--[b]
	SCD-A1	7/17, 7/31, 8/28,10/2		High flows through June; breeding habitat present (cobbles)		--[b]	--[b]	--[b]	7/17, 7/31, 8/28, 10/2
2020	CD-A3	6/19, 6/30, 7/13, 8/13, 9/1, 9/29	Dry	Low flows, side pools and channels with little flow or no connection to the main channel; low riparian cover and sunny stream banks	6/8–6/13	6/19	6/19 *(24–25)*, 6/30 *(24–25)*, 7/13 *(25)*, 8/13 *(36–37)*, 9/1 *(41)*	9/18[c], 9/29	--[b]
	CD-A4	6/17, 6/29, 8/11, 9/18, 10/14		Low flows, side pools and channels with little flow or no connection to the main channel, low riparian cover and sunny stream banks	6/8–6/13	--[b]	6/18 *(24–25)*	9/18, 10/14	--[b]
	SCD-A1	6/18, 7/14, 8/12, 9/2, 9/30		Low flows, cobble habitat along banks side pools and channels with little flow or no connection to the main channel, low riparian cover and sunny stream banks	NA	--[b]	--[b]	--[b]	6/18, 8/12, 9/2, 9/30

[a] Gosner (1960)
[b] No observations
[c] Incidental observation

6.4.1 Foothill yellow-legged Frog

6.4.1.1 Presence and Distribution

FYLFs were observed at two UARP monitoring sites, CD-A3 and CD-A4, between 2016–2020 (Figure 6-32 through Figure 6-34). All life stages (egg mass, tadpole, YOY, juvenile, and adult) were observed in the Camino Dam Reach of Silver Creek. Relatively few individuals were observed during the first four years of monitoring as compared with 2020, which had a sizable increase in observations, especially at Site CD-A3 (Figure 6-35 through Figure 6-38). Post-metamorphic FYLFs (28 adults and 3 juveniles) were also observed at three informally surveyed locations (i.e., seep, tributary, and adit) (Figure 6-32 and Figure 6-33). The 2020 survey results are described in Section 6.2.2.1.

Evidence of breeding was observed along Silver Creek during three license implementation study years: 2018, 2019, and 2020. Monitoring year 2020 had the first egg mass sightings (N=2) at Site CD-A3. In addition, a greater number of tadpoles (N=180) and YOYs (N=12) were observed in 2020 compared to 2018 (3 tadpole and 1 YOY) and 2019 (1 tadpole and no YOY) (Table 6-11, Figure 6-35 through Figure 6-38). The timing of tadpole development and metamorphosis into YOYs differed between monitoring years (Table 6-11). For example, during 2018 and 2020 VESs, tadpoles had fully metamorphosed into YOY by September, but in 2019, tadpoles were observed as late as October with no documented YOY. The variation in FYLF development timing in 2019 is likely attributed to the “wet” water year, which had relatively higher flows and colder water temperatures than other monitoring years (described in Section 6.4.1.3). This may have delayed the initiation of breeding until July. Patterns in adult behavior suggest this, as two adult female FYLFs were observed at the seep on July 18; these individuals may have been migrating to or from Silver Creek to breed.

More FYLFs were observed at Site CD-A3 than Site CD-A4 in all monitoring years. FYLFs were found at Site CD-A3 during all five monitoring years and included all four life stages: egg masses, tadpoles, YOYs, and post-metamorphs (adults) (Figure 6-35 through Figure 6-37). FYLFs were observed at Site CD-A4 during two of the five monitoring years (2018 and 2020) and included three life stages: tadpole, YOYs, and post-metamorph (a juvenile) (Figure 6-38).

A combined 54 adult and juvenile FYLF observations were recorded along Silver Creek and nearby survey locations (i.e., seep, tributary, and adit) between 2016 and 2020. Of these frogs, 28 were captured and 21 unique individuals were identified using chin photographs[17]. Individual FYLFs were identified and counted using unique chin patterns within, but not between, monitoring years.

[17] Chin patterns are hypothesized to be unique to each frog and persist throughout the life of the frog (Marlow et al. 2016).

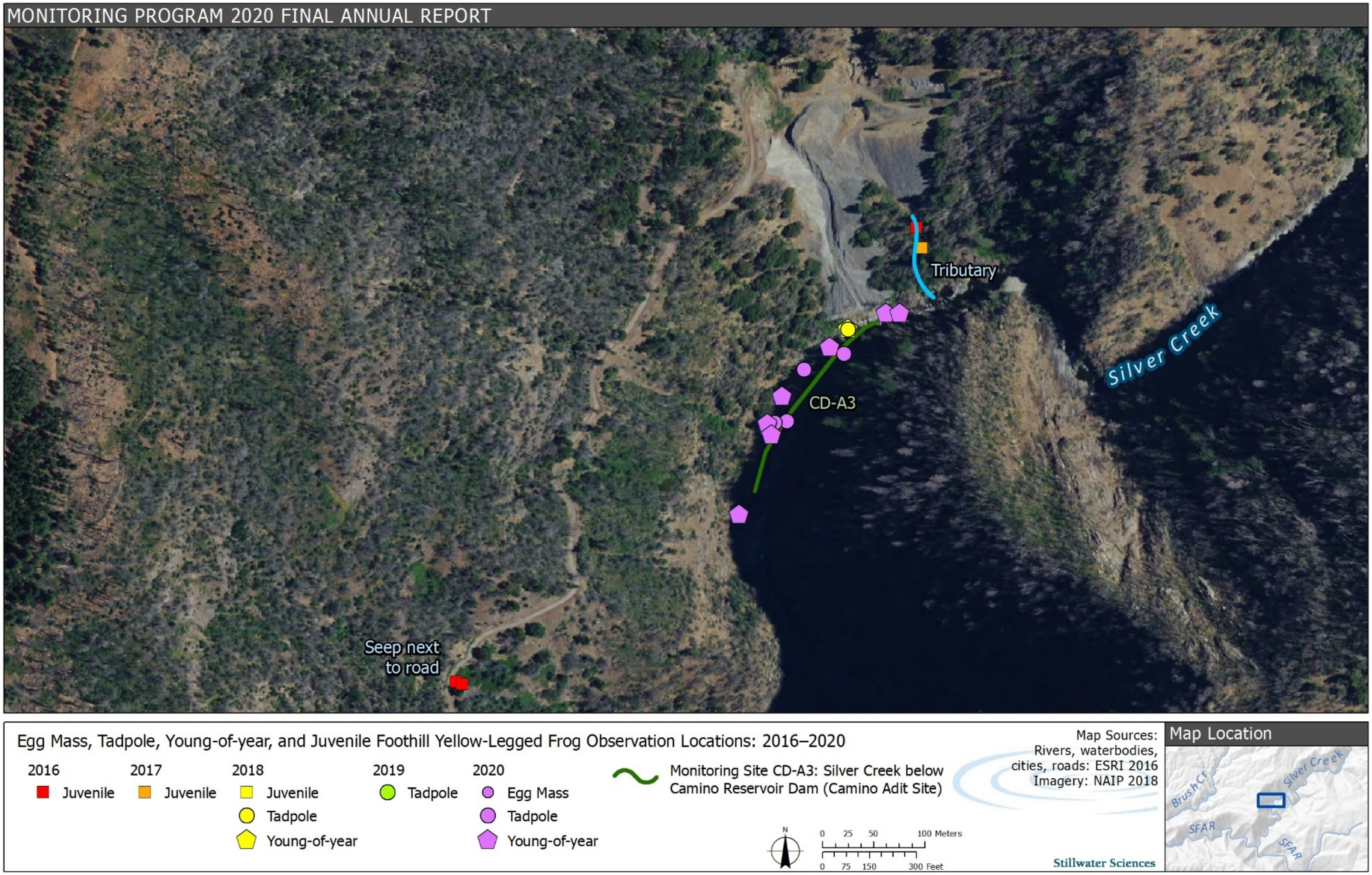

Figure 6-32. Egg mass, tadpole, young-of-year, and juvenile foothill yellow-legged frog observation locations at or near Site CD-A3, 2016–2020.

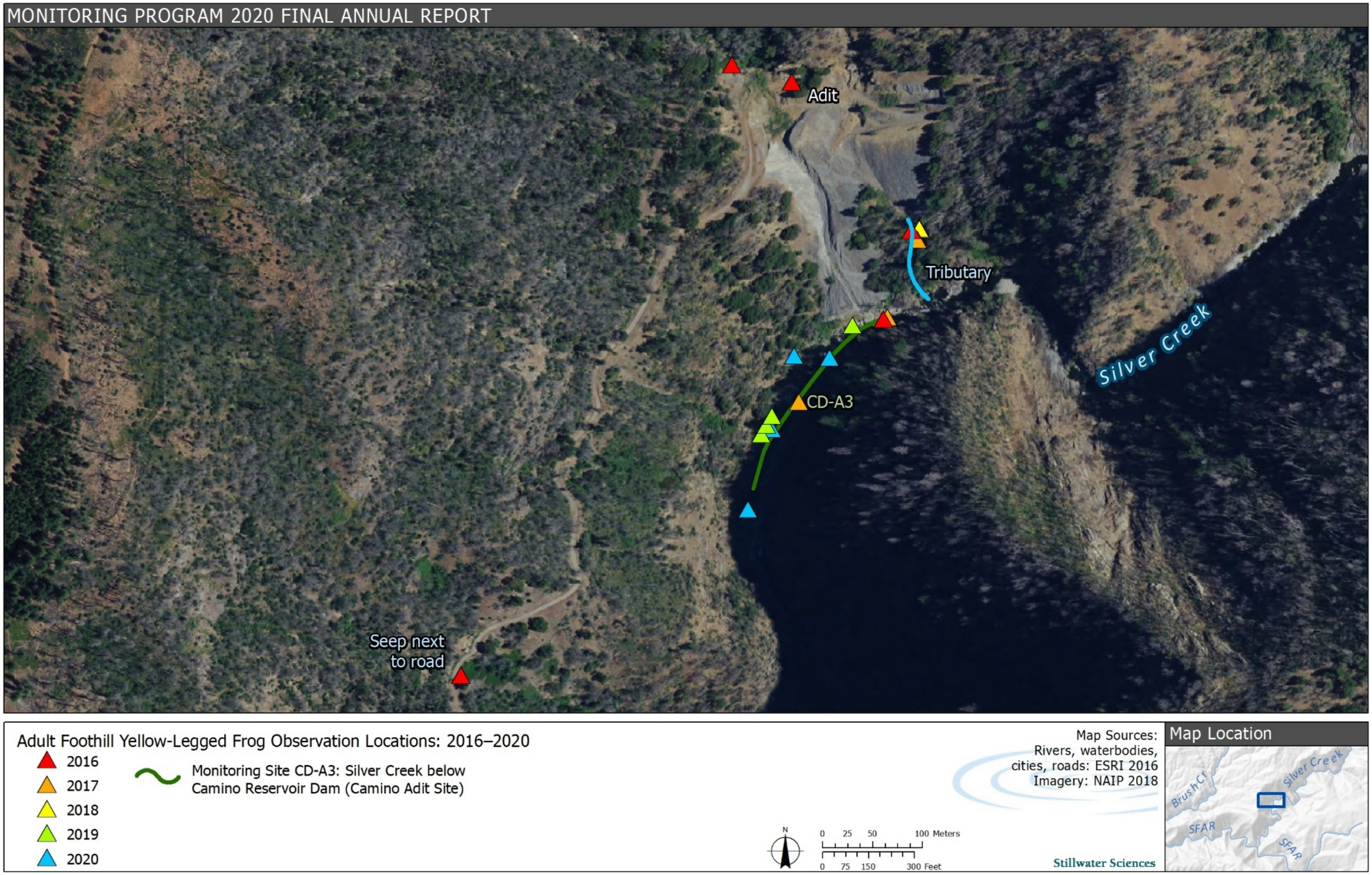

Figure 6-33. Adult foothill yellow-legged frog observation locations at or near Site CD-A3, 2016–2020.

Figure 6-34. Tadpole, young-of-year, and juvenile foothill yellow-legged frog observation locations at Site CD-A4, 2015–2020.

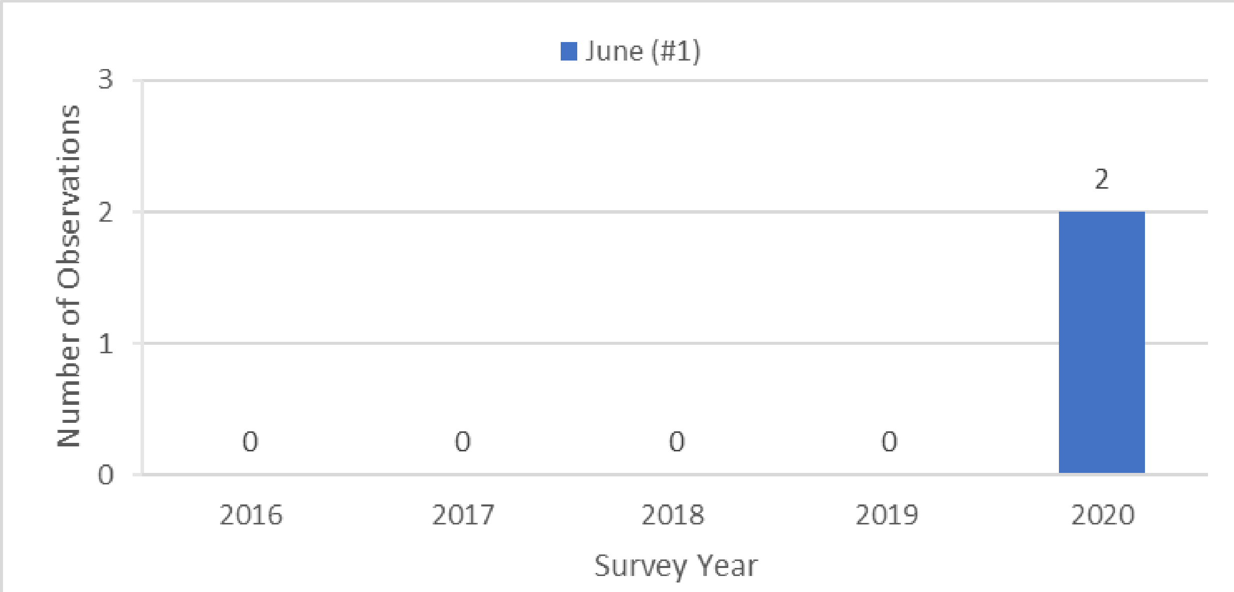

Figure 6-35. Foothill yellow-legged frog egg mass observations by survey month at Site CD-A3, 2016–2020.

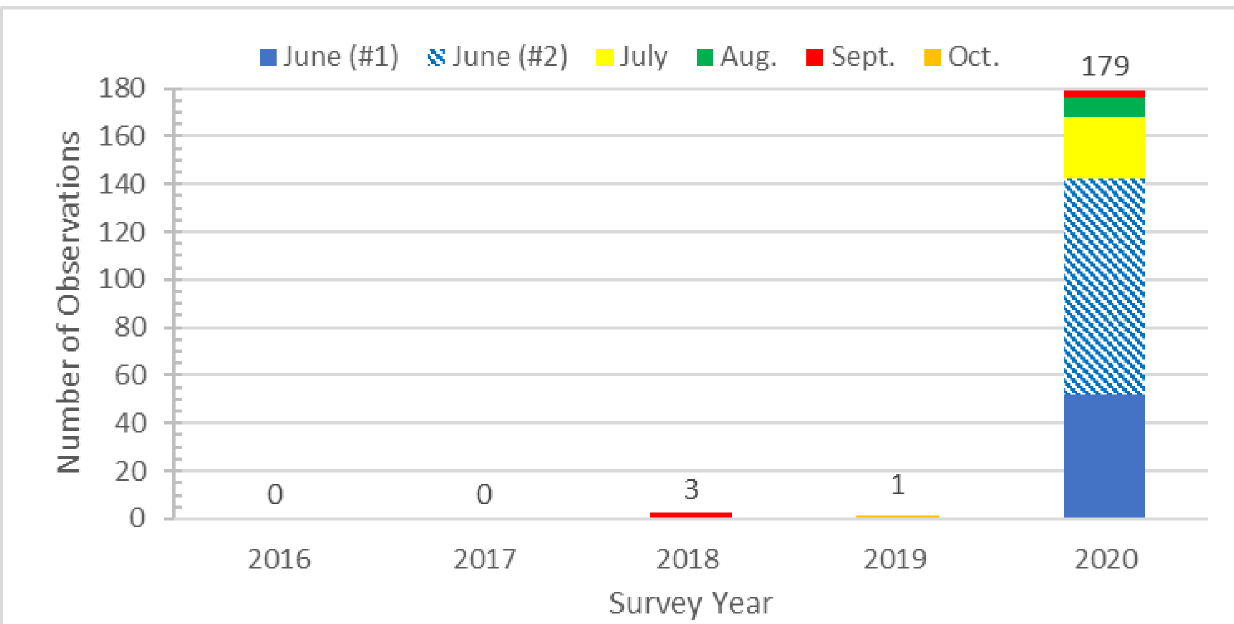

Figure 6-36. Foothill yellow-legged frog tadpole observations by survey month at Site CD-A3, 2016–2020.

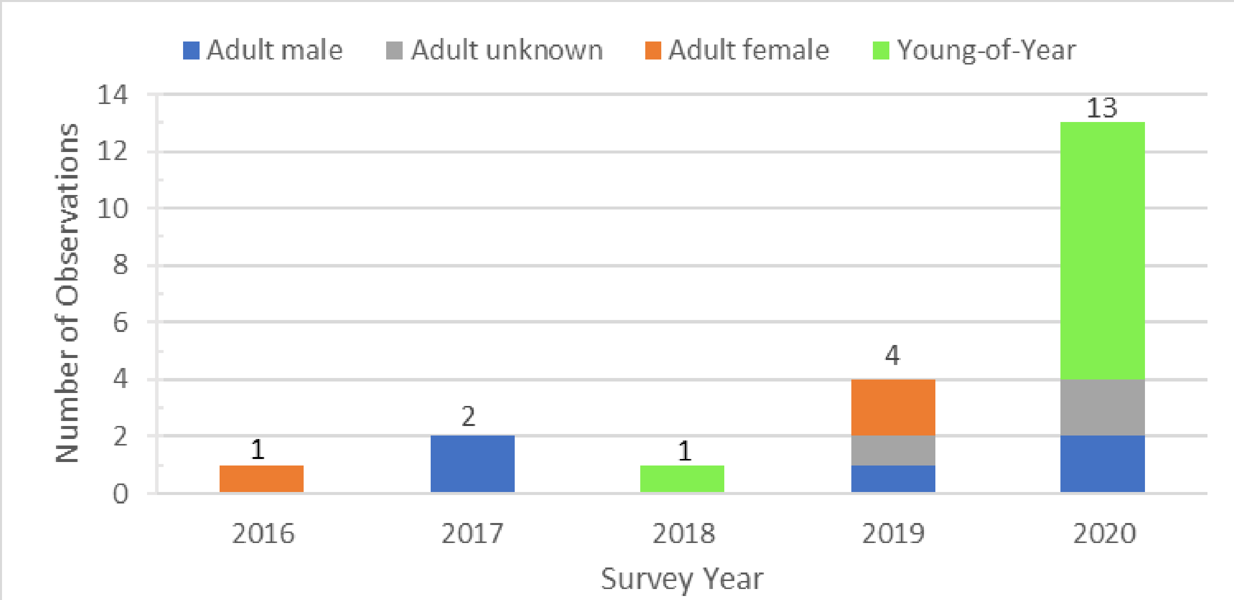

Figure 6-37. Foothill yellow-legged frog post-metamorph observations by life stage at Site CD-A3, 2016–2020.

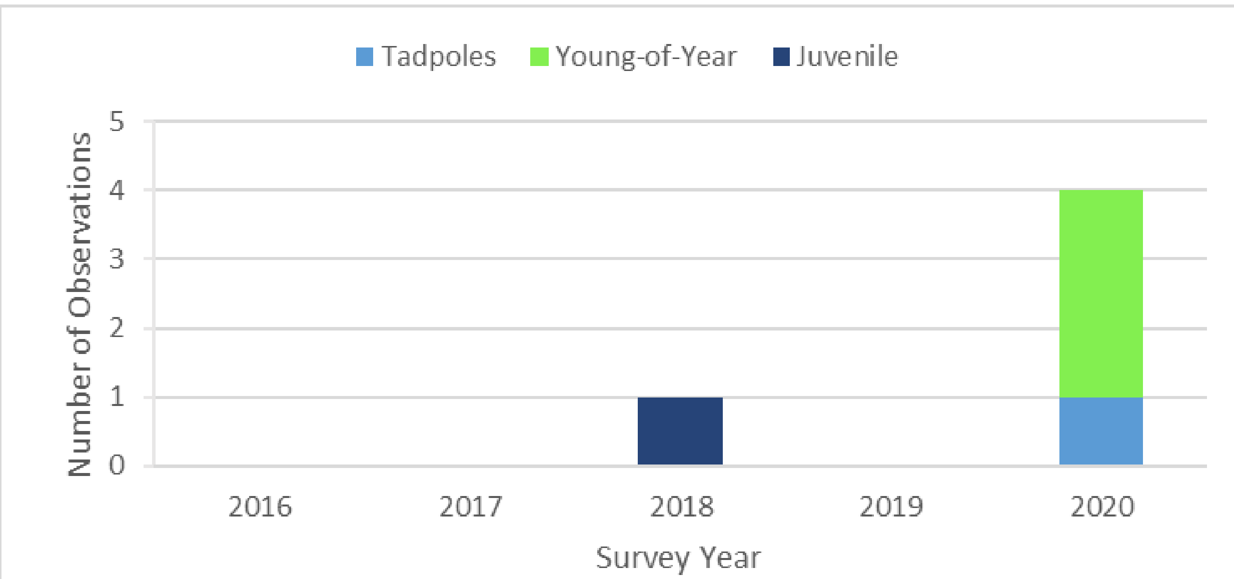

Figure 6-38. Foothill yellow-legged frog observations by life stage at Site CD-A4, 2016–2020.

6.4.1.2 Habitat Conditions

Habitat conditions (e.g., stream flows, water temperatures, algae biomass, and presence of invasive species) varied between monitoring years and between sites CD-A3, CD-A4, and SCD-A1 (Table 6-11). The most apparent habitat change observed in the first five years implementing the monitoring plan was the reduction in riparian vegetation caused by high stream flows during 2017, decreasing riparian cover and increasing sunlight along the channel and banks. Furthermore, sediment (i.e., rockslide scree and fines along banks) were apparently reduced by flushing, resulting in larger substrate sizes (i.e., cobbles, boulders, bedrock) at some locations.

6.4.1.3 Water Temperature Monitoring

Figure 6-39 through Figure 6-41 provide plots of mean daily temperatures for a seven-day moving average (7DMAVG) for sites CD-A3, CD-A4, and SCD-A1, with stream flows from the nearest gage included. Thalweg temperatures were collected at Site CD-A3 from mid-July 2019 through October 2020 only. In 2017, edgewater and thalweg data were not available for the onset of breeding season (April through June) due to the telemetered gaging stations being washed away during winter storms and unsafe conditions for installing edgewater temperature loggers until July; therefore, there are no data to discuss for those locations and time periods.

At Silver Creek sites (CD-A3 and CD-A4), the License-defined FYLF breeding water temperature threshold of 12°C (7DMAVG) was generally reached in June during three of five monitoring years (2016, 2018 and 2019) and in May during one monitoring year (2020). Water temperatures were generally 0.5–2°C warmer at Site CD-A4 than Site CD-A3 between April and June; consequently, the 12°C breeding threshold was reached up to approximately two weeks earlier at Site CD-A4 (Figure 6-39 and Figure 6-40). There were some variations in duration and timing of achieving this water temperature threshold based on water year type. For example, during 2019, a “wet” water year with sustained spill events through June, 12°C (7DMAVG) was reached in June but was not consistently maintained until July after spill events ceased. In 2020, a “dry” water year, water temperatures during the FYLF breeding season were warmer than previous years, and 12°C (7DMAVG) was reached consistently in May.

At the SFAR site (Site SCD-A1), water temperatures approached or exceeded 12°C (7DMAVG) starting in mid-to-late May during most monitoring years (2016, 2018, 2019), but in April for 2020 (Figure 6-41). Similar to Silver Creek, variations occurred between water year type. Water temperatures were generally warmer (1–4°C) during FYLF breeding months (April through June) at the SFAR compared to Silver Creek.

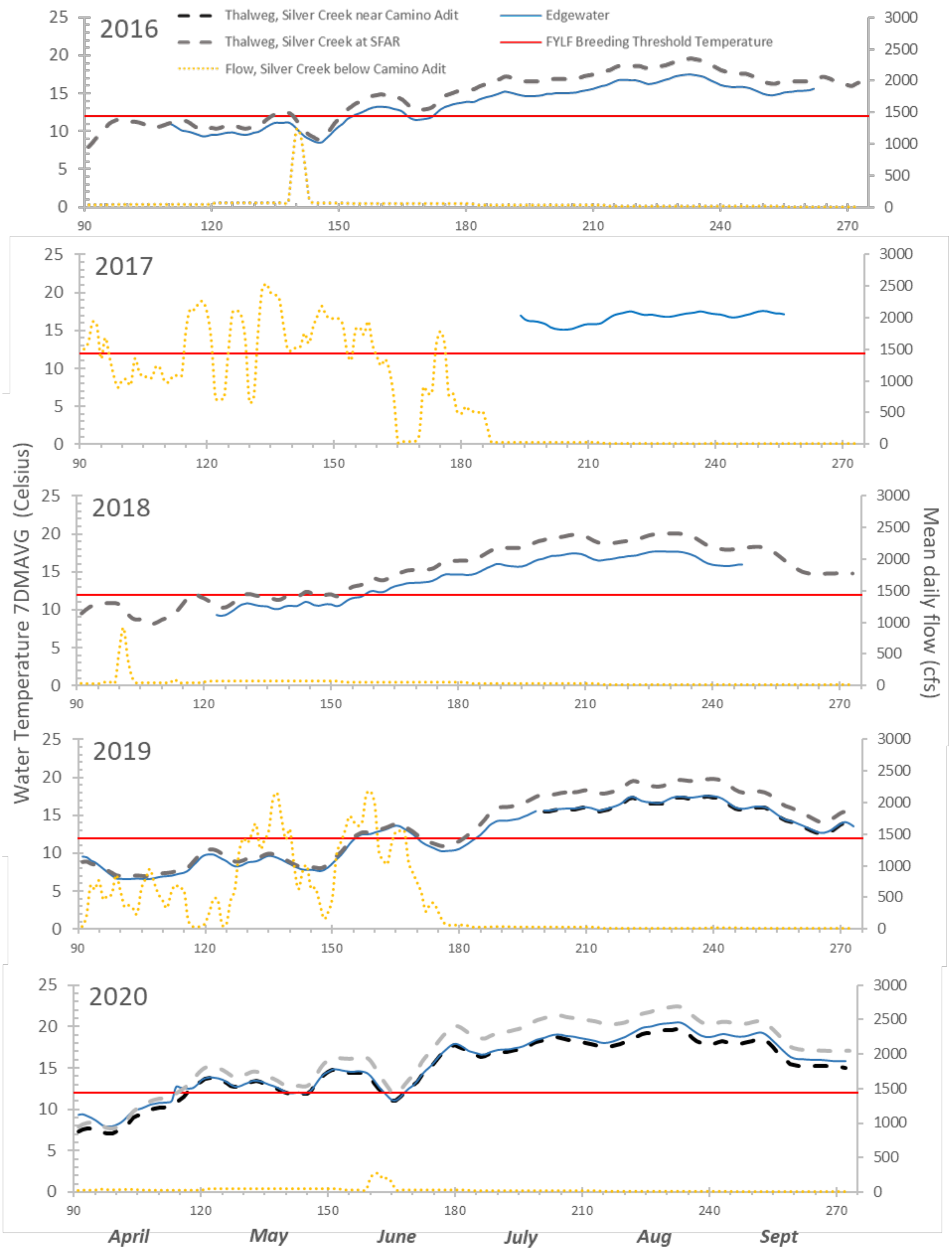

Figure 6-39. Seven-day moving average (7DMAVG) water temperatures and streamflow at Site CD-A3, 2016–2020.

Figure 6-40. Seven-day moving average (7DMAVG) water temperatures and streamflow at Site CD-A4, 2016–2020.

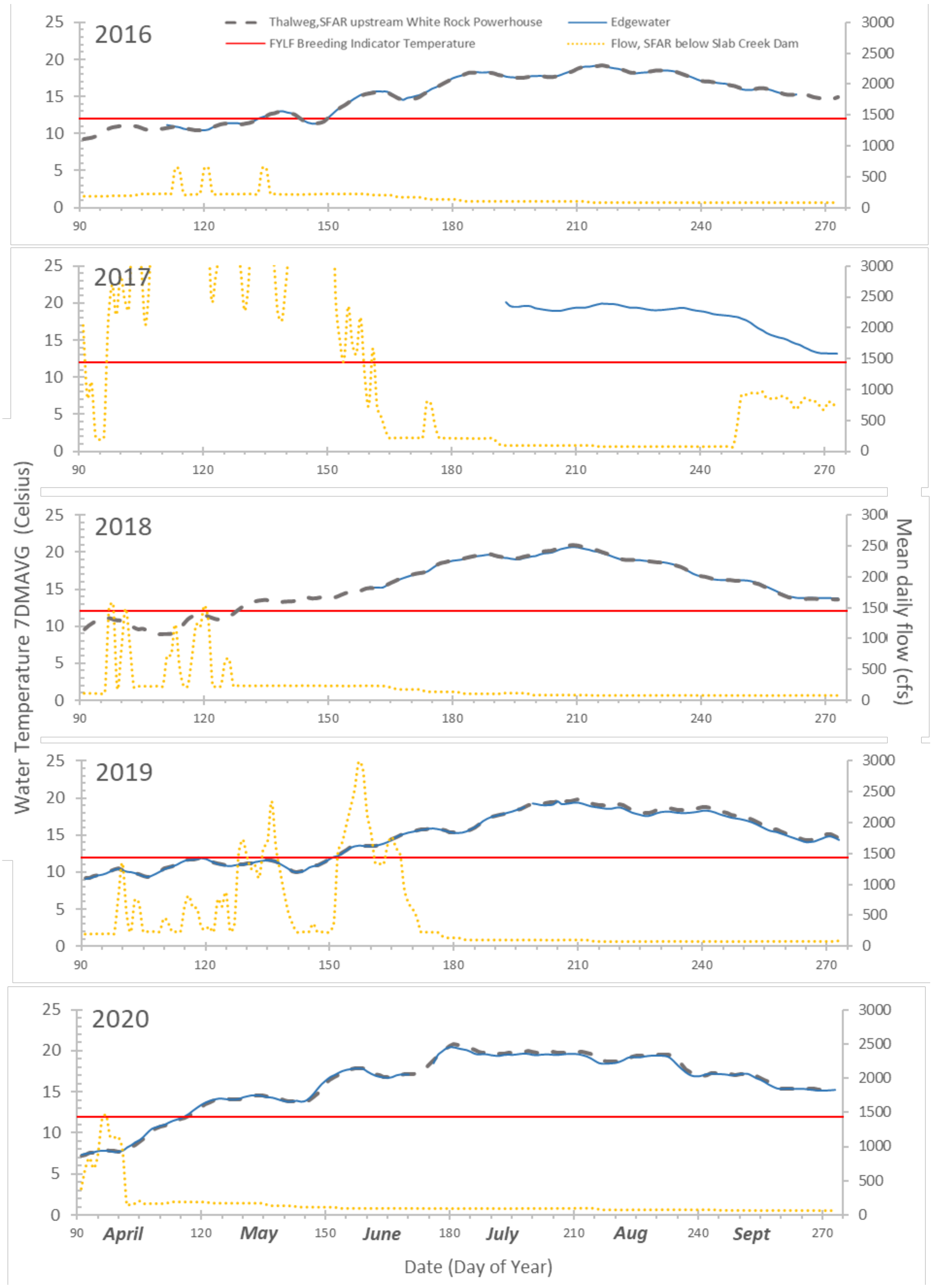

Figure 6-41. Seven-day moving average (7DMAVG) water temperatures and streamflow at Site SCD-A1, 2016–2020.

Edgewater temperatures at Silver Creek sites (CD-A3 and CD-A4) and the SFAR site (SCD-A1) were compared to the telemetered thalweg monitoring stations on Silver Creek near the confluence of the SFAR and on the SFAR upstream of White Rock Powerhouse, respectively (Figure 6-39 through Figure 6-41). Edgewater temperatures are generally similar to thalweg temperatures at sites CD-A4 and SCD-A1; therefore, the telemetered monitoring station on Silver Creek near the confluence of the SFAR is a reasonable surrogate for Site CD-A4, and the SFAR upstream of White Rock Powerhouse telemetered thalweg station is a reasonable surrogate for edgewater temperatures at Site SCD-A1. Edgewater temperatures recorded at Site CD-A3 are consistently cooler than thalweg temperatures recorded at the telemetered monitoring station on Silver Creek near the confluence of the SFAR; therefore, the telemetered monitoring station does not accurately reflect temperatures at Site CD-A3. A regression analysis was used to understand the relationship between edgewater temperatures at Site CD-A3 and thalweg temperatures collected at the telemetered monitoring station on Silver Creek during April through June. Edgewater temperatures at the more upstream Site CD-A3 are approximately 0.6–2.5°C cooler than thalweg temperatures at the more downstream telemetered station near the confluence, with the difference increasing as temperatures increase. Based on this analysis, edgewater temperatures at Site CD-A3 reach 12°C when thalweg temperatures at the telemetered station are approximately 13.3°C (Figure 6-42).

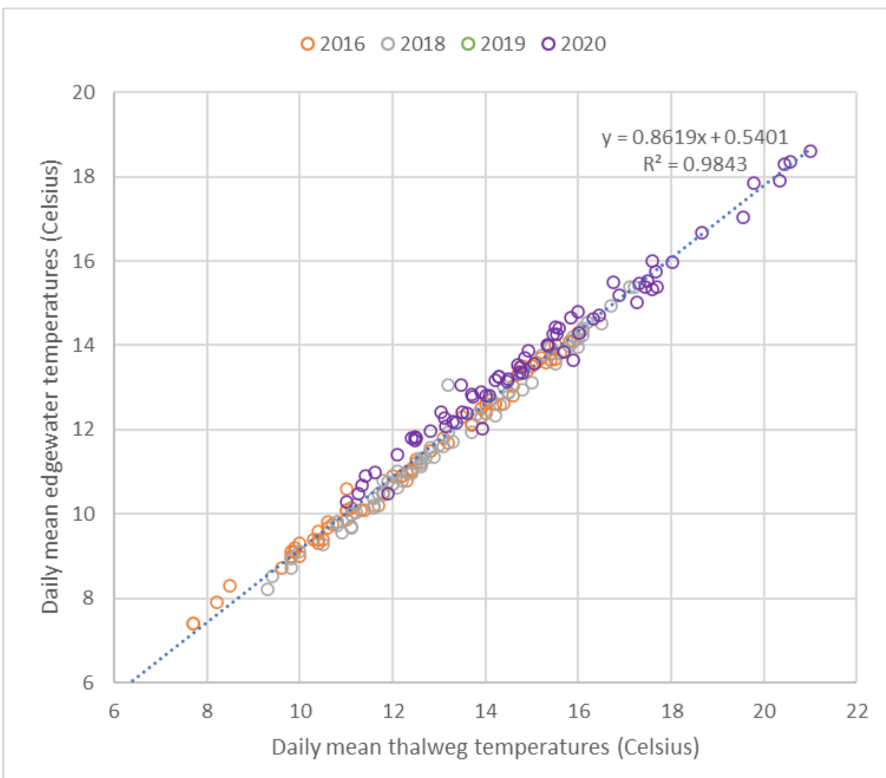

Figure 6-42. Relationship between edgewater temperatures collected at Site CD-A3 and thalweg temperatures collected at the telemetered monitoring station on Silver Creek near the confluence of the South Fork American River for April through July.

6.4.1.4 Adaptive Management Monitoring

Adaptive management monitoring was conducted following spill events due to spring run-off events or operations and maintenance activities at Camino and/or Slab Creek reservoirs during all five amphibian and aquatic reptile monitoring years (Table 6-11). No egg masses or tadpoles were documented prior to these spill events; however, egg masses and/or tadpoles were found during some surveys after spill events. No evidence of damaged, displaced, or scoured egg masses were found during any of these surveys and observed tadpoles appeared active and healthy, with no apparent signs of injury or distress.

6.4.2 Western Pond Turtle

WPTs were observed at one UARP monitoring site, Site SCD-A1, between 2016–2020. Monitoring efforts yielded 16 total WPT observations (Figure 6-43). The number of turtles observed was greater in 2019 and 2020 (5 and 9 turtles, respectively) as compared to the first three monitoring years, 2016, 2017, and 2018 (0–1 turtles) (Figure 6-43). The turtles were found in slow-moving pooled areas throughout Site SCD-A1 (Figure 6-44) and were detected during monitoring in summer and fall months (June, July, August, September, and October).

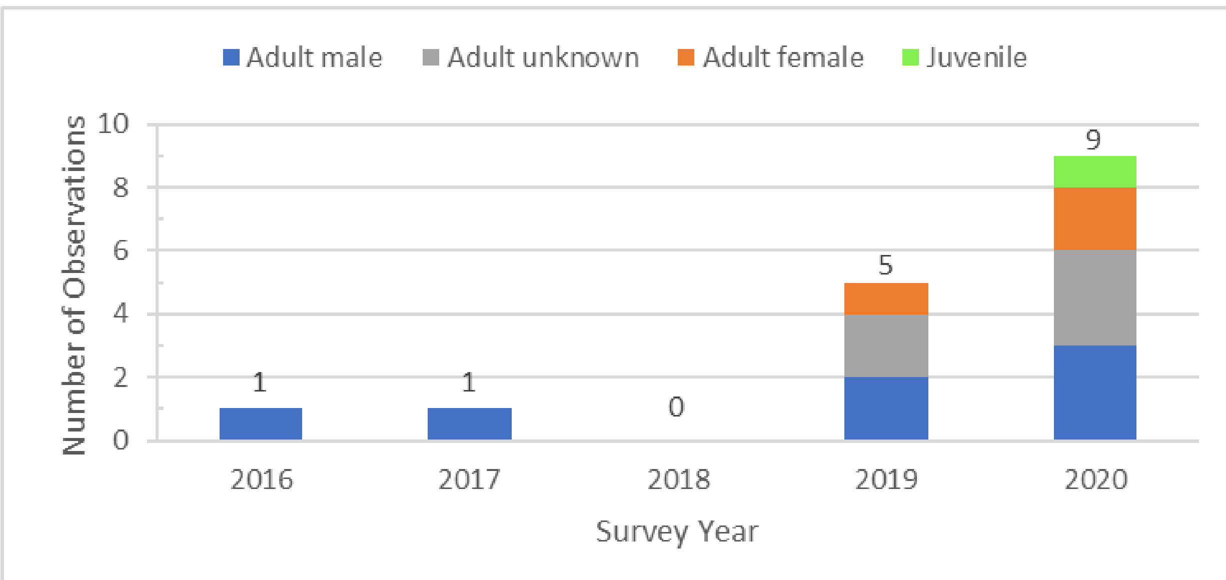

Figure 6-43. Western pond turtle observations at site SCD-A1, 2016–2020.

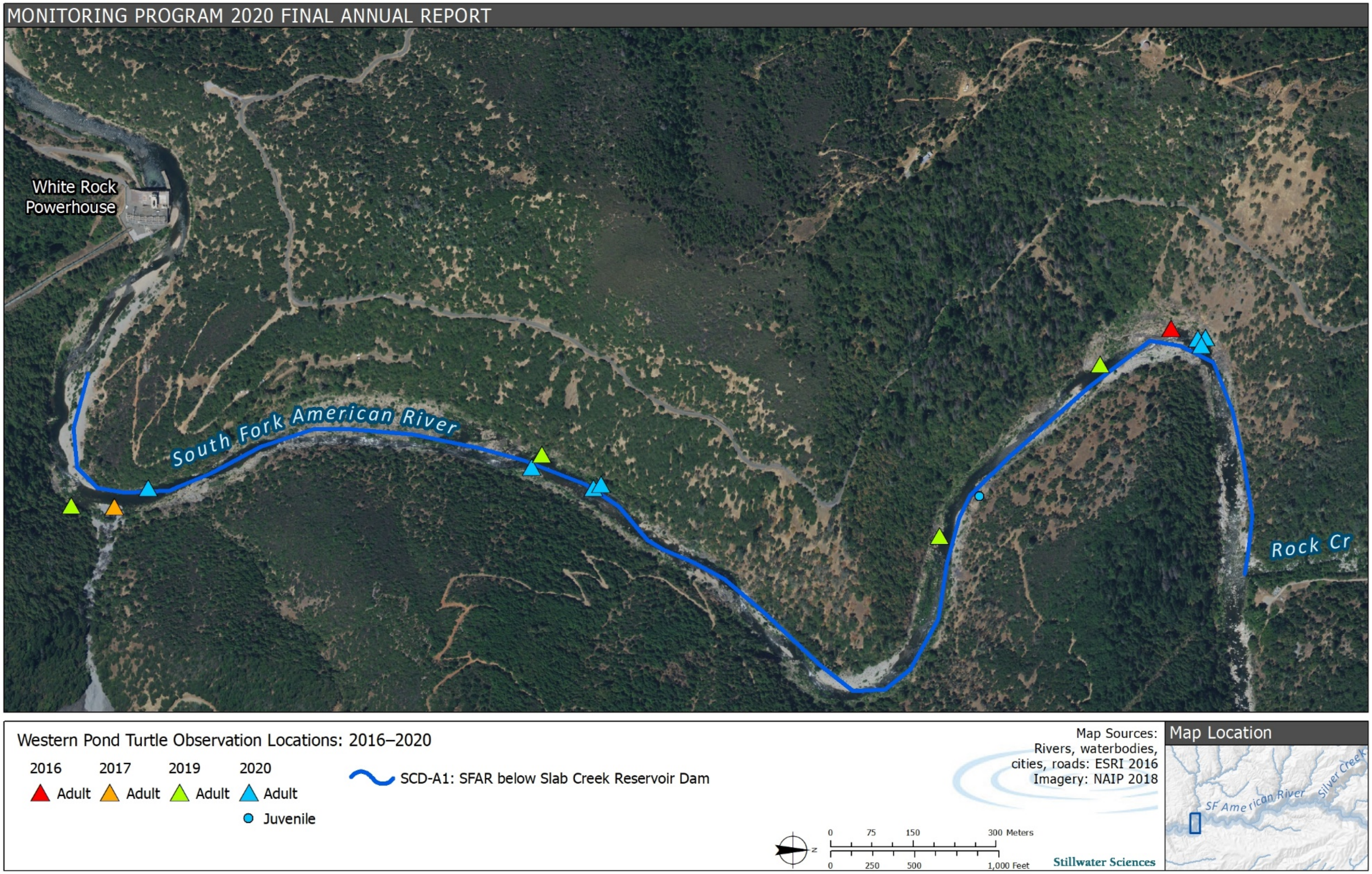

Figure 6-44. Western pond turtle observation locations at Site SCD-A1, 2016–2020.

6.4.3 Other Amphibian and Aquatic Reptile Species

Nine non-special-status amphibian and reptile species were observed throughout the study area during VESs, summarized in Table 6-12 by species, life stage, and location(s) where documented. American bullfrog, a predator of FYLF, were visually or audibly observed on the SFAR (Site SCD-A1) in 2016, 2018 and 2020; no bullfrogs were found in 2017 or 2019. Fewer observations during these years may be attributed to high flows during 2017.

Table 6-12. Additional Herpetofauna Species Observed, by Life Stage, 2006–2020.

Species Common Name *(Scientific name)*	Monitoring Year[a]					Location(s) Where Species Documented
	2016	2017	2018	2019	2020	
Amphibians						
American bullfrog (*Lithobates catesbeianus*)	L, A		A [b]		L, A	SCD-A1
Sierra newt (*Taricha sierrae*)	E, A	E, L	A	E, A	E, L	CD-A3, JD-A15, RPD-A1, RC-A1
Sierran treefrog (*Pseudacris sierra*)	L, A	L, A	L	L	L, A	CD-A3, CD-A3 (Adit), CD-A4, SCD-A1, RC-A1
Western toad (*Anaxyrus boreas*)	L, A			L	L	SCD-A1
Unidentified anuran tadpole			L [c]			SCD-A1
Reptiles[e]						
California striped racer (*Coluber lateralis lateralis*)			A		A	CD-A3[d], CD-A4[d]
Western yellow-bellied racer (*Coluber constrictor mormon*)			A			CD-A3
Sierra garter snake (*Thamnophis couchii*)	A	A	A	A	A	CD-A3, CD-A4, JD-A15, RC-A1, SCD-A1
Valley garter snake (*Thamnophis sirtalis fitchi*)	A					CD-A3[d]
Unknown garter snake (*Thamnophis* sp.)	A			A		CD-A3, RPD-A1
Western rattlesnake (*Crotalus oreganus*)	A			A		CD-A4[d], JD-A15, SCD-A1[d],

[a] E=egg mass, L=larvae, A=adult or other post-metamorph stage (i.e., young-of-year, and/or juvenile)
[b] Heard alarm call only
[c] Newly hatched tadpoles, too small to identify
[d] Observed incidentally outside of the VES
[e] Incidental sightings of the following terrestrial reptiles were made, but are not documented in this table: western fence lizard (*Sceloporus occidentalis*) and alligator lizard (*Elgaria* sp.)

6.5 DISCUSSION

6.5.1 Foothill yellow-legged frog

The number of egg mass, tadpole, and YOY observations at sites CD-A3 and CD-A4 in 2020 indicate another year of successful breeding for the Silver Creek FYLF population, following a trend of improved breeding success during the previous two years (2018–2019) (Figure 6-35 through Figure 6-38). The year 2020 also marked the first observation of egg masses in the UARP, as well as the first tadpole and YOY observations at Site CD-A4 since the implementation of the new License and associated flow regime.

The observed increase in FYLF breeding activity between 2018 and 2020 could be attributed in part to reduced riparian cover from high flows in 2017. FYLF breeding is not commonly observed in well-shaded sites (Van Wagner 1996, Zweifel 1955) and increased breeding has been found at restoration sites where alders were removed from cobble bars (Lind et al. 1996 as cited in Hayes et al. 2016). Furthermore, the year 2020 was the most prolific breeding year since license implementation surveys began in 2016. During the 2020 breeding season, stream flows were lower, and water temperatures were warmer in spring (April through June), compared with all other monitoring years (2016, 2017, 2018, and 2019) (Figure 6-39 through Figure 6-41). These conditions, coupled with increased sun exposure and basking opportunities, may have increased breeding success on Silver Creek. The 3-year time lag between improved habitat conditions from reduced riparian and a notable increase in breeding evidence may reflect the time to reproductive maturity in central and northern California (Hayes et al. 2016, Kupferberg et al. 2009). Future monitoring will continue to provide coarse data on population trends.

Incidental observations of FYLF outside of Silver Creek (i.e., the tributary to Silver Creek and seep next to the Camino Adit access road) indicate that FYLFs are likely using these habitats for basking, foraging, and overwintering. One or more individual FYLF have been observed in the tributary during at least one survey in all monitoring years: 2016, 2017, 2018, 2019, and 2020. Incidental FYLF observations at the roadside seep were less frequent; two to three FYLF were found at the seep during June 2016 and July 2019, while none were found in 2020. As expected, based on habitat conditions, there was no evidence of breeding (i.e., egg masses or tadpoles) at these locations.

Illegal suction-dredge mining equipment was observed in Silver Creek just upstream of Site CD-A3 on 1 September 2020, and in the lower third of CD-A3 on 29 September 2020 (approximately 35 ft downstream from the Egg Mass A location). Associated disturbance to the stream channel and bed was also evident, including the relocation of large boulders. Suction-dredging is among numerous risk factors that may affect persistence of FYLF populations (Hayes et al. 2016). This form of mining may affect reproduction by disturbing adults during courtship and breeding or disrupting breeding habitat (along with egg masses and/or tadpoles) during the reproductive season (Hayes et al. 2016). Impact mechanisms include dredging up or rearranging stream substrates; adverse effects from increased sedimentation; and displacement, burial, or suffocation of eggs or tadpoles from elevated currents (CDFG 1994 and Harvey and Lisle 1998, as cited in Hayes et al. 2016).

6.5.2 Water Temperature as an Indicator of Foothill Yellow-legged Frog Breeding Initiation

Based on the relatively cool temperatures in Silver Creek, timing of egg mass and tadpole observations, and cited breeding and egg-hatching times, the egg-laying period in 2020 is estimated to have been between early May to early June[18]. The timing of egg masses observations in 2020 (before 19 June) indicated that breeding (i.e., egg-laying) did not likely occur past early June. This is further supported by the observation of a seemingly gravid female at the Camino Adit on 13 May 2020. The mean 7DMAVG on-site edgewater temperature for this period at Site CD-A3 was 13.2°C (range=11.1–14.8°C), and at Site CD-A4 was 14.6°C (range=12.1–16.7°C) (Figure 6-39 and Figure 6-40). While there are not enough data to identify a precise breeding window for other years, the egg-laying period in 2018 and 2019 is estimated to have been several weeks later than in 2020 based on the later timing of (unmetamorphosed) tadpole observations (September and October, respectively).

Monitoring data from survey years with tadpole and/or egg mass observations generally indicate that breeding initiation at Site CD-A3 occurs after flows recede and on-site edgewater temperatures consistently reach approximately 12°C 7DMAVG; these conditions tend to occur between May and June. The specific timing/period for breeding initiation and tadpole development on Silver Creek likely varies between water year types due to subsequent differences in water temperature and the flow recession pattern. Wetter water years tend to have higher spring flows, more spills, a more prolonged flow recession into spring/early summer, and cooler water temperatures that take longer to warm; combined, these seem to correlate with later breeding. Drier water years tend to have lower spring flows, fewer spills, a faster flow recession in spring, and water temperatures that warm more quickly than in wet years; combined, these may correlate with earlier, and more successful, breeding. For example, during 2020, a “dry” water year, there were lower spring stream flows and fewer spill events than in other monitoring years, resulting in warmer water temperatures earlier in the spring and evidence of FYLF breeding that is estimated have occurred as early as early May, with successful metamorphosis by mid-September. During 2019, a “wet” water year, there were higher stream flows, more uncontrolled spills, and longer flow recession times on Silver Creek, resulting in colder water temperatures later in the spring and summer (i.e., the water temperature was not consistently at or above 12°C until July, after spills

[18] The duration of FYLF breeding generally ranges from six days to 3.5 weeks (Yarnell et al. 2011) and eggs hatch between 5–30+ days, depending on stream temperatures (colder temperatures result in longer times to hatching) (Kupferberg et al. 2011 as cited In Hayes et al. 2016). Because stream temperatures in Silver Creek tend to be colder for FYLF breeding, egg mass development to hatching is estimated at the longer end of the range, approximately 3–4 weeks for this system.

ended) that may have delayed FYLF breeding initiation until sometime in June or July, as well as delaying metamorphosis of tadpoles.

Based on data from FYLF VESs and water temperature monitoring, a 12°C 7DMAVG water temperature as measured at the telemetered SMUD gage station on Silver Creek at SFAR (and as required by the License [FERC 2014]) may be an appropriate threshold to use to predict breeding suitability for FYLF at Site CD-A4. However, a 13°C 7DMAVG water temperature (as measured at the same gage) is more appropriate to forecast breeding initiation at Site CD-A3. This is based on the regression analysis that showed edgewater temperatures at Site CD-A3 reach 12°C when thalweg temperatures at the telemetered station are approximately 13.3°C (Section 6.4.1.3). This differential in reaching threshold temperatures between the CD-A3 and CD-A4 sites in relation to the gaging station thalweg temperature is not unexpected; Site CD-A3 is well upstream of the gaging station and will stay colder longer into the breeding season, and as Silver Creek warms more quickly later in the season, the temperature differential between the sites will be greater.

6.5.3 Western Pond Turtle

WPTs were observed in four out of five monitoring years in the Slab Creek Dam Reach of the SFAR. A higher number of WPTs were observed during 2020 compared to prior monitoring years (2016, 2017, 2018 and 2019), and the observation of a juvenile turtle suggests that a population of WPTs continue to use habitat within the SFAR (Site SCD-A1) and are reproducing. However, this should be interpreted with caution due to the variation in number of snorkel surveys and site conditions between survey years. Future monitoring will continue to provide coarse data on population trends.

Various WPT age classes seem to be represented in the UARP based on the number of scute rings on WPT captured in 2020 (1, 7, 7, 9, and 9). This is consistent with the distribution in number of scute rings (1–10) for WPT captured between 2016–2019 (SMUD 2017, 2018, 2019, 2020). The observation of a juvenile WPT is an indication that upland habitat along the reach is being used for breeding.

WPT observations were distributed throughout Site SCD-A1 during 2020 and in prior years, which indicates the population is using various suitable pool habitat throughout the reach (Figure 6-25). A few clustered WPT observations across monitoring years suggest that some pools are preferred habitat (Figure 6-44). (Table 6-9).

Surprisingly, most turtles (13 of 16) were found underwater during snorkeling efforts and would not have been detected by traditional VES methods (e.g., scanning bank and basking habitats with or without binoculars). The higher number of detections by snorkeling is likely due to turtle “basking” behavior in the SFAR. The higher summer air temperatures elevate shallow side channel pool and surface water temperatures, perhaps causing turtles to remain in the water to thermoregulate rather than basking out of the water[19]. This behavior was observed by snorkelers; for example, some turtles

[19] Bury et al. 2012 refers to this as “aerial basking”

were observed perched on willow branches in the upper part of the water column which was perceptibly warmer. The reduced frequency of turtles basking out of the water is consistent with behavior of WPTs in the Central Valley, California, where turtles have been observed thermoregulating submerged in shallow-water habitats (e.g., ponds, marshes), floating in in the upper water column, sitting on algal mats, and burrowing under algal mats in the shallows (Bury et al. 2012).

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7.0 BEAR MANAGEMENT MONITORING

This Bear-Human Interaction Monitoring Report addresses monitoring set forth in Condition Number 31 of Appendix B (Forest Service section 4(e)) conditions of the new license issuance order (FERC 2014) for the UARP (FERC Project 2101), owned and operated by the SMUD.

The UARP lies within El Dorado and Sacramento counties, primarily within lands of the Eldorado National Forest. The UARP consists of three major storage reservoirs: Loon Lake, Union Valley, and Ice House (with a combined capacity of approximately 379,000 acre-feet); eight smaller regulating or diversion reservoirs; and eight powerhouses. The UARP also includes recreation facilities containing over 700 campsites, five boat ramps, hiking paths, and bicycle trails at the reservoirs.

In consultation with stakeholders and the resource agencies, SMUD developed a Bear-Human Interaction Monitoring Plan (SMUD 2015). The monitoring described by this Plan will be used to determine if the measures (primarily installation of bear-proof food and trash lockers and public education) implemented by the resource agencies are successful in decreasing the number of bear incidents in the UARP. Additionally, the monitoring will help inform resource managers where there are still problems that may need to be addressed with additional bear management measures. Results of bear-human interaction monitoring conducted during the 2020 recreation season are provided in this report.

7.1 MONITORING PLAN OBJECTIVES

The primary objective and rationale for the bear management monitoring program, as described in the Plan, are as follows:

> *Monitor effectiveness of measures related to bear management using a method acceptable to FS, FWS, and CDFG.*

This monitoring will help determine if bear management measures used to keep bear populations away from recreation sites within the UARP are effective. As described in Settlement Agreement Article 1-6.10:

> *If, over a 5-year period, monitoring indicates that the number of bear/human interaction incidents does not decline or decrease in severity, the licensee shall work with FS, FWS, and CDFG to identify and implement additional measures necessary to reduce such problems.*

7.2 METHODS

As was done since monitoring began in 2016, monitoring was carried out at developed, UARP-related recreation facilities within the Project area (Figure 7-1 and Table 7-1). These included both day-use and overnight facilities and both hosted and unhosted facilities.

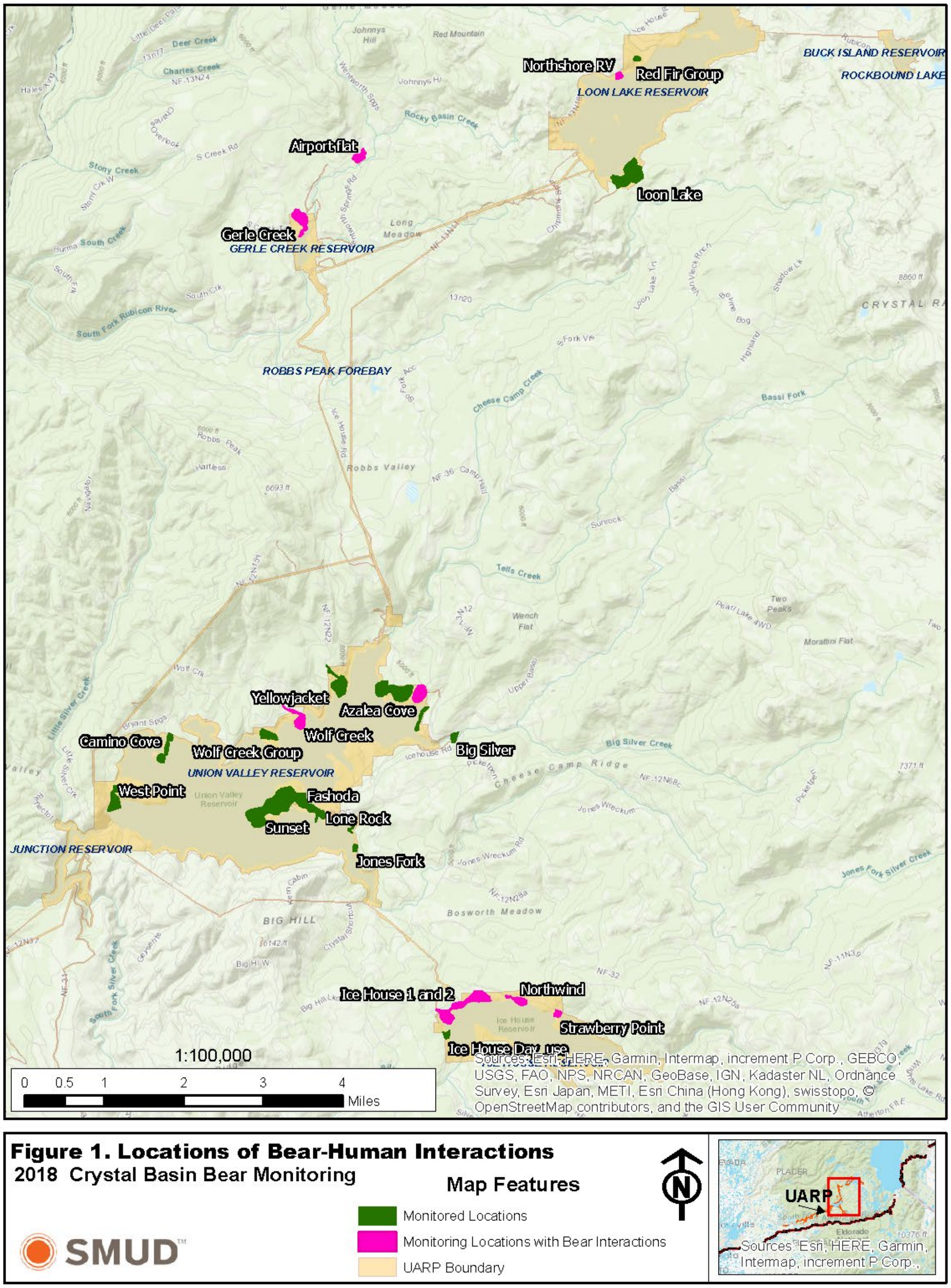

Figure 7-1. Bear-human interaction monitoring locations.

Table 7-1. Sites associated with the UARP bear-human interaction 2020 monitoring program.

Facility	Existing Lockers/Trash	Hosted Site	Monitored	Comment
Northshore CG	Y	Y	Y	Newly remodeled campground
Loon Lake Family CG; Boat Launch RV CG; Equestrian CG; Group CG; and Equestrian Group CG	Y	Y	Y	Host administering multiple LL facilities was responsible for collecting forms. Group sites closed.
Red Fir CG	Y	N	Y	Monitoring form box installed
Airport Flat CG	Y	N	Y	Monitoring form box installed
Gerle Creek CG	Y	Y	Y	Host supplied with forms
Sunset Family and Group CG	Y	Y	Y	Host supplied with forms. Group sites closed.
Fashoda CG	Y	Y	Y	Host supplied with forms
West Point CG	N	N	Y	Monitoring form box installed
Yellowjacket CG	N	Y	Y	Host supplied with forms
Wench Family and Group CG	Y	Y	Y/N	Host supplied with forms. Group sites closed.
Wolf Creek Family and Group CG	Y	Y	Y/N	Host supplied with forms. Group sites closed.
Azalea Cove CG	Y	N	Y	Monitoring form box installed
Big Silver Group CG	Y	N	N	Group site closed
Camino Cove CG	Y	N	Y	Monitoring form box installed
Jones Fork CG	Y	N	Y	Monitoring form box installed
Lone Rock CG	Y	N	Y	Monitoring form box installed
Ice House Family CG	N	Y	Y	Host supplied with forms
Northwind CG	Y	N	Y	Monitoring form box installed
Strawberry Point CG	Y	N	Y	Monitoring form box installed
Day-use Areas				
Angel Creek	Y	N	Y	Monitoring form box installed
Gerle Creek	N	Y	Y	Host supplied with forms

Facility	Existing Lockers/Trash	Hosted Site	Monitored	Comment
Ice House	N	Y	Y	Host supplied with forms
Fashoda	N	Y	Y	Host supplied with forms
Jones Fork Bike Trailhead	N	N	Y	Monitoring form box installed at CG
Big Silver Bike Trailhead	N	N	Y	Monitoring form box installed at CG
Wench Creek Bike Trailhead	Y	Y	Y	Host supplied with forms
Loon Lake – Desolation Wilderness Trailhead	N	N	Y	Monitoring form box installed at TH

The methods of this monitoring are outlined in the Bear-Human Interaction Monitoring Plan prepared by SMUD in consultation with the USFS and CDFW (SMUD 2015). SMUD has prepared a form to be used to collect standardized data. The form is supplied to the USFS at the outset of each recreation season and the USFS distributes the forms to campground hosts and to form boxes supplied by SMUD for non-hosted sites. The USFS collects forms from the boxes and from the hosts throughout the season and provides them to SMUD for reporting purposes. Data can be provided by the visiting public that can fill out the form or hosts who have interviewed campers and fill out the form.

7.2.1 Problems Encountered

2020 posed unique challenges to the monitoring program due to the COVID-19 pandemic. First, staff resources from the USFS, SMUD, and the campground concessionaire were restricted in their ability to perform field work and meet and interact with the public. This prevented the USFS from hosting their typical kickoff meeting to educate the concessionaire and staff on the monitoring program. Second, recreational use patterns were different. There were times early in the season when many facilities were closed and there was a significant increase of recreational use throughout the Forest as people were looking for ways to recreate away from each other and get outside of urban areas. Some areas, like group camps, remained closed all season under Forest policy.

In 2020 the USFS staff did stock the monitoring form boxes and collected forms when they were permitted to go into the field; concessionaires were supplied with forms also, but comparatively few completed forms were received.

7.3 RESULTS

SMUD received 11 completed forms from the USFS for the 2020 recreation season (Appendix F1), the results of which are summarized in the table located in Appendix F2. All the reports came from the following developed campgrounds: Northshore (3), Northwind (3), Strawberry Point (3), and Sunset (2).

Since monitoring started in 2016, the number of reported incidents has fluctuated from a high of 43 in 2017 to 11 in 2020. Reported incidents have come from across the Crystal Basin. In the past, the Gerle Creek/Airport Flat area was a primary location for bear activity, but not this season. The bears seem to be habituated to humans and are not easily deterred. Aside from the visitor reports, the campground hosts consistently report that the bears are knocking over dumpsters. As of 2019, most locations have bear-resistant trash and food storage containers (Table 7-1).

7.4 DISCUSSION

The low number of reported incidents in 2020 may be a result of challenges associated with the COVID-19 pandemic. Limited staff ability to go to the field coupled with a reluctance for in-person, face-to-face exchanges likely had some impact. Additionally, the facilities were opened a little later in the season in some cases and some sites may have remained closed (group camps).

In 2020 a mix of different sites saw bear activity. Facilities at Ice House Reservoir (Strawberry Point and Northwind) were impacted, as well as the newly refurbished Northshore Campground at Loon Lake. Sunset Campground had several incidents as well. In most of these cases the bears are getting food from trash and/or food left unsecured in, or adjacent to, campsites. All the sites have bear-proof food storage lockers and trash receptacles. It is evident from at least one encounter that because of the exceptionally heavy use and the difficulties associated with the pandemic, trash was building up outside dumpsters which were full. As indicated in previous reports, continuing efforts at education and enforcement are always needed so that visitors understand that *all* food, trash, or scented products need to be stored in a bear-proof food locker. This message needs to be heavily reinforced by the USFS and its concessionaire hosts.

Based on observations and the monitoring results to date, SMUD makes the following recommendations:

1. SMUD, CDFW, and the USFS should continue to present information on the monitoring program to the concessionaire's campground hosts during an annual meeting and emphasize the importance of proper food storage.
2. SMUD and USFS should meet once toward the middle of the recreation season to discuss the need for more forms, cooperation of concessionaire staff, how often boxes are being checked, and whether signage is adequate, among other things.
3. The USFS should continue to emphasize the need for concessionaire staff to talk to the public about proper food storage and make regular rounds to see if food is being left out.

SMUD will continue to provide the results of the monitoring to the USFS and CDFW and any management decisions or actions will be at the discretion of those agencies with jurisdiction over the resource. SMUD may assist in any management decisions, as appropriate.

7.4.1 5-year Summary

As stated in Article 1-6.10 of the Settlement Agreement (see Section 7.1), the parties are to determine if bear interactions are declining or decreasing in severity over the first 5 years of monitoring. The conclusion of monitoring in 2020 marks the end of the first 5-year period. The total number of bear-human interactions reported in the first 5 years of monitoring are shown in Table 7-2.

Table 7-2. Total Number of bear-Human Interactions Reported in the First 5 Years of Monitoring.

2016	2017	2018	2019	2020
20 reports	43 reports	33 reports	15 reports	11 reports

Given the changes that have happened over the first 5 years it would be difficult to make any assumptions about the number and severity of bear interactions. Initially, there is a period of refinement in the methodology and an education component to make sure camp hosts are helping with the monitoring and forms are being collected and delivered back. That is likely why there is a big upswing in 2017 and 2018. Then between 2018 and 2019, a new campground concessionaire started managing the sites so this may have contributed to the drop in reports. Likewise, there have been staff changes at the USFS during this period as well, which can have an impact on data collection efforts. Finally, in 2020, the pandemic almost assuredly impacted the results. It is clear from observations that visitor usage was up considerably in 2020, but people were keeping their distance from each other, which may impact their willingness to report bear interactions. As mentioned above, many services were overwhelmed, leading to trash being left out, which would be an attractant to bears and could have impacted results.

In accordance with the monitoring plan, monitoring will occur annually during the recreation season (approximately Memorial Day through the end of September). For 2021, SMUD will ensure that each site to be monitored, including hosted sites, has adequate signage to educate the public about bears and to inform visitors of the monitoring program. SMUD will attend the annual kick-off meeting (if it occurs) with the recreation concessionaire and the USFS to present the details of the monitoring program and enlist the support and assistance of the camp hosts and USFS recreation staff. At this meeting, additional forms will be provided to the USFS. For the monitoring to be effective it will be imperative to make sure the visiting public knows about the monitoring program and their need to fill out forms following any incidents. It is equally important that all sites have forms available throughout the year and that all forms are collected and returned to SMUD at the close of the season.

7.5 LITERATURE CITED

FERC (Federal Energy Regulatory Commission). 2014. Federal Energy Regulatory Commission Order 148 FERC 62,070 Issuing New License for the Sacramento Municipal Utility District Upper American River Hydroelectric Project No. 2101. Issued July 23, 2014.

SMUD (Sacramento Municipal Utility District). 2015. Bear-Human Interaction Monitoring Plan. Hydro License Implementation for the Upper American River Project (FERC Project No. 2101).

8.0 LARGE WOODY DEBRIS

No Large Woody Debris (LWD) meeting the size requirement was passed in 2020 at Robbs Forebay, Junction, Camino, or Slab Creek reservoirs.

9.0 WATER TEMPERATURE

The Water Temperature Monitoring Plan was developed in consultation with the SWRCB, USFS, CDFW, and USFWS. FERC approved the monitoring plan on September 30, 2015 (SMUD 2015).

9.1 MONITORING PLAN OBJECTIVES

The primary objectives and rationale for the water temperature monitoring program, as described in the Plan, are as follows:

> *Annual water temperature monitoring at specified stream sites will provide information needed to determine whether cold freshwater resource objectives are being met and will provide an evaluation of breeding conditions for sensitive amphibian species. Stream temperature monitoring results will also be used to determine whether water temperature profiles within the reservoirs are needed to better understand cold water availability. An adaptive approach to water temperature monitoring will allow the removal of specific monitoring sites if results indicate water temperatures are adequate at those specific locations (Condition 8.I.).*

This monitoring will help determine if water temperatures in UARP waters meet the Basin Plan beneficial use of Cold Freshwater Habitat (CVRWQCB 1998) and other identified habitats/species needs. If such a study is inconclusive, reservoir temperature profile monitoring may be required to assist in the decision-making process. Currently, the Plan requires water temperature monitoring in stream reaches throughout the duration of the license term or until *"the Licensee can demonstrate to the satisfaction of the Deputy Director that operation of the UARP reasonably protects the 'cold freshwater' beneficial use at any site for which the Licensee seeks modification to the temperature monitoring requirement*."

These data are also utilized to direct the following requirements of the new license:

- Adaptive management decisions regarding initiation of FYLF breeding
- Cancellation of recreational boating releases due to FYLF breeding
- Temperature monitoring related to the "block of water" releases on Silver Creek
- Response of aquatic resources to spill events and pulse flows after thresholds have been reached
- Requirement of the Basin Plan that "At no time or place shall the temperature of COLD or WARM intrastate waters be increased more than 5°F above the natural receiving water temperature"

9.2 METHODS

9.2.1 Study Area and Sampling Locations

Continuous water temperature monitoring of stream reaches occurred in 2020 at 19 sites throughout the UARP area utilizing fixed stations or dataloggers. In general, these sites measured water temperatures in diverted stream reaches downstream of UARP reservoirs. Table 9-1 describes the locations and characteristics of each site. Final site development at a local scale was determined using proximity to release point, presence of isothermal water column, logistics, and channel morphology. Figure 18 depicts the monitoring site locations relative to the UARP and primary streams and rivers.

Table 9-1. UARP Water Temperature Monitoring Site Locations.

Site Name	Site Description	UTM (NAD 83)		Sensor Type	Data	Threshold	Complete
		Easting	Northing				
RR5	Rubicon River immediately below Rubicon Reservoir Dam	740501	4319200	CS450 L	Telemetry	None	Yes
LRR3	Little Rubicon River immediately below Buck Island Reservoir Dam	737558	4320907	CS450 L	Telemetry	None	Yes
RR1	Rubicon River below confluence of Little Rubicon River at the Project boundary	736593	4323887	Onset data-logger	Manual	None	Yes
GC7	Gerle Creek immediately below Loon Lake Reservoir Dam	732455	4320776	CS450 L	Telemetry	None	Yes
GC8	Gerle Creek immediately below Gerle Creek Reservoir Dam	725745	4316219	CS107 or CS450 L	Telemetry	None	Yes
SFRR 5	South Fork Rubicon River immediately below Robbs Peak Reservoir Dam	726202	4314316	CS450 L	Fiber Optic Network	None	Yes
SFRR 6	SF Rubicon River below confluence of Gerle Creek at the Project	725256	4314907	CS450 L	Telemetry	None	Yes

Site Name	Site Description	UTM (NAD 83)		Sensor Type	Data	Threshold	Complete
		Easting	Northing				
SFRR 7	South Fork Rubicon River immediately upstream of the confluence with the Rubicon River	719438	4316236	Onset data-logger	Manual	None	No
SFSC 7	South Fork Silver Creek immediately below Ice House Reservoir Dam1	728745	4299871	CS450 L	Telemetry	None	Yes
SFSC 8	South Fork Silver Creek immediately upstream of Junction Reservoir	721498	4303358	CS450 L	Telemetry	7DMAVG*	Yes
SC5	Silver Creek immediately below Junction Reservoir Dam	720466	4303467	CS 450L	Fiber Optic Network	None	Yes
SC6	Silver Creek immediately above Camino Reservoir Dam	714119	4301407	CS450 L	Telemetry	DAVG*	Yes
SC7	Silver Creek immediately below Camino Reservoir Dam1	713631	4300155	CS450 L	Fiber Optic Network	None	Yes
SC8	Silver Creek immediately upstream of South Fork American River	709310	4296208	CS450 L	Telemetry	DAVG*	Yes
BC4	Brush Creek immediately below Brush Creek Reservoir Dam	706407	4298536	CS451	Fiber Optic Network	None	Yes
SFAR 13	South Fork American River immediately below Slab Creek Reservoir Dam	699644	4294054	CS450 L	Fiber Optic Network	None	Yes
SFAR 7	South Fork American River at Mosquito Rd Bridge	695572	4294304	Onset Data-logger	Manual	None	No

Site Name	Site Description	UTM (NAD 83)		Sensor Type	Data	Threshold	Complete
		Easting	Northing				
SFAR 15	South Fork American River approximately ½ mile upstream of White Rock Powerhouse	692576	4292875	CS450 L	Telemetry	7DMAVG*	Yes
SFAR 16	South Fork American River to record White Rock Powerhouse discharge temps	692212	4293046	CS450 L	Fiber Optic Network	None	Yes

7DMAVG – Seven-Day Moving Average
DAVG – Daily Average

9.2.2 Temperature Data at Fixed-Stations

Sixteen of the 19 sites were monitored for water temperature using fixed stations. Monitoring compliance at these sites were accomplished using gaging stations located at weirs, stilling wells, or powerhouse tailraces. Each fixed station site utilized a Campbell Scientific datalogger and a redundant pair of temperature sensors. Sensor cables were contained inside conduit, and the sensors were placed as close as possible to the stream thalweg where water is well mixed. A solar shield helped prevent exposure to direct sunlight. Depending on the site, power was supplied either by photovoltaic panels and DC batteries or through an existing power supply. Data transfer occurred through radio telemetry or fiber optic network. At the fixed stations, temperature readings were collected at 15-minute intervals and telemetered to SMUD databases, where the data was summarized to hourly means and calculated to daily statistics.

9.2.3 Temperature Data at Datalogger Stations

Simple, non-permanent, calibrated temperature dataloggers (ONSET HOBO Water Temperature Pro V2) were deployed prior to March 15, 2020, at the remaining three sites (“Manual” sites in Table 9-1). The sensors were inserted into perforated metal framed housings that allowed for adequate water movement throughout.

Each housing was secured to large boulders or bedrock using hardened 3/8" chain and placed to assure that the sensor remained submerged and was not exposed to direct sunlight (Figure 9-1). Two dataloggers were installed at each site to protect against data loss in the event of equipment failure or drift. Dataloggers were deployed in habitat strata where the water was well mixed, typically at the head of a pool just below a riffle input. Table 9-2 describes the equipment specifications for all sensors selected for water temperature monitoring.

Hourly data from HOBO loggers were manually downloaded using Onset Computer Corporation software. All water temperature data is stored in a Microsoft SQL database designed for this purpose.

Figure 9-1. Photograph of the water temperature datalogger housing, Rubicon River below confluence of Little Rubicon River.

Table 9-2. Specifications for Monitoring Equipment.

Sampling Equipment	Accuracy	Range	Calibration Interval
Campbell Scientific 107L	<±0.2°C from 0°to 50° C	-35° to +50°C	Annual
Campbell Scientific 450L	±0.2°C from 0°to 50° C	0° to 60°C	Biennial
Onset Computer Corp. HOBO®	±0.2°C from 0° to 50°C	-40° to 50°C	Annual

9.3 QA/QC

Raw data is reviewed on a routine basis. Temperature trends inspected include physical range limits, practical range limits, and rates of temperature change. Data obtained from the fixed stations were checked for validity using procedures that run every 24 hours following data download. A report is generated and sent to pertinent SMUD staff via email for any suspected erroneous data. The same procedures are run manually following download from the data loggers. Erroneous temperature values were adjusted manually; however, the original raw data were maintained in the database.

This review, along with graphical analysis and routine equipment inspection, ensured that sensors were functioning and recording properly throughout the monitoring period. For fixed stations, this allowed for a timely response if the need arose. Any equipment malfunction that required a field visit was addressed during normal business hours, under safe conditions. Repairs were made in as timely a manner as possible.

9.4 DECISION-MAKING THRESHOLDS

SMUD will use real-time water temperature information to make efforts to protect endangered species and Cold Freshwater Habitat. Eventually the 12°C seven-day moving average (7DMAVG) temperature trigger thresholds below may be adjusted on a site-specific basis if data from the FYLF monitoring support such a change. In particular, SMUD will:

- Use water temperature thresholds to protect FYLF breeding activities by canceling recreational boating flows in the following reaches when the 7DMAVG exceeds 12°C at:
    - SF Silver Creek below Ice House Dam (If FYLF are found in this reach).
    - SF American River below Slab Creek Reservoir.
- Monitor for effects to aquatic resources following spills that occur at Camino and Slab Creek reservoirs when the 7DMAVG exceeds 12°C.
- Monitor other temperature thresholds to protect the Cold Freshwater Habitat requirements on Silver Creek, as described in the 401 (SWRCB 2013). This involves informing the release of an additional “block of water” during wet water year types when the daily average temperature (DAVG) exceeds 20°C.
- Compare water temperature trends over time with other annual climatic conditions collected by SMUD. This will assist in determining whether the UARP is protecting the Basin Plan beneficial use of Cold Freshwater Habitat (CVRWQCB 1998).

9.5 ADAPTIVE MANAGEMENT

Three thresholds that are connected to various UARP adaptive management conditions were crossed during the monitoring period (Table 9-3). The exact dates are listed below. One triggered an adaptive management action.

For water temperature monitoring at Slab Creek Dam (SFAR13), no spills occurred after the 7DMAVG exceeded the 12°C threshold. For water temperature monitoring at Silver Creek at Camino Gaging Station (SC7), spills occurred on June 8th-13th after the

7DMAVG exceeded the 12°C threshold. When safe to do so, FYLF monitoring occurred on June 17 and 19.

Table 9-3. Crossed Threshold.

Site Name	Site Description	Date Crossed Threshold
SFSC8	South Fork Silver Creek immediately upstream of Junction Reservoir	May 28, 2018
SC8	Silver Creek immediately upstream of SF American River	June 24, 2020
SFAR15	SF American River approximately ½ mile upstream of White Rock	April 25, 2020

At Silver Creek upstream of South Fork American River Confluence (SC8), the average daily water temperature crossed the 20°C threshold on June 24th and four more times through September 8th; however, it was a dry water year type, so no action was required.

For water temperature monitoring at South Fork Silver Creek immediately upstream of Junction Reservoir (SFSC8), the 7DMAVG exceeded the 12°C threshold on May 28 and remained above for the remainder of the measuring period. No FYLF were found in this reach.

At SFAR approximately ½ mile upstream of White Rock (SFAR15), the 7DMAVG exceeded the 12°C threshold on April 25 and remained above for the remainder of the measuring period. No FYLF were found in this reach.

9.6 RESULTS

The water temperature sensors located at Mosquito Bridge (SFAR7) and South Fork Rubicon River (SFRR7) were lost for the 2020 monitoring season (Table 9-1). Data were analyzed at varying frequencies depending on the format of data retrieval (real-time opposed to manually retrieved/downloaded). All data were summarized to include values for daily mean, minimum, and maximum temperatures. Further analysis included calculating the highest seven-day moving average temperature (7DMAVG). In a typical year, sites associated with trigger thresholds (Table 9-1), daily minimum, maximum, average, and seven-day moving average values were determined to notify SMUD staff if these thresholds were being exceeded. These processes are automated in the SMUD License Implementation database, which includes a notification process when threshold triggers have been reached.

Water temperature data is presented graphically in Appendix G. It is impractical to place hourly and daily data for all sites into this report, although this data will be made available upon request.

9.7 LITERATURE CITED

CVRWQCB (Central Valley Regional Water Quality Control Board). 1998. Water Quality Control Plan (Basin Plan) for the Central Valley Region. Sacramento River and San Joaquin River Basins (Basin Plan). Published by the California Regional Water Quality Control Board, Central Valley Region and the State Water Resources Control Board, Sacramento, CA.

FERC (Federal Energy Regulatory Commission). 2014. New License for the continued operation of the Upper American River Project, No. 2101. Federal Energy Regulatory Commission, Washington, D.C.

SMUD (Sacramento Municipal Utility District). 2015. Temperature Monitoring Plan for the Upper American River Project. Sacramento, CA.

SWRCB (State Water Resources Control Board). 2013. Water Quality Certification for the Upper American River Project. FERC Project No. 2101. State Water Resources Control Board. Sacramento, CA.

APPENDIX A1

Pre- and Post-License Minimum Streamflow Requirements for the Upper American River Project (FERC P-2101)

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Table A1-1. Summary of minimum streamflow requirements prior to the 2014 UARP FERC license.

USGS Gaging Station	TYPE 1 - Years when less than 1 million acre-ft annual inflow is forecasted for Folsom Reservoir	FERC Article 29 Ref.	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	Comments
11427960	Rubicon River Below Rubicon Dam	(a)	6	6	6	6	6	6	6	6	6	6	6	6	See Note 1
11428400	Little Rubicon River Below Buck Island Dam	(b)	1	1	1	1	1	1	1	1	1	1	1	1	See Note 2
11429500	Gerle Creek below Loon Lake Dam	(c)	8	8	8	8	8	8	8	8	8	8	8	8	
11430000	South Fork Rubicon River below Robbs Peak Dam	(d) (g)	1	1	1	1	1	1	1	1	1	1	1	1	See Notes 3,8
11430000	Gerle Creek below Gerle Creek Dam	(d) (g)	4	4	4	4	4	4	4	4	4	4	4	4	See Notes 3,8
11441500	South Fork Silver Creek below Ice House Dam	(e) (g)	5	5	5	5	5	5	5	5	5	5	5	5	See Note 4
11441800	Silver Creek below Junction Dam	(f) (g)	5	5	5	5	5	5	5	5	5	5	5	5	See Note 3
11441900	Silver Creek below Camino Dam	(g)	5	5	5	5	5	5	5	5	5	5	5	5	See Note 3
11442700	Brush Creek below Brush Creek Dam	(l)	2	4	4	4	4	4	4	4	2	2	2	2	See Notes 5, 6
1143500	South Fork American River below Slab Creek Dam	(h)	36	36/10	10	10	10	10	10	10	36	36	36	36	See Notes 6, 7
USGS Gaging Station	**TYPE 2 - Years when 1.0-1.499 million acre-ft annual inflow is forecasted for Folsom Reservoir**	**FERC Article 29 Ref.**	**OCT**	**NOV**	**DEC**	**JAN**	**FEB**	**MAR**	**APR**	**MAY**	**JUN**	**JUL**	**AUG**	**SEP**	**Comments**
11427960	Rubicon River Below Rubicon Dam	(a)	6	6	6	6	6	6	6	6	6	6	6	6	See Note 1
11428400	Little Rubicon River Below Buck Island Dam	(b)	1	1	1	1	1	1	1	1	1	1	1	1	See Note 2
11429500	Gerle Creek below Loon Lake Dam	(c)	8	8	8	8	8	8	8	8	8	8	8	8	
11430000	South Fork Rubicon River below Robbs Peak Dam	(d) (g)	1	1	1	1	1	1	1	1	1	1	1	1	See Notes 3,8

11430000	Gerle Creek below Gerle Creek Dam	(d) (g)	4	4	4	4	4	4	4	4	4	4	4	4	See Notes 3,8
11441500	South Fork Silver Creek below Ice House Dam	(e) (g)	5	5	5	5	5	5	5	5	5	5	5	5	See Note 4
11441800	Silver Creek below Junction Dam	(f) (g)	10	6	6	6	6	6	6	10	10	10	10	10	See Note 3
11441900	Silver Creek below Camino Dam	(g)	10	6	6	6	6	6	6	10	10	10	10	10	See Note 3
11442700	Brush Creek below Brush Creek Dam	(i)	2	4	4	4	4	4	4	4	2	2	2	2	See Notes 5, 6
11443500	South Fork American River below Slab Creek Dam	(h)	36	36/10	10	10	10	10	10	10	36	36	36	36	See Notes 6,7

Notes:

1. 6 cfs or the natural flow, whichever is less, plus storage provided by stream flow maintenance dams of the CDFG in Lakes Clyde, Schmidell, Lois, and Middle Velma.
2. 1 cfs at all times in addition to the storage releases from stream flow maintenance dams of the CDFG in Rockbound and Highland Lakes as determined by that dept.
3. Requirements are based on the 4/1 CDWR Bulletin 120 forecasted "Water Year Unimpaired Runoff" for the Folsom Reservoir (which is deemed to be the same as American River at Fair Oaks).
4. Requirements are based on the CDWR Bulletin 120 forecasted "Water Year Unimpaired Runoff" to Folsom Reservoir, beginning with the 4/1 bulletin and applying in turn the 5/1 bulletin as it is issued.
   The 5/1 bulletin shall apply until 4/1 bulletin of the succeeding year is issued.
5. Requirements are as specified or natural flow, whichever is less.
6. Based on the CDWR Bulletin 120 forecasted "Water Year Unimpaired Runoff" to Folsom Reservoir, beginning with the 3/1 bulletin and applying in turn the 4/1 & 5/1 bulletins as they are issued.
   The 5/1 bulletin shall apply until 3/1 bulletin of the succeeding year is issued.
7. From November 1 - November 15, releases are 10 cfs. From November 16- November 30, releases are 4 cfs.
8. Combined releases should be either 10 cfs or 5 cfs (distributed as noted in this chart), measured on the South Fork Rubicon River below the mouth of Gerle Creek.

Table A1-2. Summary of minimum streamflow requirements included in the current 2014 UARP FERC license.

USGS Gaging Station	Above Normal years when 2.6 to 3.5 MAF water year unimpaired inflow was forecast for Folsom Lake	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Notes
11427690	Rubicon Dam	6*	6*	15	20	35	15	6*	6*	6*	6*	6*	6*	
11428400	Buck Island Dam	1*	1*	3	5	8	3	1*	1*	1*	1*	1*	1*	
11429500	Loon Lake Dam	23	27	37	49	49	27	27	17	17	20	20	22	
	Gerle Creek Dam	6	6	9	9	15	15	15	12	10	10	6	6	(4)
	Robbs Peak Dam	7	8	9	10	13	13	13	11	6	3	3	4	(4)
11441500	Ice House Dam	18	18	24	41	68	46	30	15	15	15	8	11	
11441800	Junction Dam	20	20	25	42	68	59	35	18	18	15	20	20	
11441900	Camino Dam	20	20	25	42	68	59	35	18	18	15	20	20	
11442700	Brush Creek Dam	9*	9*	9*	9*	9*	9*	5*	4*	3*	4*	9*	9*	
11443500	Slab Creek Dam	80	80	110-130-150-180	188-197-213-222	229-236-247-263	228-193-158-123	90	70	70	80	80	80	(2)
USGS Gaging Station	**Wet years when more than 3.5 MAF water year unimpaired inflow was forecast for Folsom Lake**	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**	**Notes**
11427690	Rubicon Dam	6*	6*	15	20	35	15	6*	6*	6*	6*	6*	6*	
11428400	Buck Island Dam	1*	1*	3	5	8	3	1*	1*	1*	1*	1*	1*	
11429500	Loon Lake Dam	28	32	44	58	58	32	32	20	20	23	23	26	
	Gerle Creek Dam	6	6	9	9	15	15	15	12	10	10	6	6	(4)
	Robbs Peak Dam	7	8	9	10	13	13	13	11	6	3	3	4	(4)
11441500	Ice House Dam	18	18	24	41	68	46	30	15	15	15	8	11	
11441800	Junction Dam	20	20	25	42	68	59	35	18	18	15	20	20	
11441900	Camino Dam	20	20	25	42	68	59	35	18	18	15	20	20	
11442700	Brush Creek Dam	10*	10*	10*	10*	10*	9*	5*	4*	3*	4*	9*	10*	

11443500	Slab Creek Dam	90	90	110-130-150-180	188-197-213-222	229-236-247-263	228-193-158-123	90	70	70	90	90	90	(2)

* Or natural inflow if less, but in all cases not less than 1 cfs

Notes

1. The water year total volume of unimpaired inflow to Folsom Lake is used to determine the water year. The California DWR makes forecasts of this volume, in units of thousands of acre-feet (TAF). One million acre feet (MAF) equal 1,000 TAF. DWR publishes Bulletin 120 or posts the forecast on its web site several days after February 1, March 1, April 1, and May 1 each year. The value forecasted in May applies until mid October. DWR also computes the actual water year unimpaired inflow and post this value on its web site in mid October. The value posted in October applies until the subsequent February 1 forecast is published.
2. Flows listed for Slab Creek Dam apply during the first five years of the license.
3. MAF denotes million acre-feet. Bulletin 120 gives forecasts in TAF, thousand acre-feet. 1,000 TAF = 1 MAF
4. New USGS gages to be installed in 2008 or 2009

APPENDIX B1

2020 Fish Survey Data

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Table B1-1. 2020 SMUD UARP Fish Survey Data.

Stream	Reach	Site	Segment	Method	Pass	Species	Length	Weight	Count
Rubicon River	Rubicon Dam	RRD-F1	Lower	E	1	Rainbow trout	72	3.3	1
Rubicon River	Rubicon Dam	RRD-F1	Lower	E	1	Brown trout	90	6.8	1
Rubicon River	Rubicon Dam	RRD-F1	Lower	E	1	Rainbow trout	58	1.7	1
Rubicon River	Rubicon Dam	RRD-F1	Lower	E	1	Rainbow trout	67	3.4	1
Rubicon River	Rubicon Dam	RRD-F1	Lower	E	1	Rainbow trout	66	2.7	1
Rubicon River	Rubicon Dam	RRD-F1	Lower	E	1	Brown trout	83	5.3	1
Rubicon River	Rubicon Dam	RRD-F1	Lower	E	1	Rainbow trout	59	1.9	1
Rubicon River	Rubicon Dam	RRD-F1	Lower	E	1	Rainbow trout	71	3.3	1
Rubicon River	Rubicon Dam	RRD-F1	Lower	E	1	Rainbow trout	61	2.1	1
Rubicon River	Rubicon Dam	RRD-F1	Lower	E	1	Rainbow trout	59	1.9	1
Rubicon River	Rubicon Dam	RRD-F1	Lower	E	1	Rainbow trout	70	3.6	1
Rubicon River	Rubicon Dam	RRD-F1	Lower	E	1	Rainbow trout	60	2.1	1
Rubicon River	Rubicon Dam	RRD-F1	Lower	E	1	Rainbow trout	57	1.6	1
Rubicon River	Rubicon Dam	RRD-F1	Lower	E	1	Rainbow trout	123	17.5	1
Rubicon River	Rubicon Dam	RRD-F1	Lower	E	1	Rainbow trout	61	2.0	1
Rubicon River	Rubicon Dam	RRD-F1	Lower	E	1	Rainbow trout	68	2.8	1
Rubicon River	Rubicon Dam	RRD-F1	Lower	E	1	Rainbow trout	53	1.2	1
Rubicon River	Rubicon Dam	RRD-F1	Lower	E	1	Rainbow trout	60	2.0	1

Stream	Reach	Site	Segment	Method	Pass	Species	Length	Weight	Count
Rubicon River	Rubicon Dam	RRD-F1	Lower	E	1	Rainbow trout	186	58.5	1
Rubicon River	Rubicon Dam	RRD-F1	Lower	E	1	Rainbow trout	75	3.5	1
Rubicon River	Rubicon Dam	RRD-F1	Lower	E	1	Rainbow trout	66	2.5	1
Rubicon River	Rubicon Dam	RRD-F1	Lower	E	1	Rainbow trout	61	1.9	1
Rubicon River	Rubicon Dam	RRD-F1	Lower	E	1	Rainbow trout	62	2.1	1
Rubicon River	Rubicon Dam	RRD-F1	Lower	E	1	Rainbow trout	114	14.1	1
Rubicon River	Rubicon Dam	RRD-F1	Lower	E	1	Rainbow trout	114	12.8	1
Rubicon River	Rubicon Dam	RRD-F1	Lower	E	1	Rainbow trout	71	3.4	1
Rubicon River	Rubicon Dam	RRD-F1	Lower	E	1	Rainbow trout	63	2.6	1
Rubicon River	Rubicon Dam	RRD-F1	Lower	E	1	Rainbow trout	78	4.3	1
Rubicon River	Rubicon Dam	RRD-F1	Lower	E	1	Rainbow trout	69	3.1	1
Rubicon River	Rubicon Dam	RRD-F1	Lower	E	1	Brown trout	93	7.4	1
Rubicon River	Rubicon Dam	RRD-F1	Lower	E	2	Rainbow trout	59	2.1	1
Rubicon River	Rubicon Dam	RRD-F1	Lower	E	2	Rainbow trout	57	1.7	1
Rubicon River	Rubicon Dam	RRD-F1	Lower	E	2	Rainbow trout	58	1.5	1
Rubicon River	Rubicon Dam	RRD-F1	Lower	E	2	Rainbow trout	77	4.0	1
Rubicon River	Rubicon Dam	RRD-F1	Lower	E	2	Brown trout	92	7.3	1
Rubicon River	Rubicon Dam	RRD-F1	Lower	E	2	Rainbow trout	72	3.6	1

Stream	Reach	Site	Segment	Method	Pass	Species	Length	Weight	Count
Rubicon River	Rubicon Dam	RRD-F1	Lower	E	2	Rainbow trout	68	2.8	1
Rubicon River	Rubicon Dam	RRD-F1	Lower	E	2	Rainbow trout	65	2.7	1
Rubicon River	Rubicon Dam	RRD-F1	Lower	E	2	Rainbow trout	70	3.3	1
Rubicon River	Rubicon Dam	RRD-F1	Lower	E	2	Rainbow trout	149	30.2	1
Rubicon River	Rubicon Dam	RRD-F1	Lower	E	2	Rainbow trout	73	3.6	1
Rubicon River	Rubicon Dam	RRD-F1	Lower	E	2	Rainbow trout	70	3.2	1
Rubicon River	Rubicon Dam	RRD-F1	Lower	E	2	Rainbow trout	60	1.9	1
Rubicon River	Rubicon Dam	RRD-F1	Lower	E	2	Rainbow trout	63	2.5	1
Rubicon River	Rubicon Dam	RRD-F1	Lower	E	3	Rainbow trout	58	1.9	1
Rubicon River	Rubicon Dam	RRD-F1	Lower	E	3	Rainbow trout	72	3.5	1
Rubicon River	Rubicon Dam	RRD-F1	Lower	E	3	Rainbow trout	55	1.9	1
Rubicon River	Rubicon Dam	RRD-F1	Lower	E	3	Rainbow trout	60	1.9	1
Rubicon River	Rubicon Dam	RRD-F1	Lower	E	3	Rainbow trout	56	1.6	1
Rubicon River	Rubicon Dam	RRD-F1	Lower	E	3	Rainbow trout	58	2.1	1
Rubicon River	Rubicon Dam	RRD-F1	Lower	E	3	Rainbow trout	117	16.2	1
Rubicon River	Rubicon Dam	RRD-F1	Upper	E	1	Rainbow trout	68	2.9	1
Rubicon River	Rubicon Dam	RRD-F1	Upper	E	1	Rainbow trout	72	3.0	1
Rubicon River	Rubicon Dam	RRD-F1	Upper	E	1	Rainbow trout	65	2.0	1

Stream	Reach	Site	Segment	Method	Pass	Species	Length	Weight	Count
Rubicon River	Rubicon Dam	RRD-F1	Upper	E	1	Rainbow trout	70	3.2	1
Rubicon River	Rubicon Dam	RRD-F1	Upper	E	1	Rainbow trout	80	5.1	1
Rubicon River	Rubicon Dam	RRD-F1	Upper	E	1	Rainbow trout	74	3.6	1
Rubicon River	Rubicon Dam	RRD-F1	Upper	E	1	Rainbow trout	66	2.5	1
Rubicon River	Rubicon Dam	RRD-F1	Upper	E	1	Rainbow trout	67	2.5	1
Rubicon River	Rubicon Dam	RRD-F1	Upper	E	1	Rainbow trout	108	7.2	1
Rubicon River	Rubicon Dam	RRD-F1	Upper	E	1	Rainbow trout	71	3.7	1
Rubicon River	Rubicon Dam	RRD-F1	Upper	E	1	Rainbow trout	76	3.8	1
Rubicon River	Rubicon Dam	RRD-F1	Upper	E	1	Rainbow trout	62	2.2	1
Rubicon River	Rubicon Dam	RRD-F1	Upper	E	1	Rainbow trout	74	3.6	1
Rubicon River	Rubicon Dam	RRD-F1	Upper	E	1	Rainbow trout	58	2.0	1
Rubicon River	Rubicon Dam	RRD-F1	Upper	E	1	Rainbow trout	68	3.0	1
Rubicon River	Rubicon Dam	RRD-F1	Upper	E	1	Rainbow trout	53	1.4	1
Rubicon River	Rubicon Dam	RRD-F1	Upper	E	1	Rainbow trout	182	57.2	1
Rubicon River	Rubicon Dam	RRD-F1	Upper	E	1	Rainbow trout	84	5.3	1
Rubicon River	Rubicon Dam	RRD-F1	Upper	E	1	Rainbow trout	117	15.7	1
Rubicon River	Rubicon Dam	RRD-F1	Upper	E	1	Rainbow trout	115	13.7	1
Rubicon River	Rubicon Dam	RRD-F1	Upper	E	1	Rainbow trout	66	2.6	1

Stream	Reach	Site	Segment	Method	Pass	Species	Length	Weight	Count
Rubicon River	Rubicon Dam	RRD-F1	Upper	E	1	Rainbow trout	111	13.7	1
Rubicon River	Rubicon Dam	RRD-F1	Upper	E	1	Rainbow trout	55	1.6	1
Rubicon River	Rubicon Dam	RRD-F1	Upper	E	1	Rainbow trout	60	2.1	1
Rubicon River	Rubicon Dam	RRD-F1	Upper	E	1	Rainbow trout	56	1.7	1
Rubicon River	Rubicon Dam	RRD-F1	Upper	E	1	Rainbow trout	75	4.0	1
Rubicon River	Rubicon Dam	RRD-F1	Upper	E	1	Brown trout	134	19.9	1
Rubicon River	Rubicon Dam	RRD-F1	Upper	E	1	Rainbow trout	81	4.9	1
Rubicon River	Rubicon Dam	RRD-F1	Upper	E	1	Brown trout	76	4.7	1
Rubicon River	Rubicon Dam	RRD-F1	Upper	E	1	Rainbow trout	76	4.4	1
Rubicon River	Rubicon Dam	RRD-F1	Upper	E	1	Brown trout	85	5.2	1
Rubicon River	Rubicon Dam	RRD-F1	Upper	E	1	Rainbow trout	135	23.2	1
Rubicon River	Rubicon Dam	RRD-F1	Upper	E	1	Rainbow trout	169	49.3	1
Rubicon River	Rubicon Dam	RRD-F1	Upper	E	1	Rainbow trout	62	1.8	1
Rubicon River	Rubicon Dam	RRD-F1	Upper	E	1	Rainbow trout	52	1.5	1
Rubicon River	Rubicon Dam	RRD-F1	Upper	E	1	Brown trout	139	23.3	1
Rubicon River	Rubicon Dam	RRD-F1	Upper	E	1	Rainbow trout	146	29.9	1
Rubicon River	Rubicon Dam	RRD-F1	Upper	E	1	Rainbow trout	144	28.8	1
Rubicon River	Rubicon Dam	RRD-F1	Upper	E	1	Rainbow trout	148	30.4	1

Stream	Reach	Site	Segment	Method	Pass	Species	Length	Weight	Count
Rubicon River	Rubicon Dam	RRD-F1	Upper	E	1	Rainbow trout	65	2.7	1
Rubicon River	Rubicon Dam	RRD-F1	Upper	E	1	Rainbow trout	87	6.7	1
Rubicon River	Rubicon Dam	RRD-F1	Upper	E	1	Rainbow trout	58	1.8	1
Rubicon River	Rubicon Dam	RRD-F1	Upper	E	1	Rainbow trout	68	3.1	1
Rubicon River	Rubicon Dam	RRD-F1	Upper	E	1	Rainbow trout	69	3.2	1
Rubicon River	Rubicon Dam	RRD-F1	Upper	E	1	Rainbow trout	69	3.0	1
Rubicon River	Rubicon Dam	RRD-F1	Upper	E	1	Rainbow trout	160	37.4	1
Rubicon River	Rubicon Dam	RRD-F1	Upper	E	2	Brown trout	98	8.2	1
Rubicon River	Rubicon Dam	RRD-F1	Upper	E	2	Rainbow trout	72	3.4	1
Rubicon River	Rubicon Dam	RRD-F1	Upper	E	2	Brown trout	99	8.4	1
Rubicon River	Rubicon Dam	RRD-F1	Upper	E	2	Rainbow trout	66	2.3	1
Rubicon River	Rubicon Dam	RRD-F1	Upper	E	2	Rainbow trout	63	2.5	1
Rubicon River	Rubicon Dam	RRD-F1	Upper	E	2	Rainbow trout	65	2.9	1
Rubicon River	Rubicon Dam	RRD-F1	Upper	E	2	Rainbow trout	68	2.7	1
Rubicon River	Rubicon Dam	RRD-F1	Upper	E	3	Rainbow trout	65	2.8	1
Rubicon River	Rubicon Dam	RRD-F1	Upper	E	3	Rainbow trout	66	3.0	1
Rubicon River	Rubicon Dam	RRD-F1	Upper	E	3	Rainbow trout	67	3.0	1
Rubicon River	Rubicon Dam	RRD-F1	Upper	E	3	Rainbow trout	76	4.3	1

Stream	Reach	Site	Segment	Method	Pass	Species	Length	Weight	Count
Rubicon River	Rubicon Dam	RRD-F2	Combined	E	1	Speckled dace	48	1.1	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	E	1	Rainbow trout	96	7.5	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	E	1	California roach	100	8.8	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	E	1	Rainbow trout	70	3.0	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	E	1	Speckled dace	139	0.4	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	E	1	Brown trout	74	3.6	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	E	1	Brown trout	73	3.6	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	E	1	Speckled dace	66	2.2	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	E	1	California roach	85	4.5	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	E	1	Brown trout	69	2.9	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	E	1	California roach	79	3.9	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	E	1	Speckled dace	52	1.7	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	E	1	Brown trout	47	0.8	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	E	1	California roach	66	2.0	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	E	1	Speckled dace	55	1.9	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	E	1	Speckled dace	61	2.0	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	E	1	California roach	100	8.8	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	E	1	California roach	54	1.1	1

Stream	Reach	Site	Segment	Method	Pass	Species	Length	Weight	Count
Rubicon River	Rubicon Dam	RRD-F2	Combined	E	1	Brown trout	59	2.1	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	E	1	Speckled dace	54	1.5	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	E	1	Brown trout	63	2.1	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	E	1	California roach	41	0.7	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	E	1	California roach	70	2.7	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	E	1	Speckled dace	68	2.7	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	E	1	Brown trout	59	1.0	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	E	1	Brown trout	51	1.1	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	E	1	Rainbow trout	58	1.0	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	E	1	California roach	64	2.0	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	E	1	California roach	51	1.0	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	E	1	Speckled dace	69	3.3	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	E	1	California roach	81	4.8	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	E	1	Brown trout	64	2.2	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	E	1	California roach	74	3.3	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	E	1	Brown trout	60	1.7	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	E	1	Speckled dace	66	2.8	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	E	1	California roach	53	1.2	1

Stream	Reach	Site	Segment	Method	Pass	Species	Length	Weight	Count
Rubicon River	Rubicon Dam	RRD-F2	Combined	E	1	Brown trout	57	1.6	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	E	1	California roach	42	0.7	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	E	1	Speckled dace	51	1.2	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	E	1	Speckled dace	68	2.9	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	E	1	Speckled dace	63	2.7	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	E	1	Brown trout	67	2.8	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	E	1	California roach	52	1.0	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	E	1	Speckled dace	56	2.0	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	E	1	California roach	102	9.4	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	E	1	California roach	68	2.6	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	E	1	Brown trout	63	2.1	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	E	1	California roach	76	3.6	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	E	1	Speckled dace	49	1.1	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	E	1	Speckled dace	92	8.7	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	E	1	Speckled dace	62	2.5	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	E	1	California roach	40	0.5	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	E	1	California roach	82	4.7	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	E	1	California roach	85	4.9	1

Stream	Reach	Site	Segment	Method	Pass	Species	Length	Weight	Count
Rubicon River	Rubicon Dam	RRD-F2	Combined	E	1	Rainbow trout	52	1.4	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	E	1	Brown trout	70	2.9	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	E	1	Speckled dace	64	2.5	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	E	1	Brown trout	68	2.7	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	E	1	Speckled dace	56	1.7	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	E	1	California roach	64	1.9	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	E	1	California roach	56	1.1	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	E	1	Brown trout	53	1.3	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	E	1	California roach	107	11.6	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	E	1	Speckled dace	61	1.9	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	E	1	California roach	82	4.1	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	E	1	Speckled dace	62	2.5	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	E	1	California roach	69	2.8	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	E	1	Speckled dace	39	0.2	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	E	1	Speckled dace	67	2.6	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	E	1	Speckled dace	67	2.8	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	E	1	California roach	57	1.4	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	E	1	California roach	70	2.5	1

Stream	Reach	Site	Segment	Method	Pass	Species	Length	Weight	Count
Rubicon River	Rubicon Dam	RRD-F2	Combined	E	1	Speckled dace	51	1.9	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	E	1	Brown trout	58	1.7	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	E	1	Speckled dace	60	2.3	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	E	1	Speckled dace	54	1.4	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	E	1	Speckled dace	60	2.1	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	E	1	Speckled dace	70	3.5	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	E	1	Brown trout	74	3.4	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	E	1	California roach	75	3.1	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	E	1	Brown trout	66	2.5	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	E	1	Brown trout	62	2.0	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	E	1	Speckled dace	34	0.2	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	E	1	Speckled dace	36	0.4	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	E	1	Brown trout	68	2.7	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	E	1	California roach	80	4.2	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	E	1	California roach	79	4.1	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	E	1	Speckled dace	81	1.3	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	E	1	California roach	92	6.5	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	E	1	Speckled dace	61	2.2	1

Stream	Reach	Site	Segment	Method	Pass	Species	Length	Weight	Count
Rubicon River	Rubicon Dam	RRD-F2	Combined	E	1	California roach	99	8.4	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	E	1	Speckled dace	60	2.2	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	E	1	Speckled dace	50	1.4	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	E	1	California roach	81	4.5	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	E	1	Brown trout	68	2.7	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	E	1	California roach	67	3.0	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	E	1	Speckled dace	72	3.7	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	E	1	California roach	88	6.2	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	E	1	California roach	40	0.2	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	E	1	Speckled dace	102	10.6	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	E	1	Speckled dace	42	0.7	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	E	1	Speckled dace	64	2.9	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	E	1	Brown trout	66	2.6	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	E	1	Speckled dace	50	1.3	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	E	1	Speckled dace	62	2.7	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	E	1	Brown trout	68	3.0	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	E	1	California roach	77	4.0	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	E	1	Speckled dace	60	2.3	1

Stream	Reach	Site	Segment	Method	Pass	Species	Length	Weight	Count
Rubicon River	Rubicon Dam	RRD-F2	Combined	E	1	Speckled dace	67	2.9	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	E	1	Speckled dace	56	1.6	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	E	1	California roach	83	5.0	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	E	1	California roach	45	0.6	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	E	1	Speckled dace	60	2.1	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	E	1	Speckled dace	50	1.2	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	E	1	Speckled dace	40	0.3	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	E	1	California roach	45	0.9	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	E	1	Speckled dace	57	1.8	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	E	1	California roach	55	1.5	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	E	1	Speckled dace	58	2.0	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	E	1	California roach	85	5.3	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	E	1	California roach	81	4.2	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	E	1	Brown trout	50	1.5	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	E	1	Speckled dace	56	2.0	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	E	2	California roach	74	2.9	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	E	2	Speckled dace	70	2.9	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	E	2	California roach	56	1.5	1

Stream	Reach	Site	Segment	Method	Pass	Species	Length	Weight	Count
Rubicon River	Rubicon Dam	RRD-F2	Combined	E	2	California roach	53	1.1	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	E	2	Brown trout	65	2.2	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	E	2	California roach	52	1.2	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	E	2	California roach	45	0.6	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	E	2	California roach	86	5.3	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	E	2	Speckled dace	64	2.8	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	E	2	Speckled dace	58	2.1	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	E	2	California roach	78	3.7	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	E	2	California roach	40	0.3	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	E	2	Speckled dace	50	1.1	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	E	2	California roach	37	0.5	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	E	2	Speckled dace	41	1	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	E	2	California roach	65	2.6	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	E	2	California roach	77	3.3	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	E	2	Brown trout	55	1.4	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	E	2	Brown trout	46	0.9	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	E	2	California roach	82	5.0	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	E	2	California roach	52	1.4	1

Stream	Reach	Site	Segment	Method	Pass	Species	Length	Weight	Count
Rubicon River	Rubicon Dam	RRD-F2	Combined	E	2	California roach	67	3.1	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	E	2	Speckled dace	75	3.7	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	E	2	California roach	73	3.1	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	E	2	Speckled dace	66	2.4	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	E	2	Brown trout	65	2.8	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	E	2	California roach	40	0.7	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	E	2	Speckled dace	56	1.5	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	E	2	Brown trout	68	3.0	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	E	2	California roach	95	7.7	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	E	2	Speckled dace	35	6.5	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	E	2	Brown trout	71	3.3	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	E	2	Speckled dace	53	1.1	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	E	2	Brown trout	72	3.5	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	E	2	California roach	77	4.4	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	E	2	Speckled dace	60	2.2	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	E	2	California roach	40	0.3	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	E	2	California roach	73	3.2	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	E	2	California roach	44	0.6	1

Stream	Reach	Site	Segment	Method	Pass	Species	Length	Weight	Count
Rubicon River	Rubicon Dam	RRD-F2	Combined	E	2	California roach	75	3.5	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	E	2	Speckled dace	38	0.8	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	E	2	California roach	89	6.4	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	E	2	Brown trout	65	2.3	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	E	2	Speckled dace	35	0.5	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	E	2	Speckled dace	68	3.2	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	E	2	California roach	75	3.4	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	E	2	Speckled dace	55	1.3	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	E	2	California roach	74	3.3	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	E	2	Speckled dace	72	3.3	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	E	2	Speckled dace	68	3.6	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	E	2	Speckled dace	42	0.5	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	E	2	Speckled dace	45	0.8	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	E	2	California roach	74	3.3	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	E	2	California roach	65	2.2	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	E	2	Speckled dace	52	1.4	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	E	2	California roach	60	2.0	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	E	2	Brown trout	63	2.5	1

Stream	Reach	Site	Segment	Method	Pass	Species	Length	Weight	Count
Rubicon River	Rubicon Dam	RRD-F2	Combined	E	2	Speckled dace	66	3.1	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	E	2	California roach	68	2.4	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	E	2	Speckled dace	45	0.9	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	E	2	Speckled dace	59	2.0	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	E	2	Speckled dace	50	1.2	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	E	2	California roach	95	8.5	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	E	2	Speckled dace	43	1.5	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	E	2	California roach	56	1.6	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	E	2	California roach	77	4.5	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	E	2	California roach	69	2.5	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	E	2	California roach	71	3.0	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	E	2	Speckled dace	60	2.0	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	E	2	Speckled dace	55	1.6	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	E	2	Speckled dace	58	2.2	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	E	2	Speckled dace	75	4.9	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	E	2	California roach	70	2.8	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	E	2	Speckled dace	46	0.8	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	E	2	Speckled dace	39	0.6	1

Stream	Reach	Site	Segment	Method	Pass	Species	Length	Weight	Count
Rubicon River	Rubicon Dam	RRD-F2	Combined	E	2	California roach	80	4.0	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	E	2	California roach	75	3.5	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	E	2	Speckled dace	50	1.2	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	E	2	Speckled dace	85	5.6	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	E	2	Speckled dace	54	1.6	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	E	3	Speckled dace	37	0.5	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	E	3	California roach	40	0.5	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	E	3	California roach	41	0.7	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	E	3	Speckled dace	45	1.0	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	E	3	California roach	79	4.0	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	E	3	Brown trout	65	2.7	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	E	3	California roach	40	0.4	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	E	3	California roach	64	2.5	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	E	3	California roach	46	0.8	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	E	3	Speckled dace	52	1.3	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	E	3	California roach	75	3.7	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	E	3	California roach	80	4.7	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	E	3	Speckled dace	42	0.4	1

Stream	Reach	Site	Segment	Method	Pass	Species	Length	Weight	Count
Rubicon River	Rubicon Dam	RRD-F2	Combined	E	3	Speckled dace	54	1.4	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	E	3	Speckled dace	44	0.8	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	E	3	California roach	40	0.5	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	E	3	Speckled dace	65	2.6	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	E	3	California roach	30	0.3	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	E	3	California roach	39	0.5	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	E	3	California roach	75	3.6	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	E	3	Brown trout	65	1.5	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	E	3	California roach	41	0.5	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	E	3	Speckled dace	46	0.8	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	E	3	California roach	77	3.4	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	E	3	Brown trout	55	1.4	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	E	3	Brown trout	53	1.5	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	E	3	Brown trout	65	2.8	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	E	3	California roach	40	0.4	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	E	3	Speckled dace	58	1.7	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	E	3	California roach	58	1.8	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	E	3	Speckled dace	73	3.6	1

Stream	Reach	Site	Segment	Method	Pass	Species	Length	Weight	Count
Rubicon River	Rubicon Dam	RRD-F2	Combined	E	3	Speckled dace	64	3.2	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	E	3	Speckled dace	56	1.5	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	E	3	Speckled dace	40	0.5	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	E	3	California roach	42	0.5	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	E	3	California roach	75	3.3	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	E	3	Speckled dace	38	0.8	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	E	3	Speckled dace	75	1.6	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	E	3	Speckled dace	64	2.2	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	E	3	Speckled dace	63	2.5	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	E	3	Brown trout	80	4.8	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	E	3	Speckled dace	67	2.7	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	E	3	California roach	44	0.7	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	E	3	Speckled dace	63	2.7	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	E	3	Speckled dace	65	2.4	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	E	3	California roach	43	0.5	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	E	3	Speckled dace	45	0.9	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	E	3	Speckled dace	65	2.6	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	E	3	Speckled dace	70	2.9	1

Stream	Reach	Site	Segment	Method	Pass	Species	Length	Weight	Count
Rubicon River	Rubicon Dam	RRD-F2	Combined	E	3	Speckled dace	50	1.2	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	E	3	California roach	72	3.1	1
Little Rubicon	Buck Island Dam	BID-F1	Plunge and lower	E	--	California roach	65	3.0	1
Little Rubicon	Buck Island Dam	BID-F1	Plunge and lower	E	--	California roach	68	3.5	1
Little Rubicon	Buck Island Dam	BID-F1	Plunge and lower	E	--	California roach	40	0.5	1
Little Rubicon	Buck Island Dam	BID-F1	Plunge and lower	E	--	California roach	90	7.5	1
Little Rubicon	Buck Island Dam	BID-F1	Plunge and lower	E	--	California roach	47	0.9	1
Little Rubicon	Buck Island Dam	BID-F1	Plunge and lower	E	--	California roach	83	4.7	1
Little Rubicon	Buck Island Dam	BID-F1	Plunge and lower	E	--	California roach	42	0.4	1
Little Rubicon	Buck Island Dam	BID-F1	Plunge and lower	E	--	California roach	78	4.5	1
Little Rubicon	Buck Island Dam	BID-F1	Plunge and lower	E	--	California roach	46	0.7	1
Little Rubicon	Buck Island Dam	BID-F1	Plunge and lower	E	--	California roach	45	0.6	1
Little Rubicon	Buck Island Dam	BID-F1	Plunge and lower	E	--	California roach	74	3.7	1
Little Rubicon	Buck Island Dam	BID-F1	Plunge and lower	E	--	California roach	110	11.9	1
Little Rubicon	Buck Island Dam	BID-F1	Plunge and lower	E	--	California roach	78	3.8	1
Little Rubicon	Buck Island Dam	BID-F1	Plunge and lower	E	--	California roach	81	4.8	1
Little Rubicon	Buck Island Dam	BID-F1	Plunge and lower	E	--	California roach	80	4.3	1
Little Rubicon	Buck Island Dam	BID-F1	Plunge and lower	E	--	California roach	41	0.5	1

Stream	Reach	Site	Segment	Method	Pass	Species	Length	Weight	Count
Little Rubicon	Buck Island Dam	BID-F1	Plunge and lower	E	--	California roach	70	2.7	1
Little Rubicon	Buck Island Dam	BID-F1	Plunge and lower	E	--	California roach	32	0.2	1
Little Rubicon	Buck Island Dam	BID-F1	Plunge and lower	E	--	California roach	40	0.6	1
Little Rubicon	Buck Island Dam	BID-F1	Plunge and lower	E	--	California roach	43	1.2	1
Little Rubicon	Buck Island Dam	BID-F1	Plunge and lower	E	--	California roach	76	3.5	1
Little Rubicon	Buck Island Dam	BID-F1	Plunge and lower	E	--	California roach	78	4.4	1
Little Rubicon	Buck Island Dam	BID-F1	Plunge and lower	E	--	California roach	107	10.7	1
Little Rubicon	Buck Island Dam	BID-F1	Plunge and lower	E	--	California roach	45	0.7	1
Little Rubicon	Buck Island Dam	BID-F1	Plunge and lower	E	--	California roach	76	3.5	1
Little Rubicon	Buck Island Dam	BID-F1	Plunge and lower	E	--	California roach	84	2.0	1
Little Rubicon	Buck Island Dam	BID-F1	Plunge and lower	E	--	California roach	46	1.1	1
Little Rubicon	Buck Island Dam	BID-F1	Plunge and lower	E	--	California roach	39	0.5	1
Little Rubicon	Buck Island Dam	BID-F1	Plunge and lower	E	--	California roach	42	0.3	1
Little Rubicon	Buck Island Dam	BID-F1	Plunge and lower	E	--	California roach	43	0.2	1
Little Rubicon	Buck Island Dam	BID-F1	Plunge and lower	E	--	Sacramento sucker	212	105.1	1
Little Rubicon	Buck Island Dam	BID-F1	Plunge and lower	E	--	California roach	31	0.5	1
Little Rubicon	Buck Island Dam	BID-F1	Plunge and lower	E	--	California roach	41	0.7	1
Little Rubicon	Buck Island Dam	BID-F1	Upper	E	--	California roach	100	10.9	1

Stream	Reach	Site	Segment	Method	Pass	Species	Length	Weight	Count
Little Rubicon	Buck Island Dam	BID-F1	Upper	E	--	Sacramento sucker	211	113.4	1
Little Rubicon	Buck Island Dam	BID-F1	Upper	E	--	California roach	107	11.9	1
Little Rubicon	Buck Island Dam	BID-F1	Upper	E	--	California roach	87	6.1	1
Little Rubicon	Buck Island Dam	BID-F1	Upper	E	--	California roach	102	10	1
Little Rubicon	Buck Island Dam	BID-F1	Upper	E	--	California roach	61	1.7	1
Little Rubicon	Buck Island Dam	BID-F1	Upper	E	--	California roach	138	22.8	1
Little Rubicon	Buck Island Dam	BID-F1	Upper	E	--	California roach	88	6.6	1
Little Rubicon	Buck Island Dam	BID-F1	Upper	E	--	California roach	89	6.3	1
Little Rubicon	Buck Island Dam	BID-F1	Upper	E	--	California roach	80	5.1	1
Little Rubicon	Buck Island Dam	BID-F1	Upper	E	--	California roach	124	18.2	1
Little Rubicon	Buck Island Dam	BID-F1	Upper	E	--	Golden shiner	70	2.6	1
Little Rubicon	Buck Island Dam	BID-F1	Upper	E	--	California roach	107	12.2	1
Little Rubicon	Buck Island Dam	BID-F1	Upper	E	--	California roach	84	5.5	1
Little Rubicon	Buck Island Dam	BID-F1	Upper	E	--	California roach	106	11.7	1
Little Rubicon	Buck Island Dam	BID-F1	Upper	E	--	California roach	68	2.6	1
Little Rubicon	Buck Island Dam	BID-F1	Upper	E	--	Golden shiner	72	3.6	1
Little Rubicon	Buck Island Dam	BID-F1	Upper	E	--	California roach	82	4.6	1
Little Rubicon	Buck Island Dam	BID-F1	Upper	E	--	Golden shiner	88	5.8	1

Stream	Reach	Site	Segment	Method	Pass	Species	Length	Weight	Count
Little Rubicon	Buck Island Dam	BID-F1	Upper	E	--	California roach	42	0.6	1
Little Rubicon	Buck Island Dam	BID-F1	Upper	E	--	California roach	77	4.4	1
Little Rubicon	Buck Island Dam	BID-F1	Upper	E	--	Golden shiner	96	6.3	1
Little Rubicon	Buck Island Dam	BID-F1	Upper	E	--	California roach	72	3.5	1
Little Rubicon	Buck Island Dam	BID-F1	Upper	E	--	California roach	52	1.3	1
Little Rubicon	Buck Island Dam	BID-F1	Upper	E	--	Golden shiner	74	2.9	1
Little Rubicon	Buck Island Dam	BID-F1	Upper	E	--	California roach	81	5	1
Little Rubicon	Buck Island Dam	BID-F1	Upper	E	--	California roach	93	7.8	1
Little Rubicon	Buck Island Dam	BID-F1	Upper	E	--	California roach	87	5.9	1
Little Rubicon	Buck Island Dam	BID-F1	Upper	E	--	California roach	69	2.9	1
Little Rubicon	Buck Island Dam	BID-F1	Upper	E	--	Golden shiner	73	3.0	1
Little Rubicon	Buck Island Dam	BID-F1	Upper	E	--	California roach	83	4.5	1
Little Rubicon	Buck Island Dam	BID-F1	Upper	E	--	California roach	78	3.7	1
Little Rubicon	Buck Island Dam	BID-F1	Upper	E	--	California roach	80	4.7	1
Little Rubicon	Buck Island Dam	BID-F1	Upper	E	--	California roach	72	3.3	1
Little Rubicon	Buck Island Dam	BID-F1	Upper	E	--	California roach	84	5.3	1
Little Rubicon	Buck Island Dam	BID-F1	Upper	E	--	California roach	47	1.0	1
Little Rubicon	Buck Island Dam	BID-F1	Upper	E	--	California roach	79	4.8	1

Stream	Reach	Site	Segment	Method	Pass	Species	Length	Weight	Count
Little Rubicon	Buck Island Dam	BID-F1	Upper	E	--	California roach	42	0.7	1
Little Rubicon	Buck Island Dam	BID-F1	Upper	E	--	California roach	68	2.6	1
Little Rubicon	Buck Island Dam	BID-F1	Upper	E	--	Golden shiner	70	2.6	1
Little Rubicon	Buck Island Dam	BID-F1	Upper	E	--	California roach	81	5.1	1
Little Rubicon	Buck Island Dam	BID-F1	Upper	E	--	California roach	79	4.3	1
Little Rubicon	Buck Island Dam	BID-F1	Upper	E	--	California roach	43	0.8	1
Little Rubicon	Buck Island Dam	BID-F1	Upper	E	--	Golden shiner	56	1.3	1
Little Rubicon	Buck Island Dam	BID-F1	Upper	E	--	California roach	81	5.1	1
Little Rubicon	Buck Island Dam	BID-F1	Upper	E	--	California roach	62	2.2	1
Little Rubicon	Buck Island Dam	BID-F1	Upper	E	--	California roach	83	5.1	1
Little Rubicon	Buck Island Dam	BID-F1	Upper	E	--	California roach	48	1.0	1
Little Rubicon	Buck Island Dam	BID-F1	Upper	E	--	California roach	64	2.4	1
Little Rubicon	Buck Island Dam	BID-F1	Upper	E	--	California roach	85	5.3	1
Little Rubicon	Buck Island Dam	BID-F1	Upper	E	--	California roach	80	4.6	1
Little Rubicon	Buck Island Dam	BID-F1	Upper	E	--	California roach	27	0.3	1
Little Rubicon	Buck Island Dam	BID-F1	Upper	E	--	California roach	45	0.5	1
Little Rubicon	Buck Island Dam	BID-F1	Upper	E	--	California roach	85	5.2	1
Little Rubicon	Buck Island Dam	BID-F1	Upper	E	--	California roach	90	7.0	1

Stream	Reach	Site	Segment	Method	Pass	Species	Length	Weight	Count
Little Rubicon	Buck Island Dam	BID-F1	Upper	E	--	California roach	77	3.4	1
Little Rubicon	Buck Island Dam	BID-F1	Upper	E	--	California roach	46	0.6	1
Little Rubicon	Buck Island Dam	BID-F1	Upper	E	--	California roach	47	0.8	1
Little Rubicon	Buck Island Dam	BID-F1	Upper	E	--	Golden shiner	81	3.7	1
Little Rubicon	Buck Island Dam	BID-F1	Upper	E	--	California roach	66	2.4	1
Little Rubicon	Buck Island Dam	BID-F1	Upper	E	--	California roach	43	0.7	1
Little Rubicon	Buck Island Dam	BID-F1	Upper	E	--	California roach	30	0.3	1
Little Rubicon	Buck Island Dam	BID-F1	Upper	E	--	California roach	87	5.8	1
Little Rubicon	Buck Island Dam	BID-F1	Upper	E	--	California roach	88	5.7	1
Little Rubicon	Buck Island Dam	BID-F1	Upper	E	--	California roach	49	0.9	1
Little Rubicon	Buck Island Dam	BID-F1	Upper	E	--	California roach	42	0.7	1
Little Rubicon	Buck Island Dam	BID-F1	Upper	E	--	Golden shiner	64	1.5	1
Little Rubicon	Buck Island Dam	BID-F1	Upper	E	--	California roach	40	0.4	1
Little Rubicon	Buck Island Dam	BID-F1	Upper	E	--	California roach	39	0.4	1
Little Rubicon	Buck Island Dam	BID-F1	Upper	E	--	California roach	73	3.7	1
Little Rubicon	Buck Island Dam	BID-F1	Upper	E	--	California roach	43	0.6	1
Little Rubicon	Buck Island Dam	BID-F1	Upper	E	--	California roach	34	0.3	1
Little Rubicon	Buck Island Dam	BID-F1	Upper	E	--	California roach	75	3.4	1

Stream	Reach	Site	Segment	Method	Pass	Species	Length	Weight	Count
Little Rubicon	Buck Island Dam	BID-F1	Upper	E	--	California roach	42	0.7	1
Little Rubicon	Buck Island Dam	BID-F1	Upper	E	--	California roach	31	0.2	1
Little Rubicon	Buck Island Dam	BID-F1	Upper	E	--	California roach	29	0.2	1
Little Rubicon	Buck Island Dam	BID-F1	Upper	E	--	Golden shiner	64	2.1	1
Little Rubicon	Buck Island Dam	BID-F1	Upper	E	--	California roach	40	0.3	1
Little Rubicon	Buck Island Dam	BID-F1	Upper	E	--	California roach	41	0.2	1
Little Rubicon	Buck Island Dam	BID-F1	Upper	E	--	California roach	39	0.3	1
Little Rubicon	Buck Island Dam	BID-F1	Upper	E	--	California roach	41	0.3	1
Little Rubicon	Buck Island Dam	BID-F1	Upper	E	--	California roach	65	2.2	1
Little Rubicon	Buck Island Dam	BID-F1	Upper	E	--	California roach	45	0.7	1
Little Rubicon	Buck Island Dam	BID-F1	Upper	E	--	California roach	68	2.9	1
Little Rubicon	Buck Island Dam	BID-F1	Upper	E	--	California roach	77	4.2	1
Little Rubicon	Buck Island Dam	BID-F1	Upper	E	--	California roach	70	2.7	1
Little Rubicon	Buck Island Dam	BID-F1	Upper	E	--	California roach	45	0.7	1
Little Rubicon	Buck Island Dam	BID-F1	Upper	E	--	California roach	41	0.7	1
Little Rubicon	Buck Island Dam	BID-F1	Upper	E	--	California roach	73	2.1	1
Little Rubicon	Buck Island Dam	BID-F1	Upper	E	--	California roach	45	0.9	1
Gerle Creek	Loon Lake Dam	LLD-F3	Lower	E	1	Brown trout	59	4.0	1

Stream	Reach	Site	Segment	Method	Pass	Species	Length	Weight	Count
Gerle Creek	Loon Lake Dam	LLD-F3	Lower	E	1	Brown trout	60	5.0	1
Gerle Creek	Loon Lake Dam	LLD-F3	Lower	E	1	Brown trout	74	3.8	1
Gerle Creek	Loon Lake Dam	LLD-F3	Lower	E	1	Brown trout	119	13.4	1
Gerle Creek	Loon Lake Dam	LLD-F3	Lower	E	1	Brown trout	119	22.4	1
Gerle Creek	Loon Lake Dam	LLD-F3	Lower	E	1	Brown trout	132	24.6	1
Gerle Creek	Loon Lake Dam	LLD-F3	Lower	E	1	Rainbow trout	125	18.2	1
Gerle Creek	Loon Lake Dam	LLD-F3	Lower	E	1	Brown trout	136	21.5	1
Gerle Creek	Loon Lake Dam	LLD-F3	Lower	E	1	Brown trout	136	22.6	1
Gerle Creek	Loon Lake Dam	LLD-F3	Lower	E	1	Brown trout	136	25.7	1
Gerle Creek	Loon Lake Dam	LLD-F3	Lower	E	1	Brown trout	138	23.7	1
Gerle Creek	Loon Lake Dam	LLD-F3	Lower	E	1	Brown trout	139	27.4	1
Gerle Creek	Loon Lake Dam	LLD-F3	Lower	E	1	Brown trout	147	27.1	1
Gerle Creek	Loon Lake Dam	LLD-F3	Lower	E	1	Brown trout	151	22.4	1
Gerle Creek	Loon Lake Dam	LLD-F3	Lower	E	1	Brown trout	168	41.6	1
Gerle Creek	Loon Lake Dam	LLD-F3	Lower	E	1	Rainbow trout	170	42.2	1
Gerle Creek	Loon Lake Dam	LLD-F3	Lower	E	1	Brown trout	169	45.5	1
Gerle Creek	Loon Lake Dam	LLD-F3	Lower	E	1	Brown trout	174	56.4	1
Gerle Creek	Loon Lake Dam	LLD-F3	Lower	E	1	Brown trout	180	51.5	1

Stream	Reach	Site	Segment	Method	Pass	Species	Length	Weight	Count
Gerle Creek	Loon Lake Dam	LLD-F3	Lower	E	1	Rainbow trout	175	148.4	1
Gerle Creek	Loon Lake Dam	LLD-F3	Lower	E	1	Brown trout	183	53.4	1
Gerle Creek	Loon Lake Dam	LLD-F3	Lower	E	1	Brown trout	186	62.6	1
Gerle Creek	Loon Lake Dam	LLD-F3	Lower	E	1	Brown trout	197	71.4	1
Gerle Creek	Loon Lake Dam	LLD-F3	Lower	E	1	Brown trout	198	74.2	1
Gerle Creek	Loon Lake Dam	LLD-F3	Lower	E	1	Brown trout	200	87.2	1
Gerle Creek	Loon Lake Dam	LLD-F3	Lower	E	1	Brown trout	202	90.4	1
Gerle Creek	Loon Lake Dam	LLD-F3	Lower	E	1	Brown trout	204	75.6	1
Gerle Creek	Loon Lake Dam	LLD-F3	Lower	E	1	Brown trout	215	116.3	1
Gerle Creek	Loon Lake Dam	LLD-F3	Lower	E	1	Brown trout	220	118.5	1
Gerle Creek	Loon Lake Dam	LLD-F3	Lower	E	1	Brown trout	227	96.0	1
Gerle Creek	Loon Lake Dam	LLD-F3	Lower	E	2	Brown trout	76	3.3	1
Gerle Creek	Loon Lake Dam	LLD-F3	Lower	E	2	Rainbow trout	119	17.8	1
Gerle Creek	Loon Lake Dam	LLD-F3	Lower	E	2	Brown trout	79	4.3	1
Gerle Creek	Loon Lake Dam	LLD-F3	Lower	E	2	Brown trout	88	5.7	1
Gerle Creek	Loon Lake Dam	LLD-F3	Lower	E	2	Brown trout	126	15.2	1
Gerle Creek	Loon Lake Dam	LLD-F3	Lower	E	2	Brown trout	134	21.1	1
Gerle Creek	Loon Lake Dam	LLD-F3	Lower	E	2	Brown trout	140	26.2	1

Stream	Reach	Site	Segment	Method	Pass	Species	Length	Weight	Count
Gerle Creek	Loon Lake Dam	LLD-F3	Lower	E	2	Rainbow trout	159	41.5	1
Gerle Creek	Loon Lake Dam	LLD-F3	Lower	E	2	Brown trout	159	36.1	1
Gerle Creek	Loon Lake Dam	LLD-F3	Lower	E	2	Brown trout	167	40.4	1
Gerle Creek	Loon Lake Dam	LLD-F3	Lower	E	2	Brown trout	184	52.5	1
Gerle Creek	Loon Lake Dam	LLD-F3	Lower	E	2	Brown trout	185	61.1	1
Gerle Creek	Loon Lake Dam	LLD-F3	Lower	E	2	Brown trout	187	60.5	1
Gerle Creek	Loon Lake Dam	LLD-F3	Lower	E	2	Brown trout	198	59.6	1
Gerle Creek	Loon Lake Dam	LLD-F3	Lower	E	2	Brown trout	221	83.3	1
Gerle Creek	Loon Lake Dam	LLD-F3	Lower	E	2	Brown trout	234	131.9	1
Gerle Creek	Loon Lake Dam	LLD-F3	Lower	E	3	Brown trout	83	5.0	1
Gerle Creek	Loon Lake Dam	LLD-F3	Lower	E	3	Brown trout	128	20.3	1
Gerle Creek	Loon Lake Dam	LLD-F3	Lower	E	3	Brown trout	132	19.7	1
Gerle Creek	Loon Lake Dam	LLD-F3	Lower	E	3	Brown trout	138	23.8	1
Gerle Creek	Loon Lake Dam	LLD-F3	Lower	E	3	Brown trout	138	25.5	1
Gerle Creek	Loon Lake Dam	LLD-F3	Lower	E	3	Brown trout	149	29.5	1
Gerle Creek	Loon Lake Dam	LLD-F3	Lower	E	3	Brown trout	172	41.1	1
Gerle Creek	Loon Lake Dam	LLD-F3	Lower	E	3	Brown trout	181	65.2	1
Gerle Creek	Loon Lake Dam	LLD-F3	Lower	E	3	Brown trout	196	70.9	1

Stream	Reach	Site	Segment	Method	Pass	Species	Length	Weight	Count
Gerle Creek	Loon Lake Dam	LLD-F3	Lower	E	3	Rainbow trout	176	43.7	1
Gerle Creek	Loon Lake Dam	LLD-F3	Lower	E	3	Brown trout	355	420.0	1
Gerle Creek	Loon Lake Dam	LLD-F3	Upper	E	1	Brown trout	81	5.0	1
Gerle Creek	Loon Lake Dam	LLD-F3	Upper	E	1	Brown trout	84	5.6	1
Gerle Creek	Loon Lake Dam	LLD-F3	Upper	E	1	Brown trout	162	42.2	1
Gerle Creek	Loon Lake Dam	LLD-F3	Upper	E	2	Brown trout	199	82.0	1
Gerle Creek	Loon Lake Dam	LLD-F3	Upper	E	2	Brown trout	200	66.2	1
Gerle Creek	Loon Lake Dam	LLD-F2	Lower	E	1	Brown trout	59	1.9	1
Gerle Creek	Loon Lake Dam	LLD-F2	Lower	E	1	Brown trout	74	4.1	1
Gerle Creek	Loon Lake Dam	LLD-F2	Lower	E	1	Brown trout	78	5.2	1
Gerle Creek	Loon Lake Dam	LLD-F2	Lower	E	1	Rainbow trout	65	2.7	1
Gerle Creek	Loon Lake Dam	LLD-F2	Lower	E	1	Brown trout	79	4.9	1
Gerle Creek	Loon Lake Dam	LLD-F2	Lower	E	1	Rainbow trout	74	4.5	1
Gerle Creek	Loon Lake Dam	LLD-F2	Lower	E	1	Brown trout	79	5.2	1
Gerle Creek	Loon Lake Dam	LLD-F2	Lower	E	1	Brown trout	80	5.1	1
Gerle Creek	Loon Lake Dam	LLD-F2	Lower	E	1	Brown trout	80	5.5	1
Gerle Creek	Loon Lake Dam	LLD-F2	Lower	E	1	Brown trout	80	5.5	1
Gerle Creek	Loon Lake Dam	LLD-F2	Lower	E	1	Rainbow trout	108	11.0	1

Stream	Reach	Site	Segment	Method	Pass	Species	Length	Weight	Count
Gerle Creek	Loon Lake Dam	LLD-F2	Lower	E	1	Brown trout	112	14.6	1
Gerle Creek	Loon Lake Dam	LLD-F2	Lower	E	1	Brown trout	119	15.2	1
Gerle Creek	Loon Lake Dam	LLD-F2	Lower	E	1	Rainbow trout	143	25.1	1
Gerle Creek	Loon Lake Dam	LLD-F2	Lower	E	1	Brown trout	130	20.7	1
Gerle Creek	Loon Lake Dam	LLD-F2	Lower	E	1	Brown trout	132	21.8	1
Gerle Creek	Loon Lake Dam	LLD-F2	Lower	E	1	Brown trout	140	25.1	1
Gerle Creek	Loon Lake Dam	LLD-F2	Lower	E	1	Rainbow trout	155	35.5	1
Gerle Creek	Loon Lake Dam	LLD-F2	Lower	E	1	Rainbow trout	183	54.5	1
Gerle Creek	Loon Lake Dam	LLD-F2	Lower	E	1	Brown trout	172	47.5	1
Gerle Creek	Loon Lake Dam	LLD-F2	Lower	E	1	Rainbow trout	215	85.1	1
Gerle Creek	Loon Lake Dam	LLD-F2	Lower	E	1	Brown trout	210	92.9	1
Gerle Creek	Loon Lake Dam	LLD-F2	Lower	E	1	Brown trout	363	450.0	1
Gerle Creek	Loon Lake Dam	LLD-F2	Lower	E	2	Brown trout	65	3.5	1
Gerle Creek	Loon Lake Dam	LLD-F2	Lower	E	2	Rainbow trout	66	2.7	1
Gerle Creek	Loon Lake Dam	LLD-F2	Lower	E	2	Rainbow trout	79	4.7	1
Gerle Creek	Loon Lake Dam	LLD-F2	Lower	E	2	Brown trout	79	4.9	1
Gerle Creek	Loon Lake Dam	LLD-F2	Lower	E	2	Brown trout	80	4.1	1
Gerle Creek	Loon Lake Dam	LLD-F2	Lower	E	2	Brown trout	86	5.9	1

Stream	Reach	Site	Segment	Method	Pass	Species	Length	Weight	Count
Gerle Creek	Loon Lake Dam	LLD-F2	Lower	E	2	Brown trout	88	5.6	1
Gerle Creek	Loon Lake Dam	LLD-F2	Lower	E	2	Rainbow trout	106	9.1	1
Gerle Creek	Loon Lake Dam	LLD-F2	Lower	E	2	Rainbow trout	109	10.2	1
Gerle Creek	Loon Lake Dam	LLD-F2	Lower	E	2	Brown trout	94	8.0	1
Gerle Creek	Loon Lake Dam	LLD-F2	Lower	E	2	Brown trout	123	16.6	1
Gerle Creek	Loon Lake Dam	LLD-F2	Lower	E	2	Rainbow trout	202	71.5	1
Gerle Creek	Loon Lake Dam	LLD-F2	Lower	E	3	Brown trout	63	2.4	1
Gerle Creek	Loon Lake Dam	LLD-F2	Lower	E	3	Rainbow trout	173	41.5	1
Gerle Creek	Loon Lake Dam	LLD-F2	Upper	E	1	Rainbow trout	53	1.7	1
Gerle Creek	Loon Lake Dam	LLD-F2	Upper	E	1	Brown trout	59	1.9	1
Gerle Creek	Loon Lake Dam	LLD-F2	Upper	E	1	Brown trout	62	2.3	1
Gerle Creek	Loon Lake Dam	LLD-F2	Upper	E	1	Brown trout	63	2.4	1
Gerle Creek	Loon Lake Dam	LLD-F2	Upper	E	1	Brown trout	68	2.6	1
Gerle Creek	Loon Lake Dam	LLD-F2	Upper	E	1	Brown trout	68	2.9	1
Gerle Creek	Loon Lake Dam	LLD-F2	Upper	E	1	Rainbow trout	59	1.8	1
Gerle Creek	Loon Lake Dam	LLD-F2	Upper	E	1	Rainbow trout	59	2.0	1
Gerle Creek	Loon Lake Dam	LLD-F2	Upper	E	1	Brown trout	73	3.7	1
Gerle Creek	Loon Lake Dam	LLD-F2	Upper	E	1	Rainbow trout	59	2.3	1

Stream	Reach	Site	Segment	Method	Pass	Species	Length	Weight	Count
Gerle Creek	Loon Lake Dam	LLD-F2	Upper	E	1	Rainbow trout	60	2.0	1
Gerle Creek	Loon Lake Dam	LLD-F2	Upper	E	1	Rainbow trout	61	2.0	1
Gerle Creek	Loon Lake Dam	LLD-F2	Upper	E	1	Brown trout	74	3.8	1
Gerle Creek	Loon Lake Dam	LLD-F2	Upper	E	1	Brown trout	75	5.5	1
Gerle Creek	Loon Lake Dam	LLD-F2	Upper	E	1	Brown trout	76	4.7	1
Gerle Creek	Loon Lake Dam	LLD-F2	Upper	E	1	Rainbow trout	63	2.1	1
Gerle Creek	Loon Lake Dam	LLD-F2	Upper	E	1	Rainbow trout	64	2.2	1
Gerle Creek	Loon Lake Dam	LLD-F2	Upper	E	1	Brown trout	78	4.7	1
Gerle Creek	Loon Lake Dam	LLD-F2	Upper	E	1	Rainbow trout	65	2.5	1
Gerle Creek	Loon Lake Dam	LLD-F2	Upper	E	1	Rainbow trout	65	3.0	1
Gerle Creek	Loon Lake Dam	LLD-F2	Upper	E	1	Rainbow trout	66	2.2	1
Gerle Creek	Loon Lake Dam	LLD-F2	Upper	E	1	Rainbow trout	100	8.3	1
Gerle Creek	Loon Lake Dam	LLD-F2	Upper	E	1	Brown trout	79	4.8	1
Gerle Creek	Loon Lake Dam	LLD-F2	Upper	E	1	Brown trout	79	4.9	1
Gerle Creek	Loon Lake Dam	LLD-F2	Upper	E	1	Rainbow trout	103	12.3	1
Gerle Creek	Loon Lake Dam	LLD-F2	Upper	E	1	Brown trout	82	5.4	1
Gerle Creek	Loon Lake Dam	LLD-F2	Upper	E	1	Brown trout	82	5.6	1
Gerle Creek	Loon Lake Dam	LLD-F2	Upper	E	1	Brown trout	83	5.1	1

Stream	Reach	Site	Segment	Method	Pass	Species	Length	Weight	Count
Gerle Creek	Loon Lake Dam	LLD-F2	Upper	E	1	Brown trout	83	6.1	1
Gerle Creek	Loon Lake Dam	LLD-F2	Upper	E	1	Brown trout	84	6.9	1
Gerle Creek	Loon Lake Dam	LLD-F2	Upper	E	1	Brown trout	85	3.7	1
Gerle Creek	Loon Lake Dam	LLD-F2	Upper	E	1	Brown trout	86	6.6	1
Gerle Creek	Loon Lake Dam	LLD-F2	Upper	E	1	Brown trout	87	4.7	1
Gerle Creek	Loon Lake Dam	LLD-F2	Upper	E	1	Brown trout	87	5.2	1
Gerle Creek	Loon Lake Dam	LLD-F2	Upper	E	1	Brown trout	87	6.7	1
Gerle Creek	Loon Lake Dam	LLD-F2	Upper	E	1	Rainbow trout	106	9.5	1
Gerle Creek	Loon Lake Dam	LLD-F2	Upper	E	1	Rainbow trout	106	11.3	1
Gerle Creek	Loon Lake Dam	LLD-F2	Upper	E	1	Rainbow trout	108	10.2	1
Gerle Creek	Loon Lake Dam	LLD-F2	Upper	E	1	Rainbow trout	112	11.3	1
Gerle Creek	Loon Lake Dam	LLD-F2	Upper	E	1	Rainbow trout	112	12.2	1
Gerle Creek	Loon Lake Dam	LLD-F2	Upper	E	1	Brown trout	118	14.3	1
Gerle Creek	Loon Lake Dam	LLD-F2	Upper	E	1	Rainbow trout	118	12.0	1
Gerle Creek	Loon Lake Dam	LLD-F2	Upper	E	1	Brown trout	124	15.7	1
Gerle Creek	Loon Lake Dam	LLD-F2	Upper	E	1	Rainbow trout	124	15.4	1
Gerle Creek	Loon Lake Dam	LLD-F2	Upper	E	1	Brown trout	124	20.0	1
Gerle Creek	Loon Lake Dam	LLD-F2	Upper	E	1	Rainbow trout	150	29.1	1

Stream	Reach	Site	Segment	Method	Pass	Species	Length	Weight	Count
Gerle Creek	Loon Lake Dam	LLD-F2	Upper	E	1	Brown trout	144	27.8	1
Gerle Creek	Loon Lake Dam	LLD-F2	Upper	E	1	Brown trout	172	47.6	1
Gerle Creek	Loon Lake Dam	LLD-F2	Upper	E	1	Brown trout	190	62.7	1
Gerle Creek	Loon Lake Dam	LLD-F2	Upper	E	1	Brown trout	328	290.0	1
Gerle Creek	Loon Lake Dam	LLD-F2	Upper	E	1	Rainbow trout	257	165.0	1
Gerle Creek	Loon Lake Dam	LLD-F2	Upper	E	1	Brown trout	347	315.0	1
Gerle Creek	Loon Lake Dam	LLD-F2	Upper	E	2	Rainbow trout	56	1.6	1
Gerle Creek	Loon Lake Dam	LLD-F2	Upper	E	2	Brown trout	64	2.7	1
Gerle Creek	Loon Lake Dam	LLD-F2	Upper	E	2	Brown trout	66	2.8	1
Gerle Creek	Loon Lake Dam	LLD-F2	Upper	E	2	Rainbow trout	56	1.6	1
Gerle Creek	Loon Lake Dam	LLD-F2	Upper	E	2	Brown trout	73	3.0	1
Gerle Creek	Loon Lake Dam	LLD-F2	Upper	E	2	Brown trout	74	4.4	1
Gerle Creek	Loon Lake Dam	LLD-F2	Upper	E	2	Rainbow trout	62	3.1	1
Gerle Creek	Loon Lake Dam	LLD-F2	Upper	E	2	Rainbow trout	64	2.5	1
Gerle Creek	Loon Lake Dam	LLD-F2	Upper	E	2	Rainbow trout	101	10.0	1
Gerle Creek	Loon Lake Dam	LLD-F2	Upper	E	2	Rainbow trout	109	10.7	1
Gerle Creek	Loon Lake Dam	LLD-F2	Upper	E	2	Rainbow trout	138	20.9	1
Gerle Creek	Loon Lake Dam	LLD-F2	Upper	E	2	Rainbow trout	178	50.2	1

Stream	Reach	Site	Segment	Method	Pass	Species	Length	Weight	Count
Gerle Creek	Loon Lake Dam	LLD-F2	Upper	E	2	Brown trout	190	65.0	1
Gerle Creek	Loon Lake Dam	LLD-F2	Upper	E	3	Brown trout	67	3.1	1
Gerle Creek	Loon Lake Dam	LLD-F2	Upper	E	3	Brown trout	71	3.2	1
Gerle Creek	Loon Lake Dam	LLD-F2	Upper	E	3	Brown trout	72	3.8	1
Gerle Creek	Loon Lake Dam	LLD-F2	Upper	E	3	Brown trout	75	3.9	1
Gerle Creek	Loon Lake Dam	LLD-F2	Upper	E	3	Brown trout	75	4.9	1
Gerle Creek	Loon Lake Dam	LLD-F2	Upper	E	3	Rainbow trout	67	2.6	1
Gerle Creek	Loon Lake Dam	LLD-F2	Upper	E	3	Rainbow trout	70	3.1	1
Gerle Creek	Loon Lake Dam	LLD-F2	Upper	E	3	Brown trout	86	4.0	1
Gerle Creek	Loon Lake Dam	LLD-F2	Upper	E	3	Brown trout	128	18.2	1
Gerle Creek	Loon Lake Dam	LLD-F2	Upper	E	3	Rainbow trout	141	21.2	1
Gerle Creek	Loon Lake Dam	LLD-F2	Upper	E	3	Brown trout	243	140.8	1
Gerle Creek	Loon Lake Dam	LLD-F2	Upper	E	3	Brown trout	324	340	1
Gerle Creek	Gerle Creek Dam	GCD-F1	Lower	E	1	Rainbow trout	47	0.9	1
Gerle Creek	Gerle Creek Dam	GCD-F1	Lower	E	1	Rainbow trout	56	1.4	1
Gerle Creek	Gerle Creek Dam	GCD-F1	Lower	E	1	Rainbow trout	59	1.6	1
Gerle Creek	Gerle Creek Dam	GCD-F1	Lower	E	1	Rainbow trout	58	1.7	1
Gerle Creek	Gerle Creek Dam	GCD-F1	Lower	E	1	Rainbow trout	58	1.7	1

Stream	Reach	Site	Segment	Method	Pass	Species	Length	Weight	Count
Gerle Creek	Gerle Creek Dam	GCD-F1	Lower	E	1	Rainbow trout	56	1.7	1
Gerle Creek	Gerle Creek Dam	GCD-F1	Lower	E	1	Rainbow trout	56	1.7	1
Gerle Creek	Gerle Creek Dam	GCD-F1	Lower	E	1	Rainbow trout	60	1.9	1
Gerle Creek	Gerle Creek Dam	GCD-F1	Lower	E	1	Rainbow trout	61	2.1	1
Gerle Creek	Gerle Creek Dam	GCD-F1	Lower	E	1	Rainbow trout	65	2.2	1
Gerle Creek	Gerle Creek Dam	GCD-F1	Lower	E	1	Rainbow trout	66	2.2	1
Gerle Creek	Gerle Creek Dam	GCD-F1	Lower	E	1	Rainbow trout	64	2.3	1
Gerle Creek	Gerle Creek Dam	GCD-F1	Lower	E	1	Rainbow trout	65	2.3	1
Gerle Creek	Gerle Creek Dam	GCD-F1	Lower	E	1	Rainbow trout	65	2.5	1
Gerle Creek	Gerle Creek Dam	GCD-F1	Lower	E	1	Rainbow trout	65	2.5	1
Gerle Creek	Gerle Creek Dam	GCD-F1	Lower	E	1	Rainbow trout	64	2.5	1
Gerle Creek	Gerle Creek Dam	GCD-F1	Lower	E	1	Rainbow trout	65	2.6	1
Gerle Creek	Gerle Creek Dam	GCD-F1	Lower	E	1	Rainbow trout	66	2.7	1
Gerle Creek	Gerle Creek Dam	GCD-F1	Lower	E	1	Rainbow trout	64	2.7	1
Gerle Creek	Gerle Creek Dam	GCD-F1	Lower	E	1	Rainbow trout	66	2.8	1
Gerle Creek	Gerle Creek Dam	GCD-F1	Lower	E	1	Rainbow trout	70	2.8	1
Gerle Creek	Gerle Creek Dam	GCD-F1	Lower	E	1	Rainbow trout	67	2.8	1
Gerle Creek	Gerle Creek Dam	GCD-F1	Lower	E	1	Rainbow trout	67	3.0	1

Stream	Reach	Site	Segment	Method	Pass	Species	Length	Weight	Count
Gerle Creek	Gerle Creek Dam	GCD-F1	Lower	E	1	Rainbow trout	68	3.1	1
Gerle Creek	Gerle Creek Dam	GCD-F1	Lower	E	1	Rainbow trout	69	3.2	1
Gerle Creek	Gerle Creek Dam	GCD-F1	Lower	E	1	Rainbow trout	71	3.4	1
Gerle Creek	Gerle Creek Dam	GCD-F1	Lower	E	1	Rainbow trout	71	4.0	1
Gerle Creek	Gerle Creek Dam	GCD-F1	Lower	E	1	Rainbow trout	59	4.6	1
Gerle Creek	Gerle Creek Dam	GCD-F1	Lower	E	1	Rainbow trout	82	5.4	1
Gerle Creek	Gerle Creek Dam	GCD-F1	Lower	E	1	Rainbow trout	89	6.0	1
Gerle Creek	Gerle Creek Dam	GCD-F1	Lower	E	1	Rainbow trout	100	6.3	1
Gerle Creek	Gerle Creek Dam	GCD-F1	Lower	E	1	Rainbow trout	92	6.6	1
Gerle Creek	Gerle Creek Dam	GCD-F1	Lower	E	1	Rainbow trout	92	6.8	1
Gerle Creek	Gerle Creek Dam	GCD-F1	Lower	E	1	Rainbow trout	95	7.6	1
Gerle Creek	Gerle Creek Dam	GCD-F1	Lower	E	1	Rainbow trout	96	7.7	1
Gerle Creek	Gerle Creek Dam	GCD-F1	Lower	E	1	Rainbow trout	94	7.7	1
Gerle Creek	Gerle Creek Dam	GCD-F1	Lower	E	1	Rainbow trout	99	8.0	1
Gerle Creek	Gerle Creek Dam	GCD-F1	Lower	E	1	Rainbow trout	95	8.0	1
Gerle Creek	Gerle Creek Dam	GCD-F1	Lower	E	1	Rainbow trout	95	8.0	1
Gerle Creek	Gerle Creek Dam	GCD-F1	Lower	E	1	Rainbow trout	100	8.5	1
Gerle Creek	Gerle Creek Dam	GCD-F1	Lower	E	1	Rainbow trout	98	8.8	1

Stream	Reach	Site	Segment	Method	Pass	Species	Length	Weight	Count
Gerle Creek	Gerle Creek Dam	GCD-F1	Lower	E	1	Rainbow trout	99	9.1	1
Gerle Creek	Gerle Creek Dam	GCD-F1	Lower	E	1	Rainbow trout	105	9.9	1
Gerle Creek	Gerle Creek Dam	GCD-F1	Lower	E	1	Rainbow trout	102	9.9	1
Gerle Creek	Gerle Creek Dam	GCD-F1	Lower	E	1	Rainbow trout	105	10.4	1
Gerle Creek	Gerle Creek Dam	GCD-F1	Lower	E	1	Rainbow trout	111	10.5	1
Gerle Creek	Gerle Creek Dam	GCD-F1	Lower	E	1	Rainbow trout	105	11.2	1
Gerle Creek	Gerle Creek Dam	GCD-F1	Lower	E	1	Rainbow trout	109	11.7	1
Gerle Creek	Gerle Creek Dam	GCD-F1	Lower	E	1	Rainbow trout	113	12.5	1
Gerle Creek	Gerle Creek Dam	GCD-F1	Lower	E	1	Rainbow trout	111	12.6	1
Gerle Creek	Gerle Creek Dam	GCD-F1	Lower	E	1	Rainbow trout	122	14.5	1
Gerle Creek	Gerle Creek Dam	GCD-F1	Lower	E	1	Rainbow trout	123	17.0	1
Gerle Creek	Gerle Creek Dam	GCD-F1	Lower	E	1	Rainbow trout	139	23.6	1
Gerle Creek	Gerle Creek Dam	GCD-F1	Lower	E	1	Rainbow trout	134	24.2	1
Gerle Creek	Gerle Creek Dam	GCD-F1	Lower	E	1	Rainbow trout	144	26.2	1
Gerle Creek	Gerle Creek Dam	GCD-F1	Lower	E	1	Rainbow trout	150	28.2	1
Gerle Creek	Gerle Creek Dam	GCD-F1	Lower	E	1	Rainbow trout	179	48.8	1
Gerle Creek	Gerle Creek Dam	GCD-F1	Lower	E	2	Rainbow trout	60	1.4	1
Gerle Creek	Gerle Creek Dam	GCD-F1	Lower	E	2	Rainbow trout	59	1.7	1

Stream	Reach	Site	Segment	Method	Pass	Species	Length	Weight	Count
Gerle Creek	Gerle Creek Dam	GCD-F1	Lower	E	2	Rainbow trout	61	1.8	1
Gerle Creek	Gerle Creek Dam	GCD-F1	Lower	E	2	Rainbow trout	60	2.1	1
Gerle Creek	Gerle Creek Dam	GCD-F1	Lower	E	2	Rainbow trout	61	2.1	1
Gerle Creek	Gerle Creek Dam	GCD-F1	Lower	E	2	Rainbow trout	60	2.1	1
Gerle Creek	Gerle Creek Dam	GCD-F1	Lower	E	2	Rainbow trout	66	2.5	1
Gerle Creek	Gerle Creek Dam	GCD-F1	Lower	E	2	Rainbow trout	66	2.5	1
Gerle Creek	Gerle Creek Dam	GCD-F1	Lower	E	2	Rainbow trout	66	2.6	1
Gerle Creek	Gerle Creek Dam	GCD-F1	Lower	E	2	Rainbow trout	68	2.7	1
Gerle Creek	Gerle Creek Dam	GCD-F1	Lower	E	2	Rainbow trout	65	2.7	1
Gerle Creek	Gerle Creek Dam	GCD-F1	Lower	E	2	Rainbow trout	69	2.8	1
Gerle Creek	Gerle Creek Dam	GCD-F1	Lower	E	2	Brown trout	89	5.9	1
Gerle Creek	Gerle Creek Dam	GCD-F1	Lower	E	2	Rainbow trout	94	7.6	1
Gerle Creek	Gerle Creek Dam	GCD-F1	Lower	E	2	Rainbow trout	105	10.5	1
Gerle Creek	Gerle Creek Dam	GCD-F1	Lower	E	2	Rainbow trout	110	11.9	1
Gerle Creek	Gerle Creek Dam	GCD-F1	Lower	E	2	Rainbow trout	121	15.7	1
Gerle Creek	Gerle Creek Dam	GCD-F1	Lower	E	2	Rainbow trout	138	22.6	1
Gerle Creek	Gerle Creek Dam	GCD-F1	Lower	E	3	Rainbow trout	56	1.5	1
Gerle Creek	Gerle Creek Dam	GCD-F1	Lower	E	3	Rainbow trout	61	1.9	1

Stream	Reach	Site	Segment	Method	Pass	Species	Length	Weight	Count
Gerle Creek	Gerle Creek Dam	GCD-F1	Lower	E	3	Rainbow trout	61	2.0	1
Gerle Creek	Gerle Creek Dam	GCD-F1	Lower	E	3	Rainbow trout	65	2.2	1
Gerle Creek	Gerle Creek Dam	GCD-F1	Lower	E	3	Rainbow trout	64	2.7	1
Gerle Creek	Gerle Creek Dam	GCD-F1	Lower	E	3	Rainbow trout	89	6.0	1
Gerle Creek	Gerle Creek Dam	GCD-F1	Lower	E	3	Rainbow trout	99	8.6	1
Gerle Creek	Gerle Creek Dam	GCD-F1	Lower	E	3	Rainbow trout	102	9.7	1
Gerle Creek	Gerle Creek Dam	GCD-F1	Lower	E	3	Rainbow trout	111	10.6	1
Gerle Creek	Gerle Creek Dam	GCD-F1	Lower	E	3	Rainbow trout	111	11.4	1
Gerle Creek	Gerle Creek Dam	GCD-F1	Upper	E	1	Rainbow trout	53	1.3	1
Gerle Creek	Gerle Creek Dam	GCD-F1	Upper	E	1	Rainbow trout	59	1.7	1
Gerle Creek	Gerle Creek Dam	GCD-F1	Upper	E	1	Rainbow trout	60	1.7	1
Gerle Creek	Gerle Creek Dam	GCD-F1	Upper	E	1	Rainbow trout	59	1.8	1
Gerle Creek	Gerle Creek Dam	GCD-F1	Upper	E	1	Rainbow trout	61	2.0	1
Gerle Creek	Gerle Creek Dam	GCD-F1	Upper	E	1	Rainbow trout	63	2.0	1
Gerle Creek	Gerle Creek Dam	GCD-F1	Upper	E	1	Rainbow trout	63	2.1	1
Gerle Creek	Gerle Creek Dam	GCD-F1	Upper	E	1	Rainbow trout	63	2.1	1
Gerle Creek	Gerle Creek Dam	GCD-F1	Upper	E	1	Rainbow trout	63	2.2	1
Gerle Creek	Gerle Creek Dam	GCD-F1	Upper	E	1	Rainbow trout	65	2.3	1

Stream	Reach	Site	Segment	Method	Pass	Species	Length	Weight	Count
Gerle Creek	Gerle Creek Dam	GCD-F1	Upper	E	1	Rainbow trout	67	2.7	1
Gerle Creek	Gerle Creek Dam	GCD-F1	Upper	E	1	Rainbow trout	66	3.0	1
Gerle Creek	Gerle Creek Dam	GCD-F1	Upper	E	1	Rainbow trout	85	5.2	1
Gerle Creek	Gerle Creek Dam	GCD-F1	Upper	E	1	Rainbow trout	103	8.6	1
Gerle Creek	Gerle Creek Dam	GCD-F1	Upper	E	1	Rainbow trout	104	10.1	1
Gerle Creek	Gerle Creek Dam	GCD-F1	Upper	E	1	Rainbow trout	111	11.5	1
Gerle Creek	Gerle Creek Dam	GCD-F1	Upper	E	1	Rainbow trout	110	13.2	1
Gerle Creek	Gerle Creek Dam	GCD-F1	Upper	E	1	Rainbow trout	118	14.4	1
Gerle Creek	Gerle Creek Dam	GCD-F1	Upper	E	1	Rainbow trout	140	23.1	1
Gerle Creek	Gerle Creek Dam	GCD-F1	Upper	E	1	Rainbow trout	149	29.8	1
Gerle Creek	Gerle Creek Dam	GCD-F1	Upper	E	3	Rainbow trout	65	2.9	1
S.F. Rubicon	Robb's Peak Dam	RPD-F1	Lower	E	1	Rainbow trout	37	1.0	1
S.F. Rubicon	Robb's Peak Dam	RPD-F1	Lower	E	1	Rainbow trout	37	1.0	1
S.F. Rubicon	Robb's Peak Dam	RPD-F1	Lower	E	1	Rainbow trout	41	1.0	1
S.F. Rubicon	Robb's Peak Dam	RPD-F1	Lower	E	1	Rainbow trout	45	0.8	1
S.F. Rubicon	Robb's Peak Dam	RPD-F1	Lower	E	1	Rainbow trout	46	1.0	1
S.F. Rubicon	Robb's Peak Dam	RPD-F1	Lower	E	1	Rainbow trout	47	1.0	1
S.F. Rubicon	Robb's Peak Dam	RPD-F1	Lower	E	1	Rainbow trout	48	1.0	1

Stream	Reach	Site	Segment	Method	Pass	Species	Length	Weight	Count
S.F. Rubicon	Robb's Peak Dam	RPD-F1	Lower	E	1	Rainbow trout	48	1.0	1
S.F. Rubicon	Robb's Peak Dam	RPD-F1	Lower	E	1	Rainbow trout	49	1.0	1
S.F. Rubicon	Robb's Peak Dam	RPD-F1	Lower	E	1	Rainbow trout	49	1.1	1
S.F. Rubicon	Robb's Peak Dam	RPD-F1	Lower	E	1	Rainbow trout	50	1.0	1
S.F. Rubicon	Robb's Peak Dam	RPD-F1	Lower	E	1	Rainbow trout	51	1.3	1
S.F. Rubicon	Robb's Peak Dam	RPD-F1	Lower	E	1	Rainbow trout	51	1.4	1
S.F. Rubicon	Robb's Peak Dam	RPD-F1	Lower	E	1	Rainbow trout	52	1.1	1
S.F. Rubicon	Robb's Peak Dam	RPD-F1	Lower	E	1	Rainbow trout	52	1.5	1
S.F. Rubicon	Robb's Peak Dam	RPD-F1	Lower	E	1	Rainbow trout	55	0.7	1
S.F. Rubicon	Robb's Peak Dam	RPD-F1	Lower	E	1	Rainbow trout	55	1.4	1
S.F. Rubicon	Robb's Peak Dam	RPD-F1	Lower	E	1	Rainbow trout	55	1.5	1
S.F. Rubicon	Robb's Peak Dam	RPD-F1	Lower	E	1	Rainbow trout	55	1.5	1
S.F. Rubicon	Robb's Peak Dam	RPD-F1	Lower	E	1	Rainbow trout	55	1.6	1
S.F. Rubicon	Robb's Peak Dam	RPD-F1	Lower	E	1	Rainbow trout	55	1.7	1
S.F. Rubicon	Robb's Peak Dam	RPD-F1	Lower	E	1	Rainbow trout	56	1.2	1
S.F. Rubicon	Robb's Peak Dam	RPD-F1	Lower	E	1	Rainbow trout	56	1.6	1
S.F. Rubicon	Robb's Peak Dam	RPD-F1	Lower	E	1	Rainbow trout	56	1.7	1
S.F. Rubicon	Robb's Peak Dam	RPD-F1	Lower	E	1	Rainbow trout	57	1.7	1

Stream	Reach	Site	Segment	Method	Pass	Species	Length	Weight	Count
S.F. Rubicon	Robb's Peak Dam	RPD-F1	Lower	E	1	Rainbow trout	57	1.8	1
S.F. Rubicon	Robb's Peak Dam	RPD-F1	Lower	E	1	Rainbow trout	58	2.0	1
S.F. Rubicon	Robb's Peak Dam	RPD-F1	Lower	E	1	Rainbow trout	59	1.9	1
S.F. Rubicon	Robb's Peak Dam	RPD-F1	Lower	E	1	Rainbow trout	60	1.6	1
S.F. Rubicon	Robb's Peak Dam	RPD-F1	Lower	E	1	Rainbow trout	60	1.6	1
S.F. Rubicon	Robb's Peak Dam	RPD-F1	Lower	E	1	Rainbow trout	60	1.8	1
S.F. Rubicon	Robb's Peak Dam	RPD-F1	Lower	E	1	Rainbow trout	60	1.8	1
S.F. Rubicon	Robb's Peak Dam	RPD-F1	Lower	E	1	Rainbow trout	60	1.9	1
S.F. Rubicon	Robb's Peak Dam	RPD-F1	Lower	E	1	Rainbow trout	60	1.9	1
S.F. Rubicon	Robb's Peak Dam	RPD-F1	Lower	E	1	Rainbow trout	60	2.0	1
S.F. Rubicon	Robb's Peak Dam	RPD-F1	Lower	E	1	Rainbow trout	60	2.0	1
S.F. Rubicon	Robb's Peak Dam	RPD-F1	Lower	E	1	Rainbow trout	60	2.4	1
S.F. Rubicon	Robb's Peak Dam	RPD-F1	Lower	E	1	Rainbow trout	61	1.7	1
S.F. Rubicon	Robb's Peak Dam	RPD-F1	Lower	E	1	Rainbow trout	61	1.8	1
S.F. Rubicon	Robb's Peak Dam	RPD-F1	Lower	E	1	Brown trout	78	4.6	1
S.F. Rubicon	Robb's Peak Dam	RPD-F1	Lower	E	1	Rainbow trout	62	2.3	1
S.F. Rubicon	Robb's Peak Dam	RPD-F1	Lower	E	1	Rainbow trout	62	2.4	1
S.F. Rubicon	Robb's Peak Dam	RPD-F1	Lower	E	1	Rainbow trout	63	2.3	1

Stream	Reach	Site	Segment	Method	Pass	Species	Length	Weight	Count
S.F. Rubicon	Robb's Peak Dam	RPD-F1	Lower	E	1	Rainbow trout	63	2.6	1
S.F. Rubicon	Robb's Peak Dam	RPD-F1	Lower	E	1	Rainbow trout	65	2.5	1
S.F. Rubicon	Robb's Peak Dam	RPD-F1	Lower	E	1	Rainbow trout	65	2.6	1
S.F. Rubicon	Robb's Peak Dam	RPD-F1	Lower	E	1	Rainbow trout	65	2.6	1
S.F. Rubicon	Robb's Peak Dam	RPD-F1	Lower	E	1	Rainbow trout	67	2.7	1
S.F. Rubicon	Robb's Peak Dam	RPD-F1	Lower	E	1	Rainbow trout	67	2.8	1
S.F. Rubicon	Robb's Peak Dam	RPD-F1	Lower	E	1	Rainbow trout	67	3.0	1
S.F. Rubicon	Robb's Peak Dam	RPD-F1	Lower	E	1	Rainbow trout	67	3.1	1
S.F. Rubicon	Robb's Peak Dam	RPD-F1	Lower	E	1	Rainbow trout	68	2.5	1
S.F. Rubicon	Robb's Peak Dam	RPD-F1	Lower	E	1	Rainbow trout	69	2.7	1
S.F. Rubicon	Robb's Peak Dam	RPD-F1	Lower	E	1	Rainbow trout	70	2.5	1
S.F. Rubicon	Robb's Peak Dam	RPD-F1	Lower	E	1	Rainbow trout	70	2.6	1
S.F. Rubicon	Robb's Peak Dam	RPD-F1	Lower	E	1	Brown trout	252	179.2	1
S.F. Rubicon	Robb's Peak Dam	RPD-F1	Lower	E	1	Rainbow trout	70	2.9	1
S.F. Rubicon	Robb's Peak Dam	RPD-F1	Lower	E	1	Rainbow trout	70	3.4	1
S.F. Rubicon	Robb's Peak Dam	RPD-F1	Lower	E	1	Rainbow trout	71	3.4	1
S.F. Rubicon	Robb's Peak Dam	RPD-F1	Lower	E	1	Rainbow trout	71	3.7	1
S.F. Rubicon	Robb's Peak Dam	RPD-F1	Lower	E	1	Rainbow trout	72	3.3	1

Stream	Reach	Site	Segment	Method	Pass	Species	Length	Weight	Count
S.F. Rubicon	Robb's Peak Dam	RPD-F1	Lower	E	1	Rainbow trout	72	3.4	1
S.F. Rubicon	Robb's Peak Dam	RPD-F1	Lower	E	1	Rainbow trout	73	3.1	1
S.F. Rubicon	Robb's Peak Dam	RPD-F1	Lower	E	1	Rainbow trout	73	3.4	1
S.F. Rubicon	Robb's Peak Dam	RPD-F1	Lower	E	1	Rainbow trout	75	4.4	1
S.F. Rubicon	Robb's Peak Dam	RPD-F1	Lower	E	1	Rainbow trout	77	4.5	1
S.F. Rubicon	Robb's Peak Dam	RPD-F1	Lower	E	1	Rainbow trout	81	6.2	1
S.F. Rubicon	Robb's Peak Dam	RPD-F1	Lower	E	1	Rainbow trout	83	5.4	1
S.F. Rubicon	Robb's Peak Dam	RPD-F1	Lower	E	1	Rainbow trout	90	6.8	1
S.F. Rubicon	Robb's Peak Dam	RPD-F1	Lower	E	1	Rainbow trout	95	8.1	1
S.F. Rubicon	Robb's Peak Dam	RPD-F1	Lower	E	1	Rainbow trout	100	11.0	1
S.F. Rubicon	Robb's Peak Dam	RPD-F1	Lower	E	1	Rainbow trout	103	9.3	1
S.F. Rubicon	Robb's Peak Dam	RPD-F1	Lower	E	1	Rainbow trout	103	10.0	1
S.F. Rubicon	Robb's Peak Dam	RPD-F1	Lower	E	1	Rainbow trout	105	10.1	1
S.F. Rubicon	Robb's Peak Dam	RPD-F1	Lower	E	1	Rainbow trout	105	10.5	1
S.F. Rubicon	Robb's Peak Dam	RPD-F1	Lower	E	1	Rainbow trout	105	11.6	1
S.F. Rubicon	Robb's Peak Dam	RPD-F1	Lower	E	1	Rainbow trout	110	11.3	1
S.F. Rubicon	Robb's Peak Dam	RPD-F1	Lower	E	1	Rainbow trout	112	11.1	1
S.F. Rubicon	Robb's Peak Dam	RPD-F1	Lower	E	1	Rainbow trout	112	13.2	1

Stream	Reach	Site	Segment	Method	Pass	Species	Length	Weight	Count
S.F. Rubicon	Robb's Peak Dam	RPD-F1	Lower	E	1	Rainbow trout	120	14.9	1
S.F. Rubicon	Robb's Peak Dam	RPD-F1	Lower	E	1	Rainbow trout	122	18.5	1
S.F. Rubicon	Robb's Peak Dam	RPD-F1	Lower	E	1	Rainbow trout	127	18.9	1
S.F. Rubicon	Robb's Peak Dam	RPD-F1	Lower	E	1	Rainbow trout	130	21.8	1
S.F. Rubicon	Robb's Peak Dam	RPD-F1	Lower	E	1	Rainbow trout	130	23.4	1
S.F. Rubicon	Robb's Peak Dam	RPD-F1	Lower	E	1	Rainbow trout	133	21.0	1
S.F. Rubicon	Robb's Peak Dam	RPD-F1	Lower	E	1	Rainbow trout	145	23.6	1
S.F. Rubicon	Robb's Peak Dam	RPD-F1	Lower	E	1	Rainbow trout	150	28.6	1
S.F. Rubicon	Robb's Peak Dam	RPD-F1	Lower	E	1	Rainbow trout	162	39.6	1
S.F. Rubicon	Robb's Peak Dam	RPD-F1	Lower	E	1	Rainbow trout	170	44.4	1
S.F. Rubicon	Robb's Peak Dam	RPD-F1	Lower	E	1	Rainbow trout	172	43.1	1
S.F. Rubicon	Robb's Peak Dam	RPD-F1	Lower	E	1	Rainbow trout	177	61.6	1
S.F. Rubicon	Robb's Peak Dam	RPD-F1	Lower	E	1	Rainbow trout	185	54.6	1
S.F. Rubicon	Robb's Peak Dam	RPD-F1	Lower	E	1	Rainbow trout	190	66.6	1
S.F. Rubicon	Robb's Peak Dam	RPD-F1	Lower	E	2	Rainbow trout	45	0.8	1
S.F. Rubicon	Robb's Peak Dam	RPD-F1	Lower	E	2	Rainbow trout	49	1.0	1
S.F. Rubicon	Robb's Peak Dam	RPD-F1	Lower	E	2	Rainbow trout	50	1.4	1
S.F. Rubicon	Robb's Peak Dam	RPD-F1	Lower	E	2	Rainbow trout	52	1.3	1

Stream	Reach	Site	Segment	Method	Pass	Species	Length	Weight	Count
S.F. Rubicon	Robb's Peak Dam	RPD-F1	Lower	E	2	Rainbow trout	58	1.9	1
S.F. Rubicon	Robb's Peak Dam	RPD-F1	Lower	E	2	Rainbow trout	59	1.9	1
S.F. Rubicon	Robb's Peak Dam	RPD-F1	Lower	E	2	Rainbow trout	62	2.2	1
S.F. Rubicon	Robb's Peak Dam	RPD-F1	Lower	E	2	Rainbow trout	73	3.8	1
S.F. Rubicon	Robb's Peak Dam	RPD-F1	Lower	E	2	Rainbow trout	74	3.8	1
S.F. Rubicon	Robb's Peak Dam	RPD-F1	Lower	E	2	Rainbow trout	76	4.2	1
S.F. Rubicon	Robb's Peak Dam	RPD-F1	Lower	E	2	Rainbow trout	94	6.8	1
S.F. Rubicon	Robb's Peak Dam	RPD-F1	Lower	E	2	Rainbow trout	101	8.3	1
S.F. Rubicon	Robb's Peak Dam	RPD-F1	Lower	E	2	Rainbow trout	103	9.1	1
S.F. Rubicon	Robb's Peak Dam	RPD-F1	Lower	E	2	Rainbow trout	103	9.6	1
S.F. Rubicon	Robb's Peak Dam	RPD-F1	Lower	E	2	Rainbow trout	110	11.3	1
S.F. Rubicon	Robb's Peak Dam	RPD-F1	Lower	E	2	Rainbow trout	111	11.9	1
S.F. Rubicon	Robb's Peak Dam	RPD-F1	Lower	E	2	Rainbow trout	117	12.9	1
S.F. Rubicon	Robb's Peak Dam	RPD-F1	Lower	E	2	Rainbow trout	139	26.9	1
S.F. Rubicon	Robb's Peak Dam	RPD-F1	Lower	E	2	Rainbow trout	140	22.7	1
S.F. Rubicon	Robb's Peak Dam	RPD-F1	Lower	E	3	Rainbow trout	37	0.4	1
S.F. Rubicon	Robb's Peak Dam	RPD-F1	Lower	E	3	Rainbow trout	46	1.0	1
S.F. Rubicon	Robb's Peak Dam	RPD-F1	Lower	E	3	Rainbow trout	53	1.2	1

Stream	Reach	Site	Segment	Method	Pass	Species	Length	Weight	Count
S.F. Rubicon	Robb's Peak Dam	RPD-F1	Lower	E	3	Rainbow trout	57	1.6	1
S.F. Rubicon	Robb's Peak Dam	RPD-F1	Lower	E	3	Rainbow trout	64	2.8	1
S.F. Rubicon	Robb's Peak Dam	RPD-F1	Lower	E	3	Rainbow trout	65	2.6	1
S.F. Rubicon	Robb's Peak Dam	RPD-F1	Lower	E	3	Rainbow trout	67	3.1	1
S.F. Rubicon	Robb's Peak Dam	RPD-F1	Lower	E	3	Rainbow trout	74	4.0	1
S.F. Rubicon	Robb's Peak Dam	RPD-F1	Lower	E	3	Rainbow trout	110	11.5	1
S.F. Rubicon	Robb's Peak Dam	RPD-F1	Lower	E	3	Rainbow trout	188	66.6	1
S.F. Rubicon	Robb's Peak Dam	RPD-F1	Upper	E	1	Rainbow trout	52	1.2	1
S.F. Rubicon	Robb's Peak Dam	RPD-F1	Upper	E	1	Rainbow trout	52	1.6	1
S.F. Rubicon	Robb's Peak Dam	RPD-F1	Upper	E	1	Rainbow trout	52	1.8	1
S.F. Rubicon	Robb's Peak Dam	RPD-F1	Upper	E	1	Rainbow trout	53	1.3	1
S.F. Rubicon	Robb's Peak Dam	RPD-F1	Upper	E	1	Rainbow trout	54	1.7	1
S.F. Rubicon	Robb's Peak Dam	RPD-F1	Upper	E	1	Rainbow trout	55	1.4	1
S.F. Rubicon	Robb's Peak Dam	RPD-F1	Upper	E	1	Rainbow trout	58	1.8	1
S.F. Rubicon	Robb's Peak Dam	RPD-F1	Upper	E	1	Rainbow trout	58	2.1	1
S.F. Rubicon	Robb's Peak Dam	RPD-F1	Upper	E	1	Rainbow trout	60	1.8	1
S.F. Rubicon	Robb's Peak Dam	RPD-F1	Upper	E	1	Rainbow trout	60	1.9	1
S.F. Rubicon	Robb's Peak Dam	RPD-F1	Upper	E	1	Rainbow trout	61	1.9	1

Stream	Reach	Site	Segment	Method	Pass	Species	Length	Weight	Count
S.F. Rubicon	Robb's Peak Dam	RPD-F1	Upper	E	1	Rainbow trout	61	2.3	1
S.F. Rubicon	Robb's Peak Dam	RPD-F1	Upper	E	1	Rainbow trout	62	2.2	1
S.F. Rubicon	Robb's Peak Dam	RPD-F1	Upper	E	1	Rainbow trout	62	2.4	1
S.F. Rubicon	Robb's Peak Dam	RPD-F1	Upper	E	1	Rainbow trout	63	2.1	1
S.F. Rubicon	Robb's Peak Dam	RPD-F1	Upper	E	1	Rainbow trout	66	2.3	1
S.F. Rubicon	Robb's Peak Dam	RPD-F1	Upper	E	1	Rainbow trout	66	3.5	1
S.F. Rubicon	Robb's Peak Dam	RPD-F1	Upper	E	1	Rainbow trout	68	2.5	1
S.F. Rubicon	Robb's Peak Dam	RPD-F1	Upper	E	1	Rainbow trout	71	2.5	1
S.F. Rubicon	Robb's Peak Dam	RPD-F1	Upper	E	1	Rainbow trout	71	3.0	1
S.F. Rubicon	Robb's Peak Dam	RPD-F1	Upper	E	1	Rainbow trout	85	12.9	1
S.F. Rubicon	Robb's Peak Dam	RPD-F1	Upper	E	1	Rainbow trout	98	7.4	1
S.F. Rubicon	Robb's Peak Dam	RPD-F1	Upper	E	1	Rainbow trout	98	8.0	1
S.F. Rubicon	Robb's Peak Dam	RPD-F1	Upper	E	1	Rainbow trout	104	9.2	1
S.F. Rubicon	Robb's Peak Dam	RPD-F1	Upper	E	1	Rainbow trout	104	10.6	1
S.F. Rubicon	Robb's Peak Dam	RPD-F1	Upper	E	1	Rainbow trout	111	10.9	1
S.F. Rubicon	Robb's Peak Dam	RPD-F1	Upper	E	1	Rainbow trout	111	11.4	1
S.F. Rubicon	Robb's Peak Dam	RPD-F1	Upper	E	1	Rainbow trout	112	11.8	1
S.F. Rubicon	Robb's Peak Dam	RPD-F1	Upper	E	1	Rainbow trout	116	13.4	1

Stream	Reach	Site	Segment	Method	Pass	Species	Length	Weight	Count
S.F. Rubicon	Robb's Peak Dam	RPD-F1	Upper	E	1	Rainbow trout	116	13.6	1
S.F. Rubicon	Robb's Peak Dam	RPD-F1	Upper	E	1	Rainbow trout	118	15.1	1
S.F. Rubicon	Robb's Peak Dam	RPD-F1	Upper	E	1	Rainbow trout	121	14.8	1
S.F. Rubicon	Robb's Peak Dam	RPD-F1	Upper	E	1	Rainbow trout	125	17.4	1
S.F. Rubicon	Robb's Peak Dam	RPD-F1	Upper	E	1	Rainbow trout	138	22.5	1
S.F. Rubicon	Robb's Peak Dam	RPD-F1	Upper	E	1	Rainbow trout	141	23.3	1
S.F. Rubicon	Robb's Peak Dam	RPD-F1	Upper	E	1	Rainbow trout	151	29.4	1
S.F. Rubicon	Robb's Peak Dam	RPD-F1	Upper	E	1	Rainbow trout	152	32.9	1
S.F. Rubicon	Robb's Peak Dam	RPD-F1	Upper	E	1	Rainbow trout	163	36.6	1
S.F. Rubicon	Robb's Peak Dam	RPD-F1	Upper	E	1	Rainbow trout	174	25.3	1
S.F. Rubicon	Robb's Peak Dam	RPD-F1	Upper	E	2	Rainbow trout	49	0.9	1
S.F. Rubicon	Robb's Peak Dam	RPD-F1	Upper	E	2	Rainbow trout	59	1.5	1
S.F. Rubicon	Robb's Peak Dam	RPD-F1	Upper	E	2	Rainbow trout	59	2.0	1
S.F. Rubicon	Robb's Peak Dam	RPD-F1	Upper	E	2	Rainbow trout	93	5.9	1
S.F. Rubicon	Robb's Peak Dam	RPD-F1	Upper	E	2	Rainbow trout	104	9.2	1
S.F. Rubicon	Robb's Peak Dam	RPD-F1	Upper	E	2	Rainbow trout	112	9.1	1
S.F. Rubicon	Robb's Peak Dam	RPD-F1	Upper	E	2	Rainbow trout	121	15.5	1
S.F. Rubicon	Robb's Peak Dam	RPD-F1	Upper	E	2	Rainbow trout	134	19.2	1

Stream	Reach	Site	Segment	Method	Pass	Species	Length	Weight	Count
S.F. Rubicon	Robb's Peak Dam	RPD-F1	Upper	E	2	Rainbow trout	135	21.6	1
S.F. Rubicon	Robb's Peak Dam	RPD-F1	Upper	E	2	Rainbow trout	135	22.3	1
S.F. Rubicon	Robb's Peak Dam	RPD-F1	Upper	E	2	Brown trout	81	5.4	1
S.F. Rubicon	Robb's Peak Dam	RPD-F1	Upper	E	2	Rainbow trout	146	27.4	1
S.F. Rubicon	Robb's Peak Dam	RPD-F1	Upper	E	3	Rainbow trout	55	1.5	1
S.F. Rubicon	Robb's Peak Dam	RPD-F1	Upper	E	3	Rainbow trout	67	2.8	1
S.F. Rubicon	Robb's Peak Dam	RPD-F1	Upper	E	3	Rainbow trout	90	6.3	1
S.F. Rubicon	Robb's Peak Dam	RPD-F1	Upper	E	3	Rainbow trout	93	7.6	1
S.F. Rubicon	Robb's Peak Dam	RPD-F1	Upper	E	3	Rainbow trout	96	7.4	1
S.F. Rubicon	Robb's Peak Dam	RPD-F1	Upper	E	3	Rainbow trout	104	9.9	1
S.F. Rubicon	Robb's Peak Dam	RPD-F1	Upper	E	3	Rainbow trout	111	10.9	1
S.F. Rubicon	Robb's Peak Dam	RPD-F1	Upper	E	3	Rainbow trout	124	13.6	1
S.F. Rubicon	Robb's Peak Dam	RPD-F1	Upper	E	3	Brown trout	85	6.3	1
S.F. Silver Creek	Ice House Dam	IHD-F1	Lower	E	1	Rainbow trout	35	0.5	1
S.F. Silver Creek	Ice House Dam	IHD-F1	Lower	E	1	Rainbow trout	40	0.5	1
S.F. Silver Creek	Ice House Dam	IHD-F1	Lower	E	1	Rainbow trout	40	0.6	1
S.F. Silver Creek	Ice House Dam	IHD-F1	Lower	E	1	Rainbow trout	65	3.2	1
S.F. Silver Creek	Ice House Dam	IHD-F1	Lower	E	1	Rainbow trout	70	3.7	1

Stream	Reach	Site	Segment	Method	Pass	Species	Length	Weight	Count
S.F. Silver Creek	Ice House Dam	IHD-F1	Lower	E	1	Rainbow trout	70	4.5	1
S.F. Silver Creek	Ice House Dam	IHD-F1	Lower	E	1	Rainbow trout	80	5.2	1
S.F. Silver Creek	Ice House Dam	IHD-F1	Lower	E	1	Rainbow trout	80	5.4	1
S.F. Silver Creek	Ice House Dam	IHD-F1	Lower	E	1	Rainbow trout	80	5.7	1
S.F. Silver Creek	Ice House Dam	IHD-F1	Lower	E	1	Rainbow trout	90	5.0	1
S.F. Silver Creek	Ice House Dam	IHD-F1	Lower	E	1	Rainbow trout	90	8.5	1
S.F. Silver Creek	Ice House Dam	IHD-F1	Lower	E	1	Rainbow trout	95	9.0	1
S.F. Silver Creek	Ice House Dam	IHD-F1	Lower	E	1	Brown trout	80	5.4	1
S.F. Silver Creek	Ice House Dam	IHD-F1	Lower	E	1	Rainbow trout	100	10.9	1
S.F. Silver Creek	Ice House Dam	IHD-F1	Lower	E	1	Rainbow trout	100	11.4	1
S.F. Silver Creek	Ice House Dam	IHD-F1	Lower	E	1	Rainbow trout	100	13.3	1
S.F. Silver Creek	Ice House Dam	IHD-F1	Lower	E	1	Rainbow trout	105	11.5	1
S.F. Silver Creek	Ice House Dam	IHD-F1	Lower	E	1	Brown trout	145	30.4	1
S.F. Silver Creek	Ice House Dam	IHD-F1	Lower	E	1	Rainbow trout	120	16.4	1
S.F. Silver Creek	Ice House Dam	IHD-F1	Lower	E	1	Rainbow trout	140	26.3	1
S.F. Silver Creek	Ice House Dam	IHD-F1	Lower	E	1	Rainbow trout	150	29.6	1
S.F. Silver Creek	Ice House Dam	IHD-F1	Lower	E	1	Brown trout	190	65.9	1
S.F. Silver Creek	Ice House Dam	IHD-F1	Lower	E	1	Rainbow trout	155	34.1	1

Stream	Reach	Site	Segment	Method	Pass	Species	Length	Weight	Count
S.F. Silver Creek	Ice House Dam	IHD-F1	Lower	E	1	Rainbow trout	170	40.2	1
S.F. Silver Creek	Ice House Dam	IHD-F1	Lower	E	2	Rainbow trout	32	0.3	1
S.F. Silver Creek	Ice House Dam	IHD-F1	Lower	E	2	Rainbow trout	40	0.4	1
S.F. Silver Creek	Ice House Dam	IHD-F1	Lower	E	2	Rainbow trout	43	0.8	1
S.F. Silver Creek	Ice House Dam	IHD-F1	Lower	E	2	Rainbow trout	45	0.6	1
S.F. Silver Creek	Ice House Dam	IHD-F1	Lower	E	2	Rainbow trout	83	5.2	1
S.F. Silver Creek	Ice House Dam	IHD-F1	Lower	E	2	Rainbow trout	89	2.7	1
S.F. Silver Creek	Ice House Dam	IHD-F1	Lower	E	2	Rainbow trout	92	6.5	1
S.F. Silver Creek	Ice House Dam	IHD-F1	Lower	E	2	Rainbow trout	99	8.6	1
S.F. Silver Creek	Ice House Dam	IHD-F1	Lower	E	2	Rainbow trout	116	9.1	1
S.F. Silver Creek	Ice House Dam	IHD-F1	Lower	E	2	Rainbow trout	141	26.7	1
S.F. Silver Creek	Ice House Dam	IHD-F1	Lower	E	3	Brown trout	79	4.7	1
S.F. Silver Creek	Ice House Dam	IHD-F1	Lower	E	3	Rainbow trout	31	0.2	1
S.F. Silver Creek	Ice House Dam	IHD-F1	Lower	E	3	Rainbow trout	31	0.3	1
S.F. Silver Creek	Ice House Dam	IHD-F1	Lower	E	3	Rainbow trout	40	0.6	1
S.F. Silver Creek	Ice House Dam	IHD-F1	Upper	E	1	Brown trout	78	5.1	1
S.F. Silver Creek	Ice House Dam	IHD-F1	Upper	E	1	Rainbow trout	32	0.3	1
S.F. Silver Creek	Ice House Dam	IHD-F1	Upper	E	1	Rainbow trout	35	0.3	1

Stream	Reach	Site	Segment	Method	Pass	Species	Length	Weight	Count
S.F. Silver Creek	Ice House Dam	IHD-F1	Upper	E	1	Rainbow trout	38	0.5	1
S.F. Silver Creek	Ice House Dam	IHD-F1	Upper	E	1	Rainbow trout	45	0.9	1
S.F. Silver Creek	Ice House Dam	IHD-F1	Upper	E	1	Rainbow trout	94	6.6	1
S.F. Silver Creek	Ice House Dam	IHD-F1	Upper	E	1	Rainbow trout	94	7.8	1
S.F. Silver Creek	Ice House Dam	IHD-F1	Upper	E	1	Brown trout	121	19	1
S.F. Silver Creek	Ice House Dam	IHD-F1	Upper	E	1	Brown trout	138	25.1	1
S.F. Silver Creek	Ice House Dam	IHD-F1	Upper	E	1	Rainbow trout	95	8.2	1
S.F. Silver Creek	Ice House Dam	IHD-F1	Upper	E	1	Rainbow trout	101	9.6	1
S.F. Silver Creek	Ice House Dam	IHD-F1	Upper	E	1	Rainbow trout	102	9.5	1
S.F. Silver Creek	Ice House Dam	IHD-F1	Upper	E	1	Rainbow trout	105	11.6	1
S.F. Silver Creek	Ice House Dam	IHD-F1	Upper	E	1	Rainbow trout	107	10.3	1
S.F. Silver Creek	Ice House Dam	IHD-F1	Upper	E	1	Rainbow trout	143	26.2	1
S.F. Silver Creek	Ice House Dam	IHD-F1	Upper	E	1	Rainbow trout	155	38.4	1
S.F. Silver Creek	Ice House Dam	IHD-F1	Upper	E	1	Rainbow trout	181	58.1	1
S.F. Silver Creek	Ice House Dam	IHD-F1	Upper	E	2	Brown trout	72	3.8	1
S.F. Silver Creek	Ice House Dam	IHD-F1	Upper	E	2	Rainbow trout	32	0.3	1
S.F. Silver Creek	Ice House Dam	IHD-F1	Upper	E	2	Rainbow trout	38	0.3	1
S.F. Silver Creek	Ice House Dam	IHD-F1	Upper	E	2	Rainbow trout	86	6.1	1

Stream	Reach	Site	Segment	Method	Pass	Species	Length	Weight	Count
S.F. Silver Creek	Ice House Dam	IHD-F1	Upper	E	2	Rainbow trout	102	9.3	1
S.F. Silver Creek	Ice House Dam	IHD-F1	Upper	E	2	Rainbow trout	103	9.7	1
S.F. Silver Creek	Ice House Dam	IHD-F1	Upper	E	2	Rainbow trout	106	11.4	1
S.F. Silver Creek	Ice House Dam	IHD-F1	Upper	E	3	Rainbow trout	39	0.5	1
S.F. Silver Creek	Ice House Dam	IHD-F1	Upper	E	3	Rainbow trout	43	0.6	1
S.F. Silver Creek	Ice House Dam	IHD-F1	Upper	E	3	Rainbow trout	81	4.5	1
S.F. Silver Creek	Ice House Dam	IHD-F1	Upper	E	3	Brown trout	79	4.8	1
S.F. Silver Creek	Ice House Dam	IHD-F1	Upper	E	3	Rainbow trout	132	21.4	1
S.F. Silver Creek	Ice House Dam	IHD-F2	Lower	E	1	Rainbow trout	51	1.6	1
S.F. Silver Creek	Ice House Dam	IHD-F2	Lower	E	1	Sacramento sucker	53	1.7	1
S.F. Silver Creek	Ice House Dam	IHD-F2	Lower	E	1	Rainbow trout	57	1.8	1
S.F. Silver Creek	Ice House Dam	IHD-F2	Lower	E	1	Rainbow trout	60	2.7	1
S.F. Silver Creek	Ice House Dam	IHD-F2	Lower	E	1	Rainbow trout	63	2.0	1
S.F. Silver Creek	Ice House Dam	IHD-F2	Lower	E	1	Rainbow trout	68	2.6	1
S.F. Silver Creek	Ice House Dam	IHD-F2	Lower	E	1	Sacramento sucker	149	34.8	1
S.F. Silver Creek	Ice House Dam	IHD-F2	Lower	E	1	Rainbow trout	70	2.7	1
S.F. Silver Creek	Ice House Dam	IHD-F2	Lower	E	1	Rainbow trout	71	3.4	1
S.F. Silver Creek	Ice House Dam	IHD-F2	Lower	E	1	Brown trout	80	4.5	1

Stream	Reach	Site	Segment	Method	Pass	Species	Length	Weight	Count
S.F. Silver Creek	Ice House Dam	IHD-F2	Lower	E	1	Brown trout	82	5.1	1
S.F. Silver Creek	Ice House Dam	IHD-F2	Lower	E	1	Rainbow trout	72	3.5	1
S.F. Silver Creek	Ice House Dam	IHD-F2	Lower	E	1	Rainbow trout	110	12.4	1
S.F. Silver Creek	Ice House Dam	IHD-F2	Lower	E	1	Rainbow trout	114	12.7	1
S.F. Silver Creek	Ice House Dam	IHD-F2	Lower	E	1	Rainbow trout	114	12.9	1
S.F. Silver Creek	Ice House Dam	IHD-F2	Lower	E	1	Brown trout	85	6.2	1
S.F. Silver Creek	Ice House Dam	IHD-F2	Lower	E	1	Brown trout	90	6.7	1
S.F. Silver Creek	Ice House Dam	IHD-F2	Lower	E	1	Brown trout	90	6.8	1
S.F. Silver Creek	Ice House Dam	IHD-F2	Lower	E	1	Brown trout	91	8.0	1
S.F. Silver Creek	Ice House Dam	IHD-F2	Lower	E	1	Rainbow trout	114	14.2	1
S.F. Silver Creek	Ice House Dam	IHD-F2	Lower	E	1	Rainbow trout	137	20.2	1
S.F. Silver Creek	Ice House Dam	IHD-F2	Lower	E	1	Brown trout	92	7.2	1
S.F. Silver Creek	Ice House Dam	IHD-F2	Lower	E	1	Brown trout	95	8.5	1
S.F. Silver Creek	Ice House Dam	IHD-F2	Lower	E	1	Brown trout	98	7.5	1
S.F. Silver Creek	Ice House Dam	IHD-F2	Lower	E	1	Rainbow trout	156	34.5	1
S.F. Silver Creek	Ice House Dam	IHD-F2	Lower	E	1	Brown trout	132	17.2	1
S.F. Silver Creek	Ice House Dam	IHD-F2	Lower	E	1	Brown trout	133	20.6	1
S.F. Silver Creek	Ice House Dam	IHD-F2	Lower	E	1	Rainbow trout	181	56.6	1

Stream	Reach	Site	Segment	Method	Pass	Species	Length	Weight	Count
S.F. Silver Creek	Ice House Dam	IHD-F2	Lower	E	2	Rainbow trout	56	1.3	1
S.F. Silver Creek	Ice House Dam	IHD-F2	Lower	E	2	Brown trout	79	4.2	1
S.F. Silver Creek	Ice House Dam	IHD-F2	Lower	E	2	Sacramento sucker	51	1.0	1
S.F. Silver Creek	Ice House Dam	IHD-F2	Lower	E	2	Rainbow trout	71	2.8	1
S.F. Silver Creek	Ice House Dam	IHD-F2	Lower	E	2	Brown trout	80	4.8	1
S.F. Silver Creek	Ice House Dam	IHD-F2	Lower	E	2	Sacramento sucker	156	38.1	1
S.F. Silver Creek	Ice House Dam	IHD-F2	Lower	E	2	Brown trout	84	5.6	1
S.F. Silver Creek	Ice House Dam	IHD-F2	Lower	E	2	Brown trout	90	6.7	1
S.F. Silver Creek	Ice House Dam	IHD-F2	Lower	E	2	Brown trout	91	6.6	1
S.F. Silver Creek	Ice House Dam	IHD-F2	Lower	E	2	Rainbow trout	159	35.7	1
S.F. Silver Creek	Ice House Dam	IHD-F2	Lower	E	3	Rainbow trout	65	2.1	1
S.F. Silver Creek	Ice House Dam	IHD-F2	Lower	E	3	Sacramento sucker	42	0.8	1
S.F. Silver Creek	Ice House Dam	IHD-F2	Lower	E	3	Rainbow trout	182	67.5	1
S.F. Silver Creek	Ice House Dam	IHD-F2	Upper	E	1	Rainbow trout	52	2.1	1
S.F. Silver Creek	Ice House Dam	IHD-F2	Upper	E	1	Rainbow trout	54	1.0	1
S.F. Silver Creek	Ice House Dam	IHD-F2	Upper	E	1	Brown trout	67	2.9	1
S.F. Silver Creek	Ice House Dam	IHD-F2	Upper	E	1	Brown trout	69	2.9	1
S.F. Silver Creek	Ice House Dam	IHD-F2	Upper	E	1	Brown trout	71	3.3	1

Stream	Reach	Site	Segment	Method	Pass	Species	Length	Weight	Count
S.F. Silver Creek	Ice House Dam	IHD-F2	Upper	E	1	Brown trout	71	3.8	1
S.F. Silver Creek	Ice House Dam	IHD-F2	Upper	E	1	Brown trout	73	3.5	1
S.F. Silver Creek	Ice House Dam	IHD-F2	Upper	E	1	Brown trout	73	3.5	1
S.F. Silver Creek	Ice House Dam	IHD-F2	Upper	E	1	Brown trout	75	4.1	1
S.F. Silver Creek	Ice House Dam	IHD-F2	Upper	E	1	Brown trout	75	4.2	1
S.F. Silver Creek	Ice House Dam	IHD-F2	Upper	E	1	Rainbow trout	61	2.4	1
S.F. Silver Creek	Ice House Dam	IHD-F2	Upper	E	1	Rainbow trout	62	2.1	1
S.F. Silver Creek	Ice House Dam	IHD-F2	Upper	E	1	Rainbow trout	62	2.5	1
S.F. Silver Creek	Ice House Dam	IHD-F2	Upper	E	1	Brown trout	79	4.2	1
S.F. Silver Creek	Ice House Dam	IHD-F2	Upper	E	1	Brown trout	81	5.1	1
S.F. Silver Creek	Ice House Dam	IHD-F2	Upper	E	1	Brown trout	82	4.6	1
S.F. Silver Creek	Ice House Dam	IHD-F2	Upper	E	1	Rainbow trout	95	7.5	1
S.F. Silver Creek	Ice House Dam	IHD-F2	Upper	E	1	Sacramento sucker	45	0.5	1
S.F. Silver Creek	Ice House Dam	IHD-F2	Upper	E	1	Sacramento sucker	46	0.7	1
S.F. Silver Creek	Ice House Dam	IHD-F2	Upper	E	1	Rainbow trout	100	8.6	1
S.F. Silver Creek	Ice House Dam	IHD-F2	Upper	E	1	Sacramento sucker	50	1.2	1
S.F. Silver Creek	Ice House Dam	IHD-F2	Upper	E	1	Rainbow trout	103	9.6	1
S.F. Silver Creek	Ice House Dam	IHD-F2	Upper	E	1	Brown trout	86	5.8	1

Stream	Reach	Site	Segment	Method	Pass	Species	Length	Weight	Count
S.F. Silver Creek	Ice House Dam	IHD-F2	Upper	E	1	Brown trout	86	6.1	1
S.F. Silver Creek	Ice House Dam	IHD-F2	Upper	E	1	Brown trout	92	6.9	1
S.F. Silver Creek	Ice House Dam	IHD-F2	Upper	E	1	Brown trout	115	14.2	1
S.F. Silver Creek	Ice House Dam	IHD-F2	Upper	E	1	Brown trout	116	15.2	1
S.F. Silver Creek	Ice House Dam	IHD-F2	Upper	E	1	Brown trout	119	15.9	1
S.F. Silver Creek	Ice House Dam	IHD-F2	Upper	E	1	Brown trout	120	15.2	1
S.F. Silver Creek	Ice House Dam	IHD-F2	Upper	E	1	Brown trout	121	16.2	1
S.F. Silver Creek	Ice House Dam	IHD-F2	Upper	E	1	Brown trout	125	16.2	1
S.F. Silver Creek	Ice House Dam	IHD-F2	Upper	E	1	Brown trout	134	22.2	1
S.F. Silver Creek	Ice House Dam	IHD-F2	Upper	E	1	Rainbow trout	165	41.4	1
S.F. Silver Creek	Ice House Dam	IHD-F2	Upper	E	1	Brown trout	136	22.2	1
S.F. Silver Creek	Ice House Dam	IHD-F2	Upper	E	1	Brown trout	182	56.9	1
S.F. Silver Creek	Ice House Dam	IHD-F2	Upper	E	2	Rainbow trout	58	1.6	1
S.F. Silver Creek	Ice House Dam	IHD-F2	Upper	E	2	Rainbow trout	60	1.5	1
S.F. Silver Creek	Ice House Dam	IHD-F2	Upper	E	2	Brown trout	76	4.0	1
S.F. Silver Creek	Ice House Dam	IHD-F2	Upper	E	2	Brown trout	82	5.4	1
S.F. Silver Creek	Ice House Dam	IHD-F2	Upper	E	2	Brown trout	83	5.6	1
S.F. Silver Creek	Ice House Dam	IHD-F2	Upper	E	2	Brown trout	84	5.6	1

Stream	Reach	Site	Segment	Method	Pass	Species	Length	Weight	Count
S.F. Silver Creek	Ice House Dam	IHD-F2	Upper	E	2	Brown trout	88	6.1	1
S.F. Silver Creek	Ice House Dam	IHD-F2	Upper	E	2	Brown trout	90	7.4	1
S.F. Silver Creek	Ice House Dam	IHD-F2	Upper	E	2	Rainbow trout	115	13.3	1
S.F. Silver Creek	Ice House Dam	IHD-F2	Upper	E	2	Brown trout	92	8.2	1
S.F. Silver Creek	Ice House Dam	IHD-F2	Upper	E	2	Brown trout	117	14.5	1
S.F. Silver Creek	Ice House Dam	IHD-F2	Upper	E	2	Rainbow trout	148	28.5	1
S.F. Silver Creek	Ice House Dam	IHD-F2	Upper	E	3	Rainbow trout	74	2.5	1
S.F. Silver Creek	Ice House Dam	IHD-F2	Upper	E	3	Brown trout	129	20.9	1
Silver Creek	Junction Dam	JD-F3	1 Run	S	--	Brown trout	75	--	1
Silver Creek	Junction Dam	JD-F3	1 Run	S	--	Rainbow trout	25	--	1
Silver Creek	Junction Dam	JD-F3	1 Run	S	--	Rainbow trout	50	--	10
Silver Creek	Junction Dam	JD-F3	1 Run	S	--	Rainbow trout	225	--	1
Silver Creek	Junction Dam	JD-F3	1 Run	S	--	Rainbow trout	75	--	4
Silver Creek	Junction Dam	JD-F3	1 Run	S	--	Rainbow trout	100	--	1
Silver Creek	Junction Dam	JD-F3	1 Run	S	--	Rainbow trout	125	--	1
Silver Creek	Junction Dam	JD-F3	1 Run	S	--	Rainbow trout	175	--	1
Silver Creek	Junction Dam	JD-F3	1 Run	S	--	Rainbow trout	125	--	3
Silver Creek	Junction Dam	JD-F3	1 Run	S	--	Rainbow trout	150	--	1
Silver Creek	Junction Dam	JD-F3	1 Run	S	--	Rainbow trout	175	--	1
Silver Creek	Junction Dam	JD-F3	1 Run	S	--	Rainbow trout	200	--	1
Silver Creek	Junction Dam	JD-F3	2 Riffle	S	--	Brown trout	75	--	1
Silver Creek	Junction Dam	JD-F3	2 Riffle	S	--	Rainbow trout	25	--	3
Silver Creek	Junction Dam	JD-F3	2 Riffle	S	--	Rainbow trout	50	--	7
Silver Creek	Junction Dam	JD-F3	2 Riffle	S	--	Rainbow trout	75	--	4
Silver Creek	Junction Dam	JD-F3	2 Riffle	S	--	Rainbow trout	150	--	3

Stream	Reach	Site	Segment	Method	Pass	Species	Length	Weight	Count
Silver Creek	Junction Dam	JD-F3	2 Riffle	S	--	Rainbow trout	175	--	2
Silver Creek	Junction Dam	JD-F3	2 Riffle	S	--	Rainbow trout	200	--	1
Silver Creek	Junction Dam	JD-F3	2 Riffle	S	--	Rainbow trout	25	--	2
Silver Creek	Junction Dam	JD-F3	2 Riffle	S	--	Rainbow trout	50	--	4
Silver Creek	Junction Dam	JD-F3	2 Riffle	S	--	Rainbow trout	75	--	2
Silver Creek	Junction Dam	JD-F3	2 Riffle	S	--	Rainbow trout	100	--	2
Silver Creek	Junction Dam	JD-F3	2 Riffle	S	--	Rainbow trout	150	--	1
Silver Creek	Junction Dam	JD-F3	2 Riffle	S	--	Rainbow trout	200	--	2
Silver Creek	Junction Dam	JD-F3	2 Riffle	S	--	Rainbow trout	25	--	1
Silver Creek	Junction Dam	JD-F3	2 Riffle	S	--	Rainbow trout	100	--	1
Silver Creek	Junction Dam	JD-F3	2 Riffle	S	--	Rainbow trout	125	--	2
Silver Creek	Junction Dam	JD-F3	3 Pool	S	--	Brown trout	300	--	1
Silver Creek	Junction Dam	JD-F3	3 Pool	S	--	Brown trout	325	--	1
Silver Creek	Junction Dam	JD-F3	3 Pool	S	--	Brown trout	75	--	1
Silver Creek	Junction Dam	JD-F3	3 Pool	S	--	Rainbow trout	125	--	1
Silver Creek	Junction Dam	JD-F3	3 Pool	S	--	Rainbow trout	225	--	1
Silver Creek	Junction Dam	JD-F3	3 Pool	S	--	Rainbow trout	25	--	2
Silver Creek	Junction Dam	JD-F3	3 Pool	S	--	Rainbow trout	50	--	2
Silver Creek	Junction Dam	JD-F3	3 Pool	S	--	Rainbow trout	175	--	3
Silver Creek	Junction Dam	JD-F3	3 Pool	S	--	Rainbow trout	200	--	3
Silver Creek	Junction Dam	JD-F3	3 Pool	S	--	Rainbow trout	225	--	2
Silver Creek	Junction Dam	JD-F3	3 Pool	S	--	Rainbow trout	50	--	1
Silver Creek	Junction Dam	JD-F3	3 Pool	S	--	Rainbow trout	100	--	3
Silver Creek	Junction Dam	JD-F3	3 Pool	S	--	Rainbow trout	125	--	2
Silver Creek	Junction Dam	JD-F3	3 Pool	S	--	Rainbow trout	225	--	1
Silver Creek	Junction Dam	JD-F3	3 Pool	S	--	Rainbow trout	100	--	1
Silver Creek	Junction Dam	JD-F3	3 Pool	S	--	Rainbow trout	125	--	1
Silver Creek	Junction Dam	JD-F3	3 Pool	S	--	Rainbow trout	175	--	1
Silver Creek	Junction Dam	JD-F3	3 Pool	S	--	Rainbow trout	50	--	2
Silver Creek	Junction Dam	JD-F3	3 Pool	S	--	Rainbow trout	100	--	1

Stream	Reach	Site	Segment	Method	Pass	Species	Length	Weight	Count
Silver Creek	Junction Dam	JD-F3	4 Riffle	S	--	Brown trout	75	--	1
Silver Creek	Junction Dam	JD-F3	4 Riffle	S	--	Brown trout	50	--	4
Silver Creek	Junction Dam	JD-F3	4 Riffle	S	--	Brown trout	75	--	1
Silver Creek	Junction Dam	JD-F3	4 Riffle	S	--	Brown trout	50	--	4
Silver Creek	Junction Dam	JD-F3	4 Riffle	S	--	Brown trout	100	--	2
Silver Creek	Junction Dam	JD-F3	4 Riffle	S	--	Rainbow trout	0	--	1
Silver Creek	Junction Dam	JD-F3	4 Riffle	S	--	Rainbow trout	25	--	4
Silver Creek	Junction Dam	JD-F3	4 Riffle	S	--	Rainbow trout	50	--	2
Silver Creek	Junction Dam	JD-F3	4 Riffle	S	--	Rainbow trout	150	--	2
Silver Creek	Junction Dam	JD-F3	4 Riffle	S	--	Rainbow trout	175	--	1
Silver Creek	Junction Dam	JD-F3	4 Riffle	S	--	Rainbow trout	25	--	2
Silver Creek	Junction Dam	JD-F3	4 Riffle	S	--	Rainbow trout	50	--	13
Silver Creek	Junction Dam	JD-F3	4 Riffle	S	--	Rainbow trout	100	--	2
Silver Creek	Junction Dam	JD-F3	4 Riffle	S	--	Rainbow trout	125	--	5
Silver Creek	Junction Dam	JD-F3	4 Riffle	S	--	Rainbow trout	175	--	2
Silver Creek	Junction Dam	JD-F3	4 Riffle	S	--	Rainbow trout	225	--	2
Silver Creek	Junction Dam	JD-F3	4 Riffle	S	--	Rainbow trout	250	--	1
Silver Creek	Junction Dam	JD-F3	4 Riffle	S	--	Rainbow trout	50	--	3
Silver Creek	Junction Dam	JD-F3	4 Riffle	S	--	Rainbow trout	75	--	1
Silver Creek	Junction Dam	JD-F3	4 Riffle	S	--	Rainbow trout	100	--	4
Silver Creek	Junction Dam	JD-F3	4 Riffle	S	--	Rainbow trout	150	--	1
Silver Creek	Junction Dam	JD-F3	4 Riffle	S	--	Rainbow trout	25	--	1
Silver Creek	Junction Dam	JD-F3	4 Riffle	S	--	Rainbow trout	50	--	2
Silver Creek	Junction Dam	JD-F3	4 Riffle	S	--	Rainbow trout	100	--	2
Silver Creek	Camino Dam	CD-F1	1 Pool	S	--	Rainbow trout	125	--	51
Silver Creek	Camino Dam	CD-F1	1 Pool	S	--	Rainbow trout	100	--	30
Silver Creek	Camino Dam	CD-F1	1 Pool	S	--	Rainbow trout	150	--	11
Silver Creek	Camino Dam	CD-F1	1 Pool	S	--	Rainbow trout	75	--	3
Silver Creek	Camino Dam	CD-F1	1 Pool	S	--	Rainbow trout	50	--	5
Silver Creek	Camino Dam	CD-F1	1 Pool	S	--	Rainbow trout	200	--	1

Stream	Reach	Site	Segment	Method	Pass	Species	Length	Weight	Count
Silver Creek	Camino Dam	CD-F1	2 Riffle	S	--	Rainbow trout	50	--	3
Silver Creek	Camino Dam	CD-F1	2 Riffle	S	--	Rainbow trout	75	--	1
Silver Creek	Camino Dam	CD-F1	2 Riffle	S	--	Rainbow trout	100	--	5
Silver Creek	Camino Dam	CD-F1	2 Riffle	S	--	Rainbow trout	125	--	4
Silver Creek	Camino Dam	CD-F1	2 Riffle	S	--	Rainbow trout	150	--	2
Silver Creek	Camino Dam	CD-F1	3 Pool	S	--	Rainbow trout	100	--	4
Silver Creek	Camino Dam	CD-F1	3 Pool	S	--	Rainbow trout	150	--	12
Silver Creek	Camino Dam	CD-F1	3 Pool	S	--	Rainbow trout	125	--	5
Silver Creek	Camino Dam	CD-F1	3 Pool	S	--	Rainbow trout	200	--	1
Silver Creek	Camino Dam	CD-F1	3 Pool	S	--	Rainbow trout	25	--	4
Silver Creek	Camino Dam	CD-F1	4 Riffle	S	--	Rainbow trout	150	--	1
Silver Creek	Camino Dam	CD-F1	5 Pool	S	--	Rainbow trout	150	--	1
Silver Creek	Camino Dam	CD-F1	5 Pool	S	--	Rainbow trout	50	--	1
Silver Creek	Camino Dam	CD-F1	5 Pool	S	--	Rainbow trout	75	--	1
Silver Creek	Camino Dam	CD-F1	5 Pool	S	--	Rainbow trout	100	--	2
Silver Creek	Camino Dam	CD-F1	5 Pool	S	--	Rainbow trout	125	--	16
Silver Creek	Camino Dam	CD-F1	5 Pool	S	--	Rainbow trout	175	--	7
Silver Creek	Camino Dam	CD-F1	5 Pool	S	--	Rainbow trout	200	--	2
Silver Creek	Camino Dam	CD-F1	5 Pool	S	--	Rainbow trout	25	--	1
Silver Creek	Camino Dam	CD-F1	5 Pool	S	--	Rainbow trout	125	--	1
Silver Creek	Camino Dam	CD-F1	5 Pool	S	--	Rainbow trout	200	--	1
Silver Creek	Camino Dam	CD-F1	5 Pool	S	--	Rainbow trout	175	--	4
Silver Creek	Camino Dam	CD-F1	5 Pool	S	--	Rainbow trout	150	--	1
Silver Creek	Camino Dam	CD-F1	6 Riffle	S	--	Rainbow trout	25	--	1
Silver Creek	Camino Dam	CD-F1	6 Riffle	S	--	Rainbow trout	125	--	3
Silver Creek	Camino Dam	CD-F1	6 Riffle	S	--	Rainbow trout	150	--	1
Silver Creek	Camino Dam	CD-F1	6 Riffle	S	--	Rainbow trout	175	--	1
Silver Creek	Camino Dam	CD-F1	6 Riffle	S	--	Rainbow trout	175	--	1
Silver Creek	Camino Dam	CD-F1	6 Riffle	S	--	Rainbow trout	50	--	1
Silver Creek	Camino Dam	CD-F1	6 Riffle	S	--	Rainbow trout	150	--	2

Stream	Reach	Site	Segment	Method	Pass	Species	Length	Weight	Count
Silver Creek	Camino Dam	CD-F1	6 Riffle	S	--	Rainbow trout	125	--	1
Silver Creek	Camino Dam	CD-F1	7 Pool	S	--	Rainbow trout	25	--	3
Silver Creek	Camino Dam	CD-F1	7 Pool	S	--	Rainbow trout	50	--	1
Silver Creek	Camino Dam	CD-F1	7 Pool	S	--	Rainbow trout	125	--	3
Silver Creek	Camino Dam	CD-F1	7 Pool	S	--	Rainbow trout	200	--	1
Silver Creek	Camino Dam	CD-F1	7 Pool	S	--	Rainbow trout	75	--	1
Silver Creek	Camino Dam	CD-F1	7 Pool	S	--	Rainbow trout	100	--	1
Silver Creek	Camino Dam	CD-F1	7 Pool	S	--	Rainbow trout	175	--	1
Brush Creek	Brush Creek Dam	BCD-F1	Lower	E	1	Rainbow trout	57	1.1	1
Brush Creek	Brush Creek Dam	BCD-F1	Lower	E	1	Rainbow trout	52	1.1	1
Brush Creek	Brush Creek Dam	BCD-F1	Lower	E	1	Rainbow trout	58	1.2	1
Brush Creek	Brush Creek Dam	BCD-F1	Lower	E	1	Rainbow trout	51	1.2	1
Brush Creek	Brush Creek Dam	BCD-F1	Lower	E	1	Rainbow trout	61	1.4	1
Brush Creek	Brush Creek Dam	BCD-F1	Lower	E	1	Brown trout	88	1.6	1
Brush Creek	Brush Creek Dam	BCD-F1	Lower	E	1	Rainbow trout	58	1.6	1
Brush Creek	Brush Creek Dam	BCD-F1	Lower	E	1	Rainbow trout	57	1.6	1
Brush Creek	Brush Creek Dam	BCD-F1	Lower	E	1	Rainbow trout	59	1.7	1
Brush Creek	Brush Creek Dam	BCD-F1	Lower	E	1	Rainbow trout	55	1.8	1
Brush Creek	Brush Creek Dam	BCD-F1	Lower	E	1	Rainbow trout	59	1.8	1
Brush Creek	Brush Creek Dam	BCD-F1	Lower	E	1	Rainbow trout	56	1.8	1
Brush Creek	Brush Creek Dam	BCD-F1	Lower	E	1	Rainbow trout	54	1.8	1

Stream	Reach	Site	Segment	Method	Pass	Species	Length	Weight	Count
Brush Creek	Brush Creek Dam	BCD-F1	Lower	E	1	Brown trout	61	1.9	1
Brush Creek	Brush Creek Dam	BCD-F1	Lower	E	1	Brown trout	59	1.9	1
Brush Creek	Brush Creek Dam	BCD-F1	Lower	E	1	Rainbow trout	58	1.9	1
Brush Creek	Brush Creek Dam	BCD-F1	Lower	E	1	Brown trout	63	2.0	1
Brush Creek	Brush Creek Dam	BCD-F1	Lower	E	1	Brown trout	59	2.0	1
Brush Creek	Brush Creek Dam	BCD-F1	Lower	E	1	Brown trout	66	2.1	1
Brush Creek	Brush Creek Dam	BCD-F1	Lower	E	1	Rainbow trout	62	2.1	1
Brush Creek	Brush Creek Dam	BCD-F1	Lower	E	1	Rainbow trout	61	2.1	1
Brush Creek	Brush Creek Dam	BCD-F1	Lower	E	1	Rainbow trout	59	2.1	1
Brush Creek	Brush Creek Dam	BCD-F1	Lower	E	1	Rainbow trout	63	2.2	1
Brush Creek	Brush Creek Dam	BCD-F1	Lower	E	1	Rainbow trout	67	2.2	1
Brush Creek	Brush Creek Dam	BCD-F1	Lower	E	1	Brown trout	64	2.4	1
Brush Creek	Brush Creek Dam	BCD-F1	Lower	E	1	Rainbow trout	67	2.4	1
Brush Creek	Brush Creek Dam	BCD-F1	Lower	E	1	Rainbow trout	66	2.6	1
Brush Creek	Brush Creek Dam	BCD-F1	Lower	E	1	Rainbow trout	66	2.6	1
Brush Creek	Brush Creek Dam	BCD-F1	Lower	E	1	Brown trout	70	2.9	1
Brush Creek	Brush Creek Dam	BCD-F1	Lower	E	1	Brown trout	78	3.7	1
Brush Creek	Brush Creek Dam	BCD-F1	Lower	E	1	Brown trout	70	3.9	1

Stream	Reach	Site	Segment	Method	Pass	Species	Length	Weight	Count
Brush Creek	Brush Creek Dam	BCD-F1	Lower	E	1	Brown trout	84	3.9	1
Brush Creek	Brush Creek Dam	BCD-F1	Lower	E	1	Brown trout	76	4.0	1
Brush Creek	Brush Creek Dam	BCD-F1	Lower	E	1	Brown trout	73	4.1	1
Brush Creek	Brush Creek Dam	BCD-F1	Lower	E	1	Brown trout	76	4.1	1
Brush Creek	Brush Creek Dam	BCD-F1	Lower	E	1	Rainbow trout	70	4.4	1
Brush Creek	Brush Creek Dam	BCD-F1	Lower	E	1	Brown trout	81	4.6	1
Brush Creek	Brush Creek Dam	BCD-F1	Lower	E	1	Rainbow trout	80	4.6	1
Brush Creek	Brush Creek Dam	BCD-F1	Lower	E	1	Brown trout	84	5.0	1
Brush Creek	Brush Creek Dam	BCD-F1	Lower	E	1	Brown trout	85	5.0	1
Brush Creek	Brush Creek Dam	BCD-F1	Lower	E	1	Rainbow trout	86	5.1	1
Brush Creek	Brush Creek Dam	BCD-F1	Lower	E	1	Brown trout	84	5.4	1
Brush Creek	Brush Creek Dam	BCD-F1	Lower	E	1	Brown trout	81	5.5	1
Brush Creek	Brush Creek Dam	BCD-F1	Lower	E	1	Brown trout	85	5.6	1
Brush Creek	Brush Creek Dam	BCD-F1	Lower	E	1	Brown trout	90	6.6	1
Brush Creek	Brush Creek Dam	BCD-F1	Lower	E	1	Rainbow trout	64	7.5	1
Brush Creek	Brush Creek Dam	BCD-F1	Lower	E	1	Rainbow trout	101	8.6	1
Brush Creek	Brush Creek Dam	BCD-F1	Lower	E	1	Rainbow trout	106	8.7	1
Brush Creek	Brush Creek Dam	BCD-F1	Lower	E	1	Brown trout	96	9.0	1

Stream	Reach	Site	Segment	Method	Pass	Species	Length	Weight	Count
Brush Creek	Brush Creek Dam	BCD-F1	Lower	E	1	Rainbow trout	109	9.6	1
Brush Creek	Brush Creek Dam	BCD-F1	Lower	E	1	Rainbow trout	105	10.0	1
Brush Creek	Brush Creek Dam	BCD-F1	Lower	E	1	Rainbow trout	111	10.7	1
Brush Creek	Brush Creek Dam	BCD-F1	Lower	E	1	Rainbow trout	116	12.1	1
Brush Creek	Brush Creek Dam	BCD-F1	Lower	E	1	Rainbow trout	112	12.3	1
Brush Creek	Brush Creek Dam	BCD-F1	Lower	E	1	Rainbow trout	129	14.5	1
Brush Creek	Brush Creek Dam	BCD-F1	Lower	E	1	Rainbow trout	124	15.4	1
Brush Creek	Brush Creek Dam	BCD-F1	Lower	E	1	Rainbow trout	127	16.1	1
Brush Creek	Brush Creek Dam	BCD-F1	Lower	E	1	Rainbow trout	137	23.9	1
Brush Creek	Brush Creek Dam	BCD-F1	Lower	E	1	Rainbow trout	144	28.7	1
Brush Creek	Brush Creek Dam	BCD-F1	Lower	E	1	Rainbow trout	153	29.8	1
Brush Creek	Brush Creek Dam	BCD-F1	Lower	E	1	Rainbow trout	150	31.5	1
Brush Creek	Brush Creek Dam	BCD-F1	Lower	E	1	Rainbow trout	155	32.5	1
Brush Creek	Brush Creek Dam	BCD-F1	Lower	E	1	Brown trout	151	33.0	1
Brush Creek	Brush Creek Dam	BCD-F1	Lower	E	1	Rainbow trout	171	35.6	1
Brush Creek	Brush Creek Dam	BCD-F1	Lower	E	2	Rainbow trout	50	1.1	1
Brush Creek	Brush Creek Dam	BCD-F1	Lower	E	2	Rainbow trout	51	1.2	1
Brush Creek	Brush Creek Dam	BCD-F1	Lower	E	2	Rainbow trout	53	1.2	1

Stream	Reach	Site	Segment	Method	Pass	Species	Length	Weight	Count
Brush Creek	Brush Creek Dam	BCD-F1	Lower	E	2	Rainbow trout	50	1.2	1
Brush Creek	Brush Creek Dam	BCD-F1	Lower	E	2	Rainbow trout	55	1.6	1
Brush Creek	Brush Creek Dam	BCD-F1	Lower	E	2	Rainbow trout	58	1.7	1
Brush Creek	Brush Creek Dam	BCD-F1	Lower	E	2	Rainbow trout	60	1.9	1
Brush Creek	Brush Creek Dam	BCD-F1	Lower	E	2	Rainbow trout	60	1.9	1
Brush Creek	Brush Creek Dam	BCD-F1	Lower	E	2	Rainbow trout	63	2.0	1
Brush Creek	Brush Creek Dam	BCD-F1	Lower	E	2	Rainbow trout	63	2.2	1
Brush Creek	Brush Creek Dam	BCD-F1	Lower	E	2	Rainbow trout	62	2.3	1
Brush Creek	Brush Creek Dam	BCD-F1	Lower	E	2	Rainbow trout	66	2.3	1
Brush Creek	Brush Creek Dam	BCD-F1	Lower	E	2	Rainbow trout	68	3.1	1
Brush Creek	Brush Creek Dam	BCD-F1	Lower	E	2	Brown trout	77	3.6	1
Brush Creek	Brush Creek Dam	BCD-F1	Lower	E	2	Brown trout	73	3.7	1
Brush Creek	Brush Creek Dam	BCD-F1	Lower	E	2	Brown trout	73	3.8	1
Brush Creek	Brush Creek Dam	BCD-F1	Lower	E	2	Brown trout	81	4.6	1
Brush Creek	Brush Creek Dam	BCD-F1	Lower	E	2	Brown trout	78	4.6	1
Brush Creek	Brush Creek Dam	BCD-F1	Lower	E	2	Brown trout	83	5.3	1
Brush Creek	Brush Creek Dam	BCD-F1	Lower	E	2	Brown trout	83	5.3	1
Brush Creek	Brush Creek Dam	BCD-F1	Lower	E	2	Brown trout	86	5.4	1

Stream	Reach	Site	Segment	Method	Pass	Species	Length	Weight	Count
Brush Creek	Brush Creek Dam	BCD-F1	Lower	E	2	Brown trout	92	7.3	1
Brush Creek	Brush Creek Dam	BCD-F1	Lower	E	2	Rainbow trout	107	9.5	1
Brush Creek	Brush Creek Dam	BCD-F1	Lower	E	2	Rainbow trout	124	15.2	1
Brush Creek	Brush Creek Dam	BCD-F1	Lower	E	2	Rainbow trout	124	16.9	1
Brush Creek	Brush Creek Dam	BCD-F1	Lower	E	3	Rainbow trout	56	1.6	1
Brush Creek	Brush Creek Dam	BCD-F1	Lower	E	3	Rainbow trout	56	1.7	1
Brush Creek	Brush Creek Dam	BCD-F1	Lower	E	3	Rainbow trout	60	1.9	1
Brush Creek	Brush Creek Dam	BCD-F1	Lower	E	3	Rainbow trout	62	2.0	1
Brush Creek	Brush Creek Dam	BCD-F1	Lower	E	3	Brown trout	86	5.0	1
Brush Creek	Brush Creek Dam	BCD-F1	Lower	E	3	Brown trout	94	7.0	1
Brush Creek	Brush Creek Dam	BCD-F1	Lower	E	3	Brown trout	92	7.5	1
Brush Creek	Brush Creek Dam	BCD-F1	Lower	E	3	Rainbow trout	103	12.0	1
Brush Creek	Brush Creek Dam	BCD-F1	Upper	E	1	Rainbow trout	50	1.0	1
Brush Creek	Brush Creek Dam	BCD-F1	Upper	E	1	Rainbow trout	51	1.2	1
Brush Creek	Brush Creek Dam	BCD-F1	Upper	E	1	Rainbow trout	50	1.2	1
Brush Creek	Brush Creek Dam	BCD-F1	Upper	E	1	Rainbow trout	53	1.3	1
Brush Creek	Brush Creek Dam	BCD-F1	Upper	E	1	Rainbow trout	58	1.4	1
Brush Creek	Brush Creek Dam	BCD-F1	Upper	E	1	Rainbow trout	57	1.6	1

Stream	Reach	Site	Segment	Method	Pass	Species	Length	Weight	Count
Brush Creek	Brush Creek Dam	BCD-F1	Upper	E	1	Rainbow trout	55	1.6	1
Brush Creek	Brush Creek Dam	BCD-F1	Upper	E	1	Rainbow trout	57	1.7	1
Brush Creek	Brush Creek Dam	BCD-F1	Upper	E	1	Rainbow trout	55	1.7	1
Brush Creek	Brush Creek Dam	BCD-F1	Upper	E	1	Rainbow trout	55	1.7	1
Brush Creek	Brush Creek Dam	BCD-F1	Upper	E	1	Rainbow trout	57	1.7	1
Brush Creek	Brush Creek Dam	BCD-F1	Upper	E	1	Rainbow trout	59	1.8	1
Brush Creek	Brush Creek Dam	BCD-F1	Upper	E	1	Rainbow trout	55	1.9	1
Brush Creek	Brush Creek Dam	BCD-F1	Upper	E	1	Rainbow trout	61	2.0	1
Brush Creek	Brush Creek Dam	BCD-F1	Upper	E	1	Rainbow trout	62	2.1	1
Brush Creek	Brush Creek Dam	BCD-F1	Upper	E	1	Rainbow trout	59	2.1	1
Brush Creek	Brush Creek Dam	BCD-F1	Upper	E	1	Rainbow trout	60	2.2	1
Brush Creek	Brush Creek Dam	BCD-F1	Upper	E	1	Rainbow trout	64	2.3	1
Brush Creek	Brush Creek Dam	BCD-F1	Upper	E	1	Rainbow trout	60	2.4	1
Brush Creek	Brush Creek Dam	BCD-F1	Upper	E	1	Brown trout	64	2.5	1
Brush Creek	Brush Creek Dam	BCD-F1	Upper	E	1	Rainbow trout	62	2.5	1
Brush Creek	Brush Creek Dam	BCD-F1	Upper	E	1	Brown trout	68	2.7	1
Brush Creek	Brush Creek Dam	BCD-F1	Upper	E	1	Rainbow trout	67	2.8	1
Brush Creek	Brush Creek Dam	BCD-F1	Upper	E	1	Rainbow trout	70	2.9	1

Stream	Reach	Site	Segment	Method	Pass	Species	Length	Weight	Count
Brush Creek	Brush Creek Dam	BCD-F1	Upper	E	1	Rainbow trout	69	3.0	1
Brush Creek	Brush Creek Dam	BCD-F1	Upper	E	1	Brown trout	72	3.4	1
Brush Creek	Brush Creek Dam	BCD-F1	Upper	E	1	Brown trout	71	3.4	1
Brush Creek	Brush Creek Dam	BCD-F1	Upper	E	1	Brown trout	72	3.6	1
Brush Creek	Brush Creek Dam	BCD-F1	Upper	E	1	Brown trout	75	3.7	1
Brush Creek	Brush Creek Dam	BCD-F1	Upper	E	1	Brown trout	76	3.8	1
Brush Creek	Brush Creek Dam	BCD-F1	Upper	E	1	Brown trout	75	3.8	1
Brush Creek	Brush Creek Dam	BCD-F1	Upper	E	1	Brown trout	74	3.9	1
Brush Creek	Brush Creek Dam	BCD-F1	Upper	E	1	Rainbow trout	73	3.9	1
Brush Creek	Brush Creek Dam	BCD-F1	Upper	E	1	Brown trout	76	4.0	1
Brush Creek	Brush Creek Dam	BCD-F1	Upper	E	1	Brown trout	79	4.1	1
Brush Creek	Brush Creek Dam	BCD-F1	Upper	E	1	Brown trout	80	4.2	1
Brush Creek	Brush Creek Dam	BCD-F1	Upper	E	1	Brown trout	78	4.3	1
Brush Creek	Brush Creek Dam	BCD-F1	Upper	E	1	Brown trout	77	4.5	1
Brush Creek	Brush Creek Dam	BCD-F1	Upper	E	1	Brown trout	79	4.5	1
Brush Creek	Brush Creek Dam	BCD-F1	Upper	E	1	Brown trout	81	4.9	1
Brush Creek	Brush Creek Dam	BCD-F1	Upper	E	1	Brown trout	80	5.0	1
Brush Creek	Brush Creek Dam	BCD-F1	Upper	E	1	Brown trout	82	5.2	1

Stream	Reach	Site	Segment	Method	Pass	Species	Length	Weight	Count
Brush Creek	Brush Creek Dam	BCD-F1	Upper	E	1	Brown trout	84	5.3	1
Brush Creek	Brush Creek Dam	BCD-F1	Upper	E	1	Brown trout	85	5.5	1
Brush Creek	Brush Creek Dam	BCD-F1	Upper	E	1	Brown trout	84	5.5	1
Brush Creek	Brush Creek Dam	BCD-F1	Upper	E	1	Brown trout	87	5.6	1
Brush Creek	Brush Creek Dam	BCD-F1	Upper	E	1	Brown trout	86	5.8	1
Brush Creek	Brush Creek Dam	BCD-F1	Upper	E	1	Brown trout	87	5.8	1
Brush Creek	Brush Creek Dam	BCD-F1	Upper	E	1	Rainbow trout	95	6.6	1
Brush Creek	Brush Creek Dam	BCD-F1	Upper	E	1	Rainbow trout	103	8.1	1
Brush Creek	Brush Creek Dam	BCD-F1	Upper	E	1	Rainbow trout	100	9.1	1
Brush Creek	Brush Creek Dam	BCD-F1	Upper	E	1	Rainbow trout	106	9.4	1
Brush Creek	Brush Creek Dam	BCD-F1	Upper	E	1	Rainbow trout	104	10.0	1
Brush Creek	Brush Creek Dam	BCD-F1	Upper	E	1	Rainbow trout	106	10.4	1
Brush Creek	Brush Creek Dam	BCD-F1	Upper	E	1	Rainbow trout	112	10.8	1
Brush Creek	Brush Creek Dam	BCD-F1	Upper	E	1	Rainbow trout	108	11.0	1
Brush Creek	Brush Creek Dam	BCD-F1	Upper	E	1	Rainbow trout	114	11.5	1
Brush Creek	Brush Creek Dam	BCD-F1	Upper	E	1	Rainbow trout	116	12.9	1
Brush Creek	Brush Creek Dam	BCD-F1	Upper	E	1	Rainbow trout	119	13.9	1
Brush Creek	Brush Creek Dam	BCD-F1	Upper	E	1	Rainbow trout	124	14.9	1

Stream	Reach	Site	Segment	Method	Pass	Species	Length	Weight	Count
Brush Creek	Brush Creek Dam	BCD-F1	Upper	E	1	Rainbow trout	130	16.9	1
Brush Creek	Brush Creek Dam	BCD-F1	Upper	E	1	Rainbow trout	128	17.0	1
Brush Creek	Brush Creek Dam	BCD-F1	Upper	E	1	Rainbow trout	136	17.7	1
Brush Creek	Brush Creek Dam	BCD-F1	Upper	E	1	Rainbow trout	131	17.8	1
Brush Creek	Brush Creek Dam	BCD-F1	Upper	E	1	Rainbow trout	128	17.8	1
Brush Creek	Brush Creek Dam	BCD-F1	Upper	E	1	Rainbow trout	129	18.6	1
Brush Creek	Brush Creek Dam	BCD-F1	Upper	E	1	Rainbow trout	142	23.5	1
Brush Creek	Brush Creek Dam	BCD-F1	Upper	E	1	Rainbow trout	155	28.1	1
Brush Creek	Brush Creek Dam	BCD-F1	Upper	E	1	Rainbow trout	149	29.6	1
Brush Creek	Brush Creek Dam	BCD-F1	Upper	E	1	Rainbow trout	154	29.7	1
Brush Creek	Brush Creek Dam	BCD-F1	Upper	E	1	Rainbow trout	163	35.3	1
Brush Creek	Brush Creek Dam	BCD-F1	Upper	E	1	Rainbow trout	172	44.4	1
Brush Creek	Brush Creek Dam	BCD-F1	Upper	E	1	Rainbow trout	180	47.3	1
Brush Creek	Brush Creek Dam	BCD-F1	Upper	E	1	Rainbow trout	219	86.4	1
Brush Creek	Brush Creek Dam	BCD-F1	Upper	E	2	Rainbow trout	51	1.3	1
Brush Creek	Brush Creek Dam	BCD-F1	Upper	E	2	Rainbow trout	56	1.4	1
Brush Creek	Brush Creek Dam	BCD-F1	Upper	E	2	Rainbow trout	56	1.8	1
Brush Creek	Brush Creek Dam	BCD-F1	Upper	E	2	Rainbow trout	60	2.1	1

Stream	Reach	Site	Segment	Method	Pass	Species	Length	Weight	Count
Brush Creek	Brush Creek Dam	BCD-F1	Upper	E	2	Rainbow trout	64	2.7	1
Brush Creek	Brush Creek Dam	BCD-F1	Upper	E	2	Brown trout	67	3.4	1
Brush Creek	Brush Creek Dam	BCD-F1	Upper	E	2	Brown trout	74	3.9	1
Brush Creek	Brush Creek Dam	BCD-F1	Upper	E	2	Brown trout	79	4.3	1
Brush Creek	Brush Creek Dam	BCD-F1	Upper	E	2	Brown trout	82	5.0	1
Brush Creek	Brush Creek Dam	BCD-F1	Upper	E	2	Brown trout	88	5.2	1
Brush Creek	Brush Creek Dam	BCD-F1	Upper	E	2	Rainbow trout	102	9.8	1
Brush Creek	Brush Creek Dam	BCD-F1	Upper	E	2	Rainbow trout	108	10.7	1
Brush Creek	Brush Creek Dam	BCD-F1	Upper	E	2	Rainbow trout	109	11.8	1
Brush Creek	Brush Creek Dam	BCD-F1	Upper	E	2	Rainbow trout	115	12.5	1
Brush Creek	Brush Creek Dam	BCD-F1	Upper	E	2	Rainbow trout	115	13.1	1
Brush Creek	Brush Creek Dam	BCD-F1	Upper	E	2	Rainbow trout	127	16.2	1
Brush Creek	Brush Creek Dam	BCD-F1	Upper	E	3	Rainbow trout	55	1.2	1
Brush Creek	Brush Creek Dam	BCD-F1	Upper	E	3	Rainbow trout	54	1.3	1
Brush Creek	Brush Creek Dam	BCD-F1	Upper	E	3	Rainbow trout	53	1.3	1
Brush Creek	Brush Creek Dam	BCD-F1	Upper	E	3	Rainbow trout	67	1.6	1
Brush Creek	Brush Creek Dam	BCD-F1	Upper	E	3	Brown trout	68	2.4	1
Brush Creek	Brush Creek Dam	BCD-F1	Upper	E	3	Brown trout	66	2.6	1

Stream	Reach	Site	Segment	Method	Pass	Species	Length	Weight	Count
Brush Creek	Brush Creek Dam	BCD-F1	Upper	E	3	Brown trout	71	2.7	1
Brush Creek	Brush Creek Dam	BCD-F1	Upper	E	3	Brown trout	76	3.9	1
Brush Creek	Brush Creek Dam	BCD-F1	Upper	E	3	Brown trout	82	5.3	1
S.F. American River	Slab Creek Dam	SCD-F3	1 POW	S	--	Brown trout	275	--	1
S.F. American River	Slab Creek Dam	SCD-F3	1 POW	S	--	Rainbow trout	50	--	2
S.F. American River	Slab Creek Dam	SCD-F3	1 POW	S	--	Rainbow trout	75	--	1
S.F. American River	Slab Creek Dam	SCD-F3	1 POW	S	--	Rainbow trout	75	--	4
S.F. American River	Slab Creek Dam	SCD-F3	1 POW	S	--	Rainbow trout	100	--	1
S.F. American River	Slab Creek Dam	SCD-F3	1 POW	S	--	Rainbow trout	100	--	1
S.F. American River	Slab Creek Dam	SCD-F3	1 POW	S	--	Rainbow trout	125	--	1
S.F. American River	Slab Creek Dam	SCD-F3	1 POW	S	--	Rainbow trout	175	--	2
S.F. American River	Slab Creek Dam	SCD-F3	1 POW	S	--	Rainbow trout	200	--	3
S.F. American River	Slab Creek Dam	SCD-F3	1 POW	S	--	Rainbow trout	200	--	6

Stream	Reach	Site	Segment	Method	Pass	Species	Length	Weight	Count
S.F. American River	Slab Creek Dam	SCD-F3	1 POW	S	--	Rainbow trout	225	--	5
S.F. American River	Slab Creek Dam	SCD-F3	1 POW	S	--	Rainbow trout	250	--	1
S.F. American River	Slab Creek Dam	SCD-F3	1 POW	S	--	Rainbow trout	250	--	4
S.F. American River	Slab Creek Dam	SCD-F3	1 POW	S	--	Rainbow trout	275	--	3
S.F. American River	Slab Creek Dam	SCD-F3	2 Pool	S	--	Sacramento pikeminnow	0	--	1
S.F. American River	Slab Creek Dam	SCD-F3	2 Pool	S	--	Sacramento pikeminnow	0	--	1
S.F. American River	Slab Creek Dam	SCD-F3	2 Pool	S	--	Rainbow trout	175	--	2
S.F. American River	Slab Creek Dam	SCD-F3	2 Pool	S	--	Rainbow trout	200	--	1
S.F. American River	Slab Creek Dam	SCD-F3	2 Pool	S	--	Rainbow trout	225	--	2
S.F. American River	Slab Creek Dam	SCD-F3	2 Pool	S	--	Rainbow trout	250	--	3
S.F. American River	Slab Creek Dam	SCD-F3	2 Pool	S	--	Rainbow trout	275	--	2
S.F. American River	Slab Creek Dam	SCD-F3	3 Riffle	S	--	Rainbow trout	25	--	1

Stream	Reach	Site	Segment	Method	Pass	Species	Length	Weight	Count
S.F. American River	Slab Creek Dam	SCD-F3	3 Riffle	S	--	Rainbow trout	50	--	1
S.F. American River	Slab Creek Dam	SCD-F3	3 Riffle	S	--	Rainbow trout	175	--	1
S.F. American River	Slab Creek Dam	SCD-F3	3 Riffle	S	--	Rainbow trout	200	--	3
S.F. American River	Slab Creek Dam	SCD-F3	3 Riffle	S	--	Rainbow trout	225	--	2
S.F. American River	Slab Creek Dam	SCD-F3	3 Riffle	S	--	Rainbow trout	250	--	2
S.F. American River	Slab Creek Dam	SCD-F3	3 Riffle	S	--	Rainbow trout	275	--	1
S.F. American River	Slab Creek Dam	SCD-F3	4 Run	S	--	Rainbow trout	100	--	1
S.F. American River	Slab Creek Dam	SCD-F3	4 Run	S	--	Rainbow trout	100	--	1
S.F. American River	Slab Creek Dam	SCD-F3	4 Run	S	--	Rainbow trout	150	--	1
S.F. American River	Slab Creek Dam	SCD-F3	4 Run	S	--	Rainbow trout	150	--	5
S.F. American River	Slab Creek Dam	SCD-F3	4 Run	S	--	Rainbow trout	175	--	4
S.F. American River	Slab Creek Dam	SCD-F3	4 Run	S	--	Brown trout	275	--	1

Stream	Reach	Site	Segment	Method	Pass	Species	Length	Weight	Count
S.F. American River	Slab Creek Dam	SCD-F3	4 Run	S	--	Rainbow trout	200	--	1
S.F. American River	Slab Creek Dam	SCD-F3	4 Run	S	--	Rainbow trout	250	--	1
S.F. American River	Slab Creek Dam	BID-F1	Upper	E	--	California roach	81	6.9	
S.F. American River	Slab Creek Dam	SCD-F3	--	SE	--	Rainbow trout	52	1.4	1
S.F. American River	Slab Creek Dam	SCD-F3	--	SE	--	Rainbow trout	56	1.6	1
S.F. American River	Slab Creek Dam	SCD-F3	--	SE	--	Rainbow trout	59	1.9	1
S.F. American River	Slab Creek Dam	SCD-F3	--	SE	--	Rainbow trout	60	1.8	1
S.F. American River	Slab Creek Dam	SCD-F3	--	SE	--	Rainbow trout	68	2.6	1
S.F. American River	Slab Creek Dam	SCD-F3	--	SE	--	Rainbow trout	70	2.9	1
S.F. American River	Slab Creek Dam	SCD-F3	--	SE	--	Rainbow trout	71	2.4	1
S.F. American River	Slab Creek Dam	SCD-F3	--	SE	--	Rainbow trout	76	3.7	1
S.F. American River	Slab Creek Dam	SCD-F3	--	SE	--	Rainbow trout	79	5.0	1

Stream	Reach	Site	Segment	Method	Pass	Species	Length	Weight	Count
S.F. American River	Slab Creek Dam	SCD-F3	--	SE	--	Sacramento sucker	36	0.3	1
S.F. American River	Slab Creek Dam	SCD-F3	--	SE	--	Sacramento sucker	37	0.4	1
S.F. American River	Slab Creek Dam	SCD-F3	--	SE	--	Sacramento sucker	38	0.5	1
S.F. American River	Slab Creek Dam	SCD-F3	--	SE	--	Sacramento sucker	49	1.2	1
S.F. American River	Slab Creek Dam	SCD-F3	--	SE	--	Sacramento sucker	52	1.3	1
S.F. American River	Slab Creek Dam	SCD-F3	--	SE	--	Sacramento sucker	49	1.4	1
S.F. American River	Slab Creek Dam	SCD-F3	--	SE	--	Sacramento sucker	52	1.5	1
S.F. American River	Slab Creek Dam	SCD-F3	--	SE	--	Sacramento sucker	52	1.5	1
S.F. American River	Slab Creek Dam	SCD-F3	--	SE	--	Sacramento sucker	50	1.5	1
S.F. American River	Slab Creek Dam	SCD-F3	--	SE	--	Sacramento sucker	53	1.7	1
S.F. American River	Slab Creek Dam	SCD-F3	--	SE	--	Sacramento sucker	58	1.9	1
S.F. American River	Slab Creek Dam	SCD-F3	--	SE	--	Sacramento sucker	56	2.0	1

Stream	Reach	Site	Segment	Method	Pass	Species	Length	Weight	Count
S.F. American River	Slab Creek Dam	SCD-F3	--	SE	--	Speckled dace	61	2.6	1
S.F. American River	Slab Creek Dam	SCD-F2	1 Pool	S	--	Rainbow trout	150	--	1
S.F. American River	Slab Creek Dam	SCD-F2	2 Run	S	--	Sacramento pikeminnow	0	--	16
S.F. American River	Slab Creek Dam	SCD-F2	2 Run	S	--	Sacramento pikeminnow	25	--	6
S.F. American River	Slab Creek Dam	SCD-F2	2 Run	S	--	Rainbow trout	125	--	3
S.F. American River	Slab Creek Dam	SCD-F2	2 Run	S	--	Rainbow trout	150	--	1
S.F. American River	Slab Creek Dam	SCD-F2	2 Run	S	--	Sculpin	50	--	1
S.F. American River	Slab Creek Dam	SCD-F2	2 Run	S	--	Sacramento sucker	275	--	1
S.F. American River	Slab Creek Dam	SCD-F2	2 Run	S	--	Sacramento sucker	300	--	1
S.F. American River	Slab Creek Dam	SCD-F2	2 Run	S	--	Rainbow trout	175	--	1
S.F. American River	Slab Creek Dam	SCD-F2	2 Run	S	--	Rainbow trout	250	--	3
S.F. American River	Slab Creek Dam	SCD-F2	2 Run	S	--	Rainbow trout	275	--	2

Stream	Reach	Site	Segment	Method	Pass	Species	Length	Weight	Count
S.F. American River	Slab Creek Dam	SCD-F2	2 Run	S	--	Rainbow trout	300	--	1
S.F. American River	Slab Creek Dam	SCD-F2	2 Run	S	--	Rainbow trout	350	--	1
S.F. American River	Slab Creek Dam	SCD-F2	3 Run	S	--	Rainbow trout	75	--	1
S.F. American River	Slab Creek Dam	SCD-F2	3 Run	S	--	Rainbow trout	100	--	1
S.F. American River	Slab Creek Dam	SCD-F2	3 Run	S	--	Rainbow trout	100	--	1
S.F. American River	Slab Creek Dam	SCD-F2	3 Run	S	--	Sacramento pikeminnow	75	--	1
S.F. American River	Slab Creek Dam	SCD-F2	3 Run	S	--	Sacramento pikeminnow	175	--	1
S.F. American River	Slab Creek Dam	SCD-F2	3 Run	S	--	Rainbow trout	175	--	3
S.F. American River	Slab Creek Dam	SCD-F2	3 Run	S	--	Rainbow trout	175	--	1
S.F. American River	Slab Creek Dam	SCD-F2	3 Run	S	--	Rainbow trout	200	--	1
S.F. American River	Slab Creek Dam	SCD-F2	3 Run	S	--	Rainbow trout	200	--	2
S.F. American River	Slab Creek Dam	SCD-F2	3 Run	S	--	Sculpin	0	--	1

Stream	Reach	Site	Segment	Method	Pass	Species	Length	Weight	Count
S.F. American River	Slab Creek Dam	SCD-F2	3 Run	S	--	Rainbow trout	200	--	1
S.F. American River	Slab Creek Dam	SCD-F2	3 Run	S	--	Rainbow trout	275	--	1
S.F. American River	Slab Creek Dam	SCD-F2	4 Riffle	S	--	Rainbow trout	50	--	3
S.F. American River	Slab Creek Dam	SCD-F2	4 Riffle	S	--	Rainbow trout	100	--	1
S.F. American River	Slab Creek Dam	SCD-F2	4 Riffle	S	--	Rainbow trout	150	--	1
S.F. American River	Slab Creek Dam	SCD-F2	4 Riffle	S	--	Rainbow trout	150	--	1
S.F. American River	Slab Creek Dam	SCD-F2	4 Riffle	S	--	Rainbow trout	175	--	2
S.F. American River	Slab Creek Dam	SCD-F2	4 Riffle	S	--	Rainbow trout	200	--	1
S.F. American River	Slab Creek Dam	SCD-F2	4 Riffle	S	--	Rainbow trout	250	--	5
S.F. American River	Slab Creek Dam	SCD-F2	4 Riffle	S	--	Rainbow trout	275	--	1
S.F. American River	Slab Creek Dam	SCD-F2	4 Riffle	S	--	Rainbow trout	275	--	2
S.F. American River	Slab Creek Dam	SCD-F2	5 Pool	S	--	Rainbow trout	175	--	3

Stream	Reach	Site	Segment	Method	Pass	Species	Length	Weight	Count
S.F. American River	Slab Creek Dam	SCD-F2	5 Pool	S	--	Rainbow trout	225	--	5
S.F. American River	Slab Creek Dam	SCD-F2	5 Pool	S	--	Rainbow trout	275	--	2
S.F. American River	Slab Creek Dam	SCD-F2	--	SE	--	Sacramento pikeminnow	25	0.1	1
S.F. American River	Slab Creek Dam	SCD-F2	--	SE	--	Sacramento pikeminnow	30	0.1	1
S.F. American River	Slab Creek Dam	SCD-F2	--	SE	--	Sacramento pikeminnow	36	0.3	1
S.F. American River	Slab Creek Dam	SCD-F2	--	SE	--	Sacramento pikeminnow	37	0.4	1
S.F. American River	Slab Creek Dam	SCD-F2	--	SE	--	Sacramento sucker	40	0.6	1
S.F. American River	Slab Creek Dam	SCD-F2	--	SE	--	Sacramento pikeminnow	46	0.8	1
S.F. American River	Slab Creek Dam	SCD-F2	--	SE	--	Sculpin	39	0.8	1
S.F. American River	Slab Creek Dam	SCD-F2	--	SE	--	Sacramento sucker	42	0.8	1
S.F. American River	Slab Creek Dam	SCD-F2	--	SE	--	Sacramento sucker	51	2.0	1
S.F. American River	Slab Creek Dam	SCD-F2	--	SE	--	Sculpin	59	2.1	1

Stream	Reach	Site	Segment	Method	Pass	Species	Length	Weight	Count
S.F. American River	Slab Creek Dam	SCD-F2	--	SE	--	Sacramento sucker	58	2.1	1
S.F. American River	Slab Creek Dam	SCD-F2	--	SE	--	Sculpin	64	2.6	1
S.F. American River	Slab Creek Dam	SCD-F2	--	SE	--	Sculpin	66	2.8	1
S.F. American River	Slab Creek Dam	SCD-F2	--	SE	--	Sacramento sucker	65	2.8	1
S.F. American River	Slab Creek Dam	SCD-F2	--	SE	--	Sacramento sucker	69	3.1	1
S.F. American River	Slab Creek Dam	SCD-F2	--	SE	--	Sculpin	71	3.5	1
S.F. American River	Slab Creek Dam	SCD-F2	--	SE	--	Sculpin	70	3.7	1
S.F. American River	Slab Creek Dam	SCD-F2	--	SE	--	Sculpin	70	4.0	1
S.F. American River	Slab Creek Dam	SCD-F2	--	SE	--	Sculpin	73	4.6	1
S.F. American River	Slab Creek Dam	SCD-F2	--	SE	--	Sculpin	99	10.9	1
S.F. American River	Slab Creek Dam	SCD-F2	--	SE	--	Sculpin	102	12.2	1

APPENDIX B2

Fish Population Data

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Table B2-1. Fish Population Data, 2002–2020, for Site RRD-F1, Rubicon River, Rubicon Dam Reach.

Stream and Reach	Site	Section	Year	Site Length (ft)	Avg. Width (ft)	Avg. Area (ft^2)	Species	Total Number Captured	Removal Pattern	Number of Fish / Mile	Catchable Trout / Mile (>152 mm)	Estimated Density, Zippin Method: No. of Fish / Acre	Estimated Density, Zippin Method: 95 Percent Confidence Interval (No. of fish/acre)		Captured Biomass (g)	Estimated Biomass: g/acre	Estimated Biomass: lbs/acre	Estimated Biomass: 95 Percent Confidence Interval (lbs/acre)	
Rubicon River, Rubicon Dam	RRD-F1	Combined	2020	289	29	8,381	Trout (brown & rainbow)	108	76-21-11	2,054	73	588	556	619	778.9	4,218.4	9.3	8.8	9.8
		Upper		164	30	4,920	Trout (brown & rainbow)	57	46-7-4	1,859	97	503	486	521	498.0	4,399.9	9.7	9.4	10.0
		Lower		126	27	3,402	Trout (brown & rainbow)	51	30-14-7	2,411	46	731	608	854	280.9	4,037.0	8.9	7.4	10.4
		Combined	2019	287	34	9,758	Trout (brown & rainbow)	20	16-3-1	372	37	89	85	94	339.8	1,519.5	3.4	3.2	3.5
		Upper		161	39	6,241	Trout (brown & rainbow)	2	1-1-0	72	0	15	5	25	52.7	399.2	0.9	0.3	1.5
		Lower		126	30	3,762	Trout (brown & rainbow)	18	15-2-1	758	84	210	200	220	287.1	3,347.5	7.4	7.0	7.7
		Combined	2005	314	28	8,792	Trout (brown & rainbow)	61	37-16-8	1,098	69	329	284	374	983.3	5,307.0	11.7	10.1	13.2
		Upper		175	29	5,075	Trout (brown & rainbow)	36	22-10-4	1,183	91	337	284	389	644.7	6,029.0	13.3	11.2	15.4
		Lower		149	26	3,874	Trout (brown & rainbow)	25	15-6-4	1,003	35	317	237	398	338.6	4,291.1	9.5	7.1	11.9
		Combined	2003	302	56	16,944	Trout (brown & rainbow)	65	50-12-3	1,155	337	309	298	319	1,670.6	7,937.9	17.5	16.9	18.1
		Upper		158	31	4,862	Trout (brown & rainbow)	41	33-7-1	1,385	469	370	359	381	1,225.9	11,054.0	24.4	23.7	25.1
		Lower		144	25	3,646	Trout (brown & rainbow)	24	17-5-2	911	183	297	267	327	444.7	5,497.5	12.1	10.9	13.4
		Combined	2002	299	28	8,372	Trout (brown & rainbow)	100	75-20-5	1,798	265	522	505	539	1,819.9	9,480.0	20.9	20.3	21.6
		Upper		149	28	4,109	Trout (brown & rainbow)	56	42-11-3	2,022	496	605	578	631	1,458.2	15,730.6	34.7	33.2	36.2
		Lower		150	29	4,403	Trout (brown & rainbow)	44	33-9-2	1,576	35	443	422	464	361.7	3,637.8	8.0	7.6	8.4

ft = feet
g = grams
lbs = pounds
mm = millimeters

Table B2-2. Fish Population Data, 2002–2020, for Site RRD-F2, Rubicon River, Rubicon Dam Reach.

Stream and Reach	Site	Section	Year	Site Length (ft)	Avg. Width (ft)	Avg. Area (ft^2)	Species	Total Number Captured	Removal Pattern	Number of Fish / Mile	Catchable Trout / Mile (>152 mm)	Estimated Density, Zippin Method: No. of Fish / Acre	Estimated Density, Zippin Method: 95 Percent Confidence Interval (No. of fish/acre)		Captured Biomass (g)	Estimated Biomass: g/acre	Estimated Biomass: lbs/acre	Estimated Biomass: 95 Percent Confidence Interval (lbs/acre)	
Rubicon River, Rubicon Dam	RRD-F2	Combined	2020	246	24	5,904	Trout (rainbow)	44	29-9-6	1,016	0	357	312	402	106.1	861.8	1.9	1.7	2.1
							California roach	102	44-37-21	-	-	-	-	-	-	-	-	-	-
							Speckled dace	108	50-34-24	-	-	-	-	-	-	-	-	-	-
		Combined	2019	250	28	6,908	Trout (rainbow)	1	0-0-1	21	0	6	[a]	[a]	19.6	122.5	0.3	[a]	[a]
							California roach	56	17-5-34	-	-	-	-	-	-	-	-	-	-
							Speckled dace	38	10-3-25	-	-	-	-	-	-	-	-	-	-
		Combined	2005	289	18	5,202	Trout (brown & rainbow)	47	34-9-4	886	73	411	384	438	477.3	4,173.1	9.2	8.6	9.8
		Upper		166	24	3,984	Trout (brown & rainbow)	33	23-6-4	1,104	127	385	342	428	422.4	4,930.6	10.9	9.7	12.1
							Brook trout	1	1-0-0	-	-	-	-	-	-	-	-	-	-
							California roach	61	45-11-5	-	-	-	-	-	-	-	-	-	-
							Speckled dace	56	27-14-15	-	-	-	-	-	-	-	-	-	-
		Lower		123	12	1,548	Trout (brown & rainbow)	14	11-3-0	606	0	418	397	438	54.9	1,637.5	3.6	3.4	3.8
							Brook trout	1	1-0-0	-	-	-	-	-	-	-	-	-	-
							California roach	2	2-0-0	-	-	-	-	-	-	-	-	-	-
							Speckled dace	44	29-12-2	-	-	-	-	-	-	-	-	-	-
		Combined	2003	293	20	5,716	Trout (brown & rainbow)	102	73-22-4	1,896	18	802	767	837	339.7	2,676.2	5.9	5.6	6.1
		Upper		164	24	3,944	Trout (brown & rainbow)	37	21-12-4	1,334	32	456	370	543	149.5	1,841.6	4.1	3.3	4.8
							California roach	199	96-67-36	-	-	-	-		-	-	-	-	-

Stream and Reach	Site	Section	Year	Site Length (ft)	Avg. Width (ft)	Avg. Area (ft^2)	Species	Total Number Captured	Removal Pattern	Number of Fish / Mile	Catchable Trout / Mile (>152 mm)	Estimated Density, Zippin Method			Captured Biomass (g)	Estimated Biomass			
												No. of Fish / Acre	95 Percent Confidence Interval (No. of fish/acre)			g/acre	lbs/acre	95 Percent Confidence Interval (lbs/acre)	
Rubicon River, Rubicon Dam	RRD-F2	Upper	2003	164	24	3,944	Speckled dace	163	89-47-27	-	-	-			-	-	-	-	-
		Lower		129	15	1,922	Trout (brown & rainbow)	48	35-10-3	2,013	0	1115	1052	1178	125.7	2,916.6	6.4	6.1	6.8
							California roach	36	101-20-9	-	-	-	-	-	-	-	-	-	-
							Speckled dace	45	1-0-0	-	-	-	-	-	-	-	-	-	-
		Combined	2002	300	19	5,799	Trout (brown & rainbow)	15	15-0-0	264	35	112	a	a	347.9	2,540.1	5.6	a	a
		Upper		172	22	3,772	Brown trout	8	8-0-0	246	61	92	a	a	326.9	3,773.9	8.3	a	a
							Hitch	291	188-56-47	-	-	-	-	-	-	-	-	-	-
							Speckled dace	350	209-99-42	-	-	-	-	-	-	-	-	-	-
							Sacramento sucker	16	11-0-5	-	-	-	-	-	-	-	-	-	-
		Lower		128	17	2,143	Trout (brown & rainbow)	7	7-0-0	289	0	142	a	a	21.0	426.4	0.9	a	a
							Hitch	54	37-13-4	-	-	-	-	-	-	-	-	-	-
							Sacramento sucker	1	1-0-0	-	-	-	-	-	-	-	-	-	-
							Speckled dace	130	101-20-9	-	-	-	-	-	-	-	-	-	-

ft = feet
g = grams
lbs = pounds
mm = millimeters
[a] Confidence interval could not be calculated due to low capture number on one or more passes.
[b] Calculated using weighted average.

Table B2-3. Fish Population Data, 2002–2020, for Site BID-F1, Little Rubicon River, Buck Island Dam Reach.

Stream and Reach	Site	Section	Year	Site Length (ft)	Avg. Width (ft)	Avg. Area (ft^2)	Species	Total Number Captured	Removal Pattern	Number of Fish / Mile	Catchable Trout / Mile (>152 mm)	Estimated Density, Zippin Method: No. of Fish / Acre	Estimated Density, Zippin Method: 95 Percent Confidence Interval (No. of fish/acre)		Captured Biomass (g)	Estimated Biomass: g/acre	Estimated Biomass: lbs/acre	Estimated Biomass: 95 Percent Confidence Interval (lbs/acre)	
Little Rubicon, Buck Island Dam	BID-F1	Upper	2020	104	26	2,704	California roach	79	-	-	-	-	-	-	-	-	-	-	-
							Golden shiner	11	-	-	-	-	-	-	-	-	-	-	-
							Sacramento sucker	1	-	-	-	-	-	-	-	-	-	-	-
		Combined	2019	349	27	9,465	Trout (rainbow and brown)	0	0-0-0	0	0	0	0	0	0	0	0	0	0
		Upper		123	43	5,234	California roach	6	4-2-0	-	-	-	-	-	-	-	-	-	-
		Lower		226	12	2,640	California roach	10	6-4-0	-	-	-	-	-	-	-	-	-	-
							Golden shiner	16	10-5-1	-	-	-	-	-	-	-	-	-	-
							Sacramento sucker	1	1-0-0	-	-	-	-	-	-	-	-	-	-
		Combined	2003	352	26	9,152	Rainbow trout	1	[c]	[c]	15 [b]	6 [b]	[c]	[c]	59.4	331.1 [b]	0.7 [b]	[c]	[c]
		Upper		123	38	4,705	Trout (rainbow and brown)	0	0-0-0-0	0	0	0	0	0	0	0	0	0	0
							California roach	5	2-2-0-1	-	-	-	--	--	-	-	-	-	-
							Golden shiner	71	39-11-13-8	-	-	-	--	--	-	-	-	-	-
		Lower		229	13	3,023	Rainbow trout	1	1-0-0	23	23	14	[a]	[a]	59.4	857.3	1.9	[a]	[a]
							California roach	4	2-2-0	-	-	-	--	--	-	-	-	-	-
							Golden shiner	42	30-7-5	-	-	-	--	--	-	-	-	-	-
		Combined	2002	383	27	10,341	Rainbow trout	4	[c]	[c]	[c]	19 [b]	[c]	[c]	108.3	499.0 [b]	1.1 [b]	[c]	[c]
		Upper		152	41	6,232	Trout (rainbow and brown)	0	0-0-0-0	0	0	0	0	0	0	0	0	0	0
							Golden shiner	5	1-1-1-2	-	-	-	-	-	-	-	-	-	-
		Lower		231	13	3,087	Rainbow trout	4	3-1-0	92	23	57	50	64	108.3	1542.2	3.4	3.0	3.8
		Lower					Golden shiner	7	4-2-1	-	-	-	--		-	-	-	-	-

ft = feet, g = grams, lbs = pounds, mm = millimeters
[a] Confidence interval could not be calculated due to low capture number on one or more passes.
[b] Calculated using weighted average.
[c] Not calculated due to an unequal number of passes.

Table B2-4. Fish Population Data, 2019–2020, for Site LLD-F3, Gerle Creek, Loon Lake Dam Reach.

Stream and Reach	Site	Section	Year	Site Length (ft)	Avg. Width (ft)	Avg. Area (ft^2)	Species	Total Number Captured	Removal Pattern	Number of Fish / Mile	Catchable Trout / Mile (>152 mm)	Estimated Density, Zippin Method: No. of Fish / Acre	Estimated Density, Zippin Method: 95 Percent Confidence Interval (No. of fish/acre)		Captured Biomass (g)	Estimated Biomass: g/acre	Estimated Biomass: lbs/acre	Estimated Biomass: 95 Percent Confidence Interval (lbs/acre)	
Gerle Creek, Loon Lake Dam	LLD-F3	Combined	2020	278	22	6,116	Trout (brown & rainbow)	62	33-18-11	1,450	786	544	408	680	3,119.2	27,351.6	60.3	45.2	75.4
		Upper		107	22	2,354	Brown trout	5	3-2-0	259	188	98	73	123	201.0	3,946.3	8.7	6.5	10.9
		Lower		171	22	3,762	Trout (brown & rainbow)	57	30-16-11	2,224	1,160	828	585	1,071	2,918.2	45,041.7	99.3	65.9	120.7
		Combined	2019	296	25	7,504	Trout (brown & rainbow)	10	7-2-1	186	45	61	50	71	182.6	1,088.6	2.4	2.0	2.9
		Upper		111	25	2,830	Brown trout	3	2-0-1	180	0	58	0	133	22.0	426.4	0.9	0	2.2
		Lower		185	25	4,667	Trout (brown & rainbow)	7	5-2-0	203	60	66	59	74	160.6	1,519.5	3.4	3.0	3.7

ft = feet
g = grams
lbs = pounds
mm = millimeters

Table B2-5. Fish Population Data, 2002–2020, for Site LLD-F2, Gerle Creek, Loon Lake Dam Reach.

Stream and Reach	Site	Section	Year	Site Length (ft)	Avg. Width (ft)	Avg. Area (ft^2)	Species	Total Number Captured	Removal Pattern	Number of Fish / Mile	Catchable Trout / Mile (>152 mm)	Estimated Density, Zippin Method			Captured biomass (g)	Estimated Biomass			
												No. of Fish / Acre	95 Percent Confidence Interval (No. of fish/acre)			g/acre	lbs/acre	95 Percent Confidence Interval (lbs/acre)	
Gerle Creek, Loon Lake Dam	LLD-F2	Combined	2020	289	33	9,537	Trout (brown & rainbow)	114	75-25-14	2,227	325	550	510	590	3,075.3	14,832.5	32.7	30.3	35.1
		Upper		196	41	8,036	Trout (brown & rainbow)	77	53-13-12	2,235	259	455	411	499	1,941.0	11,475.9	25.3	22.8	27.7
		Lower		93	26	2,418	Trout (brown & rainbow)	37	23-12-2	2,217	465	694	618	771	1,134.3	21,273.5	46.9	41.8	52.0
		Combined	2019	311	37	11,464	Trout (brown & rainbow)	37	17-14-6	837	246	187	104	271	1,233.4	6,545.3	14.4	8.0	20.9
		Upper		212	43	9,042	Trout (brown & rainbow)	21	9-9-3	711	255	138	51	225	1,045.5	6,844.7	15.1	5.5	24.6
		Lower		99	31	3,078	Trout (rainbow)	16	8-5-3	1,109	67	295	112	478	248.0	4,563.1	10.1	3.8	16.3
		Combined	2004	297	35	10,235	Trout (brown & rainbow)	70	48-17-5	1,295	514	309	290	329	5,075.0	22,416.5	49.4	46.3	52.5
		Upper		197	40	7,913	Trout (brown & rainbow)	45	30-11-4	1,268	429	260	236	288	2,397.3	13,869.7	30.6	27.7	33.4
		Lower		100	29	2,873	Trout (brown)	25	18-6-1	1,356	637	388	359	416	2,677.7	41,500.0	91.4	84.8	98.1
		Combined	2003	285	40	11,329	Trout (brown & rainbow)	23	11-7-1	608	366	126	37	215	1,713.0	9,389.4	20.7	6.1	35.3
		Upper		188	40	7,473	Trout (brown & rainbow)	15	7-5-3	593	334	123	20	226	1,070.9	8,786.1	19.4	3.1	35.6
		Lower		97	25	2,383	Trout (brown & rainbow)	8	4-2-2	636	444	214	0	487	642.1	17,141.3	37.8	0.0	86.1

Stream and Reach	Site	Section	Year	Site Length (ft)	Avg. Width (ft)	Avg. Area (ft^2)	Species	Total Number Captured	Removal Pattern	Number of Fish / Mile	Catchable Trout / Mile (>152 mm)	Estimated Density, Zippin Method			Captured biomass (g)	Estimated Biomass			
												No. of Fish / Acre	95 Percent Confidence Interval (No. of fish/acre)			g/acre	lbs/acre	95 Percent Confidence Interval (lbs/acre)	
Gerle Creek, Loon Lake Dam	LLD-F2	Combined	2002	293	34	10,062	Trout (brown & rainbow)	55	42-10-3	1,007	468	242	232	252	2,712.5	11,929.5	26.3	25.2	27.4
		Upper		191	42	7,917	Trout (brown & rainbow)	34	25-7-2	961	900	191	179	204	1,457.4	8,196.4	18.1	16.9	19.2
		Lower		102	27	2,770	Trout (brown & rainbow)	21	17-3-1	1,095	620	330	317	349	1,255.1	19,903.6	43.9	41.8	46.0

ft = feet
g = grams
lbs = pounds
mm = millimeters

Table B2-6. Fish Population Data, 2002–2020, for Site GCD-F1, Gerle Creek, Gerle Creek Dam Reach.

Stream and Reach	Site	Section	Year	Site Length (ft)	Avg. Width (ft)	Avg. Area (ft^2)	Species	Total Number Captured	Removal Pattern	Number of Fish / Mile	Catchable Trout / Mile (>152 mm)	Estimated Density, Zippin Method: No. of Fish / Acre	Estimated Density, Zippin Method: 95 Percent Confidence Interval (No. of fish/acre)		Captured Biomass (g)	Estimated Biomass: g/acre	Estimated Biomass: lbs/acre	Estimated Biomass: 95 Percent Confidence Interval (lbs/acre)	
Gerle Creek, Gerle Creek Dam	GCD-F1	Combined	2020	241	34	7,953	Trout (brown & rainbow)	106	77-18-11	2,411	22	587	558	616	746.1	4,127.7	9.1	8.7	9.5
		Upper	2020	103	33	3,399	Trout (brown & rainbow)	21	20-0-1	1,077	0	272	269	275	143.7	1,859.7	4.1	4.1	4.1
		Lower	2020	138	35	4,830	Trout (brown & rainbow)	85	57-18-10	3,465	40	815	751	878	602.4	5,760.6	12.7	11.7	13.7
		Combined	2019	241	34	8,217	Trout (brown & rainbow)	69	29-20-13-7	1,815	78	439	348	530	568.3	3,628.7	8.0	6.3	9.6
		Upper	2019	102	32	3,242	Trout (brown & rainbow)	15	5-5-3-2	1,096	0	284	46	522	77.3	1,460.6	3.2	0.5	5.9
		Lower	2019	139	36	5,058	Trout (brown & rainbow)	54	24-15-10-5	2,528	128	574	417	730	491.0	5,211.8	11.5	8.4	14.6
		Combined	2003	322	37	12,036	Trout (brown & rainbow)	27	15-8-4	515	366	114	81	146	637.7	2,676.2	5.9	4.2	7.6
		Upper	2003	190	36	6,872	Trout (brown & rainbow)	11	6-4-1	342	98	78	50	106	216.2	1,533.1	3.4	2.2	4.6
		Lower	2003	132	39	5,093	Trout (brown & rainbow)	16	9-4-3	769	[d]	164	92	237	421.5	4,327.3	9.5	5.3	13.8
		Combined	2002	244	35	8,534	Trout (brown & rainbow)	87	62-21-4	1,928	281	455	436	474	1421.1	7,438.9	16.4	15.7	17.1
		Upper	2002	108	34	3,628	Trout (brown & rainbow)	26	18-7-1	1,312	295	321	294	347	664.2	8,187.3	18.1	16.6	19.6
		Lower	2002	137	36	4,941	Trout (brown & rainbow)	61	44-14-3	2,412	270	551	524	577	756.9	6,826.6	15.1	14.3	15.8

ft = feet
g = grams
lbs = pounds
mm = millimeters
[d] Could not be calculated due to poor depletion pattern of juvenile/adults.

Table B2-7. Fish Population Data, 2002–2020, for Site RPD-F1, S.F. Rubicon River, Robbs Peak Dam Reach.

Stream and Reach	Site	Section	Year	Site Length (ft)	Avg. Width (ft)	Avg. Area (ft^2)	Species	Total Number Captured	Removal Pattern	Number of Fish / Mile	Catchable Trout / Mile (>152 mm)	Estimated Density, Zippin Method: No. of Fish / Acre	Estimated Density, Zippin Method: 95 Percent Confidence Interval (No. of fish/acre)		Captured Biomass (g)	Estimated Biomass: g/acre	Estimated Biomass: lbs/acre	Estimated Biomass: 95 Percent Confidence Interval (lbs/acre)	
S. F. Rubicon, Robbs Peak Dam	RPD-F1	Combined	2020	284	40	11,360	Trout (brown & rainbow)	182	132-31-19	3,509	195	729	702	756	1,731.4	6,940.0	15.3	14.7	15.8
		Upper		131	43	5,633	Trout (brown & rainbow)	60	39-12-9	2,636	88	506	445	568	574.1	4,853.4	10.7	9.4	12.0
		Lower		153	37	5,661	Trout (brown & rainbow)	122	93-19-10	4,303	284	973	940	1,005	1,157.3	9,207.9	20.3	19.7	21.0
		Combined	2019	321	42	13,340	Trout (brown & rainbow)	131	79-35-17	2,382	203	473	429	518	1,923.4	6,940.0	15.3	13.9	16.7
		Upper		161	41	6,513	Trout (brown & rainbow)	56	34-14-8	2,047	228	417	354	479	756.4	5,624.5	12.4	10.5	14.3
		Lower		161	43	6,826	Trout (brown & rainbow)	75	45-21-9	2,717	196	527	464	591	1,167.0	8,196.4	18.1	15.9	20.2
		Combined	2005	341	35	11,935	Trout (brown & rainbow)	88	[c]	[c]	403	348 [b]	[c]	[c]	2,605.5	10,296.6	22.7	[c]	[c]
		Upper		173	40	6,903	Trout (brown & rainbow)	51	30-8-12-1	1,638	519	339	309	369	1,580.4	10,496.3	23.1	21.1	25.2
		Lower		168	30	5,074	Trout (brown & rainbow)	37	21-11-5	1,325	283	362	283	440	1,025.1	10,011.0	22.1	17.3	26.8
		Combined	2003	340	38	13,037	Trout (brown & rainbow)	115	[c]	[c]	187	557 [b]	[c]	[c]	1,725.2	7,438.9 [b]	16.4 [b]	[c]	[c]
		Upper		169	45	7,526	Trout (brown & rainbow)	45	29-13-3	1,478	281	274	248	300	1,096.1	6,663.3	14.7	13.3	16.1
		Lower		171	32	5,504	Trout (brown & rainbow)	70	18-26-18-8	3,697	93	945	357	1533	629.1	8,482.2	18.7	7.1	30.3
		Combined	2002	338	41	13,802	Trout (brown & rainbow)	220	162-42-16	3,523	546	712	693	731	4,287.7	13,879.9	30.6	29.8	31.4
		Upper		173	47	8,158	Trout (brown & rainbow)	120	88-25-7	3,743	640	655	633	678	2,604.9	14,215.6	31.3	30.3	32.4
		Lower		165	35	5,693	Trout (brown & rainbow)	100	74-17-9	3,292	480	787	753	821	1,682.8	13,231.3	29.2	27.9	30.4

ft = feet, g = grams, lbs = pounds, mm = millimeters
[b] Calculated using weighted average
[c] Not calculated due to an unequal number of passes.
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Table B2-8. Fish Population Data, 2002–2020, for Site IHD-F1, S.F. Silver Creek, Ice House Dam Reach.

Stream and Reach	Site	Section	Year	Site Length (ft)	Avg. Width (ft)	Avg. Area (ft²)	Species	Total Number Captured	Removal Pattern	Number of Fish / Mile	Catchable Trout / Mile (>152 mm)	Estimated Density, Zippin Method			Captured Biomass (g)	Estimated Biomass			
												No. of Fish / Acre	95 Percent Confidence Interval (No. of fish/acre)			g/acre	lbs/acre	95 Percent Confidence Interval (lbs/acre)	
S.F. Silver, Ice House Dam	IHD-F1	Combined	2020	270	27	7,290	Trout (brown & rainbow)	67	41-17-9	1,445	99	446	389	503	724.1	4,808.1	10.6	9.3	12.0
		Upper	2020	135	27	3,645	Trout (brown & rainbow)	29	17-7-5	1,311	81	401	293	508	310.2	4,263.8	9.4	6.9	12.0
		Lower	2020	135	27	3,645	Trout (brown & rainbow)	38	24-10-4	1,596	118	497	431	563	413.9	5,397.7	11.9	10.3	13.5
		Combined	2019	267	26	6,796	Trout (brown & rainbow)	20	6-3-6-5	1,426 [d]	119 [d]	468 [d]	293 [d]	642 [d]	571.2	13,335.6	29.4 [d]	18.5 [d]	40.4 [d]
		Upper	2019	133	21	2,772	Trout (brown & rainbow)	8	1-1-3-3	79,817	19,954	31,482	0	19,495,432	247.1	971,504.0	2,141.8	0.0	1,326,355.0
		Lower	2019	134	29	3,937	Trout (brown & rainbow)	12	5-2-3-2	711	283	200	0	420	324.1	5,388.7	11.9	0.0	25.0
		Combined	2004	276	30	8,133	Trout (brown & rainbow)	79	[c]	[c]	229 [b]	481 [b]	[c]	[c]	3,309.0	21,228.1 [b]	46.8 [b]	[c]	[c]
		Upper	2004	142	31	4,440	Trout (brown & rainbow)	38	27-10-1	1,443	264	381	359	403	719.7	7,212.1	15.9	15.0	16.8
		Lower	2004	134	28	3,742	Trout (brown & rainbow)	41	15-14-8-4	2,037	320	600	402	797	2,589.3	37,829.6	83.4	55.9	110.9
		Combined	2003	271	28	7,507	Trout (brown & rainbow)	51	32-15-4	1,056	246	315	282	347	2,865.7	17,644.7	38.9	34.9	42.9
		Upper	2003	137	25	3,462	Trout (brown & rainbow)	21	11-9-1	894	206	292	225	359	524.6	7,302.8	16.1	12.4	19.8
		Lower	2003	134	30	4,037	Trout (brown & rainbow)	30	21-6-3	1,233	287	338	303	372	2,341.1	26,308.4	58.0	52.1	64.0
		Combined	2002	263	27	7,012	Trout (brown & rainbow)	65	47-13-5	1344	361	416	393	439	3,382.4	21,636.4	47.7	45.1	50.3
		Upper	2002	135	23	3,060	Trout (brown & rainbow)	33	19-10-4	1,446	352	526	418	634	2,341.2	37,285.3	82.2	65.4	99.0
		Lower	2002	128	31	3,923	Trout (brown & rainbow)	32	28-3-1	1,324	371	356	349	363	1,041.2	11,566.6	25.5	25.0	26.0

ft = feet, g = grams, lbs = pounds, mm = millimeters
[b] Calculated using weighted average.
[c] Not calculated due to an unequal number of passes.
[d] Calculated using Microfish 3.0 (Vandeventer and Platts 1985)

Table B2-9. Fish Population Data, 2002–2020, for Site IHD-F2, S.F. Silver Creek, Ice House Dam Reach.

Stream and Reach	Site	Section	Year	Site Length (ft)	Avg. Width (ft)	Avg. Area (ft^2)	Species	Total Number Captured	Removal Pattern	Number of Fish / Mile	Catchable Trout / Mile (>152 mm)	Estimated Density, Zippin Method: No. of Fish / Acre	Estimated Density, Zippin Method: 95 Percent Confidence Interval (No. of fish/acre)		Captured Biomass (g)	Estimated Biomass: g/acre	Estimated Biomass: lbs/acre	Estimated Biomass: 95 Percent Confidence Interval (lbs/acre)	
S.F. Silver, Ice House Dam	IHD-F2	Combined	2020	285	27	7,695	Trout (brown & rainbow)	82	58-20-4	1,560	113	490	468	512	876.8	5,216.3	11.5	11.0	12.0
		Upper		135	27	3,645	Trout (brown & rainbow)	46	32-12-2	1,850	78	565	530	601	457.4	5,624.5	12.4	11.6	13.2
							Sacramento sucker	3	3-0-0	-	-	-	-	-	-	-	-	-	-
		Lower		150	26	3,900	Trout (brown & rainbow)	36	26-8-2	1,299	143	420	392	448	419.4	4,898.8	10.8	10.1	11.5
							Sacramento sucker	5	2-2-1	-	-	-	-	-	-	-	-	-	-
		Combined	2019	365	27	10,021	Trout (brown & rainbow)	28	15-6-6-1	435	73	131	111	150	1,089.2	5,071.2	11.2	9.5	12.9
		Upper		226	29	6,583	Trout (brown & rainbow)	15	4-6-4-1	501	126	142	21	262	515.3	4,867.0	10.7	1.6	19.9
							Sacramento sucker	2	0-1-1-0	-	-	-	-	-	-	-	-	-	-
		Lower		139	26	3,580	Trout (brown & rainbow)	13	11-0-2-0	497	76	159	153	164	573.9	7,003.5	15.4	14.9	16.0
							Sacramento sucker	1	0-0-0-1	-	-	-	-	-	-	-	-	-	-
		Combined	2004	361	28	10,258	Trout (brown & rainbow)	20	16-4-0	294	29	85	82	89	577.4	2,449.4	5.4	5.2	5.6
		Upper		212	30	6,398	Trout (brown & rainbow)	9	8-1-0	225	0	61	60	63	106.7	726.4	1.6	1.6	1.6
							Sacramento sucker	17	12-3-2	-	-	-	-	-	-	-	-	-	-
		Lower		149	27	3,975	Trout (brown & rainbow)	11	8-3-0	394	71	122	112	132	470.7	5,230.0	11.5	10.6	12.5
							Sacramento sucker	38	23-10-5	-	-	-	-	-	-	-	-	-	-

Stream and Reach	Site	Section	Year	Site Length (ft)	Avg. Width (ft)	Avg. Area (ft^2)	Species	Total Number Captured	Removal Pattern	Number of Fish / Mile	Catchable Trout / Mile (>152 mm)	Estimated Density, Zippin Method: No. of Fish / Acre	Estimated Density, Zippin Method: 95 Percent Confidence Interval (No. of fish/acre)		Captured Biomass (g)	Estimated Biomass: g/acre	Estimated Biomass: lbs/acre	Estimated Biomass: 95 Percent Confidence Interval (lbs/acre)	
S.F. Silver, Ice House Dam	IHD-F2	Combined	2003	352	29	10,046	Trout (brown & rainbow)	21	15-2-4	339	93	98	80	116	1,063.2	4,944.2	10.9	8.9	12.9
		Upper		211	28	5,997	Trout (brown & rainbow)	14	12-0-2	356	100	103	95	112	859.0	6,332.1	14.0	12.9	15.1
							Sacramento sucker	48	25-15-8	-	-	-	-	-	-	-	-	-	-
		Lower		141	29	4,043	Trout (brown & rainbow)	7	3-2-2	548	75	158	0	639	204.2	4,594.9	10.1	0.0	41.1
							Sacramento sucker	6	5-1-0	-	-	-	-	-	-	-	-	-	-
		Combined	2002	365	30	10,950	Trout (brown & rainbow)	26	c	c	58	118 b	c	c	1,169.1	5,034.9	11.1 b	c	c
		Upper		214	32	6,923	Trout (brown & rainbow)	17	12-3-2	439	74	112	96	128	990.6	6,522.7	14.4	12.3	16.5
							Sacramento sucker	78	65-9-4	-	-	-	-	-	-	-	-	-	-
		Lower		151	28	4,228	Trout (brown & rainbow)	9	4-2-1-2	436	35	128	0	257	178.5	2,544.7	5.6	0.0	11.2
							Sacramento sucker	18	5-9-3-1	-	-	-	-	-	-	-	-	-	-

ft = feet
g = grams
lbs = pounds
mm = millimeters
[b] Calculated using weighted average.
[c] Not calculated due to an unequal number of passes.

Table B2-10. Fish Population Data, 2019, for Site JD-F3, Silver Creek, Junction Dam Reach.

Stream and Reach	Site	Section	Year	Site Length (ft)	Avg. Width (ft)	Avg. Area (ft^2)	Species	Total Number Observed	Removal Pattern	Number of Fish / Mile	Catchable Trout / Mile (>152 mm)	Minimum Density			Captured Biomass (g)	Estimated Biomass			
												No. of Fish / Acre	95 Percent Confidence Interval (No. of fish/acre)			g/acre	lbs/acre	95 Percent Confidence Interval (lbs/acre)	
Silver Creek, Junction Dam	JD-F3	--	2020 [e]	895	38	34,010	Trout (brown & rainbow)	157	--	926	212	197	--	--	--	--	--	--	--
				895	38	34,010	Rainbow trout	140	--	826	--	175	--	--	--	--	--	--	--
				895	38	34,010	Brown trout	17	--	100	--	21	--	--	--	--	--	--	--
		--	2019 [e]	921	40	38,728	No fish	0	--	0	0	0	--	--	--	--	--	--	--

ft = feet
g = grams
lbs = pounds
mm = millimeters
[e] Snorkel survey.

Table B2-11. Fish Population Data, 2002–2019, for Site CD-F1, Silver Creek, Camino Dam Reach.

Stream Reach	Site	Section	Year	Site Length (ft)	Avg. Width (ft)	Avg. Area (ft^2)	Species	Total Number Observed	Removal Pattern	Number of Fish / Mile	Catchable Trout / Mile (>152 mm)	Minimum Density			Captured Biomass (g)	Estimated Biomass			
												No. of Fish / Acre	95 Percent Confidence Interval (No. of fish/acre)			g/acre	lbs/acre	95 Percent Confidence Interval (lbs/acre)	
Silver Creek, Camino Dam	CD-F1	--	2020 [e]	935	39	36,465	Trout (rainbow)	203	--	1,146	288	227	--	--	--	--	--	--	--
		--	2019 [e]	905	32	29,931	Trout (rainbow)	157	--	917	467	228	--	--	--	--	--	--	--
		--	2002 [e]	999	49	48,765	Trout (brown & rainbow)	29	--	153	105	26	--	--	--	--	--	--	--
							Rainbow trout	26	--	137	79	24	--	--	--	--	--	--	--
							Brown trout	3	--	16	0	3	--	--	--	--	--	--	--

ft = feet
g = grams
lbs = pounds
mm = millimeters
[e] Snorkel survey.

Table B2-12. Fish Population Data, 2002–2020, for Site BCD-F1, Brush Creek, Brush Creek Dam Reach.

Stream and Reach	Site	Section	Year	Site Length (ft)	Avg. Width (ft)	Avg. Area (ft^2)	Species	Total Number Captured	Removal Pattern	Number of Fish / Mile	Catchable Trout / Mile (>152 mm)	Estimated Density, Zippin Method: No. of Fish / Acre	Estimated Density, Zippin Method: 95 Percent Confidence Interval (No. of fish/acre)		Captured Biomass (g)	Estimated Biomass: g/acre	Estimated Biomass: lbs/acre	Estimated Biomass: 95 Percent Confidence Interval (lbs/acre)	
Brush Creek, Brush Creek Dam Reach	BCD-F1	Combined	2020	346	15	5,190	Trout (brown & rainbow)	196	138-41-17	3,104	138	1,769	1,704	1,834	1,466.9	13,199.5	29.1	28.1	30.2
		Upper		175	15	2,625	Trout (brown & rainbow)	99	74-16-9	3,068	182	1,730	1,657	1,802	839.2	14,651.0	32.3	30.9	33.7
		Lower		171	14	2,394	Trout (brown & rainbow)	97	64-25-8	3,150	93	1,815	1,698	1,932	627.7	11,748.0	25.9	24.2	27.5
		Combined	2004	323	15	4,953	Trout (brown & rainbow)	107	[c]	[c]	131	1,008[b]	[c]	[c]	1,246.9	11,748.0	25.9	[c]	[c]
		Upper		153	15	2,252	Trout (brown & rainbow)	42	26-11-5	1,582	70	885	756	1,013	458.8	9,652.4	21.3	18.2	24.4
		Lower		170	16	2,669	Trout (brown & rainbow)	65	41-8-10-6	2,137	188	1111	1017	1205	788.1	13,471.7	29.7	27.2	32.2
		Combined	2003	329	15	5,093	Trout (brown & rainbow)	107	[c]	[c]	128	945[b]	[c]	[c]	978.8	8,640.9	19.1[b]	[c]	[c]
		Upper		159	15	2,343	Trout (brown & rainbow)	48	33-13-2	1,744	133	919	860	978	382.8	7,302.8	16.1	15.1	17.2
		Lower		170	16	2,757	Trout (brown & rainbow)	59	38-8-10-3	1,902	134	968	904	1,032	596.0	9,752.2	21.5	20.1	23.0

ft = feet
g = grams
lbs = pounds
mm = millimeters
[b] Calculated using weighted average.
[c] Not calculated due to an unequal number of passes.

Table B2-13. Fish Population Data, 2002–2020, for Site SCD-F3, S.F. American River, Slab Creek Dam Reach.

Stream and Reach	Site	Section	Year	Site Length (ft)	Avg. Width (ft)	Avg. Area (ft^2)	Species	Total Number Observed	Removal Pattern	Number of Fish / Mile	Catchable Trout / Mile (>152 mm)	Minimum Density: No. of Fish / Acre	Minimum Density: 95 Percent Confidence Interval (No. of fish / acre)		Captured Biomass (g)	Estimated Biomass: g/acre	Estimated Biomass: lbs/acre	Estimated Biomass: 95 Percent Confidence Interval (lbs/acre)	
S.F. American, Slab Creek Dam	SCD-F3	--	2020 [e]	1,153	43	49,579	Trout (brown & rainbow)	71	--	325	261	61	--	--	--	--	--	--	--
							Rainbow trout	69	--	316	252	58	--	--	--	--	--	--	--
							Brown trout	2	--	9	9	2	--	--	--	--	--	--	--
							Sacramento pikeminnow	2	--	9	--	--	--	--	--	--	--	--	--
			2019 [e]	1,083	40	43,212	Trout (brown & rainbow)	48	--	235	98	48	--	--	--	--	--	--	--
							Rainbow trout	44	--	215	88	44	--	--	--	--	--	--	--
							Brown trout	4	--	20	10	4	--	--	--	--	--	--	--
							Unidentif-ied Sunfish	1	--	5	--	--	--	--	--	--	--	--	--

[e] Snorkel survey.

Table B2-14. Fish Population Data, 2002–2020, for Site SCD-F2, S.F. American River, Slab Creek Dam Reach.

Stream and Reach	Site	Section	Year	Site Length (ft)	Avg. Width (ft)	Avg. Area (ft^2)	Species	Total Number Captured/ Observed	Removal Pattern	Number of Fish / Mile	Catchable Trout / Mile (>152 mm)	Estimated Density, Zippin Method: No. of Fish / Acre	Estimated Density, Zippin Method: 95 Percent Confidence Interval (No. of fish/acre)		Captured Biomass (g)	Estimated Biomass: g/acre	Estimated Biomass: lbs/acre	Estimated Biomass: 95 Percent Confidence Interval (lbs/acre)	
S.F. American, Slab Creek Dam	SCD-F2	--	2020 [e]	627	47	29,469	Trout (rainbow)	52	--	438	353	81	--	--	--	--	--	--	--
							Sacramento pikeminnow	24	--	--	--	--	--	--	--	--	--	--	--
							Sacramento sucker	2	--	--	--	--	--	--	--	--	--	--	--
							Sculpin	2	--	--	--	--	--	--	--	--	--	--	--
		--	2019 [e]	689	52	34,473	Trout (rainbow)	38	--	291	107.3	48.0	--	--	--	--	--	--	--
							Sculpin sp.	6	--	46	--	7.6	--	--	--	--	--	--	--
							Sacramento sucker	1	--	8	--	1.3	--	--	--	--	--	--	--
		Combined	2003	252	40	10,080	Trout (brown & rainbow)	12	7-1-4	369	195	75.5	0	154.3	321.4	4422.5	4.5	0	9.1
		Upper		134	35	4,690	Trout (brown & rainbow)	12	7-1-4	694	366	165.3	0.0	338.0	321.4	4422.5	9.8	0.0	19.9
							California roach	2	0-2-0	--	--	--	--	--	--	--	--	--	--
							Sacramento sucker	24	13-8-3	--	--	--	--	--	--	--	--	--	--
							Speckled dace	45	34-8-3	--	--	--	--	--	--	--	--	--	--
							Hardhead	2	0-1-1	--	--	--	--	--	--	--	--	--	--
							Sacramento pikeminnow	6	5-1-0	--	--	--	--	--	--	--	--	--	--
		Lower		118	46	5,411	Trout (brown & rainbow)	0	0-0-0	0	0	0	0	0	0	0	0	0	0
							California roach	19	6-7-6	--	--	--	--	--	--	--	--	--	--
							Sacramento sucker	8	5-2-1	--	--	--	--	--	--	--	--	--	--
							Speckled dace	16	12-1-3	--	--	--	--	--	--	--	--	--	--
							Hardhead	12	0-11-1	--	--	--	--	--	--	--	--	--	--
							Sacramento pikeminnow	26	23-2-1	--	--	--	--	--	--	--	--	--	--

Stream and Reach	Site	Section	Year	Site Length (ft)	Avg. Width (ft)	Avg. Area (ft^2)	Species	Total Number Captured/ Observed	Removal Pattern	Number of Fish / Mile	Catchable Trout / Mile (>152 mm)	Estimated Density, Zippin Method: No. of Fish / Acre	Estimated Density, Zippin Method: 95 Percent Confidence Interval (No. of fish/acre)		Captured Biomass (g)	Estimated Biomass: g/acre	Estimated Biomass: lbs/acre	Estimated Biomass: 95 Percent Confidence Interval (lbs/acre)	
S.F. American, Slab Creek Dam	SCD-F2	Combined	2002	236	44	10,384	Trout (brown & rainbow)	10	7-3-0	228	67	42.6	38.3	47.0	521.4	2,222.6	4.9	4.4	5.4
		Upper		113	39	4341	Trout (brown & rainbow)	9	6-3-0	432	141	92.6	80.4	104.7	503.9	5,171.0	11.4	9.9	12.9
							California roach	10	9-0-1	--	--	--	--	--	--	--	--	--	--
							Sacramento sucker	22	15-5-2	--	--	--	--	--	--	--	--	--	--
							Speckled dace	53	28-13-12	--	--	--	--	--	--	--	--	--	--
							Hardhead	3	1-2-0	--	--	--	--	--	--	--	--	--	--
							Sacramento pikeminnow	4	3-1-0	--	--	--	--	--	--	--	--	--	--
		Lower		123	46	5668	Trout (rainbow)	1	1-0-0	43	0	7.7	[c]	[c]	17.5	136.1	0.3	[c]	[c]
							California roach	21	16-3-2	--	--	--	--	--	--	--	--	--	--
							Sacramento sucker	16	11-4-1	--	--	--	--	--	--	--	--	--	--
							Speckled dace	18	9-2-7	--	--	--	--	--	--	--	--	--	--
							Hardhead	68	51-11-6	--	--	--	--	--	--	--	--	--	--
							Sacramento pikeminnow	41	23-13-5	--	--	--	--	--	--	--	--	--	--

[c] Couldn't not be calculated due to unequal number of passes.
[e] Conducted by snorkel survey.

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APPENDIX B3

Trout Condition Table

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Table B3-1. Fulton's Condition Factors (K-values), 2002–2020.

Stream	Reach	Site	Year	Rainbow Trout			Brown Trout		
				Sample size	Average K	Standard Error	Sample size	Average K	Standard Error
Rubicon	Rubicon Reservoir Dam	RRD-F1	2002	82	1.00	0.02	18	0.98	0.03
Rubicon	Rubicon Reservoir Dam	RRD-F1	2003	50	1.08	0.02	15	1.03	0.02
Rubicon	Rubicon Reservoir Dam	RRD-F1	2005	49	1.16	0.02	12	1.10	0.05
Rubicon	Rubicon Reservoir Dam	RRD-F1	2019	18	1.08	0.06	2	1.10	0.03
Rubicon	Rubicon Reservoir Dam	RRD-F1	2020	98	0.93	0.01	10	0.95	0.03
Rubicon	Rubicon Reservoir Dam	RRD-F2	2002	1	1.00	0.00	14	0.97	0.03
Rubicon	Rubicon Reservoir Dam	RRD-F2	2003	16	1.19	0.05	69	1.07	0.02
Rubicon	Rubicon Reservoir Dam	RRD-F2	2005	1	0.96	--	44	0.97	0.02
Rubicon	Rubicon Reservoir Dam	RRD-F2	2019	1	0.89	--	0	--	--
Rubicon	Rubicon Reservoir Dam	RRD-F2	2020	4	0.81	0.10	40	0.88	0.02
Little Rubicon	Buck Island Dam	BID-F1	2002	4	1.02	0.03	0	--	--
Little Rubicon	Buck Island Dam	BID-F1	2003	1	1.17	--	0	--	--
Little Rubicon	Buck Island Dam	BID-F1	2019	0	--	--	0	--	--
Little Rubicon	Buck Island Dam	BID-F1	2020	0	--	--	0	--	--
Gerle Creek	Loon Lake Dam	LLD-F3	2019	3	0.97	0.10	7	1.18	0.21
Gerle Creek	Loon Lake Dam	LLD-F3	2020	6	0.93	0.04	56	0.97	0.03
Gerle Creek	Loon Lake Dam	LLD-F2	2002	5	0.91	0.13	50	1.05	0.01
Gerle Creek	Loon Lake Dam	LLD-F2	2003	1	0.85	--	22	0.97	0.02
Gerle Creek	Loon Lake Dam	LLD-F2	2004	2	1.14	0.03	68	1.09	0.03
Gerle Creek	Loon Lake Dam	LLD-F2	2019	31	0.96	0.06	6	0.94	0.03
Gerle Creek	Loon Lake Dam	LLD-F2	2020	46	0.91	0.02	68	0.96	0.02
Gerle Creek	Gerle Creek Dam	GCD-F1	2002	50	0.82	0.05	37	0.97	0.04
Gerle Creek	Gerle Creek Dam	GCD-F1	2003	16	0.99	0.03	11	1.25	0.22
Gerle Creek	Gerle Creek Dam	GCD-F1	2019	68	0.84	0.01	1	1.0	--
Gerle Creek	Gerle Creek Dam	GCD-F1	2020	105	0.90	0.02	1	0.84	--
S.F. Rubicon	Robbs Peak Dam	RPD-F1	2002	153	0.98	0.05	67	1.0	0.01
S.F. Rubicon	Robbs Peak Dam	RPD-F1	2003	65	0.97	0.01	50	1.05	0.03

Stream	Reach	Site	Year	Rainbow Trout			Brown Trout		
				Sample size	Average K	Standard Error	Sample size	Average K	Standard Error
S.F. Rubicon	Robbs Peak Dam	RPD-F1	2005	60	0.98	0.02	26	0.98	0.01
S.F. Rubicon	Robbs Peak Dam	RPD-F1	2019	124	0.87	0.01	7	1.01	0.04
S.F. Rubicon	Robbs Peak Dam	RPD-F1	2020	178	0.92	0.01	4	1.03	0.03
S.F. Silver	Ice House Dam	IHD-F1	2002	40	0.90	0.03	25	0.86	0.05
S.F. Silver	Ice House Dam	IHD-F1	2003	38	0.97	0.01	13	0.95	0.04
S.F. Silver	Ice House Dam	IHD-F1	2004	60	1.07	0.03	19	1.02	0.04
S.F. Silver	Ice House Dam	IHD-F1	2019	17	1.00	0.02	3	0.98	0.02
S.F. Silver	Ice House Dam	IHD-F1	2020	58	0.92	0.02	9	1.01	0.02
S.F. Silver	Ice House Dam	IHD-F2	2002	12	1.01	0.03	14	1.06	0.02
S.F. Silver	Ice House Dam	IHD-F2	2003	11	0.91	0.03	10	1.00	0.03
S.F. Silver	Ice House Dam	IHD-F2	2004	10	0.98	0.04	10	1.03	0.05
S.F. Silver	Ice House Dam	IHD-F2	2019	11	0.89	0.03	17	0.99	0.04
S.F. Silver	Ice House Dam	IHD-F2	2020	34	0.91	0.03	48	0.93	0.01
Brush Creek	Brush Creek Dam	BCD-F1	2003	71	0.97	0.02	35	0.96	0.02
Brush Creek	Brush Creek Dam	BCD-F1	2004	50	0.95	0.02	57	1.04	0.02
Brush Creek	Brush Creek Dam	BCD-F1	2020	127	0.87	0.01	69	0.89	0.01

APPENDIX B4

2020 Scale Analysis Data

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Table B4-1. Scale Analysis Data, 2020.

Species	Sample ID	Length (TL mm)	Weight (g)	Age	1st Scale Annuli Count	2nd Scale Annuli Count	3rd Scale Annuli Count
RRD F-1							
Rainbow trout	RBT-13	80	5.1	0+	0+ (Scale 1)	0+ (Scale 2)	0+ (Scale 3)
Rainbow trout	RBT-14	108	7.2	1+	1+ (Scale 5)	1+ (Scale 5)	1+ (Scale 9)
Rainbow trout	RBT-05	114	14.1	1+	1+ (Scale 3)	1+ (Scale 4)	1+ (Scale 5)
Rainbow trout	RBT-03	123	18.5	1+	1+ (Scale 2)	1+ (Scale 3)	1+ (Scale 4)
Rainbow trout	RBT-18	135	23.2	1+	2+ (Scale 1)	2+ (Scale 2)	2+ (Scale 3)
Rainbow trout	RBT-21	160	37.4	2+	2+ (Scale 1)	2+ (Scale 3)	2+ (Scale 4)
Rainbow trout	RBT-19	169	49.3	2+	2+ (Scale 1)	2+ (Scale 2)	2+ (Scale 7)
Rainbow trout	RBT-15	182	57.2	2+	2+ (Scale 1)	2+ (Scale 2)	2+ (Scale 3)
Rainbow trout	RBT-04	186	58.5	2+	2+ (Scale 1)	2+ (Scale 2)	2+ (Scale 3)
Brown trout	BRN-08	93	7.4	0+	0+ (Scale 1)	0+ (Scale 3)	0+ (Scale 5)
Brown trout	BRN-10	92	7.3	0+	0+ (Scale 1)	0+ (Scale 2)	0+ (Scale 7)
Brown trout	BRN-20	139	23.2	1+	1+ (Scale 1)	1+ (Scale 2)	1+ (Scale 3)
Brown trout	BRN-16	134	19.9	1+	1+ (Scale 1)	1+ (Scale 4)	1+ (Scale 6)
RRD F-2							
Brown trout	BRN-2	74	3.6	0+	0+ (Scale 1)	0+ (Scale 4)	0+ (Scale 8)
Brown trout	BRN-3	70	2.9	0+	0+ (Scale 1)	0+ (Scale 4)	0+ (Scale 8)
Rainbow trout	RBT-1	96	7.5	0+	0+ (Scale 1)	0+ (Scale 4)	0+ (Scale 7)
LLD-F3							
Rainbow trout	RBT-15	175	48.4	1+	1+ (Scale 2)	1+ (Scale 3)	1+ (Scale 6)
Brown trout	BRN-28	88	5.7	0+	0+ (Scale 2)	0+ (Scale 5)	0+ (Scale 6)
Brown trout	BRN-04	139	27.4	1+	1+ (Scale 1)	1+ (Scale 2)	1+ (Scale 4)
Brown trout	BRN-14	168	41.6	2+	2+ (Scale 1)	2+ (Scale 2)	2+ (Scale 3)
Brown trout	BRN-01	174	56.4	2+	2+ (Scale 1)	2+ (Scale 2)	2+ (Scale 3)
Brown trout	BRN-02	183	53.4	2+	2+ (Scale 1)	2+ (Scale 2)	2+ (Scale 3)

Species	Sample ID	Length (TL mm)	Weight (g)	Age	1st Scale Annuli Count	2nd Scale Annuli Count	3rd Scale Annuli Count
LLD-F2							
Brown trout	BRN-06	BRN-06	80.0	5.1	0+	0+ (Scale 1)	0+ (Scale 2)
Brown trout	BRN-20	BRN-20	123.0	16.6	1+	1+ (Scale 3)	1+ (Scale 7)
Brown trout	BRN-04	BRN-04	140.0	25.1	1+	1+ (Scale 2)	1+ (Scale 3)
Brown trout	BRN-27	BRN-27	190.0	62.7	2+	2+ (Scale 1)	2+ (Scale 3)
Brown trout	BRN-05	BRN-05	210.0	92.9	2+	2+ (Scale 1)	2+ (Scale 2)
Brown trout	BRN-28	BRN-28	324.0	340.0	4+	4+ (Scale 7)	4+ (Scale 8)
Brown trout	BRN-1	BRN-1	363.0	450.0	4+	4+ (Scale 1)	4+ (Scale 3)
Rainbow trout	RBT-14	RBT-14	108.0	11.0	1+	1+ (Scale 3)	1+ (Scale 5)
Rainbow trout	RBT-17	RBT-17	143.0	25.1	2+	2+ (Scale 2)	2+ (Scale 3)
Rainbow trout	RBT-23	RBT-23	173.0	41.5	2+	2+ (Scale 3)	2+ (Scale 5)
Rainbow trout	RBT-10	RBT-10	183.0	54.5	2+	2+ (Scale 2)	2+ (Scale 6)
Rainbow trout	RBT-11	RBT-11	215.0	85.1	2+	2+ (Scale 1)	2+ (Scale 2)
Rainbow trout	RBT-21	RBT-21	202.0	71.5	3+	3+ (Scale 1)	3+ (Scale 2)
Rainbow trout	RBT-26	RBT-26	257.0	165.0	3+	3+ (Scale 2)	3+ (Scale 3)
RPD-F1							
Rainbow trout	RBT-16	95	8.1	0+	0+ (Scale 1)	0+ (Scale 2)	0+ (Scale 8)
Rainbow trout	RBT-21	94	6.8	0+	0+ (Scale 6)	0+ (Scale 7)	0+ (Scale 8)
Rainbow trout	RBT-4	122	18.5	1+	1+ (Scale 4)	1+ (Scale 6)	1+ (Scale 7)
Rainbow trout	RBT-15	127	18.9	1+	1+ (Scale 1)	1+ (Scale 5)	1+ (Scale 6)
Rainbow trout	RBT-17	133	21.0	1+	1+ (Scale 3)	1+ (Scale 5)	1+ (Scale 7)
Rainbow trout	RBT-14	130	23.4	1+	1+ (Scale 2)	1+ (Scale 4)	1+ (Scale 7)
Rainbow trout	RBT-7	145	23.6	1+	1+ (Scale 1)	1+ (Scale 6)	1+ (Scale 2)
Rainbow trout	RBT-1	162	39.6	1+	1+ (Scale 1)	1+ (Scale 2)	1+ (Scale 3)
Rainbow trout	RBT-18	185	54.6	2+	2+ (Scale 1)	2+ (Scale 3)	2+ (Scale 7)

Species	Sample ID	Length (TL mm)	Weight (g)	Age	1st Scale Annuli Count	2nd Scale Annuli Count	3rd Scale Annuli Count
Rainbow trout	RBT-22	188	66.6	2+	2+ (Scale 2)	2+ (Scale 3)	2+ (Scale 5)
Rainbow trout	RBT-11	190	66.6	2+	2+ (Scale 2)	2+ (Scale 5)	2+ (Scale 7)
Brown trout	BRN-12	252	179.2	3+	3+ (Scale 2)	3+ (Scale 1)	x
GCD-F1							
Rainbow trout	RBT-02	98	x	0+	0+ (Scale 1)	0+ (Scale 2)	0+ (Scale 4)
Rainbow trout	RBT-07	99	8.0	0+	0+ (Scale 1)	0+ (Scale 4)	0+ (Scale 5)
Rainbow trout	RBT-13	100	8.5	0+	0+ (Scale 3)	0+ (Scale 4)	0+ (Scale 5)
Rainbow trout	RBT-04	105	11.2	1+	1+ (Scale 1)	1+ (Scale 2)	1+ (Scale 3)
Rainbow trout	RBT-01	123	17.0	1+	1+ (Scale 2)	1+ (Scale 4)	1+ (Scale 6)
Rainbow trout	RBT-10	134	24.2	1+	1+ (Scale 1)	1+ (Scale 3)	1+ (Scale 5)
Rainbow trout	RBT-17	138	22.6	1+	1+ (Scale 1)	1+ (Scale 3)	1+ (Scale 6)
Rainbow trout	RBT-09	144	26.2	1+	1+ (Scale 6)	1+ (Scale 7)	1+ (Scale 8)
Rainbow trout	RBT-11	150	28.2	2+	2+ (Scale 1)	2+ (Scale 8)	2+ (Scale 9)
Rainbow trout	RBT-15	179	48.8	3+	3+ (Scale 1)	3+ (Scale 2)	3+ (Scale 3)
Brown trout	BRN-16	89	5.0	0+	0+ (Scale 2)	0+ (Scale 3)	0+ (Scale 5)
IHD F-1							
Rainbow trout	RBT-08	70	3.7	0+	0+ (Scale 1)	0+ (Scale 2)	0+ (Scale 3)
Rainbow trout	RBT-14	95	8.2	0+	0+ (Scale 1)	0+ (Scale 2)	1+ (Scale 7)
Rainbow trout	RBT-11	120	16.4	1+	1+ (Scale 1)	1+ (Scale 2)	1+ (Scale 3)
Rainbow trout	RBT-22	132	21.4	1+	1+ (Scale 1)	1+ (Scale 2)	1+ (Scale 3)
Rainbow trout	RBT-13	143	26.2	1+	1+ (Scale 1)	1+ (Scale 2)	1+ (Scale 7)
Rainbow trout	RBT-07	155	34.1	1+	1+ (Scale 1)	1+ (Scale 3)	1+ (Scale 6)
Rainbow trout	RBT-05	170	40.2	1+	1+ (Scale 1)	1+ (Scale 2)	1+ (Scale 3)
Rainbow trout	RBT-17	181	58.1	2+	2+ (Scale 5)	2+ (scale 7)	2+ (Scale 8)
Brown trout	BRN-20	79	4.8	0+	0+ (Scale 1)	0+ (scale 4)	0+ (scale 5)

Species	Sample ID	Length (TL mm)	Weight (g)	Age	1st Scale Annuli Count	2nd Scale Annuli Count	3rd Scale Annuli Count
Brown trout	BRN-01	80	5.4	0+	0+ (Scale 1)	0+ (scale 2)	0+ (scale 4)
Brown trout	BRN-16	121	19.0	1+	1+ (Scale 1)	1+ (Scale3)	1+ (Scale 4)
Brown trout	BRN-18	138	25.1	1+	1+ (Scale 1)	1+ (Scale3)	1+ (Scale 8)
Brown trout	BRN-19	145	30.4	2+	2+ (Scale 2)	2+ (Scale3)	2+ (Scale 6)
Brown trout	BRN-10	190	65.9	2+	2+ (Scale 3)	2+ (Scale 4)	2+ (Scale 6)
IHD F-2							
Rainbow trout	RBT-03	110	12.4	1+	1+ (Scale 2)	1+ (Scale 4)	1+ (Scale 7)
Rainbow trout	RBT-13	114	14.2	1+	1+ (Scale 1)	1+ (Scale 4)	1+ (Scale 5)
Rainbow trout	RBT-17	115	14.2	1+	1+ (Scale 1)	1+ (Scale 5)	1+ (Scale 6)
Rainbow trout	RBT-10	137	20.2	1+	1+ (Scale 2)	1+ (Scale 3)	1+ (Scale 6)
Rainbow trout	RBT-21	148	28.5	2+	2+ (Scale 1)	2+ (Scale 2)	2+ (Scale 4)
Rainbow trout	RBT-06	156	34.5	2+	2+ (Scale 2)	2+ (Scale 3)	2+ (Scale 6)
Rainbow trout	RBT-18	165	41.4	1+	1+ (Scale 3)	1+ (Scale 1)	1+ (Scale 8)
Rainbow trout	RBT-14	181	56.6	2+	2+ (Scale 1)	2+ (Scale 3)	2+ (Scale 4)
Rainbow trout	RBT-15	182	67.5	2+	2+ (Scale 1)	2+ (Scale 3)	2+ (Scale 4)
Brown trout	BRN-09	80	4.5	0+	0+ (Scale 1)	0+ (Scale 2)	0+ (Scale 4)
Brown trout	BRN-05	91	8.0	0+	0+ (Scale 1)	0+ (Scale 2)	0+ (Scale 4)
Brown trout	BRN-04	95	8.5	0+	0+ (Scale 3)	0+ (Scale 4)	0+ (Scale 6)
Brown trout	BRN-20	117	14.5	1+	1+ (Scale 1)	1+ (Scale 2)	1+ (Scale 4)
Brown trout	BRN-07	133	20.6	1+	2+ (Scale 1)	2+ (Scale 2)	1+ (Scale 5)
Brown trout	BRN-16	182	56.9	2+	2+ (Scale 1)	2+ (Scale 4)	1+ (Scale 6)
BCD-F1							
Rainbow trout	RBT-04	95	6.6	0+	1+ (Scale 1)	1+ (Scale 2)	1+ (Scale 6)
Rainbow trout	RBT-09	106	10.4	1+	1+ (Scale 1)	1+ (Scale 2)	1+ (Scale 3)
Rainbow trout	RBT-16	130	16.9	1+	1+ (Scale 1)	1+ (Scale 5)	1+ (Scale 6)

Species	Sample ID	Length (TL mm)	Weight (g)	Age	1st Scale Annuli Count	2nd Scale Annuli Count	3rd Scale Annuli Count
Rainbow trout	RBT-10	136	17.7	1+	1+ (Scale 1)	1+ (Scale 2)	1+ (Scale 3)
Rainbow trout	RBT-06	155	28.1	2+	2+ (Scale 2)	2+ (Scale 3)	2+ (Scale 6)
Rainbow trout	RBT-19	172	44.4	2+	2+ (Scale 3)	2+ (Scale 4)	2+ (Scale 6)
Rainbow trout	RBT-13	180	47.3	2+	2+ (Scale 3)	2+ (Scale 4)	2+ (Scale 7)
Rainbow trout	RBT-15	219	86.4	2+	3+ (Scale 1)	3+ (Scale 2)	2+ (Scale 9)
Brown trout	BRN-05	77	4.5	0+	0+ (Scale 1)	0+ (scale 2)	0+ (scale 3)
Brown trout	BRN-07	80	4.2	0+	0+ (Scale 1)	0+ (scale 2)	0+ (scale 3)
Brown trout	BRN-02	88	1.6	0+	0+ (Scale 2)	0+ (Scale 4)	0+ (Scale 5)
Brown trout	BRN-11	90	6.6	0+	0+ (Scale 4)	0+ (scale 5)	0+ (scale 7)

Table B4-2. Summary Scale Analysis Data, 2020.

Site	Rainbow Trout Age-Class Size Ranges (TL)														
	0+			1+			2+			3+			4+		
	n	min	max	n	min	max	n	min	max	n	min	max	n	min	max
RRD-F1															
RRD-F2	1	96	96	--	--	--	--	--	--	--	--	--	--	--	--
LLD-F3	--	--	--	1	175	175	--	--	--	--	--	--	--	--	--
LLD-F2	--	--	--	1	108	108	4	143	215	2	202	257	--	--	--
RPD-F1	2	94	95	6	122	162	3	185	190	--	--	--	--	--	--
GCD-F1	3	98	100	5	105	144	1	150	150	1	179	179	--	--	--
IHD-F1	2	70	95	5	120	170	1	181	181	--	--	--	--	--	--
IHD-F2	--	--	--	5	110	165	1	182	182	--	--	--	--	--	--
BCD-F1	1	95	95	3	106	136	4	155	219	--	--	--	--	--	--
	Brown Trout Age-Class Size Ranges (TL)														
	0+			**1+**			**2+**			**3+**			**4+**		
Site	**n**	**min**	**max**	**n**	**min**	**max**	**n**	**min**	**max**	**n**	**min**	**max**	**n**	**min**	**max**
RRD-F1	2	92	96	2	134	139	--	--	--	--	--	--	--	--	--
RRD-F2	2	70	74	--	--	--	--	--	--	--	--	--	--	--	
LLD-F3	1	88	88	2	139	168	2	174	183	--	--	--	--	--	--
LLD-F2	1	80	80	2	123	140	2	190	210	--	--	--	2	324	363
RPD-F1	--	--	--	--	--	--	--	--	--	1	252	252	--	--	--
GCD-F1	1	89	89	--	--	--	--	--	--	--	--	--	--	--	--
IHD-F1	2	79	80	2	121	138	1	190	190	--	--	--	--	--	--
IHD-F2	3	80	95	2	117	133	1	182	182	--	--	--	--	--	--
BCD-F1	4	77	90	--	--	--	--	--	--	--	--	--	--	--	--

APPENDIX B5

Fish Population Site Photos

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Figure B5-1. Site RRD-F1, Rubicon River, Rubicon Dam Reach. From top: upper net looking upstream, middle net looking river-right, bottom net looking downstream.

Figure B5-2. Site RRD-F2, Rubicon River, Rubicon Dam Reach. From top: upper net looking upstream, lower net looking downstream.

Figure B5-3. Site BID-F1, Little Rubicon River, Buck Island Dam Reach. From top: upper segment looking towards upstream barrier, dry middle segment looking upstream, plunge pool downstream of lower segment.

Figure B5-4. Site LLD-F3, Gerle Creek, Loon Lake Dam Reach. From top: upper net looking downstream, middle net looking downstream towards the left bank, lower net looking upstream.

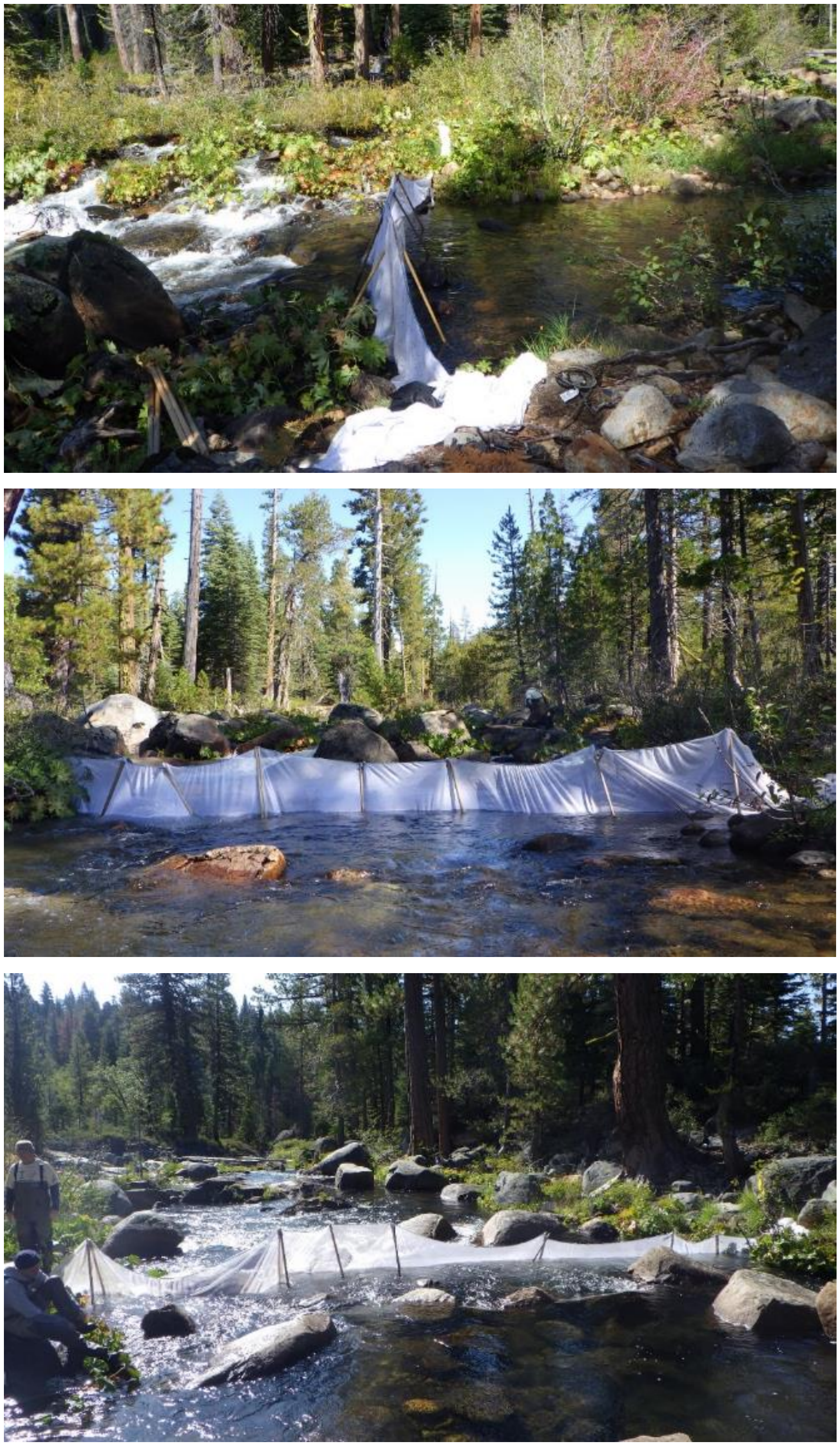

Figure B5-5. Site LLD-F2, Gerle Creek, Loon Lake Dam Reach. From top: upper net looking river-right, middle net looking upstream, lower net looking downstream.

Figure B5-6. Site GCD-F1, Gerle Creek, Gerle Creek Dam Reach. From top: upper net looking upstream, middle net looking upstream, lower net looking upstream.

Figure B5-7. Site RPD-F1, S.F. Rubicon River, Robbs Peak Dam Reach. From top: upper net looking upstream, middle net looking upstream, lower net looking upstream.

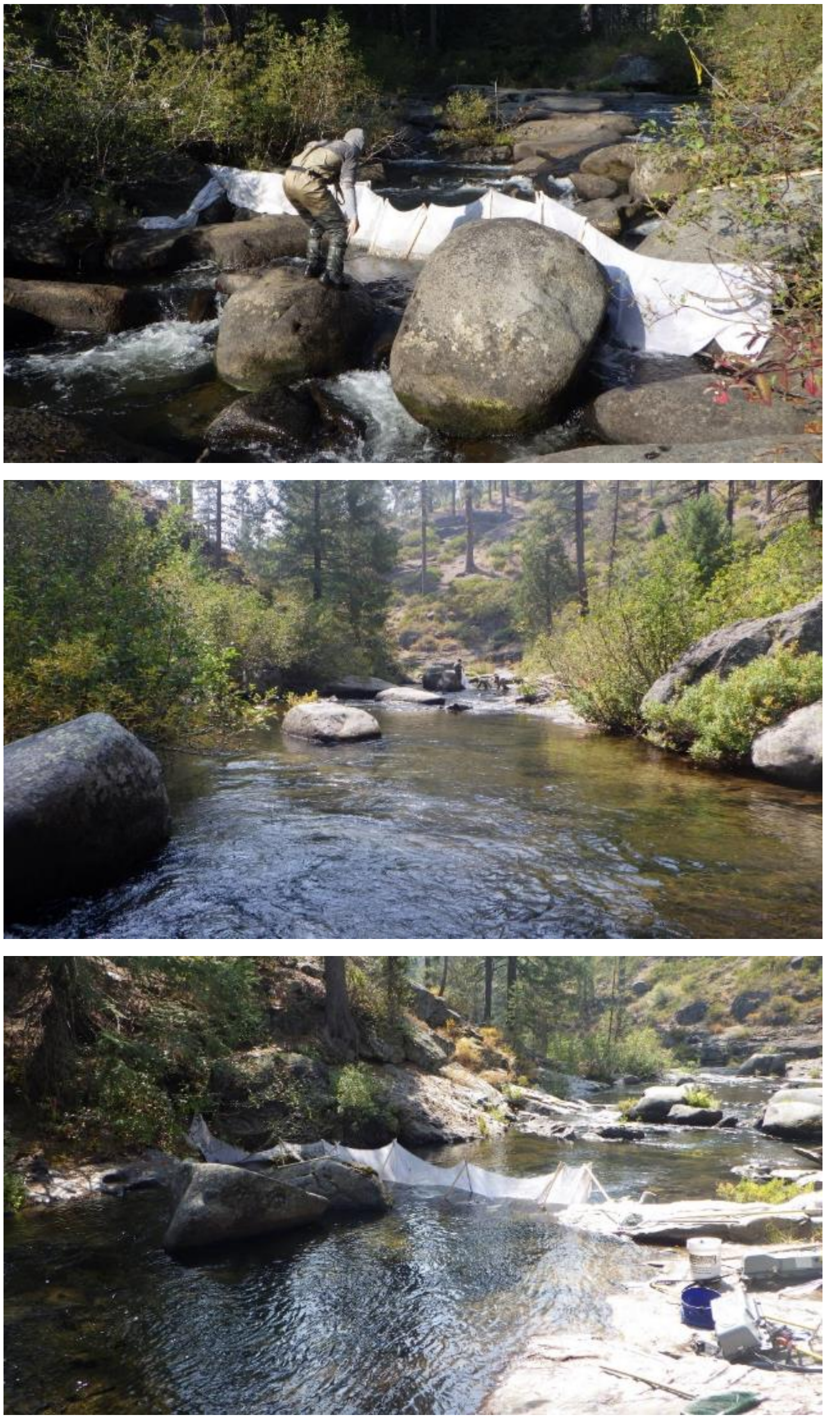

Figure B5-8. Site IHD-F1, S.F. Silver Creek, Ice House Dam Reach. From top: upper net looking upstream, middle net looking downstream, lower net looking upstream.

Figure B5-9. Site IHD-F2, S.F. Silver Creek, Ice House Dam Reach. From top: upper net looking downstream, middle net looking upstream, lower net looking upstream.

Figure B5-10. Site JD-F3, Silver Creek, Junction Dam Reach. Clockwise from top: Unit #1 - run, Unit #2 - high gradient riffle, Unit #3 - pool, Unit #4 - riffle.

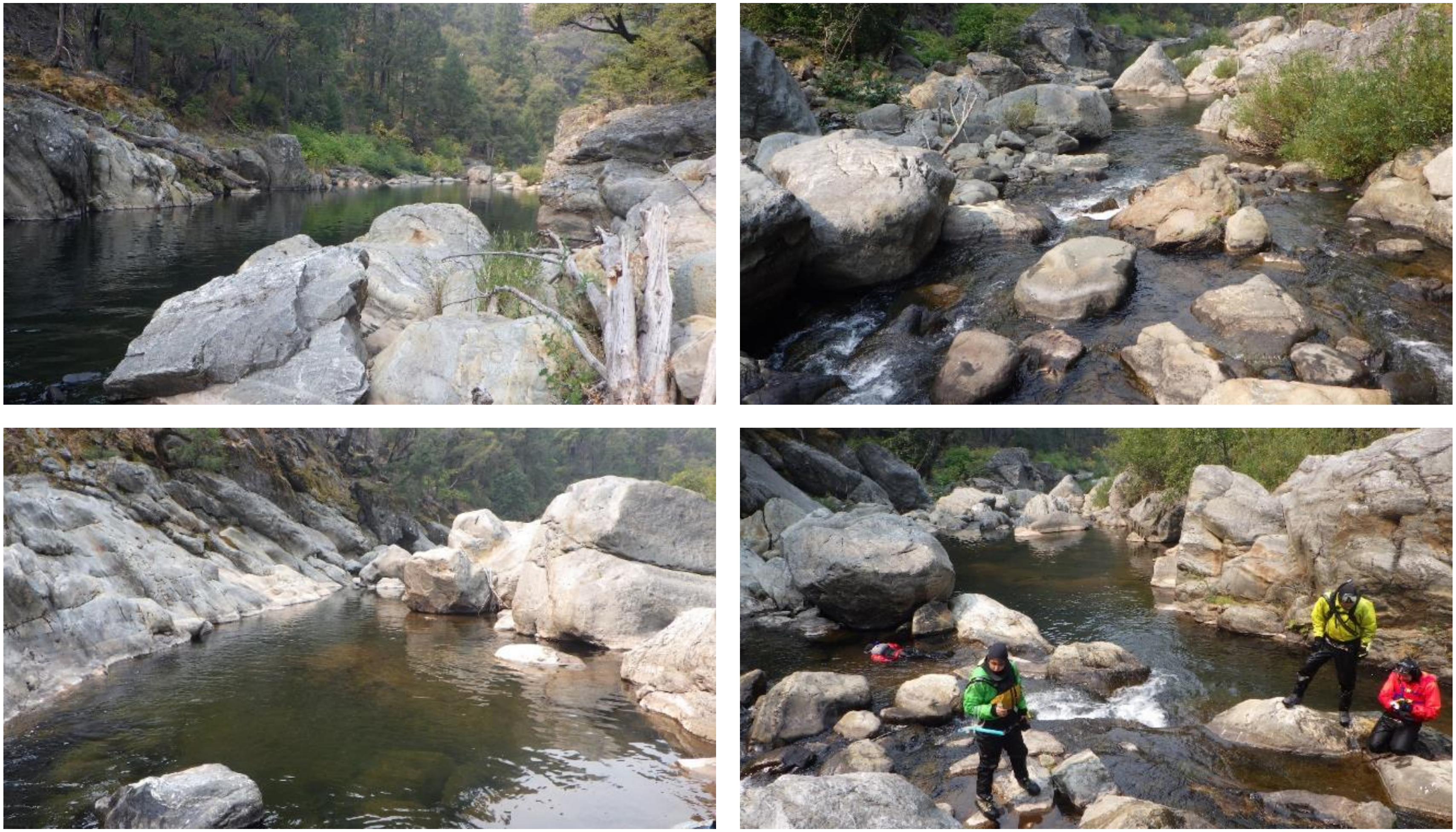

Figure B5-11. Site CD-F1, Silver Creek, Camino Dam Reach. Clockwise from top left: Unit #1 - pool, Unit #2 - riffle, Unit #3 - pool, Unit #4 – riffle.

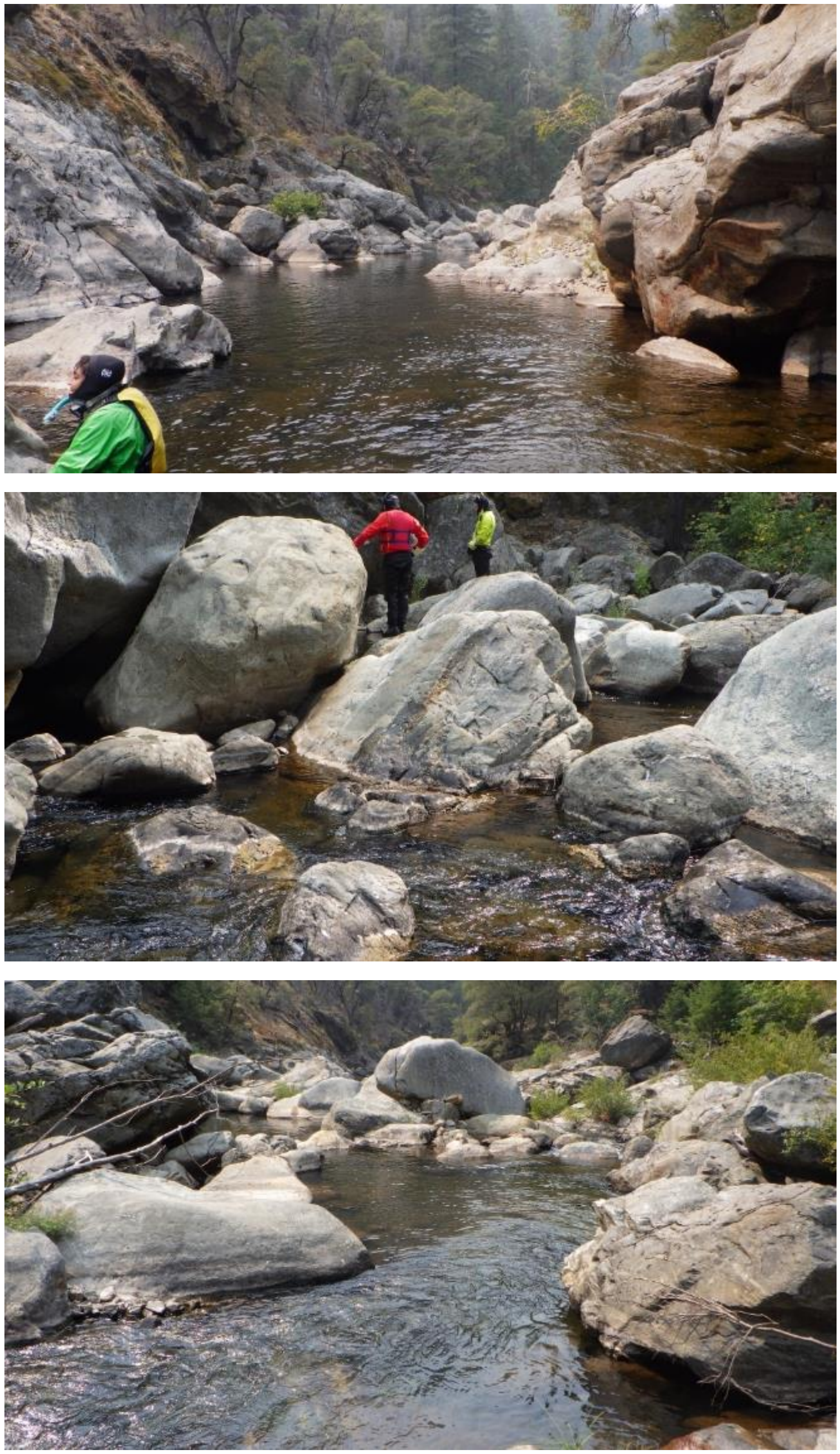

Figure B5-12. Site CD-F1, Silver Creek, Camino Dam Reach. From top: Unit #5 - pool, Unit #6 - riffle, Unit #7 - pool.

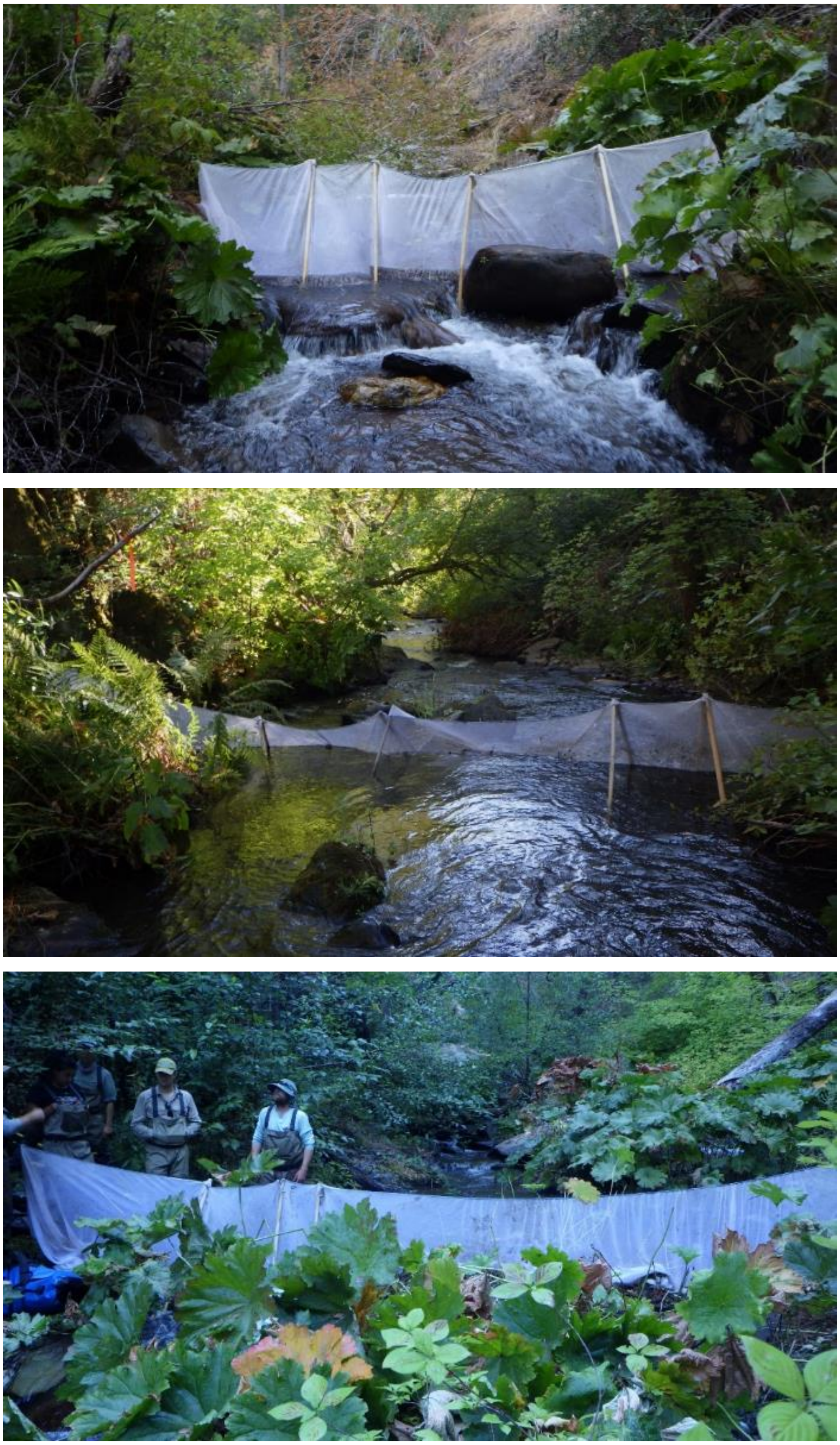

Figure B5-13. Site BCD-F1, Brush Creek, Brush Creek Dam Reach. From top: upper net looking upstream, middle net looking downstream, lower net looking upstream.

Figure B5-14. Site SCD-F3, S.F. American River, Slab Creek Dam Reach. Clockwise from top: Unit #1 - pocket water, Unit #2 - pool, Unit #3 - riffle, Unit #4 - pool.

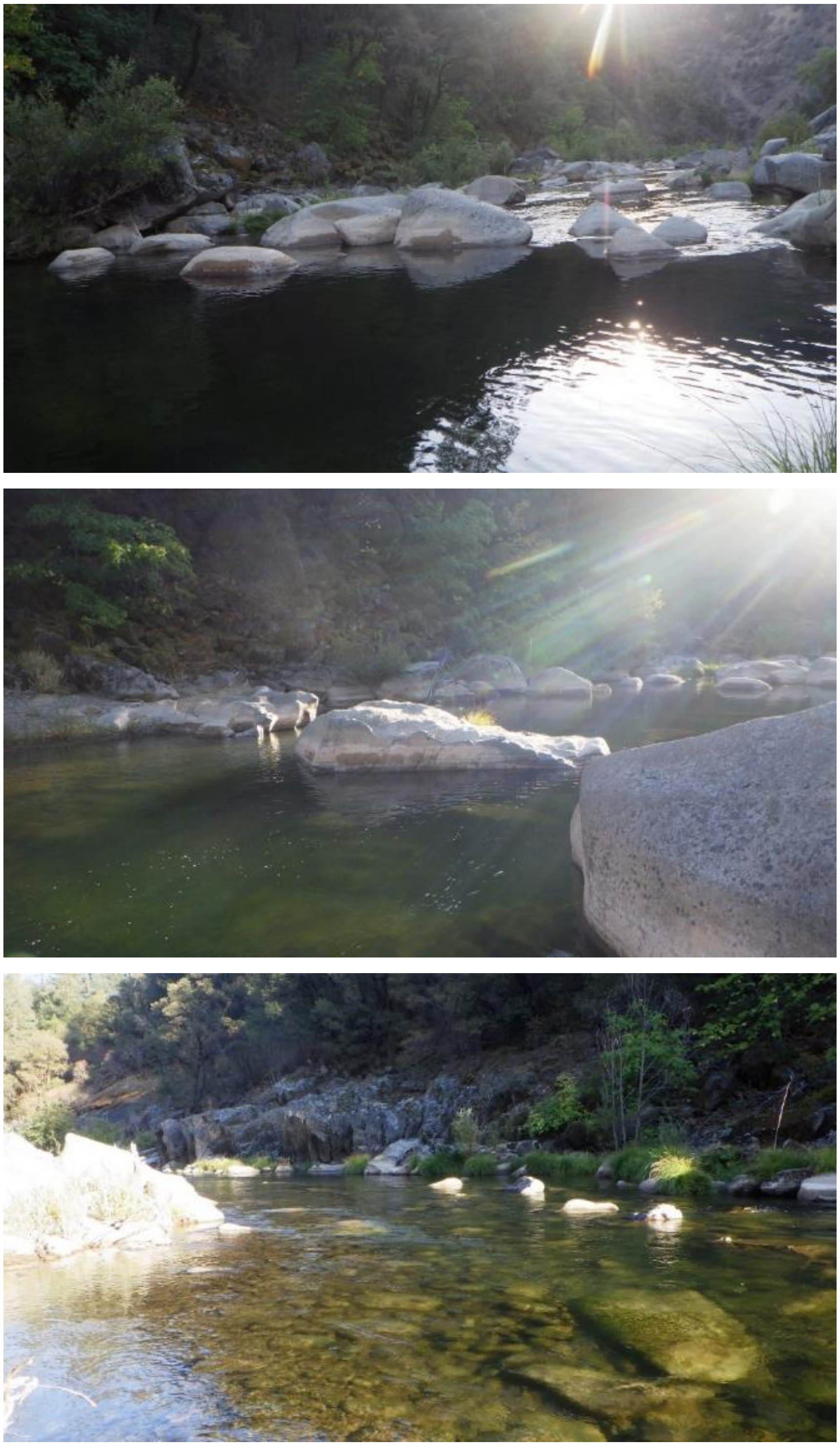

Figure B5-15. Site SCD-F2, S.F. American River, Slab Creek Dam Reach. From top: Unit #1: pool, Unit #2 - run, Unit #3 - run.

Figure B5-16. Site SCD-F2, S.F. American River, Slab Creek Dam Reach. From top: Unit #4 - riffle, Unit #5 - pool.

APPENDIX B6

Fish Population Site Conditions

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Table B6-1. Survey Site Conditions at UARP Trout Survey Locations, 2002–2020.

Date	Stream	Reach	Site Name	Habitat Section	Method	Site length (ft)	Avg. Width (ft)	Max Depth (ft)	Water Temp. (ºC)	Electric Cond. (ms)	Approx. Flow (cfs)	Percent Habitat Type			
												Pool	Riffle	Run	Glide
2020															
10/13/20	Rubicon	Rubicon River Dam	RRD-F1	Lower	E-fish	125.5	27.2	2.5	10.5	15.7	1.3	0	0	25	75
10/13/20	Rubicon	Rubicon River Dam	RRD-F1	Upper	E-fish	163.9	30.5	5.0	10.5	15.7	1.3	30	0	70	0
10/12/20	Rubicon	Rubicon River Dam	RRD-F2	Combined	E-fish	246.0	23.5	3.5	10.5	15.7	1.3	20	5	75	0
10/14/20	Little Rubicon	Buck Island Dam	BID-F1	Lower	E-fish	--[1]	--[1]	--[1]	--[1]	--[1]	--[1]	--[1]	--[1]	--[1]	--[1]
10/14/20	Little Rubicon	Buck Island Dam	BID-F1	Upper	E-fish	104.2	25.6	4.5	12.1	9.0	0.0	100	0	0	0
10/01/20	Gerle Creek	Loon Lake Dam	LLD-F3	Lower	E-fish	171.0	22.2	3.0	13.6	8.5	16.5	0	10	80	0
10/01/20	Gerle Creek	Loon Lake Dam	LLD-F3	Upper	E-fish	106.5	21.8	3.0	13.6	8.5	16.5	0	15	85	0
10/02/20	Gerle Creek	Loon Lake Dam	LLD-F2	Lower	E-fish	93.0	26.3	4.0	11.6	9.1	16.5	20	10	70	0
10/02/20	Gerle Creek	Loon Lake Dam	LLD-F2	Upper	E-fish	196.0	40.5	3.5	14.0	9.0	16.5	0	30	60	0
9/30/20	Gerle Creek	Gerle Creek Dam	GCD-F1	Lower	E-fish	137.5	35.1	3.0	14.6	11.2	10.0	20	20	60	0
9/30/20	Gerle Creek	Gerle Creek Dam	GCD-F1	Upper	E-fish	103.0	32.7	8.0	15.7	13.7	10.0	15	0	15	70
9/29/20	S.F. Rubicon	Robb's Peak Dam	RPD-F1	Lower	E-fish	153.0	36.5	3.0	14.7	15.3	16.0	10	20	40	30
9/29/20	S.F. Rubicon	Robb's Peak Dam	RPD-F1	Upper	E-fish	130.9	42.9	3.0	14.7	15.3	16.0	30	10	30	30
9/21/20	S.F. Silver Creek	Ice House Dam	IHD-F1	Lower	E-fish	135.0	26.5	4.5	10.1	75.8	11.0	0	20	50	30
9/21/20	S.F. Silver Creek	Ice House Dam	IHD-F1	Upper	E-fish	135.0	27.0	6.5	10.1	75.8	11.0	35	15	40	10
9/28/20	S.F. Silver Creek	Ice House Dam	IHD-F2	Lower	E-fish	150.0	25.5	2.0	11.6	12.6	11.0	0	20	70	10
9/28/20	S.F. Silver Creek	Ice House Dam	IHD-F2	Upper	E-fish	75.0	29.0	3.0	11.6	12.6	11.0	0	45	25	30
9/23/20	Brush Creek	Brush Creek Dam	BCD-F1	Lower	E-fish	171.0	14.3	4.0	13.6	43.3	3.0	0	25	55	20
9/23/20	Brush Creek	Brush Creek Dam	BCD-F1	Upper	E-fish	175.0	14.6	6.0	15.5	13.4	3.9	20	50	0	30
9/18/20	Silver Creek	Junction Dam	JD-F3	1	Snorkel	237.0	34.0	3.0	11.3	16.9	11.0	0	30	70	0
9/18/20	Silver Creek	Junction Dam	JD-F3	2	Snorkel	123.0	30.0	3.0	11.3	16.9	11.0	20	80	0	0
9/18/20	Silver Creek	Junction Dam	JD-F3	3	Snorkel	214.0	44.7	15.0	11.3	16.9	11.0	80	0	20	0
9/18/20	Silver Creek	Junction Dam	JD-F3	4	Snorkel	321.0	42.0	2.0	11.3	16.9	11.0	0	100	0	0
9/15/20	Silver Creek	Camino Dam	CD-F1	1	Snorkel	287.0	59.0	12.0	11.2	11.0	11.0	95	5	0	0
9/15/20	Silver Creek	Camino Dam	CD-F1	2	Snorkel	126.0	39.0	3.0	11.2	11.0	11.0	50	50	0	0
9/15/20	Silver Creek	Camino Dam	CD-F1	3	Snorkel	75.0	37.5	4.0	11.2	11.0	11.0	100	0	0	0
9/15/20	Silver Creek	Camino Dam	CD-F1	4	Snorkel	63.0	49.0	3.0	11.2	11.0	11.0	60	40	0	0
9/15/20	Silver Creek	Camino Dam	CD-F1	5	Snorkel	123.0	29.0	5.0	11.2	11.0	11.0	90	10	0	0
9/15/20	Silver Creek	Camino Dam	CD-F1	6	Snorkel	165.0	29.5	3.0	11.2	11.0	11.0	0	100	0	0

Date	Stream	Reach	Site Name	Habitat Section	Method	Site length (ft)	Avg. Width (ft)	Max Depth (ft)	Water Temp. (ºC)	Electric Cond. (ms)	Approx. Flow (cfs)	Percent Habitat Type			
												Pool	Riffle	Run	Glide
9/15/20	Silver Creek	Camino Dam	CD-F1	7	Snorkel	96.0	29.5	3.0	11.2	11.0	11.0	60	40	0	0
9/24/20	S.F. American	Slab Creek	SCD-F3	1	Snorkel	300.0	48.2	2.5	11.7	15.8	Requested	0	100	0	0
9/24/20	S.F. American	Slab Creek	SCD-F3	2	Snorkel	365.0	62.8	20+	11.7	15.8	Requested	100	0	0	0
9/24/20	S.F. American	Slab Creek	SCD-F3	3	Snorkel	262.0	25.5	2.0	11.7	15.8	Requested	0	100	0	0
9/24/20	S.F. American	Slab Creek	SCD-F3	4	Snorkel	226.0	38.5	4.0	11.7	15.8	Requested	20	35	65	0
9/24/20	S.F. American	Slab Creek	SCD-F2	1	Snorkel	75.0	58.3	8.0	14.8	16.1	Requested	100	0	0	0
9/24/20	S.F. American	Slab Creek	SCD-F2	2	Snorkel	135.0	49.0	6.0	14.8	16.1	Requested	0	0	100	0
9/24/20	S.F. American	Slab Creek	SCD-F2	3	Snorkel	238.0	40.0	2.5	14.8	16.1	Requested	0	10	90	0
9/24/20	S.F. American	Slab Creek	SCD-F2	4	Snorkel	99.0	33.6	2.0	14.8	16.1	Requested	0	100	0	0
9/24/20	S.F. American	Slab Creek	SCD-F2	5	Snorkel	80.0	52.0	8	14.8	16.1	Requested	95	5	0	0
2019															
09/11/19	Rubicon	Rubicon River Dam	RRD-F1	Lower	E-fish	126.3	29.8	2.5	15.3	13.0	7	15	30	50	5
09/11/19	Rubicon	Rubicon River Dam	RRD-F1	Upper	E-fish	160.5	38.9	5.5	15.3	13.0	7	15	5	80	0
09/12/19	Rubicon	Rubicon River Dam	RRD-F2	Combined	E-fish	250.0	27.6	3.5	15.4	15.6	7	55	15	30	0
09/10/19	Little Rubicon	Buck Island Dam	BID-F1	Lower	E-fish	226.0	11.7	2.5	18.7	9.4	1	30	25	45	0
09/10/19	Little Rubicon	Buck Island Dam	BID-F1	Upper	E-fish	123.0	42.6	4.5	18.7	9.4	1	95	0	5	0
09/03/19	Gerle Creek	Loon Lake Dam	LLD-F3	Lower	E-fish	184.7	25.3	2.5	15.4	8.4	22	0	25	65	10
09/03/19	Gerle Creek	Loon Lake Dam	LLD-F3	Upper	E-fish	111.2	22.4	3.5	15.4	8.4	22	0	15	85	0
10/01/19	Gerle Creek	Loon Lake Dam	LLD-F2	Lower	E-fish	99.1	31.1	4.0	8.9	10.1	25	0	0	90	10
10/01/19	Gerle Creek	Loon Lake Dam	LLD-F2	Upper	E-fish	212.0	42.7	1.5	8.9	10.1	25	10	15	75	0
10/02/19	Gerle Creek	Gerle Creek Dam	GCD-F1	Lower	E-fish	139.1	36.4	2.0	9.1	11.5	11	25	10	65	0
10/02/19	Gerle Creek	Gerle Creek Dam	GCD-F1	Upper	E-fish	101.8	31.9	6.0	9.1	11.5	11	40	0	60	0
10/03/19	S.F. Rubicon	Robb's Peak Dam	RPD-F1	Lower	E-fish	160.6	42.5	4.0	6.9	3.4	14	5	50	40	5
10/03/19	S.F. Rubicon	Robb's Peak Dam	RPD-F1	Upper	E-fish	160.7	40.5	3.0	6.9	3.4	14	25	50	5	20
09/05/19	S.F. Silver Creek	Ice House Dam	IHD-F1	Lower	E-fish	134.0	29.4	3.5	11.0	13.7	16	15	40	40	5
09/05/19	S.F. Silver Creek	Ice House Dam	IHD-F1	Upper	E-fish	132.5	20.9	8.0	11.0	13.7	16	20	15	65	10
09/04/19	S.F. Silver Creek	Ice House Dam	IHD-F2	Lower	E-fish	138.7	25.8	3.5	16.9	14.7	16	5	15	85	0
09/04/19	S.F. Silver Creek	Ice House Dam	IHD-F2	Upper	E-fish	226.0	29.1	3.5	16.9	14.7	16	10	25	65	0
10/4/19	Silver Creek	Junction Dam	JD-F3	1	Snorkel	177.0	29.8	4.0	6.9	13.9	17	0	10	90	0
10/4/19	Silver Creek	Junction Dam	JD-F3	2	Snorkel	171.0	32.9	3.5	6.9	13.9	17	0	100	0	0
10/4/19	Silver Creek	Junction Dam	JD-F3	3	Snorkel	262.5	43.6	15	6.9	13.9	17	100	0	0	0

Date	Stream	Reach	Site Name	Habitat Section	Method	Site length (ft)	Avg. Width (ft)	Max Depth (ft)	Water Temp. (ºC)	Electric Cond. (ms)	Approx. Flow (cfs)	Percent Habitat Type			
												Pool	Riffle	Run	Glide
10/4/19	Silver Creek	Junction Dam	JD-F3	4	Snorkel	310.0	52.8	4.0	6.9	13.9	17	0	100	0	0
9/30/19	Silver Creek	Camino Dam	CD-F1	1	Snorkel	221.0	50.9	10.0	9.8	14.5	20	100	0	0	0
9/30/19	Silver Creek	Camino Dam	CD-F1	2	Snorkel	170.0	23.3	6.0	9.8	14.5	20	50	50	0	0
9/30/19	Silver Creek	Camino Dam	CD-F1	3	Snorkel	63.0	29.5	5.0	9.8	14.5	20	100	0	0	0
9/30/19	Silver Creek	Camino Dam	CD-F1	4	Snorkel	92.0	37.4	6.0	9.8	14.5	20	50	50	0	0
9/30/19	Silver Creek	Camino Dam	CD-F1	5	Snorkel	110.5	28.9	6.0	9.8	14.5	20	100	0	0	0
9/30/19	Silver Creek	Camino Dam	CD-F1	6	Snorkel	148.0	19.2	3.0	9.8	14.5	20	0	100	0	0
9/30/19	Silver Creek	Camino Dam	CD-F1	7	Snorkel	100.0	34.0	3.0	9.8	14.5	20	85	15	0	0
10/8/19	S.F. American	Slab Creek	SCD-F3	1	Snorkel	269.0	47.0	2.5	11.1	20.2	90	0	50	50	0
10/8/19	S.F. American	Slab Creek	SCD-F3	2	Snorkel	367.5	34.4	20+	11.1	20.2	90	100	0	0	0
10/8/19	S.F. American	Slab Creek	SCD-F3	3	Snorkel	173.9	34.4	2.5	11.1	20.2	90	0	100	0	0
10/8/19	S.F. American	Slab Creek	SCD-F3	4	Snorkel	272.3	43.7	4.0	11.1	20.2	90	0	0	100	0
10/8/19	S.F. American	Slab Creek	SCD-F2	1	Snorkel	91.9	58.5	4.0	13.1	24.0	100	100	0	0	0
10/8/19	S.F. American	Slab Creek	SCD-F2	2	Snorkel	137.8	51.4	3.0	13.1	24.0	100	0	0	100	0
10/8/19	S.F. American	Slab Creek	SCD-F2	3	Snorkel	226.4	48.1	3.5	13.1	24.0	100	0	15	85	0
10/8/19	S.F. American	Slab Creek	SCD-F2	4	Snorkel	144.4	37.2	3.0	13.1	24.0	100	0	100	0	0
10/8/19	S.F. American	Slab Creek	SCD-F2	5	Snorkel	88.6	65.0	10.0	13.1	24.0	100	100	0	0	0
2005															
10/11/05	Rubicon	Rubicon River Dam	RRD-F1	Lower	E-fish	149.0	26.1	2.5	9.9	21.4	2	0	15	85	0
10/11/05	Rubicon	Rubicon River Dam	RRD-F1	Upper	E-fish	175.0	28.9	5.0	9.9	21.4	2	30	0	10	60
10/13/05	Rubicon	Rubicon River Dam	RRD-F2	Lower	E-fish	122.8	11.9	1.0	10.8	22.3	1	0	30	70	0
10/13/05	Rubicon	Rubicon River Dam	RRD-F2	Upper	E-fish	166.0	23.8	3.0	10.8	22.3	1	30	0	10	60
10/10/05	S.F Rubicon	Robbs Peak Dam	RPD-F1	Lower	E-fish	168.0	30.2	2.5	9.6	10.6	9	5	55	40	0
10/10/05	S.F Rubicon	Robbs Peak Dam	RPD-F1	Upper	E-fish	173.0	39.9	4.0	9.6	10.6	9	45	45	10	0
2004															
10/5/04	Gerle Creek	Loon Lake Dam	LLD-F1	Lower	E-Fish	212.0	23.8	4.0	13.0	4.7	9	5	30	40	25
10/5/04	Gerle Creek	Loon Lake Dam	LLD-F1	Upper	E-Fish	115.0	28.3	4.0	14.0	4.7	9	100	0	0	0
10/6/04	Gerle Creek	Loon Lake Dam	LLD-F2	Lower	E-Fish	99.5	28.9	4.0	10.8	4.7	10	0	0	0	100
10/6/04	Gerle Creek	Loon Lake Dam	LLD-F2	Upper	E-Fish	197.0	40.2	3.0	12.9	9.0	10	5	30	65	0
10/9/04	Silver Creek	Ice House Dam	IHD-F1	Lower	E-Fish	133.5	28.0	4.0	7.7	8.7	8	10	10	80	0
10/9/04	Silver Creek	Ice House Dam	IHD-F1	Upper	E-Fish	142.0	31.3	5.0	9.0	8.9	8	20	5	75	0
10/10/04	Silver Creek	Ice House Dam	IHD-F2	Lower	E-Fish	149.3	26.6	2.5	10.1	9.8	11	10	5	85	0
10/10/04	Silver Creek	Ice House Dam	IHD-F2	Upper	E-Fish	211.5	30.2	2.5	12.5	10.2	11	0	50	50	0

Date	Stream	Reach	Site Name	Habitat Section	Method	Site length (ft)	Avg. Width (ft)	Max Depth (ft)	Water Temp. (ºC)	Electric Cond. (ms)	Approx. Flow (cfs)	Percent Habitat Type			
												Pool	Riffle	Run	Glide
10/8/04	Brush Creek	Brush Creek Dam	BCD-F1	Lower	E-Fish	170.0	15.9	0	3.0	12.1	17.4	4.5	30	20	50
10/8/04	Brush Creek	Brush Creek Dam	BCD-F1	Upper	E-Fish	152.7	14.8	0	4.0	13.0	17.7	4.5	40	15	45
2003															
10/22/03	Rubicon	Rubicon River Dam	RRD-F1	Lower	E-Fish	144.0	25.3	1.5	9.5	11.2	1	0	15	85	0
10/22/03	Rubicon	Rubicon River Dam	RRD-F1	Upper	E-Fish	157.5	30.9	5.5	11.7	13.2	1	100	0	0	0
10/23/03	Rubicon	Rubicon River Dam	RRD-F2	Lower	E-Fish	129.0	14.9	1.0	7.6	16.6	1	0	30	70	0
10/23/03	Rubicon	Rubicon River Dam	RRD-F2	Upper	E-Fish	163.5	24.1	2.0	10.8	18.1	1	30	0	10	60
10/21/03	Little Rubicon	Buck Island Dam	BID-F1	Lower	E-Fish	229.0	13.2	2.0	9.8	6.5	1	0	30	70	0
10/21/03	Little Rubicon	Buck Island Dam	BID-F1	Upper	E-Fish	123.0	38.3	5.0	14.6	7.4	1	100	0	0	0
09/25/03	Gerle Creek	Loon Lake Dam	LLD-F1	Lower	E-Fish	212.6	23.9	4.0	15.6	7.4	8	5	30	40	25
09/25/03	Gerle Creek	Loon Lake Dam	LLD-F1	Upper	E-Fish	112.5	28.2	4.0	16.7	7.6	8	100	0	0	0
09/26/03	Gerle Creek	Loon Lake Dam	LLD-F2	Lower	E-Fish	97.0	24.6	4.0	12.9	8.7	8	0	0	100	0
09/26/03	Gerle Creek	Loon Lake Dam	LLD-F2	Upper	E-Fish	188.0	39.8	3.0	15.3	9.1	8	0	60	40	0
09/24/03	Gerle Creek	Gerle Creek Dam	GCD-F1	Lower	E-Fish	132.0	38.6	3.8	15.3	5.7	10	20	40	40	0
09/24/03	Gerle Creek	Gerle Creek Dam	GCD-F1	Upper	E-Fish	190.0	36.2	5.0	17.5	9.0	10	-	-	-	-
09/23/03	S.F. Rubicon	Robbs Peak Dam	RPD-F1	Lower	E-Fish	170.5	32.3	2.5	14.6	10.1	10	5	55	40	0
09/23/03	S.F. Rubicon	Robbs Peak Dam	RPD-F1	Upper	E-Fish	169.0	44.5	4.5	14.0	-	10	70	10	20	0
09/27/03	S.F. Silver Creek	Ice House Dam	IHR-F1	Lower	E-Fish	134.0	30.1	4.0	6.3	8.2	13	10	10	80	0
09/27/03	S.F. Silver Creek	Ice House Dam	IHR-F1	Upper	E-Fish	137.0	25.3	5.0	10.8	9.2	13	20	0	80	0
10/09/03	S.F. Silver Creek	Ice House Dam	IHR-F2	Lower	E-Fish	141.0	28.7	2.5	10.6	9.8	11	10	5	85	0
10/09/03	S.F. Silver Creek	Ice House Dam	IHR-F2	Upper	E-Fish	211.0	28.4	2.5	12.9	10.5	14	0	50	50	0
10/03/03	Brush Creek	Brush Creek Dam	BCD-F1	Lower	E-Fish	170.0	15.9	0	3.0	12.1	17.4	4.5	30	20	50
10/03/03	Brush Creek	Brush Creek Dam	BCD-F1	Upper	E-Fish	152.7	14.8	0	4.0	13.0	17.7	4.5	40	15	45
10/10/03	S.F. American	Slab Creek Dam	SCD-F2	Lower	E-Fish	117.5	46.1	0	12.7	20.6	35	60	0	40	0
10/10/03	S.F. American	Slab Creek Dam	SCD-F2	Upper	E-Fish	133.5	34.6	0	14.9	21.7	35	0	90	10	0
2002															
10/16/02	Rubicon	Rubicon River Dam	RRD-F1	Lower	E-Fish	150.0	29.4	1.5	9.0	20.0	5	0	15	85	0
10/16/02	Rubicon	Rubicon River Dam	RRD-F1	Upper	E-Fish	149.0	27.6	5.5	10.0	10.0	5	95	0	5	0
10/17/02	Rubicon	Rubicon River Dam	RRD-F2	Lower	E-Fish	128.0	16.7	1.5	10.0	20.0	3	0	50	50	0
10/17/02	Rubicon	Rubicon River Dam	RRD-F2	Upper	E-Fish	172.0	21.9	2.0	10.0	20.0	3	30	0	10	60
10/15/02	Little Rubicon	Buck Island Dam	BID-F1	Lower	E-Fish	231.5	13.3	2.0	10.0	10.0	5	0	30	70	0

Date	Stream	Reach	Site Name	Habitat Section	Method	Site length (ft)	Avg. Width (ft)	Max Depth (ft)	Water Temp. (ºC)	Electric Cond. (ms)	Approx. Flow (cfs)	Percent Habitat Type			
												Pool	Riffle	Run	Glide
10/15/02	Little Rubicon	Buck Island Dam	BID-F1	Upper	E-Fish	152.0	41.0	5.0	10.0	10.0	5	100	0	0	0
10/10/02	Gerle Creek	Loon Lake Dam	LLD-F2	Lower	E-Fish	102.2	27.1	4.0	12.0	9.2	15	20	0	80	0
10/10/02	Gerle Creek	Loon Lake Dam	LLD-F2	Upper	E-Fish	191.0	41.5	3.5	12.0	9.2	15	10	20	70	0
10/08/02	Gerle Creek	Gerle Creek Dam	GCD-F1	Lower	E-Fish	136.8	36.2	3.0	13.0	10.2	15	20	30	50	0
10/08/02	Gerle Creek	Gerle Creek Dam	GCD-F1	Upper	E-Fish	107.5	33.8	5.0	13.0	10.2	15	100	0	0	0
10/14/02	S.F. Rubicon	Robbs Peak Dam	RPD-F1	Lower	E-Fish	165.0	34.5	2.5	10.0	10.0	10	0	50	50	0
10/14/02	S.F. Rubicon	Robbs Peak Dam	RPD-F1	Upper	E-Fish	173.2	47.1	4.5	10.0	10.0	10	70	10	20	0
10/07/02	S.F. Silver Creek	Ice House Dam	IHD-F1	Lower	E-Fish	128.0	30.6	3.5	6.0	9.4	15	50	0	50	0
10/07/02	S.F. Silver Creek	Ice House Dam	IHD-F1	Upper	E-Fish	135.0	22.7	5.5	10.0	10.1	15	0	0	100	0
10/11/02	S.F. Silver Creek	Ice House Dam	IHD-F2	Lower	E-Fish	151.0	28.0	2.5	6.0	10.2	25	0	50	50	0
10/11/02	S.F. Silver Creek	Ice House Dam	IHD-F2	Upper	E-Fish	214.0	32.4	2.5	9.0	10.4	25	0	100	0	0
10/22/02	Silver Creek	Camino Dam	CD -F1	1	Snorkel	283.0	62.5	20.0	9.0	0	0	100	0	0	0
10/22/02	Silver Creek	Camino Dam	CD -F1	2	Snorkel	130.0	49.5	2.0	9.0	0	0	0	100	0	0
10/22/02	Silver Creek	Camino Dam	CD -F1	3	Snorkel	74.0	49.2	7.0	9.0	0	0	100	0	0	0
10/22/02	Silver Creek	Camino Dam	CD -F1	4	Snorkel	78.0	45.5	3.0	9.0	0	0	0	100	0	0
10/22/02	Silver Creek	Camino Dam	CD -F1	5	Snorkel	124.0	25.2	5.0	10.0	0	0	100	0	0	0
10/22/02	Silver Creek	Camino Dam	CD -F1	6	Snorkel	168.0	38.8	3.0	10.0	0	0	-	100	0	0
10/22/02	Silver Creek	Camino Dam	CD -F1	7	Snorkel	142.0	55.0	8.0	10.0	0	0	100	0	0	0
10/30/02	S.F. American	Slab Creek Dam	SCD-F2	Lower	E-Fish	123.0	46.0	5.0	10.0	30.0	25	70	0	30	0
10/29/02	S.F. American	Slab Creek Dam	SCD-F2	Upper	E-Fish	112.8	38.5	3.0	10.0	30.0	25	0	100	0	0

-- = no data, [1] Segment not surveyed due to lack of flow

Table B6-2. Substrate, Cover, and Visibility Conditions at UARP Trout Survey Locations, 2002–2020.

						Percent Cover							Percent Substrate						
Date	Stream	Reach	Site Name	Habitat Section	Method	Under-cut Bank	In-stream Veg	Over-hanging Veg	LWD	Bubble	Large Boulder	No Cover	Bed	Bldr	Cob	Grvl	Snd	Silt	Vis (ft)
2020																			
10/13/20	Rubicon	Rubicon River Dam	RRD-F1	Lower	E-fish	0	0	0	0	0	35	65	80	10	10	0	0	0	2.5
10/13/20	Rubicon	Rubicon River Dam	RRD-F1	Upper	E-fish	0	0	0	0	0	30	70	30	50	10	10	0	0	5.0
10/12/20	Rubicon	Rubicon River Dam	RRD-F2	Combined	E-fish	5	0	12	3	0	0	80	0	0	5	15	10	70	3.5
10/14/20	Little Rubicon	Buck Island Dam	BID-F1	Lower	E-fish	--[1]	--[1]	--[1]	--[1]	--[1]	--[1]	--[1]	--[1]	--[1]	--[1]	--[1]	--[1]	--[1]	--[1]
10/14/20	Little Rubicon	Buck Island Dam	BID-F1	Upper	E-fish	0	0	0	20	0	30	50	3	65	15	5	10	2	4.5
10/01/20	Gerle Creek	Loon Lake Dam	LLD-F3	Lower	E-fish	2	0	30	3	0	0	65	0	20	80	0	0	0	3.0
10/01/20	Gerle Creek	Loon Lake Dam	LLD-F3	Upper	E-fish	0	0	15	0	10	0	75	0	20	80	0	0	0	3.0
10/02/20	Gerle Creek	Loon Lake Dam	LLD-F2	Lower	E-fish	0	0	0	0	10	20	70	0	60	40	0	0	0	4.0
10/02/20	Gerle Creek	Loon Lake Dam	LLD-F2	Upper	E-fish	0	0	5	0	15	20	60	0	60	30	10	0	0	3.5
9/30/20	Gerle Creek	Gerle Creek Dam	GCD-F1	Lower	E-fish	3	15	15	0	4	3	60	20	50	25	5	0	0	3.0
9/30/20	Gerle Creek	Gerle Creek Dam	GCD-F1	Upper	E-fish	2	0	5	0	0	8	85	60	25	10	5	0	0	8.0
9/29/20	S.F. Rubicon	Robb's Peak Dam	RPD-F1	Lower	E-fish	5	10	15	0	0	10	60	85	7	5	0	0	3	3.0
9/29/20	S.F. Rubicon	Robb's Peak Dam	RPD-F1	Upper	E-fish	3	5	10	0	2	10	70	65	35	10	0	0	0	3.0
9/21/20	S.F. Silver Creek	Ice House Dam	IHD-F1	Lower	E-fish	0	0	5	0	2	20	73	70	20	0	0	10	0	4.5
9/21/20	S.F. Silver Creek	Ice House Dam	IHD-F1	Upper	E-fish	0	0	5	0	5	25	65	35	30	15	20	0	0	6.5
9/28/20	S.F. Silver Creek	Ice House Dam	IHD-F2	Lower	E-fish	1	0	0	0	5	4	90	50	40	10	0	0	0	2.0
9/28/20	S.F. Silver Creek	Ice House Dam	IHD-F2	Upper	E-fish	0	0	10	0	2	2	86	60	10	20	10	0	0	3.0
9/23/20	Brush Creek	Brush Creek Dam	BCD-F1	Lower	E-fish	15	15	5	10	5	5	45	0	25	25	50	0	0	4.0
9/23/20	Brush	Brush Creek	BCD-F1	Upper	E-fish	0	0	40	10	5	5	40	5	20	25	25	5	25	6.0

						Percent Cover							Percent Substrate						
Date	Stream	Reach	Site Name	Habitat Section	Method	Under-cut Bank	In-stream Veg	Over-hanging Veg	LWD	Bubble	Large Boulder	No Cover	Bed	Bldr	Cob	Grvl	Snd	Silt	Vis (ft)
	Creek	Dam																	
9/18/20	Silver Creek	Junction Dam	JD-F3	1	Snorkel	0	0	5	0	5	30	60	25	40	20	15	0	0	3.0
9/18/20	Silver Creek	Junction Dam	JD-F3	2	Snorkel	0	0	5	5	5	5	80	25	25	50	0	0	0	3.0
9/18/20	Silver Creek	Junction Dam	JD-F3	3	Snorkel	0	5	0	0	2	15	78	30	35	35	0	0	0	15.0
9/18/20	Silver Creek	Junction Dam	JD-F3	4	Snorkel	0	0	10	0	10	5	75	0	30	60	10	0	0	2.0
9/15/20	Silver Creek	Camino Dam	CD-F1	1	Snorkel	0	0	0	2	0	10	88	5	60	30	3	2	0	12.0
9/15/20	Silver Creek	Camino Dam	CD-F1	2	Snorkel	0	0	2	0	5	10	83	5	40	40	10	3	2	3.0
9/15/20	Silver Creek	Camino Dam	CD-F1	3	Snorkel	0	0	0	0	2	5	93	10	70	20	0	0	0	4.0
9/15/20	Silver Creek	Camino Dam	CD-F1	4	Snorkel	0	0	0	0	0	15	85	80	20	0	0	0	0	3.0
9/15/20	Silver Creek	Camino Dam	CD-F1	5	Snorkel	0	0	0	0	0	5	95	30	40	30	0	0	0	5.0
9/15/20	Silver Creek	Camino Dam	CD-F1	6	Snorkel	0	0	0	0	0	15	85	20	80	0	0	0	0	3.0
9/15/20	Silver Creek	Camino Dam	CD-F1	7	Snorkel	0	0	0	0	0	2	98	50	40	10	0	0	0	3.0
9/24/20	S.F. American	Slab Creek	SCD-F3	1	Snorkel	0	0	2	0	30	5	63	10	60	30	0	0	0	2.5
9/24/20	S.F. American	Slab Creek	SCD-F3	2	Snorkel	0	0	3	0	3	5	89	15	50	35	0	0	0	20+
9/24/20	S.F. American	Slab Creek	SCD-F3	3	Snorkel	0	0	0	0	60	0	40	0	65	35	0	0	0	2.0
9/24/20	S.F. American	Slab Creek	SCD-F3	4	Snorkel	0	0	0	0	15	0	85	0	70	30	0	0	0	4.0
9/24/20	S.F. American	Slab Creek	SCD-F2	1	Snorkel	0	0	5	0	0	0	95	20	60	10	5	5	0	8.0
9/24/20	S.F. American	Slab Creek	SCD-F2	2	Snorkel	0	0	5	0	5	0	90	20	60	10	5	5	0	6.0
9/24/20	S.F. American	Slab Creek	SCD-F2	3	Snorkel	2	0	5	0	8	0	85	0	90	10	0	0	0	2.5
9/24/20	S.F. American	Slab Creek	SCD-F2	4	Snorkel	0	0	5	0	0	40	55	0	90	10	0	0	0	2.0

Date	Stream	Reach	Site Name	Habitat Section	Method	Percent Cover							Percent Substrate						Vis (ft)
						Under-cut Bank	In-stream Veg	Over-hanging Veg	LWD	Bubble	Large Boulder	No Cover	Bed	Bldr	Cob	Grvl	Snd	Silt	
9/24/20	S.F. American	Slab Creek	SCD-F2	5	Snorkel	0	0	0	0	2	30	68	0	95	0	0	0	5	8.0
2019																			
09/11/19	Rubicon	Rubicon River Dam	RRD-F1	Lower	E-fish	5	5	10	0	0	20	60	35	40	10	10	5	0	5.5
09/11/19	Rubicon	Rubicon River Dam	RRD-F1	Upper	E-fish	5	10	5	0	0	25	55	40	40	10	8	3	0	5.5
09/12/19	Rubicon	Rubicon River Dam	RRD-F2	Combined	E-fish	5	5	15	5	0	0	70	0	0	5	50	30	15	3.5
09/10/19	Little Rubicon	Buck Island Dam	BID-F1	Lower	E-fish	0	0	0	0	0	40	60	25	60	10	5	0	0	4.5
09/10/19	Little Rubicon	Buck Island Dam	BID-F1	Upper	E-fish	5	0	10	0	0	15	75	5	50	20	5	20	0	4.5
09/03/19	Gerle Creek	Loon Lake Dam	LLD-F3	Lower	E-fish	0	10	20	0	0	0	70	0	20	60	20	0	0	3.5
09/03/19	Gerle Creek	Loon Lake Dam	LLD-F3	Upper	E-fish	5	0	15	0	0	0	80	0	15	55	30	0	0	3.5
10/01/19	Gerle Creek	Loon Lake Dam	LLD-F2	Lower	E-fish	5	5	0	0	0	10	80	0	80	20	0	0	0	4.0
10/01/19	Gerle Creek	Loon Lake Dam	LLD-F2	Upper	E-fish	0	15	0	0	5	5	75	0	70	25	5	0	0	4.0
10/02/19	Gerle Creek	Gerle Creek Dam	GCD-F1	Lower	E-fish	0	55	10	0	5	10	20	0	60	35	5	0	0	6.0
10/02/19	Gerle Creek	Gerle Creek Dam	GCD-F1	Upper	E-fish	10	5	20	0	0	10	55	70	10	20	0	0	0	6.0
10/03/19	S.F. Rubicon	Robb's Peak Dam	RPD-F1	Lower	E-fish	5	5	10	0	10	10	60	90	10	0	0	0	0	4.0
10/03/19	S.F. Rubicon	Robb's Peak Dam	RPD-F1	Upper	E-fish	0	0	15	0	5	20	60	70	15	5	5	5	0	4.0
09/05/19	S.F. Silver Creek	Ice House Dam	IHD-F1	Lower	E-fish	5	5	20	0	0	30	40	60	15	10	10	5	0	8.0
09/05/19	S.F. Silver Creek	Ice House Dam	IHD-F1	Upper	E-fish	0	0	15	0	0	30	55	50	20	5	5	15	0	8.0
09/04/19	S.F. Silver Creek	Ice House Dam	IHD-F2	Lower	E-fish	5	0	10	0	0	10	75	50	25	20	5	0	0	3.5
09/04/19	S.F. Silver Creek	Ice House Dam	IHD-F2	Upper	E-fish	5	5	5	0	0	10	75	40	30	20	5	5	0	3.5
10/4/19	Silver Creek	Junction Dam	JD-F3	1	Snorkel	0	0	0	0	0	30	70	35	40	20	5	0	0	37.2

Date	Stream	Reach	Site Name	Habitat Section	Method	Percent Cover							Percent Substrate						Vis (ft)
						Under-cut Bank	In-stream Veg	Over-hanging Veg	LWD	Bubble	Large Boulder	No Cover	Bed	Bldr	Cob	Grvl	Snd	Silt	
10/4/19	Silver Creek	Junction Dam	JD-F3	2	Snorkel	0	0	0	0	20	30	50	20	50	20	10	0	0	37.2
10/4/19	Silver Creek	Junction Dam	JD-F3	3	Snorkel	0	0	0	0	0	35	65	25	25	25	25	0	0	37.2
10/4/19	Silver Creek	Junction Dam	JD-F3	4	Snorkel	0	0	0	0	0	20	80	0	60	30	10	0	0	37.2
9/30/19	Silver Creek	Camino Dam	CD-F1	1	Snorkel	0	1	0	0	0	10	89	5	45	40	10	0	0	16.0
9/30/19	Silver Creek	Camino Dam	CD-F1	2	Snorkel	0	0	0	0	20	15	65	10	40	25	25	0	0	16.0
9/30/19	Silver Creek	Camino Dam	CD-F1	3	Snorkel	5	0	15	0	5	15	60	65	35	0	0	0	0	16.0
9/30/19	Silver Creek	Camino Dam	CD-F1	4	Snorkel	0	5	0	0	15	25	55	50	30	20	0	0	0	16.0
9/30/19	Silver Creek	Camino Dam	CD-F1	5	Snorkel	0	0	5	0	5	15	75	40	35	25	0	0	0	16.0
9/30/19	Silver Creek	Camino Dam	CD-F1	6	Snorkel	0	0	0	0	60	20	20	40	40	20	0	0	0	16.0
9/30/19	Silver Creek	Camino Dam	CD-F1	7	Snorkel	0	0	0	0	15	20	65	35	40	25	0	0	0	16.0
10/8/19	S.F. American	Slab Creek	SCD-F3	1	Snorkel	0	0	10	0	15	10	65	0	60	25	25	0	0	12.1
10/8/19	S.F. American	Slab Creek	SCD-F3	2	Snorkel	0	0	10	0	0	0	90	40	40	20	0	0	0	12.1
10/8/19	S.F. American	Slab Creek	SCD-F3	3	Snorkel	0	0	0	0	70	10	20	0	70	30	0	0	0	12.1
10/8/19	S.F. American	Slab Creek	SCD-F3	4	Snorkel	0	0	0	0	0	20	80	0	70	30	0	0	0	12.1
10/8/19	S.F. American	Slab Creek	SCD-F2	1	Snorkel	0	0	5	0	0	10	85	0	30	30	20	20	0	13.5
10/8/19	S.F. American	Slab Creek	SCD-F2	2	Snorkel	0	5	0	0	0	20	75	20	55	20	5	0	0	13.5
10/8/19	S.F. American	Slab Creek	SCD-F2	3	Snorkel	5	0	10	0	10	10	65	20	35	30	10	5	0	13.5
10/8/19	S.F. American	Slab Creek	SCD-F2	4	Snorkel	0	0	10	0	45	10	35	0	80	20	0	0	0	13.5
10/8/19	S.F. American	Slab Creek	SCD-F2	5	Snorkel	0	0	0	0	0	30	70	20	40	40	0	0	0	13.5

Date	Stream	Reach	Site Name	Habitat Section	Method	Percent Cover							Percent Substrate						Vis (ft)
						Under-cut Bank	In-stream Veg	Over-hanging Veg	LWD	Bubble	Large Boulder	No Cover	Bed	Bldr	Cob	Grvl	Snd	Silt	
2005																			
10/11/05	Rubicon	Rubicon River Dam	RRD-F1	Lower	E-fish	10	0	10	0	0	40	40	40	30	15	5	5	0	Max
10/11/05	Rubicon	Rubicon River Dam	RRD-F1	Upper	E-fish	0	0	0	0	0	70	30	20	50	15	10	5	0	Max
10/13/05	Rubicon	Rubicon River Dam	RRD-F2	Lower	E-fish	10	0	5	0	0	0	85	0	0	0	80	20	0	Max
10/13/05	Rubicon	Rubicon River Dam	RRD-F2	Upper	E-fish	10	0	15	0	0	0	75	1	0	5	74	20	0	Max
10/10/05	S.F Rubicon	Robbs Peak Dam	RPD-F1	Lower	E-fish	0	5	0	0	0	5	90	95	5	0	0	0	0	Max
10/10/05	S.F Rubicon	Robbs Peak Dam	RPD-F1	Upper	E-fish	10	5	5	0	0	50	30	40	25	10	5	10	10	Max
2004																			
10/5/04	Gerle Creek	Loon Lake Dam	LLD-F1	Lower	E-Fish	0	0	20	0	0	5	65	40	40	15	5	0	0	max
10/5/04	Gerle Creek	Loon Lake Dam	LLD-F1	Upper	E-Fish	10	0	20	0	0	5	65	15	15	55	10	0	5	max
10/6/04	Gerle Creek	Loon Lake Dam	LLD-F2	Lower	E-Fish	0	0	0	0	0	40	50	5	75	50	0	0	0	max
10/6/04	Gerle Creek	Loon Lake Dam	LLD-F2	Upper	E-Fish	0	5	0	0	0	40	55	0	45	45	10	2	2	max
10/9/04	Silver Creek	Ice House Dam	IHD-F1	Lower	E-Fish	0	0	5	0	0	20	75	60	30	0	0	5	5	max
10/9/04	Silver Creek	Ice House Dam	IHD-F1	Upper	E-Fish	0	0	10	0	0	30	60	70	15	5	10	0	0	max
10/10/04	Silver Creek	Ice House Dam	IHD-F2	Lower	E-Fish	0	2	7	0	0	5	86	60	10	20	75	25	0	max
10/10/04	Silver Creek	Ice House Dam	IHD-F2	Upper	E-Fish	0	1	3	0	0	5	91	30	25	40	2	2	0	max
10/8/04	Brush Creek	Brush Creek Dam	BCD-F1	Lower	E-Fish	0	20	60	0	0	10	10	10	30	20	35	5	0	max
10/8/04	Brush Creek	Brush Creek Dam	BCD-F1	Upper	E-Fish	0	5	30	0	0	10	40	10	30	15	10	20	15	max
2003																			
10/22/03	Rubicon	Rubicon River Dam	RRD-F1	Lower	E-Fish	0	0	3	0	0	20	77	40	30	20	5	5	0	2
10/22/03	Rubicon	Rubicon River Dam	RRD-F1	Upper	E-Fish	0	0	0	0	0	30	70	50	35	5	5	5	0	4

Date	Stream	Reach	Site Name	Habitat Section	Method	Percent Cover							Percent Substrate						Vis (ft)
						Under-cut Bank	In-stream Veg	Over-hanging Veg	LWD	Bubble	Large Boulder	No Cover	Bed	Bldr	Cob	Grvl	Snd	Silt	
10/23/03	Rubicon	Rubicon River Dam	RRD-F2	Lower	E-Fish	5	0	5	0	0	0	90	0	0	0	90	10	0	1
10/23/03	Rubicon	Rubicon River Dam	RRD-F2	Upper	E-Fish	5	0	20	0	0	0	75	1	0	1	78	15	5	4
10/21/03	Little Rubicon	Buck Island Dam	BID-F1	Lower	E-Fish	0	1	1	0	0	27	71	47	46	0	2	5	0	2
10/21/03	Little Rubicon	Buck Island Dam	BID-F1	Upper	E-Fish	0	2	3	0	0	30	65	56	30	0	2	5	0	5
09/25/03	Gerle Creek	Loon Lake Dam	LLD-F1	Lower	E-Fish	0	0	20	0	0	15	65	40	40	15	5	0	0	4
09/25/03	Gerle Creek	Loon Lake Dam	LLD-F1	Upper	E-Fish	10	0	20	0	0	5	65	15	15	55	10	0	5	4
09/26/03	Gerle Creek	Loon Lake Dam	LLD-F2	Lower	E-Fish	0	0	10	0	0	40	50	5	75	20	0	0	0	4
09/26/03	Gerle Creek	Loon Lake Dam	LLD-F2	Upper	E-Fish	0	5	0	0	0	40	55	0	40	50	10	0	0	3
09/24/03	Gerle Creek	Gerle Creek Dam	GCD-F1	Lower	E-Fish	0	0	40	0	0	20	30	50	20	15	10	0	5	4
09/24/03	Gerle Creek	Gerle Creek Dam	GCD-F1	Upper	E-Fish	0	0	5	0	0	15	80	90	8	1	1	0	0	5
09/23/03	S.F. Rubicon	Robbs Peak Dam	RPD-F1	Lower	E-Fish	0	5	5	0	0	0	90	90	10	0	0	0	0	3
09/23/03	S.F. Rubicon	Robbs Peak Dam	RPD-F1	Upper	E-Fish	0	3	3	0	0	15	79	90	5	3	0	2	0	5
09/27/03	S.F. Silver Creek	Ice House Dam	IHR-F1	Lower	E-Fish	0	0	5	0	0	20	75	60	30	0	0	5	5	4
09/27/03	S.F. Silver Creek	Ice House Dam	IHR-F1	Upper	E-Fish	0	0	10	0	0	50	40	70	15	5	10	0	0	5
10/09/03	S.F. Silver Creek	Ice House Dam	IHR-F2	Lower	E-Fish	0	2	7	0	0	5	86	60	10	20	7.5	2.5	0	3
10/09/03	S.F. Silver Creek	Ice House Dam	IHR-F2	Upper	E-Fish	0	1	3	0	0	5	91	30	25	40	2	2	1	3
10/03/03	Brush Creek	Brush Creek Dam	BCD-F1	Upper	E-Fish	0	20	60	0	0	10	0	10	30	20	35	5	0	max
10/03/03	Brush Creek	Brush Creek Dam	BCD-F1	Lower	E-Fish	0	5	30	0	0	10	40	10	30	15	10	30	5	6
10/10/03	S.F. American	Slab Creek Dam	SCD-F2	Lower	E-Fish	0	3	5	0	0	30	62	5	45	50	0	0	0	max
10/10/03	S.F. American	Slab Creek Dam	SCD-F2	Upper	E-Fish	0	3	0	0	0	20	77	10	65	20	5	0	0	max

Date	Stream	Reach	Site Name	Habitat Section	Method	Percent Cover							Percent Substrate						Vis (ft)
						Under-cut Bank	In-stream Veg	Over-hanging Veg	LWD	Bubble	Large Boulder	No Cover	Bed	Bldr	Cob	Grvl	Snd	Silt	
2002																			
10/16/02	Rubicon	Rubicon River Dam	RRD-F1	Lower	E-Fish	0	0	0	0	0	90	10	70	20	0	5	5	0	max
10/16/02	Rubicon	Rubicon River Dam	RRD-F1	Upper	E-Fish	0	0	0	0	0	60	40	50	40	5	5	0	0	max
10/17/02	Rubicon	Rubicon River Dam	RRD-F2	Lower	E-Fish	20	5	20	0	0	0	55	0	0	10	60	30	0	max
10/17/02	Rubicon	Rubicon River Dam	RRD-F2	Upper	E-Fish	10	5	20	0	0	65	0	0	0	5	40	40	15	max
10/15/02	Little Rubicon	Buck Island Dam	BID-F1	Lower	E-Fish	0	1	1	0	0	27	71	47	46	0	2	5	0	max
10/15/02	Little Rubicon	Buck Island Dam	BID-F1	Upper	E-Fish	0	2	3	0	0	85	10	56	30	0	2	10	2	max
10/10/02	Gerle Creek	Loon Lake Dam	LLD-F2	Lower	E-Fish	0	10	15	0	0	65	10	60	30	5	3	3	0	max
10/10/02	Gerle Creek	Loon Lake Dam	LLD-F2	Upper	E-Fish	2	0	10	0	0	83	5	20	60	10	8	2	0	max
10/08/02	Gerle Creek	Gerle Creek Dam	GCD-F1	Lower	E-Fish	2	0	0	0	0	93	5	0	80	15	4	1	0	max
10/08/02	Gerle Creek	Gerle Creek Dam	GCD-F1	Upper	E-Fish	0	0	2.5	0	0	94	2.5	0	80	15	4	1	0	max
10/14/02	S.F. Rubicon	Robbs Peak Dam	RPD-F1	Lower	E-Fish	3	1	7	0	0	84	5	55	15	5	10	5	10	max
10/14/02	S.F. Rubicon	Robbs Peak Dam	RPD-F1	Upper	E-Fish	0	0	2.5	0	0	95	2.5	95	5	0	0	0	0	max
10/07/02	S.F. Silver Creek	Ice House Dam	IHD-F1	Lower	E-Fish	0	2	3	0	0	90	5	99	0	0	1	1	0	max
10/07/02	S.F. Silver Creek	Ice House Dam	IHD-F1	Upper	E-Fish	1	1	3	0	0	90	5	95	2	1	1	1	0	max
10/11/02	S.F. Silver Creek	Ice House Dam	IHD-F2	Lower	E-Fish	0	2	2	0	0	94	2	85	10	0	0	5	0	max
10/11/02	S.F. Silver Creek	Ice House Dam	IHD-F2	Upper	E-Fish	0	0	2	0	0	88	10	40	40	0	15	5	0	max
10/22/02	Silver Creek	Camino Dam	CD -F1	1	Snorkel	5	1	1	0	0	88	5	60	10	10	10	5	5	max
10/22/02	Silver Creek	Camino Dam	CD -F1	2	Snorkel	0	1	2	0	0	97	0	60	20	11	2	2	5	max
10/22/02	Silver Creek	Camino Dam	CD -F1	3	Snorkel	5	0	0	0	0	10	85	60	25	5	5	5	0	11

Date	Stream	Reach	Site Name	Habitat Section	Method	Percent Cover							Percent Substrate						Vis (ft)
						Under-cut Bank	In-stream Veg	Over-hanging Veg	LWD	Bubble	Large Boulder	No Cover	Bed	Bldr	Cob	Grvl	Snd	Silt	
10/22/02	Silver Creek	Camino Dam	CD -F1	4	Snorkel	0	0	0	0	15	75	10	0	75	10	10	5	0	12
10/22/02	Silver Creek	Camino Dam	CD -F1	5	Snorkel	5	0	0	0	5	15	75	30	60	5	3	3	0	12
10/22/02	Silver Creek	Camino Dam	CD -F1	6	Snorkel	5	0	0	0	10	50	35	50	35	10	5	0	0	12
10/22/02	Silver Creek	Camino Dam	CD -F1	7	Snorkel	0	0	0	0	0	40	60	15	70	5	5	5	0	12
10/30/02	S.F. American	Slab Creek Dam	SCD-F2	Lower	E-Fish	0	0	0	0	20	60	20	35	55	5	5	0	0	12
10/29/02	S.F. American	Slab Creek Dam	SCD-F2	Upper	E-Fish	0	0	0	0	0	10	90	45	45	5	0	0	5	12

Bed = Bedrock
Bldr = Boulder
Cob = Cobble
Grvl = Gravel
LWD = Large woody debris
Snd = Sand
Vis = Visibility
Veg = Vegetation

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APPENDIX C1

Benthic Macroinvertebrate Site Photos

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Facing upstream from Transect A

Facing downstream from Transect F

Facing upstream from Transect F

Facing downstream from Transect K

Figure C1-1. Photographs of the Rubicon River at Sample Site RRD-I2, 2020.

Facing upstream from Transect A

Facing downstream from Transect F

Facing upstream from Transect F

Facing downstream from Transect K

Figure C1-2. Photographs of Gerle Creek at Sample Site LLD-I3, 2020.

Facing upstream from Transect A

Facing downstream from Transect F

Facing upstream from Transect F

Facing downstream from Transect K

Figure C1-3. Photographs of Gerle Creek at Sample Site GCD-I2, 2020.

Facing upstream from Transect A

Facing downstream from Transect F

Facing upstream from Transect F

Facing downstream from Transect K

Figure C1-4. Photographs of the South Fork Rubicon River at Sample Site RPD-I2, 2020.

Facing upstream from Transect A

Facing downstream from Transect F

Facing upstream from Transect F

Facing downstream from Transect K

Figure C1-5. Photographs of South Fork Silver Creek at Sample Site IHD-I2, 2020.

Facing upstream from Transect A

Facing downstream from Transect F

Facing upstream from Transect F

Facing downstream from Transect K

Figure C1-6. Photographs of Silver Creek at Sample Site JD-I1, 2020.

Facing upstream from Transect A

Facing downstream from Transect F

Facing upstream from Transect F

Facing downstream from Transect K

Figure C1-7. Photographs of Silver Creek at Sample Site JD-I4, 2020.

Facing upstream from Transect A

Facing downstream from Transect F

Facing upstream from Transect F

Facing downstream from Transect K

Figure C1-8. Photographs of the Rubicon River at Site CD-I2, 2020.

Facing upstream from Transect A

Facing downstream from Transect F

Facing upstream from Transect F

Facing downstream from Transect K

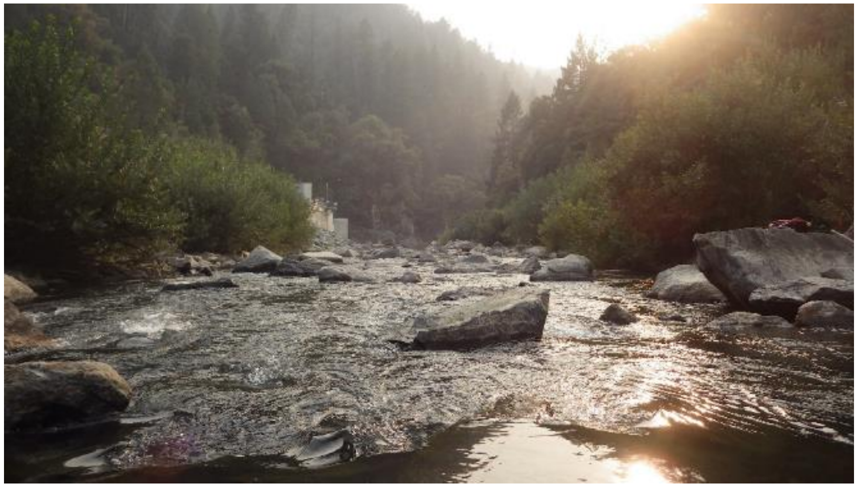
Figure C1-9. Photographs of Silver Creek at Sample Site CD-I3, 2020.

Facing upstream from Transect A

No Photo

Facing downstream from Transect F

Facing upstream from Transect F



Facing downstream from Transect K

Figure C1-10. Photographs of the South Fork American River at Sample Site SCD-I1, 2020.

Facing upstream from Transect A

Facing downstream from Transect F

Facing upstream from Transect F

Facing downstream from Transect K

Figure C1-11. Photographs of the South Fork American River at Sample Site SCD-I3, 2020

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APPENDIX C2

Interlaboratory Quality Control Report

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January 26, 2021

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Bioassessment Services
P.O. Box 0752
Folsom, CA 95763-0752

Dear Tom,

Attached are the results of my QC analysis of one benthic macroinvertebrate sample submitted from the Upper American River and Chili Bar projects. The results are presented in an Excel attachment composed of four pages and include SWAMP MQO's as suggested by Rehn et al. (2015). This QC analysis was performed in accordance to the Southwest Association of Freshwater Invertebrate Taxonomists (SAFIT)'s Standard Taxonomic Effort Document (STE) 1 March 2011 version, Level I (Richards and Rogers, 2011) with the following exception: the Chironomidae were analyzed at the subfamily/tribe level, SAFIT Level 1a.

There were no counting errors and three misidentifications. Two of the misidentifications involved early instar midge larvae. A very small Chironomini with distorted eyespots and a small Diamesinae were in the Orthocladiinae vial. The third misidentification involved an Empididae larva. I would consider the larva called *Clinocera* to be *Trichoclinocera* based on the key in Merritt et al. (2019). It would key to *Clinocera* in older keys.

SWAMP assessment MQO's were all well below the threshold error rate. I welcome any questions, comments, disagreements, etc. regarding this report.

Sincerely,

Jonathan Lee
Jon Lee Consulting
2337 15th Street
Eureka, CA
707-441-9347

Literature cited.

Merritt, R. W., K. W. Cummins and M. B. Berg (editors). 2019. An introduction to the aquatic insects of North America, fifth edition, xviii + 1480 pp. Kendall/Hunt Publishing Company, Dubuque, Iowa.

Rehn, A. C., J. Slusark, and M. A. Sigala. 2015. Standard operating procedures for external quality control of benthic macroinvertebrate taxonomy data collected for stream bioassessment in California. California State Water Resources Control Board Surface Water Ambient Monitoring Program (SWAMP) Bioassessment, SWAMP-SOP-2015-0002.

Richards, A. B., and D. C. Rogers. 2011. Southwest Association of Freshwater Invertebrate Taxonomists (SAFIT) List of Freshwater Macroinvertebrate Taxa from California and Adjacent States including Standard Taxonomic Effort Levels. Version: 1 March 2011.

APPENDIX C3

BENTHIC MACROINVERTEBRATE TAXONOMIC LIST

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Table C3-1. List of Benthic Macroinvertebrate Taxa Identified by Site for Benthic Macroinvertebrate Samples Collected from the Upper American River Project in 2020.

Phylum	Class	Order	Family	Final ID	TV[1]	FFG[2]	RRD-I2	LLD-I3	GCD-I2	RPD-I2	IHD-I2	JD-I1	JD-I4	CD-I2	CD-I3	SCD-I1	SCD-I3	SCD-I3 (rep)
Arthropoda	Insecta	Coleoptera	Dytiscidae	*Stictotarsus*	5	p	4											
Arthropoda	Insecta	Coleoptera	Elmidae	*Ampumixis dispar*	4	cg		2	1	8					2			
Arthropoda	Insecta	Coleoptera	Elmidae	*Cleptelmis addenda*	4	cg	3		1	2			2		2			
Arthropoda	Insecta	Coleoptera	Elmidae	*Dubiraphia*	6	cg											1	1
Arthropoda	Insecta	Coleoptera	Elmidae	Elmidae	4	cg		2		1								
Arthropoda	Insecta	Coleoptera	Elmidae	*Heterlimnius*	4	cg					6							
Arthropoda	Insecta	Coleoptera	Elmidae	*Microcylloepus*	4	cg									2		1	
Arthropoda	Insecta	Coleoptera	Elmidae	*Narpus*	4	cg												1
Arthropoda	Insecta	Coleoptera	Elmidae	*Optioservus*	4	sc			3	4			1	12	7		4	4
Arthropoda	Insecta	Coleoptera	Elmidae	*Ordobrevia nubifera*	4	sc	1	5	1	1			1	7	11		2	
Arthropoda	Insecta	Coleoptera	Elmidae	*Zaitzevia*	4	sc	4	5						9	6		1	2
Arthropoda	Insecta	Coleoptera	Psephenidae	*Eubrianax edwardsii*	4	sc	15	3		3				1	1			
Arthropoda	Insecta	Diptera	Ceratopogonidae	*Atrichopogon*	6	cg								1	2			
Arthropoda	Insecta	Diptera	Ceratopogonidae	*Bezzia/ Palpomyia*	6	p	1	4			1							
Arthropoda	Insecta	Diptera	Chironomidae	*Chironomini*	6	cg	36	28	46	6	9	1	1	2	3	2	17	26
Arthropoda	Insecta	Diptera	Chironomidae	*Diamesinae*	2	cg	1	1	1		11	51	36	5		10	1	4
Arthropoda	Insecta	Diptera	Chironomidae	*Orthocladiinae*	5	cg	9	43	63	50	38	66	87	33	19	96	49	37
Arthropoda	Insecta	Diptera	Chironomidae	*Pseudochironomus*	5	cg			1					6	2	1		
Arthropoda	Insecta	Diptera	Chironomidae	*Tanypodinae*	7	p	11	7	17	3	17		14	20	3	59	11	16
Arthropoda	Insecta	Diptera	Chironomidae	*Tanytarsini*	6	cg	130	66	53	14	208	272	105	170	16	180	26	51
Arthropoda	Insecta	Diptera	Dixidae	*Dixa*	2	cg		1										
Arthropoda	Insecta	Diptera	Dixidae	*Dixidae*	2	cg	1										1	
Arthropoda	Insecta	Diptera	Empididae	*Clinocera*	6	p				1	1		1				1	2
Arthropoda	Insecta	Diptera	Empididae	Empididae	6	p									3			
Arthropoda	Insecta	Diptera	Empididae	*Hemerodromia*	6	p	1									2	2	2
Arthropoda	Insecta	Diptera	Empididae	*Neoplasta*	6	p	1		3	1	2	1	3		4	16		
Arthropoda	Insecta	Diptera	Empididae	*Wiedemannia*	6	p		2						2			2	2
Arthropoda	Insecta	Diptera	Ephydridae	Ephydridae	6									1				
Arthropoda	Insecta	Diptera	Psychodidae	*Maruina lanceolata*	2	sc									1		1	
Arthropoda	Insecta	Diptera	Simuliidae	*Simulium*	6	cf	3	82	38	169	2	87	43	193	89	8	72	16
Arthropoda	Insecta	Diptera	Tipulidae	*Antocha monticola*	3	cg	3						4	2	2			
Arthropoda	Insecta	Diptera	Tipulidae	*Cryptolabis*	3	sh	1											
Arthropoda	Insecta	Diptera	Tipulidae	*Dicranota*	3	p		3		2	1							
Arthropoda	Insecta	Diptera	Tipulidae	*Hesperoconopa*	1	cg	1											
Arthropoda	Insecta	Diptera	Tipulidae	*Hexatoma*	2	p	2	5	1									
Arthropoda	Insecta	Diptera	Tipulidae	*Limnophila*	4	p					1							
Arthropoda	Insecta	Diptera	Tipulidae	*Limonia*	6	sh									2			
Arthropoda	Insecta	Ephemeroptera	Ameletidae	*Ameletus*	0	cg	28	1		3			3	2				

Phylum	Class	Order	Family	Final ID	TV[1]	FFG[2]	RRD-I2	LLD-I3	GCD-I2	RPD-I2	IHD-I2	JD-I1	JD-I4	CD-I2	CD-I3	SCD-I1	SCD-I3	SCD-I3 (rep)
Arthropoda	Insecta	Ephemeroptera	Baetidae	*Acentrella*	4	cg									2		1	1
Arthropoda	Insecta	Ephemeroptera	Baetidae	*Baetis*	5	cg	5	5	22	39	22	36	118	38	127	45	48	62
Arthropoda	Insecta	Ephemeroptera	Baetidae	*Centroptilum*	2	cg								2	2		5	3
Arthropoda	Insecta	Ephemeroptera	Baetidae	*Diphetor hageni*	5	cg	14	2	7	2				2	7			
Arthropoda	Insecta	Ephemeroptera	Ephemerellidae	*Caudatella*	1	cg		1	2	4	6		9		1			
Arthropoda	Insecta	Ephemeroptera	Ephemerellidae	*Drunella*	0	cg		8			32							
Arthropoda	Insecta	Ephemeroptera	Ephemerellidae	*Ephemerella*	1	cg	40	8	11	16	1		9	5	3	8		
Arthropoda	Insecta	Ephemeroptera	Ephemerellidae	Ephemerellidae	1	cg							2					2
Arthropoda	Insecta	Ephemeroptera	Ephemerellidae	*Serratella*	2	cg					26	21						
Arthropoda	Insecta	Ephemeroptera	Heptageniidae	*Cinygma*	2	sc			1	1	2	11		1			1	5
Arthropoda	Insecta	Ephemeroptera	Heptageniidae	*Cinygmula*	4	sc	19	3	8	3								
Arthropoda	Insecta	Ephemeroptera	Heptageniidae	*Ecdyonurus*	4	sc							2					
Arthropoda	Insecta	Ephemeroptera	Heptageniidae	*Epeorus*	0	sc	2	11	4	16			4	3	8		1	2
Arthropoda	Insecta	Ephemeroptera	Heptageniidae	*Heptageniidae*	4	sc		6	1		6	1		1	1			
Arthropoda	Insecta	Ephemeroptera	Heptageniidae	*Ironodes*	4	sc	16	6	37	30	1	11	26		16			
Arthropoda	Insecta	Ephemeroptera	Heptageniidae	*Rhithrogena*	0	sc	1	4										
Arthropoda	Insecta	Ephemeroptera	Leptohyphidae	*Tricorythodes*	4	cg												6
Arthropoda	Insecta	Ephemeroptera	Leptophlebiidae	*Paraleptophlebia*	4	cg	55	22	50	15	12	6	7	23	6	27	6	24
Arthropoda	Insecta	Lepidoptera	Pyralidae	*Petrophila*	5	sc									1		2	7
Arthropoda	Insecta	Megaloptera	Corydalidae	*Corydalidae*	0	p				2								
Arthropoda	Insecta	Megaloptera	Corydalidae	*Orohermes crepusculus*	0	p		1		1	1							
Arthropoda	Insecta	Megaloptera	Sialidae	*Sialis*	4	p							1					
Arthropoda	Insecta	Odonata	Aeshnide	*Aeshna*	5	p								1				
Arthropoda	Insecta	Odonata	Coenagrionidae	*Argia*	7	p									2			
Arthropoda	Insecta	Odonata	Coenagrionidae	*Coenagrionidae*		p						1						
Arthropoda	Insecta	Odonata	Gomphidae	*Gomphidae*	4	p	1	2										
Arthropoda	Insecta	Plecoptera		Plecoptera	0		2			3								
Arthropoda	Insecta	Plecoptera	Capniidae	*Capniidae*	1	sh		1										
Arthropoda	Insecta	Plecoptera	Chloroperlidae	*Sweltsa*	1	p	10	19	3	8	56	4	1		4		3	3
Arthropoda	Insecta	Plecoptera	Leuctridae	*Despaxia augusta*	0	sh						1						
Arthropoda	Insecta	Plecoptera	Leuctridae	*Leuctridae*	0	sh					4							
Arthropoda	Insecta	Plecoptera	Leuctridae	*Moselia infuscata*	0	sh					1	1						
Arthropoda	Insecta	Plecoptera	Nemouridae	*Malenka*	2	sh			1	1	1	20	4	6	9	1		1
Arthropoda	Insecta	Plecoptera	Nemouridae	*Zapada*	2	sh	21	31	72	30	107	4			1			
Arthropoda	Insecta	Plecoptera	Peltoperlidae	*Yoraperla*	1	sh			7	3								
Arthropoda	Insecta	Plecoptera	Perlidae	*Calineuria californica*	1	p	6	21	5	5			2	8	4	5		
Arthropoda	Insecta	Plecoptera	Perlidae	*Doroneuria baumanni*	1	p								1				

Phylum	Class	Order	Family	Final ID	TV[1]	FFG[2]	RRD-I2	LLD-I3	GCD-I2	RPD-I2	IHD-I2	JD-I1	JD-I4	CD-I2	CD-I3	SCD-I1	SCD-I3	SCD-I3 (rep)
Arthropoda	Insecta	Plecoptera	Perlidae	*Hesperoperla*	2	p				3		1	1		2		1	
Arthropoda	Insecta	Plecoptera	Perlodidae	*Cultus*	2	p							2					
Arthropoda	Insecta	Plecoptera	Perlodidae	*Isoperla*	2	p	1	6	15	3			4		5		3	2
Arthropoda	Insecta	Plecoptera	Perlodidae	*Kogotus nonus*	2	p					1							
Arthropoda	Insecta	Plecoptera	Perlodidae	*Skwala*	2	p				1					2	2		1
Arthropoda	Insecta	Trichoptera		Trichoptera	0		4		14									
Arthropoda	Insecta	Trichoptera	Apataniidae	*Apatania*	1	sc	4				1							
Arthropoda	Insecta	Trichoptera	Brachycentridae	*Amiocentrus aspilus*	3	cg	1	3	1	1	1							
Arthropoda	Insecta	Trichoptera	Brachycentridae	*Micrasema*	1	mh	12	98	4	24	1		7	1		1	1	
Arthropoda	Insecta	Trichoptera	Calamoceratidae	*Heteroplectron californicum*	1	sh	3											
Arthropoda	Insecta	Trichoptera	Glossosomatidae	*Agapetus*	0	sc		1										
Arthropoda	Insecta	Trichoptera	Glossosomatidae	*Glossosoma*	1	sc		1										
Arthropoda	Insecta	Trichoptera	Helicopsychidae	*Helicopsyche borealis*	3	sc	6											
Arthropoda	Insecta	Trichoptera	Hydropsychidae	*Arctopsyche*	1	p	1	4	5	6		1	8					
Arthropoda	Insecta	Trichoptera	Hydropsychidae	*Cheumatopsyche*	5	cf									9		10	22
Arthropoda	Insecta	Trichoptera	Hydropsychidae	*Hydropsyche*	4	cf	44	25	36	13			8	4	33	39	17	11
Arthropoda	Insecta	Trichoptera	Hydropsychidae	Hydropsychidae	0								6					
Arthropoda	Insecta	Trichoptera	Hydroptilidae	*Agraylea*	8	ph	18	16	15	15	5	5	5					
Arthropoda	Insecta	Trichoptera	Hydroptilidae	*Hydroptila*	6	ph	4	5	6	9	1		46	48	152	19	32	17
Arthropoda	Insecta	Trichoptera	Hydroptilidae	*Hydroptilidae*	4	ph		3		2								
Arthropoda	Insecta	Trichoptera	Hydroptilidae	*Neotrichia*	4	sc									2			
Arthropoda	Insecta	Trichoptera	Hydroptilidae	*Nothotrichia shasta*	4	ph									1			
Arthropoda	Insecta	Trichoptera	Lepidostomatidae	*Lepidostoma*	1	sh	26	10	32	19	8	4	35	2		12		2
Arthropoda	Insecta	Trichoptera	Leptoceridae	*Ceraclea*	3	om												2
Arthropoda	Insecta	Trichoptera	Leptoceridae	*Mystacides*	4	om				2								
Arthropoda	Insecta	Trichoptera	Leptoceridae	*Oecetis*	8	p									1			
Arthropoda	Insecta	Trichoptera	Limnephilidae	*Limnephilidae*	4	sh					1							
Arthropoda	Insecta	Trichoptera	Philopotamidae	*Wormaldia*	3	cf	1			3					36	11	2	
Arthropoda	Insecta	Trichoptera	Phryganeidae	*Yphria californica*	1	p					1							
Arthropoda	Insecta	Trichoptera	Polycentropodidae	*Polycentropus*	6	p	5	2	9	1			1	1				1
Arthropoda	Insecta	Trichoptera	Rhyacophilidae	*Rhyacophila*	0	p	2	5	17	16	4	2	8	1	6			
Arthropoda	Insecta	Trichoptera	Sericostomatidae	*Gumaga*	3	sh	16	3	3	5								
Arthropoda	Arachnoidea	Acari	Hydryphantidae	*Protzia*	8	p				3								
Arthropoda	Arachnoidea	Acari	Hygrobatidae	*Atractides*	8	p												2
Arthropoda	Arachnoidea	Acari	Hygrobatidae	*Hygrobates*	8	p	6			1			3	10			9	14
Arthropoda	Arachnoidea	Acari	Lebertiidae	*Lebertia*	8	p	4	1	1	10	13	2	8	6	1	1	46	32
Arthropoda	Arachnoidea	Acari	Mideopsidae	*Mideopsis*	5	p			1					8				
Arthropoda	Arachnoidea	Acari	Sperchontidae	*Sperchon*	8	p	2	1		3				1	2		6	10

Phylum	Class	Order	Family	Final ID	TV[1]	FFG[2]	RRD-I2	LLD-I3	GCD-I2	RPD-I2	IHD-I2	JD-I1	JD-I4	CD-I2	CD-I3	SCD-I1	SCD-I3	SCD-I3 (rep)
Arthropoda	Arachnoidea	Acari	Sperchontidae	*Sperchonopsis*	8	p										1		
Arthropoda	Arachnoidea	Acari	Torrenticolidae	*Torrenticola*	5	p	6	1	8	21			9	3	1			
Arthropoda	Malacostraca	Amphipoda	Crangonyctidae	*Crangonyx*	4	cg										55	21	64
Arthropoda	Malacostraca	Amphipoda	Crangonyctidae	*Stygobromus*	4	cg											1	
Arthropoda	Malacostraca	Amphipoda	Hyalellidae	*Hyalella*	8	cg										1		
Arthropoda	Ostracoda			Ostracoda	8	cg					1							
Annelida	Oligochaeta			Oligochaeta	5	cg	1	17	5	10	5	9	2	6	27	7	186	176
Mollusca	Bivalvia	Veneroida	Sphaeriidae	*Pisidium*	8	cf	1	3	3									
Mollusca	Gastropoda	Basommatophora	Planorbidae	*Ferrissia*	6	sc												1
Mollusca	Gastropoda	Sorbeoconcha	Pleuroceridae	*Juga*	7	sc							2					
Nemertea	Enopa		Tertastemmatidae	*Prostoma*	8	p								1	3		13	21
Platyhelminthes	Turbellaria			Turbellaria	4	p				2	3	5		2	5			2

[1] Tolerance Value: values ranging from 0-10 were assigned to each taxon and reflect the taxon's sensitivity to perturbations in water and habitat quality; as values increase, sensitivity decreases. Source: SAFIT (http://safit.org/TVFFG.php).
[2] Functional Feeding Group: collector-gatherer (cg); collector-filterer (cf); predator (p); scraper (sc); shredder (sh); macrophyte-herbivore (mh); piercer-herbivore (ph);omnivore (om).

APPENDIX C4

BENTHIC MACROINVERTEBRATE METRIC VALUES

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Table C4-1. Biological Metric Values for BMI Samples Collected for the Upper American River Project, 2020.

Metrics	RRD-I2	LLD-I3	GCD-I2	RPD-I2	IHD-I2	JD-I1	JD-I4	CD-I2	CD-I3	SCD-I1	SCD-I3	SCD-I3 (rep)
Richness												
Taxonomic Richness[1]	53	51	44	52	41	26	40	42	51	25	38	41
EPT Taxa	27	29	26	30	24	16	22	18	25	11	14	18
Ephemeroptera Taxa	8	12	10	10	9	6	8	9	10	3	6	8
Plecoptera Taxa	5	5	6	8	6	6	6	3	7	3	3	4
Trichoptera Taxa	14	12	10	12	9	4	8	6	8	5	5	6
Coleoptera Taxa	5	4	4	5	1	0	3	4	7	0	5	4
Predator Taxa	18	16	12	21	13	8	15	14	16	7	11	14
ET Taxa	22	25	20	22	18	10	16	15	18	8	11	14
Shredder Taxa[1]	4.9	3.9	4.7	4.65	5.5	4.5	2	1.9	2.65	1.85	0	1.75
Composition												
EPT Index (%)	60	54	61	49	48	21	50	23	67	28	22	25
EPT Taxa (%)[1]	57	62	68	63	64	70	62	48	54	56	41	48
Sensitive EPT Index (%)	30	38	31	28	41	11	15	4.9	13	6.6	2.8	3.5
Shannon Diversity	3.14	3.12	3.12	3.07	2.44	2.01	2.77	2.39	2.75	2.35	2.55	2.77
Dominant Taxon (%)	21	16	11	27	33	44	18	30	23	30	31	27
Non-insect Taxa (%)	11	10	11	13	10	12	13	19	12	20	18	22
Clinger Taxa (%)[1]	54	61	67	66	52	46	66	59	68	53	62	53
Coleoptera Taxa (%)[1]	11	9	9	10	3	0	8	11	15	0	14	11
Tolerance												
Tolerance Value	4.0	3.7	4.1	4.3	3.9	5.0	4.5	5.5	4.9	5.1	5.5	5.3
Intolerant Organisms (%)	27	39	31	27	43	19	21	5.7	7.3	6.4	3.0	3.8
Intolerant Taxa (%)	38	41	39	38	44	46	40	29	25	28	26	24
Intolerant Individuals (%)[1]	26	39	29	26	41	11	16	5	7	5	3	3
Tolerant Organisms (%)	5.0	3.4	3.0	5.2	3.1	1.1	2.5	2.8	1.1	0.5	12	12
Tolerant Taxa (%)	19	14	12	17	13	13	14	22	16	27	29	28
Functional Feeding Groups												
Collector-Gatherers (%)	53	34	42	28	61	74	60	46	34	71	60	69
Collector-Filterers (%)	8.0	18	12	30	0.3	14	8.0	30	25	10	17	7.4
Collector individuals (%)	61	52	54	57	61	88	68	76	59	80	77	77
Scrapers (%)	11	7.3	8.7	9.4	1.6	3.7	5.6	5.2	8.2	0.0	2.0	3.2
Predators (%)	11	14	13	15	16	2.7	10	10	7.3	14	16	17
Shredders (%)	11	7.3	18	9.4	20	4.8	6.1	1.2	1.8	2.1	0.0	0.5
Other (%)	6.2	20	6.1	8.4	1.1	0.8	10	7.7	23	3.3	5.4	2.9
non-gastropod sc (%)	11	7.3	8.7	9.4	1.6	3.7	5.3	5.2	8.2	0.0	2.0	3.0
Indices												
California Stream Condition Index[2]	1.2	1.2	1.1	1.1	0.9	0.7	1.0	0.9	1.0	0.7	0.7	0.8

1 Metrics used for California Stream Condition Index (CSCI, Rehn et al. 2015). Metric values reported in the table may differ from metric values calculated through the CSCI computational iterations due to different subsample sizes.
2 CSCI scores typically range from 0.1 to 1.4; scoring criteria described by Rehn et al. (2015)

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APPENDIX D1

Incidental Observations of Avian Species in the Study Area (2016–2019)

Table D1-1. Incidental Observations of Avian Species in the Study Area (2016–2020)

Common Name	Scientific Name
Canada goose	*Branta canadensis*
mallard	*Anas platyrhynchos*
cinnamon teal	*Spatula cyanoptera*
bufflehead	*Bucephala albeola*
common merganser	*Mergus merganser*
mountain quail	*Oreortyx pictus*
common loon	*Gavia immer*
pied-billed grebe	*Podilymbus podiceps*
eared grebe	*Podiceps nigricollis*
western grebe	*Aechmophorus occidentalis*
red-necked grebe	*Podiceps grisegena*
turkey vulture	*Cathartes aura*
osprey	*Pandion haliaetus*
sharp-shinned hawk	*Accipiter striatus*
northern goshawk	*Accipiter gentillis*
Cooper's hawk	*Accipiter cooperii*
red-tailed hawk	*Buteo jamaicensis*
American kestrel	*Falco sparverius*
peregrine falcon	*Falco peregrinus*
killdeer	*Charadrius vociferus*
spotted sandpiper	*Actitis macularius*
band-tailed pigeon	*Patagioenas fasciata*
California spotted owl	*Strix occidentalis occidentalis*
common nighthawk	*Chordeiles minor*
Vaux’s swift	*Chaetura vauxi*
red-breasted sapsucker	*Sphyrapicus ruber*
hairy woodpecker	*Picoides villosus*
white-headed woodpecker	*Picoides albolarvatus*
northern flicker	*Colaptes auratus*
pileated woodpecker	*Dryocopus pileatus*
olive-sided flycatcher	*Contopus cooperi*
western wood-pewee	*Contopus sordidulus*
dusky flycatcher	*Empidonax oberholseri*
Pacific-slope flycatcher	*Empidonax difficilis*
black phoebe	*Sayornis nigricans*
Cassin’s vireo	*Vireo cassinii*
warbling vireo	*Vireo gilvus*
Steller's jay	*Cyanocitta stelleri*
Clark’s nutcracker	*Nucifraga columbiana*
American crow	*Corvus brachyrhynchos*
common raven	*Corvus corax*

Common Name	Scientific Name
northern rough-winged swallow	*Stelgidopteryx serripennis*
tree swallow	*Tachycineta bicolor*
bushtit	*Psaltriparus minimus*
mountain chickadee	*Poecile gambeli*
brown creeper	*Certhia americana*
red-breasted nuthatch	*Sitta canadensis*
white-breasted nuthatch	*Sitta carolinensis*
rock wren	*Salpinctes obsoletus*
golden-crowned kinglet	*Regulus satrapa*
Townsend's solitaire	*Myadestes townsendi*
mountain bluebird	*Sialia currucoides*
hermit thrush	*Catharus guttatus*
American robin	*Turdus migratorius*
orange-crowned warbler	*Oreothlypis celata*
Nashville warbler	*Oreothlypis ruficapilla*
yellow warbler	*Dendroica petechia*
yellow-rumped warbler	*Setophaga coronata*
hermit warbler	*Setophaga occidentalis*
MacGillivray's warbler	*Geothlypis tolmiei*
Wilson's warbler	*Cardellina pusilla*
western tanager	*Piranga ludoviciana*
spotted towhee	*Pipilo maculatus*
California towhee	*Melozone crissalis*
rufous-crowned sparrow	*Aimophila ruficeps*
chipping sparrow	*Spizella passerina*
fox sparrow	*Passerella iliaca*
dark-eyed junco	*Junco hyemalis*
Brewer’s blackbird	*Euphagus cyanocephalus*
evening grosbeak	*Coccothraustes vespertinus*
Cassin’s finch	*Haemorhous cassinii*
purple finch	*Haemorhous purpureus*

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APPENDIX D2

Bald Eagle Nesting Survey Forms

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California Department of Fish and Game
CALIFORNIA BALD EAGLE NESTING

TERRITORY SURVEY FORM

Revised 4/2010

Territory Code: LLR

County: El Dorado **Survey Year:** 2020

Property Owner: USFS **If USFS:** Eldorado National Forest

Name (or general location of territory): Loon Lake Reservoir

Name of nearest water body: Loon Lake Reservoir

Location of Nest Site:

UTM E: 733613 **UTM N**: 4319278 **Zone:** 10S

No. of nests in territory - Intact: ____ **Remnant:** 1

Nest Tree: Species: Jeffrey Pine **Year Last Used:** 2018

NOTE: Please attach a map showing the location of any newly documented nest tree.

Describe tree and nest condition and size and add other remarks: Dominant Jeffrey pine located on south side of Loon Lake west of the summer camp; nest structure was deteriorated and unused in 2019; failed reproductive attempt in 2020.

For each visit to a territory, note, in detail, the times, number and age of birds, behavior of birds (lying, perching, etc.), evidence of nesting (nest maintenance, courtship, incubation posture), disturbances, and other pertinent information:

Observers	Date	Observations/Notes
Steven Wood Krista Orr Eric Sommerauer	05.15.20 (06:45 to 13:45)	Early Breeding Season Survey (postponed due to elevation and weather conditions): • 07:00 – From spillway, adult BAEA (likely female) observed in nest with one chick barely visible. • 07:40 – Adult BAEA departing nest, flying SW, and returning to nest ~3 minutes later (likely food delivery from male). • 09:00 – Adult BAEA (male) joining female at nest, remaining for ~5 minutes, then departing to the SW. • 09:45 – Two surveyors depart by boat to east and south sides of lake, evaluating other suitable habitat for evidence of BAEA foraging or nesting including previously documented roosts and perches (one surveyor remains to observe at alternating vantage points on spillway and dam). • 12:35 – Two surveyors hike up drainage along south side of reservoir and split up to observe from separate vantage points of nest tree. • 12:40 – Two adult BAEA and one chick observed in nest (based on feeding posture of female BAEA two chicks may be present). • 12:50 – Adult BAEA (female) departing nest and vocalizing on nearby perch. • 12:55 – Southside surveyors departed area to avoid further disturbance, returning to spillway by boat. • No further BAEA activity observed. • Recreational activity low (~3 fishing boats and 2 kayaks); frequent helicopter activity with moderate noise; no BAEA disturbance observed.

Observers	Date	Observations/Notes
Krista Orr Emily Applequist	06.19.20 (05:45 to 15:15)	<u>Mid Breeding Season Survey:</u> • 06:00 – Surveyors split up and alternate observations from dam and spillway. • No BAEA activity observed over lake or at nest site for ~two hours. • 08:03 – osprey with fish flying E to W, BAEA vocalizations heard from N. • 08:04 – adult BAEA (later determined to be female) seen flying NE to SW, then perching in lodgepole pine N of spillway. • 08:05 – adult BAEA (later determined to be male) flying NE to SW, then perching in dominant Jeffrey pine N of spillway. • 08:15 – adult BAEA (female) departing perch in lodgepole pine, flying S over reservoir and landing in fir approximately 0.2 mi NW of nest tree. • 08:18 – third adult BAEA observed flying W over knoll on S side of reservoir near boat launch. • 08:22 – adult BAEA (female) departing perch in fir, flying S to unknown location (not nest tree determined to be active during previous visit). • 08:28 – adult BAEA (male) departing perch in Jeffrey pine, flying S over reservoir and perching in fir approximately 0.2 mi NW of nest tree (where female had been previously located). • 08:55 – adult BAEA (male) departing perch in fir, flying S to unknown location (not nest tree determined to be active during previous visit). • 09:15 – two osprey observed transporting nesting material and general location of likely nest noted N of spillway. • 11:30 – surveyors launch boat from vantage point west of spillway; suitable habitat around Loon Lake and Pleasant Lake, including previously documented roosts and perches, surveyed for BAEA and/or evidence of BAEA presence by boat and foot. • 13:45 – surveyors hike up drainage along south side of reservoir and to vantage point near nest tree. • Nest smaller than previous visit; whitewash observed surrounding base of tree; bits of down and possible juvenile feathers observed in and around nest. • No further BAEA activity observed; nest determined to be unoccupied. • Recreational activity: low on lake (~2-3 fishing boats); heavy on spillway (~30-40 jeepers). No BAEA disturbance observed.

Observers	Date	Observations/Notes
Krista Orr Steven Wood	06.30.20 (06:30 to 16:00)	Late Breeding Season Survey: • 19:00 – surveyors camped at Loon Lake for evening and hiked out to nest tree evening prior (06/29/20) to look and listen for roosting near the nest tree; no BAEA detections, audially or visually. • 06:30 – surveyors split up and alternate observations from dam and spillway. • No BAEA activity observed over lake or at nest site for ~two hours. • 08:30 – surveyors hike to nest tree and split up to observe and canvass area for evidence of BAEA. • 10:45 – feather spot and broken-off tail juvenile BAEA tail feathers located approximately 0.15 mi E of nest tree. • 11:15 – surveyors depart nest tree, return to spillway, and launch boat to survey eastern side of lake for evidence of BAEA roosting, perching, or foraging in suitable habitat, including areas they have previously been observed. • 13:15 – Adult BAEA observed flying N to S over Pleasant Lake, east side of reservoir. • 15:15 – surveyors return to launch W of spillway. • No further BAEA activity observed. • Recreational activity moderate (~4 fishing boats and ~10 jeepers); no BAEA disturbance observed.

SUMMARY:

A. Successful Nestings: 0 **No. of young known fledged:** 0 **or probably fledged:** N/A

B. If no fledglings were produced this season please answer the following:

How many adults seen in the territory? 2

Was there evidence of nest repair or construction? Yes

Were adults seen in the nest? Yes

Were adults in incubating posture? Yes

Number of nestlings observed? 1

Failed during incubation or nesting stage? Nesting

Other remarks: Nestling either fell out of the nest and was predated or was taken out of the nest by a predator, likely the latter based on observation of juvenile tail feathers in the nest through the spotting scope.

Observer Contact Information:

Surveys conducted by Stillwater Sciences, contractors for the Sacramento Municipal Utility District. For additional information contact Ethan Koenigs, SMUD Project Manager (Ethan.Koenigs@smud.org).

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APPENDIX E

Representative Habitat and Edgewater Thermograph Photos

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Figure E-1. Silver Creek below Camino Reservoir Dam (near Camino Adit)(Site CD-A3) amphibian and aquatic reptile monitoring site habitat photographs, 2020.

Figure E-2. Silver Creek below Camino Reservoir Dam (near confluence with the South Fork American River)(Site CD-A4) amphibian and aquatic reptile monitoring site habitat photographs, 2020.

Figure E-3. South Fork American River (Slab Creek Dam Reach)(Site SCD-A1) amphibian and aquatic reptile monitoring site habitat photographs, 2020.

Edgewater 1 (over winter deployment)

Edgewater 2 (over winter deployment)

Edgewater 3

Edgewater 4

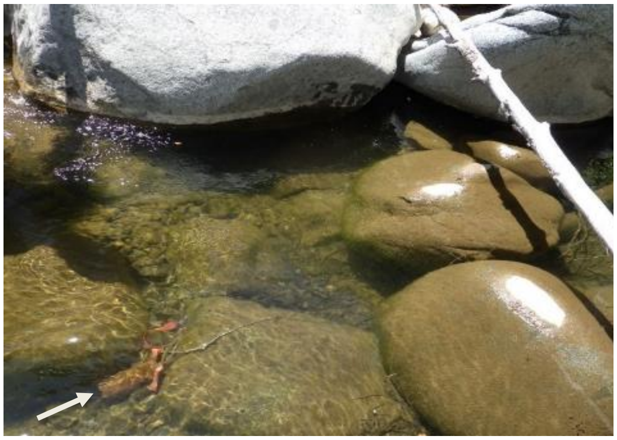
Figure E-4. Edgewater thermograph habitat photographs at Silver Creek below Camino Reservoir Dam (near Camino Adit) (Site CD-A3), 2020 (1 of 2).

Edgwater 5

Edgewater 6

Thalweg (over winter deployment)

Figure E-5. Edgewater thermograph habitat photographs at Silver Creek below Camino Reservoir Dam (near Camino Adit) (Site CD-A3), 2020 (2 of 2).


Edgewater 1 (over winter deployment)


Edgewater 2 (over winter deployment)


Edgewater 3


Edgewater 4


Edgewater 5

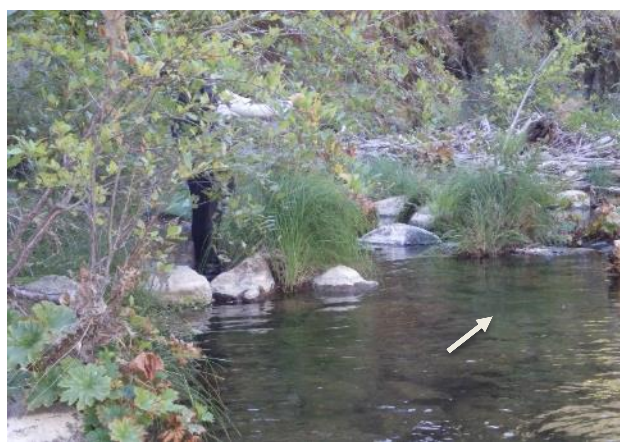

Edgewater 6

Figure E-6. Edgewater thermograph habitat photographs at Silver Creek Below Camino Reservoir Dam (Near Confluence with South Fork American River) (Site CD-A4), 2020.


Edgewater 1


Edgewater 2


Edgewater 3


Edgewater 4


Edgewater 5 (over winter deployment)


Edgewater 6 (over winter deployment)

Figure E-7. Edgewater thermograph habitat photographs at South Fork American River below Slab Creek Reservoir Dam (Site SCD-A1), 2020.

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APPENDIX F1

Bear Encounter Forms

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KEEP ME WILD

For office use only:

Report collected by: ______________________(USFS/camp host)

Date: __________

KEEP ME WILD

BEAR ENCOUNTER FORM

Bear Management Monitoring
Crystal Basin Recreation Area

Use a separate form for each individual incident. *For example, if the same bear enters two campsites while people are present, a person from each campsite should report the specifics of their encounter. Give completed forms to campground hosts. If your recreation site has no host, forms should be placed in the appropriate receptacle at the site or dropped off at the Crystal Basin Information Station on Ice House Road between Ice House Reservoir and Union Valley Reservoir. Forms also can be dropped off at the Pacific Ranger Station at 7887 Highway 50, Pollock Pines, CA 95726.*

1. Person(s) involved:

2. Describe yourself:

a. Visitor
b. Camp host
c. USFS employee
d. Contractor
e. Other ____________

3. Visitor activity:

a. Camping – developed campground
b. Camping – undeveloped campsite/wilderness
c. Day use area
d. Hiking on maintained trail
e. Other ____________

4. Group size: 6
(number of people who encountered the bear)

5. Time of encounter: Month: 7 Day: 7 Year: 2020 Time: 3 am am/pm

6. Location of encounter:

a. Airport Flat campground
b. Angel Creek day use area
c. Azalea Cove campground
d. Big Silver group campground
e. Camino Cove campground
f. Fashoda campground
g. Gerle Creek campground complex
h. Ice House campground/ boat launch/day use area
i. Jones Fork campground
j. Junction Reservoir boat launch
k. Lone Rock campground
l. Loon Lake campground/boat ramp
m. Loon Lake chalet
n. Northshore campground
o. Northshore RV campground
p. Pleasant campground
q. Red Fir group campground
r. Strawberry Point campground
s. Sunset campground/boat launch
t. Union Valley bike trail
u. Wench Creek campground
v. Wench Creek group campground
w. West Point campground/boat launch
x. Wolf Creek campground
y. Wolf Creek group campground
z. Yellowjacket campground/boat launch
Other Northwind campground

7. Number and description of bears (how many, what color, size, adult or cub, sex?):

1 big black bear

8. Did the bear(s) harm anyone?

a. No b. Yes* (describe) No

9. What were you doing before you saw the bear?

Sleeping in the tent

10. What was the bear doing when you first saw it?

broke into a food tent

* If there was a physical encounter with the bear or a bear was harmed in the incident, please report to the USFS Ranger and California Department of Fish and Wildlife.

11. How did the bear react to you?

stared and then hid behind a big rock

12. What did you do then?

directed the light on the bear and said go away

13. How did the bear react to your response?

came back and stole some food and ran into the forest

14. How close did you come to the bear (how many feet)**?**

35 - 40

15. Was human food present?

a. Food not in bear resistant container
b. Food in bear resistant container
c. Food odor only
d. Food hung in tree
e. No food present
f. Unknown

16. Did the bear eat any human food?

a. No b. Yes (what?) Yes, eggs and marshmallow
c. Unknown

17. Did the bear damage property?

a. No b. Yes (list property and estimate costs) Yes, food tent

18. Details of bear-human interaction (optional):

13N31 → 12NY15

KEEP ME WILD

For office use only:

Report collected by: ____________________ (USFS/camp host)

Date: __________

KEEP ME WILD

BEAR ENCOUNTER FORM

Bear Management Monitoring
Crystal Basin Recreation Area

Use a separate form for each individual incident. *For example, if the same bear enters two campsites while people are present, a person from each campsite should report the specifics of their encounter. Give completed forms to campground hosts. If your recreation site has no host, forms should be placed in the appropriate receptacle at the site or dropped off at the Crystal Basin Information Station on Ice House Road between Ice House Reservoir and Union Valley Reservoir. Forms also can be dropped off at the Pacific Ranger Station at 7887 Highway 50, Pollock Pines, CA 95726.*

1. Person(s) involved:

Name: Unknown name of grup

Address: ____________________

City: ____________________ State: __________

Zip code: __________ Phone: ____________________

Country: ____________________

2. Describe yourself:

a. Visitor
b. Camp host
c. USFS employee
d. Contractor
e. Other __________

3. Visitor activity:

a. Camping – developed campground
b. Camping – undeveloped campsite/wilderness
c. Day use area
d. Hiking on maintained trail
e. Other __________

4. Group size: 6-10
(number of people who encountered the bear)

5. Time of encounter: Month: 7 Day: 5 Year: 2020 Time: 1:00 am/pm

6. Location of encounter:

a. Airport Flat campground
b. Angel Creek day use area
c. Azalea Cove campground
d. Big Silver group campground
e. Camino Cove campground
f. Fashoda campground
g. Gerle Creek campground complex
h. Ice House campground/ boat launch/day use area
i. Jones Fork campground
j. Junction Reservoir boat launch
k. Lone Rock campground
l. Loon Lake campground/boat ramp
m. Loon Lake chalet
n. Northshore campground
o. Northshore RV campground
p. Pleasant campground
q. Red Fir group campground
r. Strawberry Point campground
s. Sunset campground/boat launch
t. Union Valley bike trail
u. Wench Creek campground
v. Wench Creek group campground
w. West Point campground/boat launch
x. Wolf Creek campground
y. Wolf Creek group campground
z. Yellowjacket campground/boat launch
Other Northwind

7. Number and description of bears (how many, what color, size, adult or cub, sex?):

1 ADULT BEAR

8. Did the bear(s) harm anyone?

a. No b. Yes* (describe)

9. What were you doing before you saw the bear?

Sleeping

10. What was the bear doing when you first saw it?

Trying to take bin full of food left out of bear box

* If there was a physical encounter with the bear or a bear was harmed in the incident, please report to the USFS Ranger and California Department of Fish and Wildlife.

11. How did the bear react to you?

12. What did you do then?

13. How did the bear react to your response?

No response, stayed in RVs/tents

14. How close did you come to the bear (how many feet)?

15. Was human food present?

a. Food not in bear resistant container
b. Food in bear resistant container
c. Food odor only
d. Food hung in tree
e. No food present
f. Unknown

16. Did the bear eat any human food?

a. No b. Yes (what?) Unknown dry goods
c. Unknown

17. Did the bear damage property?

a. No b. Yes (list property and estimate costs)

18. Details of bear-human interaction (optional):

Group left bin full of food out of bear box. Bear took bin & left. Family found bin next day ~100yds away, food was gone.

For office use only:

Report collected by: ______________________(USFS/camp host)

Date: __________

BEAR ENCOUNTER FORM

Bear Management Monitoring
Crystal Basin Recreation Area

Use a separate form for each individual incident. For example, if the same bear enters two campsites while people are present, a person from each campsite should report the specifics of their encounter. Give completed forms to campground hosts. If your recreation site has no host, forms should be placed in the appropriate receptacle at the site or dropped off at the Crystal Basin Information Station on Ice House Road between Ice House Reservoir and Union Valley Reservoir. Forms also can be dropped off at the Pacific Ranger Station at 7887 Highway 50, Pollock Pines, CA 95726.

1. Person(s) involved:

2. Describe yourself:

a. Visitor
b. Camp host
c. USFS employee
d. Contractor
e. Other ____________

3. Visitor activity:

a. Camping – developed campground
b. Camping – undeveloped campsite/wilderness
c. Day use area
d. Hiking on maintained trail
e. Other ____________

4. Group size: 6
(number of people who encountered the bear)

5. Time of encounter: Month: 7 Day: 6 Year: 20 Time:________ am/pm

6. Location of encounter:

a. Airport Flat campground
b. Angel Creek day use area
c. Azalea Cove campground
d. Big Silver group campground
e. Camino Cove campground
f. Fashoda campground
g. Gerle Creek campground complex
h. Ice House campground/
boat launch/day use area
i. Jones Fork campground
j. Junction Reservoir boat launch
k. Lone Rock campground
l. Loon Lake campground/boat ramp
m. Loon Lake chalet
n. Northshore campground
o. Northshore RV campground
p. Pleasant campground
q. Red Fir group campground
r. Strawberry Point campground
s. Sunset campground/boat launch
t. Union Valley bike trail
u. Wench Creek campground
v. Wench Creek group campground
w. West Point campground/boat launch
x. Wolf Creek campground
y. Wolf Creek group campground
z. Yellowjacket campground/boat launch
Other Sunset Meadow 2 #38

7. Number and description of bears (how many, what color, size, adult or cub, sex?):

don't know

8. Did the bear(s) harm anyone?

a. No b. Yes* (describe)

9. What were you doing before you saw the bear?

Sleeping

10. What was the bear doing when you first saw it?

Did not see it

* If there was a physical encounter with the bear or a bear was harmed in the incident, please report to the USFS Ranger and California Department of Fish and Wildlife.

11. How did the bear react to you?

no

12. What did you do then?

I Sleep

13. How did the bear react to your response?

No Response

14. How close did you come to the bear (how many feet)**?**

Not close

15. Was human food present?

a. Food not in bear resistant container
b. Food in bear resistant container
c. Food odor only
d. Food hung in tree
e. No food present
f. Unknown

16. Did the bear eat any human food?

a. No b. Yes (what?) all of it
c. Unknown

17. Did the bear damage property?

a. No b. Yes (list property and estimate costs) plastic container

18. Details of bear-human interaction (optional):

KEEP ME WILD

For office use only:

Report collected by: ______________________(USFS/camp host)

Date: __________

KEEP ME WILD

BEAR ENCOUNTER FORM

Bear Management Monitoring
Crystal Basin Recreation Area

Use a separate form for each individual incident. *For example, if the same bear enters two campsites while people are present, a person from each campsite should report the specifics of their encounter. Give completed forms to campground hosts. If your recreation site has no host, forms should be placed in the appropriate receptacle at the site or dropped off at the Crystal Basin Information Station on Ice House Road between Ice House Reservoir and Union Valley Reservoir. Forms also can be dropped off at the Pacific Ranger Station at 7887 Highway 50, Pollock Pines, CA 95726.*

1. Person(s) involved:

N

A

C

Zi

C

2. Describe yourself:

a. Visitor
b. Camp host
c. USFS employee
d. Contractor
e. Other ____________

3. Visitor activity:

a. Camping – developed campground
b. Camping – undeveloped campsite/wilderness
c. Day use area
d. Hiking on maintained trail
e. Other ____________

4. Group size: 1
(number of people who encountered the bear)

5. Time of encounter: Month: 6 Day: 25 Year: 2020 Time: 3:00 am/pm

6. Location of encounter:

a. Airport Flat campground
b. Angel Creek day use area
c. Azalea Cove campground
d. Big Silver group campground
e. Camino Cove campground
f. Fashoda campground
g. Gerle Creek campground complex
h. Ice House campground/
boat launch/day use area
i. Jones Fork campground
j. Junction Reservoir boat launch
k. Lone Rock campground
l. Loon Lake campground/boat ramp
m. Loon Lake chalet
n. Northshore campground
o. Northshore RV campground
p. Pleasant campground
q. Red Fir group campground
r. Strawberry Point campground
s. Sunset campground/boat launch
t. Union Valley bike trail
u. Wench Creek campground
v. Wench Creek group campground
w. West Point campground/boat launch
x. Wolf Creek campground
y. Wolf Creek group campground
z. Yellowjacket campground/boat launch
Other ______

7. Number and description of bears (how many, what color, size, adult or cub, sex?):
1, black or brown

8. Did the bear(s) harm anyone?
a. No b. Yes* (describe) NO

9. What were you doing before you saw the bear?
sleeping

10. What was the bear doing when you first saw it?
eating our cheese

* If there was a physical encounter with the bear or a bear was harmed in the incident, please report to the USFS Ranger and California Department of Fish and Wildlife.

11. How did the bear react to you?
ran away

12. What did you do then?
moved cooler into bear box

13. How did the bear react to your response?
was already gone

14. How close did you come to the bear (how many feet)**?**
50 ft

15. Was human food present?
a. Food not in bear resistant container
b. Food in bear resistant container
c. Food odor only
d. Food hung in tree
e. No food present
f. Unknown

16. Did the bear eat any human food?
a. No b. Yes (what?) cheese
c. Unknown

17. Did the bear damage property?
a. No b. Yes (list property and estimate costs) $45

18. Details of bear-human interaction (optional):
damaged lid on cooler

KEEP ME WILD

For office use only:

Report collected by: ______________________(USFS/camp host)

Date: __________

KEEP ME WILD

BEAR ENCOUNTER FORM

Bear Management Monitoring
Crystal Basin Recreation Area

*Use a separate form for **each individual incident**. For example, if the same bear enters two campsites while people are present, a person from each campsite should report the specifics of their encounter. Give completed forms to campground hosts. If your recreation site has no host, forms should be placed in the appropriate receptacle at the site or dropped off at the Crystal Basin Information Station on Ice House Road between Ice House Reservoir and Union Valley Reservoir. Forms also can be dropped off at the Pacific Ranger Station at 7887 Highway 50, Pollock Pines, CA 95726.*

1. Person(s) involved:

2. Describe yourself:

a. Visitor
b. Camp host
c. USFS employee
d. Contractor
e. Other ______________

3. Visitor activity:

a. Camping – developed campground
b. Camping – undeveloped campsite/wilderness
c. Day use area
d. Hiking on maintained trail
e. Other ______________

4. Group size: 1
(number of people who encountered the bear)

5. Time of encounter: Month: 7 Day: 23 Year: 2020 Time: 2:30 am/pm

6. Location of encounter:

a. Airport Flat campground
b. Angel Creek day use area
c. Azalea Cove campground
d. Big Silver group campground
e. Camino Cove campground
f. Fashoda campground
g. Gerle Creek campground complex
h. Ice House campground/
boat launch/day use area
i. Jones Fork campground
j. Junction Reservoir boat launch
k. Lone Rock campground
l. Loon Lake campground/boat ramp
m. Loon Lake chalet
n. Northshore campground
o. Northshore RV campground
p. Pleasant campground
q. Red Fir group campground
r. Strawberry Point campground
s. Sunset campground/boat launch
t. Union Valley bike trail
u. Wench Creek campground
v. Wench Creek group campground
w. West Point campground/boat launch
x. Wolf Creek campground
y. Wolf Creek group campground
z. Yellowjacket campground/boat launch
Other ______________

7. Number and description of bears (how many, what color, size, adult or cub, sex?):

Didn't see it Just heard it.

8. Did the bear(s) harm anyone?

a. No b. Yes* (describe) No

9. What were you doing before you saw the bear?

Sleeping

10. What was the bear doing when you first saw it?

Didn't See it just heard it

* If there was a physical encounter with the bear or a bear was harmed in the incident, please report to the USFS Ranger and California Department of Fish and Wildlife.

11. How did the bear react to you?

Shined light from tent didn't see it

12. What did you do then?

Shined light then layed back down

13. How did the bear react to your response?

Assuming it left, didn't hear it again.

14. How close did you come to the bear (how many feet)**?**

50-60 feet from tent

15. Was human food present?

a. Food not in bear resistant container
b. Food in bear resistant container
c. Food odor only
d. Food hung in tree
e. No food present
f. Unknown

16. Did the bear eat any human food?

a. No b. Yes (what?) Cheese, Hashbrowns, Some cherry tomatoes
c. Unknown

17. Did the bear damage property?

a. No b. Yes (list property and estimate costs) teeth puncture marks on lid of Ice Chest

18. Details of bear-human interaction (optional):

I heard Ice Chest open and Shut 2 times, Shined flashlight at Cooler, didn't See anything, Layed back down And stayed awake for about 30-45 minutes and never heard anything again. When I got up in the morning, Noticed 2 zip lock bags ripped up on ground and teeth ~~[illegible]~~ puncture marks on Ice Chest lid.

For office use only:

Report collected by: P. Westphal (USFS/camp host)

Date: 7-31-20

BEAR ENCOUNTER FORM

Bear Management Monitoring
Crystal Basin Recreation Area

Use a separate form for each individual incident. For example, if the same bear enters two campsites while people are present, a person from each campsite should report the specifics of their encounter. Give completed forms to campground hosts. If your recreation site has no host, forms should be placed in the appropriate receptacle at the site or dropped off at the Crystal Basin Information Station on Ice House Road between Ice House Reservoir and Union Valley Reservoir. Forms also can be dropped off at the Pacific Ranger Station at 7887 Highway 50, Pollock Pines, CA 95726.

1. Person(s) involved:

N

A

C

Zi

C

2. Describe yourself:

a. Visitor
b. Camp host
c. USFS employee
d. Contractor
e. Other ______

3. Visitor activity:

a. Camping – developed campground
b. Camping – undeveloped campsite/wilderness
c. Day use area
d. Hiking on maintained trail
e. Other ______

4. Group size: 2
(number of people who encountered the bear)

5. Time of encounter: Month: 7 Day: 27 Year: 2020 Time: 5:30 am/pm

6. Location of encounter:

a. Airport Flat campground
b. Angel Creek day use area
c. Azalea Cove campground
d. Big Silver group campground
e. Camino Cove campground
f. Fashoda campground
g. Gerle Creek campground complex
h. Ice House campground/ boat launch/day use area
i. Jones Fork campground
j. Junction Reservoir boat launch
k. Lone Rock campground
l. Loon Lake campground/boat ramp
m. Loon Lake chalet
n. Northshore campground
o. Northshore RV campground
p. Pleasant campground
q. Red Fir group campground
r. Strawberry Point campground
s. Sunset campground/boat launch
t. Union Valley bike trail
u. Wench Creek campground
v. Wench Creek group campground
w. West Point campground/boat launch
x. Wolf Creek campground
y. Wolf Creek group campground
z. Yellowjacket campground/boat launch
Other NORTHWIND C.G.

7. Number and description of bears (how many, what color, size, adult or cub, sex?):

DID NOT SEE

8. Did the bear(s) harm anyone?

a. No b. Yes* (describe) ____

9. What were you doing before you saw the bear?

SLEEPING

10. What was the bear doing when you first saw it?

GOING AWAY IN WOODS

* If there was a physical encounter with the bear or a bear was harmed in the incident, please report to the USFS Ranger and California Department of Fish and Wildlife.

11. How did the bear react to you?

CAME IN TO CAMP STOLE 5 GALLON BUCKET

12. What did you do then?

FOUND BUCKET IN WOODS JUST OUTSIDE OF C.G.

13. How did the bear react to your response?

RAN OFF INTO WOODS

14. How close did you come to the bear (how many feet)?

100 +

15. Was human food present?

a. Food not in bear resistant container
b. Food in bear resistant container
c. Food odor only
d. Food hung in tree
e. No food present
f. Unknown

16. Did the bear eat any human food?

a. No b. Yes (what?) ____
c. Unknown

17. Did the bear damage property?

a. No b. Yes (list property and estimate costs) TEETH MARKS IN BUCKET

18. Details of bear-human interaction (optional):

____
____
____

KEEP ME WILD

For office use only:

Report collected by: ____________________ (USFS/camp host)

Date: __________

KEEP ME WILD

BEAR ENCOUNTER FORM

Bear Management Monitoring
Crystal Basin Recreation Area

Use a separate form for each individual incident. For example, if the same bear enters two campsites while people are present, a person from each campsite should report the specifics of their encounter. Give completed forms to campground hosts. If your recreation site has no host, forms should be placed in the appropriate receptacle at the site or dropped off at the Crystal Basin Information Station on Ice House Road between Ice House Reservoir and Union Valley Reservoir. Forms also can be dropped off at the Pacific Ranger Station at 7887 Highway 50, Pollock Pines, CA 95726.

1. Person(s) involved:

Name: Scot/Trish (N. Shore camp hosts)

Address: ____________________

City: ____________________ State: __________

Zip code: __________ Phone: ____________________

Country: ____________________

2. Describe yourself:

a. Visitor
b. Camp host
c. USFS employee
d. Contractor
e. Other __________

3. Visitor activity:

a. Camping – developed campground
b. Camping – undeveloped campsite/wilderness
c. Day use area
d. Hiking on maintained trail
e. Other __________

4. Group size: N/A
(number of people who encountered the bear)

5. Time of encounter: Month: 07 Day: 10 Year: 2020 Time: ________ am/pm

6. Location of encounter:

a. Airport Flat campground
b. Angel Creek day use area
c. Azalea Cove campground
d. Big Silver group campground
e. Camino Cove campground
f. Fashoda campground
g. Gerle Creek campground complex
h. Ice House campground/ boat launch/day use area
i. Jones Fork campground
j. Junction Reservoir boat launch
k. Lone Rock campground
l. Loon Lake campground/boat ramp
m. Loon Lake chalet
n. Northshore campground (nearby, gabage bins on 2nd dam)
o. Northshore RV campground
p. Pleasant campground
q. Red Fir group campground
r. Strawberry Point campground
s. Sunset campground/boat launch
t. Union Valley bike trail
u. Wench Creek campground
v. Wench Creek group campground
w. West Point campground/boat launch
x. Wolf Creek campground
y. Wolf Creek group campground
z. Yellowjacket campground/boat launch
Other __________

7. Number and description of bears (how many, what color, size, adult or cub, sex?):

?

8. Did the bear(s) harm anyone?

a. No b. Yes* (describe) __________

9. What were you doing before you saw the bear?

bear not seen, just garbage extending into woods

10. What was the bear doing when you first saw it?

N/A

* If there was a physical encounter with the bear or a bear was harmed in the incident, please report to the USFS Ranger and California Department of Fish and Wildlife.

11. How did the bear react to you?

N/A

12. What did you do then?

~~#~~ Cleaned-up garbage

13. How did the bear react to your response?

N/A

14. How close did you come to the bear (how many feet)**?**

N/A

15. Was human food present?

a. Food not in bear resistant container
b. Food in bear resistant container
c. Food odor only
d. Food hung in tree
e. No food present
f. Unknown
g. garbage

16. Did the bear eat any human food?

a. No b. Yes (what?) __________
c. Unknown

17. Did the bear damage property?

a. No b. Yes (list property and estimate costs) __________

18. Details of bear-human interaction (optional):

garbage bags were removed from several that were accumulated on ground (overflow).

KEEP ME WILD

For office use only:

Report collected by: ______________________ (USFS/camp host)

Date: __________

KEEP ME WILD

BEAR ENCOUNTER FORM

Bear Management Monitoring
Crystal Basin Recreation Area

Use a separate form for each individual incident. *For example, if the same bear enters two campsites while people are present, a person from each campsite should report the specifics of their encounter. Give completed forms to campground hosts. If your recreation site has no host, forms should be placed in the appropriate receptacle at the site or dropped off at the Crystal Basin Information Station on Ice House Road between Ice House Reservoir and Union Valley Reservoir. Forms also can be dropped off at the Pacific Ranger Station at 7887 Highway 50, Pollock Pines, CA 95726.*

1. Person(s) involved:

Name: Scot Hendrickson/Trish (N. Shore camp hosts)

Address: __________

City: __________ State: __________

Zip code: __________ Phone: __________

Country: __________

2. Describe yourself:

a. Visitor
b. Camp host
c. USFS employee
d. Contractor
e. Other __________

3. Visitor activity:

a. Camping – developed campground
b. Camping – undeveloped campsite/wilderness
c. Day use area
d. Hiking on maintained trail
e. Other __________

4. Group size: N/A
(number of people who encountered the bear)

5. Time of encounter: Month: 07 Day: 27 Year: 2020 Time: 3 am/pm

6. Location of encounter:

a. Airport Flat campground
b. Angel Creek day use area
c. Azalea Cove campground
d. Big Silver group campground
e. Camino Cove campground
f. Fashoda campground
g. Gerle Creek campground complex
h. Ice House campground/ boat launch/day use area
i. Jones Fork campground
j. Junction Reservoir boat launch
k. Lone Rock campground
l. Loon Lake campground/boat ramp
m. Loon Lake chalet
n. Northshore campground
o. Northshore RV campground
p. Pleasant campground
q. Red Fir group campground
r. Strawberry Point campground
s. Sunset campground/boat launch
t. Union Valley bike trail
u. Wench Creek campground
v. Wench Creek group campground
w. West Point campground/boat launch
x. Wolf Creek campground
y. Wolf Creek group campground
z. Yellowjacket campground/boat launch
Other ____________

7. Number and description of bears (how many, what color, size, adult or cub, sex?):

1

8. Did the bear(s) harm anyone?

a. No b. Yes* (describe) ____________

9. What were you doing before you saw the bear?

sleeping

10. What was the bear doing when you first saw it?

did notsee, found footprints on table/ground

* If there was a physical encounter with the bear or a bear was harmed in the incident, please report to the USFS Ranger and California Department of Fish and Wildlife.

11. How did the bear react to you?

N/A

12. What did you do then?

N/A

13. How did the bear react to your response?

N/A

14. How close did you come to the bear (how many feet)**?**

____

15. Was human food present?

a. Food not in bear resistant container
b. Food in bear resistant container
c. Food odor only
d. Food hung in tree
e. No food present
f. Unknown

16. Did the bear eat any human food?

a. No b. Yes (what?) ____________
c. Unknown

17. Did the bear damage property?

a. No b. Yes (list property and estimate costs) ____________

18. Details of bear-human interaction (optional):

note: only footprints, garbage bag hanging on bear box was untouched. palm size 5"

KEEP ME WILD

For office use only:

Report collected by: ______________________(USFS/camp host)

Date: __________

KEEP ME WILD

BEAR ENCOUNTER FORM

Bear Management Monitoring
Crystal Basin Recreation Area

Use a separate form for each individual incident. For example, if the same bear enters two campsites while people are present, a person from each campsite should report the specifics of their encounter. Give completed forms to campground hosts. If your recreation site has no host, forms should be placed in the appropriate receptacle at the site or dropped off at the Crystal Basin Information Station on Ice House Road between Ice House Reservoir and Union Valley Reservoir. Forms also can be dropped off at the Pacific Ranger Station at 7887 Highway 50, Pollock Pines, CA 95726.

1. Person(s) involved:

2. Describe yourself:
a. Visitor
b. Camp host
c. USFS employee
d. Contractor
e. Other ______________

3. Visitor activity:
a. Camping – developed campground
b. Camping – undeveloped campsite/wilderness
c. Day use area
d. Hiking on maintained trail
e. Other ______________

4. Group size: 3
(number of people who encountered the bear)

5. Time of encounter: Month: 8 Day: 5 Year: 2020 Time: 02:40 am/pm

6. Location of encounter:

a. Airport Flat campground
b. Angel Creek day use area
c. Azalea Cove campground
d. Big Silver group campground
e. Camino Cove campground
f. Fashoda campground
g. Gerle Creek campground complex
h. Ice House campground/ boat launch/day use area
i. Jones Fork campground
j. Junction Reservoir boat launch
k. Lone Rock campground
l. Loon Lake campground/boat ramp
m. Loon Lake chalet
n. Northshore campground
o. Northshore RV campground
p. Pleasant campground
q. Red Fir group campground
r. Strawberry Point campground
s. Sunset campground/boat launch
t. Union Valley bike trail
u. Wench Creek campground
v. Wench Creek group campground
w. West Point campground/boat launch
x. Wolf Creek campground
y. Wolf Creek group campground
z. Yellowjacket campground/boat launch
Other ____________

7. Number and description of bears (how many, what color, size, adult or cub, sex?):

1 ADULT BLACK BEAR ~ 300 LBS SEX REALLY...

8. Did the bear(s) harm anyone?

a. No b. Yes* (describe) NO

9. What were you doing before you saw the bear?

SLEEPING

10. What was the bear doing when you first saw it?

WALKING DOWN THE CAMP ACCESS ROAD

* If there was a physical encounter with the bear or a bear was harmed in the incident, please report to the USFS Ranger and California Department of Fish and Wildlife.

11. How did the bear react to you?

DID NOT SEE ME

12. What did you do then?

TOOK NO ACTION BEAR SNIFFED AIR AND WALKED ON

13. How did the bear react to your response?

N/A

14. How close did you come to the bear (how many feet)**?**

75 ft

15. Was human food present?

a. Food not in bear resistant container
b. Food in bear resistant container
c. Food odor only
d. Food hung in tree
e. No food present
f. Unknown

16. Did the bear eat any human food?

a. No b. Yes (what?) ____________
c. Unknown

NOT AT MY SITE IT DID AT ANOTHER SITE.

17. Did the bear damage property?

a. No b. Yes (list property and estimate costs) ____________

18. Details of bear-human interaction (optional):

NONE OBSERVED BEAR WALK BY MY SITE WAS ALERTED BY MOTION SENSOR LIGHT AND WAS AWAKENED WHEN BEAR TRASHED ANOTHE SITE.

KEEP ME WILD

For office use only:

Report collected by: Kirby Freund (USFS/camp host)

Date: 8/8/2020

KEEP ME WILD

BEAR ENCOUNTER FORM

Bear Management Monitoring
Crystal Basin Recreation Area

Use a separate form for each individual incident. For example, if the same bear enters two campsites while people are present, a person from each campsite should report the specifics of their encounter. Give completed forms to campground hosts. If your recreation site has no host, forms should be placed in the appropriate receptacle at the site or dropped off at the Crystal Basin Information Station on Ice House Road between Ice House Reservoir and Union Valley Reservoir. Forms also can be dropped off at the Pacific Ranger Station at 7887 Highway 50, Pollock Pines, CA 95726.

1. Person(s) involved:

Name: ______

Address: ______

City: ______ State: ______

Zip code: ______ Phone: ______

Country: ______

2. Describe yourself:

a. Visitor
b. Camp host
c. USFS employee
d. Contractor
e. Other ______

3. Visitor activity:

a. Camping – developed campground
b. Camping – undeveloped campsite/wilderness
c. Day use area
d. Hiking on maintained trail
e. Other ______

4. Group size: 6
(number of people who encountered the bear)

5. Time of encounter: Month: ____ Day: ____ Year: 2020 Time: ______ am/pm
Aug 5 + 6th

6. Location of encounter:

a. Airport Flat campground
b. Angel Creek day use area
c. Azalea Cove campground
d. Big Silver group campground
e. Camino Cove campground
f. Fashoda campground
g. Gerle Creek campground complex
h. Ice House campground/ boat launch/day use area
i. Jones Fork campground
j. Junction Reservoir boat launch
k. Lone Rock campground
l. Loon Lake campground/boat ramp
m. Loon Lake chalet
n. Northshore campground
o. Northshore RV campground
p. Pleasant campground
q. Red Fir group campground
r. Strawberry Point campground
s. Sunset campground/boat launch
t. Union Valley bike trail
u. Wench Creek campground
v. Wench Creek group campground
w. West Point campground/boat launch
x. Wolf Creek campground
y. Wolf Creek group campground
z. Yellowjacket campground/boat launch
Other ______

7. Number and description of bears (how many, what color, size, adult or cub, sex?):
didn't see bear

8. Did the bear(s) harm anyone?
a. No b. Yes* (describe) NO

9. What were you doing before you saw the bear?
sleeping

10. What was the bear doing when you first saw it?
didn't see

* If there was a physical encounter with the bear or a bear was harmed in the incident, please report to the USFS Ranger and California Department of Fish and Wildlife.

11. How did the bear react to you?

12. What did you do then?

13. How did the bear react to your response?

14. How close did you come to the bear (how many feet)?

15. Was human food present?
a. Food not in bear resistant container
b. Food in bear resistant container
c. Food odor only
d. Food hung in tree
e. No food present
f. Unknown

16. Did the bear eat any human food?
a. No b. Yes (what?) ice chest
c. Unknown

17. Did the bear damage property?
a. No b. Yes (list property and estimate costs) NO.

18. Details of bear-human interaction (optional):

KEEP ME WILD

For office use only:

Report collected by: ______________________ (USFS/camp host)

Date: __________

KEEP ME WILD

BEAR ENCOUNTER FORM

Bear Management Monitoring
Crystal Basin Recreation Area

Use a separate form for each individual incident. For example, if the same bear enters two campsites while people are present, a person from each campsite should report the specifics of their encounter. Give completed forms to campground hosts. If your recreation site has no host, forms should be placed in the appropriate receptacle at the site or dropped off at the Crystal Basin Information Station on Ice House Road between Ice House Reservoir and Union Valley Reservoir. Forms also can be dropped off at the Pacific Ranger Station at 7887 Highway 50, Pollock Pines, CA 95726.

1. Person(s) involved:

Name: guest at N. Shore

Address: ______________________

City: ______________________ State: __________

Zip code: __________ Phone: ______________________

Country: ______________________

2. Describe yourself:

a. Visitor
b. Camp host
c. USFS employee
d. Contractor
e. Other __________

3. Visitor activity:

a. Camping – developed campground
b. Camping – undeveloped campsite/wilderness
c. Day use area
d. Hiking on maintained trail
e. Other __________

4. Group size: ?
(number of people who encountered the bear)

5. Time of encounter: Month: 07 Day: 25 Year: 20 Time: 10 PM am/pm

6. Location of encounter:

a. Airport Flat campground
b. Angel Creek day use area
c. Azalea Cove campground
d. Big Silver group campground
e. Camino Cove campground
f. Fashoda campground
g. Gerle Creek campground complex
h. Ice House campground/ boat launch/day use area
i. Jones Fork campground
j. Junction Reservoir boat launch
k. Lone Rock campground
l. Loon Lake campground/boat ramp
m. Loon Lake chalet
n. Northshore campground
o. Northshore RV campground
p. Pleasant campground
q. Red Fir group campground
r. Strawberry Point campground
s. Sunset campground/boat launch
t. Union Valley bike trail
u. Wench Creek campground
v. Wench Creek group campground
w. West Point campground/boat launch
x. Wolf Creek campground
y. Wolf Creek group campground
z. Yellowjacket campground/boat launch
Other corner of ice hs & wentworth

7. Number and description of bears (how many, what color, size, adult or cub, sex?):

1, large, black

8. Did the bear(s) harm anyone?

a. No b. Yes* (describe)

9. What were you doing before you saw the bear?

driving in car

10. What was the bear doing when you first saw it?

running on the roadway

* If there was a physical encounter with the bear or a bear was harmed in the incident, please report to the USFS Ranger and California Department of Fish and Wildlife.

11. How did the bear react to you?

running in front of vehicle

12. What did you do then?

?

13. How did the bear react to your response?

running

14. How close did you come to the bear (how many feet)**?**

?

15. Was human food present?

a. Food not in bear resistant container
b. Food in bear resistant container
c. Food odor only
d. Food hung in tree
e. No food present
f. Unknown

16. Did the bear eat any human food?

a. No b. Yes (what?)
c. Unknown

17. Did the bear damage property?

a. No b. Yes (list property and estimate costs)

18. Details of bear-human interaction (optional)**:**

This incident reported to camp hosts, N.Shore

APPENDIX F2

Bear Encounter Summary

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Bear Encounter Form - Bear Management Monitoring, Crystal Basin Recreation Area - UARP, Eldorado National Forest

2020 Results Summary - Compiled by Ethan Koenigs, SMUD

1. Name	2. Description	3. Visitor Activity	4. Group Size	5. Date/Time of Encounter	6. Location	7. Number / description of bear(s)	8-14 - Description of interaction w/ bear	15. Food Present	16.Consumption by Bear	17. Property Damage	Comments
NA	Visitor	Camping - developed	6	8/5/2020	Strawberry Point	Unknown	Bear got into cooler	Yes - no container	Unknown	No	Camper didn't see bear - they were asleep.
NA	Visitor	Camping - developed	1	7/25/2020	Northshore	1 - large, dark	Bear running along road	No	No	No	Bear viewed from car along road
Larry Stank	Visitor	Camping - developed	3	8/5/2020	Strawberry Point	1 adult black	Bear walking along campground road	No	No	No	Bear was observed trashing another campsite
Scot Hendrickson	Camp Host	Camping - developed	1	7/27/2020	Northshore	1 adult	Bear walking through camp	No	No	No	Bear passed through camp and left trash bag untouched - bear not observed but prints observed
Scot Hendrickson	Camp Host	Camping - developed	1	7/10/2020	Northshore	Unknown	Garbage scattered near dumpster	Yes -no container	Yes	No	Accumulated garbage next to full dumpster was picked through by bear
Ed Ingram	Visitor	Camping - developed	2	7/27/2020	Northwind	Unknown	Bear entered camp and took 5-gal bucket	Food odor only	No	No	Bear was not seen, only found bucket with some teeth marks
Dwane Smith	Visitor	Camping -developed	1	7/23/2020	Strawberry Point	Unknown	Bear opened cooler and ate food in camp	Yes - no container	Yes	Yes	Teeth punctures in Ice Chest; bear consumed cheese hashbrowns and cherry tomatoes
Melynde Capps	Visitor	Camping - developed	1	6/25.2020	Sunset CG	1 dark	Bear got into cooler and ate food;	Yes - no container	Yes	Yes	Lid on cooler damaged; bear ate cheese;
Chaina Wade	Visitor	Camping - developed	6	7/6/2020	Sunset CG	Unknown	Bear ate all of the camper's food	Yes - no container	Yes	Yes	Bear was not observed but all of the food was consumed by the bear; plastic container holding food was damaged
NA	Visitor	Camping - developed	6	7/5/2020	Northwind	1 adult	Bear came into camp and got food from a plastic container	Yes - no container	Yes	No	Bear took a bin full of food that was next to bear box and ate the dry goods that were in it
Yuriy Neshkov	Visitor	Camping - developed	6	7/7/2020	Northwind	1 - adult black	Bear came into camp at night and took food.	Yes - no container	Yes	Yes	Bear was observed getting into a food tent; it ate eggs and marshmallows and

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APPENDIX G

2020 Water Temperature Graphs

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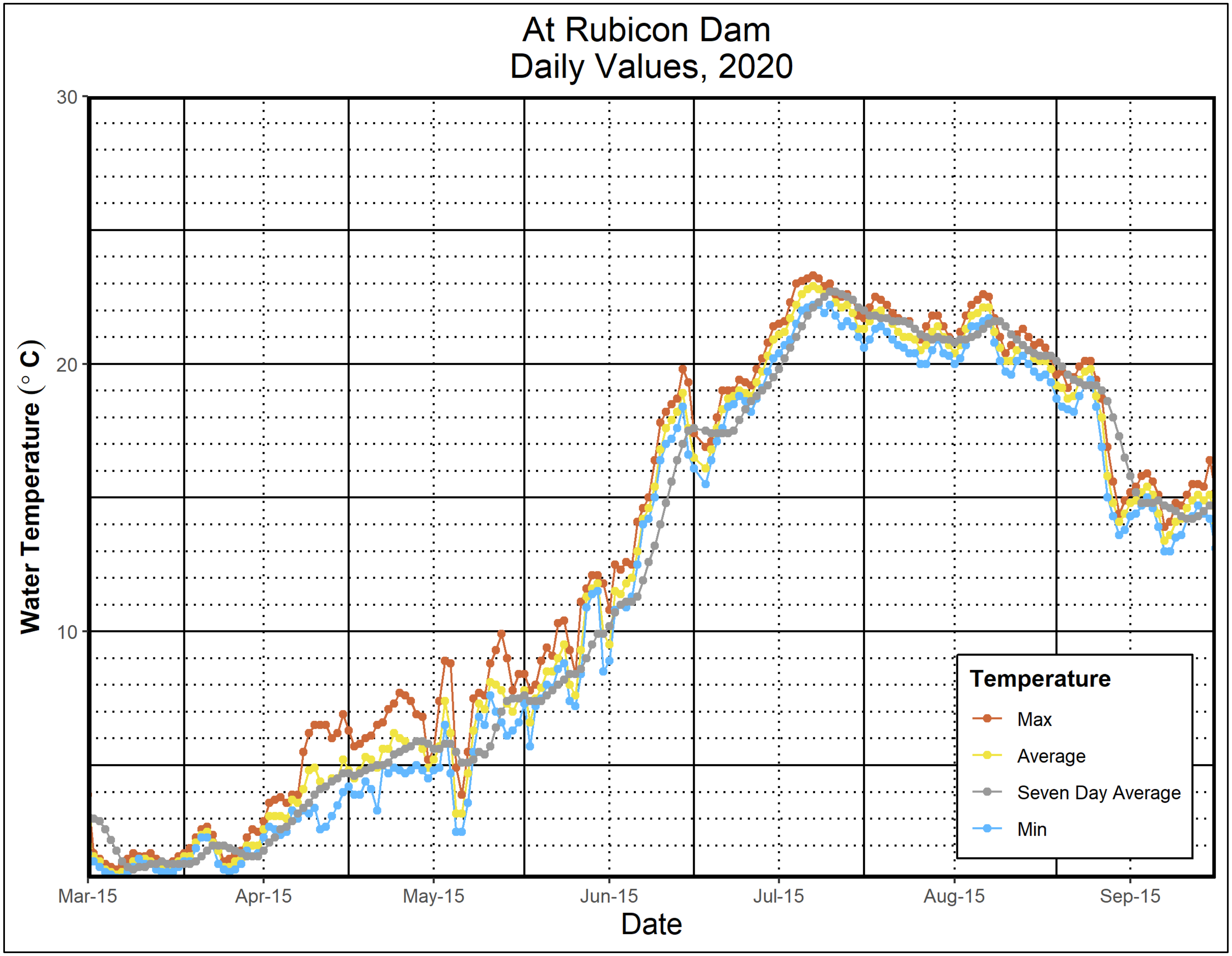

Figure G-1. Rubicon River immediately below Rubicon Reservoir Dam (RR5)

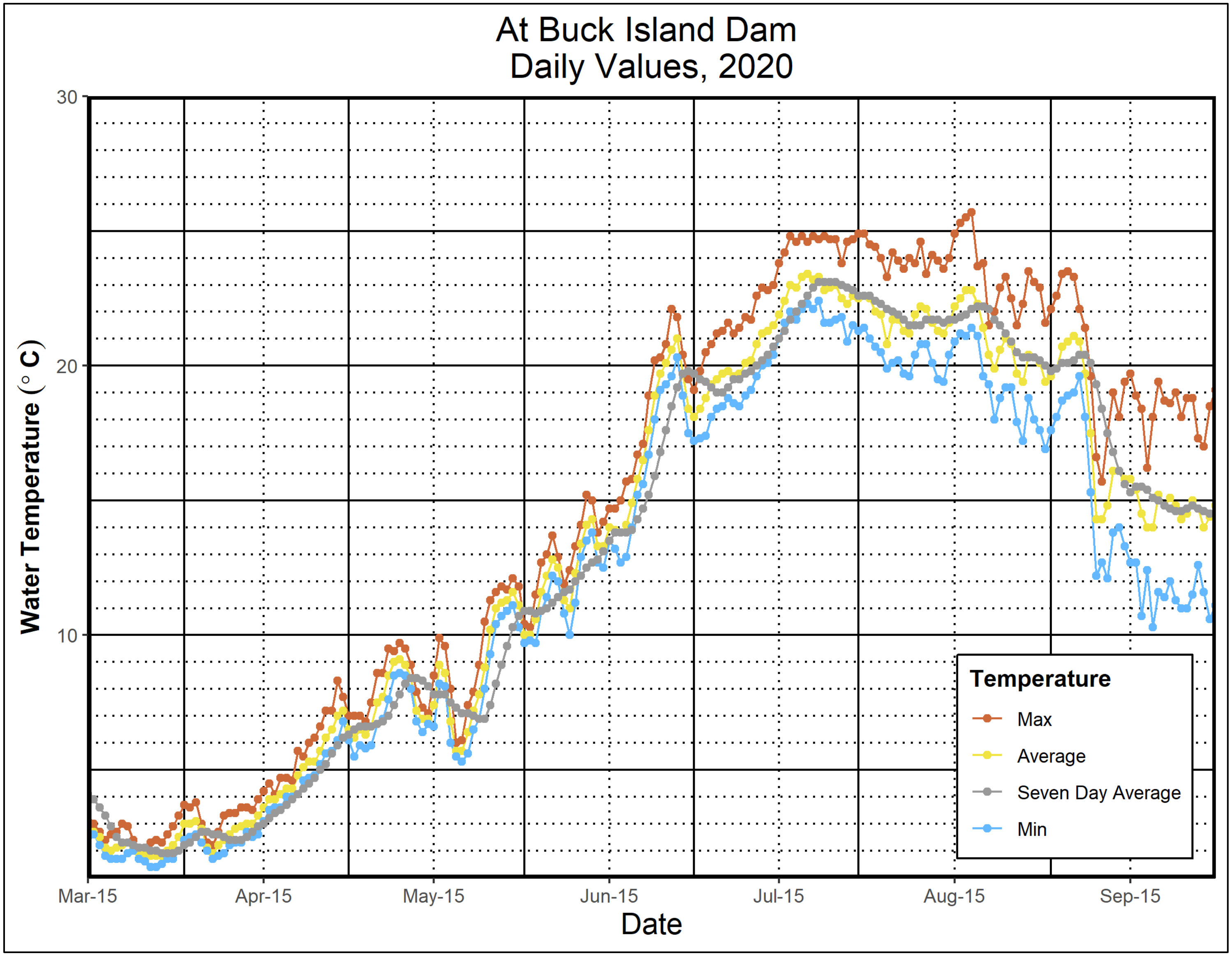

Figure G-2. Little Rubicon River Immediately below Buck Island Reservoir Dam (LRR3)

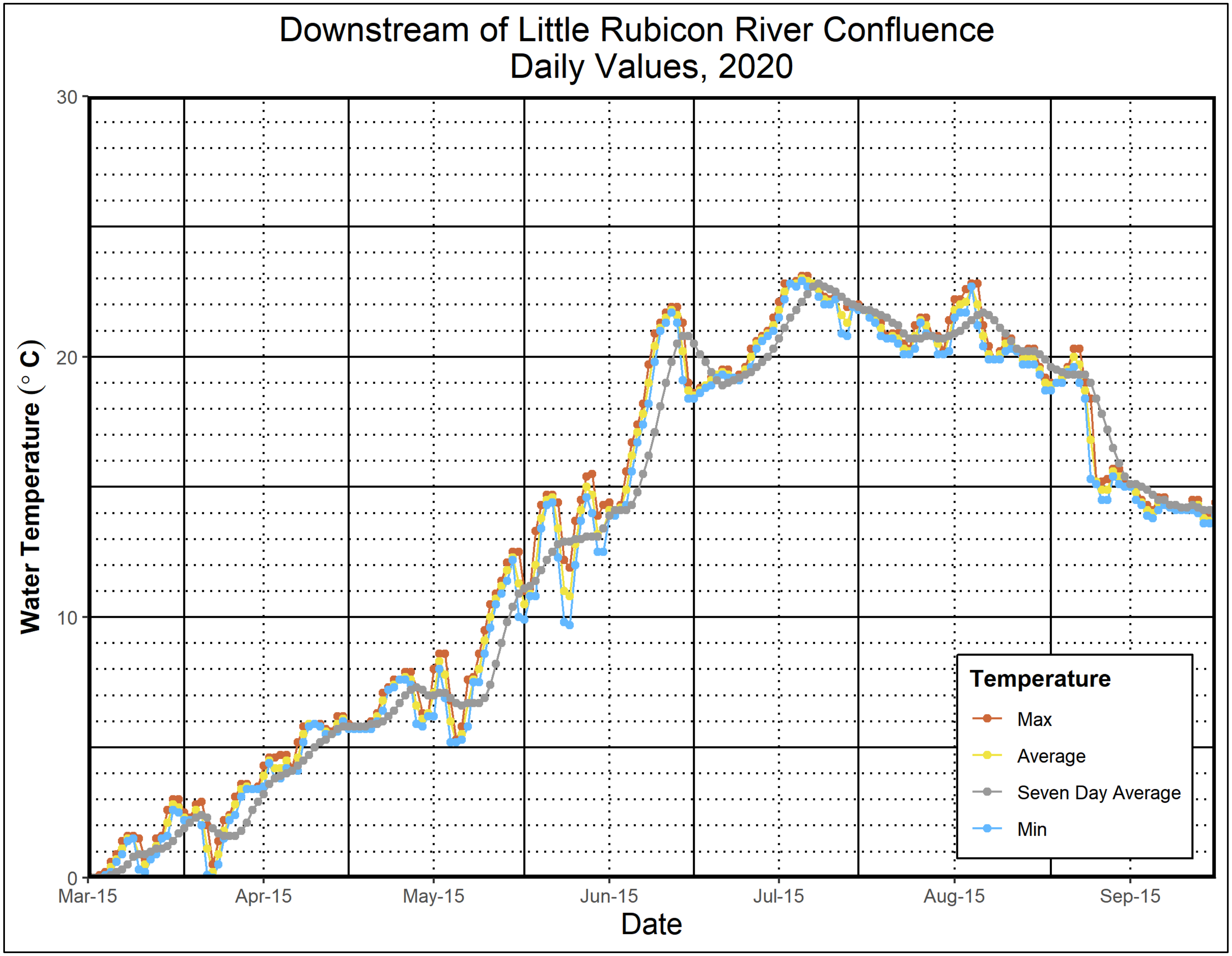

Figure G-3. Rubicon River below confluence of Little Rubicon River at the Project boundary (RR1)

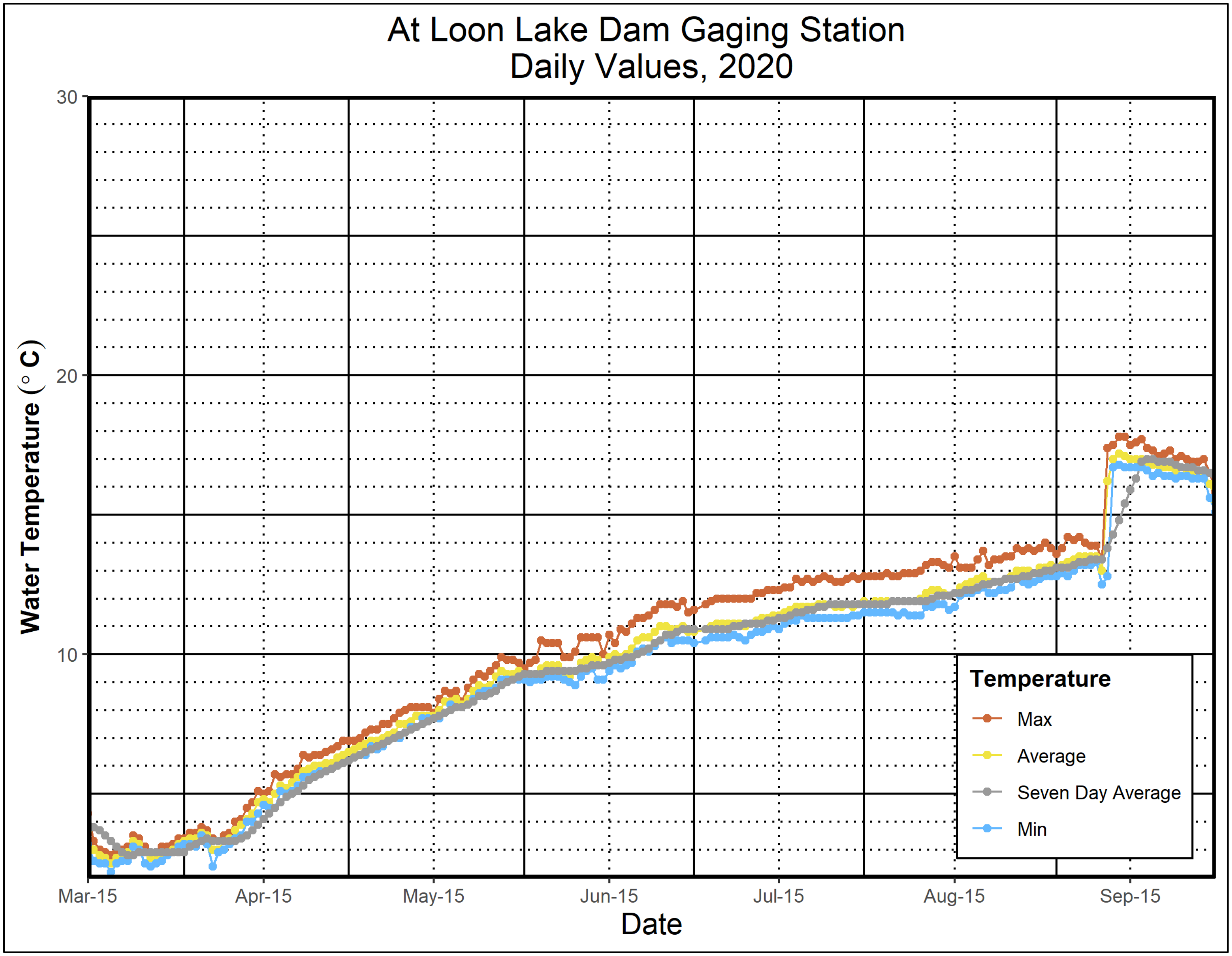

Figure G-4. Gerle Creek Immediately below Loon Lake Reservoir Dam (GC7)

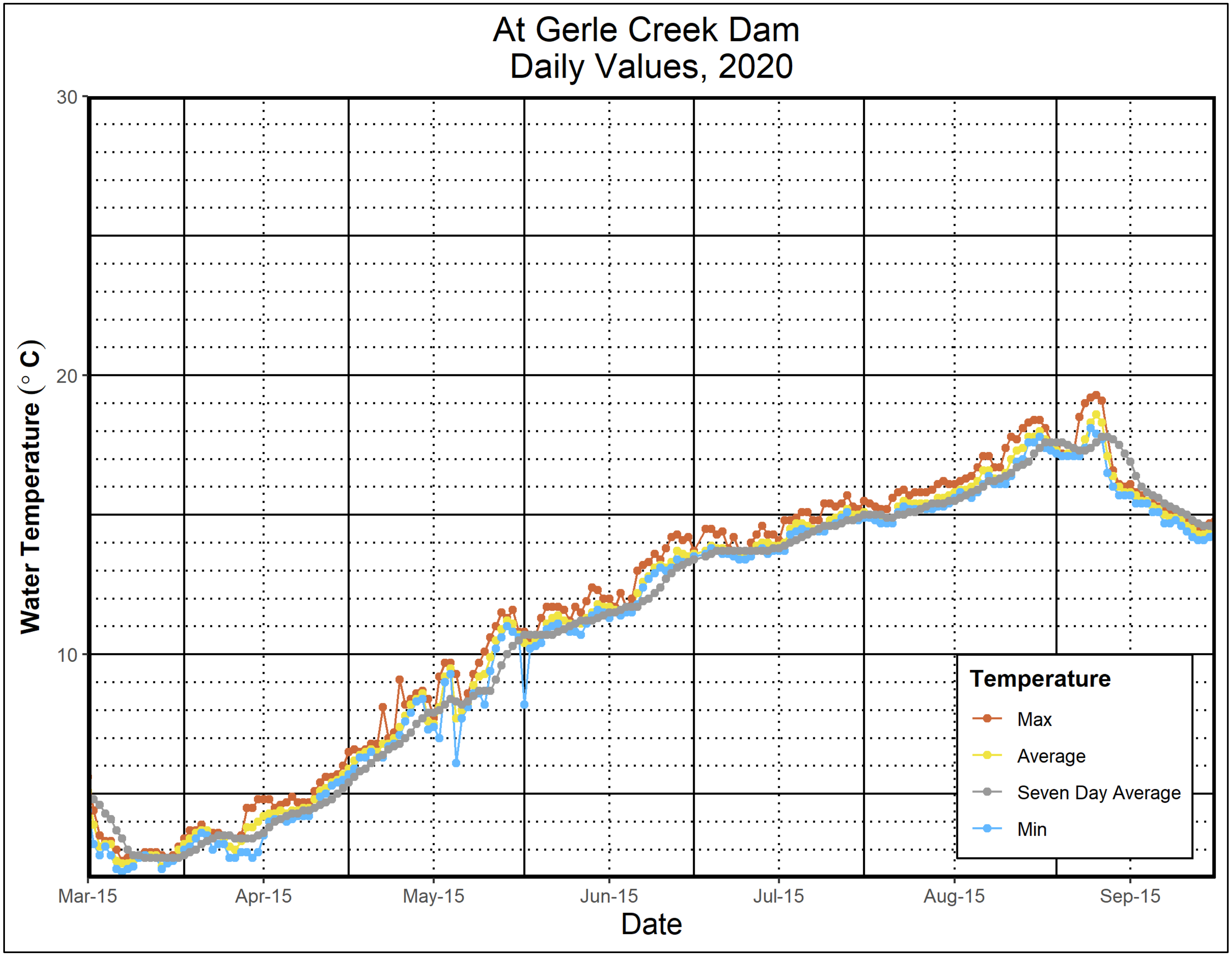

Figure G-5. Gerle Creek immediately below Gerle Creek Reservoir Dam (GC8)

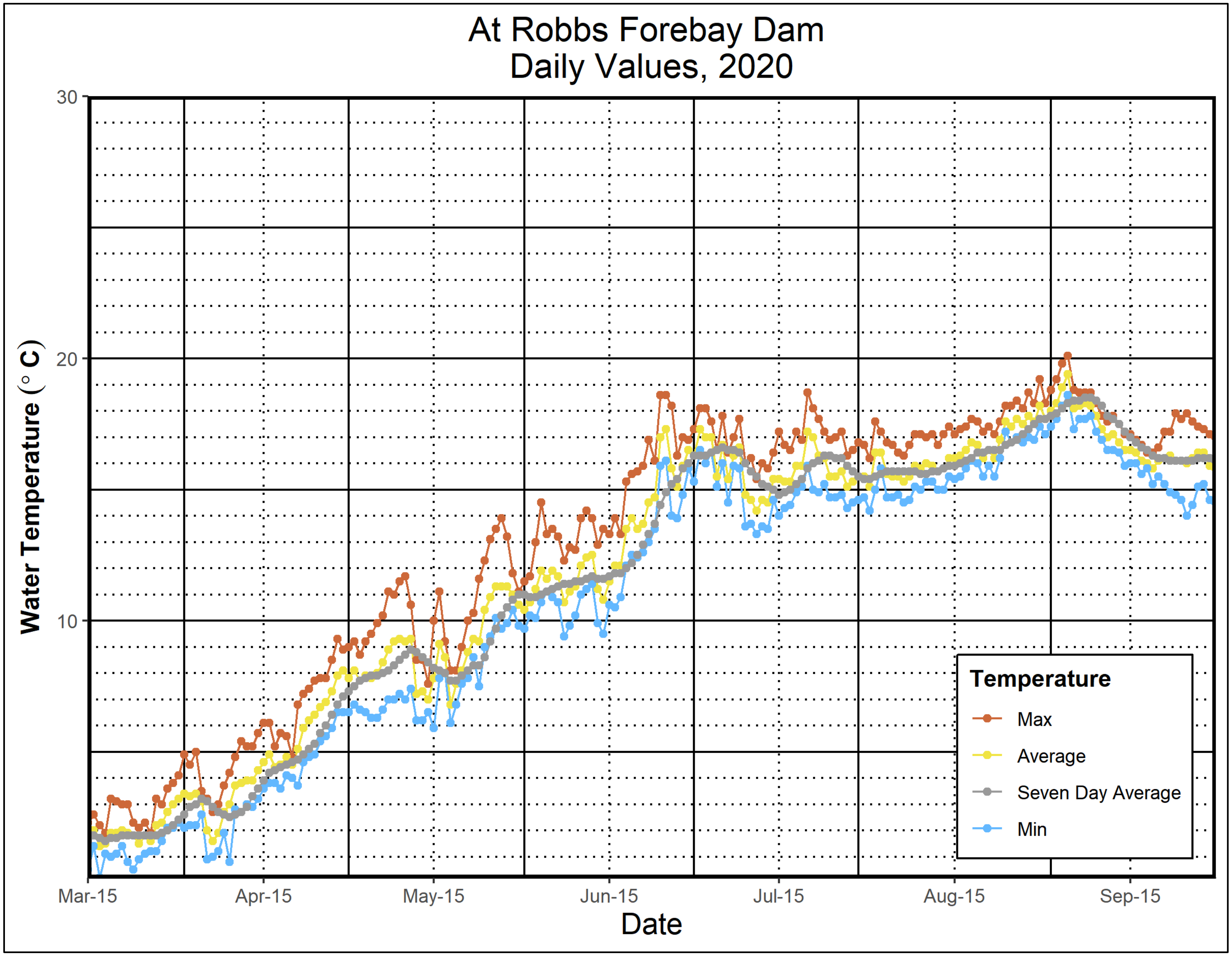

Figure G-6. SF Rubicon River immediately below Robbs Peak Reservoir Dam (SFRR5)

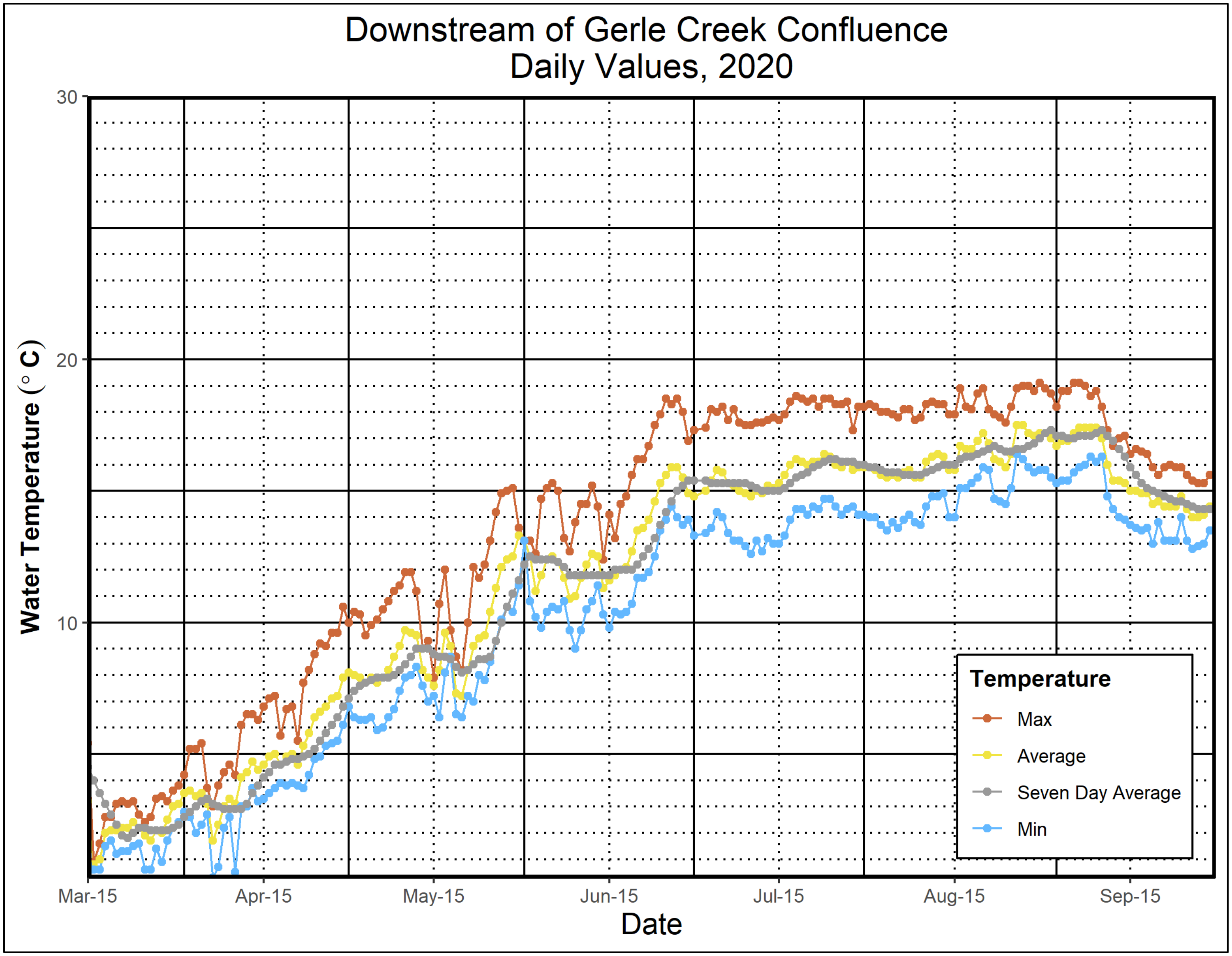

Figure G-7. SF Rubicon River below confluence of Gerle Creek (SFRR6)

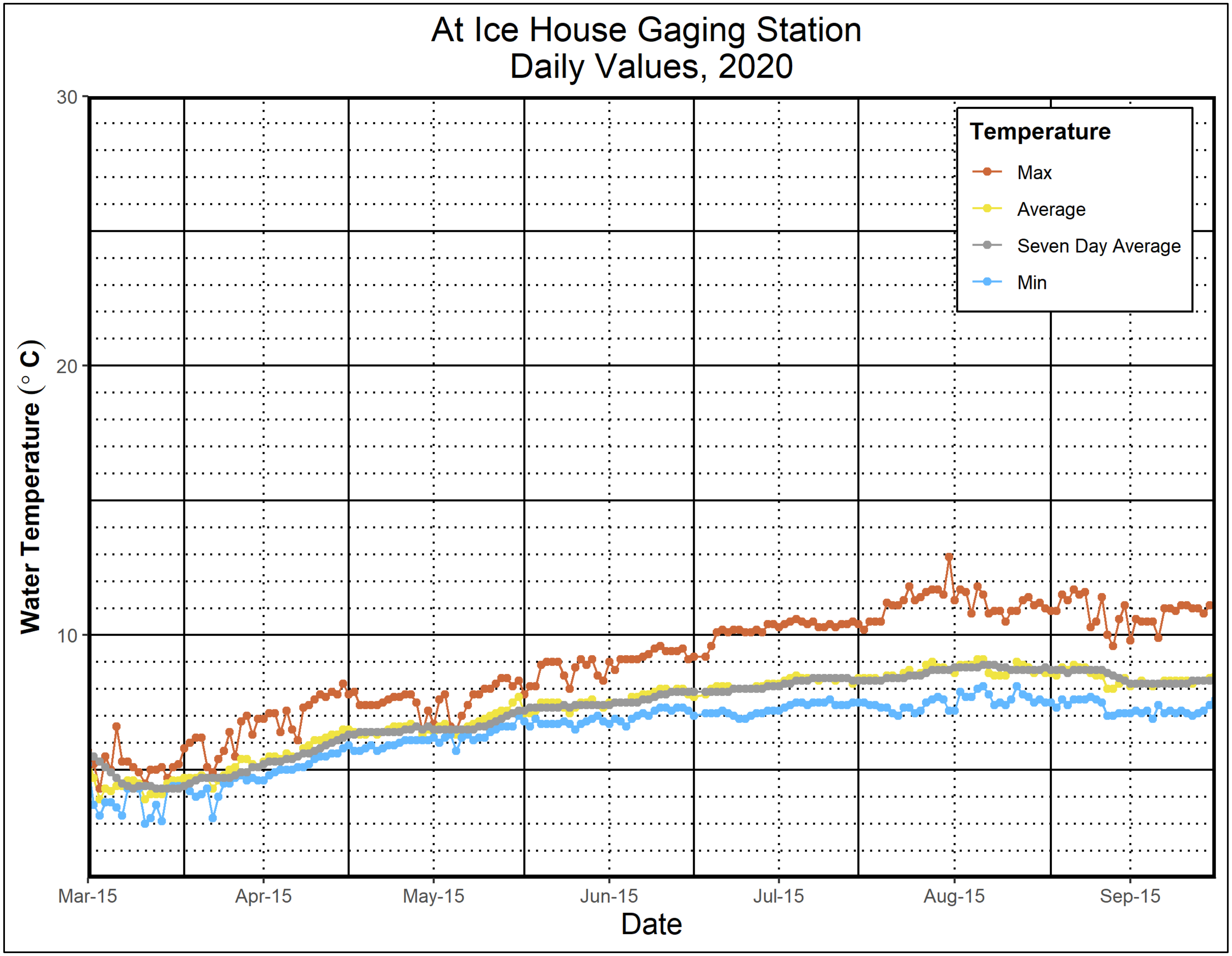

Figure G-8. South Fork Silver Creek immediately below Ice House Reservoir Dam (SFSC7)

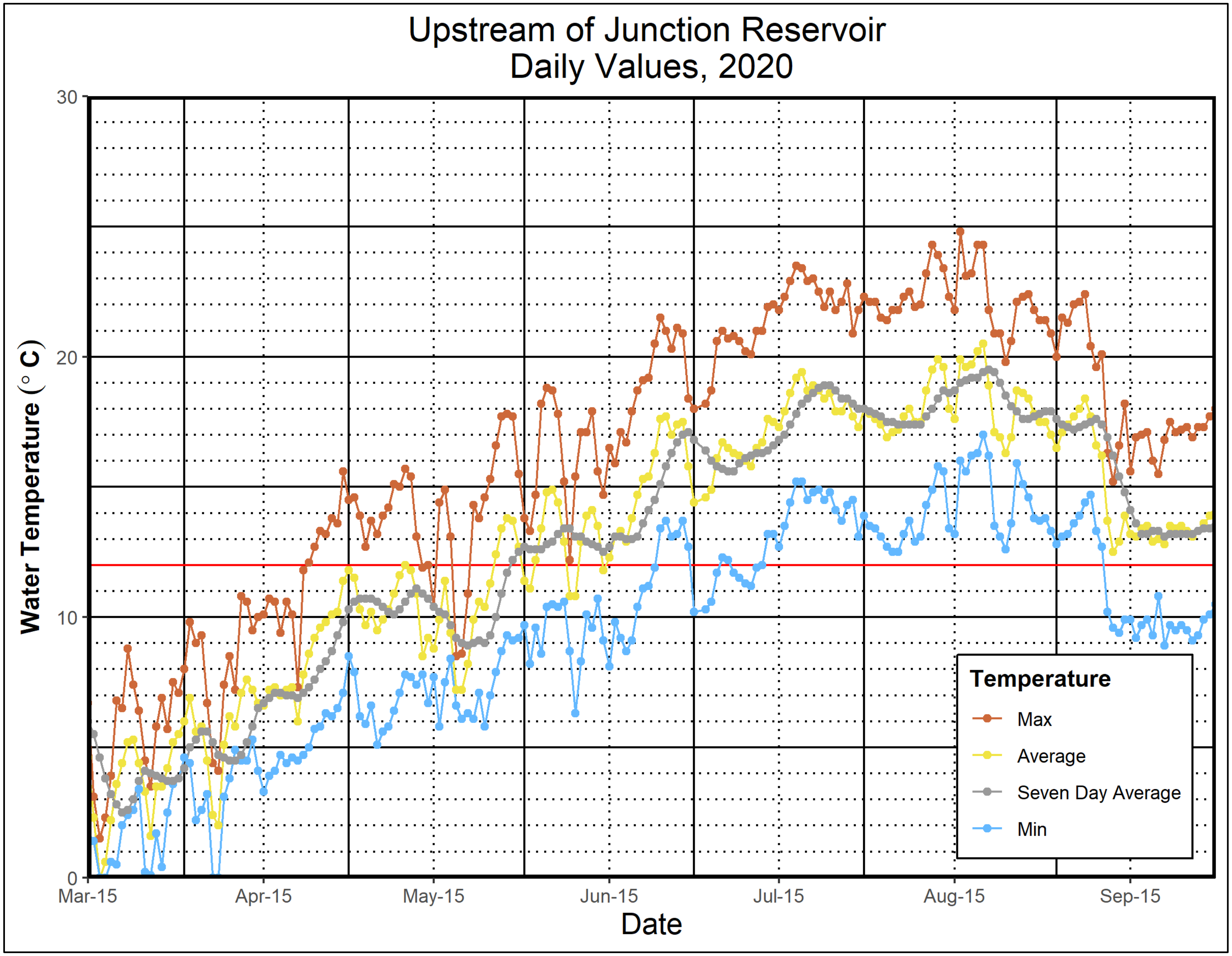

Figure G-9. South Fork Silver Creek immediately upstream of Junction Reservoir (SFSC8)

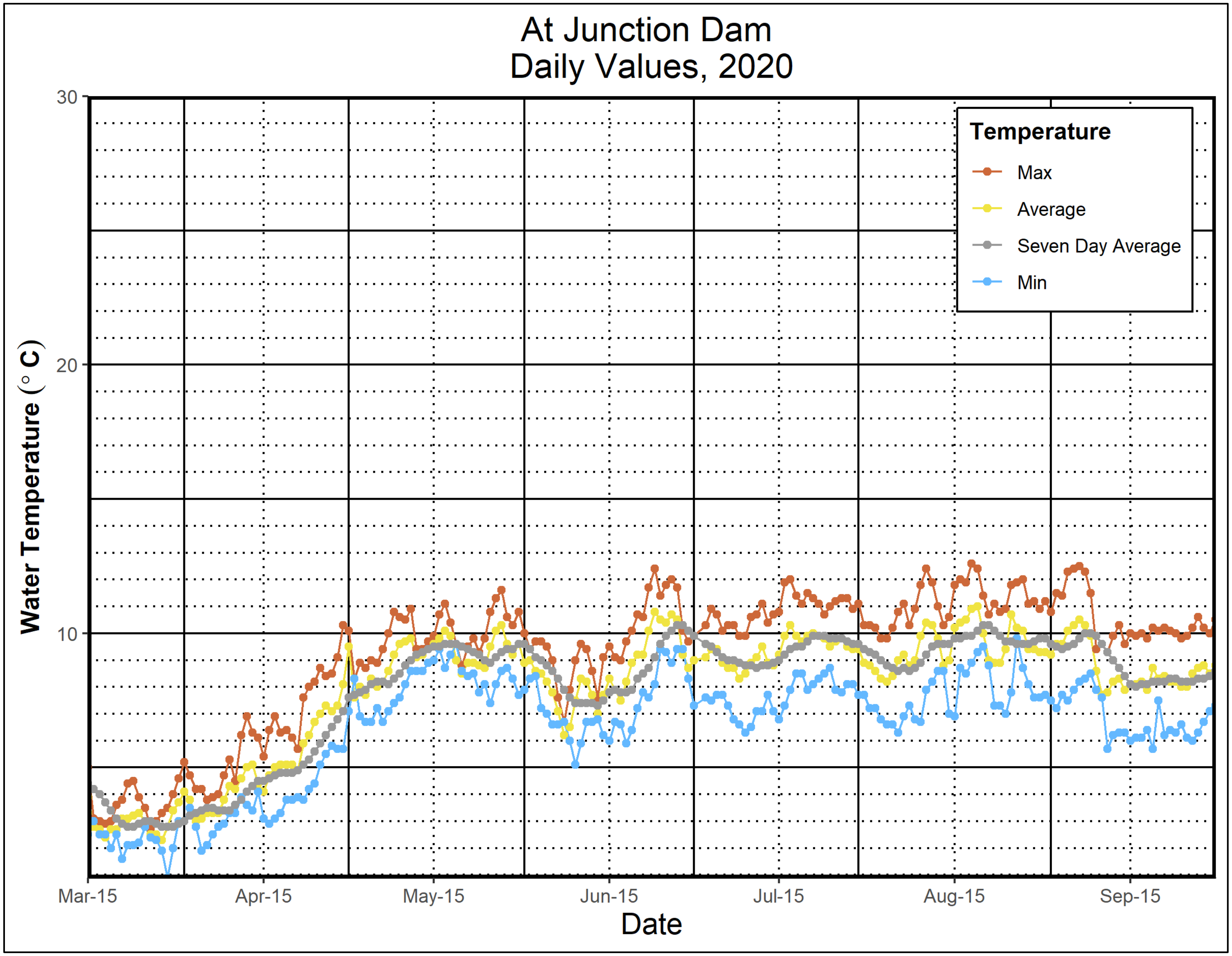

Figure G-10. Silver Creek immediately below Junction Reservoir Dam (SC5)

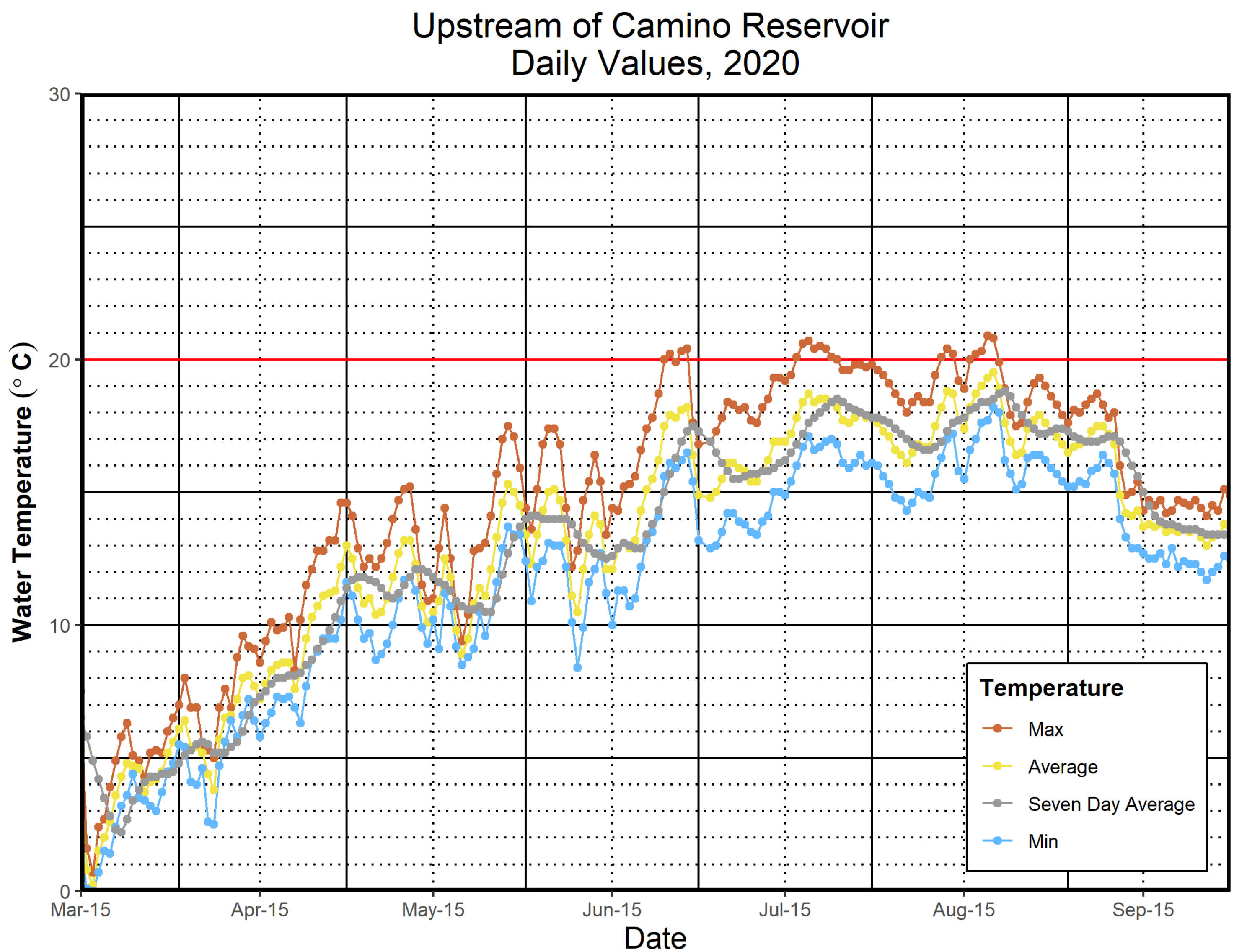

Figure G-11. Silver Creek immediately above Camino Reservoir Dam (SC6)

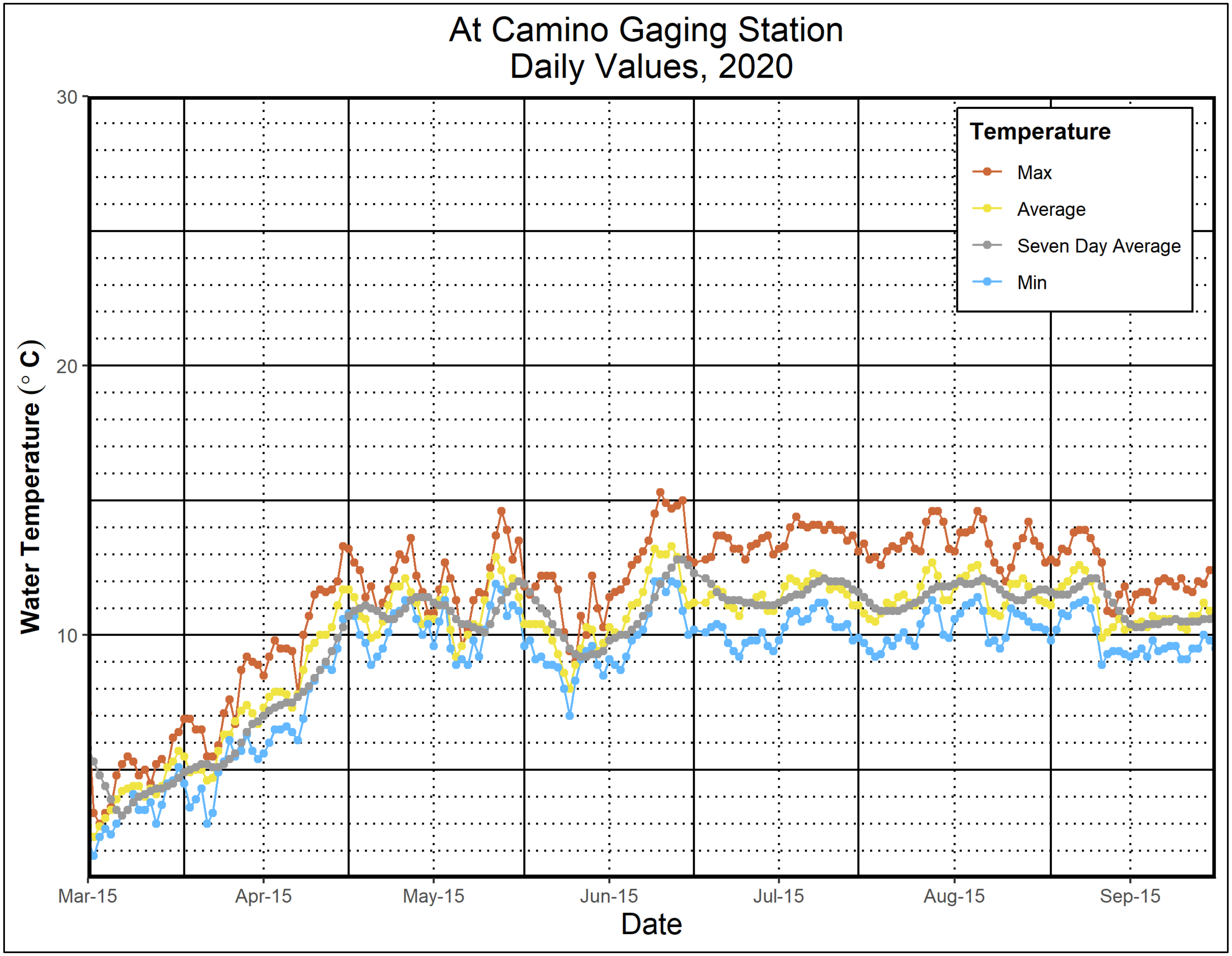

Figure G-12: Silver Creek immediately below Camino Reservoir Dam (SC7)

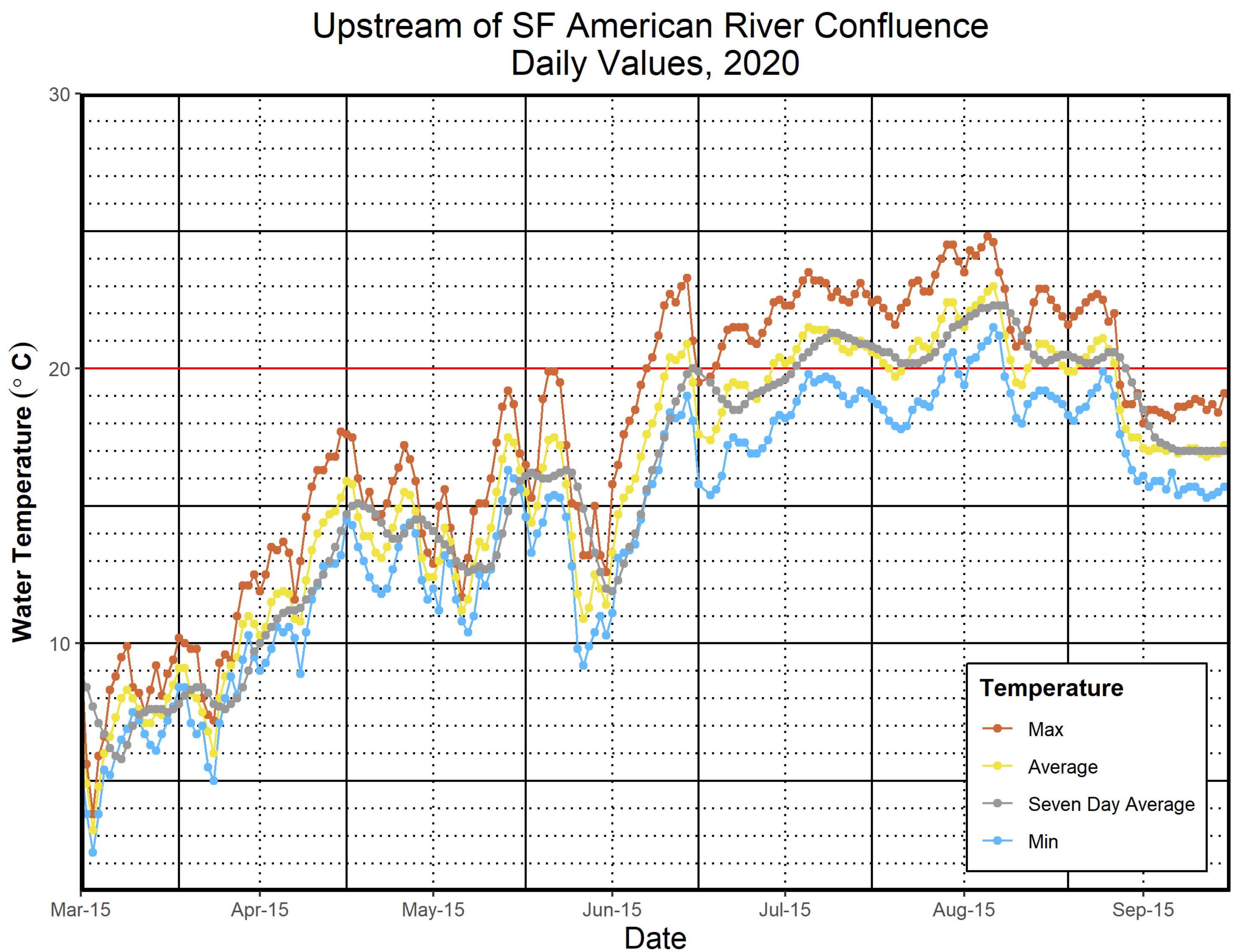

Figure G-13: Silver Creek immediately upstream of SF American River (SC8)

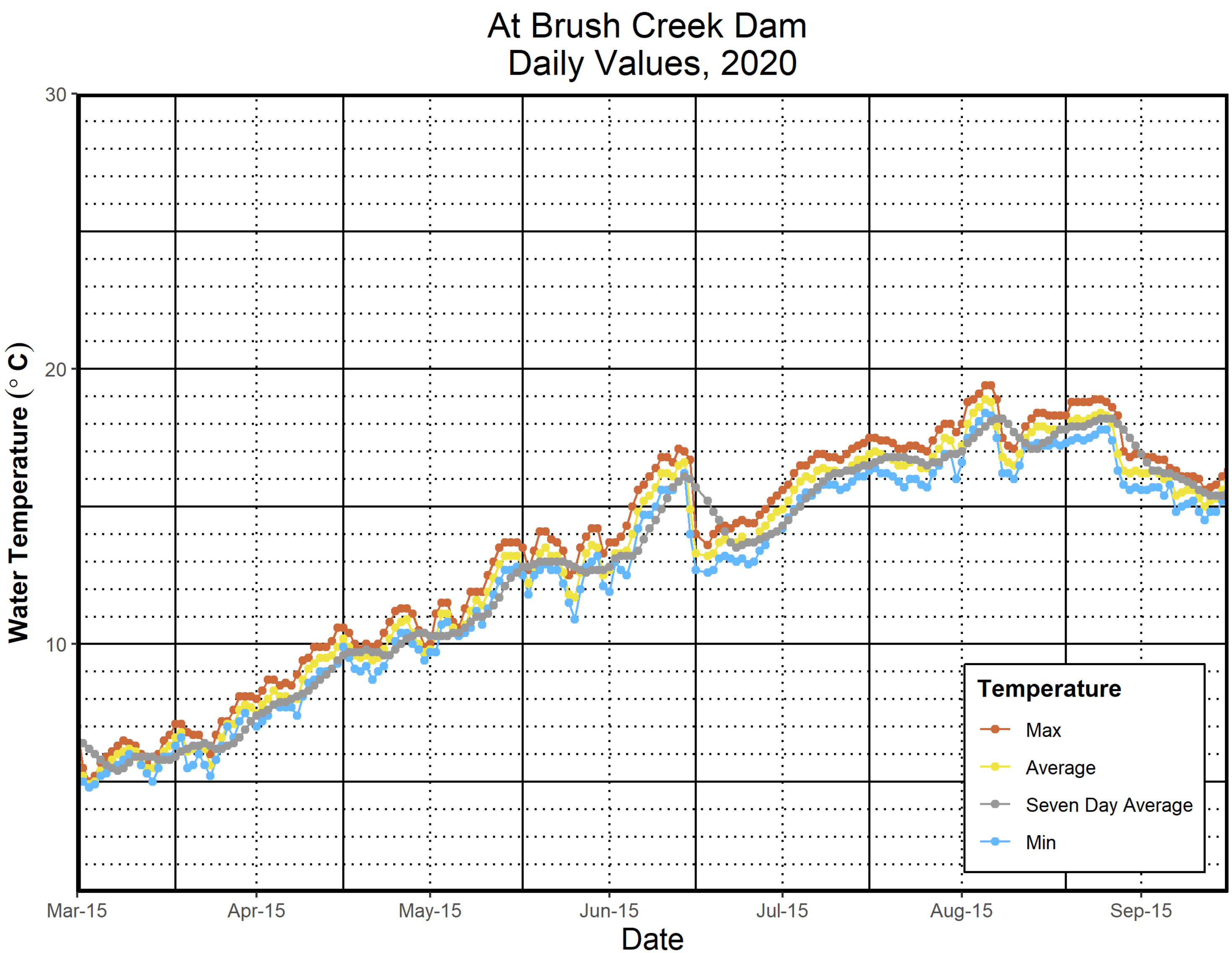

Figure G-14: Brush Creek immediately below Brush Creek Reservoir Dam (BC4)

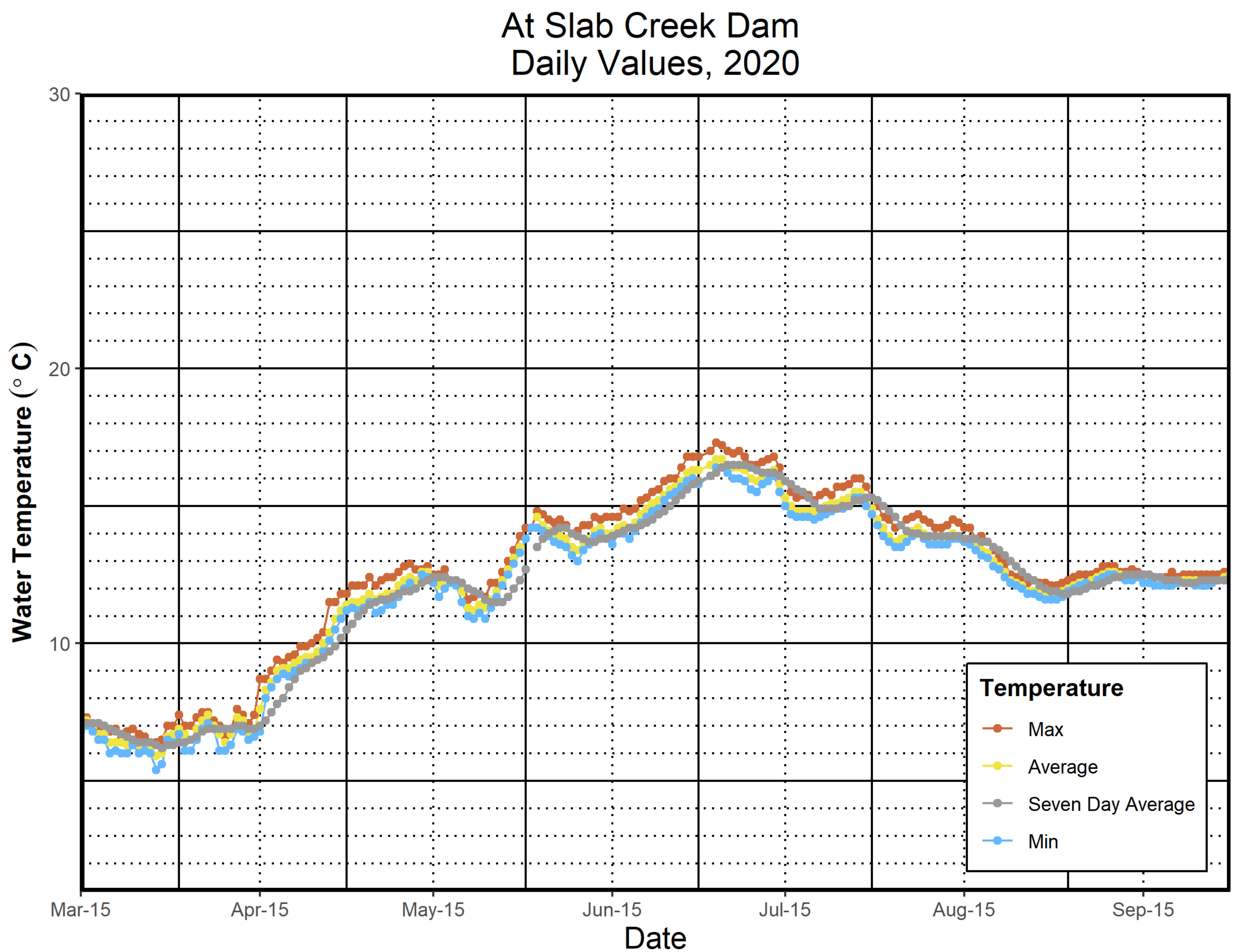

Figure G-15. SF American River immediately below Slab Creek Reservoir Dam (SFAR13)

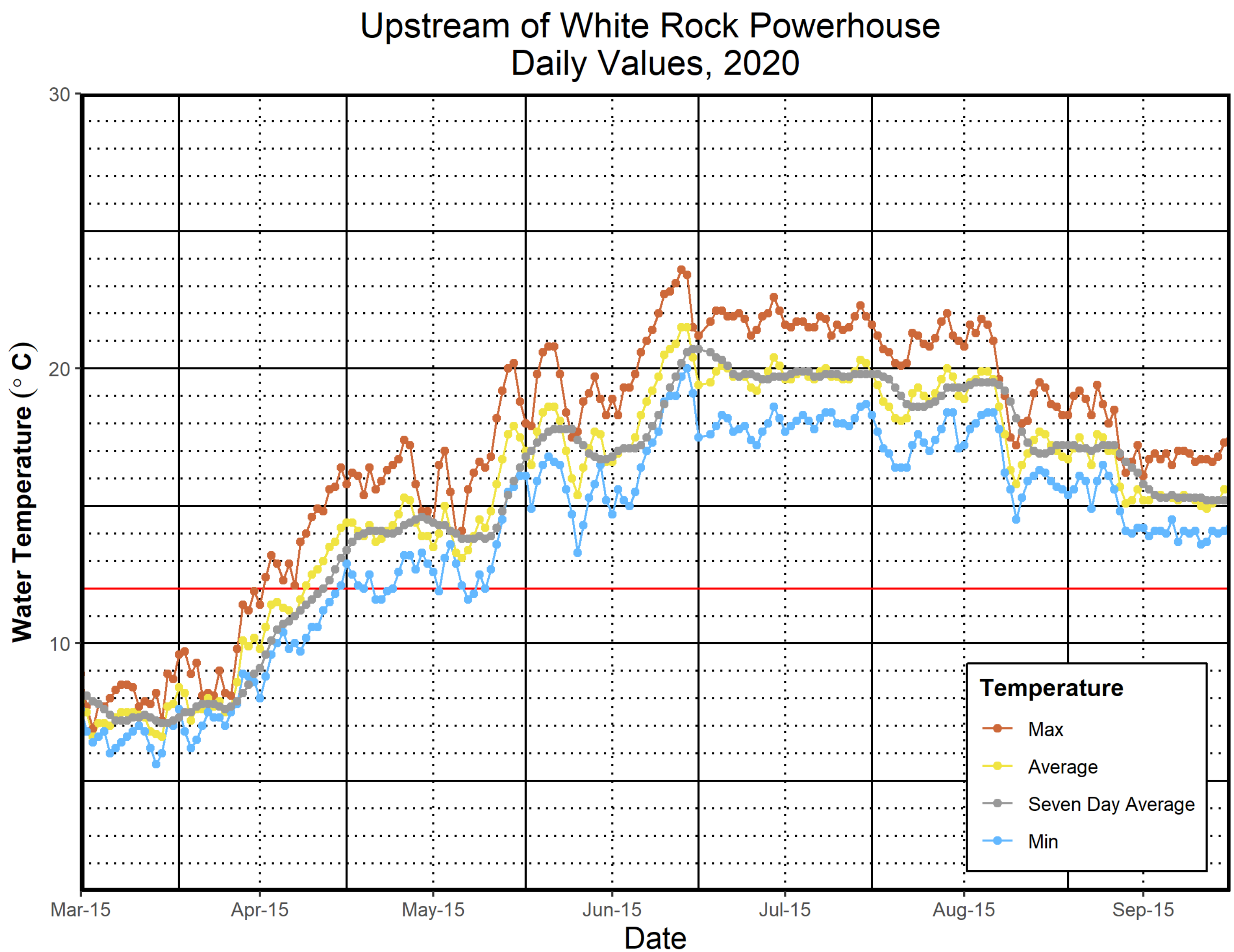

Figure G-16. SF American River approximately ½ mile upstream of White Rock Powerhouse (SFAR15)

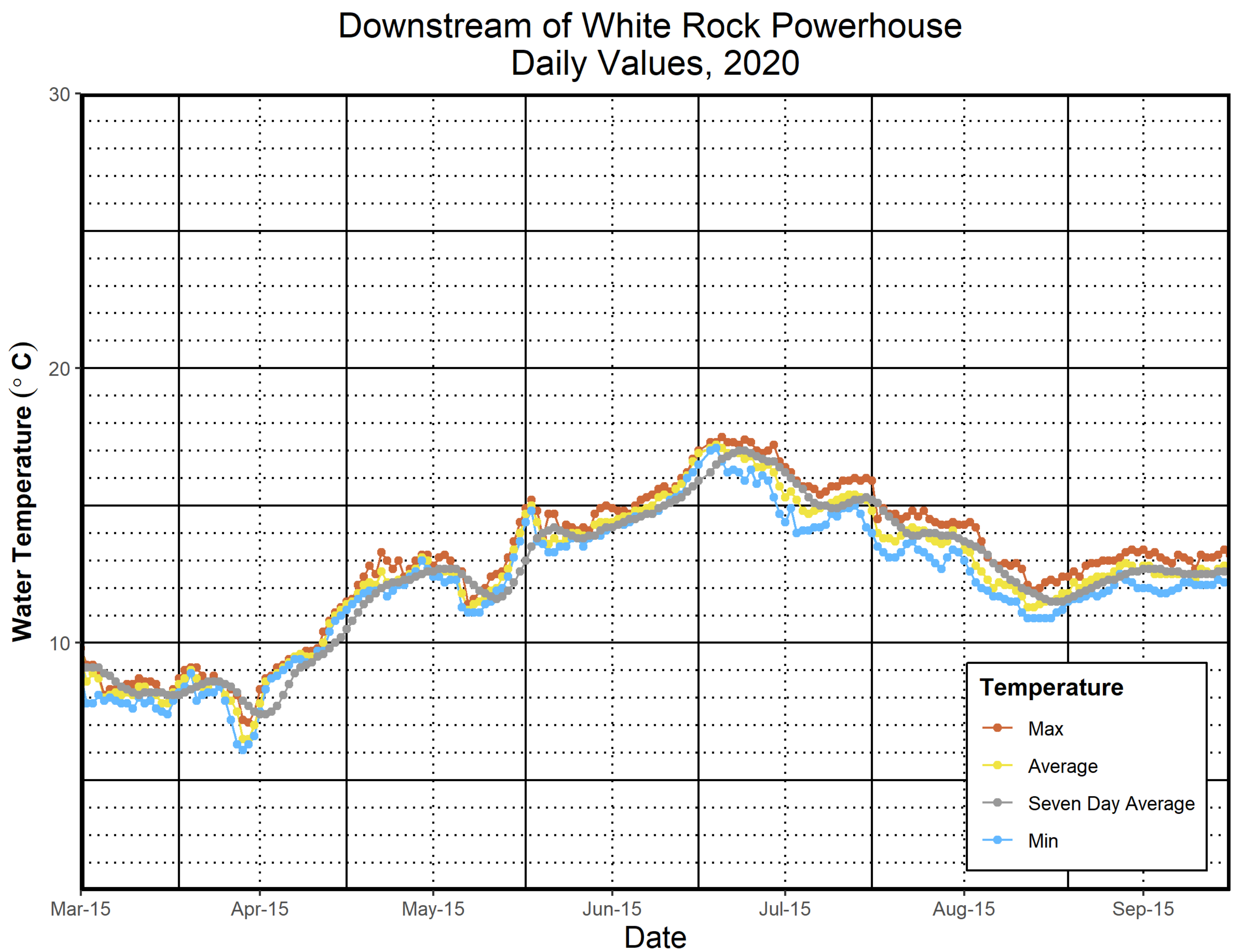

Figure G-17: SF American River to record White Rock Powerhouse discharge temps (SFAR16)

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