Monitoring Program 2024
Volume I: Final Annual Report
Sacramento Municipal Utility District

Hydro License Implementation • June 2025

Upper American River Project

FERC Project No. 2101



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VOLUME I: TABLE OF CONTENTS

1.0 INTRODUCTION AND BACKGROUND 1-1
1.1 Monitoring Sites 1-2
1.2 Monitoring Frequency 1-2
1.3 Consultation 1-7
1.4 Literature Cited 1-7
2.0 TROUT 2-1
2.1 Monitoring Plan Objectives 2-1
2.2 Methods 2-1
2.3 Results 2-2
2.3.1 Stream Habitat 2-2
2.3.2 Species Richness 2-2
2.3.3 Trout Density, Biomass, and Catchable Trout 2-5
2.3.4 Trout Condition 2-7
2.3.5 Trout Length-at-Age 2-9
2.3.6 Historical Comparison 2-13
2.4 Discussion 2-15
2.5 Literature Cited 2-19
3.0 BENTHIC MACROINVERTEBRATES 3-1
3.1 Monitoring Plan Objectives 3-1
3.2 Methods 3-1
3.2.1 Benthic Macroinvertebrate Sampling and Physical Habitat Data Collection 3-1
3.2.2 Laboratory Methods 3-1
3.2.3 Data Analysis 3-3
3.3 Results 3-4
3.3.1 Water Quality 3-4
3.3.2 Physical Habitat Assessment 3-5
3.3.3 Benthic Macroinvertebrate Assemblage Evaluation 3-8
3.4 Discussion 3-10
3.5 Conclusion and Future Monitoring 3-13

3.6 Literature Cited 3-14
4.0 GEOMORPHOLOGY 4-1
4.1 Monitoring Plan Objectives 4-1
4.2 Methods 4-1
4.2.1 Hydrologic Data 4-1
4.2.2 Field Surveys 4-2
4.2.3 Data Analysis 4-6
4.3 Results 4-7
4.3.1 Hydrologic Data 4-7
4.3.2 Geomorphic Field Data 4-17
4.4 Discussion 4-44
4.4.1 Site RRD-G1 (Rubicon River below Rubicon Dam) 4-44
4.4.2 Site LLD-G1 (Gerle Creek Below Loon Lake Dam, Upper Reach) 4-45
4.4.3 Site LLD-G2 (Gerle Creek Below Loon Lake Dam, Middle Reach) 4-45
4.4.4 Site IHD-G1 (South Fork Silver Creek below Ice House Dam, Upper Reach) 4-46
4.4.5 Site IHD-G2 (South Fork Silver Creek below Ice House Dam, Lower Reach) 4-46
4.4.6 Site CD-G1 (Silver Creek Below Camino Dam) 4-47
4.4.7 Site SCD-G1 (South Fork American River Below Slab Creek Dam) 4-47
4.5 Literature Cited 4-48
5.0 RIPARIAN VEGETATION 5-1
5.1 Monitoring Plan Objectives 5-1
5.1.1 Vegetation Mapping 5-1
5.1.2 Transect and Greenline Surveys 5-1
5.2 Results 5-1
5.2.1 Vegetation Mapping 5-1
5.2.2 Transect and Greenline Surveys 5-6

5.2.3 Special-status Species 5-11
5.3 Discussion 5-12
5.3.1 Vegetation Types 5-12
5.3.2 Species Composition and Condition 5-12
5.3.3 Bank Stability 5-15
5.3.4 Notable Site Changes 5-17
5.3.5 Conclusion and Future Monitoring 5-17
5.4 Literature Cited 5-18
6.0 BALD EAGLE 6-1
6.1 Monitoring Plan Objectives 6-1
6.2 Methods 6-1
6.3 Results 6-2
6.3.1 Union Valley Reservoir 6-2
6.3.2 Ice House Reservoir 6-6
6.4 Discussion 6-9
6.5 Literature Cited 6-10
7.0 HARDHEAD 7-1
7.1 Monitoring Plan Objectives 7-1
7.2 Methods 7-1
7.3 Results 7-1
7.3.1 Habitat Characteristics 7-1
7.3.2 Species Composition 7-4
7.3.3 Historical Comparisons 7-7
7.4 Discussion 7-17
7.5 Literature Cited 7-18
8.0 AMPHIBIAN AND AQUATIC REPTILE 8-1
8.1 Monitoring Plan Objectives 8-1
8.2 Field Methods 8-1
8.2.1 Monitoring Sites 8-1
8.2.2 Foothill Yellow-Legged Frog 8-3

8.2.3 Western Pond Turtle 8-3
8.3 Results 8-3
8.3.1 Foothill Yellow-Legged Frog 8-4
8.3.2 Western Pond Turtle 8-14
8.3.3 Habitat Conditions 8-17
8.3.4 Non-Target Species Observations 8-21
8.4 Discussion 8-23
8.4.1 Foothill Yellow-Legged Frog 8-23
8.4.2 Western Pond Turtle 8-24
8.5 Literature Cited 8-25
9.0 SIERRA NEVADA YELLOW-LEGGED FROG 9-1
9.1 Monitoring Plan Objectives 9-1
9.2 Methods 9-1
9.2.1 Monitoring Sites 9-1
9.2.2 Visual Encounter Surveys 9-1
9.2.3 Photo Points 9-2
9.3 Results 9-2
9.3.1 Rubicon Reservoir Inlet Area (Site RUB-A1) 9-3
9.3.2 Rubicon Outlet Area (Site RUB-A2) 9-6
9.3.3 Rockbound Lake Inlet Area (Site RCK-A1) 9-9
9.3.4 Highland Creek (Site HC-A1) 9-11
9.3.5 Other Amphibian and Aquatic Reptile Species 9-11
9.4 Discussion 9-13
9.5 Literature Cited 9-14
10.0 BEAR MANAGEMENT MONITORING 10-1
10.1 Monitoring Plan Objectives 10-1
10.2 Study Area and Sampling Locations 10-1
10.3 Methods 10-4
10.4 Results and Discussion 10-5
10.5 Upcoming Survey Plans 10-6

10.6 Literature Cited 10-7
11.0 LARGE WOODY DEBRIS 11-1
12.0 WATER TEMPERATURE 12-1
12.1 Monitoring Plan Objectives 12-1
12.2 Methods 12-2
12.2.1 Study Area and Sampling Locations 12-2
12.2.2 Temperature Data at Fixed Stations 12-4
12.2.3 Temperature Data at Datalogger Stations 12-5
12.2.4 Variances and Problems Encountered 12-7
12.3 Quality Assurance/Quality Control 12-7
12.4 Decision-Making Thresholds 12-7
12.5 Adaptive Management 12-8
12.6 Results 12-9
12.7 Literature Cited 12-9

LIST OF TABLES

Table 1-1. Monitoring Frequency for the First 12 Years of Implementation for the Upper American River Project. 1-6
Table 2-1. Fish Species Observed in Upper American River Project Study Reaches, 2002–2024.[1] 2-3
Table 2-2. Condition Factors for Rainbow and Brown Trout in the Upper American River Project Study Area by Site, 2002–2024.[a] 2-7
Table 2-3. Trout Length-at-Age Summary. 2-9
Table 2-4. Fisheries Objectives Specified in the Rationale Report for the Settlement Agreement. 2-17
Table 3-1. Benthic Macroinvertebrate Sites Sampled for the Upper American River Project, 2024. 3-2
Table 3-2. Water Quality Data Collected during Benthic Macroinvertebrate Sampling for the Upper American River Project, 2024. 3-4
Table 3-3. Physical Habitat Data Collected during Benthic Macroinvertebrate Sampling for the Upper American River Project, 2024. 3-5
Table 3-4. Instream Habitat Complexity and Riparian Vegetation Areal Cover by Site during Benthic Macroinvertebrate Sampling for the Upper American River Project, 2024.[1] 3-7

Table 3-5. California Stream Condition Index Scores for Benthic Macroinvertebrate Samples Collected for the Upper American River Project, 2024. 3-8
Table 3-6. California Stream Condition Index Scores for Pre-License and License Implementation Benthic Macroinvertebrate Monitoring for the Upper American River Project. 3-11
Table 4-1. Hydrologic Data Used to Assess Changes in the Geomorphic Sites. 4-1
Table 4-2. 2024 Upper American River Project Geomorphology Study Sites. 4-3
Table 4-3. Sediment Size Classes. 4-5
Table 4-4. Magnitude and Duration of Pulse Flows from Loon Lake Dam occurring between water years 2019 and 2024. 4-11
Table 4-5. Cross Section Data for Site RRD-G1, 2003, 2019, and 2024.[a] 4-19
Table 4-6. Pebble Count Data for Site RRD-G1, 2003, 2019, and 2024. 4-20
Table 4-7. Dominant Sediment Facies at Site RRD-G1, 2019 and 2024. 4-20
Table 4-8. Cross Section Data for Site LLD-G1, 2003 and 2019.[a] 4-24
Table 4-9. Cross Section Data for Site LLD-G2, 2003, 2019, and 2024.[a] 4-27
Table 4-10. Pebble Count Data for Site LLD-G2, 2003, 2019, and 2024. 4-27
Table 4-11. Dominant Sediment Facies at Site LLD-G2, 2019 and 2024. 4-28
Table 4-12. Cross Section Data for Site IHD-G1, 2003, 2019, and 2024.[a] 4-31
Table 4-13. Pebble Count Data for Site IHD-G1, 2003, 2019, and 2024 4-31
Table 4-14. Dominant Sediment Facies at Site IHD-G1, 2019 and 2024. 4-32
Table 4-15. V* Survey Results for Site IHD-G1, 2019 and 2024 4-33
Table 4-16. Cross Section Data for Site IHD-G2, 2003, 2019, and 2024.[a] 4-35
Table 4-17. Pebble Count Data for Site IHD-G2, 2003, 2019, and 2024. 4-36
Table 4-18. Dominant Sediment Facies at Site IHD-G2, 2019 and 2024. 4-36
Table 4-19. Cross Section Data for Site CD-G1, 2003, 2019, and 2024.[a] 4-39
Table 4-20. Pebble Count Data for Site CD-G1 from 2003, 2019, and 2024. 4-40
Table 4-21. Dominant Sediment Facies at Site CD-G1, 2019 and 2024. 4-40
Table 4-22. Cross section Data for Site SCD-G1, 2003, 2019, and 2024.[a] 4-43
Table 4-23. Dominant Sediment Facies at Site SCD-G1 in 2019 and 2024. 4-44
Table 5-1. Vegetation Alliances at Riparian Vegetation Monitoring Sites for the Upper American River Project, 2024. 5-2

Table 5-2. Average Bank Stability Class Based on Greenline Composition at Upper American River Project Sites, 2024. 5-11
Table 6-1. Bald Eagle Survey and Reproductive Status Check Dates, 2024. 6-1
Table 6-2. Bald Eagle Observations during the Breeding Season at Union Valley Reservoir, 2024. 6-2
Table 6-3. Bald Eagle Observations during the Breeding Season Surveys at Ice House Reservoir, 2024. 6-6
Table 7-1. Physical Characteristics at Hardhead Monitoring Sites in the Slab Creek Dam Reach, August 2024. 7-3
Table 7-2. Water Quality Conditions at Hardhead Monitoring Sites in the Slab Creek Dam Reach, August 2024. 7-4
Table 7-3. Analysis of Variance Results of Mean Monthly Water Temperatures from April to September in the Slab Creek Dam Reach, Pre- and Post-License Implementation.[a] 7-16
Table 8-1. Amphibian and Aquatic Reptile Monitoring Sites, 2024. 8-2
Table 8-2. Survey Conditions, 2024. 8-3
Table 8-3. Foothill Yellow-Legged Frog Observation Details at Site CD-A3, 2024. 8-4
Table 8-4. Foothill Yellow-Legged Frog Observation Details at Site CD-A4, 2024. 8-9
Table 8-5. Western Pond Turtle Observation Details at Site SCD-A1, 2024. 8-14
Table 8-6. Other Herpetofauna Species Observed by Life Stage and Site, 2024. 8-22
Table 9-1. Survey Dates and Conditions, 2024. 9-2
Table 9-2. Additional Herpetofauna Species Observed, 2024. 9-12
Table 10-1. Sites Associated with the Upper American River Project Bear-Human Interaction 2024 Monitoring Program. 10-3
Table 12-1. Upper American River Project Water Temperature Monitoring Site Locations. 12-2
Table 12-2. Specifications for Monitoring Equipment. 12-6
Table 12-3. Water Temperature Threshold Exceedances. 12-8

LIST OF FIGURES

Figure 1-1. Monitoring locations downstream of Rubicon Reservoir, Rockbound Lake, Buck Island Reservoir, Loon Lake Reservoir, and Gerle Creek Reservoir, 2024. 1-3

Figure 1-2. Monitoring locations downstream of Ice House Reservoir, Union Valley Reservoir, Junction Reservoir, and Camino Reservoir, 2024. 1-4

Figure 1-3. Monitoring locations downstream of Camino Reservoir (continued), Brush Creek Reservoir, and Slab Creek Reservoir, 2024. 1-5

Figure 2-1. Fish species richness and abundance among Upper American River Project trout monitoring sites, 2002–2024. 2-4

Figure 2-2. Trout density in the Upper American River Project study area by site, 2002–2024. 2-5

Figure 2-3. Trout biomass in the Upper American River Project study area by site, 2002–2024. 2-6

Figure 2-4. Number of catchable trout (>152 millimeters total length) per mile in the Upper American River Project study area by site, 2002–2024. 2-6

Figure 2-5. Condition factors (*k*-values) for rainbow trout captured by electrofishing in the Upper American River Project study area by site, 2002–2024. 2-8

Figure 2-6. Condition factors (*k*-values) for brown trout captured by electrofishing in the Upper American River Project study area by site, 2002–2024. 2-8

Figure 2-7. Length-frequency and age-class distribution of rainbow trout at electrofishing sites (top) and snorkel sites (bottom), 2024. 2-11

Figure 2-8. Length-frequency and age-class distribution of brown trout at electrofishing sites (top) and snorkel sites (bottom), 2024. 2-12

Figure 2-9. Species richness in the Upper American River Project study area by site, pre-License (2002–2005) and License implementation (2019–2024). 2-13

Figure 2-10. Trout density in the Upper American River Project study area by site, pre-License (2002–2005) and License implementation (2019–2024). 2-14

Figure 2-11. Trout biomass in the Upper American River Project study area by site, pre-License (2002–2005) and License implementation (2019–2024). 2-14

Figure 2-12. Catchable trout per mile in the Upper American River Project study area by site, pre-License (2002–2005) and License implementation (2019–2024)..... 2-15
Figure 3-1. California Stream Condition Index Scores and condition categories for benthic macroinvertebrate samples collected for the Upper American River Project, 2024. 3-9
Figure 3-2. Posterior contrast distribution by site between License implementation (2019/2020/2024) and pre-License (2002/2003) median California Stream Condition Index scores with 89% credible intervals. 3-10
Figure 3-3. Average California Stream Condition Index scores and condition categories for samples collected during pre-License (2002/2003) and License implementation (2019/2020 and 2024) benthic macroinvertebrate monitoring for the Upper American River Project. 3-12
Figure 4-1. Daily average flow for water years 2003–2024 for the Rubicon River below Rubicon Dam (sum of USGS gage 11427960 and Rubicon Reservoir spill). 4-8
Figure 4-2. Annual peak flows for water years 2003–2024 for the Rubicon River below Rubicon Dam (sum of USGS gage 11427960 and Rubicon Reservoir spill). 4-9
Figure 4-3. Daily average flow for water years 2003–2024 in Gerle Creek below Loon Lake Dam (USGS gage 11429500). 4-10
Figure 4-4. Annual peak flows for water years 2003–2024 in Gerle Creek below Loon Lake Dam (USGS gage 11429500). 4-11
Figure 4-5. Daily average flow for water years 2003–2024 in South Fork Silver Creek below Ice House Dam (USGS gage 11441500). 4-12
Figure 4-6. Annual peak flows for water years 2003–2024 in South Fork Silver Creek below Ice House Dam (USGS gage 11441500). 4-13
Figure 4-7. Daily average flow for water years 2003–2024 in Silver Creek below Camino Dam (USGS gage 11441900). 4-14
Figure 4-8. Annual peak flows for water years 2003–2024 in Silver Creek below Camino Dam (USGS gage 11441900). 4-15
Figure 4-9. Daily average flow for water years 2003–2024 in South Fork American River below Slab Creek Dam (USGS gage 11443500). 4-16
Figure 4-10. Annual peak flows for water years 2003–2024 in South Fork American River below Slab Creek Dam (USGS gage 11443500). 4-17
Figure 4-11. Site RRD-G1, looking upstream from the intermediate cross section (XS-2) in 2024 (top), 2019 (bottom left), and 2003 (bottom right). 4-18

Figure 4-12. Representative conditions near XS-2 at Site LLD-G1, 2024 (top), 2019 (bottom left), and 2003 (bottom right). 4-22
Figure 4-13. Aerial photographs of Site LLD-G1 and the surrounding area showing the forest die-off adjacent to the channel..... 4-23
Figure 4-14. Site LLD-G2, looking upstream from XS-2, 2024 (top), 2019 (bottom left), and 2003 (bottom right). 4-26
Figure 4-15. Site IHD-G1, looking upstream from XS-2, 2024 (top), 2019 (bottom left), and 2003 (bottom right). 4-30
Figure 4-16. Site IHD-G2, looking upstream from XS-1, 2024 (top), 2019 (bottom left), and 2003 (bottom right). 4-34
Figure 4-17. Site CD-G1, looking downstream near XS-2, 2024 (top), 2019 (bottom left), and 2003 (bottom right). 4-38
Figure 4-18. Site SCD-G1, looking upstream near XS-2, 2024 (top), 2019 (bottom left), and 2003 (bottom right). 4-42
Figure 5-1. Plant species diversity by site for the Upper American River Project, 2024..... 5-6
Figure 5-2. Vegetative cover (absolute) in each canopy class documented during line-point intercept surveys for the Upper American River Project, 2024..... 5-7
Figure 5-3. Recruitment of woody vegetation within 1 meter of Upper American River Project monitoring transects, 2024. 5-8
Figure 5-4. Composition and relative cover of species detected using the point-centered quarter method for the Upper American River Project, 2024..... 5-10
Figure 5-5. Comparison of the percentage of dominant wetland and upland species observed at Upper American River Project sites, 2004, 2019, and 2024. 5-13
Figure 5-6. Density of woody riparian vegetation at Upper American River Project monitoring sites, 2019 and 2024. 5-14
Figure 5-7. Average vigor and age class of woody riparian vegetation at Upper American River Project monitoring sites, 2019 and 2024..... 5-15
Figure 5-8. Percent of greenline that was vegetated at Upper American River Project sites, 2004, 2019, and 2024. 5-16
Figure 5-9. Average stability class of greenline at Upper American River Project sites, 2004, 2019, and 2024. 5-16
Figure 6-1. Bald eagle activity sites at Union Valley Reservoir, 2024. 6-3
Figure 6-2. Juvenile bald eagles in nest at Sunset Campground, 4 June 2024..... 6-4

Figure 6-3. Juvenile bald eagles in nest tree at Sunset Campground, 2 July 2024. 6-5
Figure 6-4. Bald eagle activity sites at Ice House Reservoir, 2024. 6-7
Figure 6-5. Female bald eagle in rebuilt nest on south shore of Ice House Reservoir, 21 March 2024 (left); juvenile bald eagle perched next to nest on south shore of Ice House Reservoir, 2 July 2024 (right). 6-8
Figure 7-1. Hardhead site locations in the Slab Creek Dam Reach of the South Fork American River. 7-2
Figure 7-2. Fish species observed during snorkel surveys by site and river mile in the Slab Creek Dam Reach, August 2024. 7-5
Figure 7-3. Length-frequency histogram for cyprinids observed during snorkel surveys in the Slab Creek Dam Reach, August 2024. 7-5
Figure 7-4. Length-frequency histogram for salmonids observed during snorkel surveys in the Slab Creek Dam Reach, August 2024. 7-6
Figure 7-5. Length-frequency histogram for Sacramento sucker observed during snorkel surveys in the Slab Creek Dam Reach, August 2024. 7-7
Figure 7-6. Species composition and distribution of fish by site and river mile observed during snorkel surveys conducted in fall 2004 and summer 2007, 2016, 2017, 2019, 2020, and 2024. 7-8
Figure 7-7. Abundance and distribution of young-of-year fish (<50 mm total length) by site and river mile observed during snorkel surveys conducted in fall 2004 and summer 2007, 2016, 2017, 2019, 2020, and 2024. 7-9
Figure 7-8. Total number of hardhead (>50 millimeters total length) observed by year across sites within the Slab Creek Dam Reach, fall 2004 and summer 2007, 2016, 2017, 2019, 2020, and 2024. 7-10
Figure 7-9. Longitudinal distribution of hardhead (>50 millimeters total length) by site and river mile within the Slab Creek Dam Reach. 7-11
Figure 7-10. Hardhead (>50 millimeters total length) density by site and river mile within the Slab Creek Dam Reach, fall 2004 and summer 2007, 2016, 2017, 2019, 2020, and 2024. 7-11
Figure 7-11. Age-class (Moyle 2002) and length-frequency distribution of hardhead in the Slab Creek Dam Reach, fall 2004 and summer 2007, 2016, 2017, 2019, 2020, and 2024 (n=0). 7-12
Figure 7-12. Daily mean flow at USGS gage 11443500 (South Fork American River upstream of White Rock Powerhouse before (2003–2014, blue) and after (2015–2024, red) License implementation. 7-13

Figure 7-13. Mean daily flow at USGS gage 11443500 (South Fork American River downstream of Slab Creek Dam), 2002–2024. 7-14
Figure 7-14. Daily water temperature in the South Fork American River upstream of White Rock Powerhouse (SMUD gage SFAR15, RM 0.0), before (2003–2014, blue) and after (2015–2024, red) License implementation. 7-15
Figure 7-15. Mean monthly water temperatures in the South Fork American River upstream of White Rock Powerhouse (SMUD gage SFAR15, RM 0.0) before (n=30) and after (n=58) License implementation. 7-16
Figure 8-1. Foothill yellow-legged frog observations at Site CD-A3, 2024. 8-6
Figure 8-2. Foothill yellow-legged frog tadpole (left) and habitat (right) at Site CD-A3, 21 August 2024. 8-7
Figure 8-3. Sierra garter snake with recently predated foothill yellow-legged frog tadpole, Site CD-A3, 24 September 2024. 8-7
Figure 8-4. Foothill yellow-legged frog tadpole (left) and habitat (right) at Site CD-A3, 21 August 2024. 8-8
Figure 8-5. Adult male foothill yellow-legged frog (left) and habitat (right) at Site CD-A3, 21 August 2024. 8-8
Figure 8-6. Foothill yellow-legged frog observations at Site CD-A4, 2024. 8-10
Figure 8-7. Foothill yellow-legged frogs observed on 11 June (left, middle) and 17 July (left, top and bottom) at backwater pool habitat (right), Site CD-A4, 2024. 8-11
Figure 8-8. Chin markings of sub-adult foothill yellow-legged frog on 16 July (left) and 24 September (right) at Site CD-A4, 2024. 8-12
Figure 8-9. Adult male foothill yellow-legged frog (left) and habitat (right) at Site CD-A4, 11 June 2024. 8-12
Figure 8-10. Post-metamorphic foothill yellow-legged frog observations at Sites CD-A3 and CD-A4 during pre-License (2003) and License implementation monitoring years. 8-13
Figure 8-11. Egg mass and tadpole foothill yellow-legged frog observations at Sites CD-A3 and CD-A4 during pre-License (2003) and License implementation monitoring years. 8-13
Figure 8-12. Western pond turtle observations at Site SCD-A1, 2024. 8-15
Figure 8-13. Western pond turtle in aquatic habitat (left, 20 August) and upland habitat (right, 25 September), 2024. 8-16
Figure 8-14. Representative habitat where western pond turtles were observed in June (left) and July (right) at Site SCD-A1, 2024. 8-16

Figure 8-15. Western pond turtle with a worn plastron with no countable scutes (left, 20 August) and one with countable scutes (right, 25 September), 2024. 8-17
Figure 8-16. Western pond turtle observations at Site SCD-A1 during pre-License and License implementation monitoring years. 8-17
Figure 8-17. Representative photo of Site JD-A15, highlighting suitable foothill yellow-legged frog habitat, 10 June 2024. 8-18
Figure 8-18. Representative photo of Site CD-A3, highlighting suitable foothill yellow-legged frog habitat, 11 June 2024. 8-19
Figure 8-19. Representative photo of Site CD-A4, highlighting suitable foothill yellow-legged frog habitat, 11 June 2024. 8-20
Figure 8-20. Representative photo of Site SCD-A1, highlighting western pond turtle habitat, 12 June 2024. 8-21
Figure 8-21. Habitat at Site SCD-A1 on 12 June (left) and 25 September (right), 2024. 8-21
Figure 8-22. Observations of American bullfrog at Site SCD-A1 across License implementation monitoring years. 8-23
Figure 9-1. Photo Point RR-105 looking upstream during the July (left), August (middle), and September (right) surveys in the Rubicon River at Site RUB-A1, 2024. 9-4
Figure 9-2. Photo Point Rubl-1 looking upstream during the July (left), August (middle), and September (right) surveys in the Rubicon Reservoir inlet at Site RUB-A1, 2024. 9-5
Figure 9-3. Photo Point P-3 during the July (left), August (middle), and September (right) surveys in the Rubicon Reservoir Inlet at Site RUB-A1, 2024. 9-5
Figure 9-4. Photo Point RR-2 looking upstream during the July (left), August (middle), and September (right) surveys in the Rubicon River at Site RUB-A2, 2024. 9-6
Figure 9-5. Representative photographs of the upstream (left) and downstream (right) habitat in the Rubicon River at Site RUB-A2, 7 August 2024. 9-7
Figure 9-6. Evidence of recent North American beaver activity at Site RUB-A2, 7 August 2024. 9-7
Figure 9-7. Photo Point DS-5 looking upstream during the July (left), August (middle), and September (right) surveys in the Rubicon Dam seep at Site RUB-A2, 2024. 9-8
Figure 9-8. Photo Point PE-1 during the July (left), August (middle), and September (right) surveys in the pond at Site RUB-A2, 2024. 9-8

Figure 9-9. Photo Point RCK-I-3 looking downstream during the July (left), August (middle), and September (right) surveys in Rockbound Lake inlet at Site RCK-A1, 2024. 9-9

Figure 9-10. Photo Point HC-103 looking upstream showing wet creek in July (left), one ponded area in August (middle), and a dry creek bed in September (right) in the Highland Creek segment of Site RCK-A1, 2024. 9-10

Figure 9-11. Photo Point HC-106 looking upstream during the July (left), August (middle), and September (right) surveys in the Highland Creek segment of Site RCK-A1, 2024. 9-10

Figure 9-12. Photo Point HC-1 looking downstream during the July (left), August (middle), and September (right) surveys at Site HC-A1 (Buck Island Reservoir in the background), 2024. 9-11

Figure 9-13. Sierran treefrog tadpole (left) and young-of-year (right) observed at Site RUB-A1 in 2024. 9-12

Figure 9-14. Young-of-year California toad observed at Site RUB-A1 in 2024. 9-12

Figure 10-1. Bear-human interaction monitoring locations. 10-2

Figure 12-1. Water temperature datalogger housing, Rubicon River below confluence of Little Rubicon River. 12-6

VOLUME II: LIST OF APPENDICES

Appendix A1 Pre-License and License Minimum Streamflow Requirements for the Upper American River Project

Appendix A2 2024 Draft Annual Monitoring Report Comment-Response Table

Appendix B1 Fish Population Site Photographs

Appendix B2 Fish Population Site Conditions

Appendix B3 Individual Fish Capture Data

Appendix B4 Fish Population Estimates

Appendix B5 Site-Specific Trout Density and Biomass

Appendix B6 Trout Condition

Appendix B7 Site-Specific Trout Length-Frequency and Age-Class Distributions

Appendix B8 Scale Analysis Data

Appendix C1 Benthic Macroinvertebrate Site Photographs

Appendix C2 Benthic Macroinvertebrate Taxonomic List

Appendix C3 Benthic Macroinvertebrate Metric Values

Appendix D1 Flow Data

Appendix D2 Cross Section Location Data and Overview Maps
Appendix D3 Representative Geomorphology Site Photographs
Appendix D4 Longitudinal Profiles
Appendix D5 Cross Sections at Geomorphology Sites
Appendix D6 Pebble Counts at Geomorphology Sites
Appendix D7 Sediment Facies Maps
Appendix D8 Inventory of Large Woody Debris
Appendix D9 Fine Sediment Storage Data
Appendix D10 Rosgen Level III Assessments
Appendix D11 Bank Erosion and Riparian Vegetation Assessments
Appendix D12 Channel Stability (Pfankuch) Assessments
Appendix E1 Riparian Vegetation Site Photographs
Appendix E2 Riparian Vegetation Maps
Appendix E3 Riparian Vegetation Line-point Intercept Results
Appendix E4 Riparian Vegetation Point-centered Quarter Results
Appendix E5 Riparian Vegetation Greenline Results
Appendix F1 Incidental Observations of Avian Species in the Study Area (2016–2024)
Appendix F2 California Department of Fish and Wildlife Bald Eagle Nesting Survey Forms
Appendix G1 Foothill Yellow-Legged Frog Photographs
Appendix G2 Western Pond Turtle Photographs at Site SCD-A1
Appendix G3 Monitoring Site Representative Habitat Photographs
Appendix G4 Incidental Species Photographs
Appendix H Comparison of Sierra Nevada Yellow-Legged Frog Monitoring Site Photo Points
Appendix I1 Bear Encounter Forms
Appendix I2 Bear Encounter Summary
Appendix J 2024 Water Temperature Graphs

ACRONYMS AND ABBREVIATIONS

Acronym	Definition
µS/cm	microsiemen per centimeter
7DMAVG	7-day moving average
Basin Plan	Water Quality Control Plan for the Central Valley Region, the Sacramento River Basin and the San Joaquin River Basin
BMI	Benthic Macroinvertebrate
°C	degrees Celsius
CalVeg	Classification and Assessment with Landsat of Visible Ecological to Groupings
CDFW	California Department of Fish and Wildlife
cfs	cubic feet per second
CSCI	California Stream Condition Index
DAVG	daily average
DWR	California Department of Water Resources
°F	degrees Fahrenheit
FERC	Federal Energy Regulatory Commission
Forest Service	U.S. Department of Agriculture, Forest Service
GIS	geographic information system
GNSS	global navigation satellite system
GPS	Global Positioning System
LWD	large woody debris
License	FERC Order Issuing New License for the Upper American River Project (FERC Project No. 2101), issued July 2014
mm	millimeter
MMI	multi-metric index
O/E	observed-to-expected ratio
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 Plan, Bear-Human

Acronym	Definition
	Interaction Monitoring Plan, and Water Temperature Monitoring Plan
Report	Annual Monitoring Report
RTK	real-time kinematic
RTS	robotic total station
SFAR	South Fork American River
SMUD	Sacramento Municipal Utility District
SWAMP	Surface Water Ambient Monitoring Program
SWRCB	State Water Resources Control Board
TL	total length
UARP	Upper American River Project
UAV	unmanned aerial vehicle
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
YOY	young-of-year
XS-1	upstream cross section
XS-2	intermediate cross section
XS-3	downstream cross section

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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'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 Plan, Bear-Human Interaction Monitoring Plan, and Water Temperature Monitoring Plan[1] (Plans). Requirements of the Plans are found in State Water Resources Control Board (SWRCB) Conditions 8 and 10 and in U.S. Department of Agriculture, Forest Service (Forest Service) 4(e) Conditions 31 and 35, which are provided in Appendices A and B, respectively, of the Federal Energy Regulatory Commission's (FERC's) Order Issuing New License for the Upper American River Project (UARP; FERC Project No. 2101), issued 23 July 2014 (License; FERC 2014), as well as in Forest Service Section 4(e) Conditions 14 and 15 for the Slab Creek Flow Facility Project License Amendment (Forest Service 2015). The Plans were developed in consultation with SWRCB, Forest Service, 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 2024.

SMUD owns and operates the UARP, which lies within El Dorado and Sacramento counties, primarily within lands of 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 more than 700 campsites, 5 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., prior License and current License) are provided in Appendix A1.

This Report summarizes the results of Monitoring Year 10 (2024). 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 2024 water year type as Below Normal. The final 2024 water year type remained classified as Below Normal based on DWR's Full Natural Flow record for the American River at Folsom in October 2024.

[1] Results of implementing the Water Quality Monitoring Plan (SMUD 2021) are provided in the 2024 Water Quality Monitoring Report (SMUD 2025).

1.1 MONITORING SITES

Monitoring sites are depicted in Figure 1-1 through Figure 1-3 for all 2024 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 12 years of the License. As noted in Section 1.0, some monitoring activities have specific reporting requirements and deadlines in lieu of this Report.

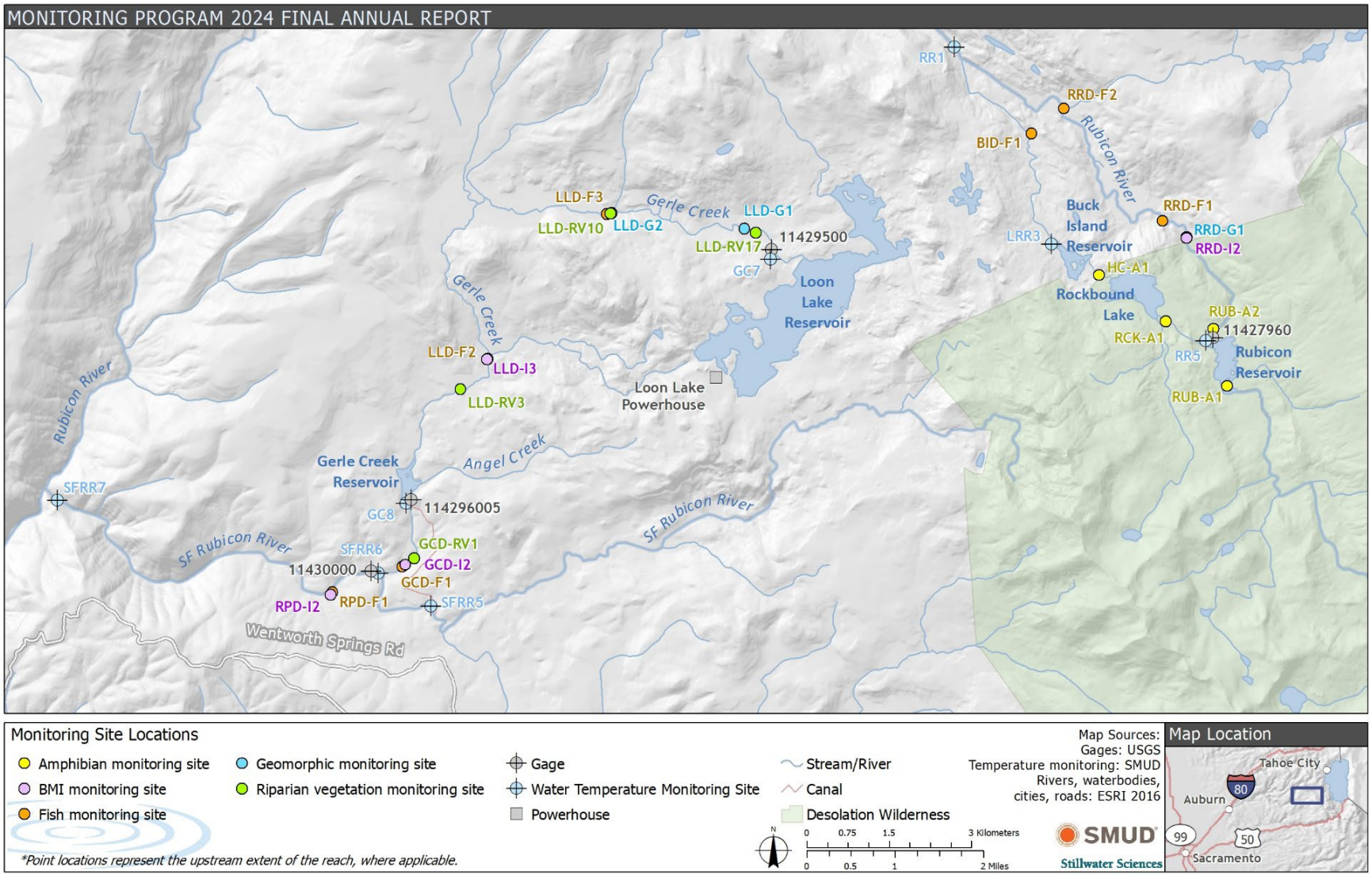


Figure 1-1. Monitoring locations downstream of Rubicon Reservoir, Rockbound Lake, Buck Island Reservoir, Loon Lake Reservoir, and Gerle Creek Reservoir, 2024.

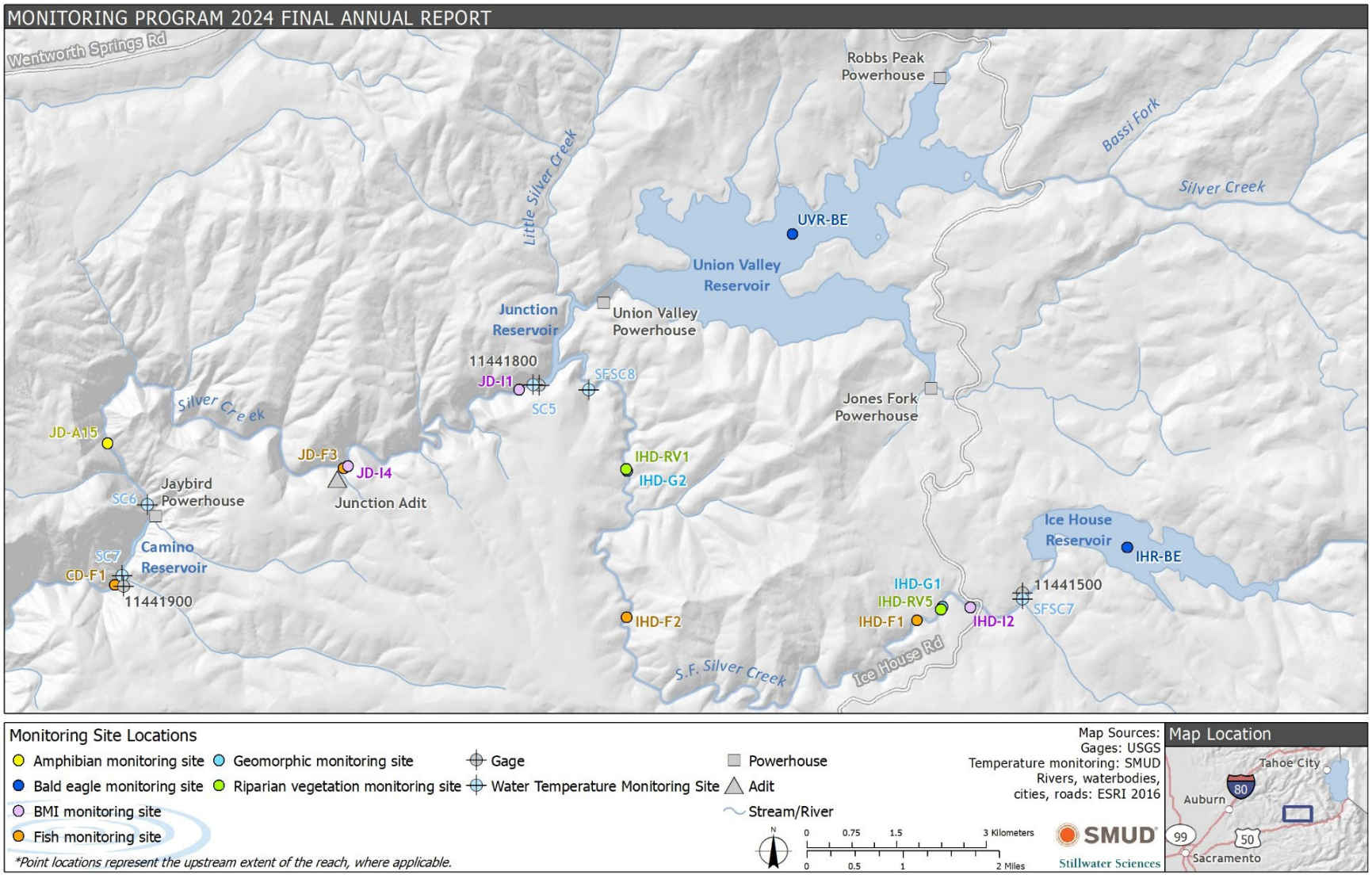


Figure 1-2. Monitoring locations downstream of Ice House Reservoir, Union Valley Reservoir, Junction Reservoir, and Camino Reservoir, 2024.

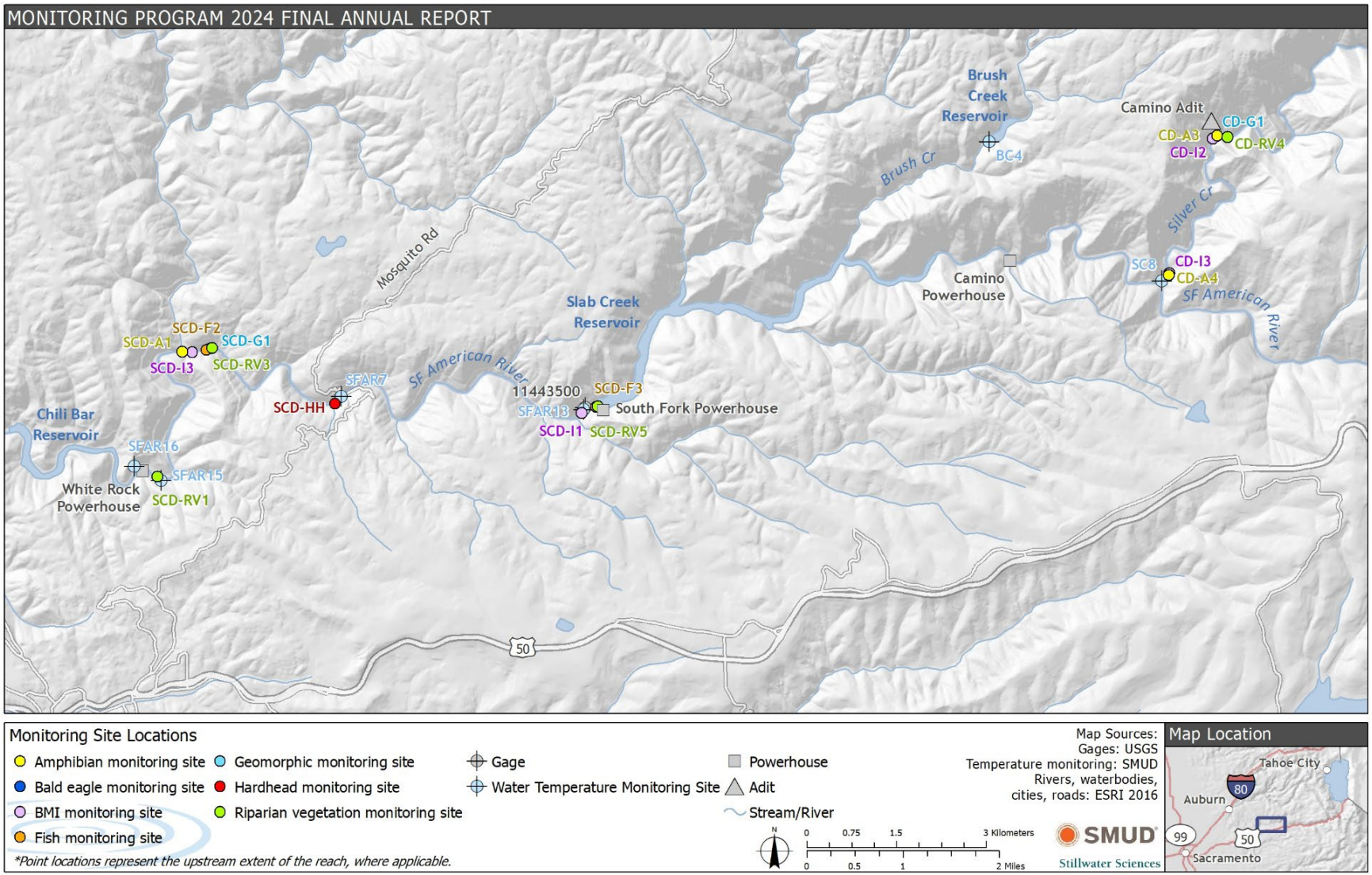


Figure 1-3. Monitoring locations downstream of Camino Reservoir (continued), Brush Creek Reservoir, and Slab Creek Reservoir, 2024.

Table 1-1. Monitoring Frequency for the First 12 Years of Implementation for the Upper American River Project.

Monitoring Effort	License Monitoring Year											
	1	2	3	4	5	6	7	8	9	10	11	12
	(2015)	(2016)	(2017)	(2018)	(2019)	(2020)	(2021)	(2022)	(2023)	(2024)	(2025)	(2026)
Trout Population					X	X				X	X	
Robbs Peak Powerhouse Entrainment	X	X	X									
Aquatic Macroinvertebrate					X	X				X	X	
Geomorphology (Sensitive Site Investigation and Mitigation Plan Development)	X	X										
Geomorphology (Continuing Evaluation of Representative Channel Areas)					X					X		
Riparian Vegetation					X					X		
Bald Eagle		X	X	X	X	X	X	X	X	X	X	X
Hardhead Population		X	X		X	X				X	X	
Amphibian and Aquatic Reptile (including Foothill Yellow-legged Frog)		X	X	X	X	X	X			X	X	
Sierra Nevada Yellow-legged Frog					X					X		
Bear Management		X	X	X	X	X	X	X	X	X	X	X
Large Woody Debris	X	X	X	X	X	X	X	X	X	X	X	X
Water Temperature		X	X	X	X	X	X	X	X	X	X	X
Algae Species		X										
In Situ Water Quality	X	X	X	X	X	X	X	X	X	X	X	X
Bacteria Monitoring	X	X	X	X	X	X	X	X	X	X	X	X
Metals Bioaccumulation		X					X					X
Water General Chemistry			X					X				

1.3 CONSULTATION

The draft Report was submitted to the consultation group via a secure file transfer website on 13 March 2025. Comments on the draft report and SMUD's replies to those comments are provided in Appendix A2.

1.4 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.

Forest Service (U.S. Department of Agriculture, Forest Service). 2015. Final Section 4(e) Terms and Conditions Slab Creek Application of Amendment Project, FERC No. 2101. Issued December.

SMUD (Sacramento Municipal Utility District). 2021. Water Quality Monitoring Plan. Revision 3. Hydro License Implementation. Upper American River Project, FERC Project No. 2101. March.

SMUD. 2025. Water Quality Monitoring Report (2024). Hydro License Implementation. Upper American River Project, FERC Project No. 2101. June.

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2.0 TROUT

2.1 MONITORING PLAN OBJECTIVES

The objective of the Trout Monitoring Plan (Plan) is to evaluate changes in trout populations throughout the UARP related to implementation of streamflows required under the License (SMUD 2016). Additionally, the *UARP and Chili Bar Hydroelectric Project Rationale Report for the Relicensing Settlement Agreement* (Settlement Agreement) (SMUD 2007) identifies resource objectives and rationale for the terms and conditions included in the UARP and Chili Bar Licenses. Objectives specific to the fish community (Fisheries Objectives) were designed to maintain, restore, or recover ecological conditions for all life stages of rainbow trout (*Oncorhynchus mykiss*), other native fishes, and select non-native fishes (i.e., brown trout [*Salmo trutta*]) in their approximate range and habitat. This Report evaluates species richness, trout biomass, density, age-class structure, and health.

2.2 METHODS

In accordance with the Plan, thirteen sites within five stream reaches were surveyed in 2024 (License Year 10, the third year of required monitoring). Methodology was consistent with the Plan, as refined in the 2019 and 2020 Reports (SMUD 2020, 2021).

Site locations are shown in Figure 1-1 through Figure 1-3. Sites RRD-F1, RRD-F2, BID-F1, LLD-F2, LLD-F3, GCD-F1, RPD-F1, IHD-F1, and IHD-F2 were surveyed via backpack electrofishing in 2024. Backpack electrofishing was conducted using a multiple-pass depletion method consistent with procedures described by Reynolds (1996) wherein captured fish are temporarily removed from the site during sequential passes and returned to the stream once sampling is completed. The electrofishing crew consisted of five or six crew members, of which one or two were equipped with backpack electrofishers and the remaining members were netting fish. Scale analysis data from representative fish captured at electrofishing sites were combined for the analysis to supplement length-at-age data from the literature.

Sites JD-F3, CD-F1, SCD-F2, and SCD-F3 were surveyed via snorkeling in 2024. During snorkel surveys, three to five snorkelers were positioned in parallel lanes and swam a single pass downstream to upstream, counting all fish observed. Lane width was determined on site, depending on visibility and habitat complexity. 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 that may have been difficult to detect during snorkeling. Opportunistic electrofishing could not be performed at all snorkel sites because large boulders and deep pools precluded safe access to the margins. Fish were enumerated by species and binned into 25- or 50-millimeter (mm) size classes.

Detection probabilities differ between electrofishing and snorkel methods. Electrofishing generally has a higher detection probability for smaller size classes of fish compared with snorkeling, while snorkel surveys tend to more accurately estimate larger size classes compared with electrofishing (Korman et al. 2010). This can result in length-frequency distributions developed from snorkeling data that overrepresent larger fish and underrepresent smaller fish (e.g., young-of-year [YOY]). However, snorkel sites in the UARP are generally deep pool habitat, which is more likely to support higher numbers of large fish compared with the shallower habitats sampled at electrofishing sites. To account for this bias, length-frequency histograms are separated by sampling method.

2.3 RESULTS

2.3.1 Stream Habitat

Habitat conditions at monitoring sites were consistent with prior surveys (SMUD 2020, 2021), except at Site RRD-F2. Site RRD-F2 transitioned from gravel-dominated pool habitat in prior years to cobble-dominated glide and run habitat with a small amount of riffle habitat in 2024. This shift is attributed to the presence of a beaver dam upstream of the site in 2024. Site photographs and habitat data are provided in Appendices B1 and B2, respectively.

2.3.2 Species Richness

Seven fish species, including six native and one non-native species, were documented during the 2024 surveys. Unidentified fry (<25-mm total length [TL]) in the family Cyprinidae, referred to herein as Cyprinid spp., were also observed in 2024. Project-wide species richness (number of species) in 2024 was generally similar to prior monitoring years except at Site SCD-F2 (Table 2-1, Figure 2-1).

Rainbow trout was the most widely distributed fish species during 2024 monitoring, with observations in eight of the nine surveyed reaches. Three species that had not been documented since before License implementation were observed in 2024: sculpin (*Cottus* spp.) in Silver Creek downstream of Camino Dam, Sacramento sucker (*Catostomus occidentalis*) in the Rubicon River downstream of Rubicon Dam, and speckled dace (*Rhinichthys osculus*) in the South Fork American River (SFAR) downstream of Slab Creek Dam. Although seen in 2019 and/or 2020, golden shiner (*Notemigonus crysoleucas*) and sunfish (*Lepomis* spp.) were not observed in 2024 in the reaches downstream of Buck Island Dam or Slab Creek Dam. The reaches downstream of Slab Creek Dam and Rubicon River Dam had the greatest number of species (five) of all survey reaches in 2024 (Table 2-1). Detailed individual fish capture data are provided in Appendix B3.

Table 2-1. Fish Species Observed in Upper American River Project Study Reaches, 2002–2024.[1]

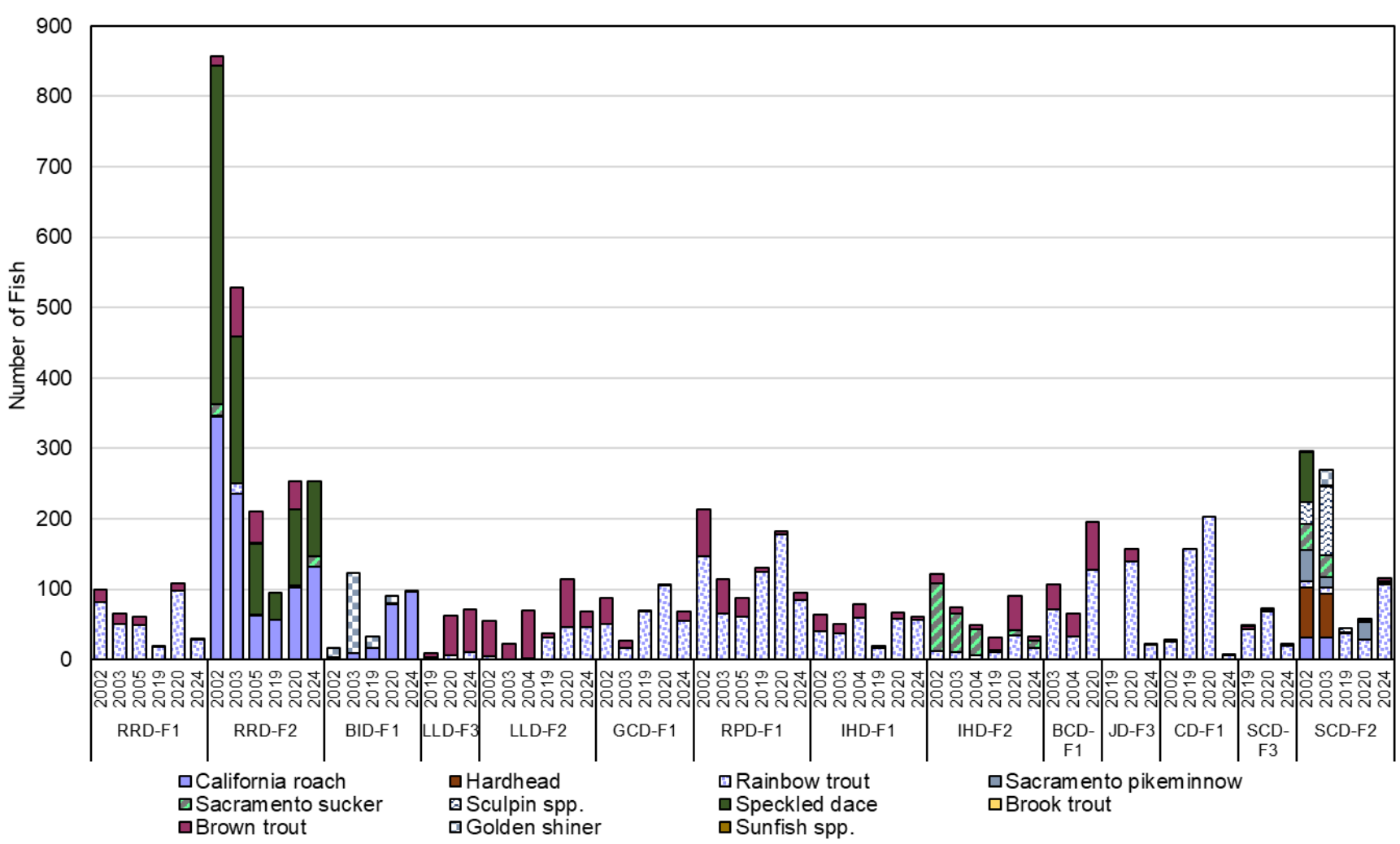
Fish Species	Stream Reach[2]									
	RRD[3]	BID	LLD	GCD	RPD	IHD	JD	BCD[4]	CD	SCD
Native										
California roach (*Hesperoleucus symmetricus*)	• ☐ X	• ☐ X								•
Hardhead (*Mylopharodon conocephalus*)										•
Rainbow trout (*Oncorhynchus mykiss*)	• ☐ X	•	• ☐ X	• ☐ X	• ☐ X	• ☐ X	• ☐ X	• ☐	• ☐ X	• ☐ X
Riffle sculpin (*Cottus gulosus*)										•
Sacramento pikeminnow (*Ptychocheilus grandis*)										• ☐ X
Sacramento sucker (*Catostomus occidentalis*)	• X	☐ X				• ☐ X	•		•	• ☐ X
Sculpin spp. (*Cottus* spp.)									X	• ☐ X
Speckled dace (*Rhinichthys osculus*)	• ☐ X									• X
Unidentified minnow spp. (Cyprinidae spp.)										X
Non-native										
Brook trout (*Salvelinus fontinalis*)	•									
Brown trout (*Salmo trutta*)	• ☐ X		• ☐ X	• ☐ X	• ☐ X	• ☐ X	• ☐ X	•	•	• ☐ X
Golden shiner (*Notemigonus crysoleucas*)		• ☐								
Smallmouth bass (*Micropterus dolomieu*)										•
Sunfish spp. (*Lepomis* spp.)										☐

[1] • = 2002, 2003, 2004, and/or 2005 surveys
☐ = 2019 and 2020 surveys
X = 2024 surveys

[2] BCD = Brush Creek Dam
BID = Buck Island Dam
CD = Camino Dam
GCD = Gerle Creek Dam
IHD = Ice House Dam
JD = Junction Dam
LLD = Loon Lake Dam
RPD = Robbs Peak Dam
RRD = Rubicon River Dam
SCD = Slab Creek Dam

[3] Hitch (*Lavina exilicauda*) were only observed in 2002 in the RRD reach following private stocking at Rubicon Springs Campground and are therefore excluded from analysis.

[4] Not surveyed in 2019 or 2024 per the Plan.

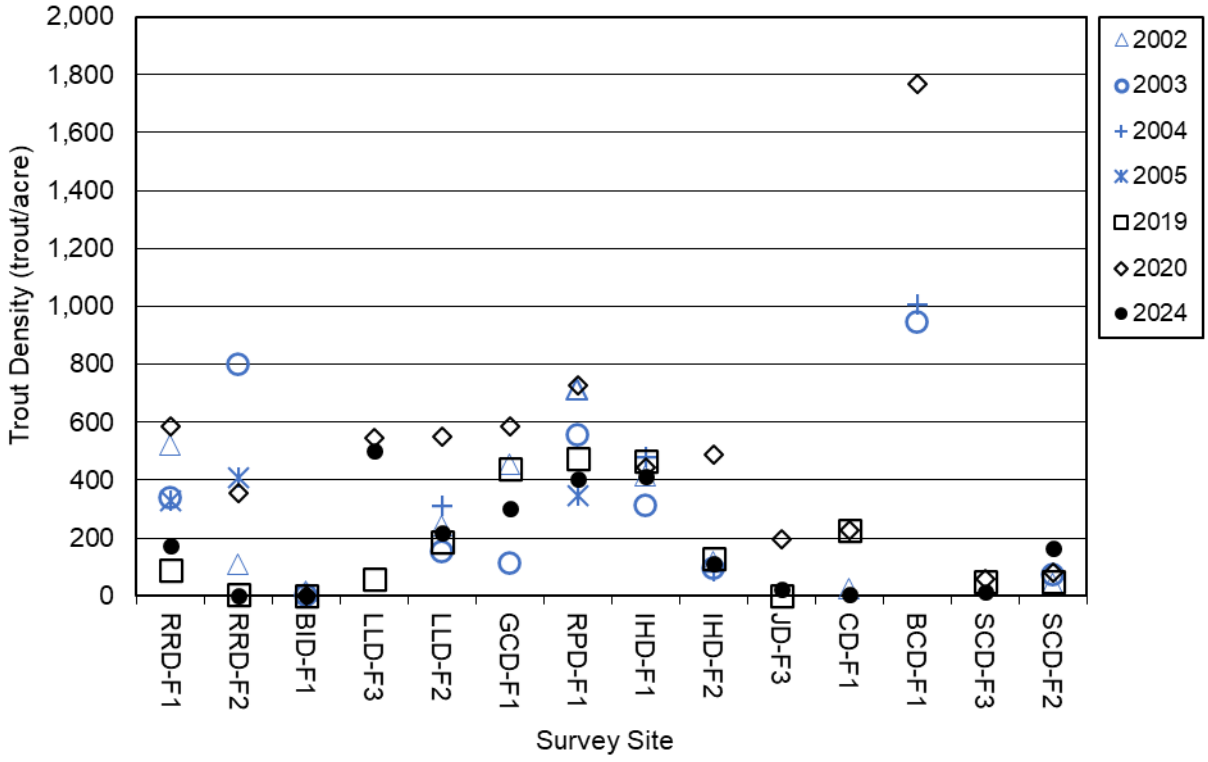


Notes: Not all sites were surveyed each year. Snorkel surveys were conducted in all monitoring years at Site CD-F1 and in monitoring years from 2019–2024 at Sites JD-F3, SCD-F3, and SCD-F2.

Figure 2-1. Fish species richness and abundance among Upper American River Project trout monitoring sites, 2002–2024.

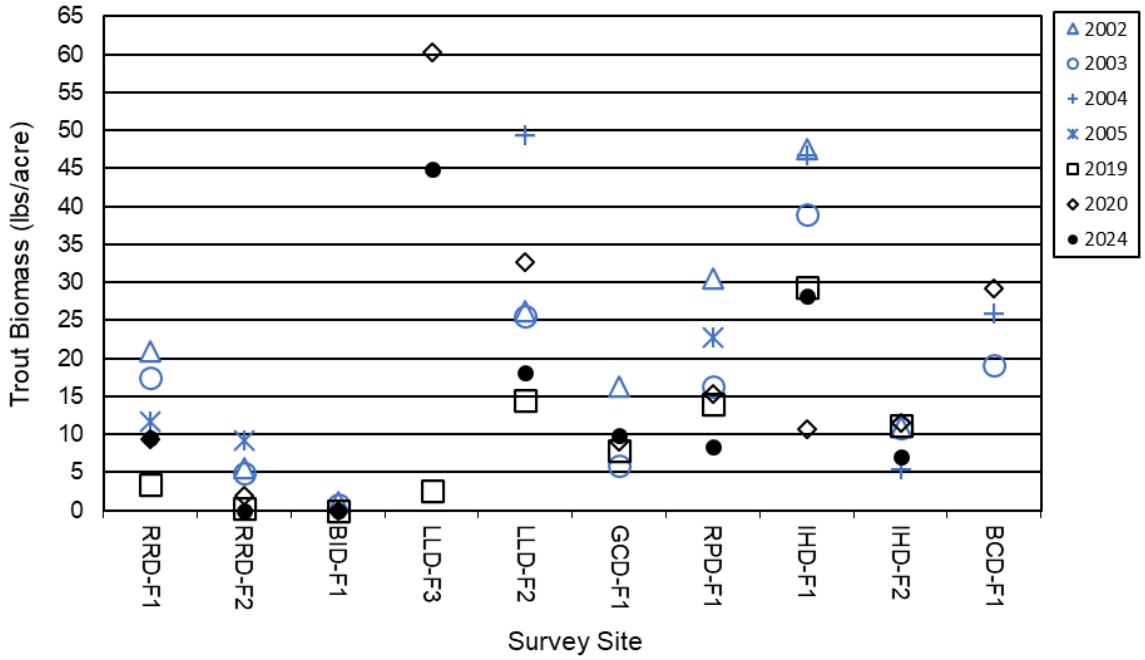
2.3.3 Trout Density, Biomass, and Catchable Trout

The combined density of rainbow and brown trout (i.e., trout density) varied across sites in 2024 and was generally within the range of 2019 and 2020 survey years (Figure 2-2). Similarly, average trout biomass was within the range of 2019 and 2020 estimates (Figure 2-3). No trout were captured at Sites RRD-F2 or BID-F1 in 2024, which is consistent with observations in 2019. However, trout were observed at Site RRD-F2 in 2020. The number of catchable trout (>152-mm TL) in 2024 was generally within range of 2019 and 2020 survey years, except at Site SCD-F2 where the number of catchable trout was notably higher and at Sites CD-F1 and SCD-F3 where it was lower (Figure 2-4). Detailed trout density and biomass data and site-specific density and biomass figures are provided in Appendices B4 and B5, respectively.



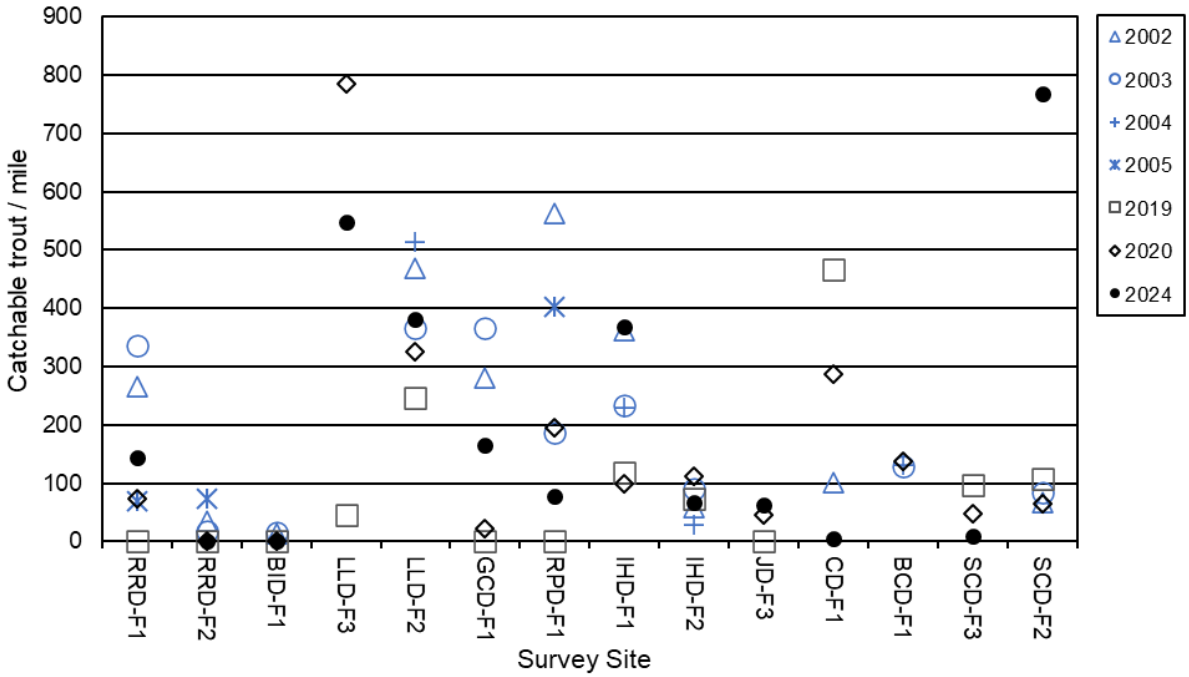
Notes: Not all sites were surveyed each year. Snorkel surveys were conducted in all monitoring years at Site CD-F1 and in monitoring years from 2019–2024 at Sites JD-F3, SCD-F3, and SCD-F2.

Figure 2-2. Trout density in the Upper American River Project study area by site, 2002–2024.



Notes: lbs = pounds
Not all sites were surveyed each year.

Figure 2-3. Trout biomass in the Upper American River Project study area by site, 2002–2024.



Notes: Not all sites were surveyed each year. Snorkel surveys were conducted in all monitoring years at Site CD-F1 and in monitoring years from 2019–2024 at Sites JD-F3, SCD-F3, and SCD-F2.

Figure 2-4. Number of catchable trout (>152 millimeters total length) per mile in the Upper American River Project study area by site, 2002–2024.

2.3.4 Trout Condition

Mean condition factors[2] (*k*-values) of rainbow and brown trout sampled in 2024 ranged between 0.8 and 1.0 across sites, indicating that the nutritional state of trout throughout the UARP remains good and is similar to other western Sierran streams[3] (Table 2-2, Figure 2-5 and Figure 2-6). Detailed trout condition data are provided in Appendix B6.

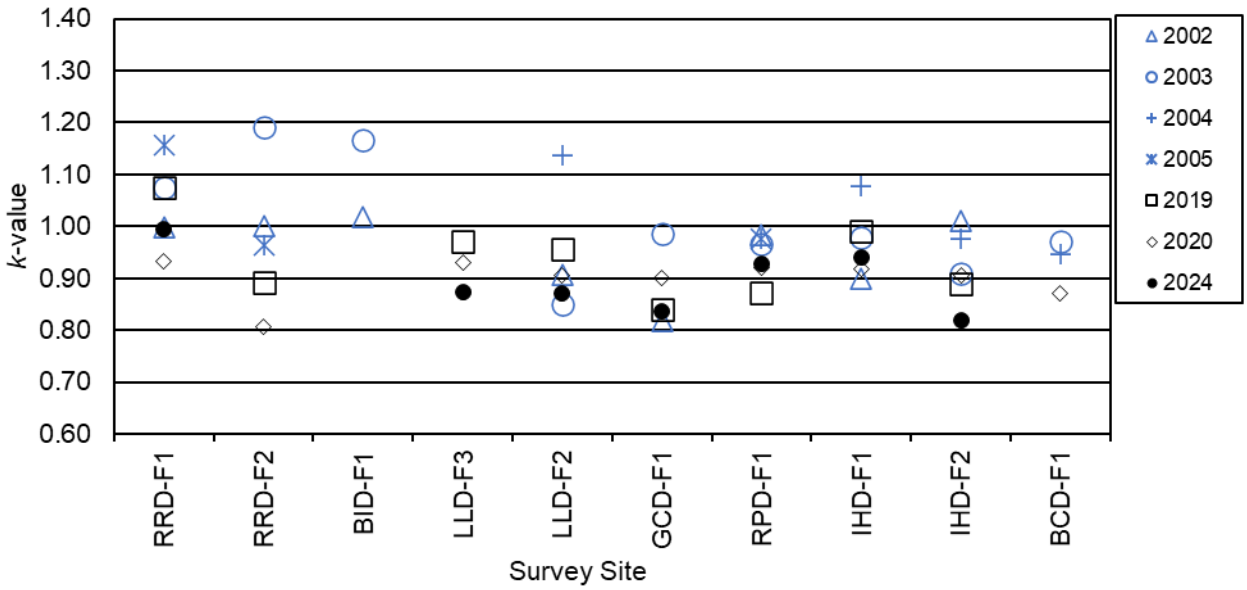
Table 2-2. Condition Factors for Rainbow and Brown Trout in the Upper American River Project Study Area by Site, 2002–2024.[a]

Year	Site									Average
	RRD-F1	RRD-F2	LLD-F3	LLD-F2	GCD-F1	RPD-F1	IHD-F1	IHD-F2	BCD-F1	
Rainbow Trout										
2024	0.99	--[b]	0.87	0.88	0.86	0.93	0.94	0.82	--[c]	**0.90**
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	--[c]	**0.94**
2005	1.16	0.96	--[b]	--[c]	--[c]	0.98	--[c]	--[c]	--[c]	**1.03**
2004	--[c]	--[c]	--[c]	1.14	--[c]	--[c]	1.08	0.98	0.95	**1.04**
2003	1.08	1.19	--[c]	0.85	0.99	0.97	0.98	0.91	0.97	**0.99**
2002	1.00	1.00	--[c]	0.91	0.82	0.98	0.90	1.01	--[c]	**0.95**
Average	**1.04**	**0.97**	**0.92**	**0.94**	**0.88**	**0.94**	**0.97**	**0.92**	**0.93**	**--**
Brown Trout										
2024	0.89	--[b]	0.90	1.00	0.93	0.99	0.91	0.98	--[c]	**0.94**
2020	0.95	0.88	0.97	0.96	0.84	1.03	1.01	0.93	0.89	**0.94**
2019	1.10	0.00[b]	1.18	0.94	1.00	1.01	0.98	0.99	--	**1.03**
2005	1.10	0.97	0.97	--[c]	--[c]	0.98	--[c]	--[c]	--[c]	**1.00**
2004	--[c]	--[c]	--[c]	1.09	--[c]	0.98	1.02	1.03	1.04	**1.03**
2003	1.02	1.07	--[c]	0.97	1.25	1.05	0.95	0.99	0.96	**1.03**
2002	0.98	0.97	--[c]	1.05	0.97	1.00	0.86	1.06	--	**0.98**
Average	**1.01**	**0.97**	**1.00**	**1.00**	**1.00**	**1.00**	**0.96**	**1.00**	**0.96**	**--**

[a] Condition factors were calculated using total length as the metric for length.
[b] No trout of this species were captured during sampling; value is not included in year or site average calculations.
[c] Not sampled in accordance with the Plan or SMUD (2007)

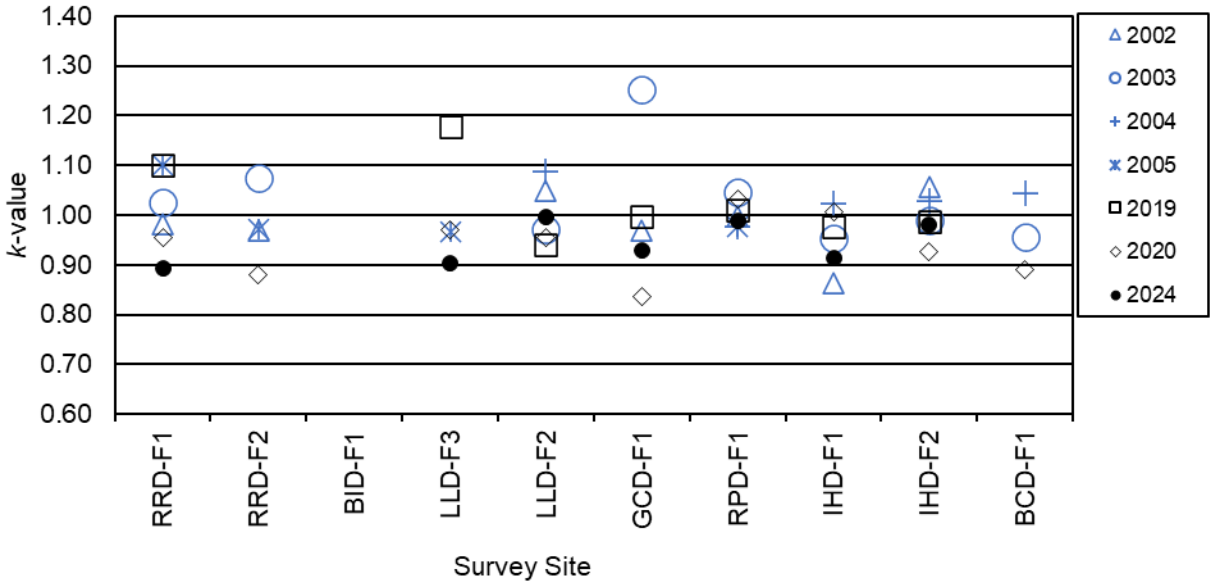
[2] Fulton's condition factor (Ricker 1975) is an indicator of nutritional health related to fish size and is calculated using the Fulton formula: *k* = 100 * weight (grams) / length (TL mm) ^3.

[3] Condition factors for wild trout 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 a broader range (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, TL, or standard length), which is not often documented with the results. Total length has been used as the standard of measurement throughout 2002–2024 trout monitoring.



Note: Not all sites were surveyed each year.

Figure 2-5. Condition factors (*k*-values) for rainbow trout captured by electrofishing in the Upper American River Project study area by site, 2002–2024.



Note: Not all sites were surveyed each year.

Figure 2-6. Condition factors (*k*-values) for brown trout captured by electrofishing in the Upper American River Project study area by site, 2002–2024.

2.3.5 Trout Length-at-Age

Length-at-age data used to determine approximate age classes of each trout species are provided in Table 2-3 and Figure 2-7 and Figure 2-8. Site-specific length-frequency distributions are provided in Appendix B7. Age data resulting from the scale analysis are provided in Appendix B8.

Table 2-3. Trout Length-at-Age Summary.

Trout Species	Length at Age (millimeter total length)					
	YOY	1+	2+	3+	4+	5+
Rainbow Trout						
Moyle (2002)	<75	75–140	140–190	190–235	--[a]	--[a]
2024 Scale Analysis	59–67 (n=3)	65–130 (n=8)	130–181 (n=7)	151–235 (n=5)	--[b]	--[b]
Brown Trout						
Moyle (2002)	<80	70–220	130–360	230–450	--[a]	--[a]
2024 Scale Analysis	70-96[c] (n=31)	74–134 (n=6)	136–170 (n=2)	178–264 (n=7)	324–363[c] (n=3)	297 (n=1)

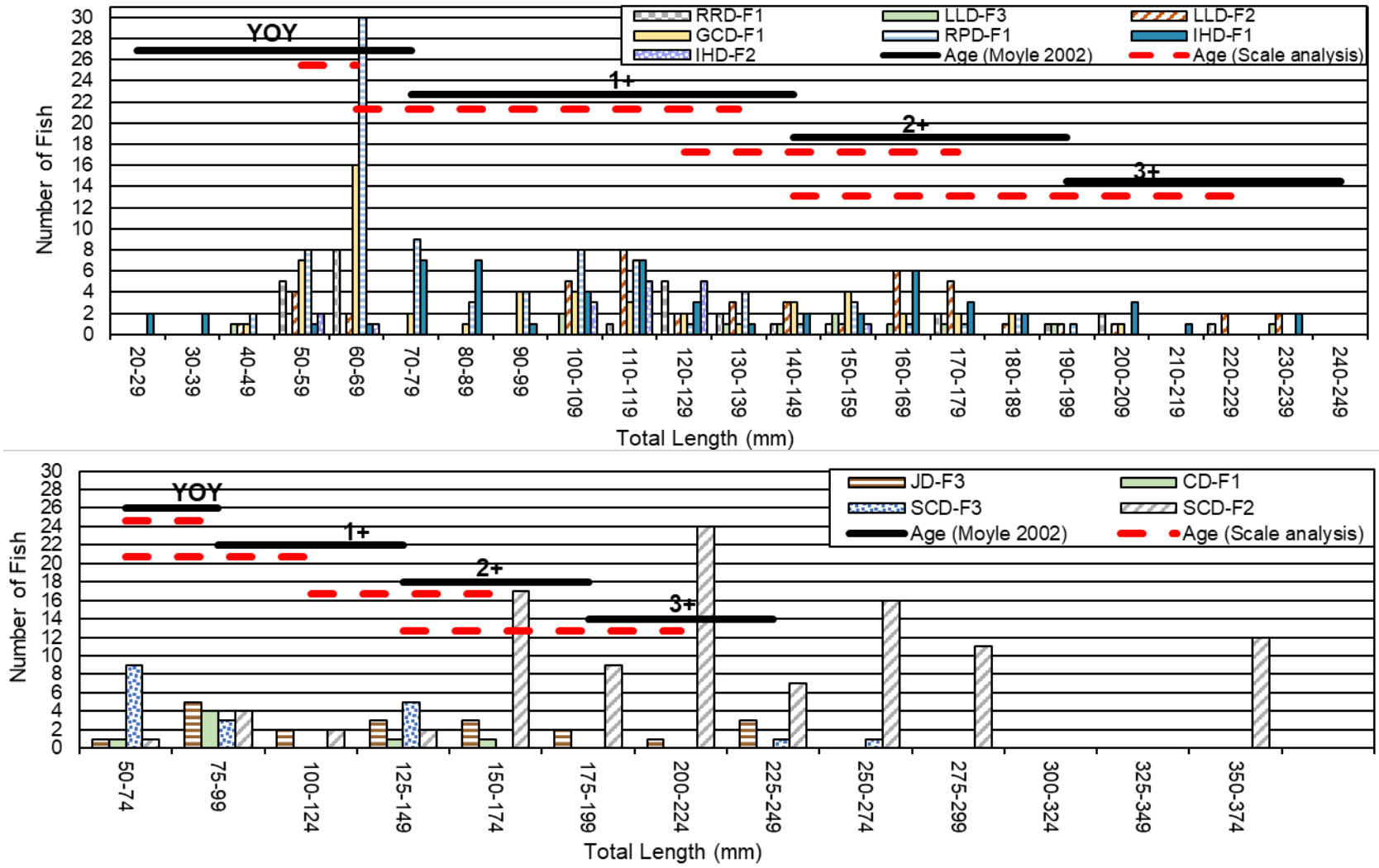
Notes: -- = no data
n = number of fish
YOY = young-of-year

[a] No length data are reported for this age class.
[b] No scales in this age class were analyzed in 2024 or prior monitoring years.
[c] Due to low catch, length-at-age analysis of YOY and 4+ age fish from 2019, 2020, and 2024 were used to inform the YOY and 4+ age-class designations.

Rainbow trout throughout the UARP ranged from 22 to approximately 350-mm TL in 2024 (Figure 2-7). Except at Sites CD-F1, SCD-F3, and SCD-F2, rainbow trout populations were generally represented by multiple age classes ranging from YOY to 3+ or older, which suggests continued annual recruitment into older age classes (Figure 2-7). At Site CD-F1, few rainbow trout were observed in the 1+ and 2+ age classes in 2024, and none were observed in the YOY and 3+ age classes (Figure 2-7; Appendix B7, Figure B7-17). Although 2019 and 2020 surveys documented more rainbow trout in all age classes, 2002 surveys had a similar number of observations to 2024 (Figure 2-7; Appendix B7, Figure B7-17). At Site SCD-F3, few age 3+ or older rainbow trout were observed in 2024 (Appendix B7, Figure B7-18). At Site SCD-F2, no YOY rainbow trout were observed in 2024, which is consistent with prior monitoring years (Appendix B7, Figure B7-20).

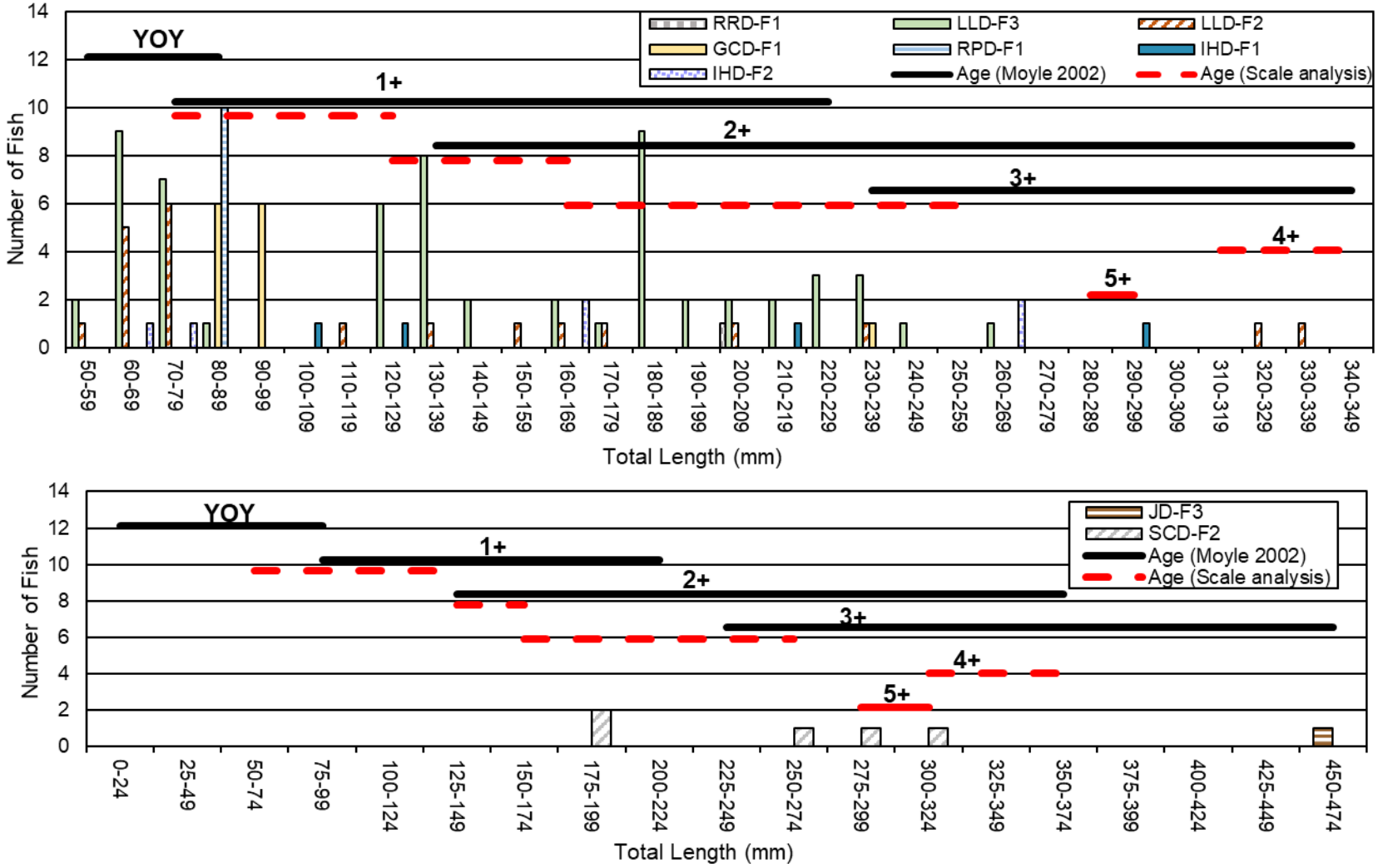
Brown trout throughout the UARP ranged from 54 to approximately 450-mm TL in 2024 (Figure 2-8). Multiple brown trout age classes were observed in 2024 at Sites LLD-F3, LLD-F2, IHD-F1, and IHD-F2, which suggests continued recruitment and survival into older age classes occurs in these stream reaches (Figure 2-8). At Site RRD-F1, one brown trout in the 2+ age class was observed in 2024 (Figure 2-8); missing age classes

have also been documented in previous monitoring years, which suggests poor recruitment and low survival continue at this site (Appendix B7, Figure B7-2). At Site GCD-F1, brown trout in the 1+ and 3+ age classes were observed in 2024, indicating limited recruitment in 2024 but stronger recruitment in the preceding years (Figure 2-8; Appendix B7, Figure B7-8). At Site RPD-F1, brown trout in the 1+ age class were documented in 2024, which suggests successful recruitment in 2023 but poor recruitment and/or survival in 2024 (Figure 2-8; Appendix B7, Figure B7-10). Similar to previous monitoring years, few or no brown trout were observed at Sites JD-F3 and SCD-F3 (Appendix B7, Figures B7- 6 and B7-19). The five brown trout observed at Site SCD-F2 in 2024 were all adult fish, a change from previous monitoring years when no brown trout were observed (Figure 2-8; Appendix B7, Figure B7-21).



Notes: mm = millimeter, YOY = young-of-year

Figure 2-7. Length-frequency and age-class distribution of rainbow trout at electrofishing sites (top) and snorkel sites (bottom), 2024.



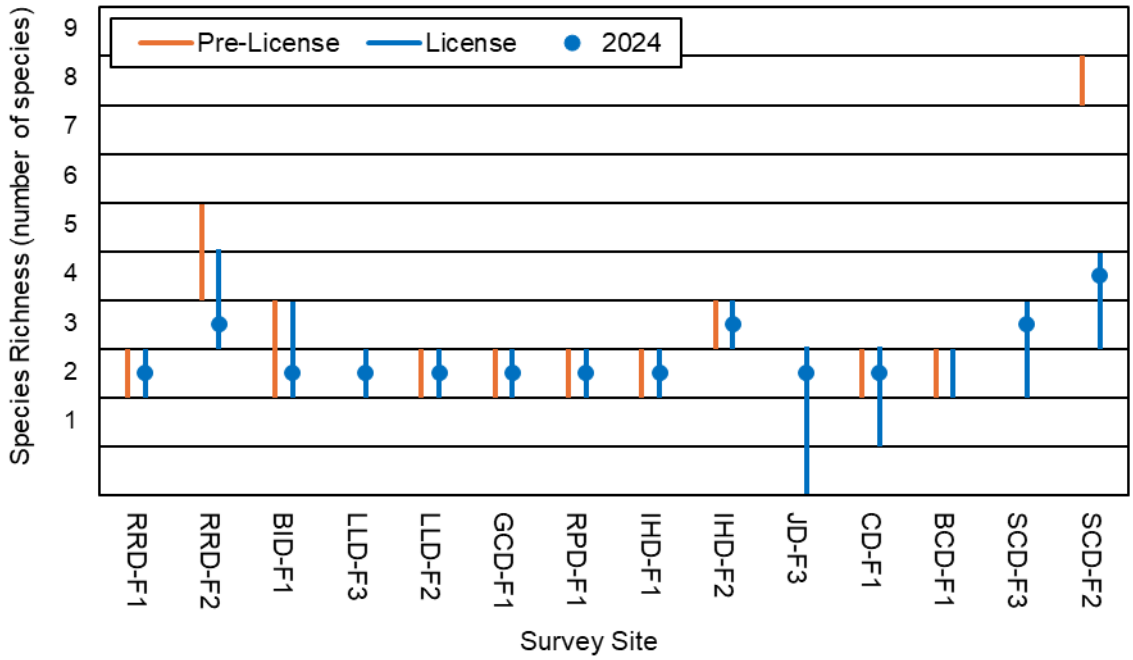
Notes: mm = millimeter, YOY = young-of-year

Figure 2-8. Length-frequency and age-class distribution of brown trout at electrofishing sites (top) and snorkel sites (bottom), 2024.

2.3.6 Historical Comparison

Species richness throughout the UARP, except at Site SCD-F2, was generally similar under License implementation and pre-License conditions (Figure 2-9). The total number of species observed at Site SCD-F2 in the Slab Creek Dam Reach[4] decreased from nine in 2002 and 2003 to five in 2019, 2020, and 2024 (Table 2-1, Figure 2-1). The site shifted from a transitional-zone fish assemblage consisting of predominantly Sacramento sucker and native Cyprinid spp. during the pre-License period to a predominantly trout assemblage during the License implementation period.

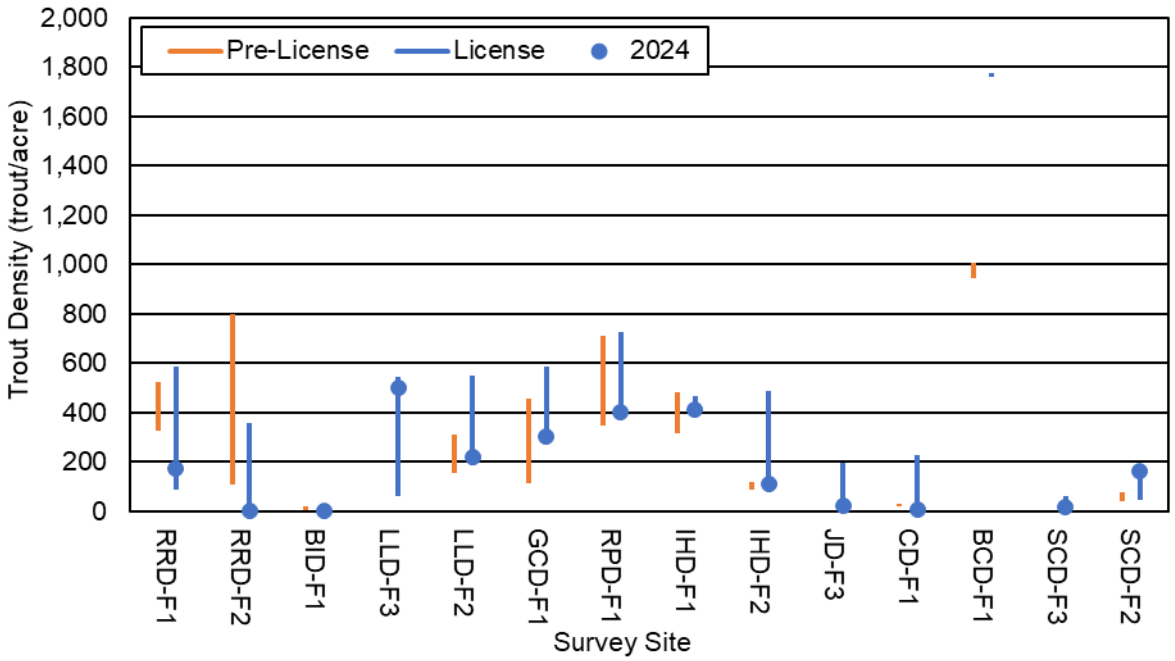
Trout biomass and catchable trout per mile at upper elevation reaches (downstream of Rubicon Dam and Loon Lake Dam) declined slightly during License implementation monitoring years compared with the pre-License period, while density remained similar (Figure 2-10, Figure 2-11, Figure 2-12). Except at Site SCD-F2, trout density, biomass, and catchable trout per mile at mid- and lower-elevation reaches (downstream of Gerle Creek Dam) were generally similar in License implementation and pre-License monitoring years. The lowest elevation site, Site SCD-F2, showed a slight increase in trout density and a substantial increase in catchable trout per mile compared with all monitoring years (Figure 2-2, Figure 2-4, Figure 2-10, and Figure 2-12).



Notes: Not all sites were surveyed each year. Snorkel surveys were conducted in all monitoring years at Site CD-F1 and in monitoring years between 2019–2024 at Sites JD-F3, SCD-F3, and SCD-F2.

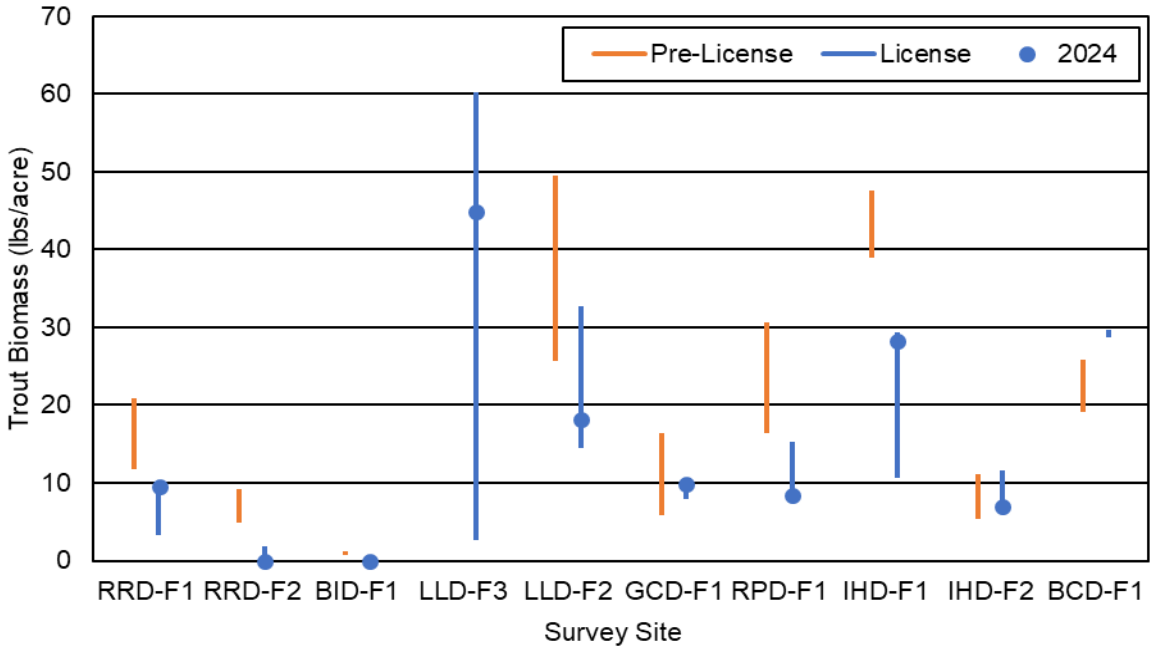
Figure 2-9. Species richness in the Upper American River Project study area by site, pre-License (2002–2005) and License implementation (2019–2024).

[4] Site SCD-F2 was surveyed via electrofishing in 2002 and 2003 and snorkeling in 2019 through 2024.



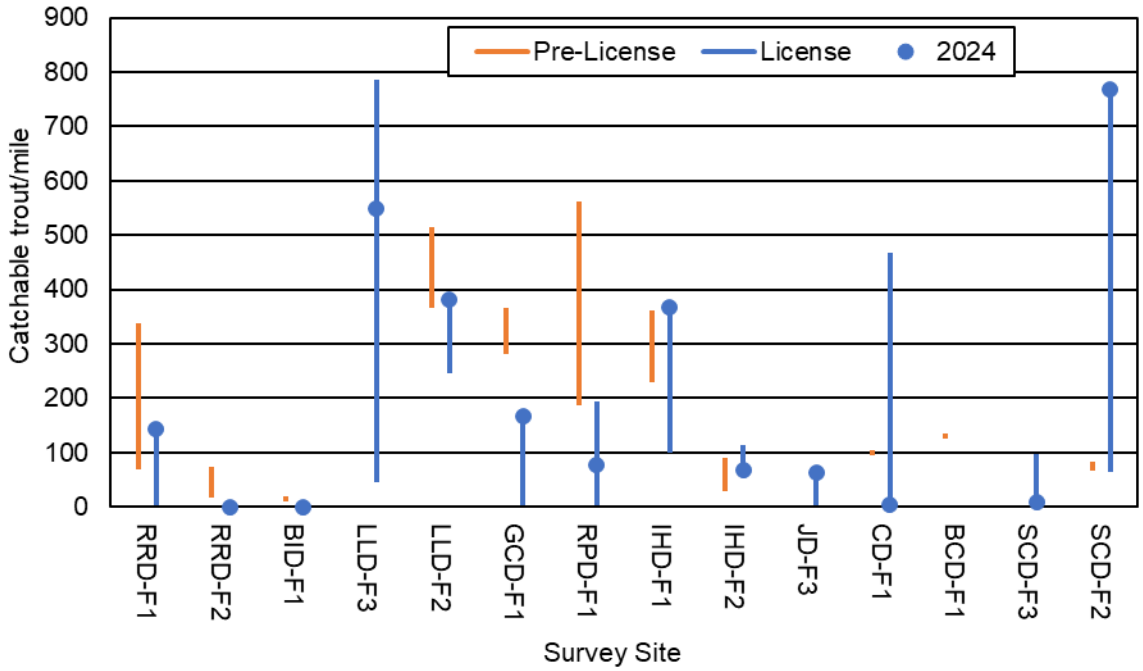
Notes: Not all sites were surveyed each year. Snorkel surveys were conducted in all monitoring years at Site CD-F1 and in monitoring years from 2019–2024 at Sites JD-F3, SCD-F3, and SCD-F2.

Figure 2-10. Trout density in the Upper American River Project study area by site, pre-License (2002–2005) and License implementation (2019–2024).



Notes: lbs = pounds
Not all sites were surveyed each year.

Figure 2-11. Trout biomass in the Upper American River Project study area by site, pre-License (2002–2005) and License implementation (2019–2024).



Notes: Not all sites were surveyed each year. Snorkel surveys were conducted in all monitoring years at Site CD-F1 and in monitoring years from 2019–2024 at Sites JD-F3, SCD-F3, and SCD-F2.

Figure 2-12. Catchable trout per mile in the Upper American River Project study area by site, pre-License (2002–2005) and License implementation (2019–2024).

2.4 DISCUSSION

The Settlement Agreement includes reach-specific objectives for species richness and trout density, biomass, and abundance (Table 2-4). One of two sites (Site BID-F1) met the species richness objective; one of ten sites (Site CD-F1) met the density objective; and three of eleven sites (Sites LLD-F3, IHD-F1, and SCD-F2) met the trout biomass or catchable trout objectives in 2024 (Table 2-4). The biomass and catchable trout goals derived from Gerstung (1973) 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.

In general, species richness and trout density throughout the UARP have generally remained similar across pre-License and License implementation monitoring years, while trout biomass and catchable trout per mile declined slightly during License implementation monitoring years compared with the pre-License period (Section 2.3.6). These findings suggest that changes in streamflow and water temperature regimes under License conditions may be altering trout populations throughout the UARP compared with pre-License conditions; however, there appears to be considerable variation from year to year with no evidence of a consistent downward trend. The observation of multiple age classes at most sites indicates that trout reproductive success continues to occur throughout the UARP. Results of this study and the

hardhead study (see Section 7.3.3) indicate notable changes in fish populations in the SFAR downstream of Slab Creek Dam under License implementation, which may be attributable to the change in streamflow and water temperature regimes in this reach. Comparisons of historical water temperature and discharge in the reach downstream of Slab Creek Dam are included in Section 7.3.4.

Table 2-4. Fisheries Objectives Specified in the Rationale Report for the Settlement Agreement.

Stream Reach	Site	Stream Width (feet)	Species Richness and Abundance		Trout Biomass or Catchable Trout Abundance			
			Objective (SMUD 2007)	License Status (2024)	Objective (SMUD 2007)[1]	Pre-License (2002–2005 mean)	License (2019–2020 mean)	License (2024)
Rubicon River downstream of Rubicon Dam	RRD-F1	29	Increase rainbow trout density	Decreased	Biomass ≥24 lbs/acre	16.7 lbs/acre	6.4 lbs/acre	9.5 lbs/acre
Rubicon River downstream of Rubicon Dam	RRD-F2	24	Increase rainbow trout density	Decreased	Biomass ≥33 lbs/acre	6.9 lbs/acre	1.1 lbs/acre	0 lbs/acre
Little Rubicon River downstream of Buck Island Dam	BID-F1	27	Reduce or eliminate golden shiner and increase rainbow trout density	Golden shiner reduced; rainbow trout decreased	Move toward 33 lbs/acre	0.9 lbs/acre	0 lbs/acre	0 lbs/acre
Gerle Creek downstream of Loon Lake Dam	LLD-F3	22	Increase rainbow trout and maintain brown trout density	--	Biomass ≥33 lbs/acre	--	31.4 lbs/acre	44.8 lbs/acre
	LLD-F2	33	Increase rainbow trout and maintain brown trout density	Rainbow trout increased; brown trout decreased	Biomass ≥24 lbs/acre	33.1 lbs/acre	23.6 lbs/acre	18.2 lbs/acre
Gerle Creek downstream of Gerle Dam	GCD-F1	34	Increase rainbow trout and maintain brown trout density	Rainbow trout increased; brown trout decreased	Biomass ≥24 lbs/acre	11.1 lbs/acre	8.6 lbs/acre	9.8 lbs/acre
South Fork Rubicon downstream of Robbs Peak Dam	RPD-F1	40	Increase rainbow trout and maintain brown trout density	Rainbow trout increased; brown trout decreased	Biomass ≥24 lbs/acre	23.2 lbs/acre	15.3 lbs/acre	8.4 lbs/acre
South Fork Silver Creek downstream of Ice House Dam	IHD-F1	27	Increase rainbow trout density	Decreased slightly	Biomass ≥24 lbs/acre	44.5 lbs/acre	20.0 lbs/acre	28.2 lbs/acre

Stream Reach	Site	Stream Width (feet)	Species Richness and Abundance		Trout Biomass or Catchable Trout Abundance			
			Objective (SMUD 2007)	License Status (2024)	Objective (SMUD 2007)[1]	Pre-License (2002–2005 mean)	License (2019–2020 mean)	License (2024)
South Fork Silver Creek downstream of Ice House Dam	IHD-F2	26	Increase rainbow trout density	Decreased slightly	Biomass ≥24 lbs/acre	9.1 lbs/acre	11.4 lbs/acre	7.0 lbs/acre
Silver Creek downstream of Junction Dam	JD-F3	38	Increase rainbow trout abundance	--	--	344.8[2] trout/mile	106.2 trout/mile	35.8 trout/mile
Silver Creek downstream of Camino Dam	CD-F1	39	Increase rainbow trout abundance	Increased	Catchable trout 278/mile	100.5 trout/mile	378.0 trout/mile	253.3 trout/mile
South Fork American River downstream of Slab Creek Dam	SCD-F3	43	Healthy age class distribution of transitional fishes, including hardhead; increase trout abundance	--	Catchable trout 278/mile	--	179.5 trout/mile	51.5 trout/mile
South Fork American River downstream of Slab Creek Dam	SCD-F2	47	Healthy age class distribution of transitional fishes, including hardhead; increase trout abundance	General decline of species richness; fewer transitional fish species, hardhead not confirmed[3]	Catchable trout 278/mile[4]	76 trout/mile	230.4 trout/mile	313.4 trout/mile

Notes: -- = no objective or not applicable
≥ = greater than or equal to
lbs = pounds
Sites RRD-F1, RRD-F2, BID-F1, LLD-F3, LLD-F2, GCD-F1, RPD-F1, IHD-F1, and IHD-F2 were surveyed via electrofishing. Sites JD-F3, CD-F1, SCD-F3, and SCD-F2 were surveyed via snorkeling.

[1] The mean biomass (lbs/acre) and catchable trout (trout per mile) objectives are based on Gerstung (1973).

[2] Pre-License catchable trout per mile was calculated from data collected at Site JD-F1.

[3] Although hardhead were not observed at this site in 2024, they were observed upstream during the 2020 hardhead survey (Section 7.0).

[4] Trout biomass was listed as the goal in the rationale document. However, biomass estimates were not possible because Site SCD-F2 was snorkeled in License implementation monitoring years, 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 (Plan) (SMUD 2016) is to monitor benthic macroinvertebrate (BMI) assemblages and utilize an aquatic ecosystem health index as an indicator of stream conditions during implementation of the streamflows required under the License.

3.2 METHODS

In accordance with the Plan, BMI monitoring was conducted at 11 sites in 8 stream reaches (Figure 1-1 through Figure 1-3, Table 3-1) in 2024 (License Year 10). Methodology was consistent with the Plan and followed the Surface Water Ambient Monitoring Program (SWAMP) protocol (Ode et al. 2016) with refinements described in the 2019 Report (SMUD 2020). These refinements were made in consultation with authors of the protocol (Ode, pers comm, 2019; Rehn, pers comm, 2020) and discussed with CDFW staff (McBride and Mack, pers comm, 2024).

3.2.1 Benthic Macroinvertebrate Sampling and Physical Habitat Data Collection

Monitoring was conducted using the standard reach-wide benthos method for collecting BMI and documenting physical habitat described in the SWAMP protocol (Ode et al. 2016). Sites were divided into 11 equidistant main transects and 10 inter-transects arranged perpendicular to the direction of flow. BMI were collected at main transects using a D-frame kicknet with 0.5-mm-diameter mesh and subsequently combined into a single composite sample for each site. Water quality (e.g., temperature, pH, dissolved oxygen) and physical habitat (e.g., wetted width, canopy cover, substrate) parameters described in the Plan were recorded.

3.2.2 Laboratory Methods

Laboratory methods followed procedures referenced in the Plan and outlined in *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]). 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). An independent laboratory conducted quality control of BMI identification for 10% of the samples.

Table 3-1. Benthic Macroinvertebrate Sites Sampled for the Upper American River Project, 2024.

Site	Sample Date (2024)	Stream Reach	Description	Northing / Easting (meters)[a]	Elevation (meters)	Site Reach Length (meters)[b]
RRD-I2	13 September	Rubicon River downstream of Rubicon Dam	Upstream of Rubicon Springs	4321159 / 740001	1,871	150
LLD-I3	10 September	Gerle Creek downstream of Loon Lake Dam	Upstream of Rocky Basin Creek confluence	4318674 / 727272	1,647	150
GCD-I2	9 September	Gerle Creek downstream of Gerle Creek Dam	Upstream of South Fork Rubicon River	4314970 / 725682	1,528	150
RPD-I2	9 September	South Fork Rubicon River downstream of Robbs Peak Dam	Downstream of Gerle Creek Confluence	4314503 / 724276[c]	1,490	150
IHD-I2	10 September	South Fork Silver Creek downstream of Ice House Dam	Downstream of Ice House Reservoir	4299814 / 727760	1,584	150
JD-I1	11 September	Silver Creek downstream of Junction Dam	Downstream of Junction Reservoir	4303286 / 720200	1,299	150
JD-I4[d]	11 September		Near Jaybird Tunnel access	4302088 / 717319	1,203	150
CD-I2[e]	17 September	Silver Creek downstream of Camino Dam	Near Camino Tunnel access	4298471 / 710090	715	90
CD-I3[e]	12 September		Upstream of South Fork American River Confluence	4296211 / 709334	629	100
SCD-I1[f]	17 September	South Fork American River downstream of Slab Creek Dam	Upstream of South Fork Powerhouse	4293960 / 699540	499	80
SCD-I3[g]	17 September		Upstream of Rock Creek confluence	4295021 / 692949	336	150

Note: SWAMP = Surface Water Ambient Monitoring Program

[a] Universal Transverse Mercator Zone 10 North, North American Datum of 1983; located at Transect A established in 2019 (SMUD 2020) unless otherwise indicated.

[b] Reach lengths were reduced from the SWAMP standard guidelines (Ode et al. 2016) as necessary when established in 2019 (SMUD 2020).

[c] Relocated approximately 50 meters upstream of the previous site (SMUD 2019, 2020) to maximize sampleable habitat in 2024.

[d] As described in the 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.

[e] Site partitioned to avoid unsampleable habitat.

[f] Identified as Site SCD-I1a in the Plan. Site SCD-I1b was relocated farther downstream; therefore, this sample location is referred to simply as Site SCD-I1 herein.

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

3.2.3 Data Analysis

A suite of standard metrics describing taxonomic richness, composition, and tolerance (Karr and Chu 1999, Richards and Rogers 2011) and the composite California Stream Condition Index (CSCI) (Rehn et al. 2015) were calculated for each BMI sample. The CSCI is based on predictive modeling generated from a statewide BMI database and is used to evaluate aquatic habitat quality and identify overall trends related to stream condition as reflected by the BMI community.

The CSCI integrates two measures for evaluating sites: (1) BMI taxonomic completeness based on an observed-to-expected ratio (O/E), and (2) a multi-metric index (MMI) that quantifies biological condition based on BMI richness, composition, and diversity. The O/E is a measure of taxonomic completeness between observed taxa collected at a site and expected 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). The MMI generates anticipated values for six metrics[5] demonstrated to be reliable indicators with minimal variability (Rehn et al. 2015). Scores for each metric are calculated by comparing anticipated values based on environmental variables and taxonomic composition at reference sites built into the model with empirical values from the BMI sample collected from each site. As observed values approach those predicted by the model, scores for each measure (i.e., MMI and O/E) increase; conversely, as observed values deviate from those expected, scores decrease.

The CSCI is calculated using R statistical software (R Core Team 2024, Engeln 2019) and integrates O/E taxonomic completeness and MMI results into a single score typically ranging from 0.1 to 1.4.[6] The CSCI score range is divided into four categories of biological condition, based on the 30th, 10th, and 1st percentiles of CSCI scores at reference sites in the state-wide database (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, and
- ≤0.62 = very likely altered condition.

A two-level hierarchical Bayesian model was fitted to estimate the median CSCI scores between the pre-License and License implementation periods with area (i.e., the combined UARP and Chili Bar Project areas) being the first hierarchical level (n=2) and site being the second hierarchical level (n=13). Priors were chosen to be weakly

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5 Total clinger taxa; percent Coleoptera taxa; percent Ephemeroptera, Plecoptera, and Trichoptera taxa; percent intolerant individuals; shredder taxa richness; and taxonomic richness.

6 The mean CSCI score of reference sites is 1.00. CSCI scores greater than 1.00 indicate greater taxonomic richness and more complex ecological function than predicted for reference sites. Scores that approach 0 indicate departure from reference condition and degradation of biological condition (Rehn et al. 2015).

regularized to control for under- and overfitting the model to the data. Convergence criteria, such as effective sample sizes and R-hat values, were used to check for appropriate model convergence throughout. R statistical software was used to fit the model and generate the figures (R Core Team 2024, Bürkner 2018, Kay 2023).

3.3 RESULTS

3.3.1 Water Quality

Water quality parameters recorded at sites during BMI collection are shown in Table 3-2.

Table 3-2. Water Quality Data Collected during Benthic Macroinvertebrate Sampling for the Upper American River Project, 2024.

Site	Water Temperature (°C)	pH (s.u.)	Alkalinity (mg/L)	Dissolved Oxygen (% sat)	Dissolved Oxygen (mg/L)	Specific Conductance (µs/cm)
RRD-I2	13.3	7.2	20	82	8.6	18.0
LLD-I3	14.8	7.1	24	81	8.3	9.8
GCD-I2	16.2	7.5	28	84	8.2	10.4
RPD-I2	16.2	6.9	24	86	8.4	10.7
IHD-I2	11.5	7.2	24	81	8.8	13.3
JD-I1	7.3	6.6	24	86	10.4	12.7
JD-I4	12.4	7.1	20	88	9.4	14.5
CD-I2	12.5	7.2	20	93	9.9	13.4
CD-I3	17.1	7.1	20	97	9.3	19.4
SCD-I1	12.5	7.0	24	91	9.7	20.3
SCD-I3	14.2	7.1	28	98	10.0	22.4

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

3.3.2 Physical Habitat Assessment

Physical habitat, instream habitat complexity, and riparian vegetation cover data are summarized in Table 3-3 and Table 3-4. Site photographs are presented in Appendix C1. Aquatic habitat among sampling sites was diverse, ranging from low gradient pools to high gradient cascades/falls with associated substrate size classes ranging from sand to bedrock (Table 3-3). Instream habitat complexity elements were present at all sites, typically ranking within the sparse category (Table 3-4). Boulders were the most common habitat complexity element. Artificial structures (e.g., pipes, bridge buttresses) were absent at all sites, and filamentous algae was only present at Site GCD-I2 (Table 3-4). Above the stream channel, average canopy cover ranged from 1% to 58% (Table 3-3). At most sites, the upper riparian canopy on the streambanks was characterized as sparse, the lower canopy as moderate or heavy, and ground cover as moderate (Table 3-4). Stream banks at all sites were categorized as stable except for a few transects at Sites RRD-I2 and CD-I2 where minor erosion was noted.

Most sites showed little evidence of in-channel human disturbance except for Sites SCD-I1 and SCD-I3. Site SCD-I1 is upstream of South Fork Powerhouse and is bordered by a pedestrian bridge and public access trail. Site SCD-I3 is upstream of Rock Creek Powerhouse and serves as public river access.

Table 3-3. Physical Habitat Data Collected during Benthic Macroinvertebrate Sampling for the Upper American River Project, 2024.

Site	Gradient (%)[1]	Discharge (cfs)[2]	Average Wetted Width (meters)[3]	Average Canopy Cover (%)	Dominant Habitat (Subdominant)[4]	Dominant Substrate (Subdominant)[5]
RRD-I2	1.3	2.8	10.5	58	Riffle (Glide)	Sand (Cobble)
LLD-I3	2.7	34.8	11.1	19	Riffle (Run)	Bedrock (Cobble)
GCD-I2	2.2	14.0	8.7	38	Riffle (Pool)	Cobble (Bedrock)
RPD-I2	2.6	21.2	11.5	37	Riffle (Glide)	Bedrock (Sand)
IHD-I2	1.6	17[f]	8.6	44	Run (Pool)	Bedrock (Sand)
JD-I1	4.8	17[f]	15.2	28	Riffle (Run)	Cobble (Small boulder)
JD-I4	2.4	31.6	20.1	45	Riffle (Pool)	Small Boulder (Cobble)
CD-I2	1.9	19.7	10.1	9	Pool (Run)	Bedrock (Cobble)

Site	Gradient (%)[1]	Discharge (cfs)[2]	Average Wetted Width (meters)[3]	Average Canopy Cover (%)	Dominant Habitat (Subdominant)[4]	Dominant Substrate (Subdominant)[5]
CD-I3	2.1	21.0	10.2	33	Riffle (Cascade/falls)	Small boulder (Cobble)
SCD-I1	1.1	80	13.4	1	Riffle (Rapid)	Cobble (Small boulder)
SCD-I3	1.7	166[f]	32.9	16	Run (Pool)	Large boulder (Cobble)

Note: cfs = cubic feet per second

1 Calculated using satellite imagery and the U.S. Geological Survey National Elevation Dataset Digital Elevation Model (USGS 2020).

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

3 Averaged across 11 main transects per site.

4 Calculated using flow habitats collected from the 10 inter-transects between the downstream and upstream transects at each site.

5 Calculated using substrate data collected on the 11 main transects and 10 inter-transects at each site.

6 DWR (2025)

Table 3-4. Instream Habitat Complexity and Riparian Vegetation Areal Cover by Site during Benthic Macroinvertebrate Sampling for the Upper American River Project, 2024.[1]

Site	Instream Habitat Complexity Feature Areal Cover									Riparian Canopy Class Areal Cover		
	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 (>5 m)	Lower Canopy (0.5–5 m)	Ground Cover (<0.5 m)
RRD-I2	Absent	Absent	Sparse	Sparse	Sparse	Sparse	Sparse	Absent	Absent	Moderate	Heavy	Moderate
LLD-I3	Absent	Sparse	Moderate	Sparse	Sparse	Sparse	Sparse	Sparse	Absent	Sparse	Moderate	Moderate
GCD-I2	Sparse	Sparse	Sparse	Sparse	Sparse	Sparse	Sparse	Sparse	Absent	Moderate	Moderate	Moderate
RPD-I2	Absent	Sparse	Sparse	Absent	Sparse	Sparse	Sparse	Sparse	Absent	Sparse	Moderate	Moderate
IHD-I2	Absent	Sparse	Moderate	Sparse	Sparse	Sparse	Sparse	Sparse	Absent	Sparse	Heavy	Moderate
JD-I1	Absent	Sparse	Heavy	Sparse	Sparse	Sparse	Sparse	Absent	Absent	Sparse	Moderate	Moderate
JD-I4	Absent	Moderate	Very heavy	Sparse	Sparse	Sparse	Sparse	Absent	Absent	Sparse	Moderate	Moderate
CD-I2	Absent	Sparse	Heavy	Sparse	Sparse	Sparse	Sparse	Absent	Absent	Sparse	Sparse	Moderate
CD-I3	Absent	Sparse	Very heavy	Sparse	Sparse	Sparse	Sparse	Sparse	Absent	Sparse	Moderate	Moderate
SCD-I1	Absent	Sparse	Very heavy	Sparse	Sparse	Sparse	Sparse	Absent	Absent	Sparse	Heavy	Moderate
SCD-I3	Absent	Moderate	Heavy	Absent	Sparse	Sparse	Sparse	Sparse	Absent	Sparse	Heavy	Moderate

Notes: m = meter
Absent = 0%
Sparse = <10%
Moderate = 10–40%
Heavy = 41–75%
Very heavy = >75%

[1] Areal cover averaged across 11 main transects per site.

3.3.3 Benthic Macroinvertebrate Assemblage Evaluation

A total of 7,032 BMIs representing 148 distinct taxa were identified from the samples collected at the UARP study sites in 2024. Interlaboratory quality control results identified minor taxonomic discrepancies within acceptable error. A complete taxonomic list with associated functional feeding group and tolerance value designations is presented in Appendix C2. Standard metrics (e.g., the Shannon Weaver Diversity Index) that describe taxonomic richness, composition, and tolerance, including those used to calculate the CSCI, are presented in Appendix C3.

CSCI scores for the BMI samples collected in 2024 (Table 3-5, Figure 3-1) ranged from 0.42 at Site SCD-I3 to 1.25 at Site LLD-I3 with scores for eight sites ranking within the "likely intact" category range. Scores for three sites ranked within the "possibly altered" or "likely altered" category ranges, and the score at one site fell within the "very likely altered" category (Rehn et al. 2015).

Table 3-5. California Stream Condition Index Scores for Benthic Macroinvertebrate Samples Collected for the Upper American River Project, 2024.

Site	CSCI Score[1]
RRD-I2	1.15
LLD-I3 (duplicate[2])	1.25 (1.21)
GCD-I2	1.06
RPD-I2	1.07
IHD-I2	0.86
JD-I1	0.77
JD-I4	1.03
CD-I2	1.01
CD-I3	1.05
SCD-I1	0.89
SCD-I3	0.42

Notes: CSCI = California Stream Condition Index, SWAMP = Surface Water Ambient Monitoring Program

[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] SWAMP quality assurance protocols require duplicate sampling of BMIs at 10% of sites (Ode et al. 2016).

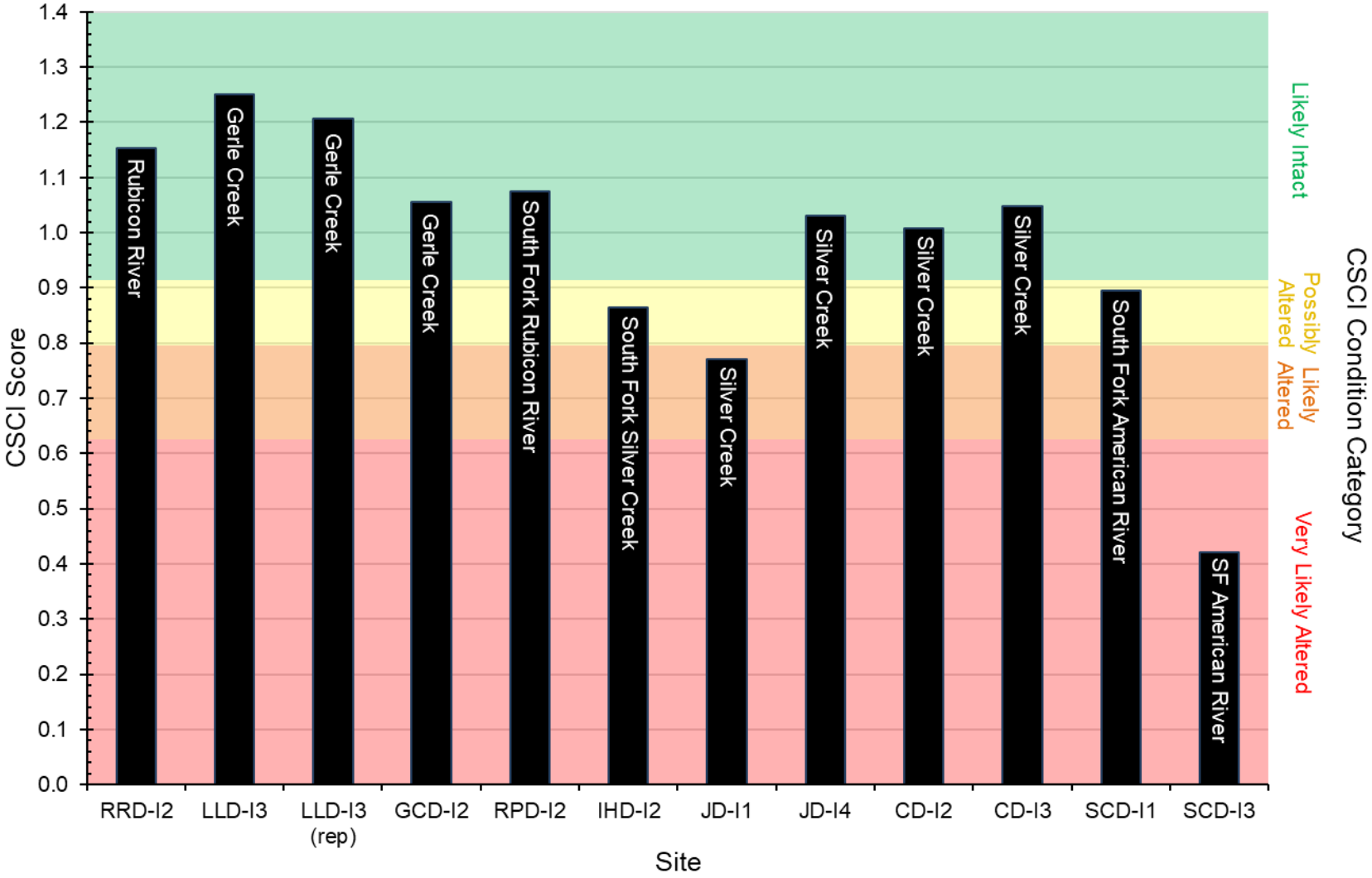
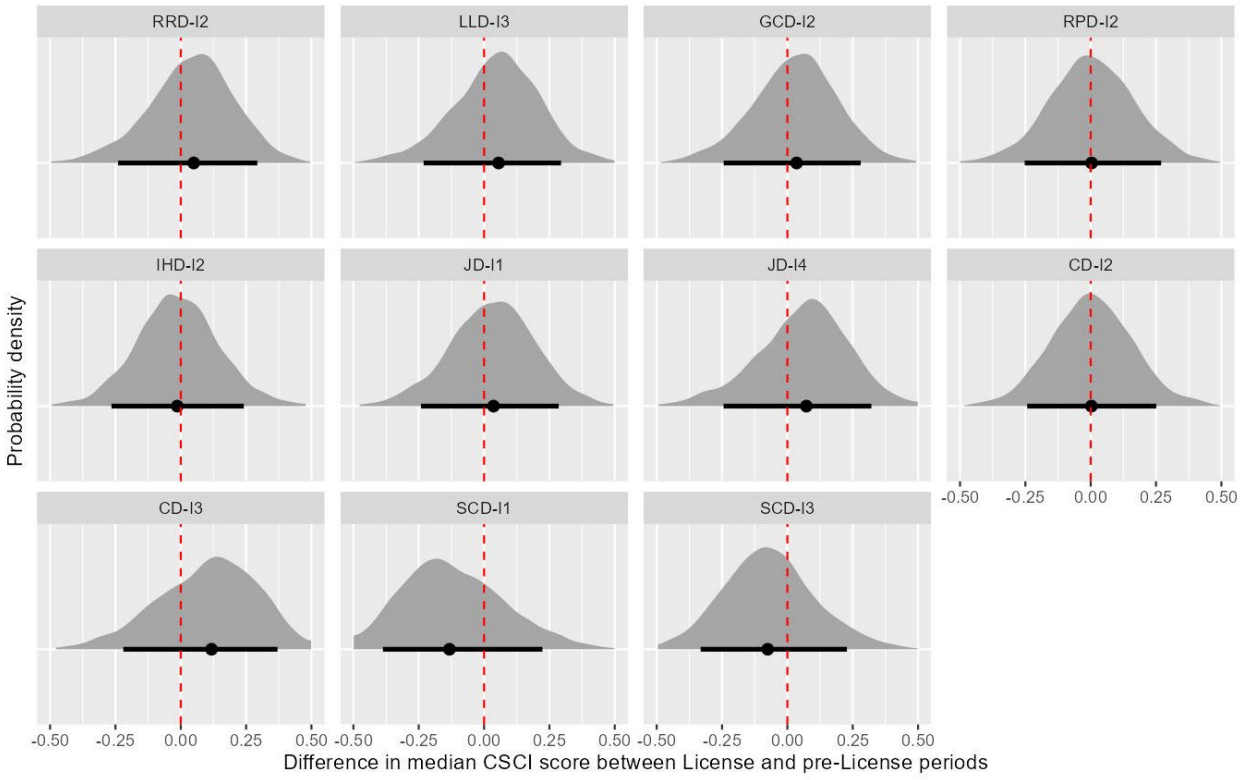


Figure 3-1. California Stream Condition Index Scores and condition categories for benthic macroinvertebrate samples collected for the Upper American River Project, 2024.

3.4 DISCUSSION

Pre-License BMI monitoring was conducted in the UARP in 2002 and 2003 prior to implementation of the minimum instream flows required under the License (Appendix A1, Table A-1). License implementation BMI monitoring has been conducted in 2019, 2020, and 2024 (License Years 5, 6, and 10, respectively) (Table 1-1). In general, aquatic habitat conditions as reflected by BMI assemblages and associated CSCI scores have not changed substantially in the UARP under the new flow regime. Bayesian posterior contrast values between License implementation (2019/2020/2024) and pre-License (2002/2003) sampling events show License implementation median CSCI scores are likely the same or slightly higher than pre-License median CSCI scores (i.e., the differences are mostly zero or positive numbers), except at Sites SCD-I1 and SCD-I3 (Figure 3-2). The addition of future License implementation data will further inform the presence and degree of change in CSCI scores at monitoring sites.



Note: Black dot denotes median, black horizontal line denotes the 89% credible interval, and red dashed vertical line denotes zero contrast value.

Figure 3-2. Posterior contrast distribution by site between License implementation (2019/2020/2024) and pre-License (2002/2003) median California Stream Condition Index scores with 89% credible intervals.

Suitable habitat complexity and generally good water quality (Section 3.3.1) likely contributed to relatively high CSCI scores for samples collected in 2024 (Table 3-6, Figure 3-3) and previous monitoring years (SMUD 2005, SMUD 2020, SMUD 2021). CSCI scores for approximately 50% of samples collected from the UARP during pre-License and License implementation monitoring ranked within the "likely intact" condition category (Table 3-6, Figure 3-3). Scores by site were comparable between License implementation sampling events (2019, 2020, and 2024) and similar to or higher than scores for pre-License samples, except at sites in the SFAR downstream of Slab Creek Dam, as noted above. CSCI scores for samples collected at sites immediately below large impoundments (e.g., Sites IHD-I2 and JD-I1) typically fell within the "possibly altered" or "likely altered" condition categories during both pre-License and License implementation monitoring. This is consistent with documented trends in BMI assemblages, where relatively low biological index values (e.g., CSCI scores) typically occur immediately downstream of large reservoirs but increase with distance downstream from the dam (Rehn et al. 2007).

Table 3-6. California Stream Condition Index Scores for Pre-License and License Implementation Benthic Macroinvertebrate Monitoring for the Upper American River Project.

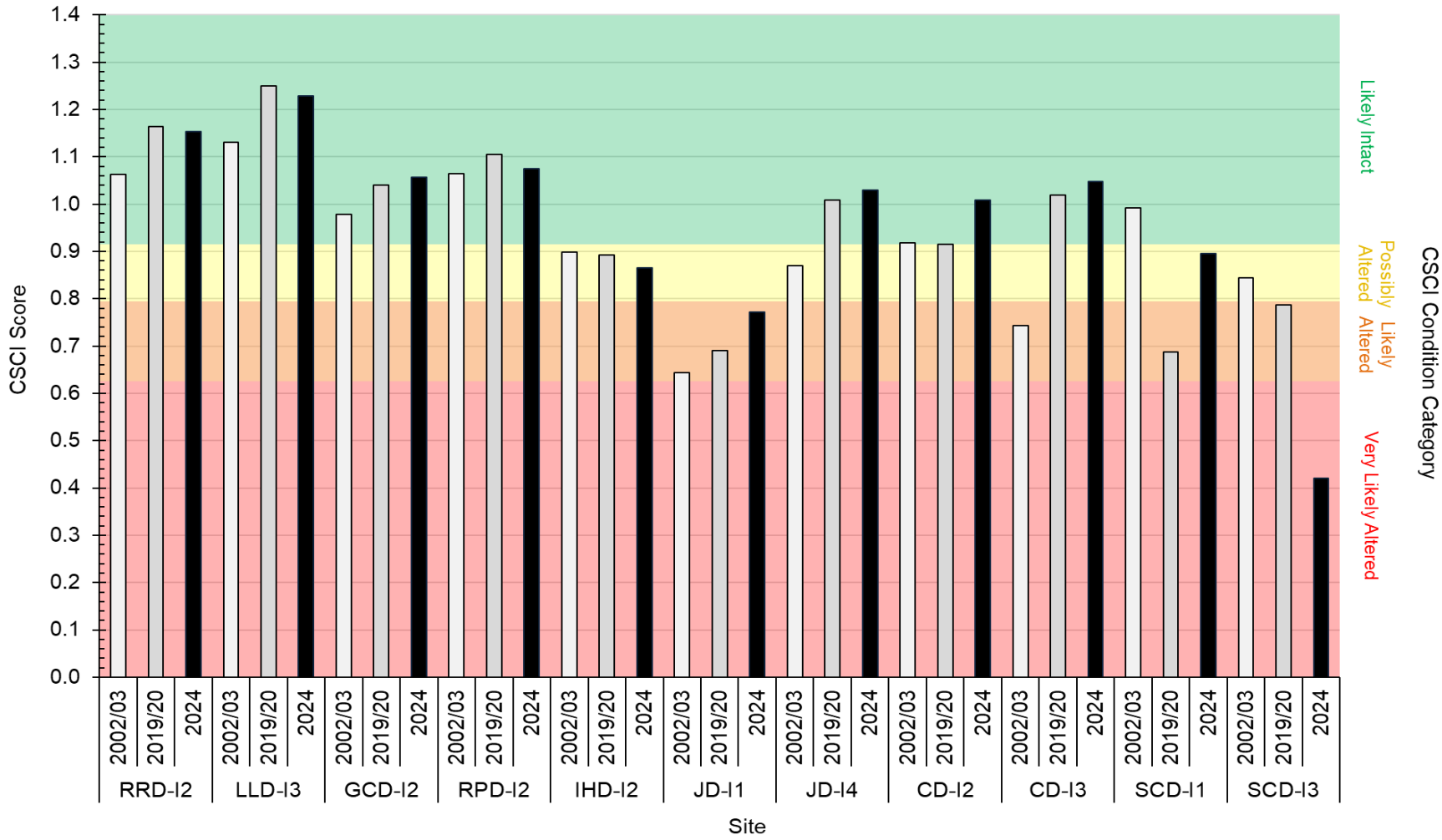
Site	CSCI Scores[1]		
	Pre-License	License Implementation	
	2002/2003 (Average)	2019/2020 (Average)	2024
RRD-I2	1.06	1.16	1.15
LLD-I3	1.13	1.25	1.23
GCD-I2	0.98	1.04	1.06
RPD-I2	1.06	1.11	1.07
IHD-I2	0.90	0.89	0.86
JD-I1	0.64	0.69	0.77
JD-I4[2]	0.87	1.01	1.03
CD-I2	0.92	0.91	1.01
CD-I3	0.74	1.02	1.05
SCD-I1[3]	0.99	0.69	0.89
SCD-I3[2]	0.84	0.79	0.42

Notes: CSCI = California Stream Condition Index

[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] Site was not sampled during relicensing study (SMUD 2016); data from proximal relicensing study site used for historical comparison (JD-I2 for JD-14 and SCD-I2 for SCD-I3).

[3] Pre-license data for this site include an additional sample collected in 2010 (ECORP 2011).



Note: Sites JD-I4 and SCD-I3 were not sampled during the relicensing (i.e., 2002, 2003) studies (SMUD 2015); data from the most proximal relicensing study site were used (Sites JD-I2 and SCD-I2, respectively).

Figure 3-3. Average California Stream Condition Index scores and condition categories for samples collected during pre-License (2002/2003) and License implementation (2019/2020 and 2024) benthic macroinvertebrate monitoring for the Upper American River Project.

The lower average CSCI score at Site SCD-I1, located just downstream of Slab Creek Dam, for the 2019/2020 sampling period was likely partially attributable to construction of the South Fork Powerhouse which involved significant channel bed disturbance and temporary dewatering in 2018. The CSCI score for the sample collected at Site SCD-I1 in 2024 was 25% greater than the 2019/2020 average and ranked in a higher condition category (Table 3-6, Figure 3-3), indicating recovery of the BMI community and improved stream condition since construction.

Although CSCI scores often increase with distance downstream of impoundments (Rehn et al. 2007), the CSCI score at Site SCD-I3 in 2024 was more than 50% lower than the score at Site SCD-I1 (Table 3-6, Figure 3-3). Additionally, the CSCI score for the sample collected at Site SCD-I3 in 2024 was 61% lower than the average score for the 2019/2020 sampling period, and the condition category changed from “likely altered” to “very likely altered.” The reduced CSCI score in 2024 was partially driven by low percentages of intolerant individuals and taxa in the orders Ephemeroptera, Plecoptera, and Trichoptera (Appendix C4), metrics known to be sensitive to large fluctuations in streamflow (Robinson et al. 2004, Rosi-Marshall et al. 2010). On the morning of BMI monitoring at Site SCD-I3, a powerhouse release related to downstream transmission line maintenance by Pacific Gas and Electric Company started at approximately 8 a.m. and continued through sampling. During the release, mean hourly discharge increased from approximately 80 to 165 cubic feet per second (cfs) (DWR 2025). Flow fluctuations (e.g., reservoir spills, recreational and other powerhouse releases) known to influence BMI assemblages (Allan 2004, Kennedy et al. 2016, Olden and Naiman 2010, Steel et al. 2017) periodically occur in the SFAR downstream of Slab Creek Dam; however, they usually occur during winter and spring (Figure 4-9, DWR 2025), which more closely follows a natural hydrograph. In 2019 and 2020, streamflows were variable early in the year but relatively consistent in the months prior to BMI monitoring (DWR 2025), which likely allowed the BMI community to partially recover prior to sampling. Because a powerhouse release commenced immediately before sampling in 2024, temporary effects on the BMI community were likely more discernable than in previous License implementation monitoring years.

3.5 CONCLUSION AND FUTURE MONITORING

CSCI scores for BMI samples collected prior to License implementation were generally similar to those for samples collected during License implementation monitoring and are indicative of likely intact stream conditions within and between monitoring periods. 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 Plan, BMI samples will be collected again from the UARP in the following years: 2025, 2029, 2030, and thereafter for 2 consecutive years every 10 years for the term of the license.

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4.0 GEOMORPHOLOGY

4.1 MONITORING PLAN OBJECTIVES

The primary objective of the Geomorphology Monitoring Plan (Plan) (SMUD 2017) is to assess potential geomorphic changes associated with the changes in flow regime under the License.

4.2 METHODS

Methods used for this study are described in the Plan. Additional methodological detail is provided below to clarify implementation of the study and improve repeatability among years.

4.2.1 Hydrologic Data

Daily average flow and annual peak flow for the stream reaches of interest (see Table 4-1) were downloaded from the U.S. Geological Survey (USGS) for each gage for the period of record through water year 2023, and SMUD provided daily average flow data for water year 2024. Annual peak flow downloaded from USGS is the maximum flow recorded in a 15-minute interval for a designated water year. Because 15-minute flow data were not available from USGS at the time of reporting, peak flows for 2024 were calculated using the maximum daily average flow data from the gage. Table 4-1 lists the USGS gages used for this analysis. Annual peak and monthly average flow data for each gage for water years 2003 through 2024 are provided in Appendix D1.

Table 4-1. Hydrologic Data Used to Assess Changes in the Geomorphic Sites.

Stream Reach	Site(s)	USGS Gage Number	Period of Record	Drainage Area at Gage (square miles)
Rubicon River below Rubicon Dam[1]	RRD-G1	11427960	10/1/2002–9/30/2024	27
Gerle Creek below Loon Lake Dam	LLD-G1 LLD-G2	11429500	10/1/1962–9/30/2024	8
South Fork Silver Creek below Ice House Dam	IHD-G1 IHD-G2	11441500	10/1/1924–9/30/2024	28
Silver Creek below Camino Dam	CD-G1	11441900	10/1/1960–9/30/2024	171
South Fork American River below Slab Creek Dam	SCD-G1	11443500	10/1/1922–9/30/2024	493

Note: SMUD = Sacramento Municipal Utility District
USGS = U.S. Geological Survey

[1] Rubicon River discharge was calculated as the sum of daily average discharge at USGS gage 11427960 and Rubicon Reservoir total daily spill data provided by SMUD. The Rubicon Dam spill data extended from 1 January 2002 to 30 September 2024.

Because flow over the Rubicon Reservoir spillway bypasses the USGS gage, Rubicon River below Rubicon Dam discharge was calculated as the sum of discharge at the USGS gage and Rubicon Reservoir spill. Instantaneous peak flow data were unavailable for the Rubicon River below Rubicon Dam for its entire period of record. For the Rubicon River, the maximum daily average flow for each water year was used as the annual peak flow for the entire period from 2002 through 2024. This approach likely underestimates the instantaneous peak discharge but provides a reasonable estimate of the relative magnitude of peak flows through time.

4.2.2 Field Surveys

The Plan includes seven sites, all of which were surveyed in 2003 (SMUD 2005), 2019 (SMUD 2020), and 2024. Geomorphology monitoring site locations are shown in Figures 1-1 to 1-3. Surveys used a real-time kinematic (RTK) global navigation satellite system (GNSS) or a robotic total station (RTS), depending on site conditions. RTK was used where there was a clear view of the sky, and RTS was used otherwise. Benchmarks and endpins (i.e., fixed-elevation points at each end of a cross section) established during the 2003 and 2019 surveys were reoccupied where possible. GNSS positions were post-processed using the National Oceanic and Atmospheric Administration's Online Positioning User Service to derive control point position accuracies with less than 0.1 foot of horizontal and vertical error. All survey coordinates were established in the North American Datum of 1983 (Epoch 2010.00), projected in California State Plane Zone 2, in U.S. survey feet. All elevations were established in North American Vertical Datum of 1988 in U.S. survey feet (Geoid 18). The sites and their upstream and downstream extents are listed in Table 4-2. The locations of all survey points are shown in the overview maps in Appendix D2.

Table 4-2. 2024 Upper American River Project Geomorphology Study Sites.

Stream	Stream Reach	Site	2024 Survey Date	Drainage Area (square miles)	Length (feet)	Upstream Extent[1]		Downstream Extent[1]	
						Northing (feet)	Easting (feet)	Northing (feet)	Easting (feet)
Rubicon	Below Rubicon Dam	RRD-G1	7/12/2024	33	500	2132902	7065109	2133230	7065089
Gerle Creek	Below Loon Lake Dam, Upper Reach	LLD-G1	7/9/2024	7	400	2133700	7038682	2133918	7038267
	Below Loon Lake Dam, Middle Reach	LLD-G2	7/10/2024	11	700	2134728	7030737	2134809	7029814
South Fork Silver Creek	Below Ice House Reservoir, Upper Reach	IHD-G1	7/11/2024	33	1,200	2063499	7022990	2062667	7022344
	Below Ice House Reservoir, Lower Reach	IHD-G2	8/6/2024	43	1,300	2071134	7005768	2072218	7005535
Silver Creek	Below Camino Dam	CD-G1	10/14/2024	175	700	2060492	6966631	2059877	6966196
South Fork American River	Below Slab Creek Dam	SCD-G1	10/15/2024	516	650	2049397	6910900	2049326	6910890

[1] From 2019 Surveys in California State Plane Coordinate System Zone 2 (North American Datum of 1983).

4.2.2.1 Site Description

At each site, representative photographs were taken to provide views of (1) cross sections from both channel banks, (2) upstream and downstream views from each cross section, (3) endpins at each cross section, and (4) any observed sources of erosion or sedimentation. Photograph locations were recorded with cameras enabled with Global Positioning System (GPS), and reference points, such as boulders or mature trees, were identified within each photograph. Channel conditions were noted during each site visit to summarize morphology and any controls on erosion and sedimentation.

4.2.2.2 Longitudinal Profile

A longitudinal profile of the channel thalweg was surveyed throughout the length of each study reach using an RTS or RTK GNSS using the same upstream and downstream extents as the 2019 surveys. The longitudinal profile survey followed procedures established by the Forest Service (Harrelson et al.1994), which require surveying a sufficient number of points to capture topography of pools, riffles, and other significant breaks in channel gradient. The average survey interval was 5 feet. Longitudinal profile data were used to determine reach-average slope.

4.2.2.3 Cross Sections

Three cross sections—XS-1, XS-2, and XS-3—were surveyed at each site using an RTS or RTK GNSS. Existing endpins were reoccupied at all cross sections, except the upstream cross section at Sites CD-G1 and SCD-G1. Where existing endpins had been disturbed, new endpins were established as close as possible to the previous location. At some sites, additional temporary benchmarks were established and their positions recorded.

The cross section surveys were conducted in sufficient detail (3-foot spacing on average) to accurately capture channel topography and characterize channel geometry following standard survey procedures established by the Forest Service (Harrelson et al. 1994). The surveys captured the bankfull elevation on both banks, the edge of water during the surveys, and the thalweg elevation. Identifying bankfull elevations is somewhat subjective for rivers without clear floodplains, such as the majority of the sites.

4.2.2.4 Bed Particle Size Distribution

Along each cross section, a pebble count (Wolman 1954) was performed within the bankfull channel to characterize the bed particle size distribution. The count entailed measuring the intermediate axis (b-axis) of 100 particles to classify the bed particle size distribution. All silt- and sand-sized particles were classified as less than 2 mm.

4.2.2.5 Sediment Facies Mapping

Sediment facies were mapped onto 2019 aerial imagery collected by unmanned aerial vehicle (UAV) at each representative site (SMUD 2020). Sediment facies size classes (Table 4-3) within the bankfull channel were delineated by order of abundance of specific grain sizes following procedures established by Buffington et al. (1999). The dominant sediment facies was identified as the size class with the highest total mapped surface area at each site.

Table 4-3. Sediment Size Classes.

Sediment Diameter (millimeter)	Size Class
<2	Sand
2–64	Gravel
65–256	Cobble
>256	Boulder

Source: Bunte and Abt (2001)

4.2.2.6 Large Woody Debris

All large woody debris (LWD) longer than one-half bankfull width and at least partially within bankfull stage were documented. LWD were categorized as either single pieces, pieces with root wads, or aggregates. An aggregate was defined as four or more pieces in contact with one another where each piece met the minimum length criterion. A root wad was defined as the root mass of a tree with root mass diameter equal to or longer than the trunk length. LWD at Site LLD-G1 was quantified using aerial imagery collected using a UAV on 9 July 2024.

4.2.2.7 Fine Sediment Storage

The fraction of the pool volume filled with fine sediment (V*; Lisle and Hilton 1992, Hilton and Lisle 1993) is a useful measure in a gravel bed channel with defined pools where fine sediment can be distinguished from coarser sediment by probing with a rod, which is not possible when sand and silt comprise the bed of a site. Only the upstream pool at Site IHD-G1 met Plan criteria (see Attachment 6 [SMUD 2017]) for V* measurement; this pool had a defined form and extensive fine sediment (sand and silt) deposition. Because the pool was too deep to wade, the methods outlined in Hilton and Lisle (1993) and Attachment 6 of the Plan (SMUD 2017) were adapted to estimate V* during the field survey on 6 August 2024. From a kayak, surveyors used a graduated 10.5-foot-long aluminum rod to measure the water depth and thickness of fine sediment along three profiles of the pool—centerline, left edge, and right edge. The maximum residual pool depth (the maximum pool depth minus the depth at the pool outlet) was measured for all three profiles at the pool outlet.

4.2.2.8 Additional Channel Condition Assessments

Rosgen Level II classifications were assigned to each site using field measurements of entrenchment ratio, width-to-depth ratio, channel sinuosity, reach-average slope, and dominant channel materials (Rosgen 1994). Rosgen Level III, Rosgen bank erosion and riparian vegetation, and Pfankuch bank stability assessments (Rosgen 1994, Pfankuch 1975) were also conducted. Amended Pfankuch ratings were used to characterize channel stability as a function of stream classification (Rosgen 1994).

4.2.3 Data Analysis

4.2.3.1 Hydrologic Data

Hydrology for water years 2003 through 2014 (prior to the License implementation) was compared with hydrology for water years 2015 through 2024 (current License period) to inform whether differences in minimum instream, recreational, and pulse flows following implementation of the License in water year 2015 may have caused geomorphic change. Peak flows were analyzed because they are influenced by UARP operations and can have a strong effect on channel morphology.

4.2.3.2 Geomorphic Field Data

Results from the longitudinal profile, cross section, and pebble count surveys were compared with available results from 2003 and 2019 to assess geomorphic change. Longitudinal profiles for 2019 and 2024 were aligned by snapping survey points to a common centerline to compute stationing for each site. The upstream end of each site started at station 0. All points were snapped to the nearest edge of the centerline, which was drawn using the 2019 UAV imagery for each site. Changes in longitudinal profiles were quantified by comparing reach-average slope and locations of aggradation and incision between monitoring years. Because some differences in profile elevations could result from specific placement of survey rods, locations of aggradation and incision were noted when elevation differences exceeded 1 foot. Reach-average slope was calculated as a best-fit line to the longitudinal profile at each site. The 2003 longitudinal profile and cross section surveys were conducted using an auto level and tape and therefore are less precise than the subsequent surveys, which used an RTS and/or RTK GNSS. Differences between 2003 and subsequent longitudinal profiles and cross sections generally reflect differences in survey methodology, rather than topographic change over time.

Rosgen classification metrics, including entrenchment ratio, flood-prone area, and bankfull statistics were calculated from cross section data. Cross sections were plotted looking downstream, with station 0 starting on the left bank. Geomorphic change in cross sections was quantified using changes in bed elevation and bankfull characteristics. Identifying bankfull elevations is subjective for rivers without clear floodplains, which is the case for most of the sites. Other bankfull indicators such as kinks in the bank topography and changes in vegetation can reflect local changes (e.g., wood deposition) or recent high flows. Bankfull characteristics can therefore adjust

due to differences in the definition of bankfull elevations, rather than a change in cross section topography.

Pebble count data were used to calculate commonly used bed particle size metrics:

- Particle size for which 16% of the distribution is finer (D_{16}),
- Particle size for which 50% of the distribution is finer (D_{50}), and
  Particle size for which 84% of the distribution is finer (D_{84}).

The pebble count statistics from 2024 were calculated using a cumulative distribution function rather than an empirical distribution function to improve statistical rigor. Statistics from 2003 and 2019 were updated to be consistent with the 2024 analysis and facilitate comparison with future survey data, resulting in some differences between the 2003 and 2019 data reported here and in prior reports (SMUD and PG&E 2005, SMUD 2020).

LWD density was calculated as wood pieces per mile using the reach lengths in Table 4-2.

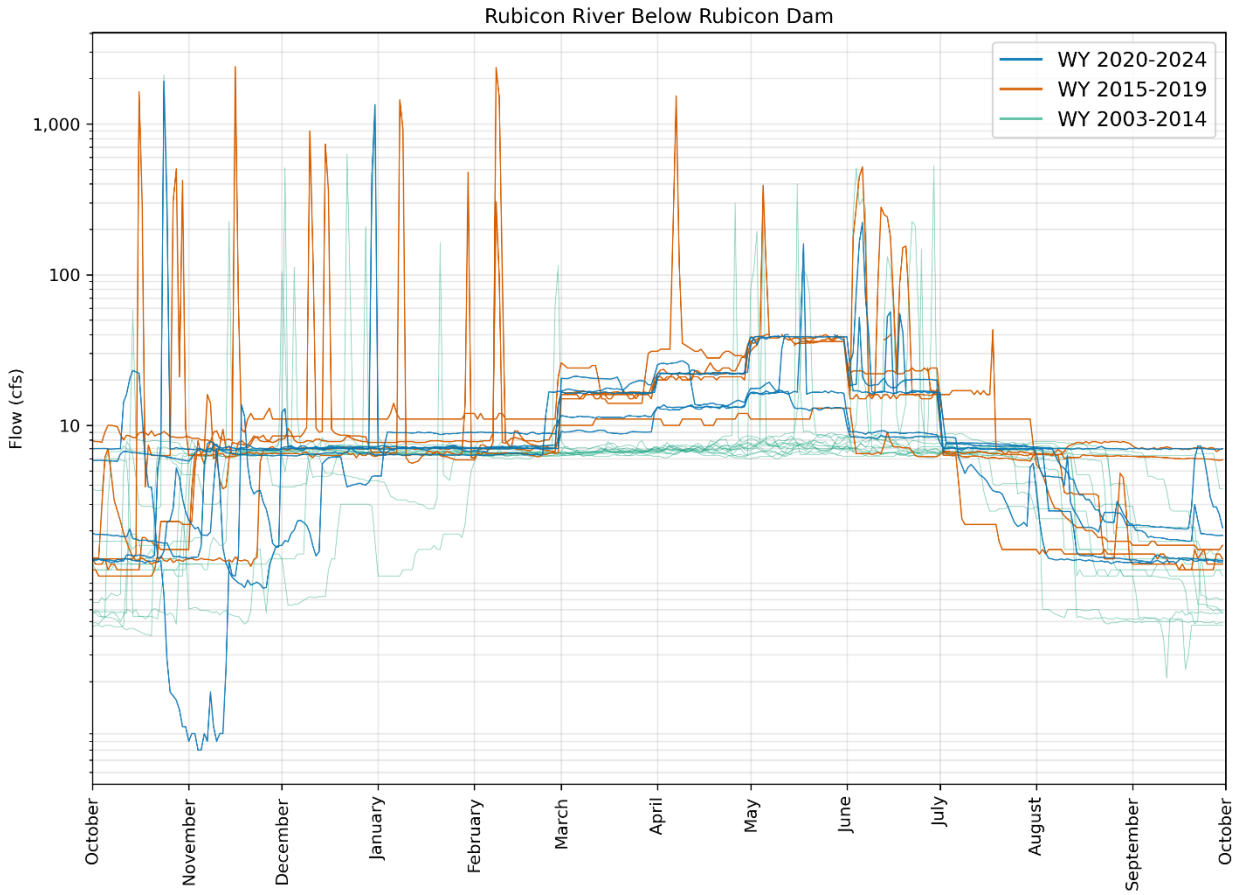
Because a detailed account of changes between 2003 and 2019 data is already provided in SMUD (2020), this Report focuses primarily on changes between 2019 and 2024 survey data but presents 2003 data to evaluate longer-term trends, where applicable.

4.3 RESULTS

4.3.1 Hydrologic Data

4.3.1.1 Rubicon River below Rubicon Dam

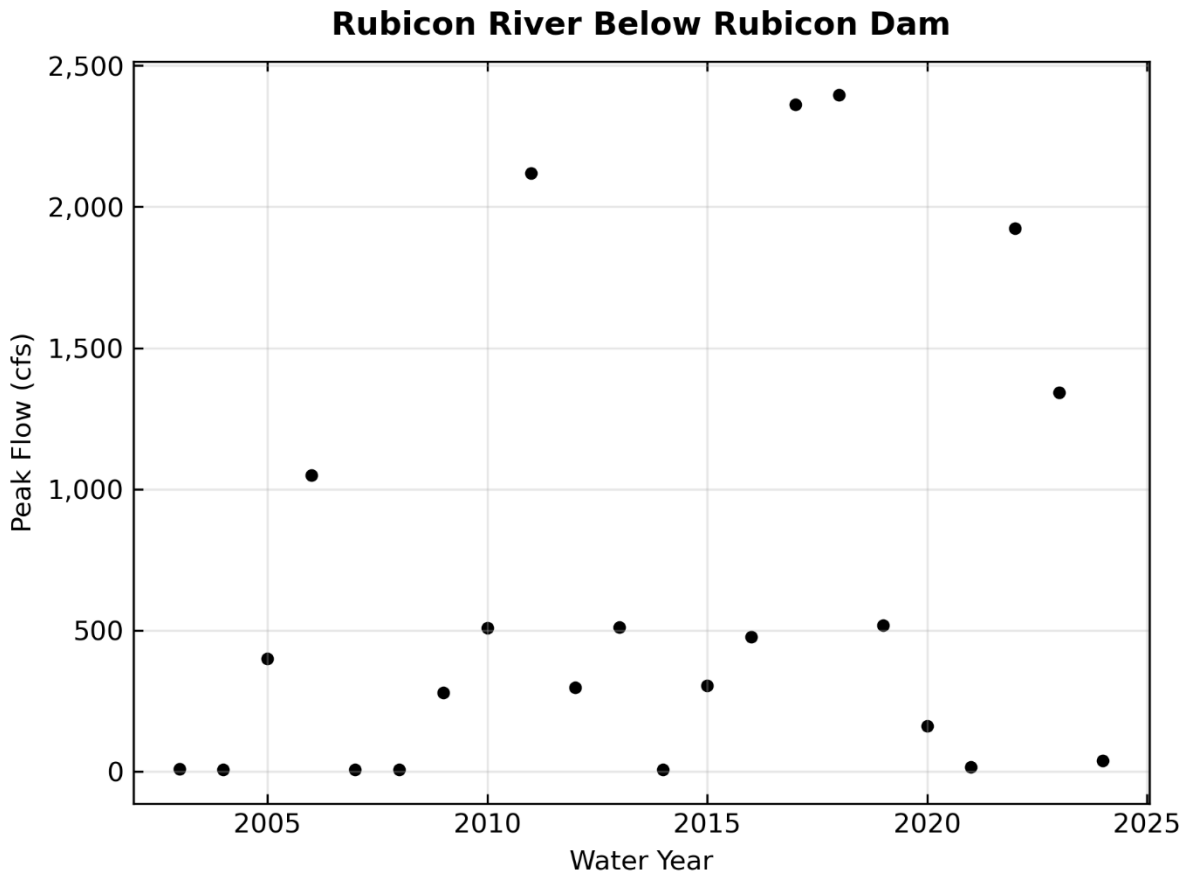
Daily average flows under the current License for the Rubicon River below Rubicon Dam have generally increased compared with years prior to License implementation (water years 2003 through 2014) (Figure 4-1). Monthly average discharge from March to June ranged from 6.3 to 60.9 cfs prior to License implementation and from 3.0 to 87.6 cfs under the License (Appendix D1, Table D1-1). Since 2015, daily average flows from July to February were higher, on average, than flows from water years prior to License implementation, but the range of flows was similar (Figure 4-1).



Notes: cfs = cubic feet per second, USGS = U.S. Geological Survey, WY = water year
Green lines show data prior to License implementation (2003–2014), orange lines show data during the first monitoring period of the current License (2015–2019), and blue lines show data during the recent monitoring period of the current License (2020–2024). The y-axis is logarithmically scaled.

Figure 4-1. Daily average flow for water years 2003–2024 for the Rubicon River below Rubicon Dam (sum of USGS gage 11427960 and Rubicon Reservoir spill).

The highest annual peak flows in this reach are associated with spill from Rubicon Reservoir. Pulse flow releases in Rubicon River below Rubicon Dam are required in Wet, Above Normal, and Below Normal water year types when natural spills do not meet the magnitude and duration of flow described in the License (FERC 2014). The reservoir spilled on 59 days during water years 2003 through 2014, prior to License issuance, and 93 days during water years 2015 through 2024, under the current License (Figure 4-1). Spill events occurred from October to June, with the majority (68%) in May and June. No spill events occurred in water years 2003, 2004, 2008, 2014, 2021, or 2024. Annual peak flows ranged from 7 to 2,397 cfs (Figure 4-2). Annual peaks greater than 1,000 cfs occurred in 2006, 2011, 2017, 2018, 2022, and 2023. Of the 152 spill events during the period of record (Figure 4-2), 84 (55%) occurred during these 6 years.

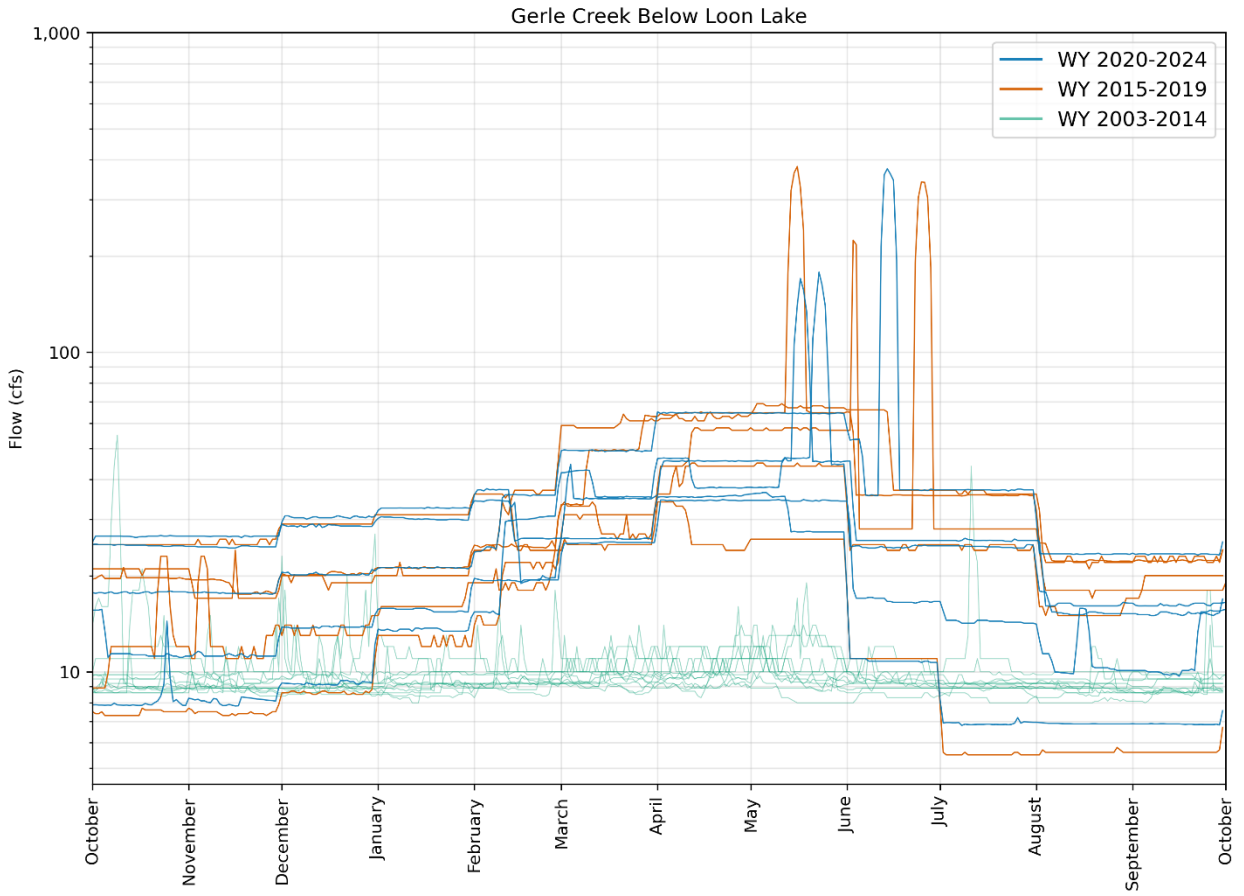


Notes: cfs = cubic feet per second, USGS = U.S. Geological Survey

Figure 4-2. Annual peak flows for water years 2003–2024 for the Rubicon River below Rubicon Dam (sum of USGS gage 11427960 and Rubicon Reservoir spill).

4.3.1.2 Gerle Creek below Loon Lake Dam

With the exception of 2015 and 2021 (the only Critically Dry water years since implementation of the current License), January through September daily average flows at Gerle Creek below Loon Lake Reservoir under the current License were two to five times greater than flows prior to the License implementation (Figure 4-3). Under the current License the hydrograph has transitioned from one with nearly constant flows and periodic peaks typically less than 30 cfs to a broad snowmelt-style hydrograph with February through July daily average flows ranging from 5.6 to 111.5 cfs, depending on the water year type (Figure 4-3).



Notes: cfs = cubic feet per second, USGS = U.S. Geological Survey, WY = water year
Green lines show data prior to License implementation (2003–2014), orange lines show data during the first monitoring period of the current License (2015–2019), and blue lines show data during the recent monitoring period of the current License (2020–2024). The y-axis is logarithmically scaled.

Figure 4-3. Daily average flow for water years 2003–2024 in Gerle Creek below Loon Lake Dam (USGS gage 11429500).

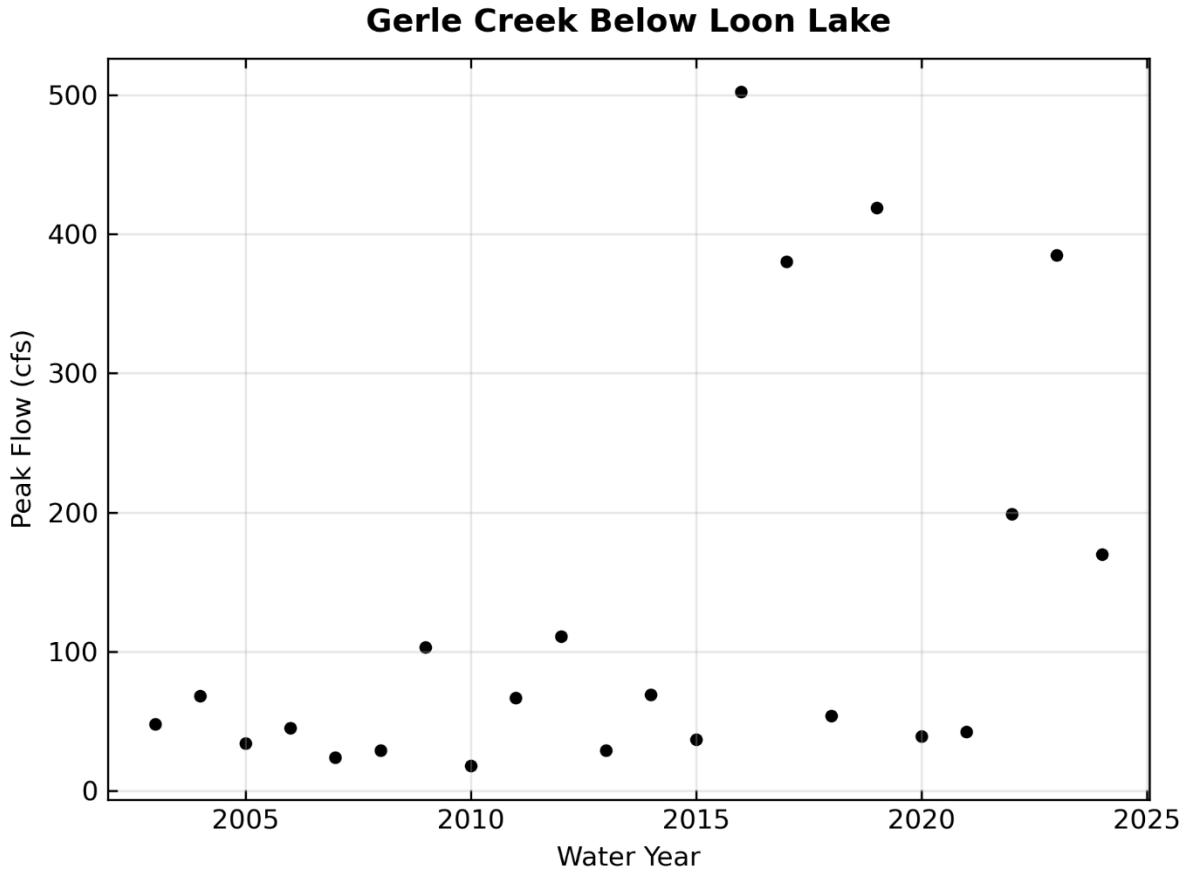
Pulse flow releases in Gerle Creek below Loon Lake Dam are required in Wet, Above Normal, and Below Normal water year types (FERC 2014). In June 2016, SMUD released a 2-day managed pulse flow with a peak daily average discharge of 224 cfs and a 5-day managed pulse flow with a peak daily average discharge of 340 cfs as part of the Gerle Creek Sensitive Site Investigation (SMUD 2016). Since 2016, SMUD has released four pulse flows from Loon Lake Dam that generally elevate flow over 5 days (Table 4-4). These pulses ranged from 170 cfs to 381 cfs. Consistent with the terms of the License, SMUD did not release pulse flows in 2020 or 2021, which were Dry and Critically Dry water year types, respectively.

Table 4-4. Magnitude and Duration of Pulse Flows from Loon Lake Dam occurring between water years 2019 and 2024.

Water Year[1]	Maximum Daily Average Discharge (cubic feet per second)	Duration (days)
2019 (Wet)	381	5
2022 (Below Normal)	178	5
2023 (Wet)	375	5
2024 (Below Normal)	170	5

[1] Pulse flows are required in Below Normal, Above Normal, and Wet water year types.

Annual peak flows averaged 53.8 cfs prior to License implementation and 222.8 cfs under the current License (Figure 4-4; Appendix D1, Table D1-6). Annual peak flows during water years 2016, 2017, 2019, 2022, 2023, and 2024 are the highest flows measured at the gage since 1996 (Appendix D1, Figure D1–1, Table D1–6).

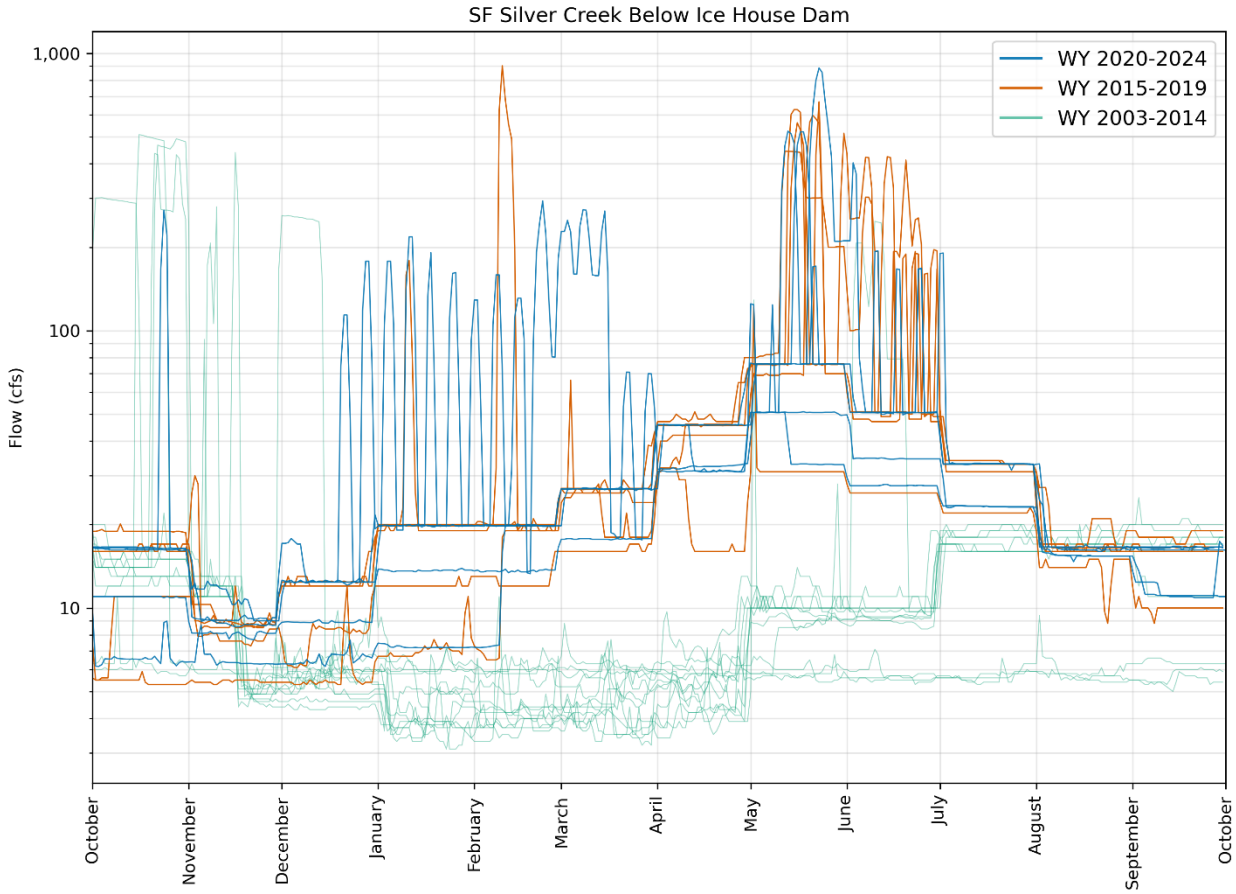


Notes: cfs = cubic feet per second, USGS = U.S. Geological Survey, WY = water year

Figure 4-4. Annual peak flows for water years 2003–2024 in Gerle Creek below Loon Lake Dam (USGS gage 11429500).

4.3.1.3 South Fork Silver Creek below Ice House Dam

Prior to License implementation, daily average flows in South Fork Silver Creek below Ice House Dam were less than 15 cfs for most of the year but were higher from October to January, reaching up to 509 cfs. The current flow regime includes a broad snowmelt hydrograph that extends from May through July, with monthly average flows approximately ten times higher than flows before License implementation (Figure 4-5; Appendix D1, Table D1-3). In addition, December through February daily average flows have increased from 3.1–260 cfs prior to License implementation to 5.3–902 cfs under the current License (Figure 4-5). Since 2015, recreation flows of 300 to 500 cfs have also been implemented annually for up to 9 days from May to June (Figure 4-5).

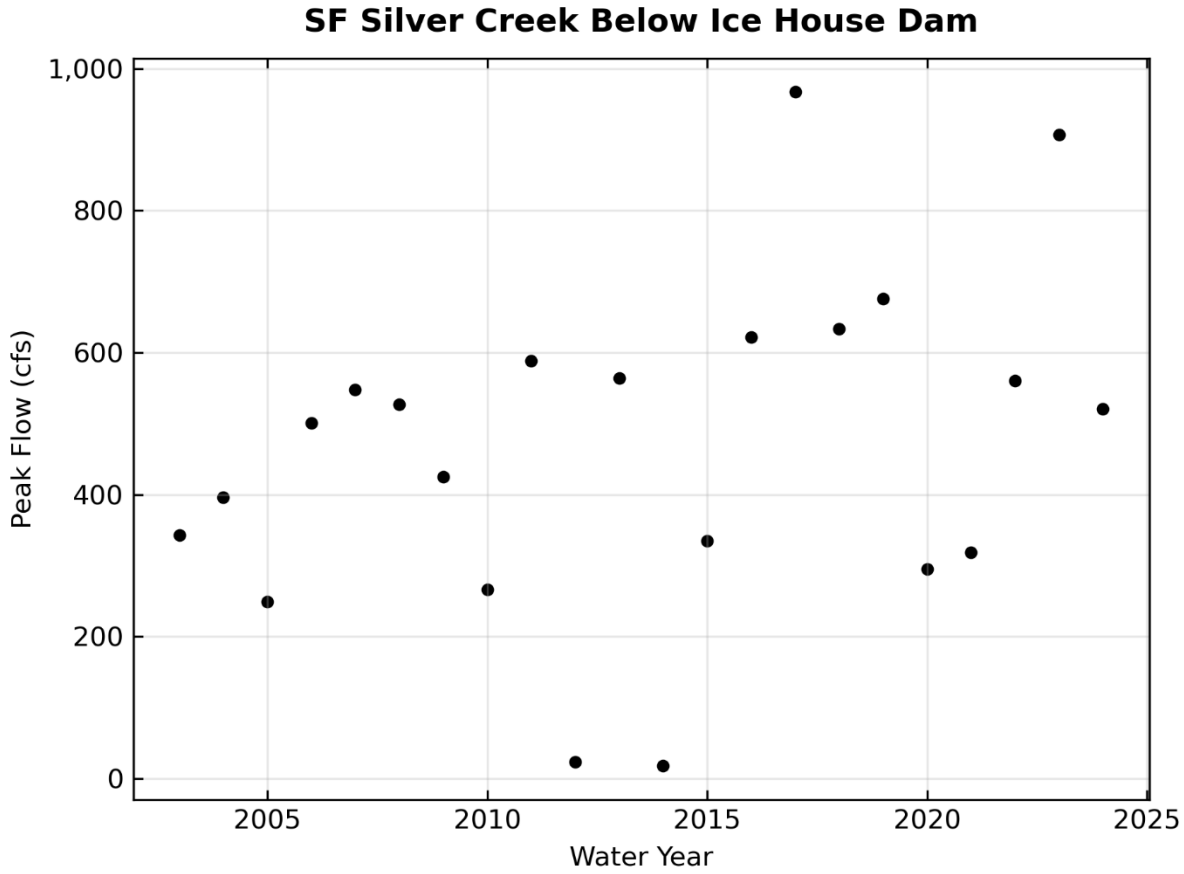


Notes: cfs = cubic feet per second, USGS = U.S. Geological Survey, WY = water year

Green lines show data prior to License implementation (2003–2014), orange lines show data during the first monitoring period of the current License (2015–2019), and blue lines show data during the recent monitoring period of the current License (2020–2024). The y-axis is logarithmically scaled.

Figure 4-5. Daily average flow for water years 2003–2024 in South Fork Silver Creek below Ice House Dam (USGS gage 11441500).

Recreational flows under the License have shifted the timing of peak flows in South Fork Silver Creek compared to pre-License from predominantly fall to spring (Figure 4-5). Additionally, recreational flows have increased the magnitude of high flows in this reach under the License compared to pre-License (Figure 4-5). Prior to License issuance, annual peak flows ranged from 18 to 588 cfs with an average of 371 cfs (Appendix D1, Table D1-6; Figure 4-6). Under the current License, annual peak flows ranged from 295 to 967 cfs with an average of 584 cfs. Annual peak flows since 2016 have been associated with pulse flows from Ice House Dam.



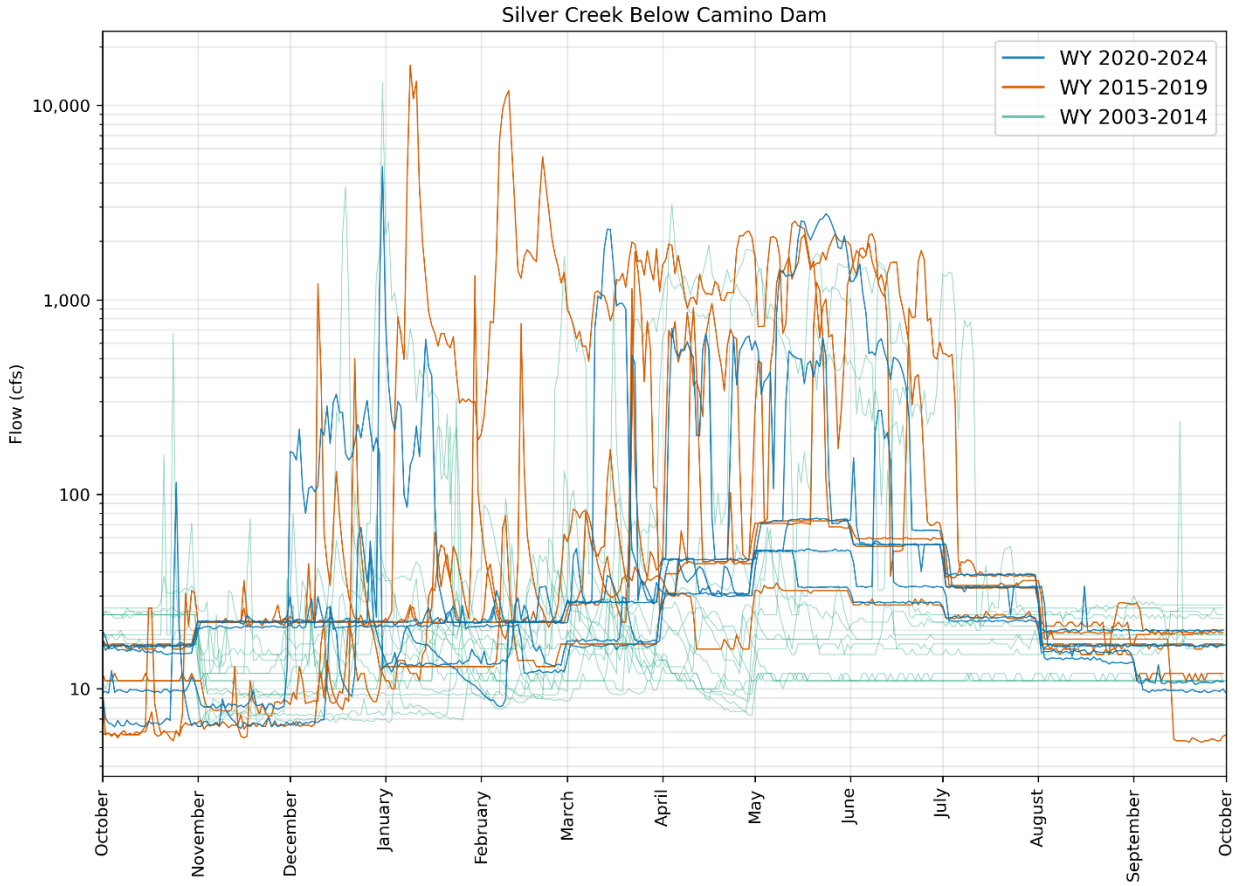
Notes: cfs = cubic feet per second, USGS = U.S. Geological Survey

Figure 4-6. Annual peak flows for water years 2003–2024 in South Fork Silver Creek below Ice House Dam (USGS gage 11441500).

4.3.1.4 Silver Creek below Camino Dam

Silver Creek below Camino Dam has periodic high flows associated with spill through three integral bulkhead gates in the face of the dam. The peak flow regime has changed little between pre-License and the current License periods, with the exception of 2017, when two peaks greater than 5,000 cfs occurred in February (Appendix D1, Table D1-6; Figure 4-7). Daily average peak flows from March to July ranged from 200 to 1,100 cfs both before and after implementation of the current License (Figure 4-8). Daily average

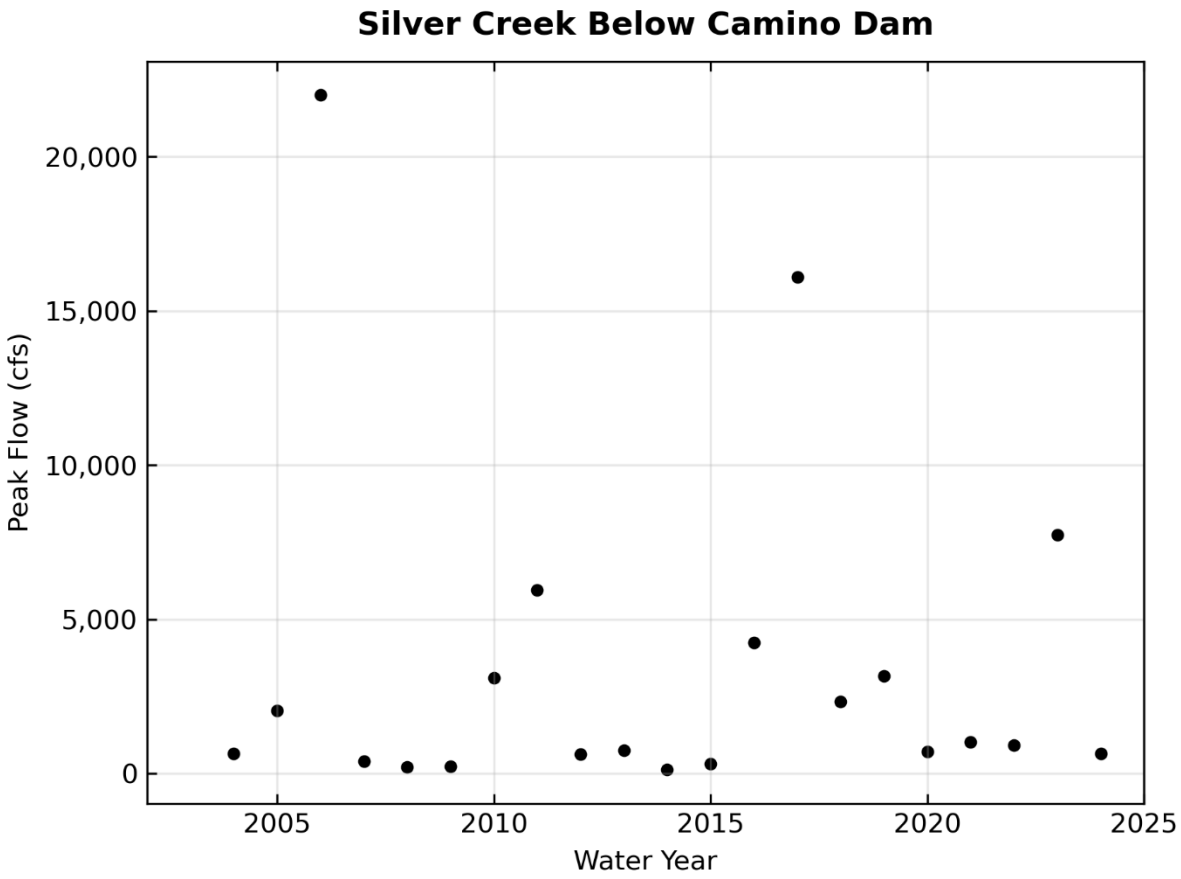
flows in September and October for Silver Creek below Camino Dam were 10 to 67.1 cfs prior to License implementation and 5.3 to 115 cfs in under the current License (Figure 4-7). Flows throughout the rest of the year were within similar ranges before and after implementation of the current License. Daily average flows in 2017 (a Wet water year) were consistently very high and ranged from 22 to 16,100 cfs from January to June, including a 3-month period when daily average flows were continuously greater than 484 cfs.



Notes: cfs = cubic feet per second, USGS = U.S. Geological Survey, WY = water year
Green lines show data prior to License implementation (2003–2014), orange lines show data during the first monitoring period of the current License (2015–2019), and blue lines show data during the recent monitoring period of the current License (2020–2024). The y-axis is logarithmically scaled.

Figure 4-7. Daily average flow for water years 2003–2024 in Silver Creek below Camino Dam (USGS gage 11441900).

Annual peak flows greater than 15,000 cfs occurred in 2006 and 2017 (Figure 4-8; Appendix D1, Table D1-6). The highest annual peak flow at Silver Creek below Camino Dam since 2020 was 7,740 cfs in 2023. The remainder of peak flows from 2020 to 2024 were 1,020 cfs or less.

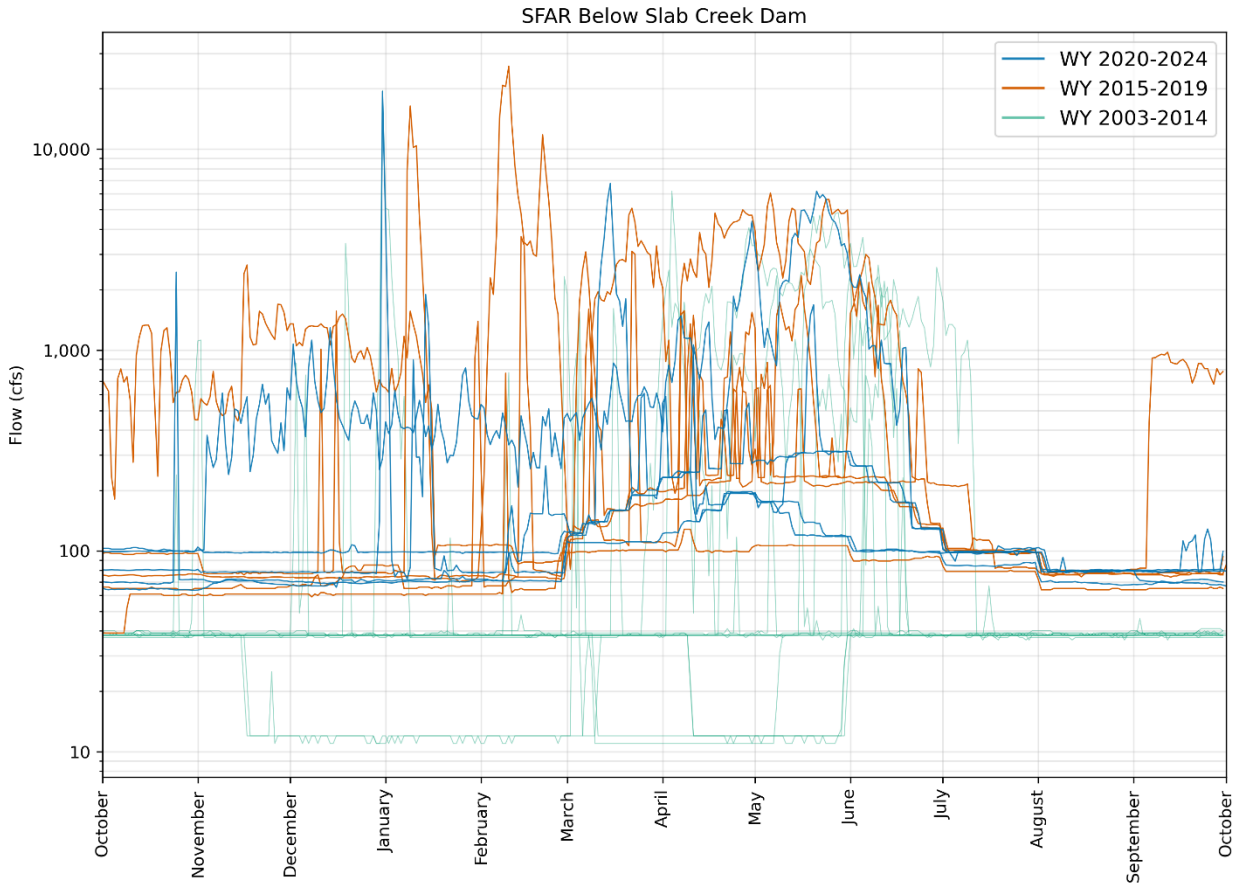


Notes: cfs = cubic feet per second, USGS = U.S. Geological Survey

Figure 4-8. Annual peak flows for water years 2003–2024 in Silver Creek below Camino Dam (USGS gage 11441900).

4.3.1.5 South Fork American River below Slab Creek Dam

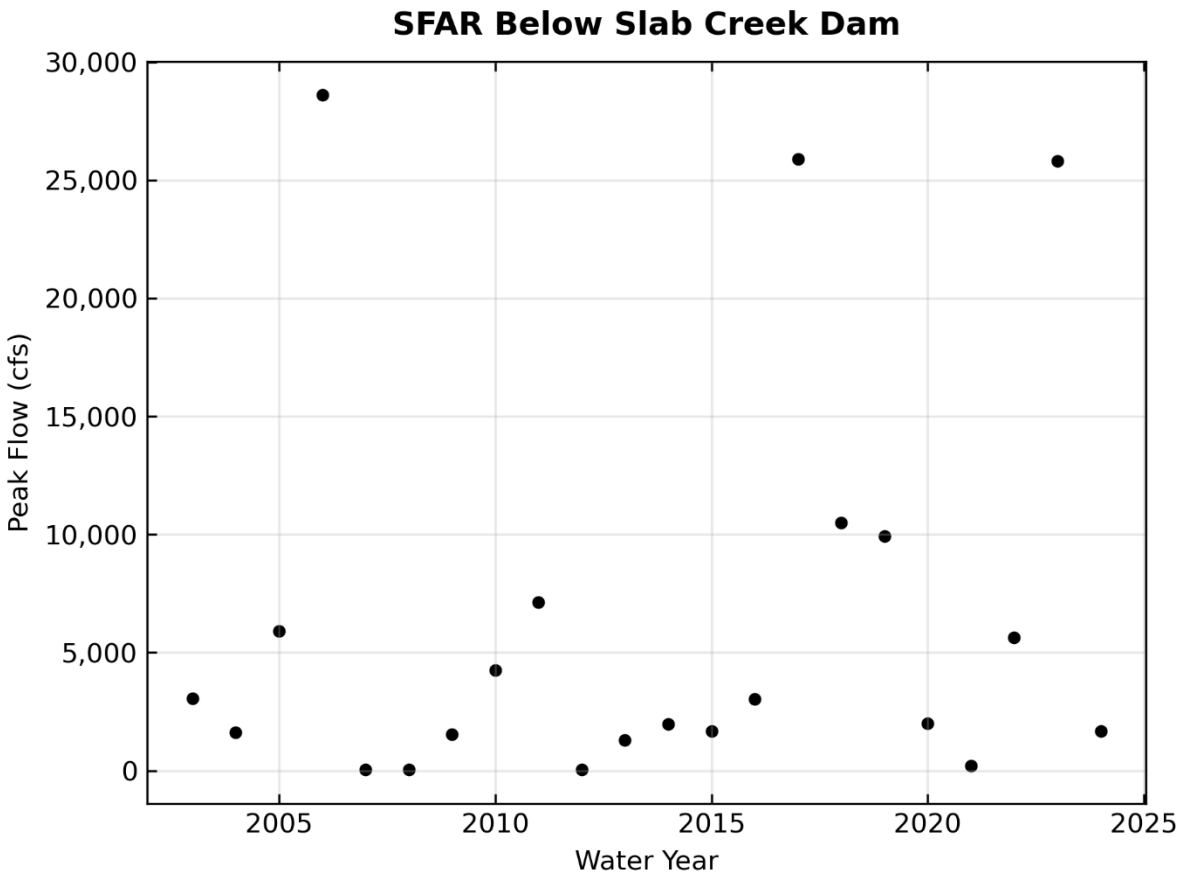
Daily average baseflows in the SFAR below Slab Creek Dam were typically 37 to 40 cfs year-round during water years 2003 through 2014 (Figure 4-6). Under the current License, baseflows have increased to 60 to 313 cfs. Discharge is highly variable at this site, with frequent spills occurring in winter and spring. During 2017 (a Wet water year), daily average discharge was generally above 2,000 cfs from March to mid-June.



Note: cfs = cubic feet per second, USGS = U.S. Geological Survey, WY = water year
Green lines show data prior to License implementation (2003–2014), orange lines show data during the first monitoring period of the current License (2015–2019), and blue lines show data during the recent monitoring period of the current License (2020–2024). The y-axis is logarithmically scaled.

Figure 4-9. Daily average flow for water years 2003–2024 in South Fork American River below Slab Creek Dam (USGS gage 11443500).

Annual peak flows greater than 25,000 cfs have occurred three times in this reach since 2003 (in 2006, 2017, and 2023) (Figure 4-10; Appendix D1, Table D1-6).



Notes: cfs = cubic feet per second, SFAR = South Fork American River, USGS = U.S. Geological Survey

Figure 4-10. Annual peak flows for water years 2003–2024 in South Fork American River below Slab Creek Dam (USGS gage 11443500).

4.3.2 Geomorphic Field Data

4.3.2.1 Site RRD-G1 (Rubicon River below Rubicon Dam)

Site Description

Site RRD-G1 (Rubicon River below Rubicon Dam) is located approximately 1.5 miles downstream of Rubicon Dam and has a drainage area of about 33 square miles. This site is immediately downstream of the Desolation Wilderness Boundary and lies within a formerly glaciated valley with large areas of exposed granitic bedrock making up the moderately steep valley slopes (30–40%). Little evidence of mass wasting was observed near the site. A coniferous forest surrounded the channel. The channel had well-vegetated lateral and mid-channel gravel bars, and a mid-channel island. Boulder and bedrock outcrops occurred on the channel margins (Figure 4-11). The banks were generally well vegetated with dense grasses and deciduous shrubs, with occasional small, recently eroded (unvegetated) areas and local erosion around boulders. There was no evidence of recent deposition or bar development at Site RRD-G1. Flood-prone

areas and the bankfull channel were generally free of woody debris. Additional representative photographs of this site are included in Appendix D3.



Figure 4-11. Site RRD-G1, looking upstream from the intermediate cross section (XS-2) in 2024 (top), 2019 (bottom left), and 2003 (bottom right).

Longitudinal Profile

Site RRD-G1 longitudinal profiles from 2024 and prior monitoring years are shown in Appendix D4, Figure D4-1. The 2024 profile was 475 feet long and extended 146 feet upstream of the upstream cross section (XS-1) and 38 feet downstream of the downstream cross section (XS-3). The 2019 and 2024 longitudinal profiles were generally similar. The reach-average slope was 0.8% during 2019 surveys and 0.6% during 2024 surveys. Up to 1 foot of local incision between 2019 and 2024 profiles was noted in pools near Stations 50 and 250 (Appendix D4, Figure D4-1).

Cross Sections

The Rubicon River cross sections for 2003, 2019, and 2024 are shown in Appendix D5, Figures D5-1 to D5-3, and characteristics are summarized in Table 4-5. XS-1 shows the multi-threaded section of the reach with a vegetated island on the left bank, while the intermediate cross section (XS-2) and XS-3 are single threaded. Cross section geometry was very similar between 2019 and 2024, with no notable aggradation or incision (Appendix D5, Figures D5-2 and D5-3). Differences between 2019 and 2024 right bank elevations at XS-3 (Stations 45–90) were likely due to differences in cross section alignment rather than topographic changes.

Table 4-5. Cross Section Data for Site RRD-G1, 2003, 2019, and 2024.[a]

Cross Section	Bankfull Width (feet)			Mean Bankfull Depth (feet)			W/D Ratio		
	2003	2019	2024	2003	2019	2024	2003	2019	2024
XS-1 (Upstream)	73	69	54	1.9	1.1	1.6	38	61	34
XS-2 (Intermediate)	60	47	61	1.4	1.6	1.5	43	30	40
XS-3 (Downstream)	75	41	40	1.1	1.4	1.4	68	30	31

Note: W/D = bankfull width divided by bankfull depth

[a] The 2003 data were collected using an auto level and tape; the 2019 and 2024 data were collected using real-time kinematic global navigation satellite system or a robotic total station.

Bed Particle Size Distributions

The channel bed was primarily cobble at XS-1 and XS-2 and primarily gravel at XS-3. All three cross sections had less than 5% boulders (Table 4-6; Appendix D6, Table D6-1, Figures D6-1 to D6-3). Sand content from the 2024 pebble counts was 9, 3, and 19% of the measured particles at XS-1, XS-2, and XS-3, respectively. Sand content was similar in 2019 and 2024. Relative to the 2019 surveys, the grain size distribution coarsened at XS-1 and XS-2 with a 61% and 64% increase in D_{50}, respectively, and the grain size distribution at XS-3 fined, with an 8% decrease in D_{50} relative to 2019 (Table 4-6; Appendix D6, Figures D6-1 to D6-3).

Table 4-6. Pebble Count Data for Site RRD-G1, 2003, 2019, and 2024.

Cross Section	Particle Size								
	D_{16} (millimeter)			D_{50} (millimeter)			D_{84} (millimeter)		
	2003	2019	2024	2003	2019	2024	2003	2019	2024
XS-1 (Upstream)	8	9	24	32	41	66	63	134	115
XS-2 (Intermediate)	5	4	19	36	50	82	97	127	175
XS-3 (Downstream)	5	<2	<2	31	43	40	69	142	95

Notes: D_{16} = particle size at which 16% of the bed is finer
D_{50} = particle size at which 50% of the bed is finer
D_{84} = particle size at which 84% of the bed is finer

Sediment Facies Mapping

The majority of the bed area in 2024 (51%) had cobble-dominant substrate with gravel-dominant substrate composing 31% of the bed area (Table 4-7; Appendix D7, Figure D7-1). One small patch of boulder-dominant facies comprised 3% of the mapped area. Approximately half of the facies had sand as a sub-dominant component in 2019 and 2024. The relative area of each facies was similar in 2019 and 2024, despite coarsening of the grain size distribution at two of the three cross sections.

Table 4-7. Dominant Sediment Facies at Site RRD-G1, 2019 and 2024.

Dominant Facies	Area (square feet)		Area (%)	
	2019	2024	2019	2024
Sand	3,195	3,213	12	11
Gravel	8,514	8,982	30	31
Cobble	14,855	15,061	54	51
Boulder	0	793	0	3
Bedrock	1,159	1,216	4	4

Large Woody Debris

No large wood was observed at this site (Appendix D8).

Fine Sediment Storage

Fine sediment storage (V*) was not measured at Site RRD-G1 because discrete fine sediment deposits were not observed within pools (Appendix D9). Sand was generally mixed with gravel and occurred as a thin veneer over gravel where it was present within

the reach. Because conditions did not meet the V* monitoring requirement for two consecutive surveys, fine sediment loads are not problematic for this site. Consistent with Attachment 6 of the Plan, V* will not be measured at this site for the remainder of the License.

Additional Channel Condition Assessments

Data from the Rosgen Level III, Rosgen bank erosion and riparian vegetation, and Pfankuch bank stability assessments are provided in Appendix D10, Appendix D11, and Appendix D12, respectively. The site is a Rosgen F4 response reach with a moderately entrenched channel, a moderate bankfull width-to-depth ratio (31–40), and a sinuosity of 1.35. The site had pool-riffle morphology with irregular meanders and a Pfankuch stability rating of 71 (good).

4.3.2.2 Site LLD-G1 (Gerle Creek below Loon Lake Dam, Upper Reach)

Site Description

Site LLD-G1 (upper reach of Gerle Creek below Loon Lake Dam) is located approximately 0.75 mile downstream of Loon Lake Dam and has a drainage area of about 6.6 square miles. At this site, the creek flows through a glaciated valley. The right bank for most of the reach is the southern limit of an approximately 88-foot-wide by 1,400-foot-long meadow. Bedrock constricts the downstream end of the reach and acts as the hydraulic control (Appendix D2). During the 2003 surveys, the meadow was forested with lodgepole pines (*Pinus contorta*). Subsequently, several North American beaver (*Castor canadensis*) dams within the channel raised the water surface elevation and flooded the lodgepole pine forest (SMUD 2016). The forest die-off was apparent in Google Earth imagery as early as 2010 and resulted in high wood density that influences flow hydraulics and morphology of the channel (Figure 4-12 and Figure 4-13). The channel is characterized by vegetated alternate bars, regular meanders, and pool-riffle morphology. The bed material was primarily fine to coarse sand with patchy surficial silt deposits. Extensive fine sediment deposits were observed within the bankfull channel and on the floodplains. No evidence of mass wasting or sediment deposition from nearby roads was observed at the site. Additional representative photographs of this site are provided in Appendix D3.



Figure 4-12. Representative conditions near XS-2 at Site LLD-G1, 2024 (top), 2019 (bottom left), and 2003 (bottom right).



Figure 4-13. Aerial photographs of Site LLD-G1 and the surrounding area showing the forest die-off adjacent to the channel.

Longitudinal Profile

Site LLD-G1 longitudinal profiles from 2024 and prior monitoring years are shown in Appendix D4, Figure D4-2. The 2024 profile was 550 feet long and extended 105 feet upstream of XS-1 and 240 feet downstream of XS-3. The longitudinal profile had a significant break in slope downstream of XS-3, where the gradient steepened as banks transitioned to bedrock and the valley was more confined. The reach-average slope was 1.1% in 2019 and 2024. Longitudinal profiles were generally similar in 2019 and 2024.

Cross Sections

Site LLD-G1 cross sections for 2019 are shown in Appendix D5, Figures D5-4 to D5-6, and characteristics are summarized in Table 4-8. XS-1 aggraded by up to 2.6 feet around the thalweg (Appendix D5, Figure D5-4), resulting in a 0.7-foot decrease in mean bankfull depth relative to 2019 surveys (Table 4-8). Overall, cross section morphology was similar in 2003, 2019, and 2024.

Table 4-8. Cross Section Data for Site LLD-G1, 2003 and 2019.[a]

Cross Section	Bankfull Width (feet)			Mean Bankfull Depth (feet)			W/D Ratio		
	2003	2019	2024	2003	2019	2024	2003	2019	2024
XS-1 (Upstream)	22	25	25	2.6	3.4	2.7	8.5	7.3	9.2
XS-2 (Intermediate)	34	34	37	3.8	4.7	3.4	8.9	7.3	10.8
XS-3 (Downstream)	23	28	33	2.7	3.7	4.0	8.5	7.6	8.2

Note: W/D = bankfull width divided by bankfull depth

[a] The 2003 data were collected using an auto level and tape; the 2019 and 2024 data were collected using real-time kinematic global navigation satellite system or a robotic total station.

Bed Particle Size Distributions

Pebble counts were not performed at this site because the bed was entirely composed of sand in 2003, 2019, and 2024, and pebble counts are only intended for gravel beds.

Sediment Facies Mapping

Sediment facies were not mapped because the channel bed was entirely composed of sand and silt which made mapping unnecessary.

Large Woody Debris

Wood density was extensive (7,616 logs per mile) within the reach and appeared very similar to conditions in 2019. A total of 564 logs exceeded 6 feet in length within the 690-foot-long reach in 2019 and 577 in 2024 (Appendix D8). The logs had a mean length of 13.7 feet and a standard deviation of 8.5 feet. The logs were randomly oriented and frequently crossed the channel. Log movement appeared to be minimal, and total wood density marginally increased relative to 2019 because more dead riparian trees fell into the channel.

Fine Sediment Storage

V* was not measured because the bed was composed of sand with no gravel at or below the bed surface (Appendix D9). Because conditions did not meet the V* monitoring requirement for two consecutive surveys, fine sediment loads are not problematic for this site. Consistent with Attachment 6 of the Plan, V* will not be measured at this site for the remainder of the License.

Additional Channel Condition Assessments

Data from the Rosgen Level III, Rosgen bank erosion and riparian vegetation, and Pfankuch bank stability assessments are provided in Appendix D10, Appendix D11, and Appendix D12, respectively. The site is a Rosgen E5 response channel. The channel has very little entrenchment (entrenchment ratio was greater than 7), and the bankfull width-to-depth ratio ranged from 8 to 11. The site had pool-riffle morphology and a Pfankuch stability rating of 92 (fair).

4.3.2.3 Site LLD-G2 (Gerle Creek below Loon Lake Dam, Middle Reach)

Site Description

Site LLD-G2 (middle reach of Gerle Creek below Loon Lake Dam) is located in a broad glaciated valley approximately 2 miles downstream of Loon Lake Dam and has a drainage area of about 11 square miles. Wentworth Springs Road runs 300 to 500 feet north of the stream for the entire length of the reach. For most of the reach length, the channel had a pool-riffle sequence with boulder steps at the upstream end of the reach. Pool residual depth was less than 3.5 feet with no sand deposits. The channel had alternate bars visible in XS-1 and XS-3 and one mid-channel bar at the downstream end of the reach. The densely forested banks were composed of cobbles with an overlying fine sediment layer. Riparian shrubs (e.g., mountain alder [*Alnus incana* subsp. *tenuifolia*], American dogwood [*Cornus sericea*]) encroached on the channel throughout the reach (Figure 4-14). The downstream end of the floodplain was composed of sand and silt deposits. Dense vegetation covered the upstream end, and the substrate was not visible. North American beaver activity (dam building, gnawed wood) was observed near the site in 2019 (SMUD 2020) but not within the site in 2019 or 2024. Additional representative photographs of this site are included in Appendix D3.



Figure 4-14. Site LLD-G2, looking upstream from XS-2, 2024 (top), 2019 (bottom left), and 2003 (bottom right).

Longitudinal Profile

Site LLD-G2 longitudinal profiles from 2024 and prior monitoring years are shown in Appendix D4, Figure D4-3. The 2024 longitudinal profile was 1,000 feet long and extended 112 feet upstream of XS-1 and 587 feet downstream of XS-3. The reach-average slope was 1.1% in 2019 and 2024. The 2024 profile incised by up to 1.5 feet around stations 150 and 850, relative to the 2019 profile.

Cross Sections

Site LLD-G2 cross sections are shown in Appendix D5, Figures D5-7 to D5-9, and characteristics are summarized in Table 4-9. The 2024 cross section surveys did not

extend past the endpins. Relative to the 2019 surveys, XS-1 aggraded by up to 0.3 foot around the thalweg, XS-2 aggraded by up to 0.6 foot along the right bank, and XS-3 aggraded by up to 0.4 foot and 0.2 foot in the side channel and main channel, respectively (Appendix D5, Figures D5-5 to D5-7). In general, the cross sections showed similar geometry between monitoring years (Table 4-9).

Table 4-9. Cross Section Data for Site LLD-G2, 2003, 2019, and 2024.[a]

Cross Section	Bankfull Width (feet)			Mean Bankfull Depth (feet)			W/D Ratio		
	2003	2019	2024	2003	2019	2024	2003	2019	2024
XS-1 (Upstream)	54	46	47	2.1	1.0	0.9	26	46	52
XS-2 (Intermediate)	38	30	21	1.5	1.3	1.3	25	23	16
XS-3 (Downstream)	51	38	36	1.1	1.1	1.0	46	35	36

Note: W/D = bankfull width divided by bankfull depth

[a] The 2003 data were collected using an auto level and tape; the 2019 and 2024 data were collected using real-time kinematic global navigation satellite system or a robotic total station.

Bed Particle Size Distributions

The channel bed at all three cross sections was primarily composed of cobble with less than 15% boulders at XS-1 and XS-2 and one boulder at XS-3 (Appendix D6, Table D6-1, Figures D6-4 to D6-6). Sand-sized particles composed less than 5% of the pebble counts during the 2003, 2019, and 2024 surveys. Relative to the 2019 surveys, the D_{50} at XS-1 and XS-2 increased by 33% and 27%, respectively. The grain size distribution at XS-3 was similar in 2019 and 2024 (Table 4-10; Appendix D6, Figures D6-4 to D6-6).

Table 4-10. Pebble Count Data for Site LLD-G2, 2003, 2019, and 2024.

Cross Section	D_{16} (millimeter)			D_{50} (millimeter)			D_{84} (millimeter)		
	2003	2019	2024	2003	2019	2024	2003	2019	2024
XS-1 (Upstream)	15	31	74	69	95	126	156	185	227
XS-2 (Intermediate)	11	29	64	64	93	118	175	204	235
XS-3 (Downstream)	34	26	43	86	80	82	170	135	146

Notes: D_{16} = particle size at which 16% of the bed is finer
D_{50} = particle size at which 50% of the bed is finer
D_{84} = particle size at which 84% of the bed is finer

Sediment Facies Mapping

Cobble-dominant facies composed 66% of the bed area, and gravel-dominant facies composed 15% of the bed area (Table 4-11; Appendix D7, Figures D7-2 and D7-3). Sediment facies gradually fined from the upstream end to the downstream end of the site. Facies patches containing sand were primarily observed on channel margins and floodplains. Sand-dominant facies decreased between 2019 and 2024 (Table 4-11), but sediment facies extents were otherwise generally similar between 2019 and 2024.

Table 4-11. Dominant Sediment Facies at Site LLD-G2, 2019 and 2024.

Dominant Facies	Area (square feet)		Area (%)	
	2019	2024	2019	2024
Sand	2,381	239	12	1
Gravel	4,210	3,578	21	15
Cobble	10,527	15,352	52	66
Boulder	2,927	4,311	15	18
Bedrock	0	0	0	0

Large Woody Debris

Site LLD-G2 had 52 logs (Appendix D8). Of these logs, 17 were individual pieces and 30 were in 10 aggregates of 2 to 4 logs. The reach had a LWD density of 392 logs per mile. Five logs with root wads were noted at the site. Wood appeared to be relatively stable and was locally sourced based on the degree of weathering. LWD did not appear to be significantly affecting channel morphology.

Fine Sediment Storage

V* was not measured because fine sediment was not observed within the pools at the site (Appendix D9). Because conditions did not meet the V* monitoring requirement for two consecutive surveys, fine sediment loads are not problematic for this site. Consistent with Attachment 6 of the Plan, V* will not be measured at this site for the remainder of the License.

Additional Channel Condition Assessments

Data from the Rosgen Level III, Rosgen bank erosion and riparian vegetation, and Pfankuch bank stability assessments are provided in Appendix D10, Appendix D11, and Appendix D12, respectively. The site is a Rosgen C3 response reach with plane-bed morphology. The bankfull width-to-depth ratio ranged from 16 to 52, and the entrenchment ratio ranged from 9 to 27. The sinuosity was 1.3, and the Pfankuch stability rating was 57 (good).

4.3.2.4 Site IHD-G1 (South Fork Silver Creek below Ice House Dam, Upper Reach)

Site Description

Site IHD-G1 (upper reach of South Fork Silver Creek below Ice House Dam) is located approximately 1.5 miles downstream of Ice House Dam and has a drainage area of about 33 square miles. At this site, the valley was densely vegetated, and hillslope angles were less than 30%, with no evidence of mass wasting. Silver Creek Group Campground is on the south bank of the river. Rock weirs built by campers in 2024 altered low-flow hydraulics during summer. The banks were densely vegetated (Figure 4-15) with frequent terrace surfaces above the estimated bankfull elevation. Bed material was primarily unconsolidated gravels and sands, which formed several bars along the channel margins. Comparison of photographs from 2003, 2019, and 2024 shows that vegetation encroached into the channel between 2003 and 2019 and has remained stable since (Figure 4-15). Several LWD pieces spanned the channel in the lower part of the site. These logs did not move between the 2019 and 2024 surveys, form backwater pools, act as instream cover, or reduce flow velocity. This reach exhibited pool-riffle morphology, with a vegetated mid-channel bar in the middle of the reach. Additional representative photographs of this site are included in Appendix D3.



Figure 4-15. Site IHD-G1, looking upstream from XS-2, 2024 (top), 2019 (bottom left), and 2003 (bottom right).

Longitudinal Profile

Site IHD-G1 longitudinal profiles for 2024 and prior monitoring years are shown in Appendix D4, Figure D4-4. The 2024 profile was 1,137 feet long and extended 334 feet upstream of XS-1 and 240 feet downstream of XS-3. Overall, the longitudinal profile was relatively similar between 2019, and 2024. The reach-average slope was 0.2% for all survey years. From 2019 to 2024, the longitudinal profile aggraded by up to 1.5 feet within the pool at the upstream end of the reach (where the V* measurement was taken) around station 150. The profile also aggraded by up to 3 feet around station 1,000 and incised by up to 2 feet around station 1,050.

Cross Sections

Site IHD-G1 cross sections for 2024 are shown in Appendix D5, Figures D5-10 to D5-12, and characteristics are summarized in Table 4-12. XS-1, immediately downstream of the pool where V* was measured, aggraded by up to 0.5 feet between 2019 and 2024, but in general, the cross section topography was very similar between monitoring years. XS-2 incised by up to 1.2 feet relative to 2019, and XS-3 had no significant changes between 2019 and 2024.

Table 4-12. Cross Section Data for Site IHD-G1, 2003, 2019, and 2024.[a]

Cross Section	Bankfull Width (feet)			Mean Bankfull Depth (feet)			W/D Ratio		
	2003	2019	2024	2003	2019	2024	2003	2019	2024
XS-1 (Upstream)	53	45	45	2.7	1.6	1.6	20	28	28
XS-2 (Intermediate)	59	26	26	1.8	3.4	3.1	33	8	8
XS-3 (Downstream)	49	26	25	2.8	1.6	2.8	18	17	9

Note: W/D = bankfull width divided by bankfull depth

[a] The 2003 data were collected using an auto level and tape; the 2019 and 2024 data were collected using real-time kinematic global navigation satellite system or a robotic total station.

Bed Particle Size Distributions

The channel bed at all three cross sections was primarily gravel with less than 15% cobbles and sparse boulders (Table 4-13; Appendix D6, Table D6-1, Figures D6-7 to D6-9). Relative to 2019, sand content increased at XS-1 and XS-2 by over an order of magnitude. Sand content decreased by 35% at XS-3. The D_{50} decreased by 24% and 9% at XS-1 and XS-2, respectively. XS-3 coarsened overall with a 29% increase in D_{50}.

Table 4-13. Pebble Count Data for Site IHD-G1, 2003, 2019, and 2024

Cross Section	D_{16} (millimeter)			D_{50} (millimeter)			D_{84} (millimeter)		
	2003	2019	2024	2003	2019	2024	2003	2019	2024
XS-1 (Upstream)	<2	15	<2	17	37	28	30	62	57
XS-2 (Intermediate)	<2	6	<2	10	11	10	20	18	30
XS-3 (Downstream)	<2	<2	5	10	14	18	26	27	38

Notes: D_{16} = particle size at which 16% of the bed is finer
D_{50} = particle size at which 50% of the bed is finer
D_{84} = particle size at which 84% of the bed is finer

Sediment Facies Mapping

The majority of the channel bed at Site IHD-G1 was sand- and gravel-dominant (Appendix D7, Figures D7-4 through D7-6). Sand-dominant patches composed 57% of the mapped area. These sand-dominant patches contained significant amounts of gravel. Substantial amounts of sand were also observed intermixed with gravel-dominant facies and on the floodplains. Boulders buried in sand were commonly observed along the banks. Gravel-dominant facies composed 34% of the channel bed in 2024, a 32% decrease relative to 2019 (Table 4-14). Sand content throughout the site increased by 57% relative to 2019. The decrease in gravel-dominant patches between 2019 and 2024 likely resulted from sand deposition atop gravel patches, rather than transport of gravel from the reach.

Table 4-14. Dominant Sediment Facies at Site IHD-G1, 2019 and 2024.

Dominant Facies	Area (square feet)		Area (%)	
	2019	2024	2019	2024
Sand	20,461	32,047	43	57
Gravel	23,905	18,851	50	34
Cobble	112	1,534	<1	3
Boulder	3,580	3,535	7	6
Bedrock	0	0	0	0

Large Woody Debris

During the 2024 surveys, 27 logs (119 logs per mile) were observed within the bankfull channel (Appendix D8). Of the 27 logs, 13 individual pieces did not have root wads, 2 individual pieces had root wads, and 12 additional logs were in 5 jams. A total of 58 logs were observed during the 2019 surveys, and 13 logs were observed during the 2003 surveys.

Fine Sediment Storage

As stated above, one pool met the conditions to survey V* at Site IHD-G1. This pool was at the upstream end of the longitudinal profile (Appendix D4, Figure D4-4). Other pools in the study reach did not have clear hydraulic controls or were associated with mid-channel bars so did not meet the pool-width criteria outlined in the Plan (SMUD 2017). The V* of the pool at Site IHD-G1 decreased from 0.32 in 2019 to 0.17 in 2024 (Table 4-15, Appendix D9). The profile on river left had the thickest deposits of fine sediment and included extensive silt and sand deposits. The total volume of fine sediment within the pool decreased from 4,200 cubic feet in 2019 to 2,325 cubic feet in 2024. Fine sediment was not observed at this site during the 2003 surveys.

Table 4-15. V* Survey Results for Site IHD-G1, 2019 and 2024.

Profile	Fine Sediment Area (square feet)		Residual Pool Area (square feet)		Profile V*	
	2019	2024	2019	2024	2019	2024
Centerline	158.0	107.4	593.9	634.3	0.27	0.17
River right	141.1	104.2	554.1	413.6	0.25	0.25
River left	207.6	66.6	480.5	853.8	0.43	0.07
Average	**168.9**	**92.8**	**542.8**	**633.9**	**0.32**	**0.17**

Additional Channel Condition Assessments

Data from the Rosgen Level III, Rosgen bank erosion and riparian vegetation, and Pfankuch bank stability assessments are provided in Appendix D10, Appendix D11, and Appendix D12, respectively. The site is a Rosgen C4 response channel with pool-riffle morphology. It was slightly entrenched, with bankfull width-to-depth ratios ranging from 8 to 28, sufficient to support alternate bars. The sinuosity was 1.2 and the Pfankuch stability rating was 71 (good).

4.3.2.5 Site IHD-G2 (South Fork Silver Creek below Ice House Dam, Lower Reach)

Site Description

Site IHD-G2 (lower reach of South Fork Silver Creek below Ice House Dam) is located approximately 10 miles downstream of Ice House Dam and has a drainage area of about 43 square miles. Hillslopes and bedrock outcrops confine most of the reach and limit sinuosity. An unnamed ephemeral tributary joins South Fork Silver Creek between XS-2 and XS-3. Grain size distributions and sediment facies maps indicate that cobble and small boulder were the dominant size classes within the channel. Sand deposits were present on floodplains and terraces. The area around the site burned during the Cleveland Fire in 1992. Comparison of photographs shows that vegetation regrowth on the hillslopes and adjacent to the channel has been significant since 2003 (Figure 4-16). Stands of willow (*Salix* spp.) and white alder (*Alnus rhombifolia*) lined the channel banks in 2019 and 2024. Little to no evidence of mass wasting was present along the site. Additional representative photographs of this site are included in Appendix D3.



Figure 4-16. Site IHD-G2, looking upstream from XS-1, 2024 (top), 2019 (bottom left), and 2003 (bottom right).

Longitudinal Profile

Site IHD-G2 longitudinal profiles for 2024 and prior monitoring years are shown in Appendix D4, Figure D4-5. The 2024 profile was 1,211 feet long and extended 237 feet upstream of XS-1 and 308 feet downstream of XS-3. The reach-average slope was 0.8% in 2019 and 2024. The 2024 profile incised by up to 1.2 feet around station 450, relative to 2019. Overall, the longitudinal profiles were similar in 2019 and 2024.

Cross Sections

The cross sections for 2003, 2019, and 2024 are shown in Appendix D5, Figures D5-13 to D5-15, and characteristics are summarized in Table 4-16. Comparisons of the 2019 and 2024 cross sections showed very little aggradation or incision and little change in cross section geometry (Table 4-16). The large differences in the bankfull characteristics of XS-1 reflected differences in the identified bankfull elevation rather than differences in topography because the bankfull elevation was overestimated in 2003.

Table 4-16. Cross Section Data for Site IHD-G2, 2003, 2019, and 2024.[a]

Cross Section	Bankfull Width (feet)			Mean Bankfull Depth (feet)			W/D Ratio		
	2003	2019	2024	2003	2019	2024	2003	2019	2024
XS-1 (Upstream)	124	53	53	2.8	2.3	1.9	44	23	28
XS-2 (Intermediate)	62	56	56	2.6	1.7	2.2	24	34	26
XS-3 (Downstream)	57	47	48	2.6	1.8	1.9	22	26	25

Note: W/D = bankfull width divided by bankfull depth

[a] The 2003 data were collected using an auto level and tape; the 2019 and 2024 data were collected using real-time kinematic global navigation satellite system or a robotic total station.

Bed Particle Size Distributions

Pebble counts were only conducted at XS-1 and XS-2 because the bed was predominantly bedrock at XS-3. (Table 4-17; Appendix D6, Table D6-1, Figures D6-10 to D6-12). The bed material at XS-1 was primarily coarse gravel and cobble, with 16% of the pebble count composed of sand. XS-2 was cobble-dominant with 32% and 9% of the pebble count composed of gravel and sand, respectively. The grain size distributions at XS-1 and XS-2 in 2024 fined relative to 2019, indicative of the large increase in sand and gravel at both cross sections. At XS-1, the 2024 D_{84} was similar to the 2019 D_{50} (Table 4-17).

Table 4-17. Pebble Count Data for Site IHD-G2, 2003, 2019, and 2024.

Cross Section (XS)	D_{16} (millimeter)			D_{50} (millimeter)			D_{84} (millimeter)		
	2003	2019	2024	2003	2019	2024	2003	2019	2024
XS-1 (Upstream)	24	35	<2	45	84	30	155	160	82
XS-2 (Intermediate)	21	55	11	88	118	78	280	220	190
XS-3 (Downstream)	<2	--	--	60	--	--	400	--	--

Notes: -- = no data; bed material was predominantly bedrock
D_{16} = particle size at which 16% of the bed is finer
D_{50} = particle size at which 50% of the bed is finer
D_{84}= particle size at which 84% of the bed is finer

Sediment Facies Mapping

The channel bed at this site was predominantly bedrock with boulder- and cobble-dominant facies occurring as a thin surficial layer covering the bedrock (Appendix D7, Figures D7-7 to D7-9). Bedrock composed 46% of the channel bed, and cobble-dominant facies composed 41% of the channel bed (Table 4-18). Sand was rarely observed within the bankfull area and was located primarily on the floodplains. Despite large changes in the pebble counts, sediment facies were overall similar between 2019 and 2024. The decrease in boulder-dominant facies in 2024 relative to 2019 was likely due to cobble deposition.

Table 4-18. Dominant Sediment Facies at Site IHD-G2, 2019 and 2024.

Dominant Facies	Area (square feet)		Area (%)	
	2019	2024	2019	2024
Sand	0	0	0	0
Gravel	129	399	<1	<1
Cobble	21,198	28,306	34	41
Boulder	10,170	7,681	17	12
Bedrock	30,672	25,513	49	46

Large Woody Debris

Five logs meeting the length criteria were observed within the bankfull channel at Site IHD-G2 in 2024 (Appendix D8). None of the logs had root wads. LWD density was low (45 logs per mile) and did not provide significant scour or habitat within the bankfull channel. One jam composed of six pieces of wood was observed along the edge of the bankfull channel in the middle of the reach. Two logs were observed during 2019

surveys, and nine logs that met the length criteria (greater than one-half bankfull width or 28 feet) were observed during the 2003 surveys.

Fine Sediment Storage

V* was not measured because no pools existed within the reach and little fine sediment accumulation was present within the active channel (Appendix D9). Because conditions did not meet the V* monitoring requirement for two consecutive surveys, fine sediment loads are not problematic for this site. Consistent with Attachment 6 of the Plan, V* will not be measured at this site for the remainder of the License.

Additional Channel Condition Assessments

Data from the Rosgen Level III, Rosgen bank erosion and riparian vegetation, and Pfankuch bank stability assessments are provided in Appendix D10, Appendix D11, and Appendix D12, respectively. Site IHD-G2 is a Rosgen C3 transport reach with predominantly plane-bed morphology and a Pfankuch stability rating of 57. The stream was slightly entrenched with bankfull width-to-depth ratios ranging from 25 to 28, sufficient to support alternate bars. The sinuosity was 1.2.

4.3.2.6 Site CD-G1 (Silver Creek below Camino Dam)

Site Description

Site CD-G1 (Silver Creek below Camino Dam) is located approximately 3.8 miles downstream of Ice House Dam and has a drainage area of about 175 square miles. The bedrock slopes constraining the valley were moderately steep (40–60%) and confined the stream in a relatively narrow channel. The riparian zone was relatively narrow and had low plant diversity and density (see riparian vegetation monitoring results for Site CD-RV4 in Section 5.3). Frequent bedrock outcrops and large boulders created flow obstructions, which primarily controlled the channel character and hydraulics (Figure 4-17). The channel had primarily bedrock and step-pool morphology with occasional cascades. This reach had a stable substrate dominated by bedrock and boulders and little to no LWD within the active channel. Small patches of gravel and cobble were deposited in the low-velocity zones on the downstream sides of the large flow obstructions and along the channel margins. Additional representative photographs of this site are included in Appendix D3.

Landslides are common along the steep hillslopes surrounding Site CD-G1. Four landslides sourced from the dirt road on the western valley slope occurred along ridges and pre-existing drainages during the 2023 New Year's storms. Two of the landslides entered Silver Creek within the study reach, and two entered the channel downstream of the site. Sediment from the landslides was not observed within the bankfull channel during 2024 surveys (based on absence of colluvium) and was likely transported downstream during high flows in winter 2023–2024.



Figure 4-17. Site CD-G1, looking downstream near XS-2, 2024 (top), 2019 (bottom left), and 2003 (bottom right).

Longitudinal Profile

Site CD-G1 longitudinal profiles for 2024 and prior monitoring years are shown in Appendix D4, Figure D4-6. The 2024 profile was 1,080 feet long and extended 220 feet upstream of XS-1 and 330 feet downstream of XS-3. The reach-average slope was 1.4% in 2019 and 1.3% in 2024. Relative to 2019, the 2024 profile aggraded by up to 1.3 feet around stations 500 and 820. Overall, little change occurred in the thalweg profile between monitoring years.

Cross Sections

Site CD-G1 cross sections for 2003, 2019, and 2024 are shown in Appendix D5, Figures D5-16 to D5-18, and characteristics are summarized in Table 4-19. At this site, both endpins were recovered at XS-2 and XS-3 in 2024, but only one endpin was recovered at XS-1. XS-2 and XS-3 showed very little to no change in cross section topography between 2019 and 2024. Differences between 2019 and 2024 at XS-1 along the left bank reflect cross section alignment differences rather than topographic change. Photographs of cross sections for 2003, 2019, and 2024 suggest that the channel was stable and had little change in topography since 2003.

Table 4-19. Cross Section Data for Site CD-G1, 2003, 2019, and 2024.[a]

Cross Section	Bankfull Width (feet)			Mean Bankfull Depth (feet)			W/D Ratio		
	2003	2019	2024	2003	2019	2024	2003	2019	2024
XS-1 (Upstream)	73	57	49	2.7	3.1	3.6	27.0	18.5	13.6
XS-2 (Intermediate)	89	74	80	3.8	3.0	3.1	23.4	24.5	25.8
XS-3 (Downstream)	77	61	55	3.2	2.7	2.3	24.1	23.2	23.9

Note: W/D = bankfull width divided by bankfull depth

[a] The 2003 data were collected using an auto level and tape; the 2019 and 2024 data were collected using real-time kinematic global navigation satellite system or a robotic total station.

Bed Particle Size Distributions

The bed at all three cross sections was primarily made up of bedrock and boulders. The pebble counts were conducted where mobile sediment was present along the cross sections, mostly along channel margins. The pebble counts were primarily composed of coarse gravel and cobble with less than 10% boulders. (Table 4-20; Appendix D6, Table D6-1, Figures D6-13 to D6-15). No sand was measured during the pebble counts in 2024. Relative to the 2019 and 2003 surveys, the bed fined at XS-2 and XS-3 and remained relatively stable at XS-1 (Appendix D6, Figures D6-13 to D6-15; Table 4-24).

Table 4-20. Pebble Count Data for Site CD-G1 from 2003, 2019, and 2024.

Cross Section	D_{16} (millimeter)			D_{50} (millimeter)			D_{84} (millimeter)		
	2003	2019	2024	2003	2019	2024	2003	2019	2024
XS-1 (Upstream)	44	31	47	74	66	74	146	154	155
XS-2 (Intermediate)	46	43	16	83	82	49	151	142	122
XS-3 (Downstream)	38	39	23	74	100	54	178	317	121

Notes: D_{16} = particle size at which 16% of the bed is finer
D_{50} = particle size at which 50% of the bed is finer
D_{84} = particle size at which 84% of the bed is finer

Sediment Facies Mapping

Bedrock and boulders dominated Site CD-G1 (Table 4-21; Appendix D7, Figures D7-10 and D7-11). Cobble and gravel facies were present in low-velocity zones and were commonly observed on channel margins and downstream of flow obstructions. During the 2019 and 2024 surveys, the wetted area of the channel had predominantly bedrock- and boulder-dominant facies (Table 4-25). The channel banks and flood-prone area were also dominated by bedrock (sand and gravel comprised less than 1% of the mapped area). Differences in the total amount of boulder- and bedrock-dominant facies between 2019 and 2024 were likely due to differences in mapping rather than a change in sediment facies because bedrock and boulders are not mobile. Furthermore, photographs from 2019 and 2024 suggest that the sediment facies were generally stable between monitoring years.

Table 4-21. Dominant Sediment Facies at Site CD-G1, 2019 and 2024.

Dominant Facies	Area (square feet)		Area (%)	
	2019	2024	2019	2024
Sand	36	0	<1	<1
Gravel	1,001	727	<1	<1
Cobble	3,626	6,606	3	6
Boulder	33,504	46,135	30	40
Bedrock	75,025	63,084	67	54

Large Woody Debris

Large wood was not observed at the site during the 2024 surveys (Appendix D8). Two logs were observed at Site CD-G1 in 2019, and only one log (categorized as 3 to 10 feet long) was observed in 2003 (Appendix D8). Two additional logs were located just downstream of the study reach in 2019.

Fine Sediment Storage

V* was not measured because fine sediment was not observed within the pools at the site (Appendix D9). Because conditions did not meet the V* monitoring requirement for two consecutive surveys, fine sediment loads are not problematic for this site. Consistent with Attachment 6 of the Plan, V* will not be measured at this site for the remainder of the License.

Additional Channel Condition Assessments

Data from the Rosgen Level III, Rosgen bank erosion and riparian vegetation, and Pfankuch bank stability assessments are provided in Appendix D10, Appendix D11, and Appendix D12, respectively. This site is a Rosgen B3c transport reach with moderate entrenchment, moderate to high bankfull width-to-depth ratios (13–26), and low sinuosity (1.4). The overall Pfankuch stability rating was 63 (good).

4.3.2.7 Site SCD-G1 (South Fork American River below Slab Creek Dam)

Site Description

Site SCD-G1 (SFAR below Slab Creek Dam) is located approximately 5.3 miles downstream of Slab Creek Dam and has a drainage area of about 515 square miles. The study reach morphology at Site SCD-G1 was composed of high-gradient boulder steps and pools. The site is in the Slab Creek recreation boating run, which is ranked Class IV/V (SMUD 2004), and wading safely at this location is challenging even at lower flows (approximately 90 cfs). Channel banks were predominantly composed of bedrock and very large boulders (Figure 4-18). Very little fine sediment was observed within the study reach, only in the wake of larger particles. Particles throughout the site were strongly imbricated. A cobble-boulder point bar was present on river left at the upstream end of the study reach. Additional representative photographs of this site are included in Appendix D3.



Figure 4-18. Site SCD-G1, looking upstream near XS-2, 2024 (top), 2019 (bottom left), and 2003 (bottom right).

Longitudinal Profile

The longitudinal profile for Site SCD-G1 from monitoring year 2024 is shown in Appendix D4, Figure D4-6. The 2024 profile was 860 feet long and extended 180 feet upstream of XS-1 and 120 feet downstream of XS-3. The longitudinal profile was not surveyed in this reach in 2019 because of unsafe wading conditions. (Appendix D4, Figure D4-6). This reach had the steepest reach-average slope (1.9%) of the seven UARP sites.

Cross Sections

Site SCD-G1 cross sections for 2003, 2019, and 2024 are shown in Appendix D5, Figures D5-19 to D5-21, and characteristics are summarized in Table 4-22. Only one endpin was recovered for XS-1, and both endpins were recovered for XS-2 and XS-3. The difficulty of wading the site and the potential change in alignment of XS-1 resulted in differences in the measured channel topography. The difficulty of determining bankfull characteristics at confined sites, like Site SCD-G1, resulted in differences in bankfull width estimates. This reach was primarily composed of very large boulders and bedrock and therefore is unlikely to have changed substantially from 2019 to 2024 (e.g., by the magnitudes shown in Appendix D, Figure D5-19, or Table 4-22). XS-2 and XS-3 were generally similar in 2003, 2019, and 2024. Comparison of photographs of cross sections from 2003, 2019, and 2004 further suggested that the channel is stable and its topography has changed little since 2003.

Table 4-22. Cross section Data for Site SCD-G1, 2003, 2019, and 2024.[a]

Cross Section	Bankfull Width (feet)			Mean Bankfull Depth (feet)			W/D Ratio		
	2003	2019	2024	2003	2019	2024	2003	2019	2024
XS-1 (Upstream)	33	122	34	5.6	--[b]	3.0	5.8	--[b]	11.3
XS-2 (Intermediate)	63	163	43	3.4	--[b]	3.7	18.4	--[b]	11.6
XS-3 (Downstream)	61	122	55	3.0	6.6	3.2	20.2	18.7	15.7

Note: W/D = bankfull width divided by bankfull depth

[a] The 2003 data were collected using an auto level and tape; the 2019 and 2024 data were collected using real-time kinematic global navigation satellite system or a robotic total station.

[b] Not measured or calculated due to unsafe wading conditions

Bed Particle Size Distributions

Pebble counts were not conducted in this boulder and bedrock reach because the bed could not safely be measured and pebble counts are not designed for boulder- and bedrock-dominant channels.

Sediment Facies Mapping

The sediment facies were dominated by boulder and bedrock, with boulder-dominant and bedrock-dominant substrate totaling 64% and 34%, respectively, of the mapped channel area (Table 4-23; Appendix D7, Figures D7-12 and D7-13). The remaining 1% of the mapped area had cobble-dominant substrate. Differences in the total amount of boulder- and bedrock-dominant facies between 2019 and 2024 were likely due to differences in mapping, rather than a change in sediment facies. Photographs from 2019 and 2024 suggest that the sediment facies were stable between monitoring years.

Table 4-23. Dominant Sediment Facies at Site SCD-G1 in 2019 and 2024.

Dominant Facies	Area (square feet)		Area (%)	
	2019	2024	2019	2024
Sand	0	0	0	0
Gravel	263	0	<1	0
Cobble	2,065	1,764	1	1
Boulder	124,347	116,775	69	64
Bedrock	54,280	61,444	30	34

Large Woody Debris

No LWD was observed in this reach in 2024 (Appendix D8).

Fine Sediment Storage

V* was not measured because fine sediment was not observed within the pools at the site (Appendix D9). Because conditions did not meet the V* monitoring requirement for two consecutive surveys, fine sediment loads are not problematic for this site. Consistent with Attachment 6 of the Plan, V* will not be measured at this site for the remainder of the License.

Additional Channel Condition Assessments

Data from the Rosgen Level III, Rosgen bank erosion and riparian vegetation, and Pfankuch bank stability assessments are provided in Appendix D10, Appendix D11, and Appendix D12, respectively. This site is a Rosgen B3 transport reach with low entrenchment (2–3.8), a moderate width to depth ratio (11.3–15.7), and low sinuosity (1.2). The overall Pfankuch stability rating for Site SCD-G1 was 64 (good).

4.4 DISCUSSION

4.4.1 Site RRD-G1 (Rubicon River below Rubicon Dam)

Downstream of Rubicon Dam, daily average flows in March through June have increased by at least 50% since License implementation (Figure 4-1). The frequency of annual peak flows has also increased since License implementation (Section 4.3.1.1). Approximately 44% of the days during which Rubicon Reservoir spilled occurred in 2017, 2019, and 2023, all of which were Wet water year types. The 2003, 2019, and 2024 surveys indicate that increases in daily average flows and spill frequency resulted in little change in the overall cross section topography. While the topography was stable, the bed at XS-1 and XS-2 coarsened compared with bed conditions in 2019 (Appendix D6, Figures D6-1 to D6-2). The degree to which this coarsening reflects a long-term trend or effects of flow and spill increases in recent Wet water years will become clearer with subsequent monitoring.

4.4.2 Site LLD-G1 (Gerle Creek Below Loon Lake Dam, Upper Reach)

The most significant change at Site LLD-G1 since the 2003 surveys was increased wood density, a result of tree mortality induced by flooding related to North American beaver dams following the 2003 surveys (SMUD 2016). During the 2003 surveys, Site LLD-G1 contained 63 logs with at least part of their length in the active channel. This number was among the highest for wood density observed at all sites surveyed in 2003. By 2019, the number of LWD pieces had increased to 563, a nearly nine-fold increase. The quantity of LWD at Site LLD-G1 increased to 577 in 2024.

The increase in LWD since 2003 likely has affected the channel in several ways, including an increase in channel roughness with a corresponding decrease in flow velocity and increase in flow depth. While the reach-average slope was 1.1% in 2024, the water surface slope (assessed using water surface measurements at the three cross sections) was flat during 2019 and 2024 surveys. The decreased flow velocity and increased water depth have led to increased deposition of sand throughout the reach, including the channel bed and floodplain. Deposition has further increased because the channel spills onto its floodplain at even moderate flows. In addition, the bedrock outcrop at the downstream end of the reach may have acted as a backwater, exacerbating the changes described above. The continued deposition of sand at the site—approximately 2.5 feet of sand deposition occurred at XS-1 between 2019 and 2024—suggests that channel morphology continues to respond to increased wood density at the site (Appendix D5, Figure D5-6). Site LLD-G1 is unusual in the UARP in that it has a sand, rather than gravel, bed, despite the channel bed being much steeper than would be expected for a sand-bedded channel. The bed was sandy in 2003, prior to the large inputs of wood to the system. The cause of the sandy bed is not known but could be due to a backwater originating at the downstream bedrock outcrop, geologic glacial activity, or a combination of both. No evidence of mass wasting or sediment deposition from nearby roads was observed at the site, which has been classified as a “swamp” in USGS topographical maps dating back to the late 1800s.

4.4.3 Site LLD-G2 (Gerle Creek Below Loon Lake Dam, Middle Reach)

Site LLD-G2 had multiple channels that supported flow during the 2019 and 2024 surveys. Similar to Site LLD-G1, Site LLD-G2 had increased LWD density since the 2003 surveys, although at a much lower magnitude. The quantity of wood observed in 2024 decreased relative to 2019, suggesting at least some of the wood is mobile. The grain size distribution of the bed coarsened relative to 2003 and 2019 at XS-1 and XS-2 and remained relatively stable at XS-3 (Appendix D6, Figures D6-4 to D6-6). Minor channel aggradation occurred between 2019 and 2024 near the thalweg at XS-1 and XS-3 and along the right bank at XS-2, but topography was similar overall. In general, the geomorphic changes reflect localized deposition and erosion but no reach-scale changes in channel morphology since License implementation.

4.4.4 Site IHD-G1 (South Fork Silver Creek below Ice House Dam, Upper Reach)

The hydrology in South Fork Silver Creek below Ice House Dam has changed since License implementation. Spring and winter baseflows increased by up to a factor of 4 following License implementation, depending on water year type and other factors (e.g., recreational flows). Under the License, peak flows are implemented from May to June and have generally increased relative to pre-License peaks. Recreational flows were often the highest flow of the year from 2015 to 2024, but they were less than the record peak flows of 7,530 and 4,440 cfs in 1996 and 1997, respectively. The peak flow of 967 cfs in 2017 remains the highest peak flow since License implementation (Figure 4-5).

The increase in winter baseflows and peak flows at Site IHD-G1 have likely increased deposition of fine sediment within the reach and resulted in minor changes in cross section topography. The channel narrowed slightly at XS-1 between 2003 and 2019, likely because of a LWD jam immediately downstream of the cross section, but the cross section morphology was otherwise largely similar. The topography at XS-1 did not change substantially between 2019 and 2024 (Appendix D5, Figure D10). XS-2 incised up to 2 feet between 2019 and 2024 and had the highest sand content (38% of the pebble count) of all three cross sections, suggesting that the bed incised during high flows and sand likely deposited during the recession limb of the hydrograph. The trends in sediment at the site between 2003, 2019, and 2024 suggest that the flow regime under the License is likely increasing sand delivery to the site, but much of this sand is moving as bedload and is therefore subject to deposition in the reach. This is particularly true at the upstream pool where V* was measured. This sand was not observed in this pool in 2003 and likely reflects sand transported since the initiation of the current flow regime, which has much higher spring flows that are likely increasing sand transport within the reach. The amount of sand in the upstream pool decreased in 2024 compared with 2019. Determining the linkage between sand mobility and deposition in this reach due to the new hydrologic regime would require specific monitoring and modeling of sand transport, which is beyond the scope of the Plan.

4.4.5 Site IHD-G2 (South Fork Silver Creek below Ice House Dam, Lower Reach)

The cross section surveys at Site IHD-G2 showed little change, but the pebble counts showed that the channel bed coarsened from 2003 to 2019 and fined from 2019 to 2024 (Appendix D6, Figures D6-10 to D6-12). The 2024 particle size distributions were finer than 2003 and 2019, mostly due to increased sand content. The fine sediment accumulation in pools observed upstream at Site IHD-G1 was not observed at this site, but an increase in surficial sand deposits along the channel margins was observed in 2024 compared with 2019. Similar to Site IHD-G1, the higher peak flows and snowmelt pulses since 2015 have likely increased the magnitude and duration of sediment transport, causing the extent of fine sediment to vary between monitoring years. Some continued grain size adjustment at this site is possible, but the bedrock and coarse materials that compose the majority of the reach make cross section adjustments unlikely.

LWD continues to play little role in channel morphology within the reach. The channel is greater than 50 feet wide and is generally confined by steep hillslopes on one bank and a terrace on the other with little variation in bed elevation and extensive bedrock at the downstream end of the reach. This morphology is likely to promote log movement and unlikely to trap fluvially transported wood delivered from upstream (Braudrick and Grant, 2001).

4.4.6 Site CD-G1 (Silver Creek Below Camino Dam)

Changes to the flow regime within the reach downstream of Camino Dam under the License resulted in increased baseflows but have not altered peak flows capable of transporting sediment (Figure 4-7 and Figure 4-8). The hillslopes surrounding this site have been prone to landsliding, which can act as a source of sediment to the reach. Sediment supplied to the channel from landslides between 2021 and 2023 was not observed within the bankfull channel in 2024 and therefore was likely transported downstream during high flows prior to the survey. Similarly, a landslide that occurred between 2014 and 2016 also increased sediment supply to the reach but caused few morphological changes or changes to the bed. Given the steep and confined channel morphology, the widespread bedrock and boulders along the bed and banks, and the fate of these landslide deposits, geomorphological adjustments are unlikely at this site.

4.4.7 Site SCD-G1 (South Fork American River Below Slab Creek Dam)

Site SCD-G1 is a very steep and confined rapid with frequent boulders, and geomorphic change is highly unlikely to occur in response to the minimum flow regime under the License given the lack of changes to high flows (Figure 4-6). Differences in cross section topography between 2003, 2019, and 2024 likely result from differences in cross section alignment associated with difficulty wading through the site due to higher minimum flows and the coarse substrate. Because high minimum flows in Wet water years are unsafe for surveyors, Site SCD-G1 could not be completely surveyed in 2019. Although the site was wadable in 2024 when the Below Normal water year had lower minimum flows than in 2019, it is recommended this reach be dropped from the monitoring program due to unsafe conditions in some years coupled with a channel that is unlikely to adjust its morphology or bed.

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5.0 RIPARIAN VEGETATION

5.1 MONITORING PLAN OBJECTIVES

The primary goals of this report are summarized in the Riparian Vegetation Monitoring Plan (Plan) (SMUD 2016) and include documenting changes in riparian conditions following implementation of current streamflows (Appendix A1). Monitoring site locations are shown in Figure 1-1 to Figure 1-3, and representative photographs are included in Appendix E1.

5.1.1 Vegetation Mapping

The maps of vegetation communities developed in 2019 were reviewed and updated in the geographic information system (GIS) using National Agriculture Imagery Program aerial imagery (2-foot resolution) collected in July 2022. The maps were verified during field surveys and subsequently revised in GIS. Vegetation types were categorized in accordance with the online Manual of California Vegetation (CNPS 2024a); a crosswalk with the Classification and Assessment with Landsat of Visible Ecological Grouping (CalVeg) types (Forest Service 2024) was also conducted. Mapping at each site captured the three permanent transects, the transition to adjacent upland habitat, and a small area of vegetation just beyond the upstream- and downstream-most transects.

5.1.2 Transect and Greenline Surveys

At each monitoring site, line-point intercept and point-centered quarter data were collected along three permanent transects perpendicular to the river and extending through the riparian corridor to the boundary with upland vegetation. Line-point intercept data were collected to assess riparian vegetation extent, composition, and canopy complexity; point-centered quarter data were collected to quantify tree and shrub composition, successional stage, health, and density. The location and composition of the greenline (i.e., the first perennial vegetation that forms a lineal grouping of community types on or near the water's edge) along the channel margin of each site were documented to assess bank stability. All plant species observed in the field were identified following the taxonomy of the Jepson eFlora (Jepson Flora Project 2024).

5.2 RESULTS

5.2.1 Vegetation Mapping

Nineteen vegetation alliances were documented within the study area; dominant riparian vegetation types included lodgepole pine forest (*Pinus contorta* ssp. *murrayana* forest & woodland alliance), mountain alder thickets (*Alnus incana* shrubland alliance), and torrent sedge patches (*Carex nudata* herbaceous alliance). Appendix E2, Figures E2-1 through E2-10 show the mapped vegetation alliances at each monitoring site, and Table 5-1 quantifies their acreages.

Table 5-1. Vegetation Alliances at Riparian Vegetation Monitoring Sites for the Upper American River Project, 2024.

Site	Community Type	Manual Of California Vegetation Type		CalVeg Type	Area (acres)[1]	State Ranking[2]
		Common Name	Scientific Name			
LLD-RV17	Riparian	Lodgepole pine forest	*Pinus contorta* ssp. *murrayana* forest & woodland alliance	Lodgepole pine	0.75	–
		Mountain alder thicket	*Alnus incana* shrubland alliance	Mountain alder	2.18	S3
		Torrent sedge patches	*Carex nudata* herbaceous alliance	Wet grasses and forbs	4.50	S3
	Upland/other	Huckleberry oak chaparral	*Quercus vacciniifolia* shrubland alliance	Huckleberry oak	0.33	–
		Open water			0.50	–
		White fir forest	*Abies concolor* forest & woodland alliance	White fir	1.75	–
				Total	**10.01**	**–**
LLD-RV10	Riparian	Lodgepole pine forest	*Pinus contorta* ssp. *murrayana* forest & woodland alliance	Lodgepole pine	7.39	–
		Mountain alder thicket	*Alnus incana* shrubland alliance	Mountain alder	0.57	S3
		Red osier thickets	*Cornus sericea* shrubland alliance	Dogwood	0.29	S3?
	Upland/other	Open water			0.46	–
		White fir forest	*Abies concolor* forest & woodland alliance	White fir	0.40	–
				Total	**9.12**	**–**
LLD-RV3	Riparian	Lodgepole pine forest	*Pinus contorta* ssp. *murrayana* forest & woodland alliance	Lodgepole pine	0.19	–
		Mountain alder thicket	*Alnus incana* shrubland alliance	Mountain alder	0.75	S3
	Upland/other	Incense cedar forest	*Calocedrus decurrens* forest & woodland alliance	Incense cedar	2.35	S3
		Jeffrey pine forest	*Pinus jeffreyi* forest & woodland alliance	Jeffrey pine	0.21	–
		Open water			0.63	–
				Total	**4.14**	**–**

Site	Community Type	Manual Of California Vegetation Type		CalVeg Type	Area (acres)[1]	State Ranking[2]
		Common Name	Scientific Name			
GCD-RV1	Riparian	Mountain alder thicket	*Alnus incana* shrubland alliance	Mountain alder	0.26	S3
		Torrent sedge patches	*Carex nudata* herbaceous alliance	Wet grasses and forbs	0.08	S3
	Upland/other	Douglas fir forest	*Pseudotsuga menziesii* forest & woodland alliance	Pacific Douglas-fir	1.16	–
		Incense cedar forest	*Calocedrus decurrens* forest & woodland alliance	Incense cedar	1.54	–
		Open water			0.80	–
		White fir forest	*Abies concolor* forest & woodland alliance	White fir	1.27	–
				Total	**5.11**	**–**
IHD-RV5	Riparian	Lodgepole pine forest	*Pinus contorta* ssp. *murrayana* forest & woodland alliance	Lodgepole pine	2.02	–
		Mountain alder thicket	*Alnus incana* shrubland alliance	Mountain alder	1.16	S3
	Upland/other	Open water			0.54	–
		White fir forest	*Abies concolor* forest & woodland alliance	White fir	2.03	–
				Total	**5.76**	**–**
IHD-RV1	Riparian	Arroyo willow thickets	*Salix lasiolepis* shrubland alliance	Willow	0.16	–
		Mountain alder thicket	*Alnus incana* shrubland alliance	Mountain alder	0.25	S3
		Red osier thickets	*Cornus sericea* shrubland alliance	Dogwood	0.09	S3?
	Upland/other	Green leaf manzanita chaparral	*Arctostaphylos patula* shrubland alliance	Greenleaf manzanita	1.70	–
		Mountain whitethorn chaparral	*Ceanothus cordulatus* shrubland alliance	Mountain whitethorn	0.48	–
		Open water			0.83	–
		Ponderosa pine forest	*Pinus ponderosa* forest & woodland alliance	Ponderosa pine	1.94	–
				Total	**5.45**	**–**

Site	Community Type	Manual Of California Vegetation Type		CalVeg Type	Area (acres)[1]	State Ranking[2]
		Common Name	Scientific Name			
CD-RV4	Riparian	Himalayan blackberry – rattlebox – edible fig riparian scrub	*Rubus armeniacus* – *Sesbania punicea* – *Ficus carica* shrubland semi-natural alliance	Non-native/ ornamental shrub	0.03	–
		White alder groves	*Alnus rhombifolia* forest & woodland alliance	White alder	0.39	–
	Upland/other	Bedrock/boulder			1.00	–
		Canyon live oak forest	*Quercus chrysolepis* (tree) forest & woodland alliance	Canyon live oak	0.61	–
		Open water			0.57	–
				Total	**2.60**	**–**
SCD-RV5	Riparian	Arroyo willow thickets	*Salix lasiolepis* shrubland alliance	Willow	0.24	–
		Himalayan blackberry – rattlebox – edible fig riparian scrub	*Rubus armeniacus* – *Sesbania punicea* – *Ficus carica* shrubland semi-natural alliance	Non-native/ ornamental shrub	0.20	–
	Upland/other	Bedrock/boulder			0.83	–
		Canyon live oak forest	*Quercus chrysolepis* (tree) forest & woodland alliance	Canyon live oak	0.53	–
		Open water			0.65	–
		Poison oak scrub	*Toxicodendron diversilobum* shrubland alliance	Lower montane mixed chaparral	0.06	–
				Total	**2.51**	**–**
SCD-RV3	Riparian	Arroyo willow thickets	*Salix lasiolepis* shrubland alliance	Willow	0.56	––
		Sandbar willow thickets	*Salix exigua* shrubland alliance	Willow	0.15	–
		White alder groves	*Alnus rhombifolia* forest & woodland alliance	White alder	0.02	–
	Upland/other	Bedrock/boulder			0.33	–
		Canyon live oak forest	*Quercus chrysolepis* (tree) forest & woodland alliance	Canyon live oak	1.31	–
		Open water			0.79	–
				Total	**3.16**	**–**

Site	Community Type	Manual Of California Vegetation Type		CalVeg Type	Area (acres)[1]	State Ranking[2]
		Common Name	Scientific Name			
SCD-RV1	Riparian	Arroyo willow thickets	*Salix lasiolepis* shrubland alliance	Willow	1.33	–
		Torrent sedge patches	*Carex nudata* herbaceous alliance	Wet grasses and forbs	0.24	S3
		White alder groves	*Alnus rhombifolia* forest & woodland alliance	White alder	0.93	–
	Upland/other	Bedrock/boulder			0.31	–
		Canyon live oak forest	*Quercus chrysolepis* (tree) forest & woodland alliance	Canyon live oak	3.78	–
		Gravel bar			1.41	–
		Open water			2.15	–
				Total	**10.14**	**–**

Note: CalVeg = Classification and Assessment with Landsat of Visible Ecological Groupings

[1] Total acres may differ slightly from the sum of tabulated vegetation type acres due to rounding.

[2] Sensitive natural communities were defined as vegetation types with a state ranking of S1 (critically imperiled), S2 (imperiled), or S3 (vulnerable) as listed in the most recent *California Sensitive Natural Communities List* (CDFW 2023). A ranking of S3? indicates vulnerable but with an inexact numeric rank due to insufficient samples over the full expected range of the type.

5.2.2 Transect and Greenline Surveys

5.2.2.1 Line-point Intercept

A total of 125 plant species, 9 of which are non-native, were recorded during line-point intercept surveys. Species diversity documented at each site ranged from 5 species at Site SCD-RV5 to 38 species at Site IHD-RV5 (Figure 5-1). Of the total species documented, 66 species (53%) are hydrophytic: 32 species (26%) are facultative, 22 species (18%) are facultative wetland, and 12 species (10%) are obligate wetland species (USACE 2020). The species with the highest number of occurrences along the transects across all sites were torrent sedge (*Carex nudata*), lodgepole pine, and mountain alder. Nativity, wetland indicator status, and percent cover of each species (relative canopy cover) are presented in Appendix E3, Table E3-1; percent cover of vegetated canopy (absolute vegetative cover) is presented by site in Appendix E3, Table E3-2.

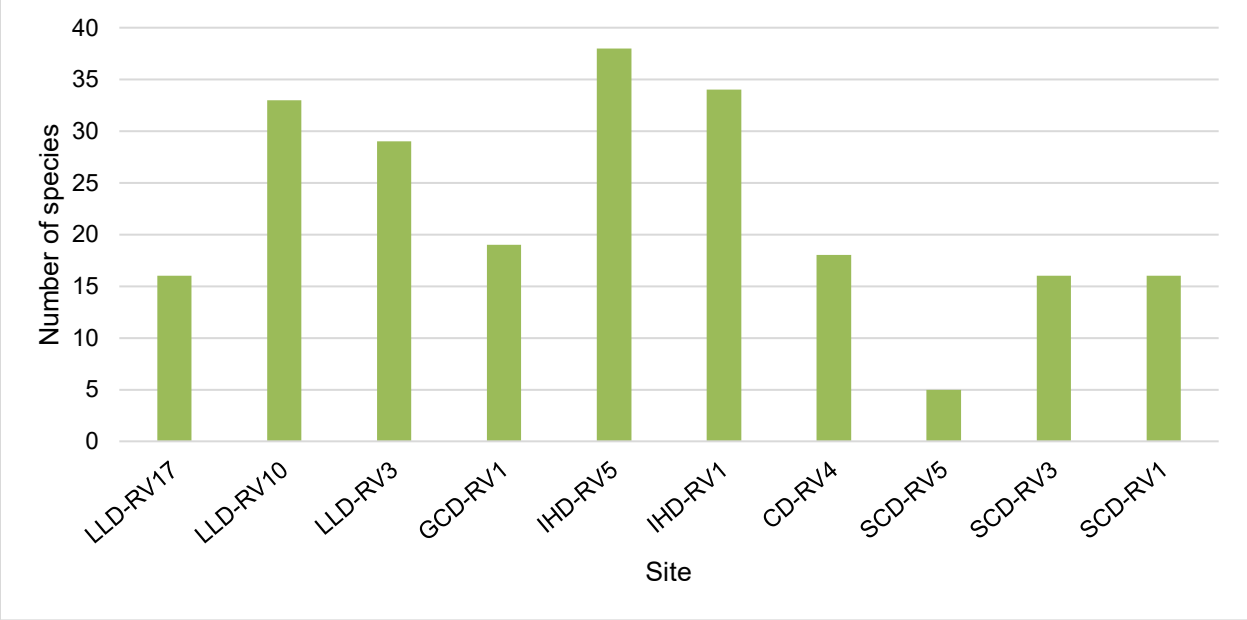


Figure 5-1. Plant species diversity by site for the Upper American River Project, 2024.

Of the ten sites surveyed, Site SCD-RV1 had the lowest average absolute cover of vegetation documented across all canopy classes (31% cover of vegetation); vegetation canopy cover was minimal in the understory (17% cover of vegetation under 1 meter tall), mid-story (15% cover of vegetation one to 5 meters tall), and the overstory (8% cover of vegetation over 5 meters tall). Site LLD-RV10 had the highest absolute vegetative cover in the understory at 106%, Site IHD-RV5 had the highest absolute cover in the mid-story canopy at 64%, and Site LLD-RV3 had the highest absolute cover in the canopy at 51%. Figure 5-2 shows the percent cover by canopy height class, as observed along line-point intercept transects.

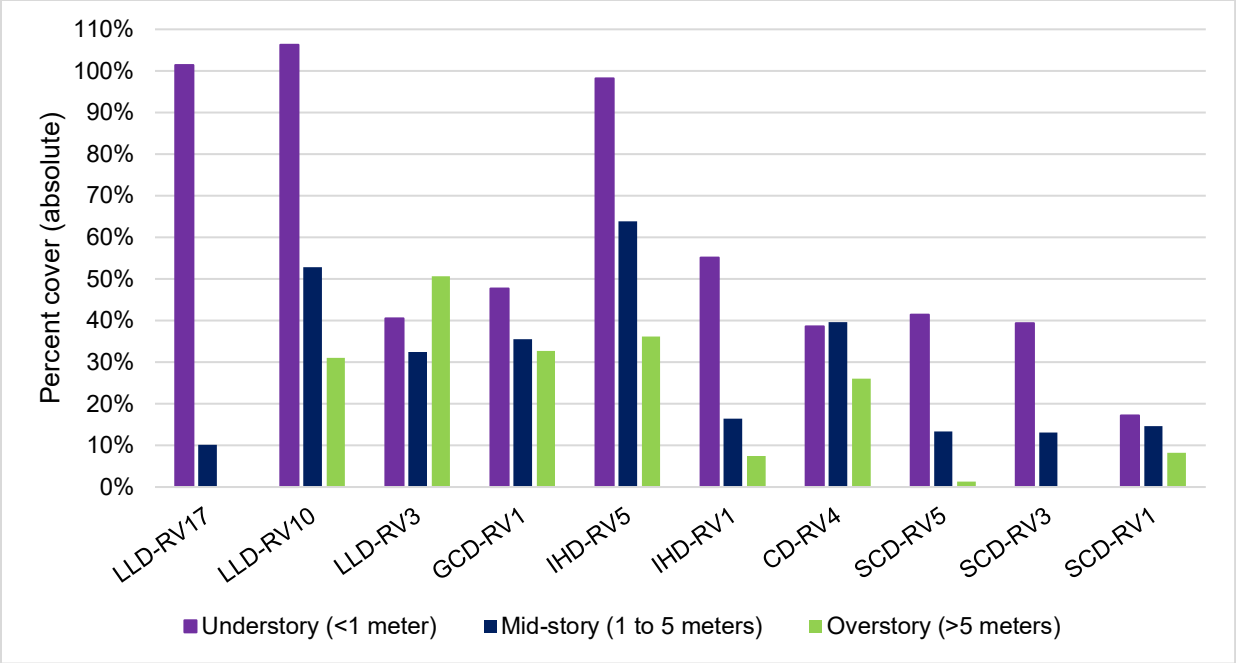


Figure 5-2. Vegetative cover (absolute) in each canopy class documented during line-point intercept surveys for the Upper American River Project, 2024.

Natural recruitment of woody vegetation was observed at all sites, with the highest recruitment documented for wetland shrub species at Site LLD-RV10 (Figure 5-3; Appendix E3, Table E3-3). Seedlings and saplings of wetland tree and shrub species such as mountain alder, American dogwood, and narrowleaf willow (*Salix exigua)* were some of the most common recruits, along with seedlings and saplings of the conifer species white fir (*Abies concolor*) and lodgepole pine. Recruitment of additional species of conifers (e.g., Douglas-fir [*Pseudotsuga menziesii* subsp. *menziesii*] and incense cedar [*Calocedrus decurrens*]) was observed at Sites LLD-RV10, LLD-RV3, GCD-RV1, IHD-RV-5, and IHD-RV1. Upland tree and shrub recruits such as black oak (*Quercus kelloggii*) and Saskatoon serviceberry (*Amelanchier alnifolia*) were observed at seven sites.

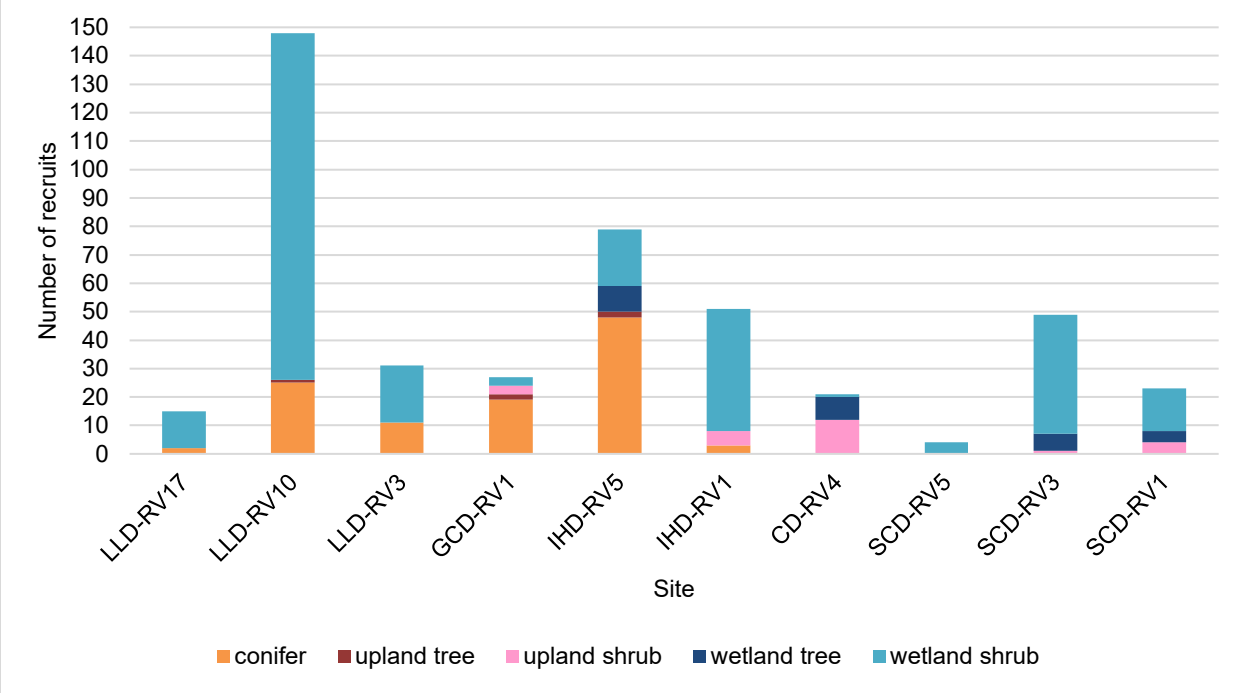


Figure 5-3. Recruitment of woody vegetation within 1 meter of Upper American River Project monitoring transects, 2024.

Non-native plant species were documented at six sites (Sites IHD-RV5, IHD-RV1, CD-RV4, SCD-RV5, SCD-RV3, and SCD-RV1) (Appendix E3, Table E3-1). Himalayan blackberry (*Rubus armeniacus*) was the most frequently documented non-native species, and Site SCD-RV5 had the highest relative cover of Himalayan blackberry at 31%. Sites IHD-RV1 and SCD-RV1 had the highest number of documented non-native species, including klamathweed (*Hypericum perforatum* subsp. *perforatum*), sheep sorrel (*Rumex acetosella*), and water speedwell (*Veronica anagallis-aquatica*). Site CD-RV4 had the lowest cover of non-native species at 1%, which included one record of white sweetclover (*Melilotus albus*) along one transect. Skeleton weed (*Chondrilla juncea*) was detected via incidental observation at Sites SCD-RV3 and SCD-RV1.

5.2.2.2 Point-centered Quarter

Point-centered quarter results of tree and shrub composition, frequency, and overall vegetative health are presented by site in Appendix E4, Table E4-1. Figure 5-4 depicts composition and relative cover of each plant species by site. The composition of riparian tree and shrub species shifted from predominantly mountain alder and lodgepole pine in the upper reaches of the UARP to predominantly white alder and willows (*Salix exigua*, *S. laevigata*, and *S. lasiolepis*) in the lower reaches (Figure 5-4). Large conifers including lodgepole pine, ponderosa pine (*Pinus ponderosa*), and incense cedar provided the majority of cover at sites in the upper reaches downstream of Loon Lake, Gerle Creek, and Ice House dams. Upland plant species (e.g., Jeffrey pine [*Pinus jeffreyi*], California coffee berry [*Frangula californica*]) occurred within the riparian

corridor at seven sites (Sites LLD-RV10, LLD-RV3, GCD-RV1, IHD-RV5, IHD-RV1, CD-RV4 and SCD-RV5).

The estimated density of trees and shrubs ranged widely between sites, from 74 individuals per acre at Site SCD-RV5 to 1,350 individuals per acre at Site LLD-RV10, where mature mountain alder and American dogwood formed a dense thicket along both banks (Appendix E4, Table E4-1). Sites in the reaches downstream of Camino and Slab Creek dams generally had lower tree and shrub density than sites higher in the watershed.

No woody species observed at any site displayed substantial amounts of leaf death, branch dieback, or other indicators of poor health. The proportion of the canopy with signs of reduced vigor did not exceed 20% for any site or species.

Age classes did not follow any notable pattern either by site or by species. Individuals in all age classes with measurable diameters at breast height (i.e., saplings to mature trees and shrubs) were present at all sites.

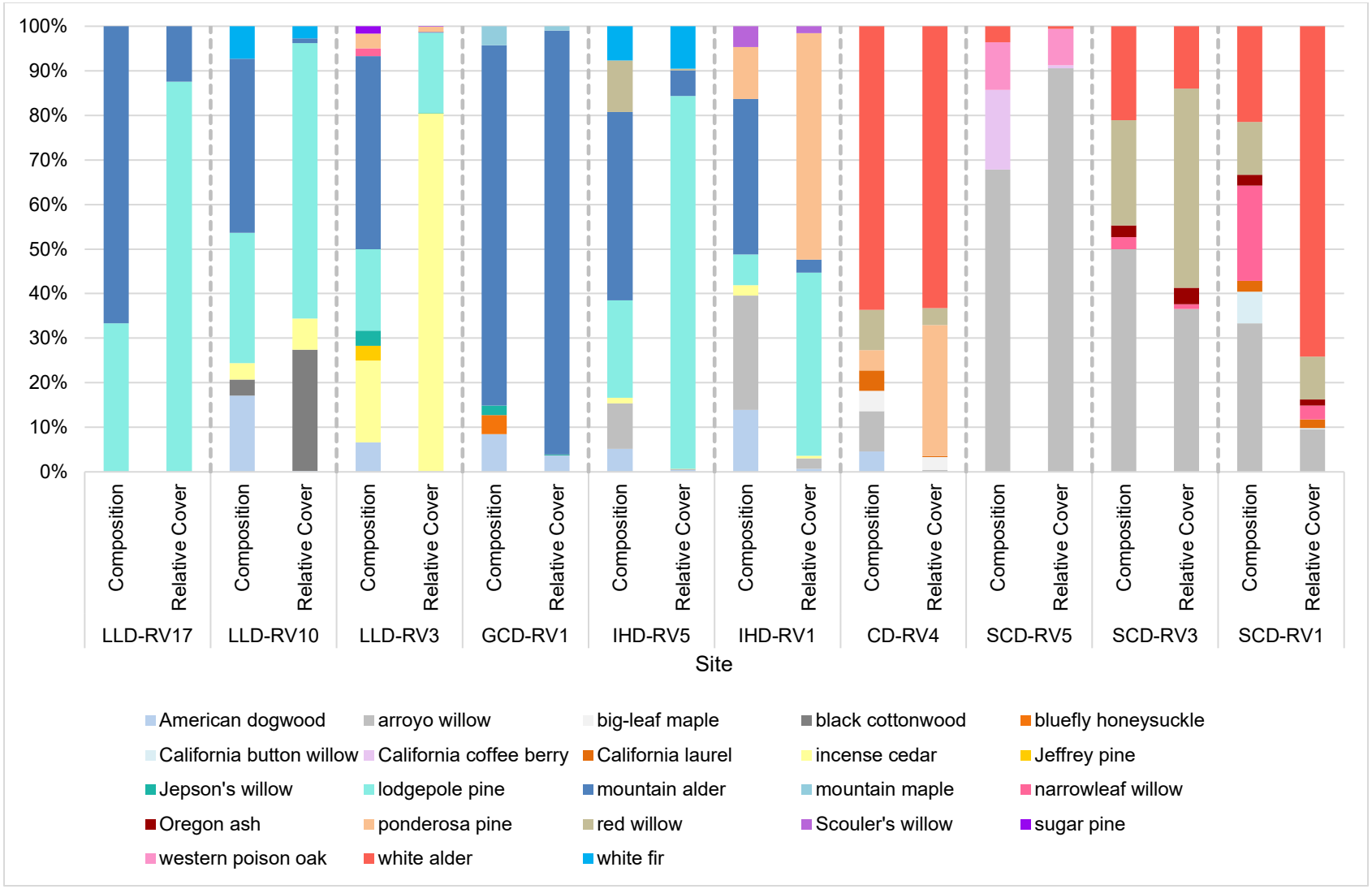


Figure 5-4. Composition and relative cover of species detected using the point-centered quarter method for the Upper American River Project, 2024.

5.2.2.3 Greenline

Greenline results are presented in Table 5-2; Appendix E2, Figure E2-1 through Figure E2-10; and Appendix E5, Table E5-1. In addition to numerous perennial vegetation types, the greenline also included boulders and bedrock at some sites. Overall bank stability class ranged from 6.1 at Site SCD-RV1 to 9.3 at Site CD-RV4 (Table 5-2); a crosswalk of vegetation alliances to their closest related Winward (2000) cover type, successional status, and stability class is provided in Appendix E5, Table E5-2.

Table 5-2. Average Bank Stability Class Based on Greenline Composition at Upper American River Project Sites, 2024.

Site	Stability Class[1]
LLD-RV17	9.0
LLD-RV10	7.4
LLD-RV3	7.9
GCD-RV1	9.1
IHD-RV5	7.1
IHD-RV1	7.3
CD-RV4	9.3
SCD-RV5	8.6
SCD-RV3	7.9
SCD-RV1	6.1

[1] Stability rating classes (Winward 2000):
1–2 = very low stability
3–4 = low stability
5–6 = mid-level stability
7–8 = high stability
9–10 = excellent stability

5.2.3 Special-status Species

Two special-status plant species were documented at Site IHD-RV1: Sierra sweet bay (*Myrica hartwegii*) and felt-leaved violet (*Viola tomentosa*). Sierra bayberry has a California Rare Plant Rank of 4.3 (i.e., watch list, not very threatened in California [CNPS 2024b]) and is listed on the Eldorado National Forest watch list (Forest Service 2020). Approximately 50 individuals were found near the water's edge in silty sand substrates, among boulders, and in moderate shade; plant associates included mountain alder, arroyo willow (*Salix lasiolepis*), streambank bird's-foot trefoil (*Hosackia oblongifolia* var. *oblongifolia*), and iris-leaved rush (*Juncus xiphioides*). Felt-leaved violet has a California Rare Plant Rank of 4.2 (i.e., watch list, moderately threatened in California [CNPS 2024b]). Approximately 55 individuals were found growing in granitic sand in the upland area with squirreltail grass (*Elymus elymoides*) under a ponderosa pine canopy.

5.3 DISCUSSION

5.3.1 Vegetation Types

Field observations from 2024 indicate that vegetation types at all sites except Site LLD-RV17 have not changed substantially since the 2004 riparian vegetation study. However, comparisons to the results of the 2004 riparian vegetation study (SMUD and PG&E 2004) are largely qualitative because quantitative comparisons of vegetation type acreages at each site are confounded by differences in site boundaries, resolution of available aerial imagery, and vegetation classification systems.

Site LLD-RV17 experienced notable change from 2004 to 2019 in both vegetative composition and channel alignment following inundation of riparian communities from a series of beaver dams on Gerle Creek that caused tree and shrub mortality and initiated adjustments to geomorphic conditions (SMUD 2020). Alterations from 2019 to 2024 were minimal; however, the site appears to be returning to a single stream channel evidenced by the drying of a previously mapped secondary channel and lack of beaver activity in the reach. In addition, the mountain alder vegetation type at Site LLD-RV17 increased from 16% of the total mapped acres in 2019 to 22% of the total mapped acres in 2024; the increased acreage of mountain alder and the presence of mountain alder recruits at the site suggest that native woody species are rebounding following beaver-induced inundation.

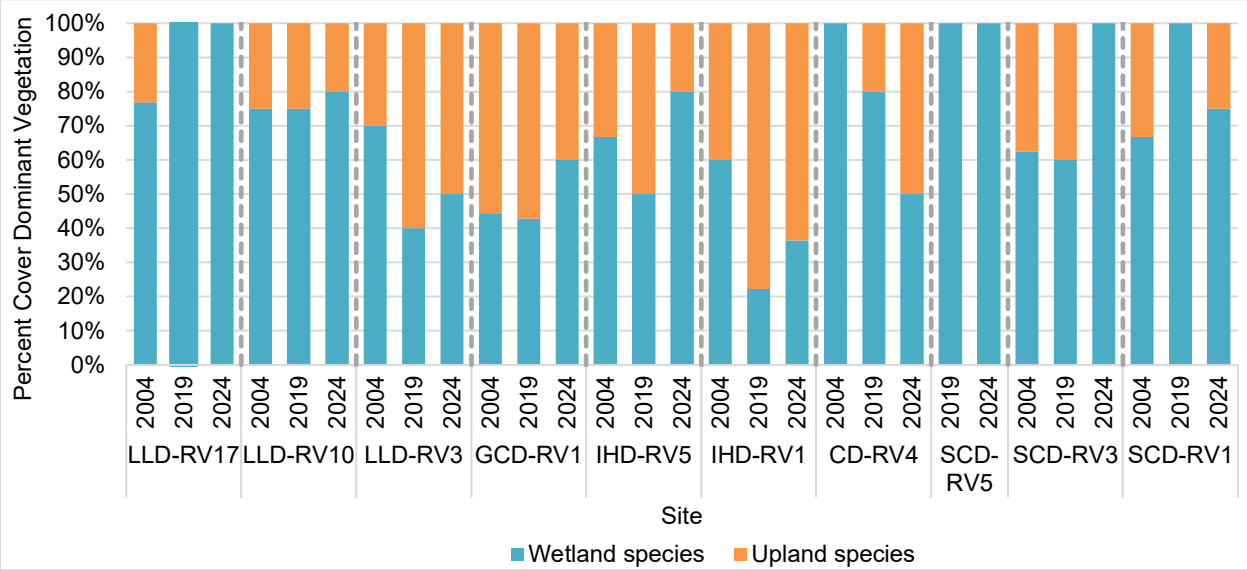
No substantial changes in vegetation occurred at any of the ten monitoring sites between 2019 and 2024. Indications of high flows (e.g., broken branches and debris) were observed at Site LLD-RV3; high flows possibly contributed to the slight reduction in the acreage of the mountain alder type (i.e., a decrease of 0.14 acre) at this site.

5.3.2 Species Composition and Condition

Only two of the ten monitoring sites (Sites CD-RV4 and SCD-RV1) exhibited a decrease in the percentage of dominant[7] wetland species observed from 2019 to 2024; six monitoring sites (Sites LLD-RV10, LLD-RV3, GCD-RV1, IHD-RV5, IHD-RV1, and SCD-RV3) exhibited an increase in the percentage of dominant wetland species; and two monitoring sites (Sites LLD-RV17 and SCD-RV5) were already dominated by wetland species in 2019 and 2024 (Figure 5-5). Sites with higher proportions of dominant wetland species in 2024 (i.e., sites where greater than 50% of the dominant species were wetland species) had a 23% increase in the proportion of dominant wetland species from 2019. The biggest change was observed at Site SCD-RV3, where wetland species increased from 60% of the dominant species to 100% due to increased cover of the facultative wetland species arroyo willow. Despite the general increase in

[7] Dominant species from 2019 and 2024 line-point intercept data were defined as the most frequently occurring species that, either individually or together, accounted for over 50% of the total vegetative cover, plus any additional species that had at least 20% cover (USACE 2010). Dominant species from the 2004 line-point intercept were taken from those listed as dominant in the 2004 riparian vegetation study (SMUD and PG&E 2004).

the proportion of wetland species from 2019 to 2024, comparison of 2019 and 2024 results with 2004 results reveals no common trend among monitoring sites since the implementation of the modified flow regime under the 2014 License (Figure 5-5).



Note: Site SCD-RV5 was not monitored in 2004.

Figure 5-5. Comparison of the percentage of dominant wetland and upland species observed at Upper American River Project sites, 2004, 2019, and 2024.

Recruitment of woody riparian species was observed at all sites in 2024 and at eight sites in 2019; recruitment was not observed at Sites LLD-RV17 and SCD-RV5 in 2019. More recruits were observed overall in 2024 than in 2019, and a higher proportion of those recruits were wetland species. For example, recruitment observed in 2019 at Site IHD-RV5 consisted primarily of the upland species white fir; in 2024, white fir recruits were still present along with recruits of several wetland species including mountain alder and red willow (*Salix laevigata*). Although conifer encroachment into the riparian zone (i.e., conifer recruitment) was observed at five sites with some of the highest percentages of dominant upland species (Sites LLD-RV10, LLD-RV3, GCD-RV1, IHD-RV5, and IHD-RV1), the proportion of dominant upland species decreased from 2019 to 2024 at each of these sites (Figure 5-5). The observed changes in recruitment and species composition between 2019 and 2024 indicate that riparian species continue to recruit successfully and maintain dominance under the current flow regime, even where conifers are present and recruiting within the riparian corridor.

The density and vigor of woody vegetation in the riparian corridor increased marginally at most sites from 2019 to 2024 (Figure 5-6 and Figure 5-7). Increases in vegetation density are likely indicative of the growth and establishment of new and younger individuals, as supported by corresponding increases in the number of recruits and decreases in the average age class at most of these sites (Figure 5-7). Decreases in woody riparian vegetation density at Sites IHD-RV1 and IHD-RV5 were likely associated with conifer encroachment and human disturbance (e.g., vegetation management, recreation use trails near Silver Creek Group Campground). Nevertheless, both Sites IHD-RV1 and IHD-RV5 maintained some of the highest vegetation densities observed at the UARP in 2024 (i.e., 568 individuals per acre at Site IHD-RV5 and 342 individuals per acre at Site IHD-RV1). Decreased density of woody vegetation at Site SCD-RV1 was attributable to a debris slide from a former silica and gravel mine upslope of the left bank of Transect 1 that eliminated vegetation in its direct path.

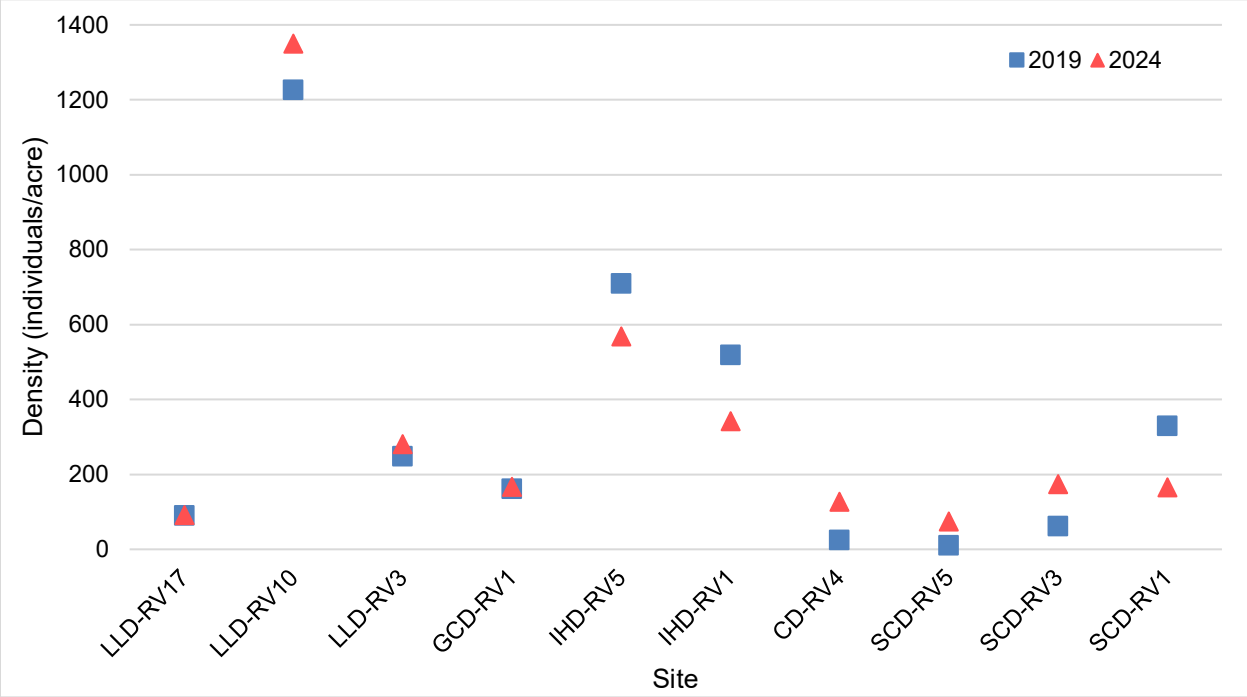
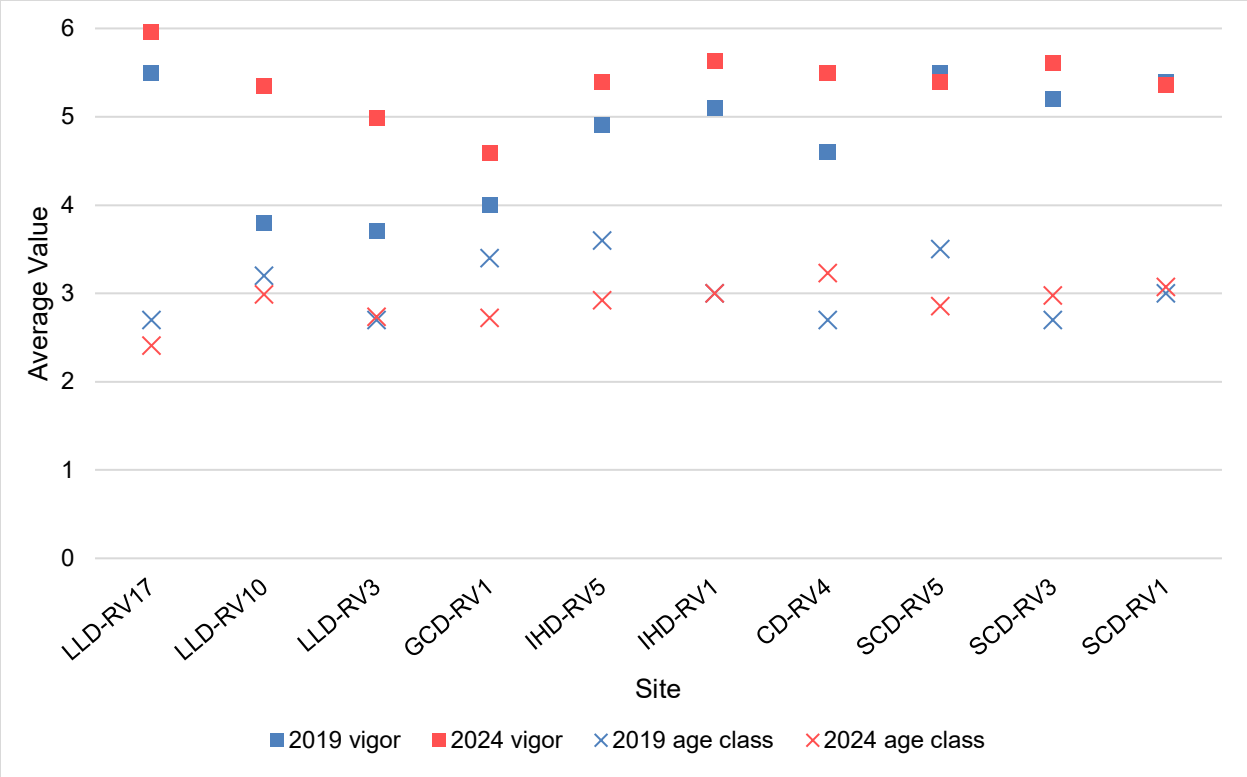


Figure 5-6. Density of woody riparian vegetation at Upper American River Project monitoring sites, 2019 and 2024.



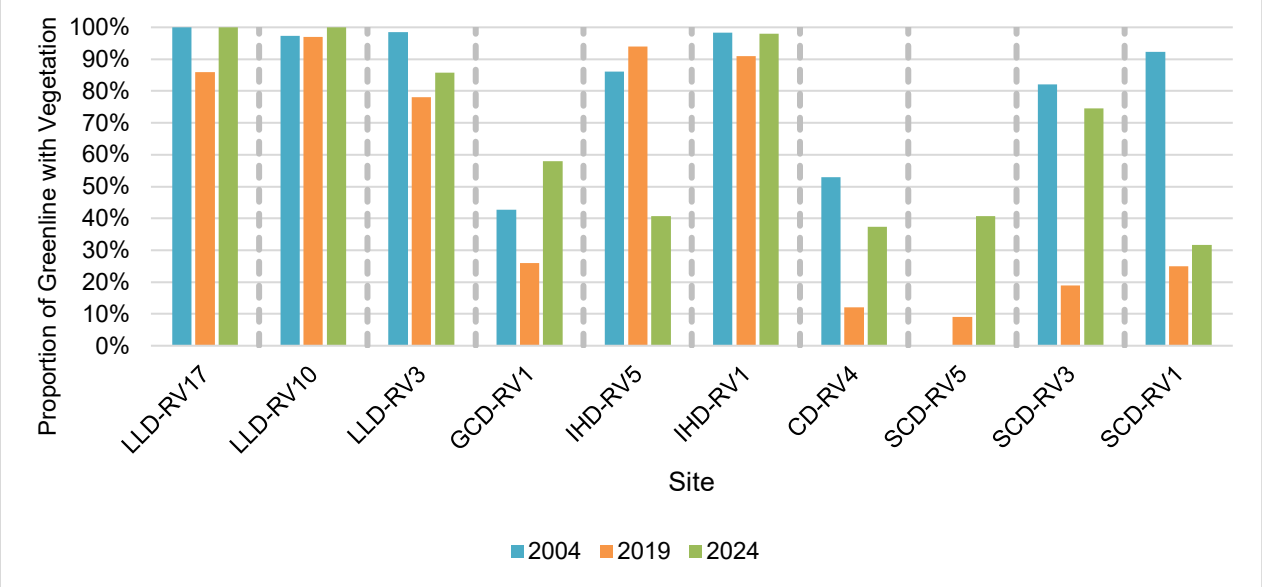
Notes: Vigor values: 1 = dead; 2 = critically stressed (>50% of canopy affected); 3 = significantly stressed (21–50% of canopy affected); 4 = stressed (11–20% of canopy affected); 5 = normal (5–10% of canopy affected); 6 = vigorous (<5% of canopy affected)

Age classes: 1 = seedlings ≤1 year old; 2 = trees and shrubs 2–4 years old; 3 = young trees (4–10 years old) and mature shrubs (>4 years old, <20% dead); 4 = mature trees (>10 years old, <20% dead) and decadent shrubs (>4 years old, ≥20% dead); 5 – decadent trees (>10 years old, ≥20% dead)

Figure 5-7. Average vigor and age class of woody riparian vegetation at Upper American River Project monitoring sites, 2019 and 2024.

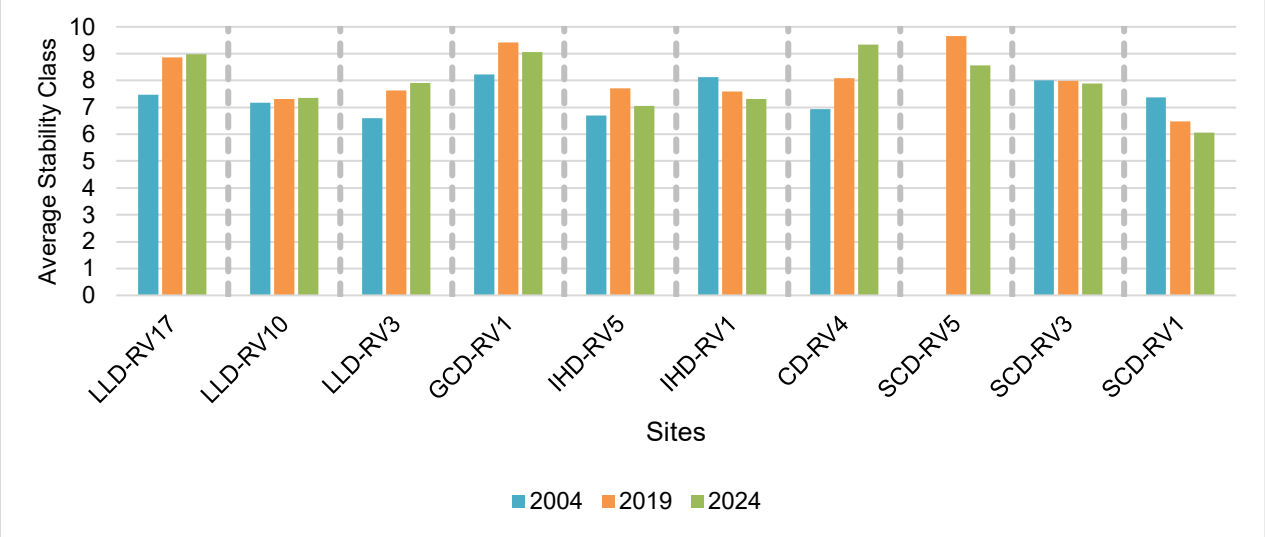
5.3.3 Bank Stability

Despite variability in the proportion of vegetated greenline at several sites (Figure 5-8), the average bank stability class did not fluctuate substantially between 2019 and 2024 (Figure 5-9). The most notable shift occurred at Site CD-RV4, where the average bank stability class increased from 8.1 in 2019 to 9.3 in 2024, likely following an increased relative abundance of mountain alder. Any documented decreases in the average stability class from 2019 to 2024 were small (i.e., less than 1 unit of stability).



Note: Site SCD-RV5 was not monitored in 2004.

Figure 5-8. Percent of greenline that was vegetated at Upper American River Project sites, 2004, 2019, and 2024.



Note: Site SCD-RV5 was not monitored in 2004.

Figure 5-9. Average stability class of greenline at Upper American River Project sites, 2004, 2019, and 2024.

Compared with 2004 pre-License survey results, the average stability class from 2019 and 2024 increased at six of the nine sites while remaining within one unit of all 2004 measurements (Figure 5-9). Comparison between years suggests large woody species maintain a similar proportion of the greenline at most sites, while the largest variability was observed among herbaceous or small woody species at sites with rocky substrates. Sites LLD-RV17 and LLD-RV3 developed comparatively higher increases in average bank stability classes from pre-License monitoring due to proliferations of woody plants

such as mountain alder at Site LLD-RV17 and herbaceous plants with relatively high stability classes (e.g., umbrella bulrush [*Scirpus diffusus*]) at Site LLD-RV3.

The greenline at high-elevation sites is typically more vegetated than the greenline at lower-elevation sites; greater than 85% of the greenline was vegetated at Sites LLD-RV17, LLD-RV10, LLD-RV3, IHD-RV5, and IHD-RV1. Although these sites may be more susceptible to changes in bank stability due to the potential for shifts in vegetation composition, the proportion of vegetated greenline varied less than 15% between 2019 and 2024 at each site, and the banks remained stable (i.e., maintained a stability class over 7). At Sites GCD-RV1 and SCD-RV5, the banks are primarily boulders and bedrock, which have high stability classes, so little change in stability is expected over time.

5.3.4 Notable Site Changes

Site SCD-RV5 was added as an implementation monitoring site to support construction of the South Fork Powerhouse in 2018 because dewatering during construction may have affected riparian vegetation in the vicinity. In 2019, Site SCD-RV5 had the lowest number of recruits, density of woody riparian species, and proportion of vegetated greenline. Each of these metrics increased from 2019 to 2024, indicating that the low-flow channel created per the South Fork Powerhouse Project Habitat Improvement Plan (SMUD 2018) provides the necessary flow connectivity to support the establishment and survival of riparian vegetation in the area, even with a substrate composed largely of bedrock and boulders.

5.3.5 Conclusion and Future Monitoring

Small increases in the proportion of wetland species, the number of recruits, and the density and vigor of woody species occurred from 2019 to 2024 at many riparian vegetation monitoring sites across the UARP. Because only 2 years of data have been collected under the current License, these small increases could indicate year-to-year variability or longer-term trends associated with modified flows. Future monitoring over the course of the 50-year License will elucidate whether any significant long-term trends in riparian vegetation extent, composition, and condition are tied to modifications in the flow regime.

Although more monitoring is necessary to conclude if modified flows have altered riparian conditions in the UARP, the relatively high cover and density of native wetland vegetation and the bank stability across the sites in 2024 indicate that the system is in proper functioning condition (Dickard et al. 2015).

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6.0 BALD EAGLE

6.1 MONITORING PLAN OBJECTIVES

The objectives of bald eagle (*Haliaeetus leucocephalus*) monitoring in the UARP are to document bald eagle nesting activity in the study area (Section 1.0) and ensure that bald eagle nests are not adversely affected by UARP-related activities. Results are intended to inform future bald eagle management in the UARP (SMUD 2015).

6.2 METHODS

Bald eagle surveys were conducted during the 2024 breeding season[8] at Union Valley Reservoir and Ice House Reservoir[9] in accordance with the *Protocol for Evaluating Bald Eagle Habitat and Populations in California* (Jackman and Jenkins 2004), *Bald Eagle Breeding Survey Instructions* (CDFW 2017), and the Bald Eagle Monitoring Plan (Plan) (SMUD 2015) (Figure 1-2, Table 6-1).

Table 6-1. Bald Eagle Survey and Reproductive Status Check Dates, 2024.

Survey Type	Survey Date	
	Union Valley Reservoir	Ice House Reservoir
Early breeding season survey	20 March	21 March
Mid-breeding season survey	16 May	16 May
Late breeding season survey	2 July	2 July
Reproductive status check	4 June, 24 June, 1 July, 11 July	4 June, 1 July

Nest sites documented during previous years of surveys (SMUD 2024) were revisited, and other areas with suitable habitat surrounding each reservoir were evaluated for signs of bald eagle nesting activity. Observations were made using binoculars and/or a spotting scope from boat- and land-based vantage points. Detailed information about the location, age class, activity, movement, and behavior of bald eagles was recorded, along with notes on the general level of recreation or other noise-generating activity at each reservoir. Notable features (e.g., bald eagle perches) located during the surveys were mapped using a tablet equipped with a GPS. Incidental observations of other avian species were also recorded (Appendix F1). Bald eagle observations made during field surveys were summarized using the California Bald Eagle Nesting Territory Form

[8] The bald eagle breeding season in California is defined as 1 February to 31 July (CDFW 2017). Because the study area is at high elevation, bald eagle breeding may be delayed (Jackman and Jenkins 2004); therefore, bald eagle surveys in the UARP are typically initiated in mid- to late March, contingent upon accessibility and weather conditions.

[9] Per the Bald Eagle Monitoring Plan (Plan), surveys were not performed at Loon Lake Reservoir in 2024 because bald eagle reproductive activity was not observed during 2021–2023 breeding season surveys (SMUD 2022, 2023, 2024).

(CDFW 2017) and submitted to CDFW at the end of the breeding season (Appendix F2).

6.3 RESULTS

6.3.1 Union Valley Reservoir

Bald eagles successfully reproduced at Union Valley Reservoir in 2024 using the nest in Sunset Campground, which has been used annually since 2016 (SMUD 2017–2024) (Table 6-2, Figure 6-1). Incubation was observed during the early breeding season survey (20 March), and two nestlings were observed during the mid-breeding season survey (16 May). Both eaglets had molted into juvenile plumage by the 4 June status check (Figure 6-2). During the final survey (2 July) both juveniles were branching and close to fledging (Figure 6-3). A subsequent status check (11 July) indicated fledging, as both juveniles were absent from the nest and one was observed flying.

No evidence of bald eagle reproductive activity was observed elsewhere on Union Valley Reservoir in 2024 including at the historical nest site (SMUD 2015) and nest platform on Granlee's Point, and other suitable habitat around the reservoir (Figure 6-1). Additional detail regarding surveys and reproductive status checks conducted in 2024 at Union Valley Reservoir is provided in Appendix F2.

Table 6-2. Bald Eagle Observations during the Breeding Season at Union Valley Reservoir, 2024.

Date	Time	Number of Eagles	Age Class	Notes
20 March	18:45	1	Adult	Adult vocalizing and visible within nest at Sunset Campground.
16 May	09:20	1	Adult	Adult (female) perching on branch adjacent to nest.
16 May	10:25	2	Nestling	Wing of nestling(s) visible above edge of nest.
16 May	10:43	1	Adult	Adult (female) flying from nest tree to perch in sugar pine (*Pinus lambertiana*) along shore.
4 June	11:30	1	Juvenile	Juvenile present in nest.
4 June	11:40	1	Adult	Adult flying east above nest tree.
4 June	11:45	2	Juvenile	Second juvenile visible in nest, both vocalizing.
24 June	09:56	2	Adult; juvenile	Adult in nest; juvenile perching next to nest and stretching wings and hopping.
1 July	20:15	1	Juvenile	Juvenile on nest, periodically vocalizing.
2 July	06:00	2	Juvenile	Two juveniles in nest tree: one in nest, second perched on a branch 20 feet below.
2 July	08:24	3	Adult; juvenile	Adult landing on nest, both juveniles vocalizing in response from previously noted locations.
2 July	15:30	1	Adult	Adult flying southeast over reservoir south of Sunset Boat Launch toward Jones Fork Campground.
2 July	16:30	2	Juvenile	Both juveniles in nest tree at previous locations.
11 July	17:10	1	Juvenile	Juvenile flying south from shore, landing in ponderosa pine (*Pinus ponderosa*) near access trail to Sunset Campground.



Figure 6-1. Bald eagle activity sites at Union Valley Reservoir, 2024.



Figure 6-2. Juvenile bald eagles in nest at Sunset Campground, 4 June 2024.



Figure 6-3. Juvenile bald eagles in nest tree at Sunset Campground, 2 July 2024.

6.3.2 Ice House Reservoir

Bald eagles successfully reproduced at Ice House Reservoir in 2024 using the nest that was severely damaged in 2023 (SMUD 2024) (Table 6-3, Figure 6-4). During the early breeding season survey (21 March), incubation was observed on the rebuilt nest (Figure 6-5). A single eaglet, first observed during the mid-breeding season survey (16 May), was branching and appeared to be close to fledging during the final survey (2 July) (Figure 6-5). On 20 July, SMUD staff observed a juvenile eagle flying over the southeast end of the reservoir, suggesting fledging. Additional detail regarding surveys and reproductive status checks conducted in 2024 at Ice House Reservoir is provided in Appendix F2.

Table 6-3. Bald Eagle Observations during the Breeding Season Surveys at Ice House Reservoir, 2024.

Date	Time	Number of Eagles	Age Class	Notes
21 March	08:04	1	Adult	Adult (male) perching in Douglas fir (*Pseudotsuga menziesii*) on ridge east of Ice House Dam for approximately 10 minutes before flying west across reservoir.
21 March	09:40	1	Adult	Adult (male) perching in incense cedar (*Calocedrus decurrens*) with snag-top northwest of the nest tree on the south shore.
21 March	09:50	1	Adult	Adult (female) in incubation posture on nest in large, broken-topped incense cedar on south shore.
21 March	10:00	1	Adult	Adult (male) relocating to three separate trees near nest over the course of 30 minutes before returning to incense cedar.
16 May	07:25	1	Adult	Adult (female) perching on branch above nest.
16 May	07:38	2	Adult	Adult (female) flying north from nest tree across reservoir, briefly joining adult (male), and landing in perch in ponderosa pine on north shore.
16 May	07:41	1	Adult	Adult (male) capturing juvenile waterfowl, flying south across reservoir, and landing on stump to pluck prey.
16 May	07:46	1	Adult; nestling	Adult (male) departing plucking post to deliver prey to nestling.
16 May	07:47	3	Adult; nestling	Adult (female) briefly joining adult (male) on nest, then flying north across reservoir; adult (male) continued feeding nestling.
4 June	10:20	2	Adult; juvenile	Adult feeding juvenile in nest.
1 July	18:50	1	Juvenile	Juvenile perching on branch above nest, flapping wings and hopping.
1 July	18:55	1	Adult	Adult perching in ponderosa pine east of nest tree.
2 July	09:00	1	Juvenile	Juvenile perching on nest and adjacent branches, flapping wings and vocalizing.
2 July	10:15	1	Adult	Adult flying west over south shore toward Ice House Dam.

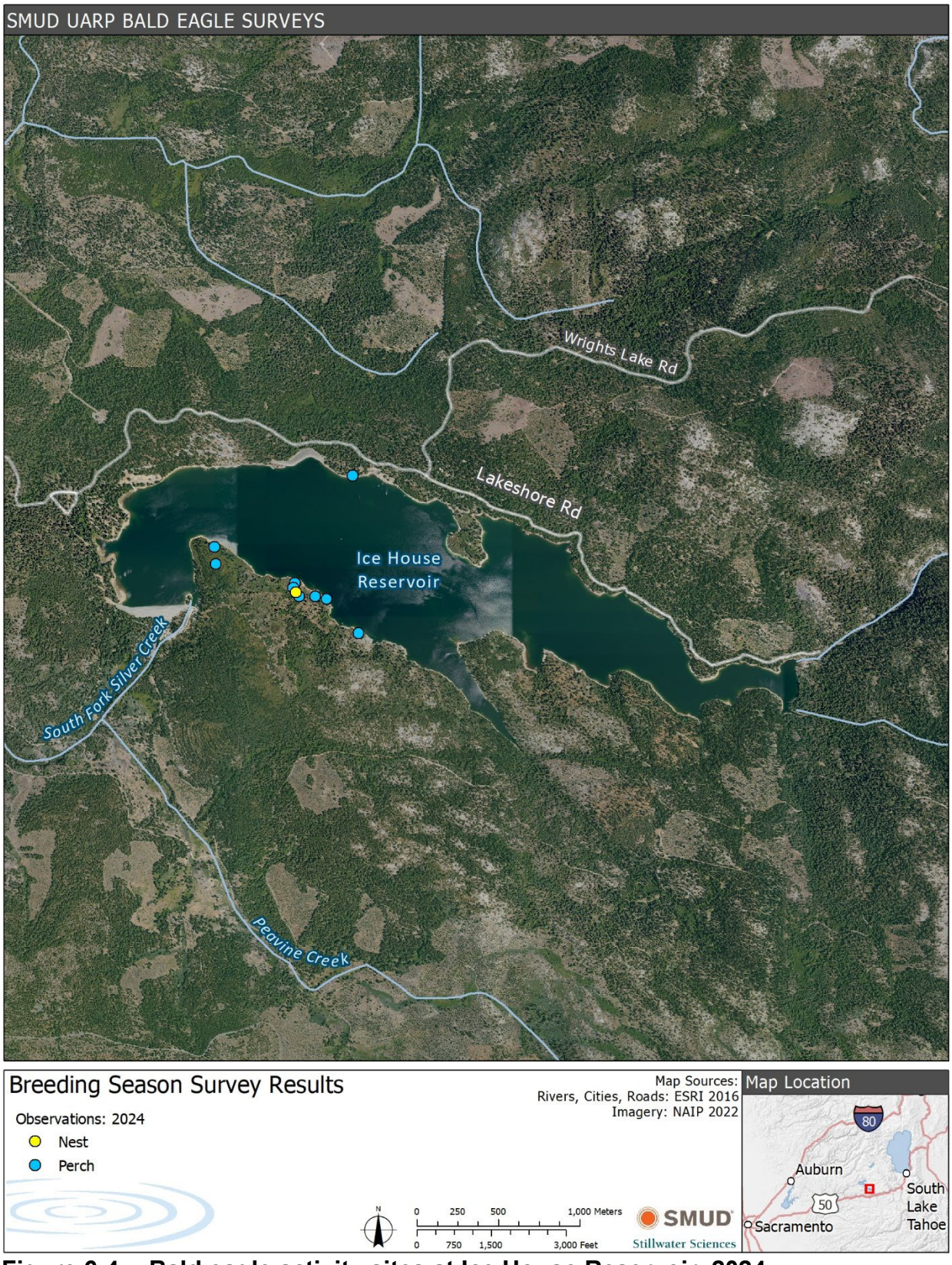


Figure 6-4. Bald eagle activity sites at Ice House Reservoir, 2024.



Figure 6-5. Female bald eagle in rebuilt nest on south shore of Ice House Reservoir, 21 March 2024 (left); juvenile bald eagle perched next to nest on south shore of Ice House Reservoir, 2 July 2024 (right).

6.4 DISCUSSION

Relatively mild weather conditions in the UARP during the 2024 breeding season likely contributed to successful nesting at both Union Valley and Ice House reservoirs, unlike prior years when severe weather with heavy precipitation and/or high wind, particularly in the spring, likely caused bald eagle nest failures within the study area (SMUD 2004, SMUD 2020, SMUD 2021, SMUD 2024). The 2024 water year was Below Normal with cumulative precipitation in the region at approximately 88% of normal (DWR 2024a, NOAA 2024). During the breeding season, cumulative precipitation at Robbs Powerhouse (Station ID: RBP)[10] was 28 inches with the majority falling between early February and early March (DWR 2024b). Additional minor precipitation events occurred in the spring with no significant late season storms. Wind speed measured at Big Hill (Station ID: BHS) peaked at 49 miles per hour during a storm in early February. Snowpack (as measured by water content) peaked in March with 7 inches at Robbs Powerhouse and 9 inches at Ice House Resort (Station ID: IHS) and melted completely by April.

Conditions at each reservoir were conducive to bald eagle foraging through most of the breeding season. Though minimum air temperatures regularly dropped below freezing through early May (Station ID: RBP, BHS), the surfaces of both reservoirs were free of ice during the initial survey and for the remainder of the breeding season (DWR 2024b). Water surface elevations (above mean sea level) remained relatively consistent throughout the breeding season with Union Valley Reservoir (Station ID: UNV) ranging from 4,823 to 4,868 feet and Ice House Reservoir (Station ID: ICH) ranging from 5,426 to 5,446 feet (DWR 2024b).

Maintenance, construction, and recreation activities did not affect bald eagle nesting success at either reservoir in 2024. Consistent with observations in prior years (SMUD 2017–2024), bald eagles did not exhibit signs of disturbance in response to these types of activities during surveys. Maintenance activities during the breeding season at both reservoirs were routine and did not involve significant noise generation. At Union Valley Reservoir, road construction involving heavy equipment was conducted in May on Fashoda Way approximately 0.25 mile from the nest tree in Sunset Campground. No other construction occurred at Union Valley or Ice House reservoirs during the 2024 breeding season. Recreation on and around both reservoirs was minimal during the early and mid-breeding season surveys; however, an increase in boating and campground activity was noted at both locations during the late breeding season surveys (Appendix F2). At Union Valley Reservoir, the Forest Service did not open the portion of Sunset Campground immediately surrounding the eagle nest until after the juveniles had fledged (Section 6.3.1).

[10] Referenced values are from the station closest to each reservoir with available data.

6.5 LITERATURE CITED

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7.0 HARDHEAD

7.1 MONITORING PLAN OBJECTIVES

The objective of the Hardhead Monitoring Plan (Plan) is to evaluate long-term trends in the longitudinal distribution and relative abundance of hardhead (*Mylopharodon conocephalus*) following implementation of higher minimum streamflows required by 2014 License conditions in the SFAR downstream of the Slab Creek Dam (Slab Creek Dam Reach) (SMUD 2016, FERC 2014). 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.

7.2 METHODS

The hardhead monitoring area is presented in Figure 1-3. Site locations are depicted in Figure 7-1. During hardhead surveys, three to four snorkelers were positioned in parallel lanes and swam a single pass downstream to upstream, counting all fish observed. Lane width was determined on site, depending on visibility and habitat complexity. Fish were enumerated by species and binned into 25-mm size classes. Consistent survey locations and methods have been used throughout License implementation, including in 2024 (SMUD 2017, 2018, 2020, 2021). Further details on field and analytical methods are described in Sections 3.1 and 4.0 of the Plan (SMUD 2016).

7.3 RESULTS

Snorkel surveys on the SFAR downstream of Slab Creek Dam were conducted on 19 and 22 August 2024 (Figure 7-1). Conditions during surveys included calm weather, clear skies, and water visibility (estimated with a Secchi disk) ranging from 8.7 to 18.2 feet. Discharge during snorkel surveys downstream of Slab Creek Dam was approximately 78 cfs.

7.3.1 Habitat Characteristics

Sites in 2024 varied in length and habitat type (e.g., run, pool, or pocket water) (Table 7-1). Most habitat units were dominated by boulder substrate. Fish cover, primarily in the form of large boulders, was present at all units; other forms of cover included overhanging vegetation and bubble curtains. Water quality conditions during sampling included high dissolved oxygen levels (average 98%), cool water temperatures (ranging from 13.5 degrees Celsius [°C] to 17.9°C), and low conductivity (ranging from 18.2 to 20.8 microsiemens per centimeter [µS/cm]) (Table 7-2).

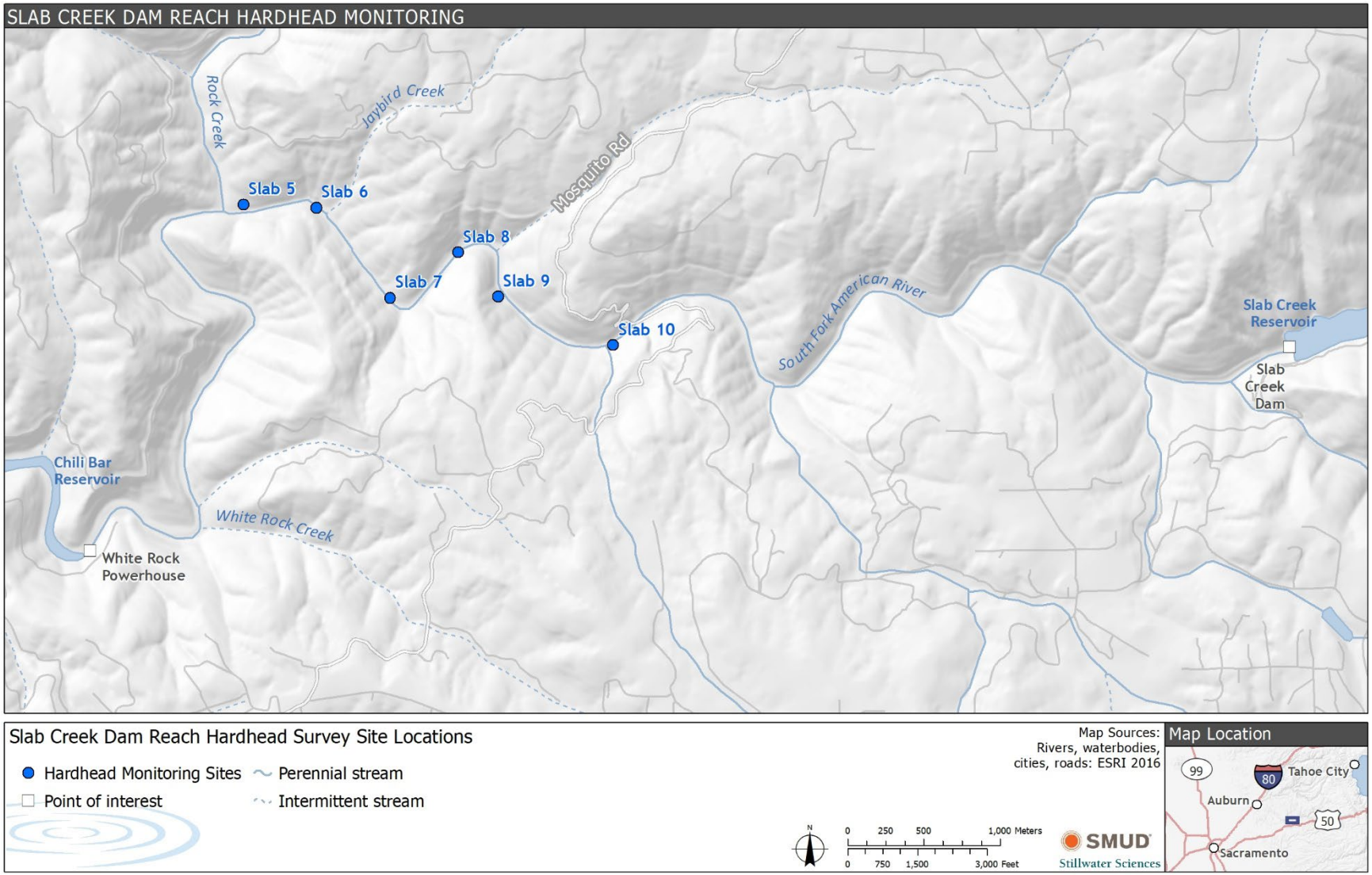


Figure 7-1. Hardhead site locations in the Slab Creek Dam Reach of the South Fork American River.

Table 7-1. Physical Characteristics at Hardhead Monitoring Sites in the Slab Creek Dam Reach, August 2024.

Site	Habitat Type	Substrate		Cover			Average Width (feet)	Unit Length (feet)
		Dominant	Sub-dominant	Dominant	Sub-dominant	Total %		
Slab 5	Run	Boulder	Bedrock	Boulder	None	20	84	217
	Pool	Bedrock	Boulder			40	79	87
Slab 6	Pool	Boulder	Bedrock	Boulder	Overhanging vegetation	30	64	266
	Run				None	30	58	102
Slab 7	Pool 1	Boulder	Bedrock	Boulder	None	10	64[a]	79[a]
	Pool 2				Bubble curtain	20	76[a]	69[a]
Slab 8	Run 1	Boulder	Cobble	Boulder	Bubble curtain	15	56	125[a]
	Run 2	Bedrock	Boulder		None	25	89	174
	Pool				Bubble curtain	25	59	190
Slab 9	Pool	Boulder	Bedrock	Boulder	Bubble curtain	55	51	95
	Run					30	45	66
Slab 10	Pocket water	Boulder	Bedrock	Boulder	Bubble curtain	20	64	177
	Run					20	53	230

[a] Length measurements are from 2020 data collection due to measurement error.

Table 7-2. Water Quality Conditions at Hardhead Monitoring Sites in the Slab Creek Dam Reach, August 2024.

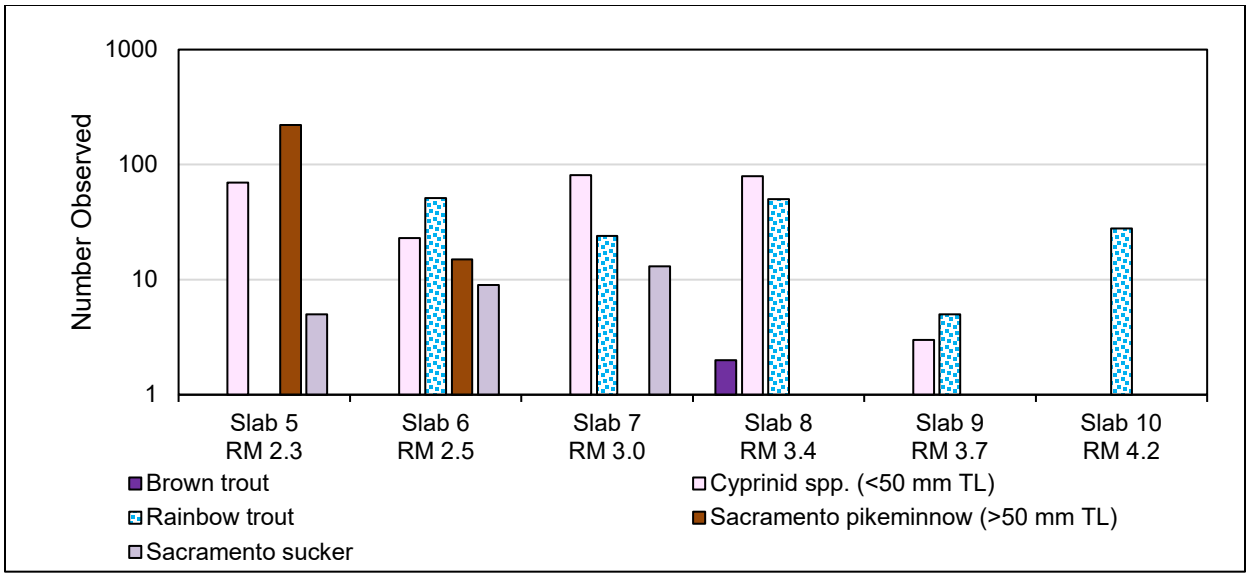
Site	Habitat Unit	Conductivity (µS/cm)	Temperature (°C)	Dissolved Oxygen	
				%	mg/L
Slab 5	Run	20.8	17.9	101	10
	Pool				
Slab 6	Pool	20.7	17.9	99	9
	Run				
Slab 7	Pool 1	19.9	16.9	98	9
	Pool 2				
Slab 8	Run 1	19.4	15.9	97	10
	Run 2				
	Pool				
Slab 9	Pool	18.8	14.5	97	10
	Run				
Slab 10	Pocket water	18.2	13.5	93	10
	Run				

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

7.3.2 Species Composition

Four fish species were observed in the Slab Creek Dam Reach during 2024 survey efforts: brown trout, rainbow trout, Sacramento sucker, and Sacramento pikeminnow (*Ptychocheilus grandis*) (Figure 7-2). Unidentified YOY cyprinids[11] (<50-mm TL) are referred to herein as Cyprinid spp. No hardhead observations were documented during 2024 snorkel surveys.

[11] Unidentified cyprinids are likely Sacramento pikeminnow or hardhead based on past observations of older life stages in the reach, but California roach (*Hesperoleucus symmetricus*) and speckled dace may also be present.

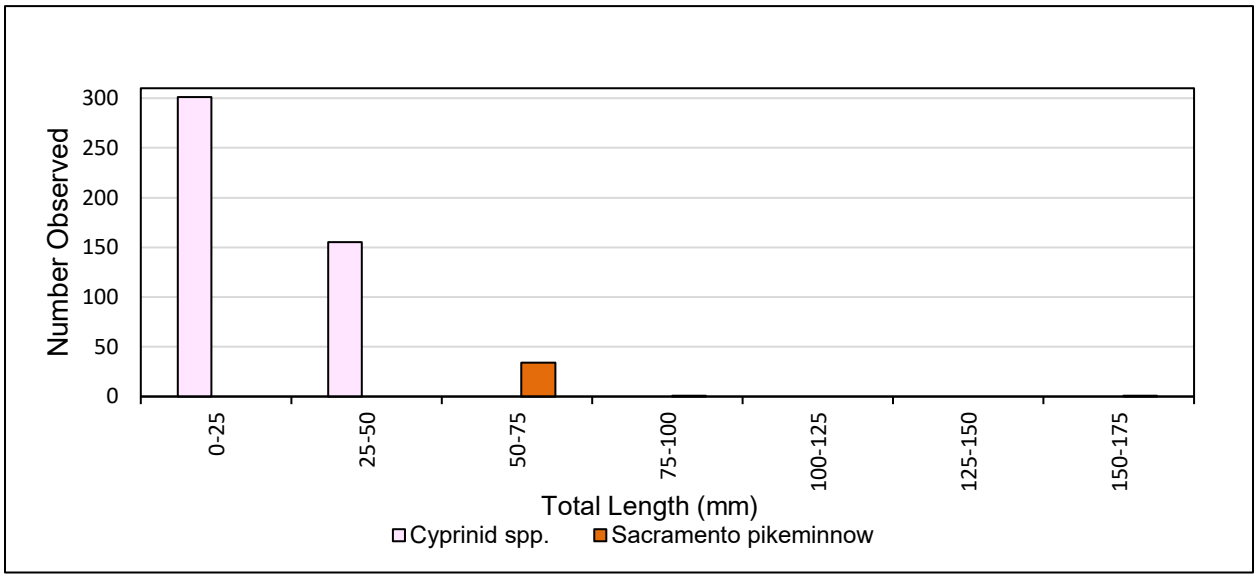


Notes: mm = millimeter, RM = river mile, TL = total length
Y axis is scaled to log10.

Figure 7-2. Fish species observed during snorkel surveys by site and river mile in the Slab Creek Dam Reach, August 2024.

7.3.2.1 Cyprinids

Cyprinids in 2024 were observed at every site within the study reach except Slab 10 (Figure 7-3). Many cyprinids were YOY that were not positively identified to species due to their size and lack of distinguishable characteristics; the remaining cyprinids were identified as Sacramento pikeminnow (Figure 7-3).

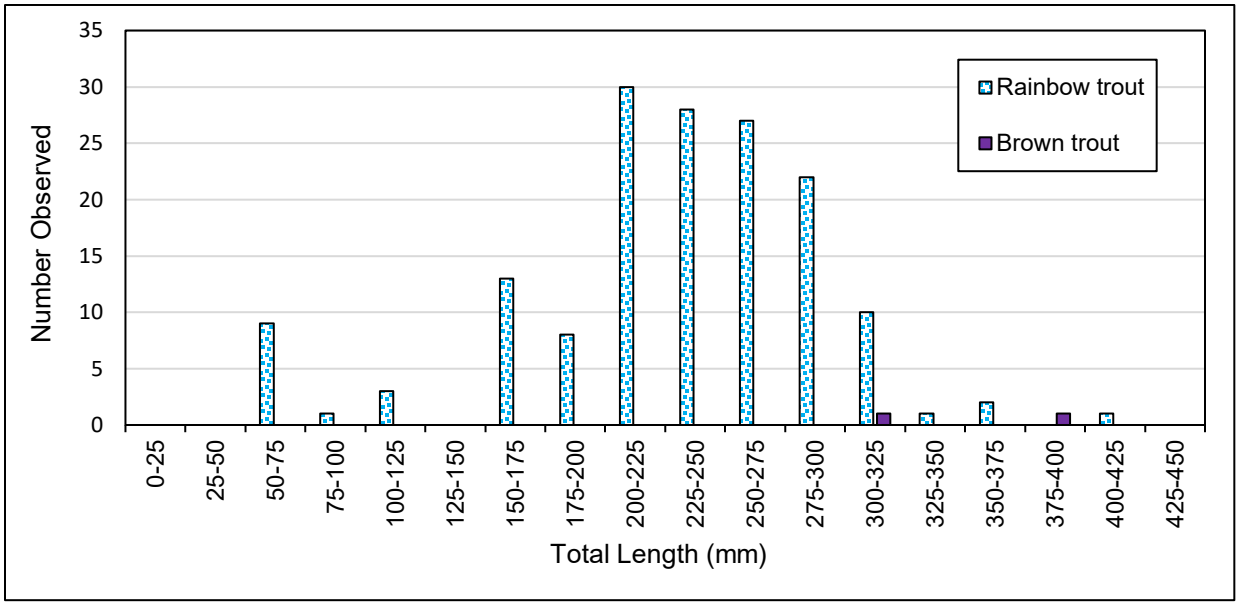


Note: mm = millimeter

Figure 7-3. Length-frequency histogram for cyprinids observed during snorkel surveys in the Slab Creek Dam Reach, August 2024.

7.3.2.2 Salmonids

Rainbow trout were observed at every site within the study reach except Slab 5 (Figure 7-2). A total of 158 rainbow trout representing multiple age classes were observed, ranging from 50- to 425-mm TL (Figure 7-4). Two brown trout ranging from 300- to 400-mm TL were observed at Slab 8 (Figure 7-2 and Figure 7-4).

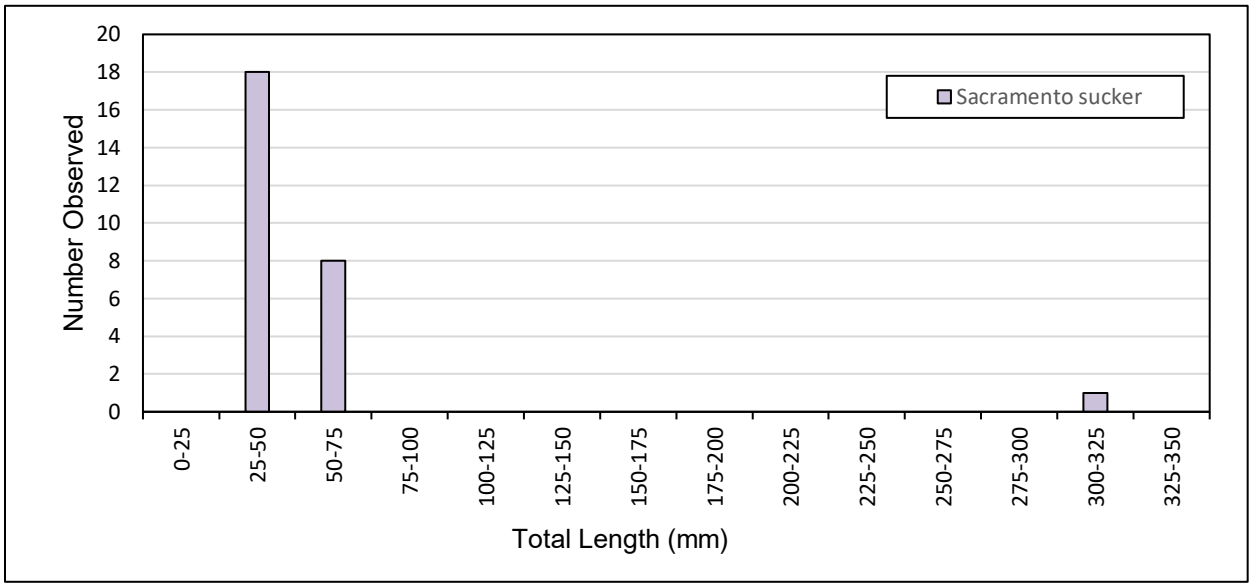


Note: mm = millimeter

Figure 7-4. Length-frequency histogram for salmonids observed during snorkel surveys in the Slab Creek Dam Reach, August 2024.

7.3.2.3 Additional Species

One additional taxon, Sacramento sucker, was observed at Slab 5 through Slab 7. A total of 27 Sacramento suckers, 26 of which were juveniles ranging from 25- to 75-mm TL, were observed across all sites. The remaining Sacramento sucker observation was an adult that was 300- to 325-mm TL at Slab 6 (Figure 7-5).



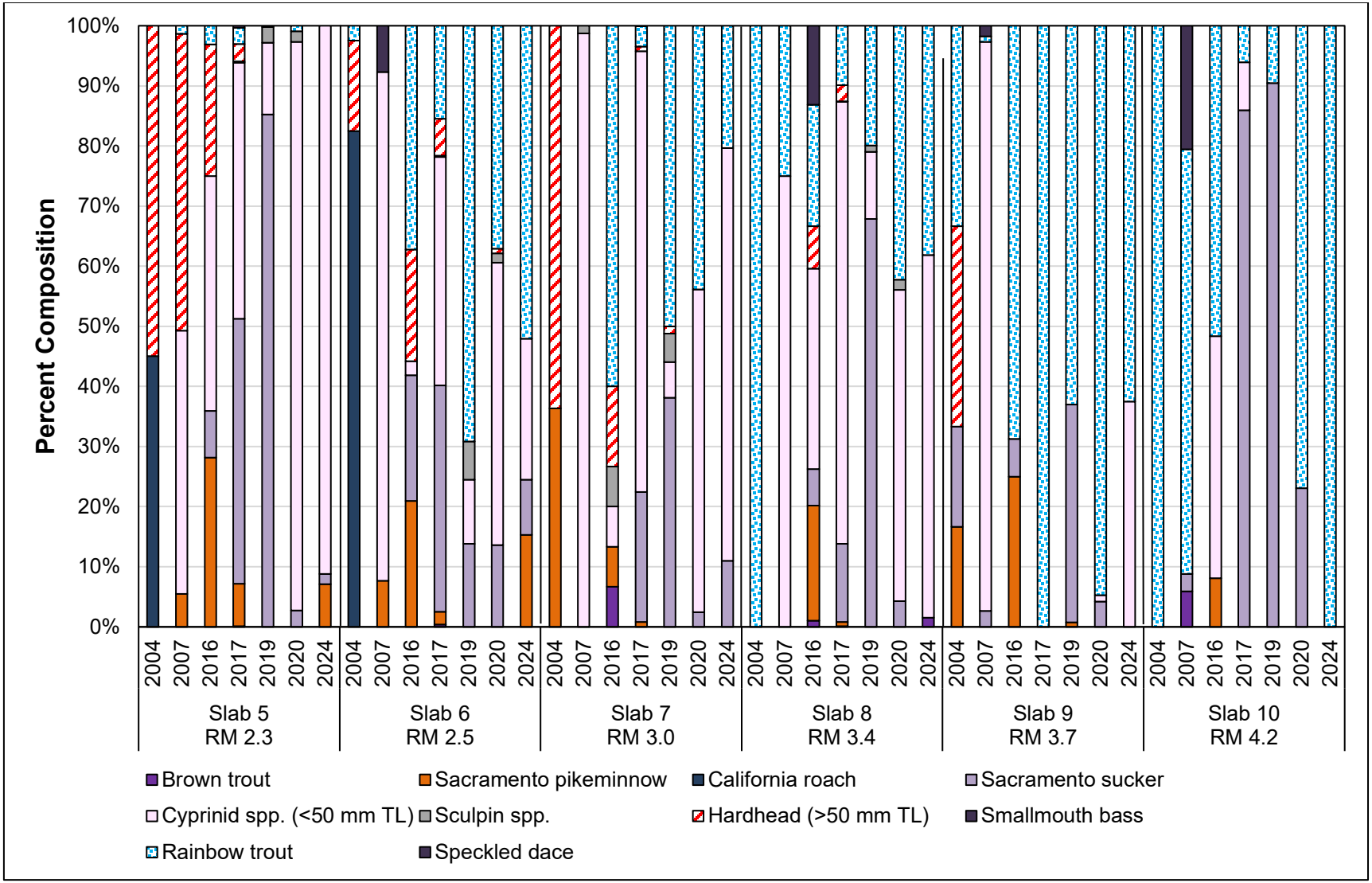
Note: mm = millimeter

Figure 7-5. Length-frequency histogram for Sacramento sucker observed during snorkel surveys in the Slab Creek Dam Reach, August 2024.

7.3.3 Historical Comparisons

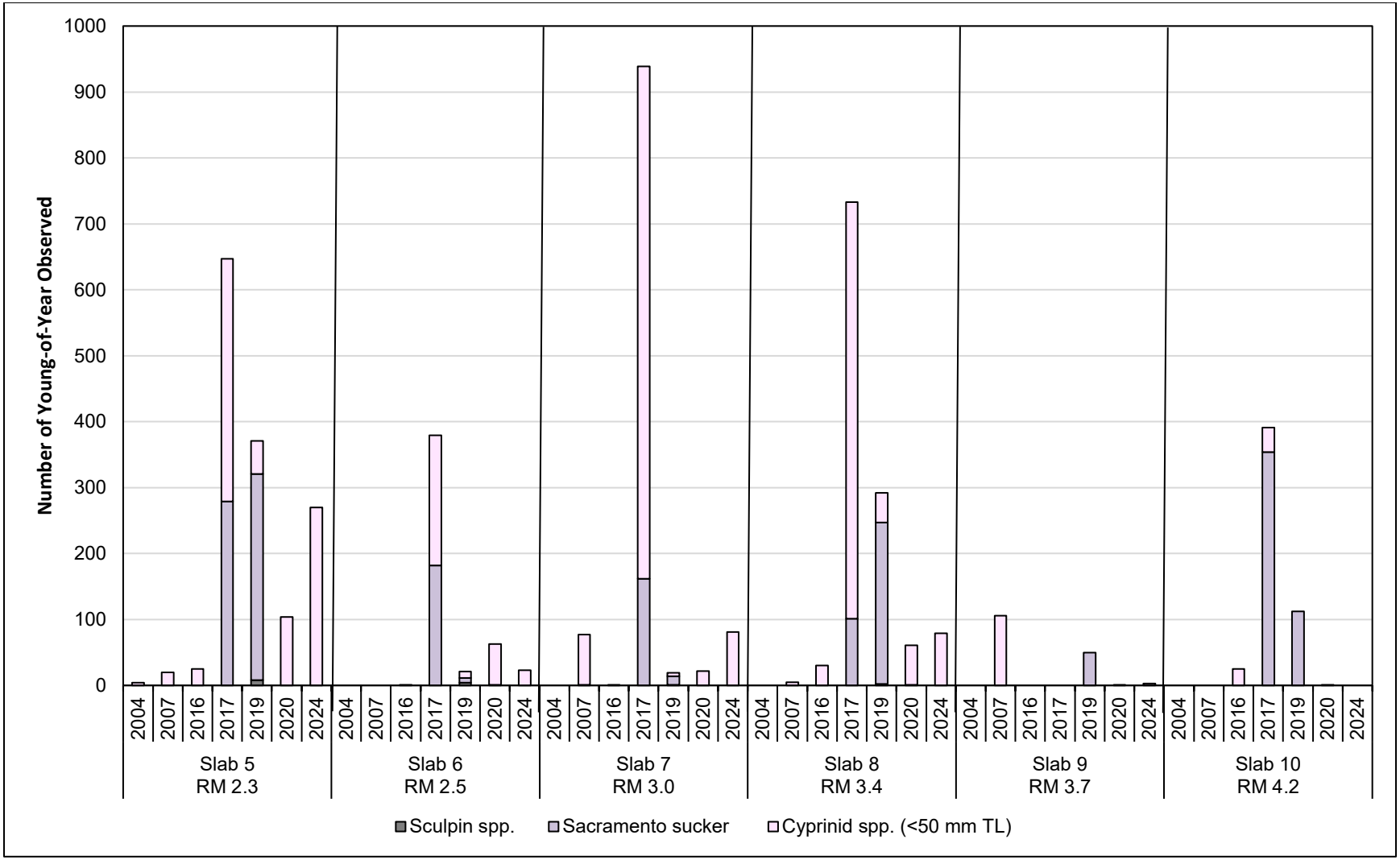
7.3.3.1 Fish Populations

The 2024 hardhead surveys documented decreased species diversity and a shift in species composition compared with previous surveys. The 2024 survey year was the first in which no hardhead was confirmed; however, the number of YOY cyprinid observations was the second highest of all survey years (Figure 7-6 and Figure 7-7). Other species observed in previous survey years but absent in 2024 included California roach (*Hesperoleucus symmetricus*), observed in 2004; sculpin, observed in 2016, 2017, 2019, and 2020; speckled dace, observed in 2007, 2016, and 2017; and smallmouth bass (*Micropterus dolomieu*), observed in 2007. Sacramento pikeminnow and brown trout were observed in 2024 but not in 2020 (Figure 7-6). Counts of rainbow trout and juvenile pikeminnow greater than 50-mm TL represented the majority (74% and 17%, respectively) of observations in 2024 (Fimpgure 7-6).



Notes: mm = millimeter, RM = river mile, TL = total length

Figure 7-6. Species composition and distribution of fish by site and river mile observed during snorkel surveys conducted in fall 2004 and summer 2007, 2016, 2017, 2019, 2020, and 2024.



Notes: mm = millimeter, RM = river mile, TL = total length

Figure 7-7. Abundance and distribution of young-of-year fish (<50 mm total length) by site and river mile observed during snorkel surveys conducted in fall 2004 and summer 2007, 2016, 2017, 2019, 2020, and 2024.

Hardhead abundance has declined, on average, since surveys began in 2004. Prior to 2024, the total number of hardhead observations ranged from 93 in 2004 to 1 in 2019 and in 2020 (Figure 7-8).

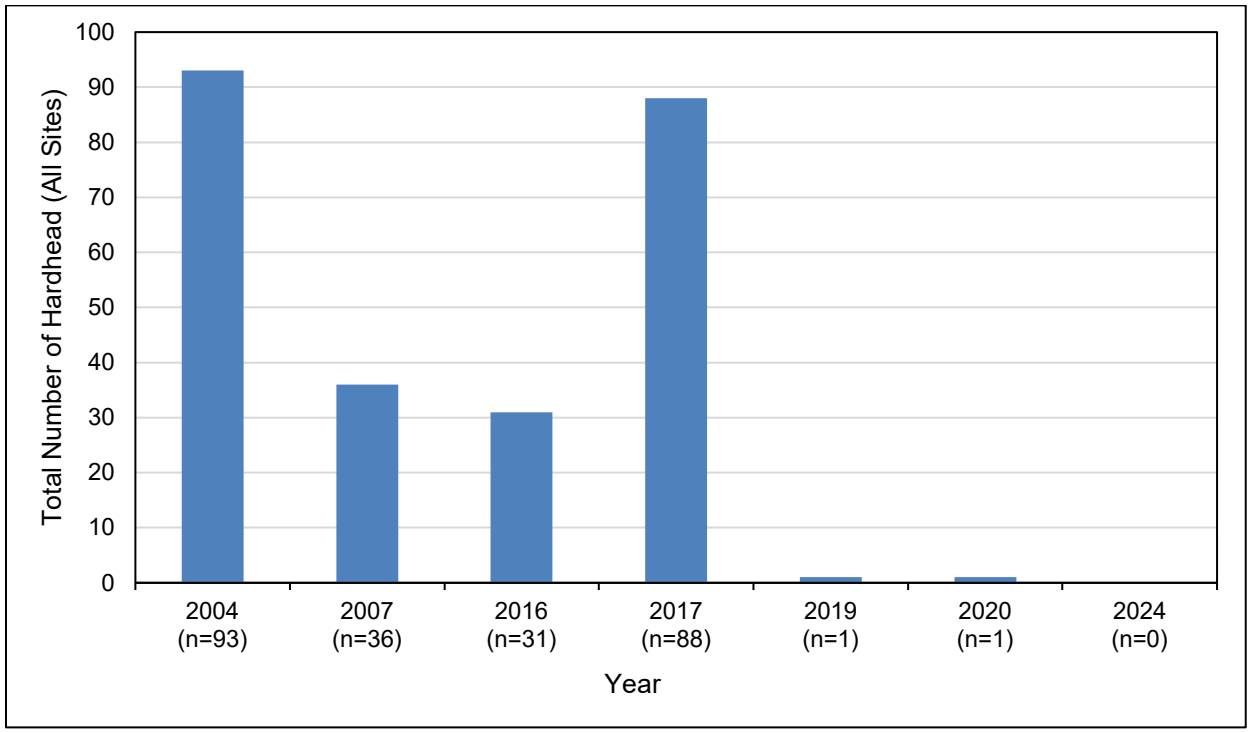
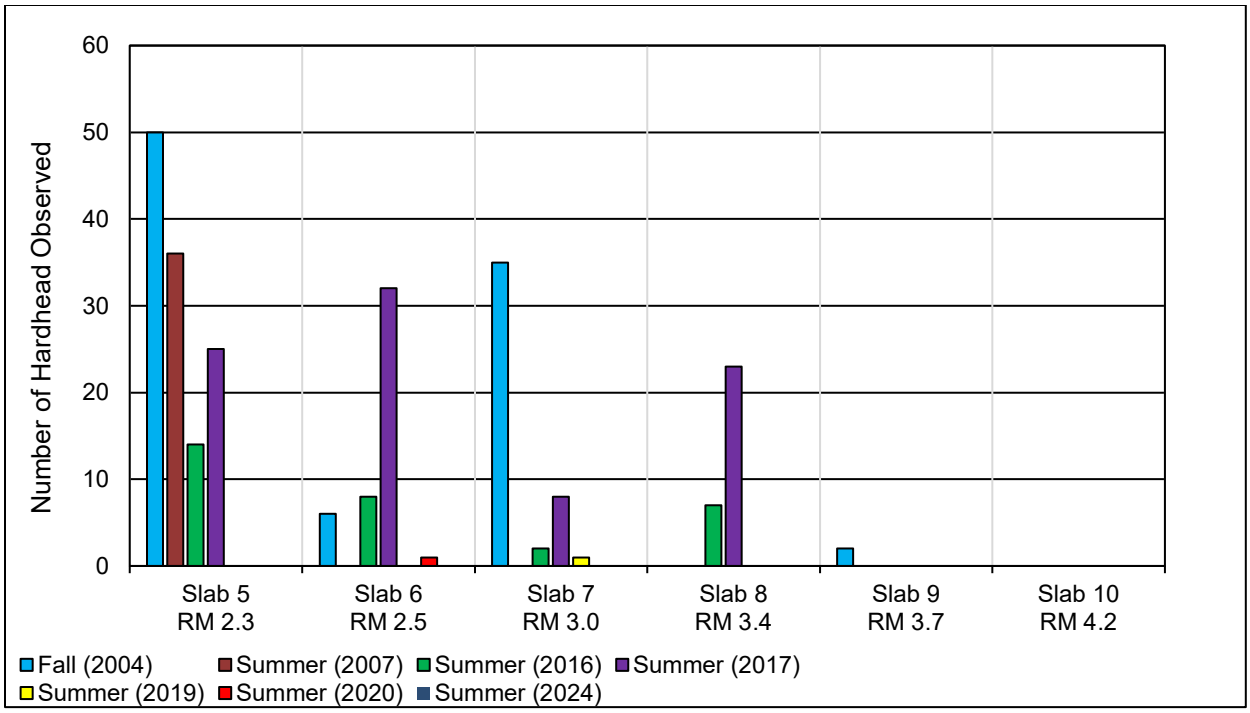


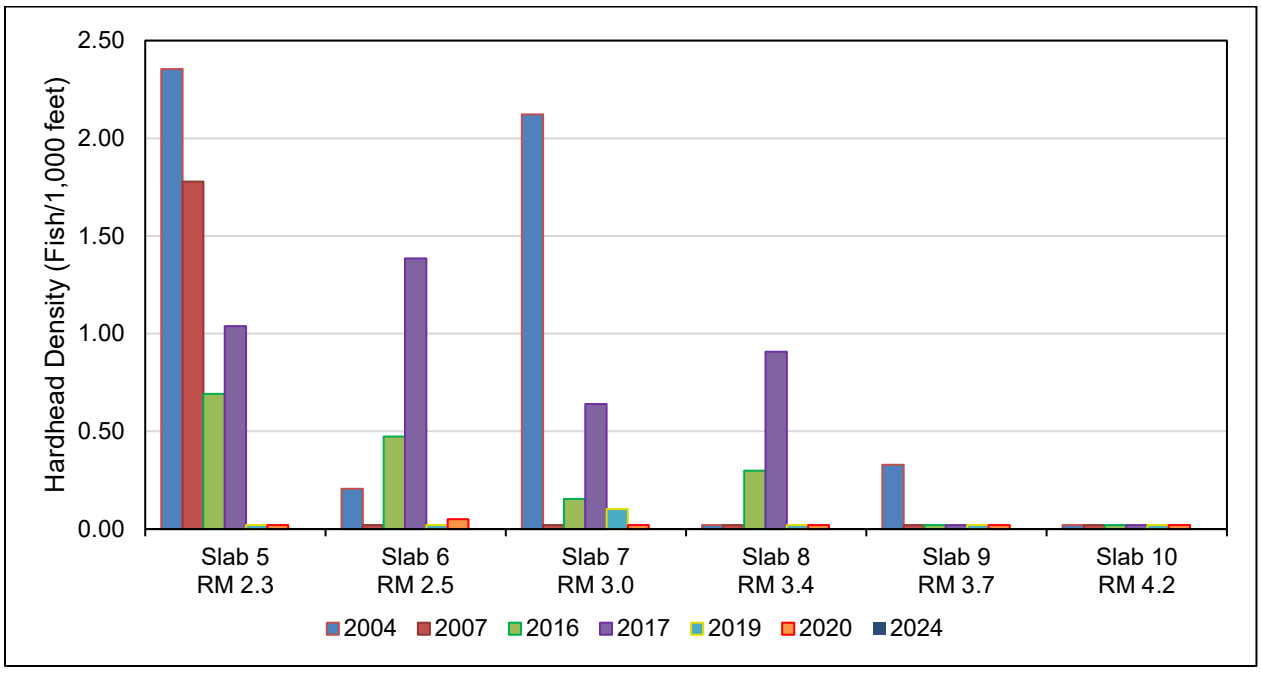
Figure 7-8. Total number of hardhead (>50 millimeters total length) observed by year across sites within the Slab Creek Dam Reach, fall 2004 and summer 2007, 2016, 2017, 2019, 2020, and 2024.

The distribution of observed hardhead in the Slab Creek Dam Reach has become increasingly restricted over the survey period (Figure 7-9 and Figure 7-10). In 2004, hardhead was observed at Slab 5, Slab 6, Slab 7, and Slab 9 but was limited to Slab 5 by 2007 (Figure 7-9). Observations in 2016 and 2017 were contiguous between Slab 5 and Slab 8; however, by 2019 and 2020, a single observation was limited to Slab 7 and Slab 6, respectively (Figure 7-9). Regardless of survey year, densities of observed hardhead trend downward from downstream to upstream.



Notes: RM = river mile

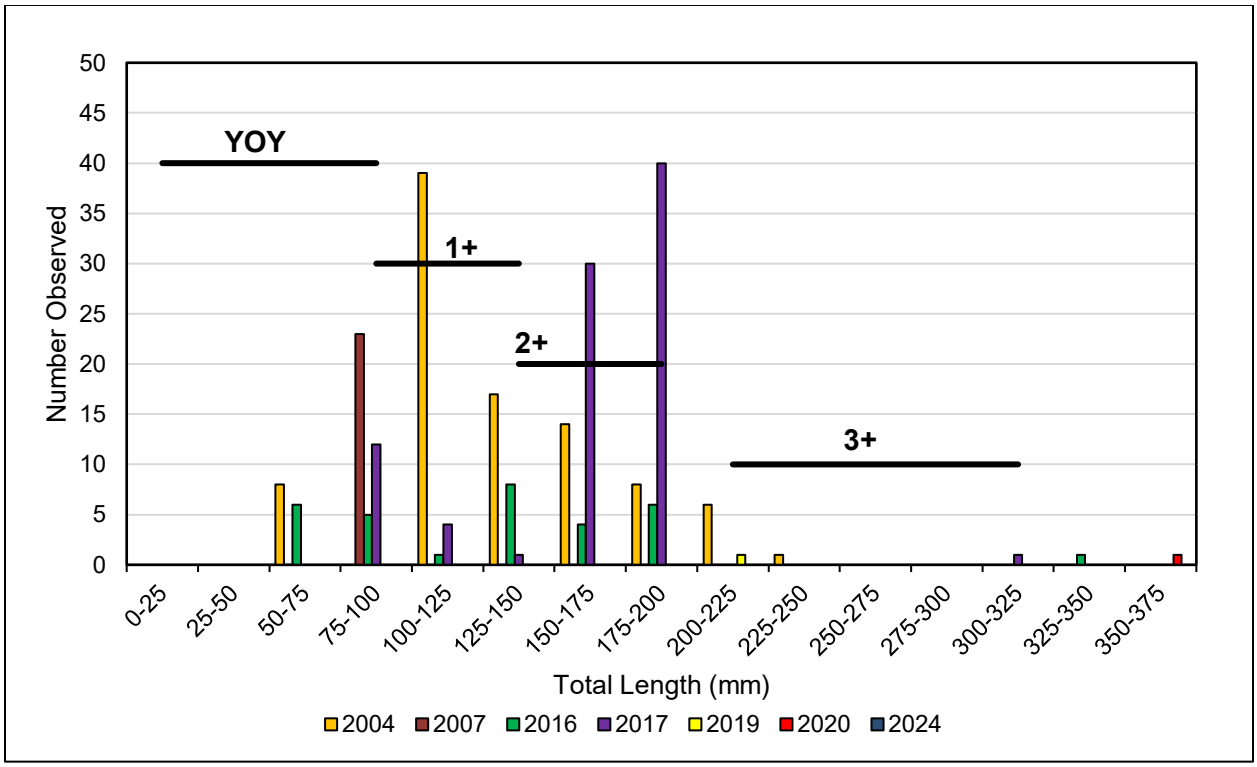
Figure 7-9. Longitudinal distribution of hardhead (>50 millimeters total length) by site and river mile within the Slab Creek Dam Reach.



Notes: RM = river mile

Figure 7-10. Hardhead (>50 millimeters total length) density by site and river mile within the Slab Creek Dam Reach, fall 2004 and summer 2007, 2016, 2017, 2019, 2020, and 2024.

The hardhead age-class structure has shifted over the study period. Age-class structure in pre-License monitoring was generally stratified across all observed cohorts, including YOY (Figure 7-11). In comparison, age-class structure in post-License monitoring was skewed older. 2016 age-class distribution spanned cohorts from YOY to age 2+ with fewer YOY observed in 2016 compared with 2004 or 2007. Distribution in 2017 also skewed towards older age classes where the majority of observed hardhead were age 2+ or older. By 2019 and 2020, observations of hardhead were limited to two adults that were age 3+ or older. Poor recruitment since 2017 resulted in an aging population with declining numbers of breeding adults.



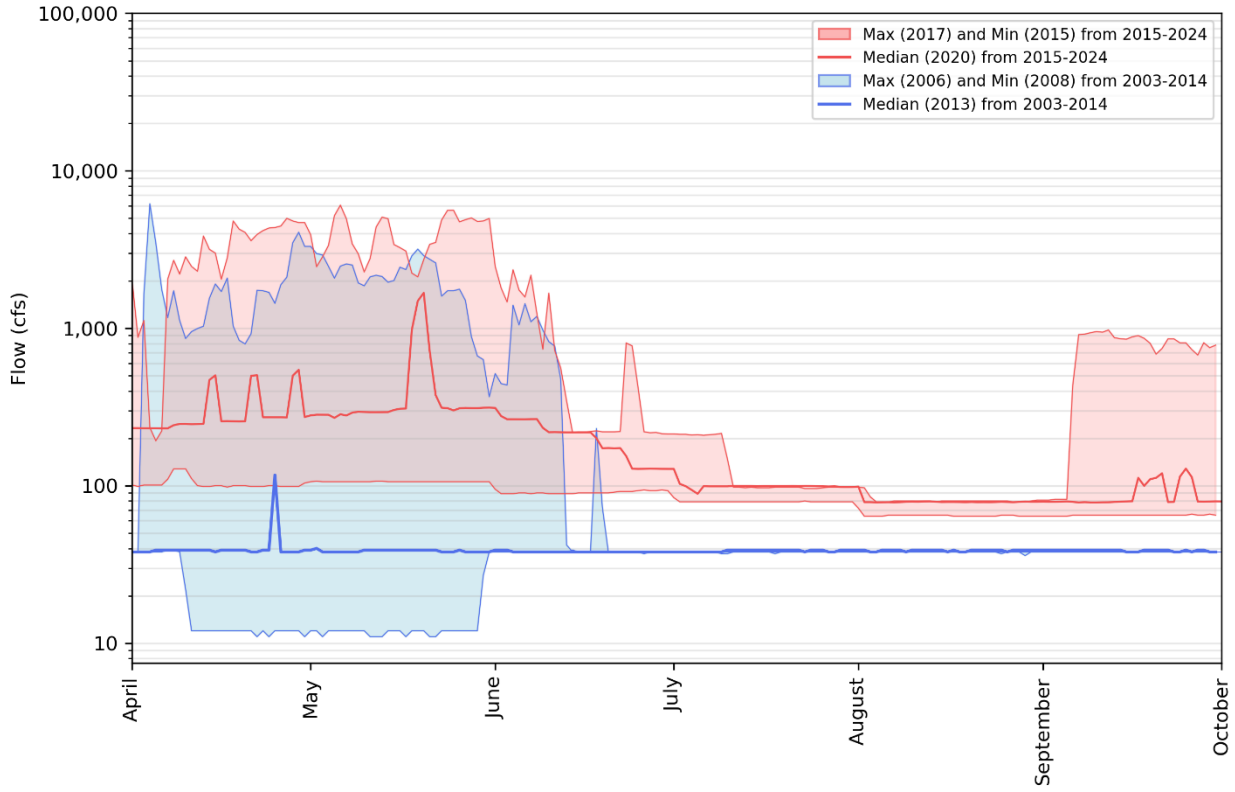
Note: mm = millimeter

Figure 7-11. Age-class (Moyle 2002) and length-frequency distribution of hardhead in the Slab Creek Dam Reach, fall 2004 and summer 2007, 2016, 2017, 2019, 2020, and 2024 (n=0).

7.3.3.2 Discharge and Water Temperature

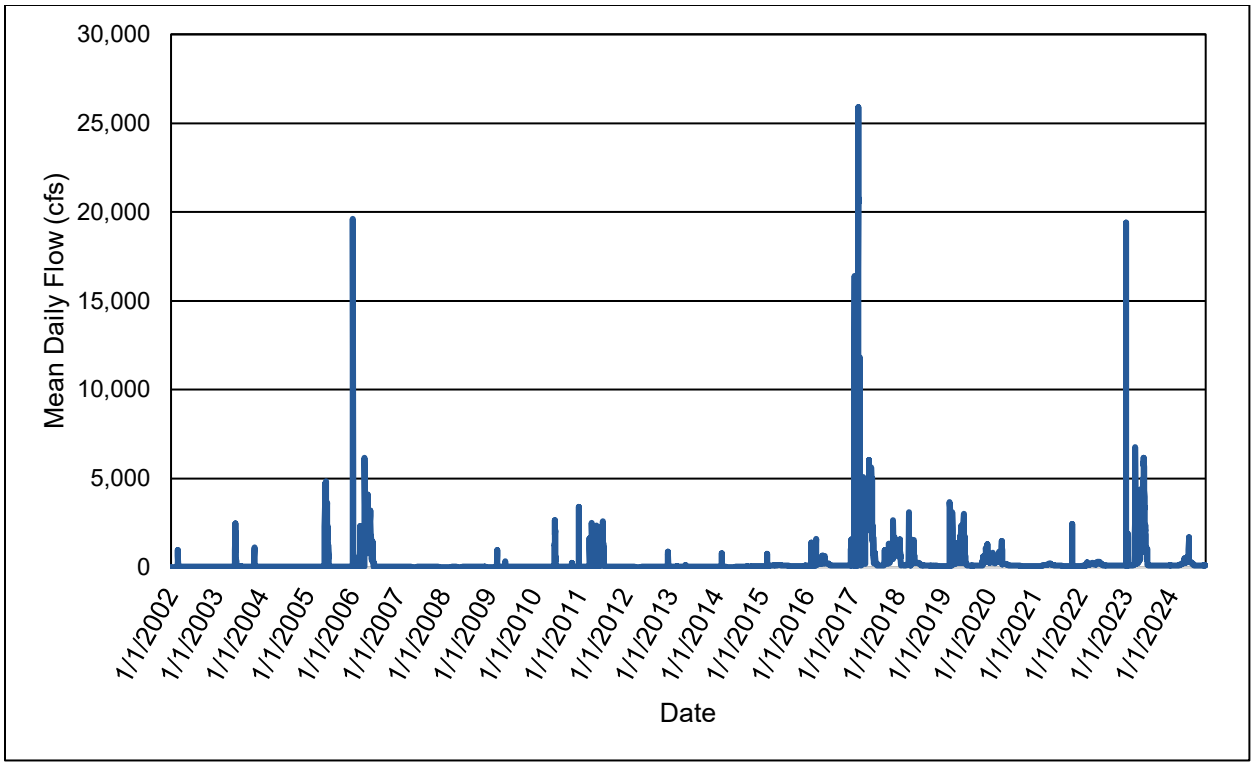
Figure 7-12 displays daily mean flow in the SFAR downstream of Slab Creek Dam before (2003–2014) and during (2015–2024) License implementation; both periods include four water year types (Dry, Below Normal, Above Normal, and Wet from 2003 to 2014; Critically Dry, Dry, Below Normal, and Wet from 2015 to 2024).The magnitude and timing of spring peak flows in wetter water years are consistent between pre-

License and License operations but differ in drier water years (Figure 7-12 and Figure 7-13). Flows in summer months of all water years are higher under the current flow regime compared to pre-License (Figure 7-12; Appendix A1, Tables A-1 and A-2).



Notes: cfs = cubic feet per second, USGS = U.S. Geological Survey
Water year data were ranked by total annual flow at USGS gage 11443500 (South Fork American River downstream of Slab Creek Dam), and the minimum, median, and maximum flow years are plotted above. The lower middle year was selected when identifying median flow year.

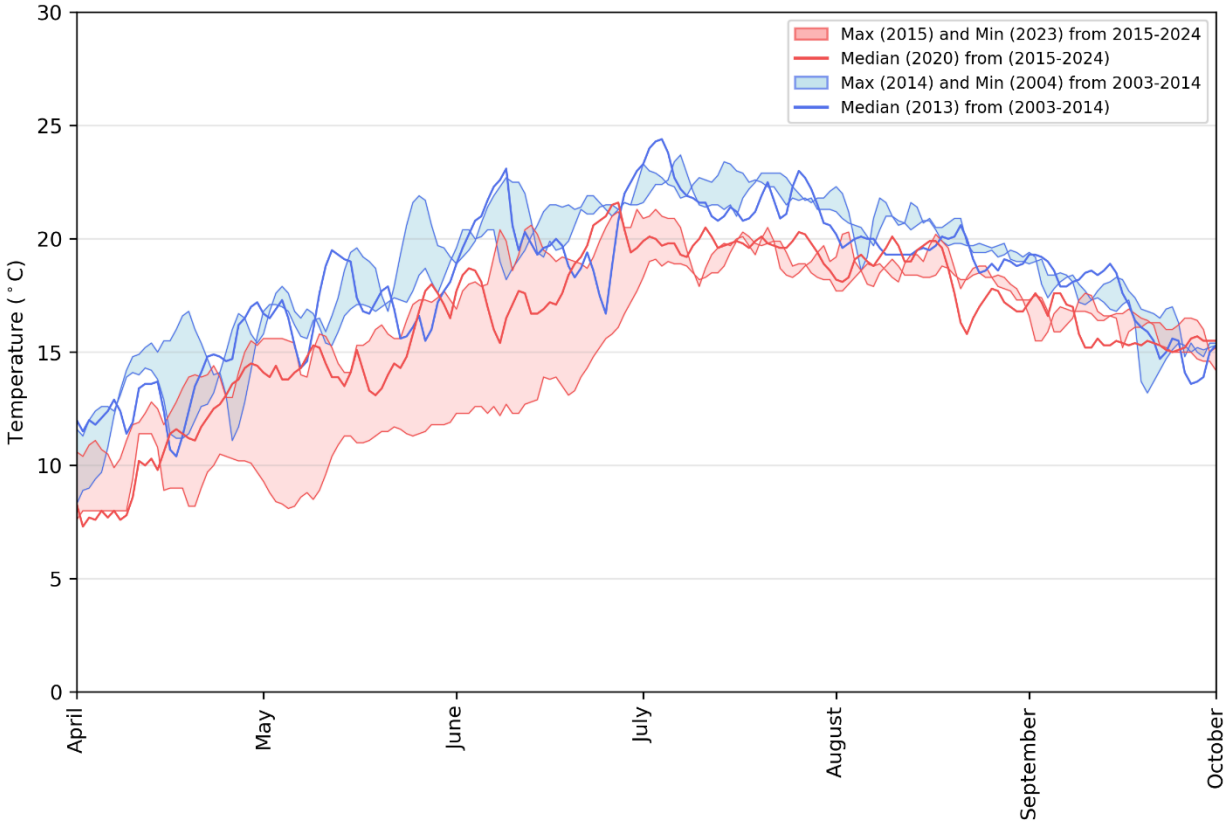
Figure 7-12. Daily mean flow at USGS gage 11443500 (South Fork American River upstream of White Rock Powerhouse before (2003–2014, blue) and after (2015–2024, red) License implementation.



Note: cfs = cubic feet per second, USGS = U.S. Geological Survey

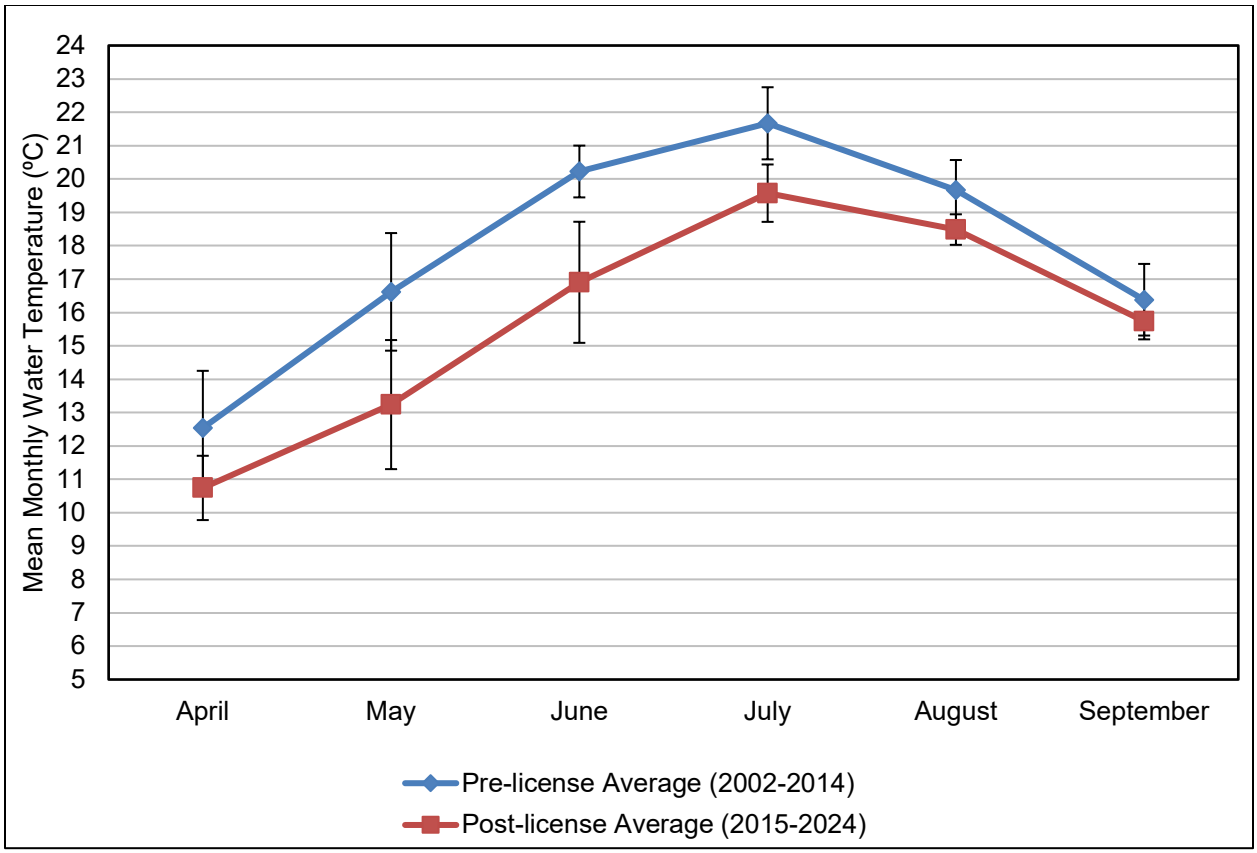
Figure 7-13. Mean daily flow at USGS gage 11443500 (South Fork American River downstream of Slab Creek Dam), 2002–2024.

Under the pre-License flow regime (2004–2014), mean monthly water temperatures upstream of White Rock Powerhouse during the early spawning period were 13°C in April, 17°C in May, and 20°C in June (Figure 7-14 and Figure 7-15). Under the current flow regime (2015–2024), mean monthly water temperatures decreased to 11°C in April, 13°C in May, and 17°C in June. Similarly, mean monthly water temperatures under the pre-License flow regime during late spawning and summer rearing periods were 22°C in July, 20°C in August, and 16°C in September. Under the current flow regime, mean monthly water temperature during late spawning and summer rearing periods decreased to 20°C in July and 18°C in August with no change in September (Figure 7-14 and Figure 7-15, Table 7-3). An analysis of variance of mean monthly water temperature from April to September in the Slab Creek Dam Reach showed statistically significant differences at the 0.05 significance level between water temperatures before and after License implementation for all spawning and early rearing months except September (Table 7-3).



Note: SMUD = Sacramento Municipal Utility District
Complete temperature data were unavailable for 2005–2012 and 2017. Water years with temperature data were ranked by total annual flow at USGS gage 11443500 (South Fork American River downstream of Slab Creek Dam), and the minimum, median, and maximum flow years plotted above. The lower middle year was selected when identifying median flow year since there are an even number of years in the License periods. Minimum, median, and maximum water years differ from Figure 7-12 due to temperature data gaps.

Figure 7-14. Daily water temperature in the South Fork American River upstream of White Rock Powerhouse (SMUD gage SFAR15, RM 0.0), before (2003–2014, blue) and after (2015–2024, red) License implementation.



Note: Error bars are standard deviation. Complete temperature data were unavailable for 2005–2012 and 2017.

Figure 7-15. Mean monthly water temperatures in the South Fork American River upstream of White Rock Powerhouse (SMUD gage SFAR15, RM 0.0) before (n=30) and after (n=58) License implementation.

Table 7-3. Analysis of Variance Results of Mean Monthly Water Temperatures from April to September in the Slab Creek Dam Reach, Pre- and Post-License Implementation.[a]

Month	Pre-License Mean Temperature (°C)	Post-License Mean Temperature (°C)	df	Mean Square	F	p-value
April	13	11	12	8.9	6	0.032[b]
May	17	13	12	31.6	8.9	0.012[b]
June	20	17	15	41.4	17.7	<0.001[b]
July	22	20	15	16.4	18.4	<0.001[b]
August	20	18	14	4.7	11.9	0.004[b]
September	16	16	14	1.4	2.4	0.143

Note: °C = degrees Celsius
df = degrees of freedom
USGS = U.S. Geological Survey

[a] Water temperature data are from USGS gage 11443500 (South Fork American River). Complete temperature data were unavailable for 2005–2012 and 2017.

[b] Significant differences at the 0.05 significance level.

7.4 DISCUSSION

Declines of hardhead have been common in foothill streams in recent decades and may be attributed to predation and competition from non-native centrarchids, loss of habitat from urbanization and agriculture, and altered flow regimes from dam operations (Moyle 2002). Predation from non-native predators is possible in the Slab Creek Dam Reach but unlikely in recent survey years because smallmouth bass have not been observed during monitoring surveys since 2007 (Figure 7-6, Table 2-1). The Slab Creek Reach is relatively remote, with little to no influence from urban infrastructure and agricultural practices. Additionally, habitat types and dominant substrates in the reach have remained generally consistent through License implementation (SMUD 2017, 2018, 2020, 2021), which provides further evidence that physical habitat has not substantially changed. The apparent loss of recruitment to this hardhead population is likely attributable to changes in temperature-dependent spawning and rearing periods. The relicensing Aquatic Technical Work Group hypothesized that there may be a change (reduction) in hardhead distribution as a result of flow regime and associated water temperature changes, which was the primary reason for developing the Plan.

Hardhead populations in foothill streams generally reach maturity at age two and spawn from April to August, with peak spawning occurring in spring (April through June) (Moyle 2002). After a short egg incubation period, larval hardhead grow rapidly during summer, reaching 80 mm in length by their first year (Moyle 2002). This rearing period typically occurs from July through September. Streams supporting hardhead typically have mean summer temperatures above 20°C; adults and juveniles prefer mean temperatures of 20.5°C and 19.5°C, respectively (Moyle 2002, Thompson et al. 2012). Hardhead have also been shown to avoid temperatures below 14°C, regardless of life stage (Thompson et al. 2012).

The results of this study indicate that water temperatures in the Slab Creek Dam Reach under the pre-License flow regime were marginally suitable for hardhead spawning and rearing, and the species was restricted to the lower (warmer) portion of the reach. Lower water temperatures under the new License have likely reduced the reproductive success of hardhead, leading to lower abundance and density in the study reach and an associated reduction in their longitudinal distribution in the SFAR downstream of Slab Creek Dam. Despite the downward trend in hardhead abundance, and this year's absence of juvenile or adult hardhead in the survey reach, it is premature to conclude that hardhead have been extirpated from the reach given the number of unidentified YOY cyprinid species observed (<50 mm) and interannual variation in species distribution, flows, and thermal regimes.

Stream thermal regimes are affected by minimum instream flows as well as other factors including, but not limited to, interannual variability in peak flows, water year type, and climate. Therefore, decreases in mean summer water temperatures following License implementation in 2014 likely reflect the combined impacts of annual variability in climate (i.e., precipitation and air temperature) and changes to the minimum streamflow regime (Figure 7-12). Pre-License water temperature data only offer insights

into drier water years, so the difference in water temperatures in wetter years could not be evaluated between pre- and post-License periods. Observed changes in the thermal regime are consistent with the original hypothesis of the relicensing Aquatic Technical Work Group, but the degree to which each of the factors listed above has contributed to these changes is unknown.

The 2024 hardhead survey was the fifth year of monitoring since implementation of the current flow regime. The 2025 survey will provide further insight into the degree to which the thermal regime change is affecting the hardhead population within the reach.

7.5 LITERATURE CITED

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8.0 AMPHIBIAN AND AQUATIC REPTILE

8.1 MONITORING PLAN OBJECTIVES

The main objectives of the Amphibian and Aquatic Reptile Monitoring Plan (Plan) (SMUD 2016) are to monitor for and document the presence and distribution of target amphibians and aquatic reptiles, including foothill yellow-legged frog (*Rana boylii*) and western pond turtle[12] (*Actinemys marmorata*), in the UARP over the term of the License (FERC 2014). Monitoring is being conducted to help determine if populations of these species are changing following the implementation of current streamflows as defined in the License (FERC 2014).

8.2 FIELD METHODS

8.2.1 Monitoring Sites

In accordance with the Plan, four of the six monitoring sites[13] were surveyed in 2024 (License Year 10) (Table 8-1, Figures 1-2 and 1-3). Table 8-1 includes a summary of foothill yellow-legged frog and western pond turtle observations during pre-License and License implementation monitoring studies in the UARP.

Opportunistic searches for foothill yellow-legged frogs were also conducted in three locations outside the monitoring sites, including a seep from a cliff face along the access road to Site CD-A3, a small stream flowing from Camino Adit (Figure 13), and a small section of a tributary to Silver Creek visible from the access trail to Site CD-A3.

[12] The Plan was written prior to the recognized split of western pond turtle into two species (northwestern pond turtle [*Actinemys marmorata*] and southwestern pond turtle [*Actinemys pallida*]). The UARP is located within the range of the northwestern pond turtle; for consistency with the Plan, this Report will continue to use the prior species name western pond turtle.

[13] Site codes used in this and past Reports differ from site codes in the Plan but correspond with naming conventions used by other UARP monitoring studies.

Table 8-1. Amphibian and Aquatic Reptile Monitoring Sites, 2024.

Site Code / Monitoring Plan Site Code[1]	Stream Reach	Site Length (feet)	Elevation (feet)	Prior Observation at Monitoring Site (Yes/No)	
				Foothill Yellow-legged Frog	Western Pond Turtle
JD-A15 / JA-15	Silver Creek downstream of Junction Dam	653	3,045	No	No
CD-A3 / CA-3	Silver Creek downstream of Camino Dam (near Camino Adit)	735	2,336	Yes[2]	No
CD-A4 / SFA-4	Silver Creek downstream of Camino Dam (at the confluence with South Fork American River)	404	2,067	Yes[2]	No
SCD-A1 / SCA-6a–SCA-4	South Fork American River downstream of Slab Creek Dam	10,404	1,007	No	Yes[2]

[1] Site codes used in this Report differ from site codes in the Plan. Site codes were developed to mirror site codes used by other monitoring studies and match codes used in past Reports.
[2] Observations made during pre-License (2003–2004) and License implementation monitoring (2016–2023).

8.2.2 Foothill Yellow-Legged Frog

8.2.2.1 Visual Encounter Surveys

In 2024, four visual encounter surveys were conducted in all safely accessible areas following methods outlined in the Plan (SMUD 2016) and detailed in the 2017 and 2018 Reports (SMUD 2018 and 2019). Other amphibian and reptile species and potential predators (e.g., fish, crayfish, American bullfrogs [*Lithobates catesbeianus*]) were also recorded.

8.2.2.2 Adaptive Management Monitoring

Spill events at Camino and Slab Creek dams in June triggered adaptive management monitoring (SMUD 2016). The June survey at Sites CD-A3, CD-A4, and SCD-A1 fulfilled the adaptive management post-spill monitoring requirements in 2024.

8.2.3 Western Pond Turtle

Western pond turtle surveys were conducted using methods detailed in the Plan (SMUD 2016) and refined as noted in the 2017 and 2018 Reports (SMUD 2018 and 2019). Western pond turtle surveys were conducted concurrently with foothill yellow-legged frog surveys in July and August at Sites JD-A15, CD-A3, and CD-A4 and all four surveys at Site SCD-A1.

8.3 RESULTS

Surveys were conducted during daylight hours and favorable weather conditions (i.e., clear skies and calm winds) for amphibian and aquatic reptile detection (Table 8-2).

Table 8-2. Survey Conditions, 2024.

Site	Survey Date	Time		Temperature Range (°C)	
		Start	End	Water	Air
JD-A15	10 June	15:28	16:19	17	23–28
	15 July	14:36	15:15	18–19	31
	19 August	14:06	14:42	17	26–27
	23 September	14:49	15:06	15	24–27
CD-A3	11 June[1]	14:01	15:13	14–16	32
	16 July	14:04	15:05	17	32–33
	21 August	14:55	16:51	18	29–31
	24 September	13:31	14:48	16–17	32–34

Site	Survey Date	Time		Temperature Range (°C)	
		Start	End	Water	Air
CD-A4	11 June[1]	08:59	10:25	15	29–31
	16 July	09:13	10:51	17–18	23–30
	22 August	10:34	11:52	17–18	24–28
	24 September	09:42	10:37	14–15	19–21
SCD-A1	12 June[1]	09:31	16:55	16–21	25–31
	17 July	10:14	17:15	20–22	27–32
	20 August	09:52	16:45	15–19	24–30
	25 September	09:28	17:18	13–16	17–24

Note: °C = degrees Celsius
[1] These surveys fulfilled the adaptive management post-spill monitoring requirements.

8.3.1 Foothill Yellow-Legged Frog

In 2024, foothill yellow-legged frogs were observed at Sites CD-A3 and CD-A4. No foothill yellow-legged frogs were observed at Site JD-A15, Site SCD-A1, or any of the opportunistic search locations (i.e., the seep, the stream at Camino Adit, or the tributary to Silver Creek).

8.3.1.1 Site CD-A3

Adult and tadpole life stages of foothill yellow-legged frog were observed at Site CD-A3 (Table 8-3 and Figure 8-1). Photos of foothill yellow-legged frogs and associated habitats are included in Appendix H1.

Table 8-3. Foothill Yellow-Legged Frog Observation Details at Site CD-A3, 2024.

Date	Life Stage	Observation Label	Number Observed	Length[a] (mm)	Species Notes	Habitat Conditions
21 August	Adult	1	1	49	Male	Bedrock perch at mouth of tributary
	Tadpole	2	4	49[b]	Gosner stage 26–40[b]	Large bedrock side-channel pool
	Tadpole	3	1	--	Gosner stage 26–40	Small off-channel bedrock pool at base of tributary
	Tadpole	4	1	--	Gosner stage unknown	Small edgewater depression

Date	Life Stage	Observation Label	Number Observed	Length[a] (mm)	Species Notes	Habitat Conditions
	Tadpole	5	1	--	Gosner stage unknown	Small edgewater depression
	Tadpole	6	1	41	Gosner stage 26–40	Side-channel pool downstream of the monitoring site
24 September	Tadpole	7	2[c]	52[b]	Gosner stage 41–46[b]	Same pool as tadpoles observed on 21 August (Observation Label 2)

Notes: mm = millimeters
-- = No data available; individual observed but not captured.

[a] Post-metamorphic individuals were measured by snout-to-urostyle length and tadpoles were measured by total length.

[b] Length and Gosner stage collected for one tadpole.

[c] One of the two tadpoles had been recently predated by a Sierra garter snake (*Thamnophis couchii*).

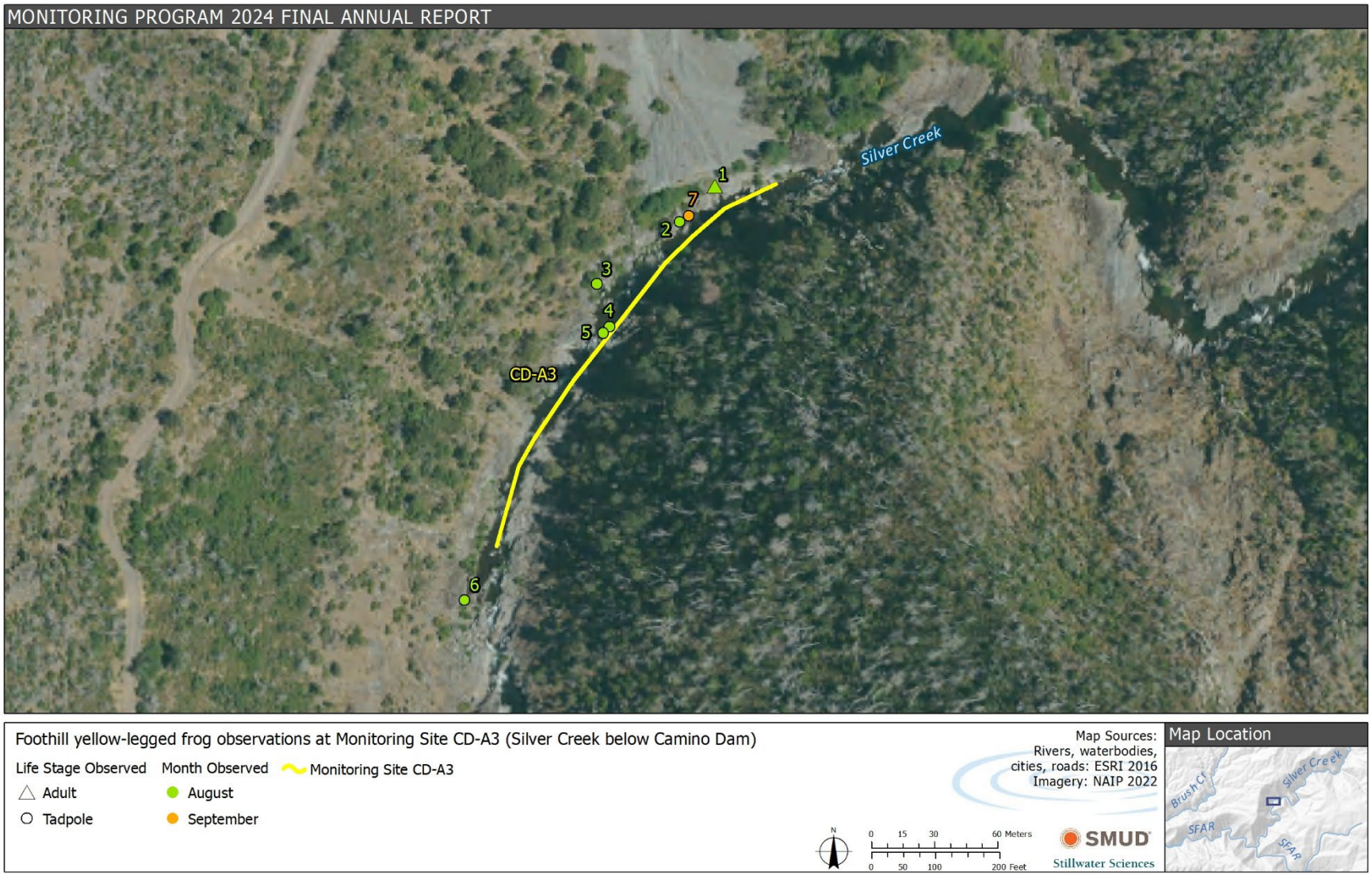


Figure 8-1. Foothill yellow-legged frog observations at Site CD-A3, 2024.

Tadpoles were observed in five separate bedrock pools during the 2024 surveys. The most upstream pool, where tadpoles were observed in 2018 and 2019 (SMUD 2019, 2020), contained four tadpoles during the August survey and one living tadpole during the September survey (Figure 8-1 and Figure 8-2). During the September survey, a Sierra garter snake (*Thamnophis couchii*) in this pool was captured and palpated to induce regurgitation (following methods in Fitch [1987]), which produced a dead foothill yellow-legged frog tadpole (Table 8-3 and Figure 8-3). This pool was long and narrow (approximately 30 feet by 5 feet) with water depths ranging from less than 1 inch to nearly 2 feet. Bedrock overhangs and large boulders shaded portions of the pool. Gaps between the bedrock and boulders and dense periphyton provided refugia for tadpoles. Periphyton throughout the pool also provided a food source (Kupferberg et al. 2011).



Figure 8-2. Foothill yellow-legged frog tadpole (left) and habitat (right) at Site CD-A3, 21 August 2024.



Figure 8-3. Sierra garter snake with recently predated foothill yellow-legged frog tadpole, Site CD-A3, 24 September 2024.

The remaining tadpoles at Site CD-A3 were observed in four small pools. Two of these pools were shallow, depressions in bedrock connected to the left bank of the main channel. These edgewater depressions had dense periphyton that provided cover for tadpoles but lacked additional features for protection. The other two pools were larger and less connected to the main channel. They had bedrock substrate and boulders that provided cover for tadpoles (Figure 8-4). All four pools had ample sunlight and small patches of sedge (*Carex* spp.) along their margins.



Figure 8-4. Foothill yellow-legged frog tadpole (left) and habitat (right) at Site CD-A3, 21 August 2024.

The adult foothill yellow-legged frog observed at Site CD-A3 in 2024 was basking adjacent to the mouth of a small tributary on the right bank (Table 8-3, Figures 8-1 and 8-5). The tributary joined the site at a small side-channel pool that was approximately 1.5 feet deep.



Figure 8-5. Adult male foothill yellow-legged frog (left) and habitat (right) at Site CD-A3, 21 August 2024.

8.3.1.2 Site CD-A4

Post-metamorphic life stages of foothill yellow-legged frogs were observed at Site CD-A4 in 2024 (Table 8-4, Figure 8-6). Four individuals were observed, one of which was recaptured during a subsequent survey. Photos of the observed foothill yellow-legged frogs and their associated habitat are included in Appendix H1.

Table 8-4. Foothill Yellow-Legged Frog Observation Details at Site CD-A4, 2024.

Date	Life stage	Observation Label	Number Observed	Length[1] (mm)	Sex	Habitat Conditions
11 June	Adult	1	1	75	Female	Backwater pool
	Adult	2	1	37	Male	Mid-channel glide
16 July	Adult	3	1	56	Female	Same backwater pool as Observation Label 1
	Sub-adult	4	1	32	Unknown	Same backwater pool as Observation Labels 1 and 3
24 September	Sub-adult	5	1	40	Unknown	Recapture of 32-mm sub-adult from 16 July (Observation Label 4); in same pool as Observation Labels 1, 3, and 4

Note: mm = millimeter

[1] Post-metamorphic individuals were measured by snout-to-urostyle length

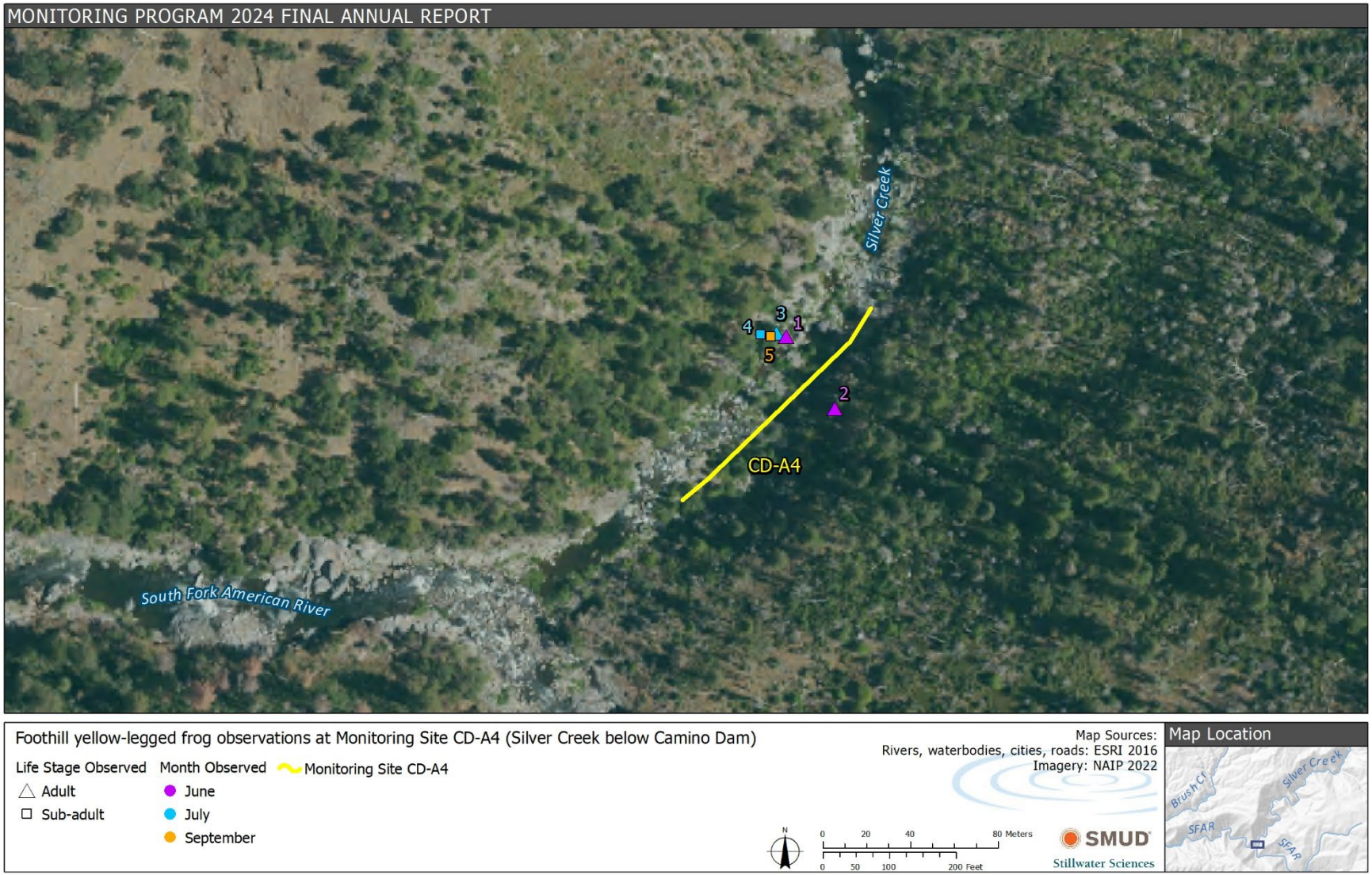


Figure 8-6. Foothill yellow-legged frog observations at Site CD-A4, 2024.

Three of the four frogs observed at Site CD-A4 in 2024 were in the same backwater pool (Table 8-4, Figure 8-7). One adult female was observed in this pool in June, and one adult female and one subadult were observed there in July. The sub-adult[14] was recaptured in September (Figure 8-8). All three frogs were basking on the shore at the pool's edge when surveyors approached.

The backwater pool was shaded by a canopy of willow (*Salix* spp.) and white alder and fringed by emergent sedges and grasses. It was lined with cobbles, boulders, leaf litter, and organic material. The pool was less than 1 foot deep, with minimal hydrologic connectivity to the main channel and no flow during any survey.



Figure 8-7. Foothill yellow-legged frogs observed on 11 June (left, middle) and 17 July (left, top and bottom) at backwater pool habitat (right), Site CD-A4, 2024.

[14] The re-captured sub-adult was identified as the same individual by analysis of chin markings (Marlow et al. 2016),



Figure 8-8. Chin markings of sub-adult foothill yellow-legged frog on 16 July (left) and 24 September (right) at Site CD-A4, 2024.

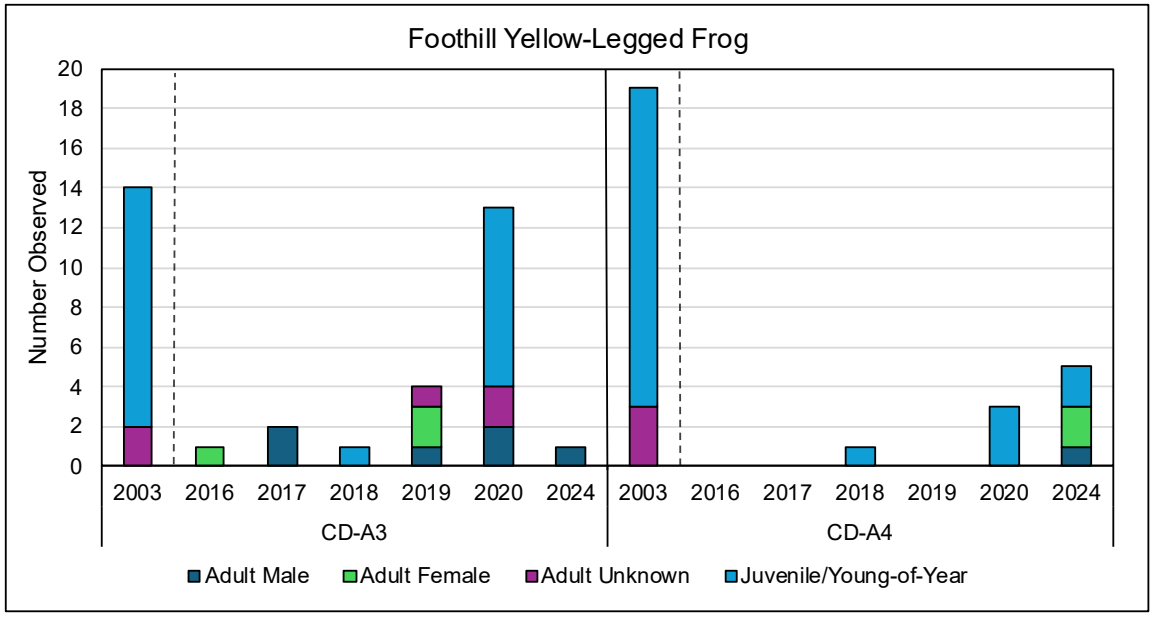
The fourth frog observed at Site CD-A4 was in a glide among cobbles on the main channel bottom (approximately 1 foot deep) on 11 June 2024 (Figure 8-9). The glide had high solar exposure and was lined with sedges.



Figure 8-9. Adult male foothill yellow-legged frog (left) and habitat (right) at Site CD-A4, 11 June 2024.

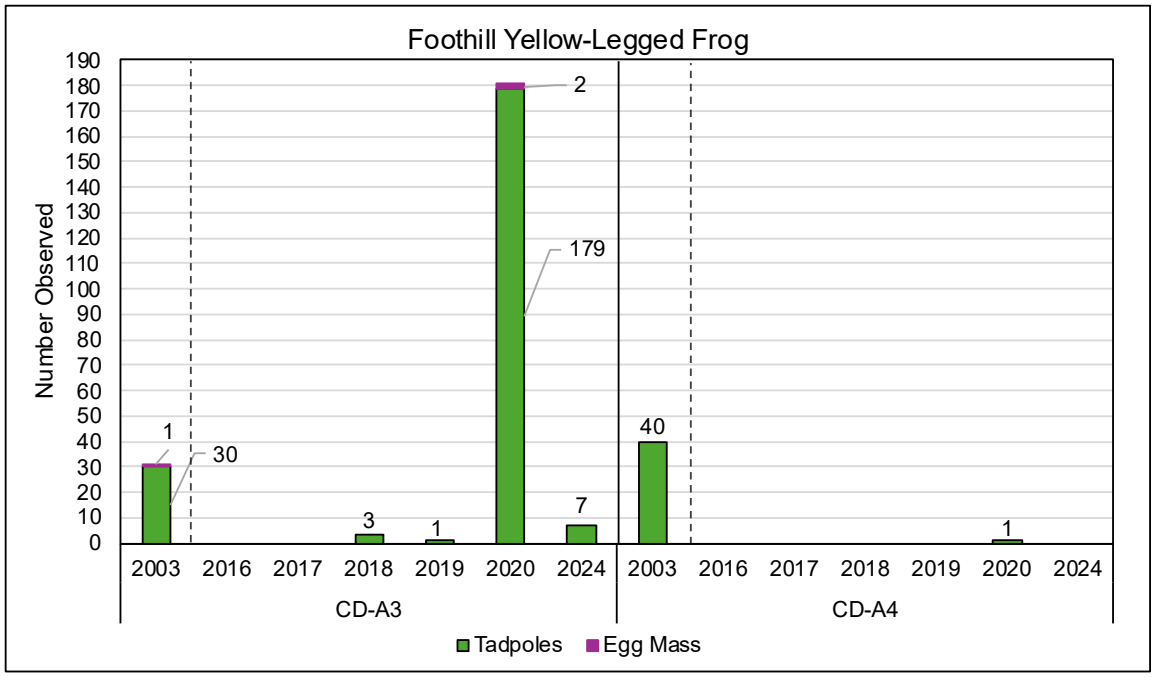
8.3.1.3 Historical Comparison

Foothill yellow-legged frogs were observed at Sites CD-A3 and CD-A4 during most monitoring years. At Site CD-A3, the number of post-metamorphic individuals varied across monitoring years with the majority observed in 2003 (pre-License monitoring) and 2020 (Figure 8-10). At Site CD-A4, most post-metamorphic individuals were observed during pre-License monitoring (Figure 8-10). Egg masses have been infrequently observed at Site CD-A3 over pre-License and License implementation monitoring and have not been observed at Site CD-A4 during the entire monitoring period (Figure 8-11). The majority of tadpoles were observed in 2020 at Site CD-A3 and in 2003 at Site CD-A4 (Figure 8-11).



Note: These data are cumulative for each monitoring year (i.e., observations include counts of recaptured individuals); therefore, totals may exceed the actual number of individuals observed.

Figure 8-10. Post-metamorphic foothill yellow-legged frog observations at Sites CD-A3 and CD-A4 during pre-License (2003) and License implementation monitoring years.



Note: Tadpole data are cumulative for each monitoring year. Individual tadpoles may have been observed on consecutive visits (particularly at egg mass locations); therefore, totals may exceed the actual number of individuals observed.

Figure 8-11. Egg mass and tadpole foothill yellow-legged frog observations at Sites CD-A3 and CD-A4 during pre-License (2003) and License implementation monitoring years.

8.3.2 Western Pond Turtle

8.3.2.1 Site SCD-A1

Ten individual adult western pond turtles were observed at monitoring Site SCD-A1 in 2024 (Table 8-5, Figure 8-12). Observations were distributed throughout the length of the reach and across all four surveys. No turtles were observed at any other monitoring site in 2024.

Table 8-5. Western Pond Turtle Observation Details at Site SCD-A1, 2024.

Date	Life Stage/ Sex	Observation Label	Carapace Measurements (mm)		Number of Scute Rings	Habitat/ Behavior at Observation
			Length	Width		
12 June	Adult/ male	1	142	120	8	Eating crayfish underwater
12 June	Adult/ female	2	135	105	9	Swimming underwater on edge of main channel
17 July	Adult/ female	3	137	114	NA[1]	Hiding under root wad/ undercut bank
17 July	Adult/ male	4	130	102	14	Swimming underwater at entrance to small backwater pool
20 August	Adult/ female	5	144	115	NA[1]	Hiding underneath boulder/ undercut bank
20 August	Adult/ female	6	141	116	NA[1]	Hiding under undercut bank in willow root wad
20 August	Adult/ male	7	171	130	NA[1]	Hiding behind boulder among woody debris
25 September	Adult/ female	8	135	108	9	Swimming in protected pocket water among sedges and bedrock
25 September	Adult/ male	9	154	121	11	Walking across dry uplands
25 September	Adult/ male	10	120	104	8	Swimming in backwater pool around base of sedges

Notes: mm = millimeters
NA = not available

[1] Plastral scutes were too worn to be counted.

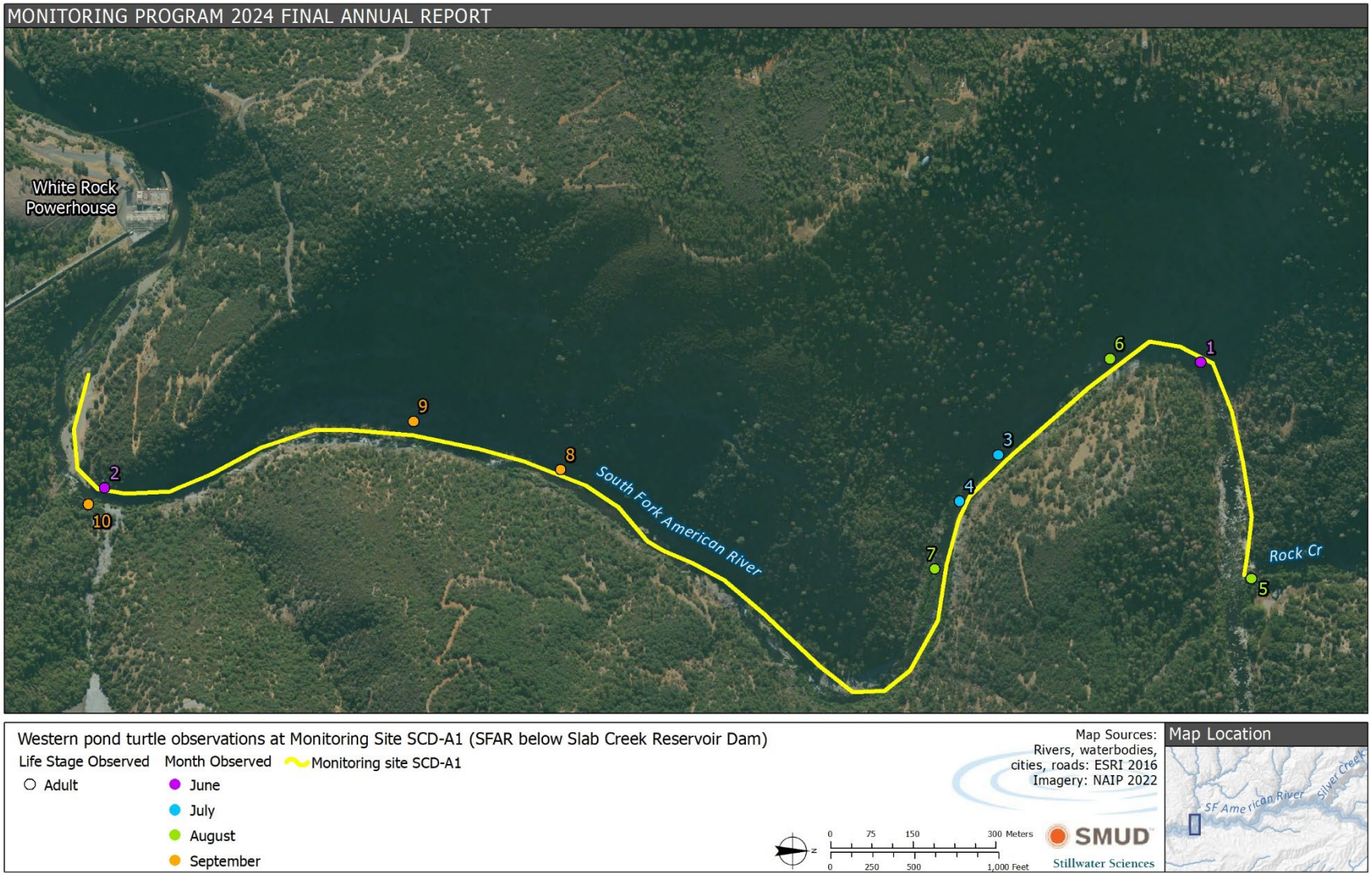


Figure 8-12. Western pond turtle observations at Site SCD-A1, 2024.

Snorkelers observed nine turtles underwater and one in the dry uplands (Figure 8-13). Those observed underwater were found at depths ranging from 4 inches to 3 feet in runs, glides, and mid-channel and backwater pools (Figure 8-14). Turtles were often observed seeking cover in root systems, undercut banks, bedrock crevices, boulders, sedges, or large woody debris. The lone upland turtle was observed on exposed bedrock approximately 25 feet from the nearest waterway.



Figure 8-13. Western pond turtle in aquatic habitat (left, 20 August) and upland habitat (right, 25 September), 2024.



Figure 8-14. Representative habitat where western pond turtles were observed in June (left) and July (right) at Site SCD-A1, 2024.

All turtles observed in 2024 were sexually mature adults. Age of the six turtles with countable scute rings were estimated to be between 8 and 14 years[15] (Table 8-5). The remaining four turtles had scute rings too worn to be counted so were likely at least 10 years in age (Figure 8-15). Additional photos of observed western pond turtles and associated habitat at Site SCD-A1 are available in Appendix H2.

[15] Plastron scute ring counts on western pond turtles can be used to estimate age. Scute rings are thought to be deposited annually up to 10 rings for this species (Bury and Germano 1998), after which they may be deposited inconsistently or become worn down, making them less accurate for age estimates (Germano and Bury 1998, Bury and Germano 1998).



Figure 8-15. Western pond turtle with a worn plastron with no countable scutes (left, 20 August) and one with countable scutes (right, 25 September), 2024.

8.3.2.2 Historical Comparison

The highest number of western pond turtle observations were in 2024 (10 turtles) at Site SCD-A1, followed by 2020 (9 turtles) (Figure 8-16). Adult western pond turtles have been observed during most License implementation monitoring years, whereas one juvenile was recorded in 2020 (Figure 8-16).

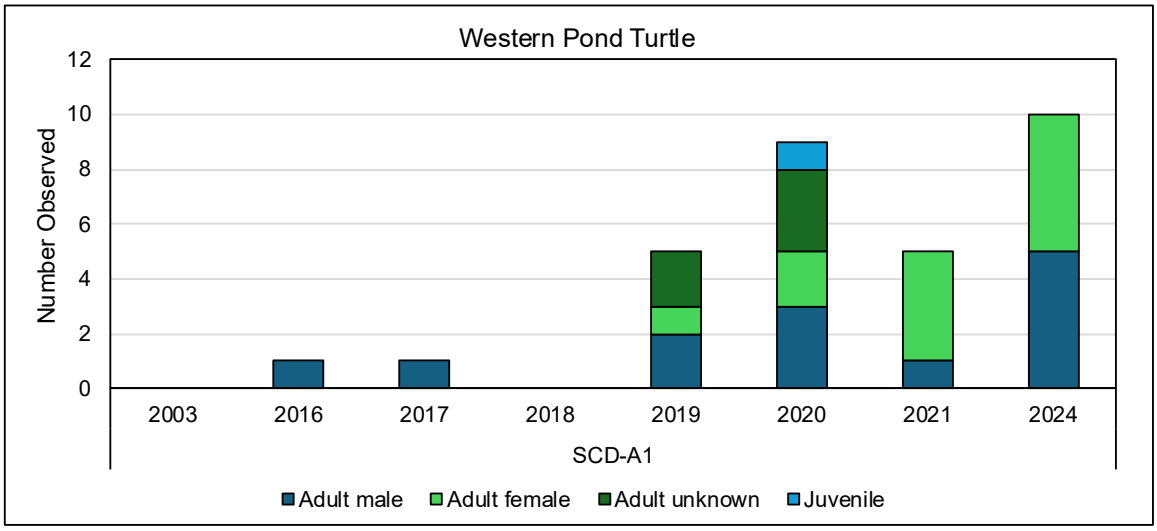


Figure 8-16. Western pond turtle observations at Site SCD-A1 during pre-License and License implementation monitoring years.

8.3.3 Habitat Conditions

All monitoring sites contained suitable habitat for foothill yellow-legged frog and western pond turtle. Conditions were similar to prior monitoring years across all sites. Representative photos of habitat at all survey sites in 2024 are available in Appendix H3.

8.3.3.1 Site JD-A15

Site JD-A15 contained a short, high-gradient riffle with boulder substrate in the upstream section and a long run with a mix of boulder and cobble substrate in the downstream section. The upstream high-gradient riffle had small, braided side channels and a few shallow backwater pools along the left bank. In the downstream run, the right bank was gently sloped and the left bank was steep. A few deep side-channel pools created by scouring around boulders and downed logs were present on the left bank. A mature canopy of willow and white alder shaded the entire left bank and the bank margins at the site were vegetated with sedge and Indian rhubarb (*Darmera peltate*) (Figure 8-17). This site contained suitable aquatic habitat for foothill yellow-legged frog and western pond turtle. While most terrestrial areas were densely vegetated, discrete areas had less vegetation and more solar exposure, providing marginal nesting habitat for western pond turtle.



Figure 8-1717. Representative photo of Site JD-A15, highlighting suitable foothill yellow-legged frog habitat, 10 June 2024.

8.3.3.2 Site CD-A3

Site CD-A3 contained runs interrupted by short sections of high-gradient riffle and dominated by bedrock substrate (Figure 8-18). The steep bedrock canyon walls, covered in some areas by scree or boulders, restricted tree growth, and resulted in high solar exposure throughout the site. The reach consisted of bedrock banks, a few cobble

bars, and several shallow edgewater bedrock pools with varying levels of connectivity to the channel. The site had sedges and willow and white alder saplings. Vegetation at the site grew most densely around two small tributaries that join Silver Creek on the right bank. Site CD-A3 contained suitable aquatic habitat for foothill yellow-legged frog and western pond turtle, although it had limited terrestrial nesting habitat for western pond turtle.



Figure 8-18. Representative photo of Site CD-A3, highlighting suitable foothill yellow-legged frog habitat, 11 June 2024.

8.3.3.3 Site CD-A4

Silver Creek was braided with two channels at Site CD-A4. The left channel had boulder and cobble substrate and was comprised of a large glide and a few side-channel pools. The banks of the glide contained cobble bars and shallow backwater areas. The right channel consisted of high- and low-gradient riffle habitats created by large boulders (Figure 8-19) and contained a few small cobble bars, side-channel pools, and backwater pools. Channel margins along the entire reach were vegetated with sedges, Indian rhubarb, and a multistory riparian canopy of willow and white alder. Site CD-A4 contained suitable aquatic habitat for foothill yellow-legged frog and western pond turtle but limited terrestrial nesting habitat for western pond turtle.



Figure 8-19. Representative photo of Site CD-A4, highlighting suitable foothill yellow-legged frog habitat, 11 June 2024.

8.3.3.4 Site SCD-A1

Site SCD-A1 was the longest site surveyed in 2024 with the widest variety of habitats. The site contained glides, runs, high- and low-gradient riffles, braided channels, mid-channel pools, and backwater pools (Figure 8-20). The substrate at the site was primarily bedrock, boulder, cobble, with some sand/silt. Both banks included cobble bars, sections of bedrock, sandy beaches or earthen areas, and boulders. A variety of riparian vegetation including sedges, Indian rhubarb, and willow and white alder saplings grew along the margins. Site SCD-A1 contained areas of suitable aquatic habitat for foothill yellow-legged frog and had suitable aquatic and terrestrial nesting habitat for western pond turtle. A portion of the river right bank at Site SCD-A1 that was dry during prior monitoring years was inundated during June surveys and dry during all subsequent surveys (Figure 8-21). Evidence of North American beaver (*Castor canadensis*), including small beaver dams, gnawed riparian vegetation, and a beaver carcass, was observed.



Figure 8-20. Representative photo of Site SCD-A1, highlighting western pond turtle habitat, 12 June 2024.



Figure 8-21. Habitat at Site SCD-A1 on 12 June (left) and 25 September (right), 2024.

8.3.4 Non-Target Species Observations

Ten non-special-status amphibian and reptile species were observed during surveys in 2024 (Table 8-6). Several known predators of foothill yellow-legged frogs and/or western pond turtles were observed, including non-native American bullfrogs (CDFW 2019, Nicholson et al. 2020, Sloan 2012), native garter snake species (*Thamnophis*

spp.) (CDFW 2019, also see Section 8.3.1.1), signal crayfish (*Pacifastacus leniusculus*), and fish. Additional photos of non-target amphibian and aquatic reptile species observed during surveys are included in Appendix H4. American bullfrogs also were observed at Site SCD-A1 during previous monitoring years (Figure 8-22).

Table 8-6. Other Herpetofauna Species Observed by Life Stage and Site, 2024.

Species Common Name (*Scientific name*)	Number of Individuals Observed[1] by Life Stage				Site(s) Where Species Observed
	Egg/ Egg Mass	Tadpole[2]	Young-of-Year	Juvenile/ Adult	
Amphibians					
Sierran treefrog (*Pseudacris sierra*)		3,545	55	3	CD-A4, SCD-A1
California toad (*Anaxyrus boreas halophulus*)			4		SCD-A1
American bullfrog (*Lithobates catesbeianus*)		1,379		30	SCD-A1
Sierra newt (*Taricha sierrae*)	16			3	JD-A15
Reptiles					
Northern alligator lizard (*Elgaria coerulea*)				1	CD-A3
Northwestern fence lizard (*Sceloporous occidentalis occidentalis*)				54	All sites
Western skink (*Plestidon skiltonianus*)				1	CD-A3
Sierra garter snake (*Thamnophis couchii*)				6	JD-A15, CD-A3, SCD-A1
Mountain garter snake (*Thamnophis elegans elegans*)				1	SCD-A1
Common garter snake (*Thamnophis sirtalis*)				1	CD-A3

Note:
[1] Observations were totaled for all surveys.
[2] Total numbers were approximated and cumulative.

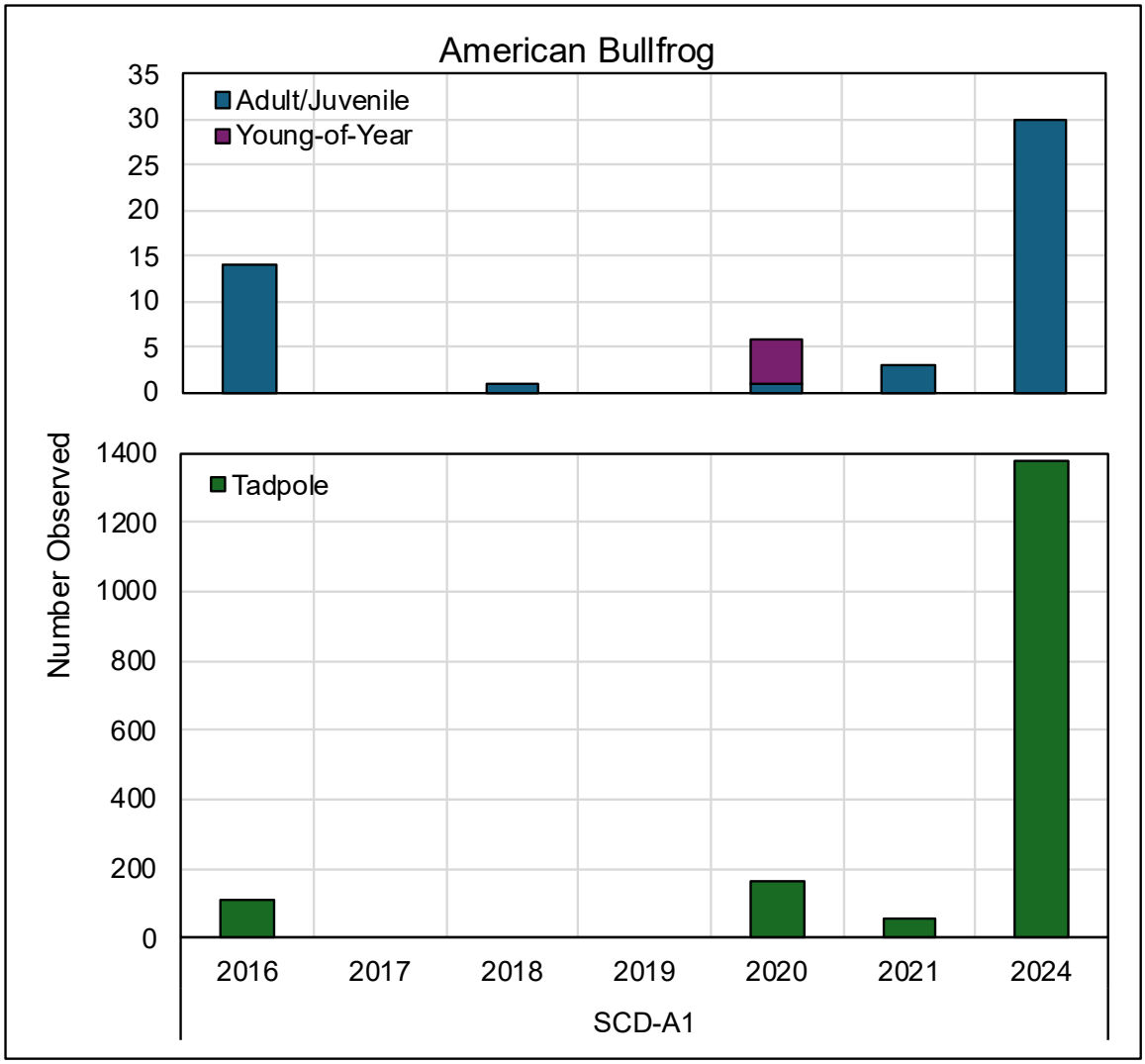


Figure 8-22. Observations of American bullfrog at Site SCD-A1 across License implementation monitoring years.

8.4 DISCUSSION

8.4.1 Foothill Yellow-Legged Frog

Consistent with pre-License (2003–2004) and License implementation (Years 1–9, 2016–2023) monitoring (Table 8-1), foothill yellow-legged frogs were observed only at Sites CD-A3 and CD-A4 during 2024 surveys.

In general, the number of frogs observed at Site CD-A3 has remained similar across pre-License and License implementation monitoring years. Although there is variation from year to year, the 2024 survey results provide evidence of ongoing foothill yellow-legged frog breeding. The observed predation of a foothill yellow-legged frog tadpole by a Sierra garter snake at the side-channel pool (Section 8.3.1.1) suggests the presence of native predatory species may play a role in foothill yellow-legged frog breeding and rearing survival along Silver Creek.

At Site CD-A4, the number of foothill yellow-legged frog observations (all life stages) is generally lower between the single pre-License year and License implementation monitoring years. However, more post-metamorphic foothill yellow-legged frogs (four) were observed in 2024 than during previous License implementation monitoring years (one juvenile in 2018, three young-of-year in 2020) (SMUD 2021), which suggests that frog populations may be increasing following implementation of License flow regimes or transient from other populations (e.g., South Fork American River or upstream in Silver Creek). Site CD-A4 contains suitable foothill yellow-legged frog breeding habitat, though no definitive evidence of breeding (i.e., egg masses) has been observed during pre-License or License implementation monitoring.

Foothill yellow-legged frogs have not been observed at Site JD-A15 or Site SCD-A1 during pre-License or License implementation monitoring. Both sites contain suitable aquatic features for foothill yellow-legged frog breeding (Section 8.3.3), but other parameters, like water temperature, predation, or competition, may preclude the species from occupying these two sites.

Water temperatures in the reach downstream of Junction Dam may be too cold to support foothill yellow-legged frog breeding. Studies in the Sierra Nevada foothills found the 30-day moving average water temperature (over the warmest 30-days period) needed to support foothill yellow-legged frog breeding was at least 17.6°C (Catenazzi and Kupferberg 2017). Two temperature gages bound the reach downstream of Junction Dam: Site SC5 (7.5 miles upstream of Site JD-A15) and Site SC6 (0.7 mile upstream of Site JD-A15). The 30-day moving average water temperatures in 2024 were 10.1°C and 17.6°C, at water temperature Sites SC5 and SC6, respectively. Therefore, water temperatures in the reach—and at Site JD-A15—may be at or below the threshold for foothill yellow-legged frog breeding.

At Site SCD-A1, the persistence of American bullfrogs may prevent foothill yellow-legged frogs from occupying the site. In 2024, American bullfrog observations were more abundant and broadly distributed throughout Site SCD-A1 than in previous years (SMUD 2021, 2022, 2024) (Figure 8-22). American bullfrogs have been shown to severely limit foothill yellow-legged frog abundance through predation and competition (CDFW 2019).

8.4.2 Western Pond Turtle

Consistent with all pre-License and License implementation monitoring, western pond turtles were only observed at Site SCD-A1 in 2024 (Figure 8-16). The total number of western pond turtles observed at Site SCD-A1 (ten in 2024) exceeded the total observations in comparable monitoring years[16] (one in both 2016 and 2017, five in 2019, nine in 2020, and five in 2021) (SMUD 2021, 2022). These results indicate a generally increasing trend in observations over License implementation monitoring.

[16] An adaptive management monitoring survey was conducted in 2023, and one western pond turtle was observed (SMUD 2024); these results are not comparable to other monitoring years.

All turtles observed during 2024 were sexually mature adults; only one juvenile was observed during License implementation monitoring (at Site SCD-A1 in 2020 [SMUD 2021]). This older age structure is consistent with other studies that have found many populations of western pond turtles in California are skewed toward adults (Reese 1996, Manzo et al. 2021). This shift in age distribution may be attributed to lower detectability of younger age classes of turtles (Bury et al. 2012) or could be an indication of reduced recruitment rates. Predation pressure by American bullfrog is a primary cause of reduced recruitment in western pond turtle populations across their range, particularly for juvenile and hatchling turtles (Nicholson et al. 2020, Sloan 2012). The increased bullfrog population abundance and distribution observed at Site SCD-A1 may be contributing to the lack of observed hatchling and juvenile pond turtles, despite the population of sexually mature turtles and presence of suitable nesting habitat at the site.

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9.0 SIERRA NEVADA YELLOW-LEGGED FROG

9.1 MONITORING PLAN OBJECTIVES

The objectives of the Sierra Nevada Yellow-legged Frog Monitoring Plan (Plan) (SMUD 2017) are to inform the presence and distribution of Sierra Nevada yellow-legged frog (*Rana sierrae*); if found, coarsely evaluate long-term population trends; and evaluate any long-term changes in habitat suitability in the UARP.

9.2 METHODS

9.2.1 Monitoring Sites

In accordance with the Plan and as detailed in the 2019 Annual Monitoring Report (SMUD 2020), biologists conducted Sierra Nevada yellow-legged frog monitoring at the following four sites[17] (Figure 1-1) in 2024:

- Rubicon Reservoir Inlet Area (Site RUB-A1), including the Rubicon River (from the FERC Project Boundary to the inlet), the Rubicon Reservoir inlet, and a nearby pond.
- Rubicon Reservoir Outlet Area (Site RUB-A2), including the Rubicon River, Rubicon Dam seep, and a nearby pond.
- Rockbound Lake Inlet Area (Site RCK-A1), including the inlet and a portion of Highland Creek (upper) upstream of the inlet
- Highland Creek (lower) (Site HC-A1) between Rockbound Lake and Buck Island Reservoir.

9.2.2 Visual Encounter Surveys

Three diurnal visual encounter surveys were performed in all safely accessible areas within each monitoring site following protocols outlined in the Plan (SMUD 2017) and by the California Department of Fish and Wildlife (CDFW) (CDFW 2017). Surveys focused on adult, subadult, and tadpole life stages and were conducted approximately one month apart: one survey in July after snowmelt and after frogs presumably emerged for breeding, one mid-season survey in August, and one late-season survey in September. During the surveys, biologists recorded any amphibian or aquatic reptile species observed, as well as any potential predators of Sierra Nevada yellow-legged frogs (e.g., fish). Observations regarding habitat suitability (e.g., quality of available habitat, opportunities for cover) were also recorded.

[17] All monitoring sites are located within critical habitat for Sierra Nevada yellow-legged frog (USFWS 2016).

9.2.3 Photo Points

In 2019, photo points were established to document site conditions and representative areas of suitable Sierra Nevada yellow-legged frog habitat at each site. These photo points were revisited in 2024 to document any apparent changes in habitat. Appendix H provides a map of photo point locations for each site and comparison photos between monitoring efforts in 2019 and 2024. When necessary, photo point locations (i.e., GPS coordinates) were adjusted to match the reference photographs during 2024 monitoring efforts. Photo Points RR-5 and DS-2 at Site RUB-A2 were identified as duplicates based on photograph records and removed from the survey.

9.3 RESULTS

No Sierra Nevada yellow-legged frogs were observed at any monitoring site in 2024. Surveys were conducted during favorable weather conditions (sunny, warm, and calm) and times (between 9 a.m. and 6 p.m.) for amphibian detections (Table 9-1). Substantial changes in the monitoring sites were not observed between 2019 (SMUD 2020) and 2024; comparison photographs are included in Appendix H.

Table 9-1. Survey Dates and Conditions, 2024.

Site (Description)	Aquatic Feature	Survey Date (2024)	Time (Hours)		Temperature Range (°C)		Fish Observed?
			Start	End	Air	Water	
RUB-A1 (Rubicon Reservoir Inlet Area)	Rubicon River	9 July	13:25	13:55	28.8–28.9	19.5	No
		6 August	13:45	14:06	27.2–29.4	25.5	Yes
		11 September	11:49	12:05	17.7–18.3	15.6–15.8	Yes
	Rubicon Reservoir inlet	9 July	09:25	11:46	27.5–28.1	19.6–21.0	Yes
		6 August	10:42	12:35	25.9–26.5	22.8–23.9	Yes
		11 September	10:08	11:16	17.1–17.4	15.1–18.0	Yes
	Pond	9 July	11:56	12:48	27.8	28.4	No
		6 August	13:13	13:35	28.5	27.4	No
		11 September	11:30	11:40	18.9	20.5	No
RUB-A2 (Rubicon Reservoir Outlet Area)	Rubicon River	8 July	10:04	12:02	29.4–32.3	20.9–21.6	Yes
		7 August	10:05	11:16	26.1–26.2	22.2–22.4	No
		10 September	09:52	10:39	21.1–22.0	18.1–19.0	No
	Rubion Dam seep	8 July	12:04	12:36	30.1–32.3	21.6–24.0	No
		7 August	11:25	11:44	26.2–28.4	21.2–24.9	No
		10 September	10:45	10:56	23.0–25.1	16.7–18.7	No
	Pond	9 July	14:41	14:57	28.9	29.8	No
		7 August	12:31	12:35	25.6	23.5	No
		11 September	13:34	13:35	18.0	Dry	No

Site (Description)	Aquatic Feature	Survey Date (2024)	Time (Hours)		Temperature Range (°C)		Fish Observed?
			Start	End	Air	Water	
RCK-A1 (Rockbound Lake Inlet Area)	Rockbound Lake inlet	10 July	08:48	11:04	27.2–24.9	20.8–21.5	Yes
		8 August	10:16	11:47	23.6–25.0	22.7–22.3	Yes
		12 September	10:30	11:06	12.5–19.0	15.1–17.9	Yes
	Highland Creek (upper)	10 July	11:43	12:47	28.5–29.7	17.6–19.4	Yes
		8 August	12:34	13:17	21.5–25.2	17.4–22.2	Yes
		12 September	11:58	12:29	18.1–18.2	7.5–15.2	Yes
HC-A1 (Highland Creek)	Highland Creek (lower)	9 July	16:27	17:42	28.0–29.5	22.8–23.5	Yes
		7 August	14:04	14:55	26.3–27.3	22.3–24.4	Yes
		10 September	13:48	14:32	23.1–23.6	16.3–17.1	Yes

Note: °C = degrees Celsius

9.3.1 Rubicon Reservoir Inlet Area (Site RUB-A1)

Three aquatic features were surveyed at Site RUB-A1: Rubicon River, Rubicon Reservoir inlet, and a pond.

9.3.1.1 Rubicon River

The Rubicon River is located at the upstream end of Site RUB-A1 (Figure 9-1), extending approximately 400 feet upstream of the confluence with the reservoir inlet. This segment consisted of a low-gradient, bedrock-lined stream channel, with small and shallow pools, runs, riffles, and cascades. Side-channel pools provided shallow basking habitat, and boulders provided aquatic cover for frogs in their interstitial spaces. Because of sparse canopy cover, this segment provided ample solar exposure for frogs and tadpoles. This segment contained suitable adult habitat (i.e., non-breeding habitat) for Sierra Nevada yellow-legged frogs, but the shallow bedrock-lined pools and fish presence make it unlikely that the species would use the segment for breeding.



Note: Orange arrow is the landmark point.

Figure 9-1. Photo Point RR-105 looking upstream during the July (left), August (middle), and September (right) surveys in the Rubicon River at Site RUB-A1, 2024.

9.3.1.2 Rubicon Reservoir Inlet

The Rubicon Reservoir inlet is an approximately 4.1-acre wetted area connecting the Rubicon River and Rubicon Reservoir (Figure 9-2). This segment included areas of slow-moving deep channels, backwater pools, and ephemeral creek confluences. Aquatic cover was predominately boulders with additional backwater and side-channel areas containing logs, rootwads, overhanging branches, undercut banks, and underwater vegetation. Bank slope and composition varied from steep to low-gradient and bedrock or boulders to sand or soil. The sand or soil banks had mixed amounts of vegetation (from sparse to dense). Upland habitat was dominated by mixed conifers and open areas of bedrock. Solar exposure varied throughout the day due to sun angle and mixed vegetative cover. Fish were observed during all surveys. The inlet contained marginal habitat for Sierra Nevada yellow-legged frogs because most of the shoreline dropped abruptly to deep water, with few gently sloped, shallow areas more suitable for basking and foraging. Suitable non-breeding habitat was isolated to ephemeral tributaries adjacent to the main channel.



Note: Orange arrow is the landmark point.

Figure 9-2. Photo Point Rubl-1 looking upstream during the July (left), August (middle), and September (right) surveys in the Rubicon Reservoir inlet at Site RUB-A1, 2024.

9.3.1.3 Pond

The approximately 0.7-acre natural pond located at Site RUB-A1 included two ponded areas connected by a narrow channel (Figure 9-3). The pond remained wet during all surveys but became increasingly dry by September. No fish were observed during any survey. Emergent vegetation (e.g., sedges) provided aquatic cover for frogs. The banks of the pond had ample solar exposure and included sparsely vegetated bedrock or boulders and areas of vegetated sand or soil. Upland habitat was dominated by conifers. The ephemeral pond did not provide suitable breeding habitat for Sierra Nevada yellow-legged frogs because tadpoles require perennial water for overwintering.



Note: Orange arrow is the landmark point.

Figure 9-3. Photo Point P-3 during the July (left), August (middle), and September (right) surveys in the Rubicon Reservoir Inlet at Site RUB-A1, 2024.

9.3.2 Rubicon Outlet Area (Site RUB-A2)

Site RUB-A2 includes two perennial aquatic features, Rubicon River and Rubicon Dam seep, and one ephemeral pond. The pond was surveyed in July and August but was dry by September.

9.3.2.1 Rubicon River

Site RUB-A2 is an approximately 1,900-foot-long reach of the Rubicon River downstream of Rubicon Dam. Seasonal flow into this area is regulated by UARP operations and controlled at the Rubicon Dam. Habitat types in this segment included pools, riffles, and runs (Figure 9-4).



Note: Orange arrow is the landmark point.

Figure 9-4. Photo Point RR-2 looking upstream during the July (left), August (middle), and September (right) surveys in the Rubicon River at Site RUB-A2, 2024.

The site varied from a deep silt-, sand-, and cobble-lined channel upstream to a wide, bedrock- and boulder-lined channel downstream (Figure 9-5). Aquatic cover included logs, boulders, rootwads, overhanging branches, underwater vegetation, and undercut banks. Solar exposure changed from a shaded upstream portion to sunny downstream portion. The upland habitat transitioned from a mixed conifer forest upstream to sporadic trees downstream (Figure 9-5). Fish were observed in July but not during subsequent surveys. The site contained suitable Sierra Nevada yellow-legged frog habitat, including discrete areas for breeding (e.g., the deep gage pool near the downstream end of the segment).



Figure 9-5. Representative photographs of the upstream (left) and downstream (right) habitat in the Rubicon River at Site RUB-A2, 7 August 2024.

Evidence of recent North American beaver activity, including cut trees, herbaceous vegetation, and willows along the stream edge, was incidentally observed at this site in 2024 (Figure 9-6).



Figure 9-6. Evidence of recent North American beaver activity at Site RUB-A2, 7 August 2024.

9.3.2.2 Rubicon Dam Seep

The seep below Rubicon Reservoir is approximately 618 feet long and is fed by Rubicon Dam (Figure 9-7). Habitat included shallow granite-lined pools with stagnant, tannic waters. Aquatic cover included boulders, underwater vegetation, and undercut banks. The granite-lined pools became increasingly fragmented throughout the summer as the seep dried. This segment had suitable adult frog habitat, but the shallow, stagnant water is likely unfit for successful breeding and overwintering.

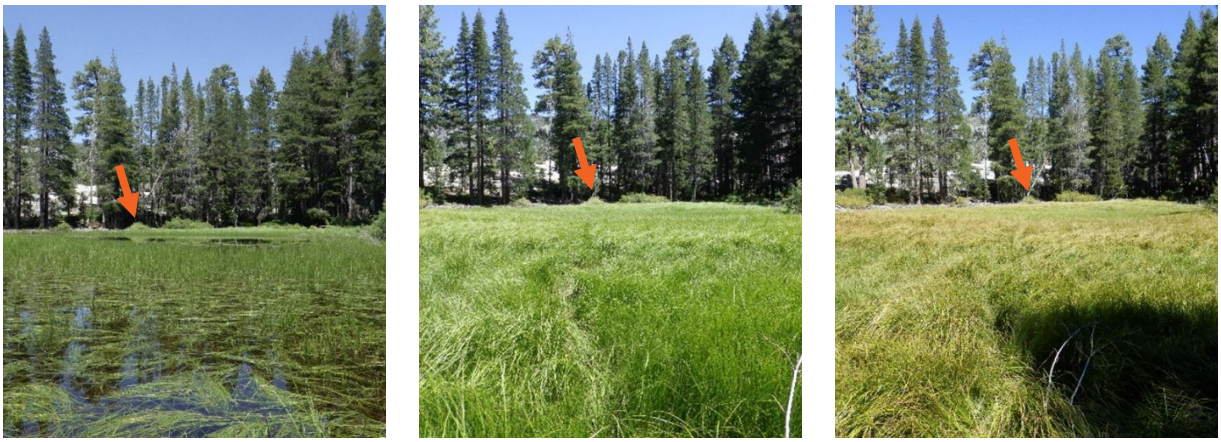


Note: Orange arrow is the landmark point.

Figure 9-7. Photo Point DS-5 looking upstream during the July (left), August (middle), and September (right) surveys in the Rubicon Dam seep at Site RUB-A2, 2024.

9.3.2.3 Pond

One naturally occurring pond was surveyed in July but was mostly dry by August (Figure 9-8). Aquatic cover was dominated by submerged and emergent graminoids with a few logs along the pond margin. Upland and edge habitat was surrounded by conifers and willows, respectively. The ephemeral pond is not suitable Sierra Nevada yellow-legged frog breeding habitat because it does not provide perennial water.



Note: Orange arrow is the landmark point.

Figure 9-8. Photo Point PE-1 during the July (left), August (middle), and September (right) surveys in the pond at Site RUB-A2, 2024.

9.3.3 Rockbound Lake Inlet Area (Site RCK-A1)

Two perennial aquatic features were surveyed at Site RCK-A1: Rockbound Lake inlet and Highland Creek.

9.3.3.1 Rockbound Lake Inlet

The inlet of Rockbound Lake is downstream of a diversion tunnel connected to Rubicon Reservoir. The segment includes approximately 660 feet of low-gradient stream channel, one 2.9-acre backwater pool, and one 1.4-acre wetland area (Figure 9-9). Aquatic cover throughout the site included logs, boulders, underwater vegetation, rootwads, branches, and undercut banks. Streambanks were predominately low gradient and covered with grasses and sedges. Solar exposure varied from moderate to high—moderate along channel areas lined with forests and high in exposed areas near the reservoir. Upland habitat was dominated by mixed conifer forest. This site contained suitable habitat for all life stages of Sierra Nevada yellow-legged frogs (i.e., slow-moving perennial water, vegetation-lined stream channels, and backwater alcoves), but are likely absent due to fish observed throughout the monitoring season. In September, water levels decreased, exposing a cobble shelf that spanned the downstream channel, potentially limiting fish passage.



Note: Orange arrow is the landmark point.

Figure 9-9. Photo Point RCK-I-3 looking downstream during the July (left), August (middle), and September (right) surveys in Rockbound Lake inlet at Site RCK-A1, 2024.

9.3.3.2 Highland Creek

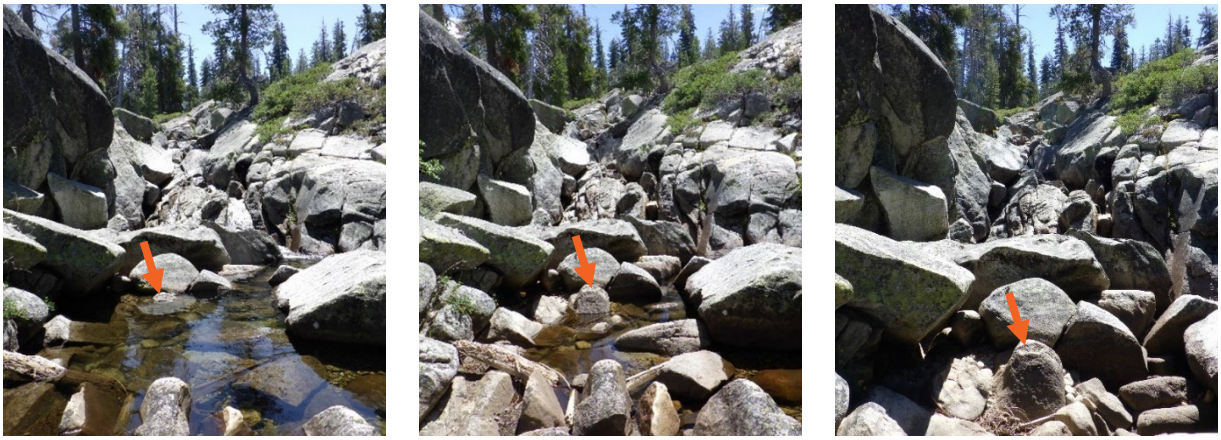
The Highland Creek (upper) segment of Site RCK-A1 begins at the Rockbound Lake inlet and ends 1,390 feet upstream at a large cascade. The segment is intersected by the Rubicon Hiking Trail. The stream segment became increasingly dry between July and September causing fragmentation of aquatic habitats (Figure 9-10).



Note: Orange arrow is the landmark point and orange circle highlights the one ponded area.

Figure 9-10. Photo Point HC-103 looking upstream showing wet creek in July (left), one ponded area in August (middle), and a dry creek bed in September (right) in the Highland Creek segment of Site RCK-A1, 2024.

The gradient variability in the Highland Creek (upper) segment divided the reach into two distinct areas with different morphology and habitat types. The upstream portion, above the intersection with the Rubicon Hiking Trail, was a confined steep gradient section dominated by boulders and cobbles with riffles and cascades (Figure 9-11). The downstream portion was low gradient with gently sloped (<15°) vegetated banks and deep pools. Aquatic cover throughout the reach included logs, boulders, rootwads, branches, underwater vegetation, and undercut banks. Solar exposure varied throughout the reach, from a downstream section shaded by conifers to upstream areas with sparse canopy cover. The segment contained suitable non-breeding habitat for Sierra Nevada yellow-legged frogs, but the lack of perennial water makes it unsuitable for breeding or overwintering.



Note: Orange arrow is the landmark point.

Figure 9-11. Photo Point HC-106 looking upstream during the July (left), August (middle), and September (right) surveys in the Highland Creek segment of Site RCK-A1, 2024.

9.3.4 Highland Creek (Site HC-A1)

Highland Creek (lower) is the only perennial aquatic area at Site HC-A1. The 1,691-foot-long reach connects Rockbound Lake and Buck Island Reservoir. Habitat features included cascades, deep pools, riffles, and runs. Aquatic cover included logs, boulders, undercut banks, underwater vegetation, and the occasional rootwad or branch. Dominant substrate included bedrock, boulders, and cobble. The site had ample sun exposure. The stream segment became increasingly dry between July and September, causing fragmentation of aquatic habitats (Figure 9-12). The site contained areas suitable for Sierra Nevada yellow-legged frog adults and for breeding (i.e., deep perennial pools). However, fragmentation or loss of aquatic habitat during drier water year types and the observed presence of trout species make it unlikely to be used by the species.



Note: Orange arrow is the landmark point.

Figure 9-12. Photo Point HC-1 looking downstream during the July (left), August (middle), and September (right) surveys at Site HC-A1 (Buck Island Reservoir in the background), 2024.

9.3.5 Other Amphibian and Aquatic Reptile Species

Six non-target amphibian or reptile species were observed at the monitoring sites in 2024; species, life stage, and location(s) are summarized in Table 9-2, and representative photos are shown in Figures 9-13 and 9-14.

Table 9-2. Additional Herpetofauna Species Observed, 2024.

Common Name (*Scientific Name*)	Life Stage	Number of Species Observed[1] at Site			
		RUB-A1	RUB-A2	RCK-A1	HC-A1
Western fence lizard (*Sceloporus occidentalis*)	Juvenile/adult	32	20	3	1
Sierran treefrog (*Pseudacris sierra*)	Tadpole[2]	3,000	2,000		
	Young-of-year	20	1	6	
California toad (*Anaxyrus boreas halophilus*)	Tadpole[2]	1,000			
	Young-of-year	1			
Sierra garter snake (*Thamnophis couchii*)	Juvenile/adult	2			3
Valley garter snake (*Thamnophis sirtalis fitchi*)	Juvenile/adult	1			
Mountain garter snake (*Thamnophis elegans elegans*)	Juvenile/adult	2			

Note:
[1] Observations were totaled for all surveys.
[2] Total amounts were approximated.



Figure 9-13. Sierran treefrog tadpole (left) and young-of-year (right) observed at Site RUB-A1 in 2024.



Figure 9-14. Young-of-year California toad observed at Site RUB-A1 in 2024.

9.4 DISCUSSION

Consistent with past results of surveys in the UARP, no Sierra Nevada yellow-legged frogs were documented during 2024 monitoring efforts (SMUD and PG&E 2005; Stillwater Sciences 2017, 2018; SMUD 2020). There were also no major habitat changes between 2019 and 2024, except for observed water levels (photo point comparisons are included in Appendix H). This is expected because 2019 was a Wet water year type, whereas 2024 was a Below Normal water year type with measurably drier conditions. Lower water levels in 2024 led to observed reductions in available aquatic habitat compared with 2019.

Sierra Nevada yellow-legged frogs have a multi-year aquatic developmental stage (i.e., tadpoles must overwinter at least once and may take 2 to 4 years to grow and develop before metamorphosing); as such, they require perennial water that is deep enough to prevent freezing or anoxic conditions over the winter (Pope and Matthews 2001). The observed drying and fragmentation of aquatic habitats in 2024 suggests even greater losses of aquatic habitat during periods of Dry and Critically Dry water year types. For instance, lower water levels observed in 2024, compared with 2019, eliminated most of the adult frog habitat in Highland Creek (upper and lower) and reduced breeding habitat to a few isolated pools.

In addition to drier conditions, many monitoring sites are connected to reservoirs containing salmonids (i.e., Rubicon Reservoir, Rockbound Lake, and Buck Island Reservoir), including rainbow trout, brook trout, and brown trout (CDFW 2024a). Trout species are predators of Sierra Nevada yellow-legged frogs and one of the main factors that have led to their population decline in the Sierra Nevada mountains (Knapp and Matthews 2000, Wilkins et al. 2019). Observed fish presence in all segments with suitable habitat may limit recruitment of Sierra Nevada yellow-legged frog within the UARP. Recent studies have observed adult Sierra Nevada yellow-legged frogs in streams with fish, including those hydrologically connected to reservoirs (Brown et al. 2019). These studies indicate that successful recruitment of Sierra Nevada yellow-legged frog in areas with fish require habitat features that provide adequate refugia from predation and deep perennial water(e.g., areas protected from freezing overwinter or desiccation in summer) (Lacan et al. 2008; Knapp and Matthews 2000, as cited in Brown et al. 2019).

The likelihood Sierra Nevada yellow-legged frogs could establish a new population in the UARP also depends on the nearest source population. A known population exists in Highland Lake and Highland Creek (from the outflow of Highland Lake to 0.5 miles downstream) (CDFW 2024a and 2024b), approximately 2.25 miles upstream of the Highland Creek segment of Site RCK-A1. CDFW's High Mountain Lakes Project surveyed this area for Sierra Nevada yellow-legged frogs in August 2023 and observed 450 adults, 140 subadults, and 1,610 tadpoles (CDFW 2024a). Additional observations of the species are documented in Lake Zitella, McConnell Lake, and Leland Lakes (upper and lower); all of which are hydrologically connected to the Rubicon River and Site RUB-A1 but are more than 2 miles upstream (CDFW 2024a and 2024b). Existing source populations adjacent to the UARP are farther from the monitoring sites than the

species' known dispersal distances. In the Sierra National Forest, specifically Humphreys Basin, Sierra Nevada yellow-legged frogs have dispersed upwards of 2,890 feet, approximately 0.55 mile, along a stream to recolonize a lake following fish removal (Knapp et al. 2007). Southern mountain yellow-legged frog (*Rana muscosa*), a similar species, has been documented dispersing overland distances exceeding 200 feet (Pope and Matthews 2001). In other studies, Sierra Nevada yellow-legged frogs have been documented as far as 1,300 feet away from water (Vredenburg et al. 2005), indicating the species can make overland movements outside of hydrologically connected habitats. Because potential source populations are beyond observed dispersal distances, Sierra Nevada yellow-legged frogs would need to incrementally populate areas closer to monitoring sites to occupy the UARP.

While there is suitable habitat for Sierra Nevada yellow-legged frogs at monitoring sites in the UARP, occupancy is likely limited by extent of perennial habitats, fish presence, and distance from source populations. Future monitoring will continue to inform whether Sierra Nevada yellow-legged frogs establish in the UARP or habitat suitability changes over time.

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10.0 BEAR MANAGEMENT MONITORING

This Bear-Human Interaction Monitoring Report addresses monitoring set forth in Condition Number 31 of Appendix B of Forest Service Section 4(e) conditions of the License (FERC 2014).

In consultation with stakeholders and the resource agencies, SMUD developed a Bear-Human Interaction Monitoring Plan (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 SMUD and 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 2024 recreation season are provided in this report.

10.1 MONITORING PLAN OBJECTIVES

The primary objectives and rationale for the bear management monitoring program, as described in the Plan follow:

> Monitor effectiveness of measures related to bear management using a method acceptable to FS [Forest Service], [US]FWS, and CDFG [California Department of Fish and Game].

This monitoring will help determine whether bear management measures used to keep bear populations away from recreation sites at 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 [Forest Service], [US]FWS, and CDFG [California Department of Fish and Game] to identify and implement additional measures necessary to reduce such problems.

10.2 STUDY AREA AND SAMPLING LOCATIONS

As has been done since the program began in 2016, monitoring was carried out at developed, UARP-related recreation facilities within the study area (Figure 10-1, Table 10-1). These included both day-use and overnight facilities, hosted and un-hosted.

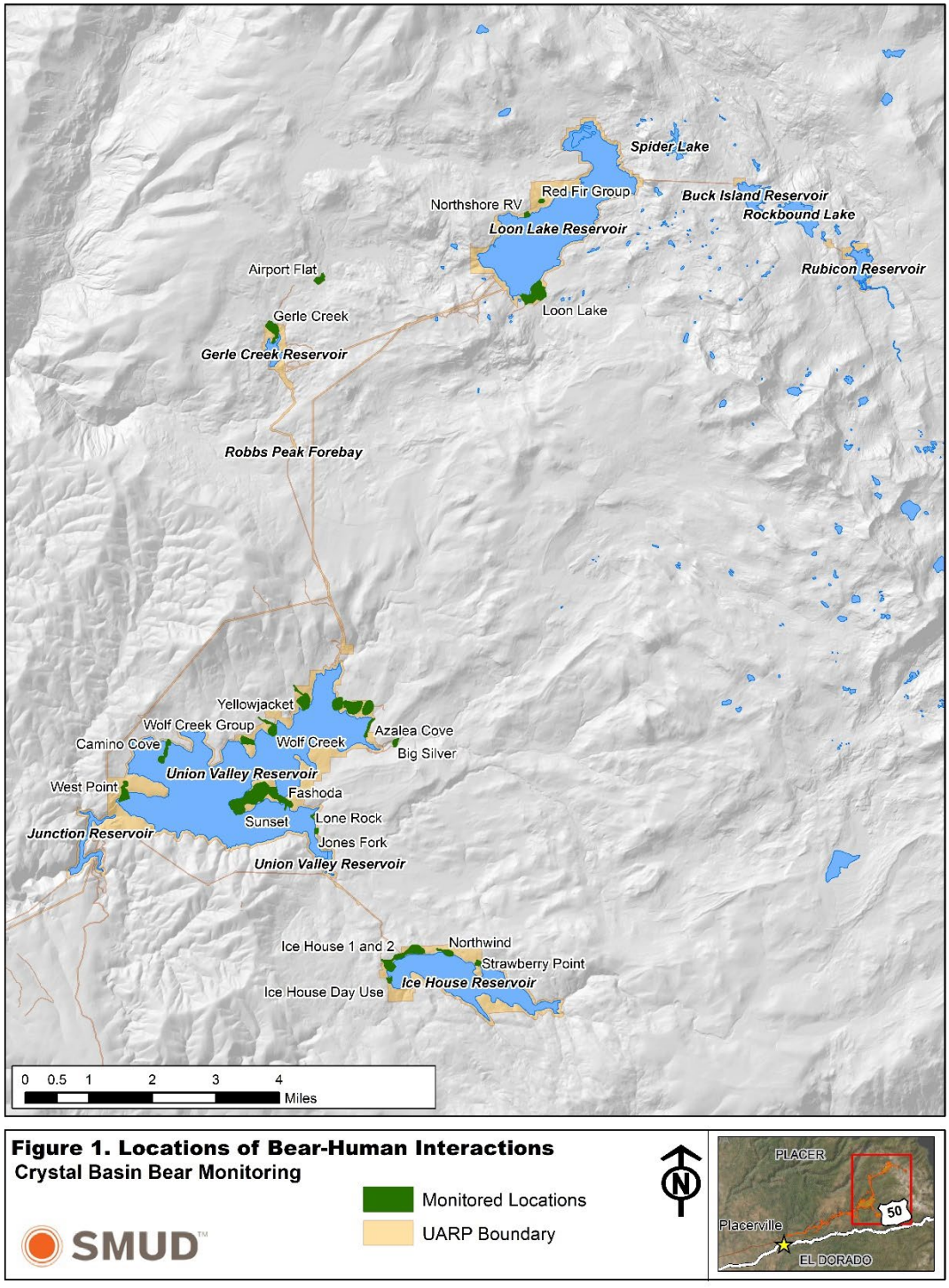


Figure 10-1. Bear-human interaction monitoring locations.

Table 10-1. Sites Associated with the Upper American River Project Bear-Human Interaction 2024 Monitoring Program.

Facility	Existing Lockers/Trash	Hosted Site	Monitored	Comment
Northshore CG	Y	Y	Y	Host supplied with forms
Loon Lake Family CG; Boat Launch RV CG; Equestrian CG; Group CG; and Equestrian Group CG	Y	Y	Y	Host administering multiple Loon Lake facilities was responsible for collecting forms
Red Fir CG	Y	N	Y	Monitoring form box installed
Pleasant Boat-in CG	Y	N	N	Monitoring Box not deployed here due to access challenge
Airport Flat CG	Y	N	Y	Monitoring form box installed
Gerle Creek CG	Y	Y	Y	Host supplied with forms
Sunset Family CG	Y	Y	Y	Host supplied with forms
Fashoda CG	Y	Y	Y	Host supplied with forms
West Point CG	Y	Y	Y	Host supplied with forms
Yellowjacket CG	Y	Y	Y	Host supplied with forms
Wench Family and Group CG	Y	Y	Y	Host supplied with forms
Wolf Creek Family CG	Y	Y	Y	Host supplied with forms
Wolf Creek Group CG	Y	Y	Y	Host supplied with forms
Azalea Cove CG	Y	N	Y	Monitoring form box installed
Big Silver Group CG	Y	N	Y	Monitoring form box installed
Camino Cove CG	Y	N	N	CG closed for season due to construction
Jones Fork CG	Y	N	Y	Monitoring form box installed

Facility	Existing Lockers/Trash	Hosted Site	Monitored	Comment
Lone Rock CG	Y	N	Y	Monitoring form box installed
Ice House Family CG	Y	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	Y	Y	Y	Host supplied with forms
Ice House	Y	Y	Y	Host supplied with forms
Fashoda	Y	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	N	N	Y	Monitoring form box installed at trailhead
Silver Creek Day Use	Y	N	N	Monitoring form box to be installed

Note: CG = Campground

10.3 METHODS

The methods of this monitoring program are outlined in the Plan prepared by SMUD in consultation with the Forest Service and CDFW in 2015. SMUD has prepared a form to collect standardized bear-human interaction data. The form is supplied to the Forest Service at the outset of each recreation season, and the Forest Service distributes the forms to campground hosts and to form boxes supplied by SMUD for non-hosted sites. Signage that describes the monitoring program is supplied by SMUD and is posted at kiosk locations throughout the Crystal Basin. The Forest Service collects completed forms throughout the season and provides them to SMUD at the end of the season for reporting purposes. Data are provided by the visiting public, Forest Service staff, or

campground hosts who have interviewed campers. SMUD staff communicate with Forest Service staff throughout the season to ensure supplies of forms are sufficient.

10.4 RESULTS AND DISCUSSION

At the annual kickoff meeting with the Forest Service and the recreation concessionaire in 2024, SMUD discussed the bear monitoring program and asked for the help of the concessionaire staff at hosted campgrounds to distribute and collect informational forms from campers. As seen in Table 10-1, most of the facilities were monitored throughout the 2024 recreation season except for a closure at Camino Cove related to construction of a bike trail along the north shore of Union Valley Reservoir. In 2024, Forest Service and SMUD staff stocked collection boxes regularly with bear-human interaction forms. The concessionaire camp hosts were also supplied with forms that were collected at the end of the season by Forest Service staff.

SMUD received 32 completed forms (Appendix I1) from the Forest Service for the 2024 recreation season. The results are summarized in Appendix I2. Completed bear-human encounter forms came from the following designated monitoring sites: Sunset Campground/Boat Launch (15), Fashoda Campground (10), Jones Fork Campground (2), Northwind (1), Strawberry Point Campground (1), Union Valley Bike Trail (1), Ice House Campground (1), and one encounter at an undisclosed location.

Since monitoring started in 2016, the number of reported incidents has fluctuated from a high of 43 in 2017 to a low of 7 in 2023. Reported incidents have come from across the Crystal Basin. Locations of bear interactions appear to fluctuate every year, with new hot spots developing at different locations. Many bears described in the interactions seem to be habituated to humans and are not easily deterred, particularly when there are numerous incidents in one area. All campground locations in the monitoring program have bear-resistant trash and food storage containers, and most day-use areas have bear-resistant trash containers (Table 10-1).

In 2024, 17 of the 32 bear-human encounters involved food stored outside of designated bear lockers (Appendix I2). The remaining incidents involved bears attracted to food odor and trash. Most bear encounters occurred at the Sunset and Fashoda Campgrounds. Both campgrounds reported multiple encounters on the same nights, indicating they were likely the same bear(s). Five forms reported property damage to either tents or ice chests.

As indicated in previous reports, continuing public education and enforcement are needed to ensure ***all food, trash, or scented products*** are stored in bear-proof food lockers or trash receptacles. This message should be continually reinforced by the Forest Service and its concessionaire hosts. Based on observations and the monitoring results to date, SMUD makes the following recommendations and suggestions:

- SMUD, CDFW, and the Forest Service 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.

- SMUD and the Forest Service should meet briefly 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.
- The Forest Service should continue to emphasize the need for concessionaire staff to inform the public about proper food storage and make regular rounds to see if food is being left out. Consider providing a handout about proper food storage that could be given to all campers.
- The Forest Service could consider having all guests that make reservations online for campsites sign an acknowledgment regarding complying with food storage.
- SMUD will continue to provide the results of the monitoring to the Forest Service 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.

10.5 UPCOMING SURVEY PLANS

In accordance with the Plan, monitoring will continue to occur annually during the recreation season (approximately Memorial Day through the end of September). In 2025, SMUD, with the help of the Forest Service, will ensure that each site, including hosted sites, has adequate signage to educate the public about bears and inform visitors of the monitoring program. If requested by the Forest Service, SMUD will attend the annual kick-off meeting with the recreation concessionaire to present the details of the monitoring program. SMUD will also provide the Forest Service additional forms to be handed out to the concessionaire during this meeting. 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.

10.6 LITERATURE CITED

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

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11.0 LARGE WOODY DEBRIS

No LWD met the size criteria for passage at Robbs Peak Dam, Junction Dam, Camino Dam, or Slab Creek Dam in 2024.

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12.0 WATER TEMPERATURE

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

12.1 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 whether water temperatures in UARP waters meet the beneficial use of cold freshwater habitat in the Water Quality Control Plan for the Central Valley Region, the Sacramento River Basin and the San Joaquin River Basin (Basin Plan) (CVRWQCB 1998) and other identified habitat and 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 habitat beneficial use at any site for which the Licensee seeks modification to the temperature monitoring requirement."

These data are also used to direct the following License requirements:

- Adaptive management decisions regarding initiation of foothill yellow-legged frog breeding,
- Cancellation of recreational boating releases due to foothill yellow-legged frog 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, and

- Requirement of the Basin Plan that "at no time or place shall the temperature of COLD [cold freshwater habitat] or WARM [warm freshwater habitat] intrastate waters be increased more than 5°F [degrees Fahrenheit] above the natural receiving water temperature."

12.2 METHODS

12.2.1 Study Area and Sampling Locations

Continuous water temperature monitoring of stream reaches occurred in 2024 at 19 sites throughout the UARP area using fixed stations or dataloggers. In general, these sites measured water temperatures in diverted stream reaches downstream of UARP reservoirs. Table 12-1 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 1-1 through Figure 1-3 depict the monitoring site locations relative to the UARP and primary streams and rivers.

Table 12-1. Upper American River Project Water Temperature Monitoring Site Locations.

Site	Site Description	UTM (NAD 83)		Sensor Type	Data	Threshold	Complete Record
		Easting	Northing				
RR5	Rubicon River immediately below Rubicon Reservoir Dam	740501	4319200	CS450L	Telemetry	None	Yes
LRR3	Little Rubicon River immediately below Buck Island Reservoir Dam	737558	4320907	CS450L	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	CS450L	Telemetry	None	Yes
GC8	Gerle Creek immediately below Gerle Creek Reservoir Dam	725745	4316219	CS107 or CS450L	Telemetry	None	Yes

Site	Site Description	UTM (NAD 83)		Sensor Type	Data	Threshold	Complete Record
		Easting	Northing				
SFRR5	South Fork Rubicon River immediately below Robbs Peak Reservoir Dam	726202	4314316	CS450L	Fiber Optic Network	None	Yes
SFRR6	South Fork Rubicon River below confluence of Gerle Creek at the Project boundary	725256	4314907	CS450L	Telemetry	None	Yes
SFRR7	South Fork Rubicon River immediately upstream of the confluence with the Rubicon River	719438	4316236	Onset data-logger	Manual	None	Yes
SFSC7	South Fork Silver Creek immediately below Ice House Reservoir Dam	728745	4299871	CS450L	Telemetry	None	Yes
SFSC8	South Fork Silver Creek immediately upstream of Junction Reservoir	721498	4303358	CS450L	Telemetry	7DMAVG	No[1]
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	CS450L	Telemetry	DAVG	Yes
SC7	Silver Creek immediately below Camino Reservoir Dam	713631	4300155	CS450L	Fiber Optic Network	None	Yes

Site	Site Description	UTM (NAD 83)		Sensor Type	Data	Threshold	Complete Record
		Easting	Northing				
SC8	Silver Creek immediately upstream of the South Fork American River	709310	4296208	CS450L	Telemetry	DAVG 7DMAVG	Yes
BC4	Brush Creek immediately below Brush Creek Reservoir Dam	706407	4298536	CS451	Fiber Optic Network	None	Yes
SFAR13	South Fork American River immediately below Slab Creek Reservoir Dam	699644	4294054	CS450L	Fiber Optic Network	None	Yes
SFAR7	South Fork American River at Mosquito Road Bridge	695572	4294304	Onset Data-logger	Manual	None	No[1]
SFAR15	South Fork American River approximately 0.5 mile upstream of White Rock Powerhouse	692576	4292875	CS450L	Telemetry	7DMAVG	Yes
SFAR16	South Fork American River to record White Rock Powerhouse discharge temps	692212	4293046	CS450L	Fiber Optic Network	None	No[1]

Notes: 7DMAVG = 7-day moving average
DAVG = daily average
NAD 83 = North American Datum 1983
UTM = Universal Transverse Mercator

[1] See Section 12.2.4 for discussion on missing record.

12.2.2 Temperature Data at Fixed Stations

Sixteen of the nineteen sites were monitored for water temperature using fixed stations. Monitoring compliance at these sites was accomplished using gaging stations located at weirs, stilling wells, or powerhouse tailraces. Each fixed station site used 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 direct current batteries or by an existing hard-wired 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's License implementation database, *Aquarius*, where the data were summarized to hourly means and calculated to daily statistics.

Computation of daily minimum, maximum, average, and 7-day moving average (7DMAVG) values are automated in real time for fixed station sites in the SMUD License implementation database. SMUD staff are notified when thresholds are exceeded at sites associated with trigger thresholds (Table 12-1).

12.2.3 Temperature Data at Datalogger Stations

Simple, non-permanent, calibrated temperature dataloggers (Onset HOBO® Water Temperature Pro V2) were deployed prior to 15 March 2024 at the remaining three sites ("manual" sites in Table 12-1). 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-inch chain and placed to ensure that the sensor remained submerged and was not exposed to direct sunlight (Figure 12-1). 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 12-2 describes the equipment specifications for all sensors selected for water temperature monitoring.

Hourly data from HOBO loggers were manually downloaded using Onset Computer Corporation's HOBOware software upon retrieval at the end of the monitoring period.



Figure 12-1. Water temperature datalogger housing, Rubicon River below confluence of Little Rubicon River.

Table 12-2. 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

Note: °C = degrees Celsius

12.2.4 Variances and Problems Encountered

Issues occurred with two telemetered fixed stations. Site SFSC8 (South Fork Silver Creek immediately upstream of Junction Reservoir) had communication errors at the beginning of the period. Good data started being reported on 21 March and continued though the period. The other issue occurred at Site SFAR16 (South Fork American River to record White Rock Powerhouse discharge temps). The remote terminal unit failed at this site and did not report data from 21 May to 14 August.

The HOBO temperature probes at Site SFAR7 (South Fork American River at Mosquito Road Bridge) were not installed until 9 April. The delay in deployment was caused by previous equipment being destroyed in water year 2023.

12.3 QUALITY ASSURANCE/QUALITY CONTROL

Raw data from fixed stations were 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 was generated and sent to pertinent SMUD staff via email for any suspected erroneous data. The same procedures were 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, allowing for a timely response at fixed stations 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.

12.4 DECISION-MAKING THRESHOLDS

SMUD uses real-time water temperature information in an effort to protect listed species and cold freshwater habitat. The following 12°C 7DMAVG temperature trigger thresholds may eventually be adjusted on a site-specific basis if data from the foothill yellow-legged frog monitoring support such a change. In particular, SMUD will:

- Use water temperature thresholds to protect foothill yellow-legged frog breeding activities by canceling recreation streamflows in the following reaches when the 7DMAVG exceeds 12°C at the following:
  - South Fork Silver Creek below Ice House Dam (if foothill yellow-legged frogs are found in this reach), and
  - SFAR below Slab Creek Reservoir.
- Monitor for effects on 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 certification (SWRCB 2013) and in Forest Service Section 4(e) Condition 27 (FERC 2014). This monitoring 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 to assist in determining whether the UARP is protecting the Basin Plan beneficial use of cold freshwater habitat (CVRWQCB 1998).

12.5 ADAPTIVE MANAGEMENT

Thresholds connected to various UARP adaptive management conditions were crossed at three sites during the monitoring period (Table 12-3), triggering adaptive management actions.

Table 12-3. Water Temperature Threshold Exceedances.

Site	Site Description	Threshold	Date of Threshold Exceedance
SFSC8	South Fork Silver Creek immediately upstream of Junction Reservoir	7DMAVG, 12°C	3 June
SC8	Silver Creek immediately upstream of South Fork American River confluence	7DMAVG, 12°C	23 April
SFAR15	South Fork American River approximately 0.5 mile upstream of White Rock	7DMAVG, 12°C	15 May

Note: 7DMAVG = 7-day moving average

At South Fork Silver Creek immediately upstream of Junction Reservoir (Site SFSC8), the temperature threshold trigger site for South Fork Silver Creek below Ice House Dam, the 7DMAVG exceeded the 12°C threshold on 3 June. The threshold exceedance did not trigger cancellation of recreational streamflows because foothill yellow-legged frogs have not been documented in this section of river.

For water temperature monitoring at Silver Creek immediately upstream of SFAR confluence (Site SC8), spill occurred at Camino Dam after the 7DMAVG reached the 12°C threshold on 17 May. Subsequent monitoring was performed after the spill occurred (Section 8.2.2.2), in accordance with the License.

For water temperature monitoring at SFAR approximately 0.5 mile upstream of White Rock (Site SFAR15), spills occurred at Slab Dam after the 7DMAVG exceeded the 12°C threshold on 31 May. Subsequent monitoring was performed after the spill occurred, in accordance with the License. Furthermore, all recreation streamflows were complete prior to the threshold exceedance date (15 May).

Because the 2024 water year type was Below Normal, the “Block of Water” adaptive management measures were not required.

12.6 RESULTS

Daily water temperature statistics are presented graphically in Appendix J. Hourly data will be made available upon request.

12.7 LITERATURE CITED

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

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Monitoring Program 2024 Volume II: Final Annual Report Appendices

Sacramento Municipal Utility District

Hydro License Implementation • June 2025

Upper American River Project

FERC Project No. 2101



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VOLUME II: CONTENTS

Appendix A1 Pre-License and License Minimum Streamflow Requirements for the Upper American River Project
Appendix A2 2024 Draft Annual Monitoring Report Comment–Response Table
Appendix B1 Fish Population Site Photographs
Appendix B2 Fish Population Site Conditions
Appendix B3 Individual Fish Capture Data
Appendix B4 Fish Population Estimates
Appendix B5 Site-Specific Trout Density and Biomass
Appendix B6 Trout Condition
Appendix B7 Site-Specific Trout Length-Frequency and Age-Class Distributions
Appendix B8 Scale Analysis Data
Appendix C1 Benthic Macroinvertebrate Site Photographs
Appendix C2 Benthic Macroinvertebrate Taxonomic List
Appendix C3 Benthic Macroinvertebrate Metric Values
Appendix D1 Flow Data
Appendix D2 Cross Section Location Data and Overview Maps
Appendix D3 Representative Geomorphology Site Photographs
Appendix D4 Longitudinal Profiles
Appendix D5 Cross Sections at Geomorphology Sites
Appendix D6 Pebble Counts at Geomorphology Sites
Appendix D7 Sediment Facies Maps
Appendix D8 Inventory of Large Woody Debris
Appendix D9 Fine Sediment Storage Data
Appendix D10 Rosgen Level III Assessments
Appendix D11 Bank Erosion and Riparian Vegetation Assessments
Appendix D12 Channel Stability (Pfankuch) Assessments
Appendix E1 Riparian Vegetation Site Photographs
Appendix E2 Riparian Vegetation Maps
Appendix E3 Riparian Vegetation Line-point Intercept Results
Appendix E4 Riparian Vegetation Point-centered Quarter Results
Appendix E5 Riparian Vegetation Greenline Results

Appendix F1 Incidental Observations of Avian Species in the Study Area (2016–2024)
Appendix F2 California Department of Fish and Wildlife Bald Eagle Nesting Survey Forms
Appendix G1 Foothill Yellow-Legged Frog Photographs
Appendix G2 Western Pond Turtle Photographs at Site SCD-A1
Appendix G3 Monitoring Site Representative Habitat Photographs
Appendix G4 Incidental Species Photographs
Appendix H Comparison of Sierra Nevada Yellow-Legged Frog Monitoring Site Photo Points
Appendix I1 Bear Encounter Forms
Appendix I2 Bear Encounter Summary
Appendix J 2024 Water Temperature Graphs

APPENDIX A1

Pre-License and License Minimum Streamflow Requirements for the Upper American River Project (FERC Project No. 2101)

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Table A-1. Minimum Streamflow Requirements prior to the 2014 License.

USGS Gaging Station	Stream Reach	FERC Article 29 Ref.	Minimum Streamflow (cfs)											
			Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Years when less than 1.0 million acre-feet annual inflow is forecasted for Folsom Reservoir														
11427960	Rubicon River below Rubicon Dam[1]	(a)	6	6	6	6	6	6	6	6	6	6	6	6
11428400	Little Rubicon River below Buck Island Dam[2]	(b)	1	1	1	1	1	1	1	1	1	1	1	1
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[3,8]	(d) (g)	1	1	1	1	1	1	1	1	1	1	1	1
11430000	Gerle Creek below Gerle Creek Dam[3,8]	(d) (g)	4	4	4	4	4	4	4	4	4	4	4	4
11441500	South Fork Silver Creek below Ice House Dam[4]	(e) (g)	5	5	5	5	5	5	5	5	5	5	5	5
11441800	Silver Creek below Junction Dam[3]	(f) (g)	5	5	5	5	5	5	5	5	5	5	5	5
11441900	Silver Creek below Camino Dam[3]	(g)	5	5	5	5	5	5	5	5	5	5	5	5
11442700	Brush Creek below Brush Creek Dam[5,6]	(I)	2	4	4	4	4	4	4	4	2	2	2	2
1143500	South Fork American River below Slab Creek Dam[6,7]	(h)	36	36/10	10	10	10	10	10	10	36	36	36	36
Years when 1.0–1.499 million acre-feet annual inflow is forecasted for Folsom Reservoir														
11427960	Rubicon River below Rubicon Dam[1]	(a)	6	6	6	6	6	6	6	6	6	6	6	6
11428400	Little Rubicon River below Buck Island Dam[2]	(b)	1	1	1	1	1	1	1	1	1	1	1	1
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[3,8]	(d) (g)	1	1	1	1	1	1	1	1	1	1	1	1
11430000	Gerle Creek below Gerle Creek Dam[3,8]	(d) (g)	4	4	4	4	4	4	4	4	4	4	4	4

USGS Gaging Station	Stream Reach	FERC Article 29 Ref.	Minimum Streamflow (cfs)											
			Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
11441500	South Fork Silver Creek below Ice House Dam[4]	(e) (g)	5	5	5	5	5	5	5	5	5	5	5	5
11441800	Silver Creek below Junction Dam[3]	(f) (g)	10	6	6	6	6	6	6	10	10	10	10	10
11441900	Silver Creek below Camino Dam[3]	(g)	10	6	6	6	6	6	6	10	10	10	10	10
11442700	Brush Creek below Brush Creek Dam[5,6]	(i)	2	4	4	4	4	4	4	4	2	2	2	2
11443500	South Fork American River below Slab Creek Dam[6,7]	(h)	36	36/10	10	10	10	10	10	10	36	36	36	36
Years when less than 1.5-1.999 million acre-feet annual inflow is forecasted for Folsom Reservoir														
11427960	Rubicon River below Rubicon Dam[1]	(a)	6	6	6	6	6	6	6	6	6	6	6	6
11428400	Little Rubicon River below Buck Island Dam[2]	(b)	1	1	1	1	1	1	1	1	1	1	1	1
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[3,8]	(d) (g)	3	1	1	1	1	1	1	3	3	3	3	3
11430000	Gerle Creek below Gerle Creek Dam[3,8]	(d) (g)	7	4	4	4	4	4	4	7	7	7	7	7
11441500	South Fork Silver Creek below Ice House Dam[4,7]	(e) (g)	12	10/4	4	3	3	3	3	8	8	15	15	15
11441800	Silver Creek below Junction Dam[3]	(f) (g)	15	8	8	8	8	8	8	15	15	15	15	15
11441900	Silver Creek below Camino Dam[3]	(g)	15	8	8	8	8	8	8	15	15	15	15	15
11442700	Brush Creek below Brush Creek Dam[5,6]	(l)	3	6	6	6	6	6	6	6	3	3	3	3
1143500	South Fork American River below Slab Creek Dam[6]	(h)	36	36	36	36	36	36	36	36	36	36	36	36

USGS Gaging Station	Stream Reach	FERC Article 29 Ref.	Minimum Streamflow (cfs)											
			Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Years when more than 2 million acre-feet annual inflow is forecasted for Folsom Reservoir														
11427960	Rubicon River below Rubicon Dam[1]	(a)	6	6	6	6	6	6	6	6	6	6	6	6
11428400	Little Rubicon River below Buck Island Dam[2]	(b)	1	1	1	1	1	1	1	1	1	1	1	1
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[3,8]	(d) (g)	3	1	1	1	1	1	1	3	3	3	3	3
11430000	Gerle Creek below Gerle Creek Dam[3,8]	(d) (g)	7	4	4	4	4	4	4	7	7	7	7	7
11441500	South Fork Silver Creek below Ice House Dam[4,7]	(e) (g)	12	10/4	4	3	3	3	3	8	8	15	15	15
11441800	Silver Creek below Junction Dam[3]	(f) (g)	20	10	10	10	10	10	10	20	20	20	20	20
11441900	Silver Creek below Camino Dam[3]	(g)	20	10	10	10	10	10	10	20	20	20	20	20
11442700	Brush Creek below Brush Creek Dam[5,6]	(i)	3	6	6	6	6	6	6	6	3	3	3	3
11443500	South Fork American River below Slab Creek Dam[6]	(h)	36	36	36	36	36	36	36	36	36	36	36	36

Notes: cfs = cubic feet per second, DWR = California Department of Water Resources, USGS = U.S. Geological Survey

[1] 6 cfs or the natural flow, whichever is less, plus storage provided by stream flow maintenance dams 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 in Rockbound and Highland Lakes.

[3] Requirements are based on the 1 April DWR Bulletin 120 forecasted "Water Year Unimpaired Runoff" for Folsom Reservoir

[4] Requirements are based on the DWR Bulletin 120 forecasted "Water Year Unimpaired Runoff" to Folsom Reservoir, beginning with the 1 April bulletin and applying in turn the 1 May bulletin as it is issued. The 1 May bulletin shall apply until 1 April 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 1 March bulletin and applying in turn the 1 April and 1 May bulletins as they are issued. The 1 May bulletin shall apply until the 1 March bulletin of the succeeding year is issued.

[7] From 1 November–15 November, releases are 10 cfs. From 16 November–30 November, releases are 4 cfs.

[8] Combined releases should be either 10 cfs or 5 cfs (as noted in this chart), measured on the South Fork Rubicon River below the mouth of Gerle Creek.

Table A-2. Minimum Streamflow Requirements in the Current License.

USGS Gaging Station	Stream Reach	Minimum Streamflow (cfs)											
		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Critically Dry years when less than 0.9 MAF water year unimpaired inflow was forecast for Folsom Lake[a]													
11427960	Rubicon River below Rubicon Dam	6[b]	6[b]	6[b]	8	10	6[b]	6[b]	6[b]	6[b]	6[b]	6[b]	6[b]
11428400	Little Rubicon River below Buck Island Dam	1[b]	1[b]	1[b]	2	2	1[b]	1[b]	1[b]	1[b]	1[b]	1[b]	1[b]
11429500	Gerle Creek below Loon Lake Dam	12	14	19	23	25	10	5	5	5	7	7	8
114296005	Gerle Creek Gerle Creek Dam	5	5	7	9	9	9	7	5	5	5	4	4
11428995	South Fork Rubicon River below Robbs Peak Dam	2	2	3	4	4	4	3	3	3	3	1	1
11441500	South Fork Silver Creek bellow Ice House Dam	6	6	8	15	30	25	21	14	10	5	5	5
11441800	Silver Creek below Junction Dam	6	6	8	15	30	25	21	14	10	5	5	5
11441900	Silver Creek below Camino Dam	6	6	8	15	30	25	21	14	10	5	5	5
11442700	Brush Creek below Brush Creek Dam	6[b]	6[b]	6[b]	6[b]	6[b]	6[b]	5[b]	4[b]	3[b]	4[b]	6[b]	6[b]
11443500	South Fork American River below Slab Creek Dam	63	63	63	100	109	90	77	63	63	63	63	63

USGS Gaging Station	Stream Reach	Minimum Streamflow (cfs)											
		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Dry years when 0.9 to 1.7 MAF water year unimpaired inflow was forecast for Folsom Lake[a]													
11427960	Rubicon River below Rubicon Dam	6[b]	6[b]	8	12	15	8	6[b]	6[b]	6[b]	6[b]	6[b]	6[b]
11428400	Little Rubicon River below Buck Island Dam	1[b]	1[b]	2	3	3	2	1[b]	1[b]	1[b]	1[b]	1[b]	1[b]
11429500	Gerle Creek below Loon Lake Dam	15	18	24	32	32	16	14	10	10	11	11	13
114296005	Gerle Creek Gerle Creek Dam	6	6	10	12	12	12	10	9	9	9	4	5
11428995	South Fork Rubicon River below Robbs Peak Dam	5	5	7	9	9	9	5	5	5	3	2	3
11441500	South Fork Silver Creek bellow Ice House Dam	12	12	16	28	46	31	21	14	10	10	7	8
11441800	Silver Creek below Junction Dam	12	12	16	28	46	31	21	14	10	10	7	8
11441900	Silver Creek below Camino Dam	12	12	16	28	46	31	21	14	10	10	7	8
11442700	Brush Creek below Brush Creek Dam	7[b]	7[b]	7[b]	7[b]	7[b]	7[b]	5[b]	4[b]	3[b]	4[b]	7[b]	7[b]
11443500	South Fork American River below Slab Creek Dam	63	63	101	101-130-150-183	164-145-126-107	90	90	70	63	63	63	63

USGS Gaging Station	Stream Reach	Minimum Streamflow (cfs)											
		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Below Normal years when 1.7 to 2.6 MAF water year unimpaired inflow was forecast for Folsom Lake[a]													
11427960	Rubicon River below Rubicon Dam	6[b]	6[b]	15	20	35	15	6[b]	6[b]	6[b]	6[b]	6[b]	6[b]
11428400	Little Rubicon River below Buck Island Dam	1[b]	1[b]	3	5	8	3	1[b]	1[b]	1[b]	1[b]	1[b]	1[b]
11429500	Gerle Creek below Loon Lake Dam	19	22	30	40	40	22	22	14	14	16	16	18
114296005	Gerle Creek Gerle Creek Dam	6	6	12	15	15	15	13	12	10	10	6	6
11428995	South Fork Rubicon River below Robbs Peak Dam	7	8	11	13	13	13	6	6	6	3	3	4
11441500	South Fork Silver Creek bellow Ice House Dam	18	18	24	41	68	46	30	15	15	15	8	11
11441800	Silver Creek below Junction Dam	20	20	25	42	68	50	30	15	15	15	20	20
11441900	Silver Creek below Camino Dam	20	20	25	42	68	50	30	15	15	15	20	20
11442700	Brush Creek below Brush Creek Dam	8[b]	8[b]	8[b]	8[b]	8[b]	8[b]	5[b]	4[b]	3[b]	4[b]	8[b]	8[b]
11443500	South Fork American River below Slab Creek Dam	70	70	110-130-150-180	222-236-247-263	272-286-297-303	255-210-165-120	90	70	70	70	70	70

USGS Gaging Station	Stream Reach	Minimum Streamflow (cfs)											
		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Above Normal years when 2.6 to 3.5 MAF water year unimpaired inflow was forecast for Folsom Lake[a]													
11427960	Rubicon River below Rubicon Dam	6[b]	6[b]	15	20	35	15	6[b]	6[b]	6[b]	6[b]	6[b]	6[b]
11428400	Little Rubicon River below Buck Island Dam	1[b]	1[b]	3	5	8	3	1[b]	1[b]	1[b]	1[b]	1[b]	1[b]
11429500	Gerle Creek below Loon Lake Dam	23	27	37	49	49	27	27	17	17	20	20	22
114296005	Gerle Creek Gerle Creek Dam	6	6	9	9	15	15	15	12	10	10	6	6
11428995	South Fork Rubicon River below Robbs Peak Dam	7	8	9	10	13	13	13	11	6	3	3	4
11441500	South Fork Silver Creek bellow Ice House Dam	18	18	24	41	68	46	30	15	15	15	8	11
11441800	Silver Creek below Junction Dam	20	20	25	42	68	59	35	18	18	15	20	20
11441900	Silver Creek below Camino Dam	20	20	25	42	68	59	35	18	18	15	20	20
11442700	Brush Creek below Brush Creek Dam	9[b]	9[b]	9[b]	9[b]	9[b]	9[b]	5[b]	4[b]	3[b]	4[b]	9[b]	9[b]
11443500	South Fork American River below Slab Creek Dam	80	80	110-130-150-180	222-236-247-263	272-316-367-395	324-256-188-120	90	70	70	80	80	80

USGS Gaging Station	Stream Reach	Minimum Streamflow (cfs)											
		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wet years when greater than 3.5 MAF water year unimpaired inflow was forecast for Folsom Lake[a]													
11427960	Rubicon River below Rubicon Dam	6[b]	6[b]	15	20	35	15	6[b]	6[b]	6[b]	6[b]	6[b]	6[b]
11428400	Little Rubicon River below Buck Island Dam	1[b]	1[b]	3	5	8	3	1[b]	1[b]	1[b]	1[b]	1[b]	1[b]
11429500	Gerle Creek below Loon Lake Dam	28	32	44	58	58	32	32	20	20	23	23	26
114296005	Gerle Creek Gerle Creek Dam	6	6	9	9	15	15	15	12	10	10	6	6
11428995	South Fork Rubicon River below Robbs Peak Dam	7	8	9	10	13	13	13	11	6	3	3	4
11441500	South Fork Silver Creek bellow Ice House Dam	18	18	24	41	68	46	30	15	15	15	8	11
11441800	Silver Creek below Junction Dam	20	20	25	42	68	59	35[c]	18[c]	18[c]	15[c]	20[c]	20[c]
11441900	Silver Creek below Camino Dam	20	20	25	42	68	59	35[c]	18[c]	18[c]	15	20	20
11442700	Brush Creek below Brush Creek Dam	10[b]	10[b]	10[b]	10[b]	10[b]	9[b]	5[b]	4[b]	3[b]	4[b]	9[b]	10[b]
11443500	South Fork American River below Slab Creek Dam	90	90	110-130-150-180	222-236-247-263	272-337-387-415	352-274-197-120	90	70	70	90	90	90

Notes: DWR = California Department of Water Resources, MAF = million acre-feet

[a] The water year total volume of unimpaired inflow to Folsom Lake is used to determine the water year type. DWR makes forecasts of this volume, in units of thousands of acre-feet (TAF). 1 MAF equals 1,000 TAF. DWR publishes Bulletin 120 or posts the forecast on its web site several days after 1 February, 1

March, 1 April, and 1 May each year. The value forecasted in May applies until mid-October. DWR also computes the actual water year unimpaired inflow and posts this value on its website in mid-October. The value posted in October applies until the subsequent 1 February forecast is published.

[b] Or natural inflow if less, but in all cases not less than 1 cfs

[c] The Licensee may be required to release additional water below Camino Reservoir Dam in Wet years (see Condition 1.I.–Adaptive Water Temperature Management in Silver Creek below Junction and Camino Reservoir Dams).

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APPENDIX A2

2024 Draft Annual Monitoring Report Comment–Response Table

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Table A2-1. 2024 Draft Annual Monitoring Report Comment–Response Table.

Commenter	Report Section	Section No.	Page No.	Comment	Response
U.S. Forest Service	All			Great job!	Thank you!
U.S. Forest Service	Amphibian and Reptile	8.3.1.4	8-19	Can we get photo and coordintes for the dead beaver?	Approximate coordinates are 38.76351291240934, -120.7827993 1796422; no photos were acquired.
U.S. Forest Service	Amphibian and Reptile	8.3.1	8-21	It would be great to see Table 8-6 with numbers when possible, rather than just presence/absence.	Table 8-6 was updated to include total amounts of incidental herpetofauna species observed throughout the 2024 monitoring surveys.
U.S. Forest Service	Amphibian and Reptile	8.4.1	8-21	It would be great to have a historical comparison section for FYLF. I recommend modeling after the Hardhead Historical Comparisons Section (7.33; especially Figures 7-8, 7-9, & 7-11).	New Section 8.3.1.3, *Historical Comparison*, was added for foothill yellow-legged frog observations during all license implementation monitoring years.
U.S. Forest Service	Amphibian and Reptile	8.4.2	8-22	It would be great to have a historical comparison section for WPT I recommend modeling after the Hardhead Historical Comparisons Section (7.33; especially Figures 7-8, 7-9, & 7-11).	New Section 8.3.2.2, *Historical Comparison*, was added for western pond turtle observations during all license implementation monitoring years.
U.S. Forest Service	Amphibian and Reptile	8.4.2	8-23	Can we display historical comparisons in a figure or table for bullfrogs in reach SCD-A1?	A figure that displays total observations of American bullfrogs at Site SCD-A1 was added to Section 8.3.4, *Non-Target Species Observations*.

Commenter	Report Section	Section No.	Page No.	Comment	Response
U.S. Forest Service	Amphibian and Reptile	9.3.5	9-12	It would be great to see Table 9-2 with numbers when possible, rather than just presence/absence.	Table 9-2 was updated to include total number of incidental herpetofauna species observed throughout the 2024 monitoring surveys.
U.S. Forest Service	Amphibian and Reptile	9.3.2.3	9-8	"The ephemeral pond is not suitable for Sierra Nevada yellow-legged frog habitat because it does not provide perennial water." Is meant to mean not suitable BREEDING habitat.	Clarification of breeding habitat has been included in Section 9.3.2.3.
U.S. Forest Service	Water Temperature	12.3	12-7	When do you make the decision not to use the data, post calibration (that the loggers are not working properly)? When temps drift trend? What about if loggers are measuring X degrees difference? Are you calibrating in room temperature, ice bath, or both?	Stream temperature probes are deployed following factory calibration. All stream deployed sensors go out in pairs to track drift in data. Typical deletions in time series data occur at erroneous spikes (for example, a single point being 10 degrees higher than the surrounding two points). When a temperature probe produces continuous error the sensor is retired and the data are corrected using the secondary probe. Gaps in data occur when a recording device fails on a telemetered site and there is not a secondary probe to correct the loss of information.

Commenter	Report Section	Section No.	Page No.	Comment	Response
U.S. Forest Service	Water Temperature	12.4	12-7	"South Fork Silver Creek below Ice House Dam (if foothill yellow-legged frogs are found in this reach)"... Do you mean if FY:LF eggs are found or any frog?	License Condition 9.A uses the term "FYL frogs," this is understood to be an observation of any life stage of the species (i.e., egg mass, tadpole, post-metamorphic individual).
U.S. Forest Service	Water Temperature	12.4	12-7	Can you clarify for me some more? When the 7DMAVG reached the threshold, then you released flows from Camino to cool it down to what temperature? And what if FYLF are present, then what? I don't remeber what the "accordance with the license" part means off top of my head.	License Conditions 1.L and 27 dictate that SMUD provide Block of Water releases in Wet water year types to Silver Creek "... to maintain mean daily water temperatures of 20 degrees Celsius or below in the Junction Dam and Camino Dam reaches." License Conditions 1 and 27 also state that if the temperature threshold is met in the target reaches, SMUD may be required to monitor for foothill yellow-legged frogs prior to and after the release of the water block. This License requirement was incorporated into the Block of Water and Amphibian and Aquatic Reptile Monitoring plans, which are available on SMUD's Hydro License Compliance Page here (under License implementation and monitoring plans): https://www.smud.org/Corporate/Environmental-Leadership/Power-Sources/Upper-American-River-Project/Hydro-License-Compliance.

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APPENDIX B1

Fish Population Site Photographs

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Figure B1-1. Site RRD-F1, Rubicon River downstream of Rubicon Dam, 2024: upper net looking upstream (top), middle net looking downstream (center), and lower net looking downstream (bottom).



Figure B1-2. Site RRD-F2, Rubicon River downstream of Rubicon Dam, 2024: upper net looking upstream (top) and lower net looking downstream (bottom).



Figure B1-3. Site BID-F1, Little Rubicon River downstream of Buck Island Dam, 2024: upper segment looking toward upstream barrier (top), middle net looking downstream toward the left bank (center), and lower net looking toward the left bank (bottom).



Figure B1-4. Site LLD-F3, Gerle Creek downstream of Loon Lake Dam, 2024: upper net looking downstream (top), middle net looking downstream (center), and lower net looking upstream (bottom).



Figure B1-5. Site LLD-F2, Gerle Creek downstream of Loon Lake Dam, 2024: upper net looking river right (top), middle net looking upstream (center), and lower net looking downstream (bottom).



Figure B1-6. Site GCD-F1, Gerle Creek downstream of Gerle Creek Dam, 2024: upper net looking downstream (top), middle net looking upstream (bottom), and lower net looking downstream (bottom).



Figure B1-7. **Site RPD-F1, South Fork Rubicon River downstream of Robbs Peak Dam, 2024: upper net looking upstream (top), middle net looking upstream (center), and lower net looking upstream (bottom).**



Figure B1-8. **Site IHD-F1, South Fork Silver Creek downstream of Ice House Dam, 2024: upper net looking downstream (top), middle net looking downstream toward river left (center), and lower net looking downstream (bottom).**



Figure B1-9. Site IHD-F2, South Fork Silver Creek downstream of Ice House Dam, 2024: upper net looking downstream (top), middle net looking downstream (center), and lower net looking upstream (bottom).

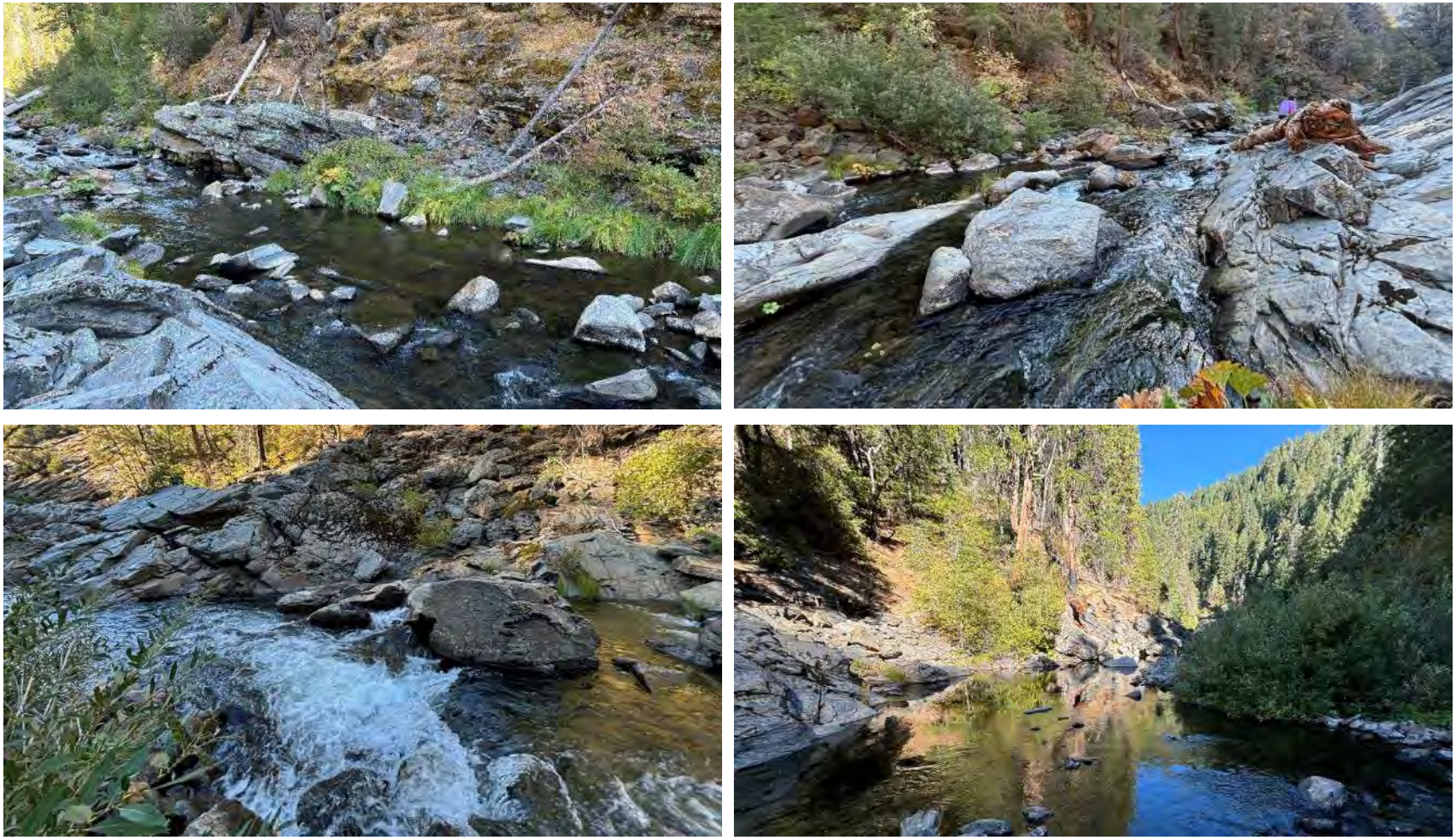


Figure B1-10. Site JD-F3, Silver Creek downstream of Junction Dam, 2024: Unit #1 – run (top right), Unit #2 – high-gradient riffle (top left), Unit #3 – pool (bottom right), and Unit #4 – riffle (bottom left).



Figure B1-11. Site CD-F1, Silver Creek downstream of Camino Dam, 2024: Unit #1 – pool (top right), Unit #2 – riffle (top left), Unit #3 – pool (bottom right), and Unit #4 – riffle (bottom left).



Figure B1-12. Site CD-F1, Silver Creek downstream of Camino Dam, 2024: Unit #5 – pool (top), Unit #6 – riffle (center), and Unit #7 – pool (bottom).



Figure B1-13. Site SCD-F3, South Fork American River downstream of Slab Creek Dam, 2024: Unit #1 – pocket water (top left), Unit #2 – pool (top right), Unit #3 – riffle (bottom right), Unit #4 – pool (bottom left).



Figure B1-14. Site SCD-F2, South Fork American River downstream of Slab Creek Dam, 2024: Unit #1 – pool (top), Unit #2 – run (center), Unit #3 – run (bottom).



Figure B1-15. Site SCD-F2, South Fork American River downstream of Slab Creek Dam, 2024: Unit #4 – riffle (top) and Unit #5 – pool (bottom).

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APPENDIX B2

Fish Population Site Conditions

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Table B2-1. Survey Site Conditions at Upper American River Project Trout Survey Locations, 2002–2024.

Date	Stream	Reach	Site Name	Habitat Section	Method	Site Length (feet)	Avgerage Width (feet)	Maximum Depth (feet)	Water Temperature (°C)	Conductivity (uS/cm)	Approximate Flow (cfs)	Percent Habitat Type			
												Pool	Riffle	Run	Glide
2024															
09/11/24	Rubicon	Rubicon River Dam	RRD-F1	Lower	E-fish	123.4	26.0	2.5	14.3	15.6	1.8	0	2	23	75
09/11/24	Rubicon	Rubicon River Dam	RRD-F1	Upper	E-fish	135.5	35.7	7.0	14.3	15.6	1.8	80	0	0	20
09/12/24	Rubicon	Rubicon River Dam	RRD-F2	Combined	E-fish	235.9	35.3	3.5	14.1	19.6	1.8	15	0	0	85
09/10/24	Little Rubicon	Buck Island Dam	BID-F1	Lower	E-fish	189.3	11.3	2.5	16.2	8.1	1.3	10	10	0	80
09/10/24	Little Rubicon	Buck Island Dam	BID-F1	Upper	E-fish	71.5	61.4	5.5	16.2	8.1	1.3	100	0	0	0
10/03/24	Gerle Creek	Loon Lake Dam	LLD-F3	Lower	E-fish	206.5	23.8	3.5	13.2	6.9	16.0	0	10	90	0
10/03/24	Gerle Creek	Loon Lake Dam	LLD-F3	Upper	E-fish	116.9	23.2	2.5	13.2	6.9	16.0	0	20	80	0
09/05/24	Gerle Creek	Loon Lake Dam	LLD-F2	Lower	E-fish	129.3	34.6	4.5	13.8	8.4	15.1	20	5	75	0
09/05/24	Gerle Creek	Loon Lake Dam	LLD-F2	Upper	E-fish	244.4	46.8	4.0	13.8	8.4	15.1	15	30	55	0
10/04/24	Gerle Creek	Gerle Creek Dam	GCD-F1	Lower	E-fish	170.8	37.8	2.5	12.9	12.0	10.7	20	20	60	0
10/04/24	Gerle Creek	Gerle Creek Dam	GCD-F1	Upper	E-fish	126.1	33.3	8.0	12.9	12.0	10.7	15	0	25	60
10/02/24	South Fork Rubicon	Robbs Peak Dam	RPD-F1	Lower	E-fish	153.4	39.9	3.0	12.7	9.4	4.0	10	10	40	40
10/02/24	South Fork Rubicon	Robbs Peak Dam	RPD-F1	Upper	E-fish	129.6	37.3	3.0	12.7	9.4	4.0	60	10	10	20
09/03/24	South Fork Silver Creek	Ice House Dam	IHD-F1	Lower	E-fish	149.0	24.8	4.5	7.0	10.0	16.6	0	20	50	30
09/03/24	South Fork Silver Creek	Ice House Dam	IHD-F1	Upper	E-fish	130.2	29.6	6.0	7.0	10.0	16.6	35	15	50	0
09/04/24	South Fork Silver Creek	Ice House Dam	IHD-F2	Lower	E-fish	138.3	26.9	3.0	10.8	11.1	16.6	0	15	75	10
09/04/24	South Fork Silver Creek	Ice House Dam	IHD-F2	Upper	E-fish	233.0	35.7	3.5	10.8	11.1	16.6	5	45	35	15
09/30/24	Silver Creek	Junction Dam	JD-F3	1	Snorkel	183.7	36.5	3.8	11	10.1	17.0	0	30	70	0
09/30/24	Silver Creek	Junction Dam	JD-F3	2	Snorkel	141.7	43.6	4.1	11	10.1	17.0	15	85	0	0
09/30/24	Silver Creek	Junction Dam	JD-F3	3	Snorkel	196.2	46.2	10	11	10.1	17.0	100	0	0	0
09/30/24	Silver Creek	Junction Dam	JD-F3	4	Snorkel	326.8	59.9	4.6	11	10.1	17.0	2	98	0	0
10/01/24	Silver Creek	Camino Dam	CD-F1	1	Snorkel	278.9	56.7	18.0	10.7	10.0	16.3	100	0	0	0
10/01/24	Silver Creek	Camino Dam	CD-F1	2	Snorkel	114.2	52.5	6.0	10.7	10.0	16.3	50	50	0	0
10/01/24	Silver Creek	Camino Dam	CD-F1	3	Snorkel	78.4	45.6	8.0	10.7	10.0	16.3	100	0	0	0
10/01/24	Silver Creek	Camino Dam	CD-F1	4	Snorkel	94.5	46.2	3.0	10.7	10.0	16.3	60	40	0	0
10/01/24	Silver Creek	Camino Dam	CD-F1	5	Snorkel	125.0	38.1	8.0	10.7	10.0	16.3	95	5	0	0
10/01/24	Silver Creek	Camino Dam	CD-F1	6	Snorkel	98.4	25.6	3.5	10.7	10.0	16.3	0	100	0	0
10/01/24	Silver Creek	Camino Dam	CD-F1	7	Snorkel	158.5	48.0	3	10.7	10.0	16.3	60	40	0	0
08/20/24	South Fork American	Slab Creek	SCD-F3	1	Snorkel	173.9	42.1	2.5	13.3	16.3	79.0	0	100	0	0
08/20/24	South Fork American	Slab Creek	SCD-F3	2	Snorkel	449.5	60.7	20.0	13.3	16.3	79.0	95	5	0	0
08/20/24	South Fork American	Slab Creek	SCD-F3	3	Snorkel	219.8	33.9	2.5	13.3	16.3	79.0	0	100	0	0

Date	Stream	Reach	Site Name	Habitat Section	Method	Site Length (feet)	Avgerage Width (feet)	Maximum Depth (feet)	Water Temperature (°C)	Conductivity (uS/cm)	Approximate Flow (cfs)	Percent Habitat Type			
												Pool	Riffle	Run	Glide
08/20/24	South Fork American	Slab Creek	SCD-F3	4	Snorkel	265.8	39.4	5.0	13.3	16.3	79.0	30	0	70	0
08/20/24	South Fork American	Slab Creek	SCD-F2	1	Snorkel	88.6	63.4	6.4	18.0	20.6	79.0	100	0	0	0
08/20/24	South Fork American	Slab Creek	SCD-F2	2	Snorkel	144.4	43.7	7.1	18.0	20.6	79.0	0	0	100	0
08/20/24	South Fork American	Slab Creek	SCD-F2	3	Snorkel	259.2	41.0	5.2	18.0	20.6	79.0	0	20	80	0
08/20/24	South Fork American	Slab Creek	SCD-F2	4	Snorkel	128.0	35.5	3.2	18.0	20.6	79.0	0	100	0	0
08/20/24	South Fork American	Slab Creek	SCD-F2	5	Snorkel	88.6	27.9	15.0	18.0	20.6	79.0	85	15	0	0
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	--[a]	--[a]	--[a]	--[a]	--[a]	--[a]	--[a]	--[a]	--[a]	--[a]
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
09/30/20	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
09/30/20	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
09/29/20	South Fork Rubicon	Robbs Peak Dam	RPD-F1	Lower	E-fish	153.0	36.5	3.0	14.7	15.3	16.0	10	20	40	30
09/29/20	South Fork Rubicon	Robbs Peak Dam	RPD-F1	Upper	E-fish	130.9	42.9	3.0	14.7	15.3	16.0	30	10	30	30
09/21/20	South Fork 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
09/21/20	South Fork 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
09/28/20	South Fork 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
09/28/20	South Fork 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
09/23/20	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
09/23/20	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
09/18/20	Silver Creek	Junction Dam	JD-F3	1	Snorkel	237.0	34.0	3.0	11.3	16.9	11.0	0	30	70	0
09/18/20	Silver Creek	Junction Dam	JD-F3	2	Snorkel	123.0	30.0	3.0	11.3	16.9	11.0	20	80	0	0
09/18/20	Silver Creek	Junction Dam	JD-F3	3	Snorkel	214.0	44.7	15.0	11.3	16.9	11.0	80	0	20	0
09/18/20	Silver Creek	Junction Dam	JD-F3	4	Snorkel	321.0	42.0	2.0	11.3	16.9	11.0	0	100	0	0
09/15/20	Silver Creek	Camino Dam	CD-F1	1	Snorkel	287.0	59.0	12.0	11.2	11.0	11.0	95	5	0	0
09/15/20	Silver Creek	Camino Dam	CD-F1	2	Snorkel	126.0	39.0	3.0	11.2	11.0	11.0	50	50	0	0
09/15/20	Silver Creek	Camino Dam	CD-F1	3	Snorkel	75.0	37.5	4.0	11.2	11.0	11.0	100	0	0	0

Date	Stream	Reach	Site Name	Habitat Section	Method	Site Length (feet)	Avgerage Width (feet)	Maximum Depth (feet)	Water Temperature (°C)	Conductivity (uS/cm)	Approximate Flow (cfs)	Percent Habitat Type			
												Pool	Riffle	Run	Glide
09/15/20	Silver Creek	Camino Dam	CD-F1	4	Snorkel	63.0	49.0	3.0	11.2	11.0	11.0	60	40	0	0
09/15/20	Silver Creek	Camino Dam	CD-F1	5	Snorkel	123.0	29.0	5.0	11.2	11.0	11.0	90	10	0	0
09/15/20	Silver Creek	Camino Dam	CD-F1	6	Snorkel	165.0	29.5	3.0	11.2	11.0	11.0	0	100	0	0
09/15/20	Silver Creek	Camino Dam	CD-F1	7	Snorkel	96.0	29.5	3.0	11.2	11.0	11.0	60	40	0	0
09/24/20	South Fork American	Slab Creek	SCD-F3	1	Snorkel	300.0	48.2	2.5	11.7	15.8	68.5	0	100	0	0
09/24/20	South Fork American	Slab Creek	SCD-F3	2	Snorkel	365.0	62.8	20+	11.7	15.8	68.5	100	0	0	0
09/24/20	South Fork American	Slab Creek	SCD-F3	3	Snorkel	262.0	25.5	2.0	11.7	15.8	68.5	0	100	0	0
09/24/20	South Fork American	Slab Creek	SCD-F3	4	Snorkel	226.0	38.5	4.0	11.7	15.8	68.5	30	0	70	0
09/24/20	South Fork American	Slab Creek	SCD-F2	1	Snorkel	75.0	58.3	8.0	14.8	16.1	68.5	100	0	0	0
09/24/20	South Fork American	Slab Creek	SCD-F2	2	Snorkel	135.0	49.0	6.0	14.8	16.1	68.5	0	0	100	0
09/24/20	South Fork American	Slab Creek	SCD-F2	3	Snorkel	238.0	40.0	2.5	14.8	16.1	68.5	0	10	90	0
09/24/20	South Fork American	Slab Creek	SCD-F2	4	Snorkel	99.0	33.6	2.0	14.8	16.1	68.5	0	100	0	0
09/24/20	South Fork American	Slab Creek	SCD-F2	5	Snorkel	80.0	52.0	8	14.8	16.1	68.5	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	South Fork Rubicon	Robbs 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	South Fork Rubicon	Robbs 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	South Fork 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	South Fork 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	South Fork 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	South Fork 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

Date	Stream	Reach	Site Name	Habitat Section	Method	Site Length (feet)	Avgerage Width (feet)	Maximum Depth (feet)	Water Temperature (°C)	Conductivity (uS/cm)	Approximate Flow (cfs)	Percent Habitat Type			
												Pool	Riffle	Run	Glide
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
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
09/30/19	Silver Creek	Camino Dam	CD-F1	1	Snorkel	221.0	50.9	10.0	9.8	14.5	20	100	0	0	0
09/30/19	Silver Creek	Camino Dam	CD-F1	2	Snorkel	170.0	23.3	6.0	9.8	14.5	20	50	50	0	0
09/30/19	Silver Creek	Camino Dam	CD-F1	3	Snorkel	63.0	29.5	5.0	9.8	14.5	20	100	0	0	0
09/30/19	Silver Creek	Camino Dam	CD-F1	4	Snorkel	92.0	37.4	6.0	9.8	14.5	20	50	50	0	0
09/30/19	Silver Creek	Camino Dam	CD-F1	5	Snorkel	110.5	28.9	6.0	9.8	14.5	20	100	0	0	0
09/30/19	Silver Creek	Camino Dam	CD-F1	6	Snorkel	148.0	19.2	3.0	9.8	14.5	20	0	100	0	0
09/30/19	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	South Fork 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	South Fork American	Slab Creek	SCD-F3	2	Snorkel	367.5	34.4	20+	11.1	20.2	90	100	0	0	0
10/8/19	South Fork 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	South Fork 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	South Fork 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	South Fork 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	South Fork 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	South Fork 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	South Fork 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	South Fork 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	South Fork 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

Date	Stream	Reach	Site Name	Habitat Section	Method	Site Length (feet)	Avgerage Width (feet)	Maximum Depth (feet)	Water Temperature (°C)	Conductivity (uS/cm)	Approximate Flow (cfs)	Percent Habitat Type			
												Pool	Riffle	Run	Glide
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
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	South Fork 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	South Fork 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	South Fork 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	South Fork 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	South Fork 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	South Fork 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	South Fork 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	South Fork 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
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

Date	Stream	Reach	Site Name	Habitat Section	Method	Site Length (feet)	Avgerage Width (feet)	Maximum Depth (feet)	Water Temperature (°C)	Conductivity (uS/cm)	Approximate Flow (cfs)	Percent Habitat Type			
												Pool	Riffle	Run	Glide
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	South Fork 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	South Fork 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	South Fork 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	South Fork 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	South Fork 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	South Fork 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	10.0	16	100	0	0	0
10/22/02	Silver Creek	Camino Dam	CD -F1	2	Snorkel	130.0	49.5	2.0	9.0	10.0	16	0	100	0	0
10/22/02	Silver Creek	Camino Dam	CD -F1	3	Snorkel	74.0	49.2	7.0	9.0	10.0	16	100	0	0	0
10/22/02	Silver Creek	Camino Dam	CD -F1	4	Snorkel	78.0	45.5	3.0	9.0	10.0	16	0	100	0	0
10/22/02	Silver Creek	Camino Dam	CD -F1	5	Snorkel	124.0	25.2	5.0	10.0	10.0	16	100	0	0	0
10/22/02	Silver Creek	Camino Dam	CD -F1	6	Snorkel	168.0	38.8	3.0	10.0	10.0	16	0	100	0	0
10/22/02	Silver Creek	Camino Dam	CD -F1	7	Snorkel	142.0	55.0	8.0	10.0	10.0	16	100	0	0	0
10/30/02	South Fork 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	South Fork American	Slab Creek Dam	SCD-F2	Upper	E-Fish	112.8	38.5	3.0	10.0	30.0	25	0	100	0	0

Notes: -- = no data
°C = degree Celsius
cfs = cubic feet per second
uS/centimeter = microsiemen per centimeter

[a] Segment not surveyed due to lack of flow

Table B2-2. Substrate, Cover, and Visibility Conditions at UARP Trout Survey Locations, 2002–2024.

Date	Stream	Reach	Site Name	Habitat Section	Method	Percent Cover							Percent Substrate						Visibility (feet)
						Undercut Bank	Instream Vegetation	Overhanging Vegetation	Large Woody Debris	Bubble	Large Boulder	No Cover	Bedrock	Boulder	Cobble	Gravel	Sand	Silt	
2024																			
09/11/24	Rubicon	Rubicon River Dam	RRD-F1	Lower	E-fish	0	0	1	0	1	35	63	80	10	10	<1	<1	0	Max
09/11/24	Rubicon	Rubicon River Dam	RRD-F1	Upper	E-fish	0	0	0	0	<1	40	60	60	35	3	0	2	0	Max
09/12/24	Rubicon	Rubicon River Dam	RRD-F2	Combined	E-fish	10	0	5	10	0	0	75	5	0	75	5	10	5	Clear
09/10/24	Little Rubicon	Buck Island Dam	BID-F1	Lower	E-fish	0	0	2	0	3	15	80	15	75	0	0	10	0	Max
09/10/24	Little Rubicon	Buck Island Dam	BID-F1	Upper	E-fish	5	0	5	15	0	20	55	10	50	0	0	40	0	Max
10/03/24	Gerle Creek	Loon Lake Dam	LLD-F3	Lower	E-fish	2	2	15	2	2	0	77	0	10	90	0	0	0	Max
10/03/24	Gerle Creek	Loon Lake Dam	LLD-F3	Upper	E-fish	0	0	10	0	10	0	80	0	90	10	0	0	0	Max
09/05/24	Gerle Creek	Loon Lake Dam	LLD-F2	Lower	E-fish	3	0	2	0	10	25	60	0	60	40	0	<1	0	Max
09/05/24	Gerle Creek	Loon Lake Dam	LLD-F2	Upper	E-fish	0	0	5	0	10	30	55	5	50	45	0	0	0	Max
10/04/24	Gerle Creek	Gerle Creek Dam	GCD-F1	Lower	E-fish	2	15	25	0	5	5	48	20	50	25	5	0	0	Max
10/04/24	Gerle Creek	Gerle Creek Dam	GCD-F1	Upper	E-fish	2	0	2	0	0	8	88	73	15	10	2	0	0	Max
10/02/24	South Fork Rubicon	Robbs Peak Dam	RPD-F1	Lower	E-fish	5	5	10	0	0	10	70	85	10	5	0	0	0	Max
10/02/24	South Fork Rubicon	Robbs Peak Dam	RPD-F1	Upper	E-fish	2	5	10	0	1	5	77	65	30	5	0	0	0	Max
09/03/24	South Fork Silver Creek	Ice House Dam	IHD-F1	Lower	E-fish	0	0	2	0	5	20	73	70	20	0	0	10	0	Max
09/03/24	South Fork Silver Creek	Ice House Dam	IHD-F1	Upper	E-fish	0	0	5	0	5	15	75	40	30	10	10	10	0	Max
09/04/24	South Fork Silver Creek	Ice House Dam	IHD-F2	Lower	E-fish	0	2	10	0	15	5	68	75	10	15	0	0	0	Max
09/04/24	South Fork Silver Creek	Ice House Dam	IHD-F2	Upper	E-fish	0	2	10	1	5	5	77	50	30	15	5	0	0	Max
09/30/24	Brush Creek	Brush Creek Dam	BCD-F1	Lower	E-fish	0	0	5	0	5	30	60	25	50	20	5	0	0	17.4
09/30/24	Brush Creek	Brush Creek Dam	BCD-F1	Upper	E-fish	0	0	5	5	25	5	60	25	25	50	0	0	0	17.4
09/30/24	Silver Creek	Junction Dam	JD-F3	1	Snorkel	0	0	2	0	2	15	81	30	35	35	0	0	0	17.4
09/30/24	Silver Creek	Junction Dam	JD-F3	2	Snorkel	0	0	10	0	10	5	75	0	35	65	0	0	0	17.4
10/01/24	Silver Creek	Junction Dam	JD-F3	3	Snorkel	0	0	2	0	1	15	82	15	55	30	0	0	0	23.7
10/01/24	Silver Creek	Junction Dam	JD-F3	4	Snorkel	0	0	5	0	25	35	35	5	73	20	1	1	0	23.7
10/01/24	Silver Creek	Camino Dam	CD-F1	1	Snorkel	0	0	2	0	1	10	87	10	68	20	2	0	0	23.7
10/01/24	Silver Creek	Camino Dam	CD-F1	2	Snorkel	0	0	1	0	2	10	87	74	20	5	1	0	0	23.7
10/01/24	Silver Creek	Camino Dam	CD-F1	3	Snorkel	0	0	0	0	2	10	88	10	30	50	5	5	0	23.7

Date	Stream	Reach	Site Name	Habitat Section	Method	Percent Cover							Percent Substrate						Visibility (feet)
						Undercut Bank	Instream Vegetation	Overhanging Vegetation	Large Woody Debris	Bubble	Large Boulder	No Cover	Bedrock	Boulder	Cobble	Gravel	Sand	Silt	
10/01/24	Silver Creek	Camino Dam	CD-F1	4	Snorkel	0	0	0	0	10	20	70	15	70	15	0	0	0	23.7
10/01/24	Silver Creek	Camino Dam	CD-F1	5	Snorkel	0	0	0	0	2	5	93	50	40	10	0	0	0	23.7
08/20/24	Silver Creek	Camino Dam	CD-F1	6	Snorkel	3	0	5	0	1	0	91	0	95	5	0	0	0	3.0
08/20/24	Silver Creek	Camino Dam	CD-F1	7	Snorkel	2	0	0	0	2	0	96	15	60	25	0	0	0	3.0
08/20/24	South Fork American	Slab Creek	SCD-F3	1	Snorkel	0	0	0	0	20	0	80	0	80	20	0	0	0	3.0
08/20/24	South Fork American	Slab Creek	SCD-F3	2	Snorkel	0	0	0	0	1	0	99	0	90	10	0	0	0	3.0
08/20/24	South Fork American	Slab Creek	SCD-F3	3	Snorkel	0	0	0	0	0	15	85	0	45	50	5	0	0	10.0
08/20/24	South Fork American	Slab Creek	SCD-F3	4	Snorkel	0	0	5	0	10	35	50	0	88	10	2	0	0	10.0
08/20/24	South Fork American	Slab Creek	SCD-F2	1	Snorkel	0	1	5	0	25	10	59	0	70	30	0	0	0	10.0
08/20/24	South Fork American	Slab Creek	SCD-F2	2	Snorkel	0	0	2	0	55	10	33	0	70	30	0	0	0	10.0
08/20/24	South Fork American	Slab Creek	SCD-F2	3	Snorkel	0	0	5	0	5	25	65	2	95	3	0	0	0	10.0
09/11/24	South Fork American	Slab Creek	SCD-F2	4	Snorkel	0	0	1	0	1	35	63	80	10	10	<1	<1	0	Max
09/11/24	South Fork American	Slab Creek	SCD-F2	5	Snorkel	0	0	0	0	<1	40	60	60	35	3	0	2	0	Max
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	--[a]	--[a]	--[a]	--[a]	--[a]	--[a]	--[a]	--[a]	--[a]	--[a]	--[a]	--[a]	--[a]	--[a]
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
09/30/20	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

Date	Stream	Reach	Site Name	Habitat Section	Method	Percent Cover							Percent Substrate						Visibility (feet)
						Undercut Bank	Instream Vegetation	Overhanging Vegetation	Large Woody Debris	Bubble	Large Boulder	No Cover	Bedrock	Boulder	Cobble	Gravel	Sand	Silt	
09/29/20	South Fork Rubicon	Robbs Peak Dam	RPD-F1	Lower	E-fish	5	10	15	0	0	10	60	85	7	5	0	0	3	3.0
09/29/20	South Fork Rubicon	Robbs Peak Dam	RPD-F1	Upper	E-fish	3	5	10	0	2	10	70	65	35	10	0	0	0	3.0
09/21/20	South Fork 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
09/21/20	South Fork 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
09/28/20	South Fork 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
09/28/20	South Fork 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
09/23/20	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
09/23/20	Brush Creek	Brush Creek Dam	BCD-F1	Upper	E-fish	0	0	40	10	5	5	40	5	20	25	25	5	25	6.0
09/18/20	Silver Creek	Junction Dam	JD-F3	1	Snorkel	0	0	5	0	5	30	60	25	40	20	15	0	0	3.0
09/18/20	Silver Creek	Junction Dam	JD-F3	2	Snorkel	0	0	5	5	5	5	80	25	25	50	0	0	0	3.0
09/18/20	Silver Creek	Junction Dam	JD-F3	3	Snorkel	0	5	0	0	2	15	78	30	35	35	0	0	0	15.0
09/18/20	Silver Creek	Junction Dam	JD-F3	4	Snorkel	0	0	10	0	10	5	75	0	30	60	10	0	0	2.0
09/15/20	Silver Creek	Camino Dam	CD-F1	1	Snorkel	0	0	0	2	0	10	88	5	60	30	3	2	0	12.0
09/15/20	Silver Creek	Camino Dam	CD-F1	2	Snorkel	0	0	2	0	5	10	83	5	40	40	10	3	2	3.0
09/15/20	Silver Creek	Camino Dam	CD-F1	3	Snorkel	0	0	0	0	2	5	93	10	70	20	0	0	0	4.0
09/15/20	Silver Creek	Camino Dam	CD-F1	4	Snorkel	0	0	0	0	0	15	85	80	20	0	0	0	0	3.0
09/15/20	Silver Creek	Camino Dam	CD-F1	5	Snorkel	0	0	0	0	0	5	95	30	40	30	0	0	0	5.0
09/15/20	Silver Creek	Camino Dam	CD-F1	6	Snorkel	0	0	0	0	0	15	85	20	80	0	0	0	0	3.0
09/15/20	Silver Creek	Camino Dam	CD-F1	7	Snorkel	0	0	0	0	0	2	98	50	40	10	0	0	0	3.0
09/24/20	South Fork American	Slab Creek	SCD-F3	1	Snorkel	0	0	2	0	30	5	63	10	60	30	0	0	0	2.5
09/24/20	South Fork American	Slab Creek	SCD-F3	2	Snorkel	0	0	3	0	3	5	89	15	50	35	0	0	0	20+
09/24/20	South Fork American	Slab Creek	SCD-F3	3	Snorkel	0	0	0	0	60	0	40	0	65	35	0	0	0	2.0
09/24/20	South Fork American	Slab Creek	SCD-F3	4	Snorkel	0	0	0	0	15	0	85	0	70	30	0	0	0	4.0
09/24/20	South Fork American	Slab Creek	SCD-F2	1	Snorkel	0	0	5	0	0	0	95	20	60	10	5	5	0	8.0

Date	Stream	Reach	Site Name	Habitat Section	Method	Percent Cover							Percent Substrate						Visibility (feet)
						Undercut Bank	Instream Vegetation	Overhanging Vegetation	Large Woody Debris	Bubble	Large Boulder	No Cover	Bedrock	Boulder	Cobble	Gravel	Sand	Silt	
09/24/20	South Fork American	Slab Creek	SCD-F2	2	Snorkel	0	0	5	0	5	0	90	20	60	10	5	5	0	6.0
09/24/20	South Fork American	Slab Creek	SCD-F2	3	Snorkel	2	0	5	0	8	0	85	0	90	10	0	0	0	2.5
09/24/20	South Fork American	Slab Creek	SCD-F2	4	Snorkel	0	0	5	0	0	40	55	0	90	10	0	0	0	2.0
09/24/20	South Fork 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	South Fork Rubicon	Robbs 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	South Fork Rubicon	Robbs 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	South Fork 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	South Fork 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	South Fork 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	South Fork 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
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

Date	Stream	Reach	Site Name	Habitat Section	Method	Percent Cover							Percent Substrate						Visibility (feet)
						Undercut Bank	Instream Vegetation	Overhanging Vegetation	Large Woody Debris	Bubble	Large Boulder	No Cover	Bedrock	Boulder	Cobble	Gravel	Sand	Silt	
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
09/30/19	Silver Creek	Camino Dam	CD-F1	1	Snorkel	0	1	0	0	0	10	89	5	45	40	10	0	0	16.0
09/30/19	Silver Creek	Camino Dam	CD-F1	2	Snorkel	0	0	0	0	20	15	65	10	40	25	25	0	0	16.0
09/30/19	Silver Creek	Camino Dam	CD-F1	3	Snorkel	5	0	15	0	5	15	60	65	35	0	0	0	0	16.0
09/30/19	Silver Creek	Camino Dam	CD-F1	4	Snorkel	0	5	0	0	15	25	55	50	30	20	0	0	0	16.0
09/30/19	Silver Creek	Camino Dam	CD-F1	5	Snorkel	0	0	5	0	5	15	75	40	35	25	0	0	0	16.0
09/30/19	Silver Creek	Camino Dam	CD-F1	6	Snorkel	0	0	0	0	60	20	20	40	40	20	0	0	0	16.0
09/30/19	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	South Fork 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	South Fork 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	South Fork 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	South Fork 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	South Fork 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	South Fork 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	South Fork 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	South Fork 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	South Fork American	Slab Creek	SCD-F2	5	Snorkel	0	0	0	0	0	30	70	20	40	40	0	0	0	13.5
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

Date	Stream	Reach	Site Name	Habitat Section	Method	Percent Cover							Percent Substrate						Visibility (feet)
						Undercut Bank	Instream Vegetation	Overhanging Vegetation	Large Woody Debris	Bubble	Large Boulder	No Cover	Bedrock	Boulder	Cobble	Gravel	Sand	Silt	
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
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	South Fork 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	South Fork 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	South Fork 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	South Fork 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	South Fork 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	South Fork Silver Creek	Ice House Dam	IHR-F2	Upper	E-Fish	0	1	3	0	0	5	91	30	25	40	2	2	1	3

Date	Stream	Reach	Site Name	Habitat Section	Method	Percent Cover							Percent Substrate						Visibility (feet)
						Undercut Bank	Instream Vegetation	Overhanging Vegetation	Large Woody Debris	Bubble	Large Boulder	No Cover	Bedrock	Boulder	Cobble	Gravel	Sand	Silt	
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	South Fork 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	South Fork American	Slab Creek Dam	SCD-F2	Upper	E-Fish	0	3	0	0	0	20	77	10	65	20	5	0	0	Max
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	South Fork 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	South Fork 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	South Fork 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	South Fork 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	South Fork 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	South Fork 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
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

Date	Stream	Reach	Site Name	Habitat Section	Method	Percent Cover							Percent Substrate						Visibility (feet)
						Undercut Bank	Instream Vegetation	Overhanging Vegetation	Large Woody Debris	Bubble	Large Boulder	No Cover	Bedrock	Boulder	Cobble	Gravel	Sand	Silt	
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	South Fork 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	South Fork American	Slab Creek Dam	SCD-F2	Upper	E-Fish	0	0	0	0	0	10	90	45	45	5	0	0	5	12

Notes < = less than
Max = maximum
[a] Segment not surveyed due to lack of flow

APPENDIX B3

Individual Fish Capture Data

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Table B3-1. 2024 Upper American River Project Individual Fish Capture Data.

Stream	Reach	Site	Segment	Method	Pass	Species	Total Length (mm)	Weight (g)	Count
Rubicon River	Rubicon Dam	RRD-F1	Lower	Electrofishing	1	Brown trout	202	73.5	1
Rubicon River	Rubicon Dam	RRD-F1	Lower	Electrofishing	1	Rainbow trout	129	20.8	1
Rubicon River	Rubicon Dam	RRD-F1	Lower	Electrofishing	1	Rainbow trout	67	5.5	1
Rubicon River	Rubicon Dam	RRD-F1	Lower	Electrofishing	1	Rainbow trout	130	23.1	1
Rubicon River	Rubicon Dam	RRD-F1	Lower	Electrofishing	1	Rainbow trout	222	94.0	1
Rubicon River	Rubicon Dam	RRD-F1	Lower	Electrofishing	1	Rainbow trout	69	3.1	1
Rubicon River	Rubicon Dam	RRD-F1	Lower	Electrofishing	1	Rainbow trout	194	63.0	1
Rubicon River	Rubicon Dam	RRD-F1	Lower	Electrofishing	1	Rainbow trout	172	48.0	1
Rubicon River	Rubicon Dam	RRD-F1	Lower	Electrofishing	1	Rainbow trout	132	20.5	1
Rubicon River	Rubicon Dam	RRD-F1	Lower	Electrofishing	1	Rainbow trout	70	3.3	1
Rubicon River	Rubicon Dam	RRD-F1	Lower	Electrofishing	2	Rainbow trout	114	13.3	1
Rubicon River	Rubicon Dam	RRD-F1	Lower	Electrofishing	2	Rainbow trout	210	79.3	1
Rubicon River	Rubicon Dam	RRD-F1	Lower	Electrofishing	2	Rainbow trout	65	2.8	1
Rubicon River	Rubicon Dam	RRD-F1	Lower	Electrofishing	2	Rainbow trout	61	2.1	1
Rubicon River	Rubicon Dam	RRD-F1	Lower	Electrofishing	3	Rainbow trout	51	1.1	1
Rubicon River	Rubicon Dam	RRD-F1	Lower	Electrofishing	3	Rainbow trout	134	24.6	1
Rubicon River	Rubicon Dam	RRD-F1	Lower	Electrofishing	3	Rainbow trout	65	2.7	1
Rubicon River	Rubicon Dam	RRD-F1	Upper	Electrofishing	1	Rainbow trout	129	26.6	1
Rubicon River	Rubicon Dam	RRD-F1	Upper	Electrofishing	1	Rainbow trout	61	2.6	1
Rubicon River	Rubicon Dam	RRD-F1	Upper	Electrofishing	1	Rainbow trout	127	23.3	1
Rubicon River	Rubicon Dam	RRD-F1	Upper	Electrofishing	1	Rainbow trout	154	34.1	1
Rubicon River	Rubicon Dam	RRD-F1	Upper	Electrofishing	1	Rainbow trout	64	2.8	1

Stream	Reach	Site	Segment	Method	Pass	Species	Total Length (mm)	Weight (g)	Count
Rubicon River	Rubicon Dam	RRD-F1	Upper	Electrofishing	1	Rainbow trout	51	1.5	1
Rubicon River	Rubicon Dam	RRD-F1	Upper	Electrofishing	1	Rainbow trout	141	29.3	1
Rubicon River	Rubicon Dam	RRD-F1	Upper	Electrofishing	1	Rainbow trout	127	21.6	1
Rubicon River	Rubicon Dam	RRD-F1	Upper	Electrofishing	1	Rainbow trout	171	47.3	1
Rubicon River	Rubicon Dam	RRD-F1	Upper	Electrofishing	1	Rainbow trout	201	74.0	1
Rubicon River	Rubicon Dam	RRD-F1	Upper	Electrofishing	1	Rainbow trout	55	1.2	1
Rubicon River	Rubicon Dam	RRD-F1	Upper	Electrofishing	2	Rainbow trout	59	2.0	1
Rubicon River	Rubicon Dam	RRD-F1	Upper	Electrofishing	3	Rainbow trout	53	2.1	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	Electrofishing	1	California roach	52	1.1	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	Electrofishing	1	California roach	58	1.5	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	Electrofishing	1	California roach	37	0.3	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	Electrofishing	1	California roach	52	1.2	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	Electrofishing	1	California roach	81	4.7	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	Electrofishing	1	California roach	69	2.4	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	Electrofishing	1	California roach	53	0.9	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	Electrofishing	1	California roach	52	1.3	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	Electrofishing	1	California roach	50	0.9	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	Electrofishing	1	California roach	53	1.1	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	Electrofishing	1	California roach	54	1.2	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	Electrofishing	1	California roach	54	0.9	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	Electrofishing	1	Speckled dace	75	3.7	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	Electrofishing	1	Speckled dace	27	<0.1	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	Electrofishing	1	California roach	74	3.1	1

Stream	Reach	Site	Segment	Method	Pass	Species	Total Length (mm)	Weight (g)	Count
Rubicon River	Rubicon Dam	RRD-F2	Combined	Electrofishing	1	California roach	38	0.4	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	Electrofishing	1	California roach	25	<0.1	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	Electrofishing	1	California roach	24	<0.1	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	Electrofishing	1	California roach	74	3.1	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	Electrofishing	1	California roach	78	4.5	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	Electrofishing	1	Sacramento sucker	93	11.2	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	Electrofishing	1	California roach	30	0.2	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	Electrofishing	1	California roach	23	<0.1	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	Electrofishing	1	Speckled dace	49	1.1	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	Electrofishing	1	California roach	36	0.3	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	Electrofishing	1	California roach	58	1.5	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	Electrofishing	1	California roach	58	1.4	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	Electrofishing	1	California roach	56	1.3	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	Electrofishing	1	California roach	44	0.7	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	Electrofishing	1	California roach	55	1.2	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	Electrofishing	1	California roach	53	1.1	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	Electrofishing	1	California roach	34	0.3	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	Electrofishing	1	Speckled dace	62	1.1	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	Electrofishing	1	Speckled dace	45	0.7	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	Electrofishing	1	California roach	28	0.1	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	Electrofishing	1	California roach	47	0.8	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	Electrofishing	1	California roach	37	0.4	1

Stream	Reach	Site	Segment	Method	Pass	Species	Total Length (mm)	Weight (g)	Count
Rubicon River	Rubicon Dam	RRD-F2	Combined	Electrofishing	1	California roach	45	0.4	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	Electrofishing	1	California roach	57	1.5	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	Electrofishing	1	Speckled dace	35	0.4	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	Electrofishing	1	California roach	39	0.4	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	Electrofishing	1	California roach	57	1.4	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	Electrofishing	1	California roach	80	4.7	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	Electrofishing	1	California roach	58	1.8	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	Electrofishing	1	California roach	46	0.7	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	Electrofishing	1	California roach	81	4.3	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	Electrofishing	1	Speckled dace	51	1.3	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	Electrofishing	1	Speckled dace	64	2.4	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	Electrofishing	1	Speckled dace	34	0.3	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	Electrofishing	1	Speckled dace	23	<0.1	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	Electrofishing	1	California roach	49	0.9	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	Electrofishing	1	California roach	48	0.9	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	Electrofishing	1	California roach	41	0.5	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	Electrofishing	1	California roach	34	0.4	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	Electrofishing	1	California roach	53	1.1	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	Electrofishing	1	California roach	52	1.0	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	Electrofishing	1	California roach	56	1.4	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	Electrofishing	1	Speckled dace	39	0.5	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	Electrofishing	1	California roach	80	4.1	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	Electrofishing	1	California roach	86	5.2	1

Stream	Reach	Site	Segment	Method	Pass	Species	Total Length (mm)	Weight (g)	Count
Rubicon River	Rubicon Dam	RRD-F2	Combined	Electrofishing	1	California roach	72	3.5	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	Electrofishing	1	California roach	75	3.7	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	Electrofishing	1	California roach	47	1.1	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	Electrofishing	1	California roach	54	1.2	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	Electrofishing	1	Speckled dace	47	1.0	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	Electrofishing	1	Speckled dace	58	1.7	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	Electrofishing	1	California roach	30	0.1	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	Electrofishing	1	Speckled dace	62	2.1	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	Electrofishing	1	California roach	72	3.4	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	Electrofishing	1	Speckled dace	45	0.8	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	Electrofishing	1	Speckled dace	31	0.3	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	Electrofishing	1	Sacramento sucker	72	3.5	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	Electrofishing	1	California roach	53	0.8	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	Electrofishing	1	California roach	36	0.3	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	Electrofishing	1	Speckled dace	77	3.9	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	Electrofishing	1	Speckled dace	52	1.2	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	Electrofishing	1	Speckled dace	32	0.2	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	Electrofishing	1	Speckled dace	60	1.7	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	Electrofishing	1	Speckled dace	57	1.7	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	Electrofishing	1	California roach	57	1.8	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	Electrofishing	1	Speckled dace	30	0.2	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	Electrofishing	1	Speckled dace	71	3.8	1

Stream	Reach	Site	Segment	Method	Pass	Species	Total Length (mm)	Weight (g)	Count
Rubicon River	Rubicon Dam	RRD-F2	Combined	Electrofishing	1	Speckled dace	45	0.7	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	Electrofishing	1	California roach	54	1.2	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	Electrofishing	1	Speckled dace	64	2.5	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	Electrofishing	1	California roach	74	3.2	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	Electrofishing	1	Speckled dace	77	4.8	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	Electrofishing	1	Speckled dace	40	0.6	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	Electrofishing	1	California roach	75	3.5	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	Electrofishing	1	Speckled dace	52	1.4	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	Electrofishing	1	Speckled dace	57	2.0	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	Electrofishing	1	California roach	72	3.3	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	Electrofishing	1	Speckled dace	57	1.7	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	Electrofishing	1	Speckled dace	62	2.6	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	Electrofishing	1	California roach	82	4.9	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	Electrofishing	1	California roach	55	1.4	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	Electrofishing	1	Speckled dace	36	0.2	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	Electrofishing	1	Sacramento sucker	105	10.7	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	Electrofishing	1	Speckled dace	67	2.6	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	Electrofishing	1	California roach	70	2.5	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	Electrofishing	1	California roach	56	1.5	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	Electrofishing	1	California roach	80	4.2	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	Electrofishing	1	Speckled dace	70	3.3	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	Electrofishing	1	California roach	70	3.0	1

Stream	Reach	Site	Segment	Method	Pass	Species	Total Length (mm)	Weight (g)	Count
Rubicon River	Rubicon Dam	RRD-F2	Combined	Electrofishing	1	Speckled dace	66	2.7	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	Electrofishing	1	Speckled dace	45	0.9	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	Electrofishing	1	Speckled dace	73	3.5	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	Electrofishing	1	California roach	65	2.0	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	Electrofishing	1	California roach	79	3.3	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	Electrofishing	1	Speckled dace	50	1.3	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	Electrofishing	1	Speckled dace	28	0.1	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	Electrofishing	1	Speckled dace	64	2.6	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	Electrofishing	1	Sacramento sucker	93	7.4	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	Electrofishing	1	Sacramento sucker	67	8.5	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	Electrofishing	1	California roach	74	3.1	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	Electrofishing	1	California roach	80	4.4	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	Electrofishing	1	Speckled dace	65	2.5	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	Electrofishing	1	Speckled dace	47	0.7	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	Electrofishing	1	California roach	86	5.6	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	Electrofishing	1	California roach	60	1.9	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	Electrofishing	1	California roach	86	5.9	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	Electrofishing	1	Sacramento sucker	97	8.8	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	Electrofishing	1	Speckled dace	37	0.3	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	Electrofishing	1	Speckled dace	73	2.1	1

Stream	Reach	Site	Segment	Method	Pass	Species	Total Length (mm)	Weight (g)	Count
Rubicon River	Rubicon Dam	RRD-F2	Combined	Electrofishing	1	Sacramento sucker	99	9.3	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	Electrofishing	1	Speckled dace	62	1.9	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	Electrofishing	1	Sacramento sucker	95	12.6	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	Electrofishing	1	Sacramento sucker	104	11.3	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	Electrofishing	1	Sacramento sucker	70	0.0	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	Electrofishing	1	Sacramento sucker	107	12.3	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	Electrofishing	1	Speckled dace	51	1.0	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	Electrofishing	2	Speckled dace	61	2.4	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	Electrofishing	2	Speckled dace	31	0.0	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	Electrofishing	2	Speckled dace	79	4.6	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	Electrofishing	2	California roach	49	0.0	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	Electrofishing	2	California roach	36	0.0	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	Electrofishing	2	Speckled dace	68	3.1	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	Electrofishing	2	California roach	83	4.1	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	Electrofishing	2	Sacramento sucker	103	9.3	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	Electrofishing	2	Speckled dace	63	2.5	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	Electrofishing	2	Speckled dace	51	1.1	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	Electrofishing	2	California roach	30	0.1	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	Electrofishing	2	California roach	54	1.0	1

Stream	Reach	Site	Segment	Method	Pass	Species	Total Length (mm)	Weight (g)	Count
Rubicon River	Rubicon Dam	RRD-F2	Combined	Electrofishing	2	California roach	53	1.1	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	Electrofishing	2	Speckled dace	75	4.2	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	Electrofishing	2	California roach	50	1.0	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	Electrofishing	2	California roach	92	7.4	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	Electrofishing	2	California roach	34	0.1	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	Electrofishing	2	California roach	45	0.6	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	Electrofishing	2	California roach	46	0.7	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	Electrofishing	2	California roach	61	1.7	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	Electrofishing	2	California roach	55	1.2	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	Electrofishing	2	California roach	47	0.7	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	Electrofishing	2	Speckled dace	46	0.8	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	Electrofishing	2	Speckled dace	63	2.5	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	Electrofishing	2	Speckled dace	62	2.3	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	Electrofishing	2	California roach	60	1.8	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	Electrofishing	2	California roach	47	1.4	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	Electrofishing	2	California roach	45	0.5	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	Electrofishing	2	California roach	55	1.2	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	Electrofishing	2	Sacramento sucker	89	7.8	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	Electrofishing	2	Speckled dace	31	0.1	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	Electrofishing	2	California roach	45	0.8	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	Electrofishing	2	Speckled dace	34	0.3	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	Electrofishing	2	Speckled dace	52	1.7	1

Stream	Reach	Site	Segment	Method	Pass	Species	Total Length (mm)	Weight (g)	Count
Rubicon River	Rubicon Dam	RRD-F2	Combined	Electrofishing	2	California roach	59	2.1	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	Electrofishing	2	Speckled dace	52	1.6	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	Electrofishing	2	Speckled dace	55	2.0	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	Electrofishing	2	California roach	66	3.3	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	Electrofishing	2	Speckled dace	60	2.8	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	Electrofishing	2	Speckled dace	56	2.1	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	Electrofishing	2	Speckled dace	42	1.0	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	Electrofishing	2	Sacramento sucker	110	16.1	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	Electrofishing	2	Speckled dace	36	0.5	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	Electrofishing	2	Speckled dace	56	2.2	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	Electrofishing	2	Speckled dace	54	--	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	Electrofishing	2	Speckled dace	54	--	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	Electrofishing	2	California roach	20	--	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	Electrofishing	2	Speckled dace	40	--	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	Electrofishing	2	California roach	44	--	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	Electrofishing	2	Speckled dace	40	--	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	Electrofishing	2	Speckled dace	35	--	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	Electrofishing	2	Speckled dace	26	--	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	Electrofishing	2	Speckled dace	31	--	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	Electrofishing	3	California roach	46	--	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	Electrofishing	3	California roach	55	--	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	Electrofishing	3	California roach	35	--	1

Stream	Reach	Site	Segment	Method	Pass	Species	Total Length (mm)	Weight (g)	Count
Rubicon River	Rubicon Dam	RRD-F2	Combined	Electrofishing	3	California roach	43	--	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	Electrofishing	3	California roach	66	--	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	Electrofishing	3	California roach	76	--	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	Electrofishing	3	California roach	45	--	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	Electrofishing	3	California roach	64	--	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	Electrofishing	3	California roach	53	--	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	Electrofishing	3	California roach	50	--	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	Electrofishing	3	California roach	58	--	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	Electrofishing	3	California roach	44	--	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	Electrofishing	3	Speckled dace	NA	--	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	Electrofishing	3	California roach	43	--	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	Electrofishing	3	California roach	43	--	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	Electrofishing	3	California roach	50	--	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	Electrofishing	3	California roach	46	--	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	Electrofishing	3	California roach	56	--	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	Electrofishing	3	California roach	45	--	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	Electrofishing	3	California roach	39	--	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	Electrofishing	3	Speckled dace	58	--	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	Electrofishing	3	Speckled dace	43	--	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	Electrofishing	3	Speckled dace	45	--	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	Electrofishing	3	California roach	45	--	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	Electrofishing	3	California roach	55	--	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	Electrofishing	3	Speckled dace	54	--	1

Stream	Reach	Site	Segment	Method	Pass	Species	Total Length (mm)	Weight (g)	Count
Rubicon River	Rubicon Dam	RRD-F2	Combined	Electrofishing	3	California roach	50	--	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	Electrofishing	3	Speckled dace	65	--	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	Electrofishing	3	California roach	32	--	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	Electrofishing	3	Speckled dace	30	--	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	Electrofishing	3	Speckled dace	44	--	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	Electrofishing	3	Speckled dace	45	--	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	Electrofishing	3	Speckled dace	56	--	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	Electrofishing	3	Speckled dace	52	--	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	Electrofishing	3	California roach	43	--	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	Electrofishing	3	Speckled dace	42	--	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	Electrofishing	3	California roach	51	--	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	Electrofishing	3	California roach	46	--	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	Electrofishing	3	Sacramento sucker	92	--	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	Electrofishing	3	Speckled dace	41	--	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	Electrofishing	3	Speckled dace	42	--	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	Electrofishing	3	California roach	26	--	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	Electrofishing	3	Speckled dace	54	--	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	Electrofishing	3	California roach	45	--	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	Electrofishing	3	Speckled dace	43	--	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	Electrofishing	3	Speckled dace	40	--	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	Electrofishing	3	Speckled dace	30	--	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	Electrofishing	3	Speckled dace	45	--	1

Stream	Reach	Site	Segment	Method	Pass	Species	Total Length (mm)	Weight (g)	Count
Rubicon River	Rubicon Dam	RRD-F2	Combined	Electrofishing	3	California roach	50	--	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	Electrofishing	3	Speckled dace	71	--	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	Electrofishing	3	California roach	45	--	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	Electrofishing	3	California roach	50	--	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	Electrofishing	3	Speckled dace	63	--	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	Electrofishing	3	Speckled dace	49	--	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	Electrofishing	3	Speckled dace	47	--	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	Electrofishing	3	Speckled dace	50	--	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	Electrofishing	3	Speckled dace	66	--	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	Electrofishing	3	Speckled dace	40	--	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	Electrofishing	3	California roach	70	--	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	Electrofishing	3	Speckled dace	32	--	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	Electrofishing	3	California roach	62	--	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	Electrofishing	3	California roach	70	--	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	Electrofishing	3	Speckled dace	66	--	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	Electrofishing	3	Speckled dace	30	--	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	Electrofishing	3	Speckled dace	69	--	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	Electrofishing	3	California roach	79	--	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	Electrofishing	3	Speckled dace	65	--	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	Electrofishing	3	Speckled dace	45	--	1
Rubicon River	Rubicon Dam	RRD-F2	Combined	Electrofishing	3	Speckled dace	44	--	1
Little Rubicon	Buck Island Dam	BID-F1	Lower	Electrofishing	1	California roach	70	3.0	1
Little Rubicon	Buck Island Dam	BID-F1	Lower	Electrofishing	1	California roach	32	0.3	2

Stream	Reach	Site	Segment	Method	Pass	Species	Total Length (mm)	Weight (g)	Count
Little Rubicon	Buck Island Dam	BID-F1	Lower	Electrofishing	1	California roach	31	0.3	3
Little Rubicon	Buck Island Dam	BID-F1	Lower	Electrofishing	1	California roach	31	0.3	4
Little Rubicon	Buck Island Dam	BID-F1	Lower	Electrofishing	1	California roach	42	0.6	5
Little Rubicon	Buck Island Dam	BID-F1	Lower	Electrofishing	1	California roach	49	0.6	6
Little Rubicon	Buck Island Dam	BID-F1	Lower	Electrofishing	1	California roach	21	<0.1	7
Little Rubicon	Buck Island Dam	BID-F1	Lower	Electrofishing	1	California roach	25	<0.1	8
Little Rubicon	Buck Island Dam	BID-F1	Lower	Electrofishing	1	California roach	102	11.6	9
Little Rubicon	Buck Island Dam	BID-F1	Lower	Electrofishing	1	California roach	26	<0.1	10
Little Rubicon	Buck Island Dam	BID-F1	Lower	Electrofishing	1	California roach	70	3.9	11
Little Rubicon	Buck Island Dam	BID-F1	Lower	Electrofishing	1	California roach	68	2.9	12
Little Rubicon	Buck Island Dam	BID-F1	Lower	Electrofishing	1	California roach	40	0.7	13
Little Rubicon	Buck Island Dam	BID-F1	Lower	Electrofishing	1	California roach	86	6.8	14
Little Rubicon	Buck Island Dam	BID-F1	Lower	Electrofishing	1	California roach	69	2.6	15
Little Rubicon	Buck Island Dam	BID-F1	Lower	Electrofishing	1	California roach	42	0.6	16
Little Rubicon	Buck Island Dam	BID-F1	Lower	Electrofishing	1	California roach	46	1.0	17
Little Rubicon	Buck Island Dam	BID-F1	Lower	Electrofishing	1	California roach	43	0.7	18
Little Rubicon	Buck Island Dam	BID-F1	Lower	Electrofishing	1	California roach	76	3.9	19
Little Rubicon	Buck Island Dam	BID-F1	Lower	Electrofishing	1	California roach	70	3.3	20
Little Rubicon	Buck Island Dam	BID-F1	Lower	Electrofishing	1	California roach	66	2.4	21
Little Rubicon	Buck Island Dam	BID-F1	Lower	Electrofishing	1	California roach	29	0.1	22
Little Rubicon	Buck Island Dam	BID-F1	Lower	Electrofishing	1	California roach	67	2.8	23
Little Rubicon	Buck Island Dam	BID-F1	Lower	Electrofishing	1	California roach	106	12.3	24
Little Rubicon	Buck Island Dam	BID-F1	Lower	Electrofishing	1	California roach	28	0.2	25

Stream	Reach	Site	Segment	Method	Pass	Species	Total Length (mm)	Weight (g)	Count
Little Rubicon	Buck Island Dam	BID-F1	Lower	Electrofishing	1	California roach	30	0.1	26
Little Rubicon	Buck Island Dam	BID-F1	Lower	Electrofishing	1	California roach	25	<0.1	27
Little Rubicon	Buck Island Dam	BID-F1	Lower	Electrofishing	1	California roach	33	0.2	28
Little Rubicon	Buck Island Dam	BID-F1	Lower	Electrofishing	1	California roach	67	2.7	29
Little Rubicon	Buck Island Dam	BID-F1	Lower	Electrofishing	1	California roach	65	2.1	30
Little Rubicon	Buck Island Dam	BID-F1	Lower	Electrofishing	1	California roach	40	0.5	31
Little Rubicon	Buck Island Dam	BID-F1	Lower	Electrofishing	1	California roach	95	9.0	32
Little Rubicon	Buck Island Dam	BID-F1	Lower	Electrofishing	1	California roach	36	0.2	33
Little Rubicon	Buck Island Dam	BID-F1	Lower	Electrofishing	1	California roach	94	10.4	34
Little Rubicon	Buck Island Dam	BID-F1	Lower	Electrofishing	1	California roach	29	<0.1	35
Little Rubicon	Buck Island Dam	BID-F1	Lower	Electrofishing	1	California roach	21	<0.1	36
Little Rubicon	Buck Island Dam	BID-F1	Lower	Electrofishing	1	California roach	32	0.1	37
Little Rubicon	Buck Island Dam	BID-F1	Lower	Electrofishing	1	California roach	73	3.2	38
Little Rubicon	Buck Island Dam	BID-F1	Lower	Electrofishing	2	California roach	78	4.6	39
Little Rubicon	Buck Island Dam	BID-F1	Lower	Electrofishing	2	California roach	34	0.3	40
Little Rubicon	Buck Island Dam	BID-F1	Lower	Electrofishing	2	California roach	31	0.1	41
Little Rubicon	Buck Island Dam	BID-F1	Lower	Electrofishing	2	California roach	31	0.4	42
Little Rubicon	Buck Island Dam	BID-F1	Lower	Electrofishing	2	California roach	24	<0.1	43
Little Rubicon	Buck Island Dam	BID-F1	Lower	Electrofishing	2	California roach	62	2.2	44
Little Rubicon	Buck Island Dam	BID-F1	Lower	Electrofishing	2	California roach	63	2.1	45
Little Rubicon	Buck Island Dam	BID-F1	Lower	Electrofishing	2	Sacramento sucker	200	88.5	46
Little Rubicon	Buck Island Dam	BID-F1	Lower	Electrofishing	2	California roach	38	0.5	47

Stream	Reach	Site	Segment	Method	Pass	Species	Total Length (mm)	Weight (g)	Count
Little Rubicon	Buck Island Dam	BID-F1	Lower	Electrofishing	3	California roach	35	0.6	48
Little Rubicon	Buck Island Dam	BID-F1	Lower	Electrofishing	3	California roach	30	0.5	49
Little Rubicon	Buck Island Dam	BID-F1	Lower	Electrofishing	3	California roach	35	0.3	50
Little Rubicon	Buck Island Dam	BID-F1	Lower	Electrofishing	3	California roach	96	10.2	51
Little Rubicon	Buck Island Dam	BID-F1	Lower	Electrofishing	3	California roach	74	4.5	52
Little Rubicon	Buck Island Dam	BID-F1	Lower	Electrofishing	3	California roach	84	6.9	53
Little Rubicon	Buck Island Dam	BID-F1	Upper	Electrofishing	1	California roach	60	2.4	54
Little Rubicon	Buck Island Dam	BID-F1	Upper	Electrofishing	1	California roach	28	0.1	55
Little Rubicon	Buck Island Dam	BID-F1	Upper	Electrofishing	1	California roach	30	0.3	56
Little Rubicon	Buck Island Dam	BID-F1	Upper	Electrofishing	1	California roach	29	--	57
Little Rubicon	Buck Island Dam	BID-F1	Upper	Electrofishing	1	California roach	69	3.9	58
Little Rubicon	Buck Island Dam	BID-F1	Upper	Electrofishing	1	California roach	58	3.6	59
Little Rubicon	Buck Island Dam	BID-F1	Upper	Electrofishing	1	California roach	33	0.3	60
Little Rubicon	Buck Island Dam	BID-F1	Upper	Electrofishing	1	California roach	32	--	61
Little Rubicon	Buck Island Dam	BID-F1	Upper	Electrofishing	1	California roach	49	1.3	62
Little Rubicon	Buck Island Dam	BID-F1	Upper	Electrofishing	1	California roach	31	--	63
Little Rubicon	Buck Island Dam	BID-F1	Upper	Electrofishing	1	California roach	23	--	64
Little Rubicon	Buck Island Dam	BID-F1	Upper	Electrofishing	1	California roach	33	--	65
Little Rubicon	Buck Island Dam	BID-F1	Upper	Electrofishing	1	California roach	29	--	66
Little Rubicon	Buck Island Dam	BID-F1	Upper	Electrofishing	1	California roach	23	--	67
Little Rubicon	Buck Island Dam	BID-F1	Upper	Electrofishing	1	California roach	24	--	68
Little Rubicon	Buck Island Dam	BID-F1	Upper	Electrofishing	1	California roach	30	--	69
Little Rubicon	Buck Island Dam	BID-F1	Upper	Electrofishing	1	California roach	24	--	70

Stream	Reach	Site	Segment	Method	Pass	Species	Total Length (mm)	Weight (g)	Count
Little Rubicon	Buck Island Dam	BID-F1	Upper	Electrofishing	1	California roach	32	--	71
Little Rubicon	Buck Island Dam	BID-F1	Upper	Electrofishing	1	California roach	33	--	72
Little Rubicon	Buck Island Dam	BID-F1	Upper	Electrofishing	1	California roach	57	2.4	73
Little Rubicon	Buck Island Dam	BID-F1	Upper	Electrofishing	1	California roach	34	--	74
Little Rubicon	Buck Island Dam	BID-F1	Upper	Electrofishing	1	California roach	30	--	75
Little Rubicon	Buck Island Dam	BID-F1	Upper	Electrofishing	1	California roach	27	--	76
Little Rubicon	Buck Island Dam	BID-F1	Upper	Electrofishing	1	California roach	49	--	77
Little Rubicon	Buck Island Dam	BID-F1	Upper	Electrofishing	1	California roach	84	7.8	78
Little Rubicon	Buck Island Dam	BID-F1	Upper	Electrofishing	1	California roach	27	--	79
Little Rubicon	Buck Island Dam	BID-F1	Upper	Electrofishing	1	California roach	55	2.3	80
Little Rubicon	Buck Island Dam	BID-F1	Upper	Electrofishing	1	California roach	56	2.1	81
Little Rubicon	Buck Island Dam	BID-F1	Upper	Electrofishing	1	California roach	24	--	82
Little Rubicon	Buck Island Dam	BID-F1	Upper	Electrofishing	1	California roach	53	1.4	83
Little Rubicon	Buck Island Dam	BID-F1	Upper	Electrofishing	1	California roach	23	--	84
Little Rubicon	Buck Island Dam	BID-F1	Upper	Electrofishing	1	California roach	31	--	85
Little Rubicon	Buck Island Dam	BID-F1	Upper	Electrofishing	1	California roach	24	--	86
Little Rubicon	Buck Island Dam	BID-F1	Upper	Electrofishing	1	California roach	34	--	87
Little Rubicon	Buck Island Dam	BID-F1	Upper	Electrofishing	2	California roach	52	--	88
Little Rubicon	Buck Island Dam	BID-F1	Upper	Electrofishing	2	California roach	34	--	89
Little Rubicon	Buck Island Dam	BID-F1	Upper	Electrofishing	2	California roach	29	--	90
Little Rubicon	Buck Island Dam	BID-F1	Upper	Electrofishing	2	California roach	31	--	91
Little Rubicon	Buck Island Dam	BID-F1	Upper	Electrofishing	2	California roach	25	--	92
Little Rubicon	Buck Island Dam	BID-F1	Upper	Electrofishing	2	California roach	49	1.9	93

Stream	Reach	Site	Segment	Method	Pass	Species	Total Length (mm)	Weight (g)	Count
Little Rubicon	Buck Island Dam	BID-F1	Upper	Electrofishing	2	California roach	46	0.8	94
Little Rubicon	Buck Island Dam	BID-F1	Upper	Electrofishing	3	California roach	50	1.0	95
Little Rubicon	Buck Island Dam	BID-F1	Upper	Electrofishing	3	California roach	53	--	96
Little Rubicon	Buck Island Dam	BID-F1	Upper	Electrofishing	3	California roach	42	0.6	97
Gerle Creek	Loon Lake Dam	LLD-F3	Lower	Electrofishing	1	Brown trout	232	117.3	1
Gerle Creek	Loon Lake Dam	LLD-F3	Lower	Electrofishing	1	Brown trout	265	165.0	1
Gerle Creek	Loon Lake Dam	LLD-F3	Lower	Electrofishing	1	Brown trout	166	43.7	1
Gerle Creek	Loon Lake Dam	LLD-F3	Lower	Electrofishing	1	Brown trout	136	20.6	1
Gerle Creek	Loon Lake Dam	LLD-F3	Lower	Electrofishing	1	Brown trout	122	16.8	1
Gerle Creek	Loon Lake Dam	LLD-F3	Lower	Electrofishing	1	Brown trout	229	109.1	1
Gerle Creek	Loon Lake Dam	LLD-F3	Lower	Electrofishing	1	Brown trout	187	55.2	1
Gerle Creek	Loon Lake Dam	LLD-F3	Lower	Electrofishing	1	Brown trout	245	135.7	1
Gerle Creek	Loon Lake Dam	LLD-F3	Lower	Electrofishing	1	Brown trout	134	21.2	1
Gerle Creek	Loon Lake Dam	LLD-F3	Lower	Electrofishing	1	Brown trout	202	74.5	1
Gerle Creek	Loon Lake Dam	LLD-F3	Lower	Electrofishing	1	Brown trout	144	25.2	1
Gerle Creek	Loon Lake Dam	LLD-F3	Lower	Electrofishing	1	Brown trout	190	66.1	1
Gerle Creek	Loon Lake Dam	LLD-F3	Lower	Electrofishing	1	Brown trout	74	3.6	1
Gerle Creek	Loon Lake Dam	LLD-F3	Lower	Electrofishing	1	Brown trout	128	19.7	1
Gerle Creek	Loon Lake Dam	LLD-F3	Lower	Electrofishing	1	Brown trout	69	2.6	1
Gerle Creek	Loon Lake Dam	LLD-F3	Lower	Electrofishing	1	Brown trout	189	64.9	1
Gerle Creek	Loon Lake Dam	LLD-F3	Lower	Electrofishing	1	Brown trout	63	2.2	1
Gerle Creek	Loon Lake Dam	LLD-F3	Lower	Electrofishing	1	Brown trout	62	2.3	1
Gerle Creek	Loon Lake Dam	LLD-F3	Lower	Electrofishing	1	Brown trout	127	19.6	1

Stream	Reach	Site	Segment	Method	Pass	Species	Total Length (mm)	Weight (g)	Count
Gerle Creek	Loon Lake Dam	LLD-F3	Lower	Electrofishing	1	Brown trout	180	54.0	1
Gerle Creek	Loon Lake Dam	LLD-F3	Lower	Electrofishing	1	Brown trout	224	97.7	1
Gerle Creek	Loon Lake Dam	LLD-F3	Lower	Electrofishing	1	Brown trout	215	97.6	1
Gerle Creek	Loon Lake Dam	LLD-F3	Lower	Electrofishing	1	Brown trout	64	2.5	1
Gerle Creek	Loon Lake Dam	LLD-F3	Lower	Electrofishing	1	Brown trout	62	2.2	1
Gerle Creek	Loon Lake Dam	LLD-F3	Lower	Electrofishing	1	Rainbow trout	160	34.6	1
Gerle Creek	Loon Lake Dam	LLD-F3	Lower	Electrofishing	2	Brown trout	204	72.2	1
Gerle Creek	Loon Lake Dam	LLD-F3	Lower	Electrofishing	1	Rainbow trout	47	0.9	1
Gerle Creek	Loon Lake Dam	LLD-F3	Lower	Electrofishing	1	Rainbow trout	170	45.3	1
Gerle Creek	Loon Lake Dam	LLD-F3	Lower	Electrofishing	2	Brown trout	192	63.8	1
Gerle Creek	Loon Lake Dam	LLD-F3	Lower	Electrofishing	2	Brown trout	235	121.0	1
Gerle Creek	Loon Lake Dam	LLD-F3	Lower	Electrofishing	1	Rainbow trout	137	22.7	1
Gerle Creek	Loon Lake Dam	LLD-F3	Lower	Electrofishing	2	Brown trout	185	58.5	1
Gerle Creek	Loon Lake Dam	LLD-F3	Lower	Electrofishing	2	Brown trout	57	1.9	1
Gerle Creek	Loon Lake Dam	LLD-F3	Lower	Electrofishing	2	Brown trout	135	24.1	1
Gerle Creek	Loon Lake Dam	LLD-F3	Lower	Electrofishing	2	Brown trout	145	26.5	1
Gerle Creek	Loon Lake Dam	LLD-F3	Lower	Electrofishing	2	Brown trout	124	17.2	1
Gerle Creek	Loon Lake Dam	LLD-F3	Lower	Electrofishing	2	Rainbow trout	235	115.5	1
Gerle Creek	Loon Lake Dam	LLD-F3	Lower	Electrofishing	2	Rainbow trout	105	9.5	1
Gerle Creek	Loon Lake Dam	LLD-F3	Lower	Electrofishing	2	Rainbow trout	155	32.2	1
Gerle Creek	Loon Lake Dam	LLD-F3	Lower	Electrofishing	2	Rainbow trout	199	66.2	1
Gerle Creek	Loon Lake Dam	LLD-F3	Lower	Electrofishing	3	Brown trout	127	18.8	1
Gerle Creek	Loon Lake Dam	LLD-F3	Lower	Electrofishing	3	Brown trout	184	54.1	1

Stream	Reach	Site	Segment	Method	Pass	Species	Total Length (mm)	Weight (g)	Count
Gerle Creek	Loon Lake Dam	LLD-F3	Lower	Electrofishing	3	Brown trout	54	--	1
Gerle Creek	Loon Lake Dam	LLD-F3	Lower	Electrofishing	3	Brown trout	130	19.5	1
Gerle Creek	Loon Lake Dam	LLD-F3	Lower	Electrofishing	3	Brown trout	74	3.9	1
Gerle Creek	Loon Lake Dam	LLD-F3	Lower	Electrofishing	3	Brown trout	75	4.2	1
Gerle Creek	Loon Lake Dam	LLD-F3	Lower	Electrofishing	3	Brown trout	65	2.7	1
Gerle Creek	Loon Lake Dam	LLD-F3	Upper	Electrofishing	1	Brown trout	190	64.6	1
Gerle Creek	Loon Lake Dam	LLD-F3	Upper	Electrofishing	1	Brown trout	226	105.7	1
Gerle Creek	Loon Lake Dam	LLD-F3	Upper	Electrofishing	1	Brown trout	193	65.6	1
Gerle Creek	Loon Lake Dam	LLD-F3	Upper	Electrofishing	1	Brown trout	188	60.7	1
Gerle Creek	Loon Lake Dam	LLD-F3	Upper	Electrofishing	1	Rainbow trout	142	26.1	1
Gerle Creek	Loon Lake Dam	LLD-F3	Upper	Electrofishing	1	Brown trout	190	61.5	1
Gerle Creek	Loon Lake Dam	LLD-F3	Upper	Electrofishing	1	Brown trout	73	3.5	1
Gerle Creek	Loon Lake Dam	LLD-F3	Upper	Electrofishing	1	Rainbow trout	103	9.5	1
Gerle Creek	Loon Lake Dam	LLD-F3	Upper	Electrofishing	1	Brown trout	138	25.7	1
Gerle Creek	Loon Lake Dam	LLD-F3	Upper	Electrofishing	1	Rainbow trout	173	46.1	1
Gerle Creek	Loon Lake Dam	LLD-F3	Upper	Electrofishing	1	Brown trout	82	4.1	1
Gerle Creek	Loon Lake Dam	LLD-F3	Upper	Electrofishing	1	Brown trout	68	3.1	1
Gerle Creek	Loon Lake Dam	LLD-F3	Upper	Electrofishing	2	Brown trout	134	21.7	1
Gerle Creek	Loon Lake Dam	LLD-F3	Upper	Electrofishing	2	Brown trout	66	2.8	1
Gerle Creek	Loon Lake Dam	LLD-F3	Upper	Electrofishing	2	Brown trout	72	3.8	1
Gerle Creek	Loon Lake Dam	LLD-F3	Upper	Electrofishing	2	Brown trout	61	2.2	1
Gerle Creek	Loon Lake Dam	LLD-F3	Upper	Electrofishing	3	Brown trout	183	58.4	1
Gerle Creek	Loon Lake Dam	LLD-F3	Upper	Electrofishing	3	Brown trout	138	24.3	1

Stream	Reach	Site	Segment	Method	Pass	Species	Total Length (mm)	Weight (g)	Count
Gerle Creek	Loon Lake Dam	LLD-F3	Upper	Electrofishing	3	Brown trout	216	83.3	1
Gerle Creek	Loon Lake Dam	LLD-F3	Upper	Electrofishing	3	Brown trout	133	24.3	1
Gerle Creek	Loon Lake Dam	LLD-F3	Upper	Electrofishing	3	Brown trout	236	120.1	1
Gerle Creek	Loon Lake Dam	LLD-F3	Upper	Electrofishing	3	Brown trout	135	21.7	1
Gerle Creek	Loon Lake Dam	LLD-F3	Upper	Electrofishing	3	Brown trout	76	3.7	1
Gerle Creek	Loon Lake Dam	LLD-F3	Upper	Electrofishing	3	Brown trout	74	3.9	1
Gerle Creek	Loon Lake Dam	LLD-F2	Lower	Electrofishing	1	Rainbow trout	110	12.7	1
Gerle Creek	Loon Lake Dam	LLD-F2	Lower	Electrofishing	1	Rainbow trout	223	91.2	1
Gerle Creek	Loon Lake Dam	LLD-F2	Lower	Electrofishing	1	Rainbow trout	109	10.2	1
Gerle Creek	Loon Lake Dam	LLD-F2	Lower	Electrofishing	1	Brown trout	70	3.7	1
Gerle Creek	Loon Lake Dam	LLD-F2	Lower	Electrofishing	1	Brown trout	324	295.7	1
Gerle Creek	Loon Lake Dam	LLD-F2	Lower	Electrofishing	1	Brown trout	71	6.6	1
Gerle Creek	Loon Lake Dam	LLD-F2	Lower	Electrofishing	1	Rainbow trout	170	44.5	1
Gerle Creek	Loon Lake Dam	LLD-F2	Lower	Electrofishing	1	Rainbow trout	222	87.1	1
Gerle Creek	Loon Lake Dam	LLD-F2	Lower	Electrofishing	1	Rainbow trout	181	53.7	1
Gerle Creek	Loon Lake Dam	LLD-F2	Lower	Electrofishing	1	Rainbow trout	111	12.0	1
Gerle Creek	Loon Lake Dam	LLD-F2	Lower	Electrofishing	1	Rainbow trout	140	21.9	1
Gerle Creek	Loon Lake Dam	LLD-F2	Lower	Electrofishing	1	Rainbow trout	119	18.6	1
Gerle Creek	Loon Lake Dam	LLD-F2	Lower	Electrofishing	1	Rainbow trout	168	44.9	1
Gerle Creek	Loon Lake Dam	LLD-F2	Lower	Electrofishing	1	Rainbow trout	158	34.8	1
Gerle Creek	Loon Lake Dam	LLD-F2	Lower	Electrofishing	2	Brown trout	335	400.0	1
Gerle Creek	Loon Lake Dam	LLD-F2	Lower	Electrofishing	2	Rainbow trout	110	12.5	1
Gerle Creek	Loon Lake Dam	LLD-F2	Lower	Electrofishing	2	Brown trout	168	49.7	1

Stream	Reach	Site	Segment	Method	Pass	Species	Total Length (mm)	Weight (g)	Count
Gerle Creek	Loon Lake Dam	LLD-F2	Lower	Electrofishing	2	Rainbow trout	145	35.4	1
Gerle Creek	Loon Lake Dam	LLD-F2	Lower	Electrofishing	2	Rainbow trout	106	10.3	1
Gerle Creek	Loon Lake Dam	LLD-F2	Lower	Electrofishing	2	Rainbow trout	55	1.4	1
Gerle Creek	Loon Lake Dam	LLD-F2	Lower	Electrofishing	2	Brown trout	115	14.4	1
Gerle Creek	Loon Lake Dam	LLD-F2	Lower	Electrofishing	3	Rainbow trout	118	16.2	1
Gerle Creek	Loon Lake Dam	LLD-F2	Lower	Electrofishing	3	Rainbow trout	115	15.3	1
Gerle Creek	Loon Lake Dam	LLD-F2	Lower	Electrofishing	3	Rainbow trout	115	15.4	1
Gerle Creek	Loon Lake Dam	LLD-F2	Upper	Electrofishing	1	Rainbow trout	45	0.6	1
Gerle Creek	Loon Lake Dam	LLD-F2	Upper	Electrofishing	1	Rainbow trout	120	14.4	1
Gerle Creek	Loon Lake Dam	LLD-F2	Upper	Electrofishing	1	Brown trout	64	2.4	1
Gerle Creek	Loon Lake Dam	LLD-F2	Upper	Electrofishing	1	Rainbow trout	52	1.1	1
Gerle Creek	Loon Lake Dam	LLD-F2	Upper	Electrofishing	1	Rainbow trout	122	14.4	1
Gerle Creek	Loon Lake Dam	LLD-F2	Upper	Electrofishing	1	Brown trout	59	2.0	1
Gerle Creek	Loon Lake Dam	LLD-F2	Upper	Electrofishing	1	Brown trout	159	35.4	1
Gerle Creek	Loon Lake Dam	LLD-F2	Upper	Electrofishing	1	Rainbow trout	64	2.2	1
Gerle Creek	Loon Lake Dam	LLD-F2	Upper	Electrofishing	1	Rainbow trout	202	72.2	1
Gerle Creek	Loon Lake Dam	LLD-F2	Upper	Electrofishing	1	Rainbow trout	180	48.5	1
Gerle Creek	Loon Lake Dam	LLD-F2	Upper	Electrofishing	1	Rainbow trout	239	102.2	1
Gerle Creek	Loon Lake Dam	LLD-F2	Upper	Electrofishing	1	Rainbow trout	235	123.6	1
Gerle Creek	Loon Lake Dam	LLD-F2	Upper	Electrofishing	1	Brown trout	201	76.1	1
Gerle Creek	Loon Lake Dam	LLD-F2	Upper	Electrofishing	1	Brown trout	79	4.5	1
Gerle Creek	Loon Lake Dam	LLD-F2	Upper	Electrofishing	1	Brown trout	232	119.5	1
Gerle Creek	Loon Lake Dam	LLD-F2	Upper	Electrofishing	1	Rainbow trout	172	41.0	1

Stream	Reach	Site	Segment	Method	Pass	Species	Total Length (mm)	Weight (g)	Count
Gerle Creek	Loon Lake Dam	LLD-F2	Upper	Electrofishing	1	Brown trout	80	4.6	1
Gerle Creek	Loon Lake Dam	LLD-F2	Upper	Electrofishing	1	Brown trout	77	4.5	1
Gerle Creek	Loon Lake Dam	LLD-F2	Upper	Electrofishing	1	Rainbow trout	167	43.2	1
Gerle Creek	Loon Lake Dam	LLD-F2	Upper	Electrofishing	1	Rainbow trout	163	35.9	1
Gerle Creek	Loon Lake Dam	LLD-F2	Upper	Electrofishing	1	Rainbow trout	144	25.5	1
Gerle Creek	Loon Lake Dam	LLD-F2	Upper	Electrofishing	1	Rainbow trout	58	1.9	1
Gerle Creek	Loon Lake Dam	LLD-F2	Upper	Electrofishing	1	Rainbow trout	103	9.4	1
Gerle Creek	Loon Lake Dam	LLD-F2	Upper	Electrofishing	1	Rainbow trout	148	28.2	1
Gerle Creek	Loon Lake Dam	LLD-F2	Upper	Electrofishing	1	Rainbow trout	172	47.5	1
Gerle Creek	Loon Lake Dam	LLD-F2	Upper	Electrofishing	1	Rainbow trout	173	46.0	1
Gerle Creek	Loon Lake Dam	LLD-F2	Upper	Electrofishing	2	Brown trout	136	22.9	1
Gerle Creek	Loon Lake Dam	LLD-F2	Upper	Electrofishing	2	Brown trout	178	53.1	1
Gerle Creek	Loon Lake Dam	LLD-F2	Upper	Electrofishing	2	Brown trout	70	3.2	1
Gerle Creek	Loon Lake Dam	LLD-F2	Upper	Electrofishing	2	Brown trout	71	3.3	1
Gerle Creek	Loon Lake Dam	LLD-F2	Upper	Electrofishing	2	Rainbow trout	166	41.4	1
Gerle Creek	Loon Lake Dam	LLD-F2	Upper	Electrofishing	2	Rainbow trout	61	2.2	1
Gerle Creek	Loon Lake Dam	LLD-F2	Upper	Electrofishing	2	Rainbow trout	197	62.4	1
Gerle Creek	Loon Lake Dam	LLD-F2	Upper	Electrofishing	2	Rainbow trout	172	44.1	1
Gerle Creek	Loon Lake Dam	LLD-F2	Upper	Electrofishing	2	Rainbow trout	59	1.8	1
Gerle Creek	Loon Lake Dam	LLD-F2	Upper	Electrofishing	2	Brown trout	69	3.2	1
Gerle Creek	Loon Lake Dam	LLD-F2	Upper	Electrofishing	2	Rainbow trout	115	13.9	1
Gerle Creek	Loon Lake Dam	LLD-F2	Upper	Electrofishing	2	Rainbow trout	140	22.9	1
Gerle Creek	Loon Lake Dam	LLD-F2	Upper	Electrofishing	3	Rainbow trout	132	18.9	1

Stream	Reach	Site	Segment	Method	Pass	Species	Total Length (mm)	Weight (g)	Count
Gerle Creek	Loon Lake Dam	LLD-F2	Upper	Electrofishing	3	Brown trout	74	3.8	1
Gerle Creek	Loon Lake Dam	LLD-F2	Upper	Electrofishing	3	Brown trout	66	2.8	1
Gerle Creek	Loon Lake Dam	LLD-F2	Upper	Electrofishing	3	Rainbow trout	123	11.5	1
Gerle Creek	Loon Lake Dam	LLD-F2	Upper	Electrofishing	3	Rainbow trout	120	14.6	1
Gerle Creek	Loon Lake Dam	LLD-F2	Upper	Electrofishing	3	Rainbow trout	161	34.7	1
Gerle Creek	Gerle Creek Dam	GCD-F1	Lower	Electrofishing	1	Rainbow trout	97	7.7	1
Gerle Creek	Gerle Creek Dam	GCD-F1	Lower	Electrofishing	1	Rainbow trout	155	32.2	1
Gerle Creek	Gerle Creek Dam	GCD-F1	Lower	Electrofishing	1	Rainbow trout	160	32.2	1
Gerle Creek	Gerle Creek Dam	GCD-F1	Lower	Electrofishing	1	Rainbow trout	203	79.2	1
Gerle Creek	Gerle Creek Dam	GCD-F1	Lower	Electrofishing	1	Rainbow trout	69	2.3	1
Gerle Creek	Gerle Creek Dam	GCD-F1	Lower	Electrofishing	1	Rainbow trout	66	2.3	1
Gerle Creek	Gerle Creek Dam	GCD-F1	Lower	Electrofishing	1	Rainbow trout	71	2.9	1
Gerle Creek	Gerle Creek Dam	GCD-F1	Lower	Electrofishing	1	Rainbow trout	50	--	1
Gerle Creek	Gerle Creek Dam	GCD-F1	Lower	Electrofishing	1	Rainbow trout	59	1.6	1
Gerle Creek	Gerle Creek Dam	GCD-F1	Lower	Electrofishing	1	Rainbow trout	155	32.3	1
Gerle Creek	Gerle Creek Dam	GCD-F1	Lower	Electrofishing	1	Rainbow trout	60	1.9	1
Gerle Creek	Gerle Creek Dam	GCD-F1	Lower	Electrofishing	1	Rainbow trout	54	0.9	1
Gerle Creek	Gerle Creek Dam	GCD-F1	Lower	Electrofishing	1	Rainbow trout	70	2.1	1
Gerle Creek	Gerle Creek Dam	GCD-F1	Lower	Electrofishing	1	Rainbow trout	65	2.3	1
Gerle Creek	Gerle Creek Dam	GCD-F1	Lower	Electrofishing	1	Brown trout	95	8.5	1
Gerle Creek	Gerle Creek Dam	GCD-F1	Lower	Electrofishing	1	Rainbow trout	100	8.4	1
Gerle Creek	Gerle Creek Dam	GCD-F1	Lower	Electrofishing	1	Brown trout	81	4.8	1
Gerle Creek	Gerle Creek Dam	GCD-F1	Lower	Electrofishing	1	Rainbow trout	62	2.2	1

Stream	Reach	Site	Segment	Method	Pass	Species	Total Length (mm)	Weight (g)	Count
Gerle Creek	Gerle Creek Dam	GCD-F1	Lower	Electrofishing	1	Rainbow trout	151	28.2	1
Gerle Creek	Gerle Creek Dam	GCD-F1	Lower	Electrofishing	1	Rainbow trout	172	50.7	1
Gerle Creek	Gerle Creek Dam	GCD-F1	Lower	Electrofishing	1	Rainbow trout	174	42.6	1
Gerle Creek	Gerle Creek Dam	GCD-F1	Lower	Electrofishing	1	Rainbow trout	70	2.8	1
Gerle Creek	Gerle Creek Dam	GCD-F1	Lower	Electrofishing	1	Brown trout	93	7.1	1
Gerle Creek	Gerle Creek Dam	GCD-F1	Lower	Electrofishing	1	Rainbow trout	68	2.8	1
Gerle Creek	Gerle Creek Dam	GCD-F1	Lower	Electrofishing	1	Rainbow trout	69	3.0	1
Gerle Creek	Gerle Creek Dam	GCD-F1	Lower	Electrofishing	1	Brown trout	88	7.1	1
Gerle Creek	Gerle Creek Dam	GCD-F1	Lower	Electrofishing	1	Brown trout	93	6.7	1
Gerle Creek	Gerle Creek Dam	GCD-F1	Lower	Electrofishing	1	Brown trout	85	5.1	1
Gerle Creek	Gerle Creek Dam	GCD-F1	Lower	Electrofishing	1	Rainbow trout	64	2.1	1
Gerle Creek	Gerle Creek Dam	GCD-F1	Lower	Electrofishing	1	Rainbow trout	118	14.0	1
Gerle Creek	Gerle Creek Dam	GCD-F1	Lower	Electrofishing	1	Brown trout	90	6.6	1
Gerle Creek	Gerle Creek Dam	GCD-F1	Lower	Electrofishing	1	Brown trout	236	135.5	1
Gerle Creek	Gerle Creek Dam	GCD-F1	Lower	Electrofishing	1	Brown trout	81	5.0	1
Gerle Creek	Gerle Creek Dam	GCD-F1	Lower	Electrofishing	1	Brown trout	100	9.2	1
Gerle Creek	Gerle Creek Dam	GCD-F1	Lower	Electrofishing	1	Rainbow trout	60	1.7	1
Gerle Creek	Gerle Creek Dam	GCD-F1	Lower	Electrofishing	2	Rainbow trout	143	24.1	1
Gerle Creek	Gerle Creek Dam	GCD-F1	Lower	Electrofishing	2	Brown trout	95	8.6	1
Gerle Creek	Gerle Creek Dam	GCD-F1	Lower	Electrofishing	2	Rainbow trout	142	26.7	1
Gerle Creek	Gerle Creek Dam	GCD-F1	Lower	Electrofishing	2	Rainbow trout	114	11.7	1
Gerle Creek	Gerle Creek Dam	GCD-F1	Lower	Electrofishing	2	Brown trout	96	8.3	1
Gerle Creek	Gerle Creek Dam	GCD-F1	Lower	Electrofishing	2	Rainbow trout	182	47.0	1

Stream	Reach	Site	Segment	Method	Pass	Species	Total Length (mm)	Weight (g)	Count
Gerle Creek	Gerle Creek Dam	GCD-F1	Lower	Electrofishing	2	Rainbow trout	91	7.0	1
Gerle Creek	Gerle Creek Dam	GCD-F1	Lower	Electrofishing	2	Rainbow trout	143	25.6	1
Gerle Creek	Gerle Creek Dam	GCD-F1	Lower	Electrofishing	2	Rainbow trout	126	17.9	1
Gerle Creek	Gerle Creek Dam	GCD-F1	Lower	Electrofishing	2	Rainbow trout	61	2.1	1
Gerle Creek	Gerle Creek Dam	GCD-F1	Lower	Electrofishing	2	Rainbow trout	58	1.6	1
Gerle Creek	Gerle Creek Dam	GCD-F1	Lower	Electrofishing	2	Rainbow trout	114	12.6	1
Gerle Creek	Gerle Creek Dam	GCD-F1	Lower	Electrofishing	3	Brown trout	86	5.5	1
Gerle Creek	Gerle Creek Dam	GCD-F1	Lower	Electrofishing	2	Rainbow trout	54	1.5	1
Gerle Creek	Gerle Creek Dam	GCD-F1	Lower	Electrofishing	2	Rainbow trout	87	6.1	1
Gerle Creek	Gerle Creek Dam	GCD-F1	Lower	Electrofishing	3	Rainbow trout	169	--	1
Gerle Creek	Gerle Creek Dam	GCD-F1	Lower	Electrofishing	3	Rainbow trout	69	2.6	1
Gerle Creek	Gerle Creek Dam	GCD-F1	Lower	Electrofishing	3	Rainbow trout	64	2.7	1
Gerle Creek	Gerle Creek Dam	GCD-F1	Lower	Electrofishing	3	Rainbow trout	106	10.4	1
Gerle Creek	Gerle Creek Dam	GCD-F1	Upper	Electrofishing	1	Rainbow trout	98	8.0	1
Gerle Creek	Gerle Creek Dam	GCD-F1	Upper	Electrofishing	1	Rainbow trout	138	23.5	1
Gerle Creek	Gerle Creek Dam	GCD-F1	Upper	Electrofishing	1	Rainbow trout	164	38.7	1
Gerle Creek	Gerle Creek Dam	GCD-F1	Upper	Electrofishing	1	Rainbow trout	69	2.8	1
Gerle Creek	Gerle Creek Dam	GCD-F1	Upper	Electrofishing	1	Rainbow trout	130	19.8	1
Gerle Creek	Gerle Creek Dam	GCD-F1	Upper	Electrofishing	2	Rainbow trout	181	56.8	1
Gerle Creek	Gerle Creek Dam	GCD-F1	Upper	Electrofishing	2	Rainbow trout	105	10.3	1
Gerle Creek	Gerle Creek Dam	GCD-F1	Upper	Electrofishing	2	Rainbow trout	109	12.0	1
Gerle Creek	Gerle Creek Dam	GCD-F1	Upper	Electrofishing	3	Rainbow trout	62	2.1	1
Gerle Creek	Gerle Creek Dam	GCD-F1	Upper	Electrofishing	3	Rainbow trout	64	2.3	1

Stream	Reach	Site	Segment	Method	Pass	Species	Total Length (mm)	Weight (g)	Count
Gerle Creek	Gerle Creek Dam	GCD-F1	Upper	Electrofishing	3	Rainbow trout	67	2.7	1
Gerle Creek	Gerle Creek Dam	GCD-F1	Upper	Electrofishing	3	Rainbow trout	107	11.1	1
South Fork Rubicon	Robbs Peak Dam	RPD-F1	Lower	Electrofishing	1	Rainbow trout	100	8.4	1
South Fork Rubicon	Robbs Peak Dam	RPD-F1	Lower	Electrofishing	1	Rainbow trout	59	2.0	1
South Fork Rubicon	Robbs Peak Dam	RPD-F1	Lower	Electrofishing	1	Rainbow trout	68	2.8	1
South Fork Rubicon	Robbs Peak Dam	RPD-F1	Lower	Electrofishing	1	Rainbow trout	111	11.2	1
South Fork Rubicon	Robbs Peak Dam	RPD-F1	Lower	Electrofishing	1	Rainbow trout	62	2.5	1
South Fork Rubicon	Robbs Peak Dam	RPD-F1	Lower	Electrofishing	1	Rainbow trout	69	3.4	1
South Fork Rubicon	Robbs Peak Dam	RPD-F1	Lower	Electrofishing	1	Brown trout	89	6.5	1
South Fork Rubicon	Robbs Peak Dam	RPD-F1	Lower	Electrofishing	1	Rainbow trout	116	13.8	1
South Fork Rubicon	Robbs Peak Dam	RPD-F1	Lower	Electrofishing	1	Rainbow trout	164	35.7	1
South Fork Rubicon	Robbs Peak Dam	RPD-F1	Lower	Electrofishing	1	Rainbow trout	160	33.6	1
South Fork Rubicon	Robbs Peak Dam	RPD-F1	Lower	Electrofishing	1	Rainbow trout	127	19.0	1
South Fork Rubicon	Robbs Peak Dam	RPD-F1	Lower	Electrofishing	1	Rainbow trout	85	6.5	1

Stream	Reach	Site	Segment	Method	Pass	Species	Total Length (mm)	Weight (g)	Count
South Fork Rubicon	Robbs Peak Dam	RPD-F1	Lower	Electrofishing	1	Rainbow trout	187	56.0	1
South Fork Rubicon	Robbs Peak Dam	RPD-F1	Lower	Electrofishing	1	Rainbow trout	137	24.0	1
South Fork Rubicon	Robbs Peak Dam	RPD-F1	Lower	Electrofishing	1	Rainbow trout	69	3.5	1
South Fork Rubicon	Robbs Peak Dam	RPD-F1	Lower	Electrofishing	1	Rainbow trout	67	3.9	1
South Fork Rubicon	Robbs Peak Dam	RPD-F1	Lower	Electrofishing	1	Rainbow trout	60	2.8	1
South Fork Rubicon	Robbs Peak Dam	RPD-F1	Lower	Electrofishing	1	Rainbow trout	74	4.3	1
South Fork Rubicon	Robbs Peak Dam	RPD-F1	Lower	Electrofishing	1	Rainbow trout	105	8.8	1
South Fork Rubicon	Robbs Peak Dam	RPD-F1	Lower	Electrofishing	1	Rainbow trout	191	60.2	1
South Fork Rubicon	Robbs Peak Dam	RPD-F1	Lower	Electrofishing	1	Rainbow trout	66	2.7	1
South Fork Rubicon	Robbs Peak Dam	RPD-F1	Lower	Electrofishing	1	Rainbow trout	111	10.1	1
South Fork Rubicon	Robbs Peak Dam	RPD-F1	Lower	Electrofishing	1	Rainbow trout	108	8.7	1
South Fork Rubicon	Robbs Peak Dam	RPD-F1	Lower	Electrofishing	1	Rainbow trout	132	18.5	1
South Fork Rubicon	Robbs Peak Dam	RPD-F1	Lower	Electrofishing	1	Rainbow trout	96	8.4	1
South Fork Rubicon	Robbs Peak Dam	RPD-F1	Lower	Electrofishing	1	Rainbow trout	73	3.2	1

Stream	Reach	Site	Segment	Method	Pass	Species	Total Length (mm)	Weight (g)	Count
South Fork Rubicon	Robbs Peak Dam	RPD-F1	Lower	Electrofishing	1	Rainbow trout	78	4.5	1
South Fork Rubicon	Robbs Peak Dam	RPD-F1	Lower	Electrofishing	1	Rainbow trout	116	13.7	1
South Fork Rubicon	Robbs Peak Dam	RPD-F1	Lower	Electrofishing	1	Rainbow trout	74	4.2	1
South Fork Rubicon	Robbs Peak Dam	RPD-F1	Lower	Electrofishing	1	Rainbow trout	65	3.1	1
South Fork Rubicon	Robbs Peak Dam	RPD-F1	Lower	Electrofishing	1	Rainbow trout	65	2.9	1
South Fork Rubicon	Robbs Peak Dam	RPD-F1	Lower	Electrofishing	1	Brown trout	85	6.7	1
South Fork Rubicon	Robbs Peak Dam	RPD-F1	Lower	Electrofishing	1	Rainbow trout	67	2.6	1
South Fork Rubicon	Robbs Peak Dam	RPD-F1	Upper	Electrofishing	1	Rainbow trout	133	21.2	1
South Fork Rubicon	Robbs Peak Dam	RPD-F1	Upper	Electrofishing	1	Brown trout	81	5.5	1
South Fork Rubicon	Robbs Peak Dam	RPD-F1	Upper	Electrofishing	1	Rainbow trout	142	25.1	1
South Fork Rubicon	Robbs Peak Dam	RPD-F1	Upper	Electrofishing	1	Rainbow trout	60	1.5	1
South Fork Rubicon	Robbs Peak Dam	RPD-F1	Upper	Electrofishing	1	Rainbow trout	111	12.4	1
South Fork Rubicon	Robbs Peak Dam	RPD-F1	Upper	Electrofishing	1	Rainbow trout	61	2.4	1
South Fork Rubicon	Robbs Peak Dam	RPD-F1	Upper	Electrofishing	1	Rainbow trout	104	10.5	1

Stream	Reach	Site	Segment	Method	Pass	Species	Total Length (mm)	Weight (g)	Count
South Fork Rubicon	Robbs Peak Dam	RPD-F1	Upper	Electrofishing	1	Rainbow trout	155	31.3	1
South Fork Rubicon	Robbs Peak Dam	RPD-F1	Upper	Electrofishing	1	Rainbow trout	63	2.8	1
South Fork Rubicon	Robbs Peak Dam	RPD-F1	Upper	Electrofishing	1	Rainbow trout	42	0.7	1
South Fork Rubicon	Robbs Peak Dam	RPD-F1	Upper	Electrofishing	1	Rainbow trout	66	2.3	1
South Fork Rubicon	Robbs Peak Dam	RPD-F1	Upper	Electrofishing	1	Rainbow trout	64	2.8	1
South Fork Rubicon	Robbs Peak Dam	RPD-F1	Upper	Electrofishing	1	Rainbow trout	67	3.2	1
South Fork Rubicon	Robbs Peak Dam	RPD-F1	Upper	Electrofishing	1	Rainbow trout	66	2.8	1
South Fork Rubicon	Robbs Peak Dam	RPD-F1	Upper	Electrofishing	1	Rainbow trout	68	4.7	1
South Fork Rubicon	Robbs Peak Dam	RPD-F1	Upper	Electrofishing	1	Rainbow trout	63	2.5	1
South Fork Rubicon	Robbs Peak Dam	RPD-F1	Upper	Electrofishing	1	Rainbow trout	110	13.1	1
South Fork Rubicon	Robbs Peak Dam	RPD-F1	Upper	Electrofishing	1	Rainbow trout	63	2.4	1
South Fork Rubicon	Robbs Peak Dam	RPD-F1	Upper	Electrofishing	1	Rainbow trout	156	34.9	1
South Fork Rubicon	Robbs Peak Dam	RPD-F1	Upper	Electrofishing	1	Rainbow trout	85	4.1	1
South Fork Rubicon	Robbs Peak Dam	RPD-F1	Upper	Electrofishing	1	Rainbow trout	61	1.8	1

Stream	Reach	Site	Segment	Method	Pass	Species	Total Length (mm)	Weight (g)	Count
South Fork Rubicon	Robbs Peak Dam	RPD-F1	Upper	Electrofishing	1	Rainbow trout	72	3.6	1
South Fork Rubicon	Robbs Peak Dam	RPD-F1	Upper	Electrofishing	1	Rainbow trout	171	44.2	1
South Fork Rubicon	Robbs Peak Dam	RPD-F1	Upper	Electrofishing	1	Rainbow trout	188	66.0	1
South Fork Rubicon	Robbs Peak Dam	RPD-F1	Upper	Electrofishing	1	Rainbow trout	63	2.4	1
South Fork Rubicon	Robbs Peak Dam	RPD-F1	Lower	Electrofishing	2	Rainbow trout	67	3.0	1
South Fork Rubicon	Robbs Peak Dam	RPD-F1	Lower	Electrofishing	2	Rainbow trout	108	10.7	1
South Fork Rubicon	Robbs Peak Dam	RPD-F1	Upper	Electrofishing	1	Brown trout	83	5.2	1
South Fork Rubicon	Robbs Peak Dam	RPD-F1	Upper	Electrofishing	1	Brown trout	83	6.0	1
South Fork Rubicon	Robbs Peak Dam	RPD-F1	Lower	Electrofishing	2	Rainbow trout	57	1.6	1
South Fork Rubicon	Robbs Peak Dam	RPD-F1	Lower	Electrofishing	2	Rainbow trout	71	2.9	1
South Fork Rubicon	Robbs Peak Dam	RPD-F1	Lower	Electrofishing	2	Rainbow trout	105	10.6	1
South Fork Rubicon	Robbs Peak Dam	RPD-F1	Upper	Electrofishing	1	Brown trout	87	6.5	1
South Fork Rubicon	Robbs Peak Dam	RPD-F1	Lower	Electrofishing	2	Rainbow trout	76	4.0	1
South Fork Rubicon	Robbs Peak Dam	RPD-F1	Lower	Electrofishing	2	Rainbow trout	92	6.7	1

Stream	Reach	Site	Segment	Method	Pass	Species	Total Length (mm)	Weight (g)	Count
South Fork Rubicon	Robbs Peak Dam	RPD-F1	Lower	Electrofishing	2	Brown trout	86	6.0	1
South Fork Rubicon	Robbs Peak Dam	RPD-F1	Lower	Electrofishing	2	Rainbow trout	61	1.6	1
South Fork Rubicon	Robbs Peak Dam	RPD-F1	Upper	Electrofishing	2	Rainbow trout	72	3.7	1
South Fork Rubicon	Robbs Peak Dam	RPD-F1	Upper	Electrofishing	2	Rainbow trout	65	2.2	1
South Fork Rubicon	Robbs Peak Dam	RPD-F1	Upper	Electrofishing	2	Brown trout	86	6.7	1
South Fork Rubicon	Robbs Peak Dam	RPD-F1	Upper	Electrofishing	2	Rainbow trout	65	2.6	1
South Fork Rubicon	Robbs Peak Dam	RPD-F1	Upper	Electrofishing	2	Rainbow trout	108	10.6	1
South Fork Rubicon	Robbs Peak Dam	RPD-F1	Upper	Electrofishing	2	Rainbow trout	65	2.7	1
South Fork Rubicon	Robbs Peak Dam	RPD-F1	Upper	Electrofishing	2	Rainbow trout	71	3.3	1
South Fork Rubicon	Robbs Peak Dam	RPD-F1	Upper	Electrofishing	2	Rainbow trout	62	2.1	1
South Fork Rubicon	Robbs Peak Dam	RPD-F1	Upper	Electrofishing	2	Rainbow trout	115	13.2	1
South Fork Rubicon	Robbs Peak Dam	RPD-F1	Upper	Electrofishing	2	Rainbow trout	116	11.7	1
South Fork Rubicon	Robbs Peak Dam	RPD-F1	Upper	Electrofishing	2	Rainbow trout	50	1.2	1
South Fork Rubicon	Robbs Peak Dam	RPD-F1	Upper	Electrofishing	2	Rainbow trout	55	1.8	1

Stream	Reach	Site	Segment	Method	Pass	Species	Total Length (mm)	Weight (g)	Count
South Fork Rubicon	Robbs Peak Dam	RPD-F1	Upper	Electrofishing	2	Rainbow trout	57	1.6	1
South Fork Rubicon	Robbs Peak Dam	RPD-F1	Upper	Electrofishing	2	Rainbow trout	62	2.0	1
South Fork Rubicon	Robbs Peak Dam	RPD-F1	Upper	Electrofishing	2	Rainbow trout	58	1.9	1
South Fork Rubicon	Robbs Peak Dam	RPD-F1	Upper	Electrofishing	2	Brown trout	86	6.4	1
South Fork Rubicon	Robbs Peak Dam	RPD-F1	Lower	Electrofishing	3	Rainbow trout	67	2.5	1
South Fork Rubicon	Robbs Peak Dam	RPD-F1	Lower	Electrofishing	3	Rainbow trout	100	9.0	1
South Fork Rubicon	Robbs Peak Dam	RPD-F1	Upper	Electrofishing	3	Rainbow trout	131	18.1	1
South Fork Rubicon	Robbs Peak Dam	RPD-F1	Upper	Electrofishing	3	Rainbow trout	62	2.4	1
South Fork Rubicon	Robbs Peak Dam	RPD-F1	Upper	Electrofishing	3	Rainbow trout	83	5.4	1
South Fork Rubicon	Robbs Peak Dam	RPD-F1	Upper	Electrofishing	3	Rainbow trout	58	1.7	1
South Fork Rubicon	Robbs Peak Dam	RPD-F1	Upper	Electrofishing	3	Brown trout	84	5.2	1
South Fork Rubicon	Robbs Peak Dam	RPD-F1	Upper	Electrofishing	3	Rainbow trout	107	11.5	1
South Fork Rubicon	Robbs Peak Dam	RPD-F1	Upper	Electrofishing	3	Rainbow trout	67	3.1	1
South Fork Silver Creek	Ice House Dam	IHD-F1	Upper	Electrofishing	1	Rainbow trout	110	8.7	1

Stream	Reach	Site	Segment	Method	Pass	Species	Total Length (mm)	Weight (g)	Count
South Fork Silver Creek	Ice House Dam	IHD-F1	Upper	Electrofishing	1	Rainbow trout	240	17.0	1
South Fork Silver Creek	Ice House Dam	IHD-F1	Upper	Electrofishing	1	Rainbow trout	101	9.3	1
South Fork Silver Creek	Ice House Dam	IHD-F1	Upper	Electrofishing	1	Rainbow trout	80	4.1	1
South Fork Silver Creek	Ice House Dam	IHD-F1	Upper	Electrofishing	1	Rainbow trout	168	42.6	1
South Fork Silver Creek	Ice House Dam	IHD-F1	Upper	Electrofishing	1	Rainbow trout	114	14.2	1
South Fork Silver Creek	Ice House Dam	IHD-F1	Upper	Electrofishing	1	Rainbow trout	176	51.5	1
South Fork Silver Creek	Ice House Dam	IHD-F1	Upper	Electrofishing	1	Rainbow trout	182	51.2	1
South Fork Silver Creek	Ice House Dam	IHD-F1	Upper	Electrofishing	1	Rainbow trout	79	4.7	1
South Fork Silver Creek	Ice House Dam	IHD-F1	Lower	Electrofishing	1	Rainbow trout	88	7.1	1
South Fork Silver Creek	Ice House Dam	IHD-F1	Lower	Electrofishing	1	Rainbow trout	130	19.5	1
South Fork Silver Creek	Ice House Dam	IHD-F1	Lower	Electrofishing	1	Rainbow trout	85	5.8	1
South Fork Silver Creek	Ice House Dam	IHD-F1	Lower	Electrofishing	1	Rainbow trout	152	37.7	1
South Fork Silver Creek	Ice House Dam	IHD-F1	Lower	Electrofishing	1	Rainbow trout	113	13.8	1
South Fork Silver Creek	Ice House Dam	IHD-F1	Lower	Electrofishing	1	Rainbow trout	208	97.0	1

Stream	Reach	Site	Segment	Method	Pass	Species	Total Length (mm)	Weight (g)	Count
South Fork Silver Creek	Ice House Dam	IHD-F1	Lower	Electrofishing	1	Rainbow trout	171	48.6	1
South Fork Silver Creek	Ice House Dam	IHD-F1	Lower	Electrofishing	1	Rainbow trout	32	--	1
South Fork Silver Creek	Ice House Dam	IHD-F1	Lower	Electrofishing	1	Rainbow trout	89	6.9	1
South Fork Silver Creek	Ice House Dam	IHD-F1	Lower	Electrofishing	1	Rainbow trout	149	29.8	1
South Fork Silver Creek	Ice House Dam	IHD-F1	Lower	Electrofishing	1	Brown trout	212	82.6	1
South Fork Silver Creek	Ice House Dam	IHD-F1	Lower	Electrofishing	1	Rainbow trout	85	5.5	1
South Fork Silver Creek	Ice House Dam	IHD-F1	Lower	Electrofishing	1	Rainbow trout	132	22.7	1
South Fork Silver Creek	Ice House Dam	IHD-F1	Lower	Electrofishing	1	Rainbow trout	161	37.0	1
South Fork Silver Creek	Ice House Dam	IHD-F1	Lower	Electrofishing	1	Rainbow trout	116	15.1	1
South Fork Silver Creek	Ice House Dam	IHD-F1	Lower	Electrofishing	1	Rainbow trout	77	4.5	1
South Fork Silver Creek	Ice House Dam	IHD-F1	Lower	Electrofishing	1	Rainbow trout	120	15.6	1
South Fork Silver Creek	Ice House Dam	IHD-F1	Lower	Electrofishing	1	Rainbow trout	100	8.3	1
South Fork Silver Creek	Ice House Dam	IHD-F1	Lower	Electrofishing	2	Brown trout	107	12.6	1
South Fork Silver Creek	Ice House Dam	IHD-F1	Lower	Electrofishing	1	Rainbow trout	113	14.2	1

Stream	Reach	Site	Segment	Method	Pass	Species	Total Length (mm)	Weight (g)	Count
South Fork Silver Creek	Ice House Dam	IHD-F1	Lower	Electrofishing	1	Rainbow trout	154	33.3	1
South Fork Silver Creek	Ice House Dam	IHD-F1	Lower	Electrofishing	1	Rainbow trout	162	37.3	1
South Fork Silver Creek	Ice House Dam	IHD-F1	Lower	Electrofishing	1	Rainbow trout	185	54.1	1
South Fork Silver Creek	Ice House Dam	IHD-F1	Lower	Electrofishing	1	Rainbow trout	213	86.2	1
South Fork Silver Creek	Ice House Dam	IHD-F1	Upper	Electrofishing	2	Rainbow trout	22	0.2	1
South Fork Silver Creek	Ice House Dam	IHD-F1	Upper	Electrofishing	2	Rainbow trout	166	41.0	1
South Fork Silver Creek	Ice House Dam	IHD-F1	Upper	Electrofishing	2	Rainbow trout	79	3.3	1
South Fork Silver Creek	Ice House Dam	IHD-F1	Upper	Electrofishing	2	Rainbow trout	169	38.9	1
South Fork Silver Creek	Ice House Dam	IHD-F1	Upper	Electrofishing	2	Rainbow trout	88	4.7	1
South Fork Silver Creek	Ice House Dam	IHD-F1	Upper	Electrofishing	2	Rainbow trout	54	1.4	1
South Fork Silver Creek	Ice House Dam	IHD-F1	Upper	Electrofishing	2	Rainbow trout	113	12.7	1
South Fork Silver Creek	Ice House Dam	IHD-F1	Lower	Electrofishing	2	Rainbow trout	180	47.6	1
South Fork Silver Creek	Ice House Dam	IHD-F1	Lower	Electrofishing	2	Rainbow trout	126	19.7	1
South Fork Silver Creek	Ice House Dam	IHD-F1	Lower	Electrofishing	2	Rainbow trout	109	13.1	1

Stream	Reach	Site	Segment	Method	Pass	Species	Total Length (mm)	Weight (g)	Count
South Fork Silver Creek	Ice House Dam	IHD-F1	Lower	Electrofishing	2	Rainbow trout	109	11.7	1
South Fork Silver Creek	Ice House Dam	IHD-F1	Lower	Electrofishing	2	Rainbow trout	204	81.9	1
South Fork Silver Creek	Ice House Dam	IHD-F1	Lower	Electrofishing	2	Rainbow trout	234	125.4	1
South Fork Silver Creek	Ice House Dam	IHD-F1	Lower	Electrofishing	2	Rainbow trout	77	4.3	1
South Fork Silver Creek	Ice House Dam	IHD-F1	Lower	Electrofishing	2	Rainbow trout	164	40.9	1
South Fork Silver Creek	Ice House Dam	IHD-F1	Lower	Electrofishing	2	Rainbow trout	118	14.6	1
South Fork Silver Creek	Ice House Dam	IHD-F1	Lower	Electrofishing	2	Rainbow trout	87	6.1	1
South Fork Silver Creek	Ice House Dam	IHD-F1	Lower	Electrofishing	2	Rainbow trout	123	17.5	1
South Fork Silver Creek	Ice House Dam	IHD-F1	Lower	Electrofishing	2	Rainbow trout	78	4.8	1
South Fork Silver Creek	Ice House Dam	IHD-F1	Upper	Electrofishing	3	Rainbow trout	82	4.7	1
South Fork Silver Creek	Ice House Dam	IHD-F1	Lower	Electrofishing	2	Brown trout	125	18.2	1
South Fork Silver Creek	Ice House Dam	IHD-F1	Upper	Electrofishing	3	Brown trout	297	216.5	1
South Fork Silver Creek	Ice House Dam	IHD-F1	Upper	Electrofishing	3	Rainbow trout	205	78.3	1
South Fork Silver Creek	Ice House Dam	IHD-F1	Upper	Electrofishing	3	Rainbow trout	62	2.3	1

Stream	Reach	Site	Segment	Method	Pass	Species	Total Length (mm)	Weight (g)	Count
South Fork Silver Creek	Ice House Dam	IHD-F1	Lower	Electrofishing	3	Rainbow trout	30	--	1
South Fork Silver Creek	Ice House Dam	IHD-F1	Lower	Electrofishing	3	Rainbow trout	146	27.1	1
South Fork Silver Creek	Ice House Dam	IHD-F1	Lower	Electrofishing	3	Rainbow trout	33	0.4	1
South Fork Silver Creek	Ice House Dam	IHD-F1	Lower	Electrofishing	3	Rainbow trout	75	4.0	1
South Fork Silver Creek	Ice House Dam	IHD-F2	Upper	Electrofishing	1	Sacramento sucker	162	47.0	1
South Fork Silver Creek	Ice House Dam	IHD-F2	Upper	Electrofishing	1	Sacramento sucker	103	11.6	1
South Fork Silver Creek	Ice House Dam	IHD-F2	Upper	Electrofishing	1	Rainbow trout	115	12.8	1
South Fork Silver Creek	Ice House Dam	IHD-F2	Upper	Electrofishing	1	Brown trout	170	45.2	1
South Fork Silver Creek	Ice House Dam	IHD-F2	Upper	Electrofishing	1	Rainbow trout	102	7.9	1
South Fork Silver Creek	Ice House Dam	IHD-F2	Upper	Electrofishing	2	Rainbow trout	110	10.3	1
South Fork Silver Creek	Ice House Dam	IHD-F2	Upper	Electrofishing	2	Rainbow trout	56	1.5	1
South Fork Silver Creek	Ice House Dam	IHD-F2	Upper	Electrofishing	2	Sacramento sucker	78	6.2	1
South Fork Silver Creek	Ice House Dam	IHD-F2	Upper	Electrofishing	2	Rainbow trout	113	12.5	1
South Fork Silver Creek	Ice House Dam	IHD-F2	Upper	Electrofishing	2	Brown trout	264	185.0	1

Stream	Reach	Site	Segment	Method	Pass	Species	Total Length (mm)	Weight (g)	Count
South Fork Silver Creek	Ice House Dam	IHD-F2	Upper	Electrofishing	2	Rainbow trout	62	--	1
South Fork Silver Creek	Ice House Dam	IHD-F2	Upper	Electrofishing	2	Rainbow trout	130	--	1
South Fork Silver Creek	Ice House Dam	IHD-F2	Upper	Electrofishing	3	Brown trout	264	185.0	1
South Fork Silver Creek	Ice House Dam	IHD-F2	Upper	Electrofishing	3	Sacramento sucker	160	44.0	1
South Fork Silver Creek	Ice House Dam	IHD-F2	Upper	Electrofishing	3	Brown trout	80	5.6	1
South Fork Silver Creek	Ice House Dam	IHD-F2	Upper	Electrofishing	3	Sacramento sucker	117	12.6	1
South Fork Silver Creek	Ice House Dam	IHD-F2	Upper	Electrofishing	4	Sacramento sucker	162	43.7	1
South Fork Silver Creek	Ice House Dam	IHD-F2	Lower	Electrofishing	1	Rainbow trout	59	1.8	1
South Fork Silver Creek	Ice House Dam	IHD-F2	Lower	Electrofishing	1	Brown trout	170	44.2	1
South Fork Silver Creek	Ice House Dam	IHD-F2	Lower	Electrofishing	1	Rainbow trout	130	19.0	1
South Fork Silver Creek	Ice House Dam	IHD-F2	Lower	Electrofishing	2	Rainbow trout	112	12.7	1
South Fork Silver Creek	Ice House Dam	IHD-F2	Lower	Electrofishing	2	Rainbow trout	113	11.8	1
South Fork Silver Creek	Ice House Dam	IHD-F2	Lower	Electrofishing	2	Rainbow trout	152	28.2	1
South Fork Silver Creek	Ice House Dam	IHD-F2	Lower	Electrofishing	2	Rainbow trout	106	9.5	1

Stream	Reach	Site	Segment	Method	Pass	Species	Total Length (mm)	Weight (g)	Count
South Fork Silver Creek	Ice House Dam	IHD-F2	Lower	Electrofishing	2	Rainbow trout	123	13.0	1
South Fork Silver Creek	Ice House Dam	IHD-F2	Lower	Electrofishing	2	Rainbow trout	126	17.5	1
South Fork Silver Creek	Ice House Dam	IHD-F2	Lower	Electrofishing	2	Sacramento sucker	139	22.1	1
South Fork Silver Creek	Ice House Dam	IHD-F2	Lower	Electrofishing	3	Sacramento sucker	37	0.5	1
South Fork Silver Creek	Ice House Dam	IHD-F2	Lower	Electrofishing	3	Sacramento sucker	156	34.4	1
South Fork Silver Creek	Ice House Dam	IHD-F2	Lower	Electrofishing	3	Rainbow trout	122	16.1	1
South Fork Silver Creek	Ice House Dam	IHD-F2	Lower	Electrofishing	4	Rainbow trout	112	10.4	1
South Fork Silver Creek	Ice House Dam	IHD-F2	Lower	Electrofishing	4	Sacramento sucker	160	44.1	1
South Fork Silver Creek	Ice House Dam	IHD-F2	Lower	Electrofishing	4	Brown trout	70	3.3	1
Silver Creek	Junction Dam	JD-F3	1 Run	Snorkel	--	Rainbow trout	125–150	--	1
Silver Creek	Junction Dam	JD-F3	1 Run	Snorkel	--	Rainbow trout	225–250	--	1
Silver Creek	Junction Dam	JD-F3	2 Riffle	Snorkel	--	Rainbow trout	75–100	--	2
Silver Creek	Junction Dam	JD-F3	2 Riffle	Snorkel	--	Rainbow trout	200–225	--	1
Silver Creek	Junction Dam	JD-F3	3 Pool	Snorkel	--	Rainbow trout	50–75	--	1
Silver Creek	Junction Dam	JD-F3	3 Pool	Snorkel	--	Rainbow trout	150–175	--	1
Silver Creek	Junction Dam	JD-F3	3 Pool	Snorkel	--	Brown trout	450–475	--	1
Silver Creek	Junction Dam	JD-F3	4 Riffle	Snorkel	--	Rainbow trout	225–250	--	2

Stream	Reach	Site	Segment	Method	Pass	Species	Total Length (mm)	Weight (g)	Count
Silver Creek	Junction Dam	JD-F3	4 Riffle	Snorkel	--	Rainbow trout	100–125	--	2
Silver Creek	Junction Dam	JD-F3	4 Riffle	Snorkel	--	Rainbow trout	175–200	--	2
Silver Creek	Junction Dam	JD-F3	4 Riffle	Snorkel	--	Rainbow trout	75–100	--	1
Silver Creek	Junction Dam	JD-F3	4 Riffle	Snorkel	--	Rainbow trout	25–50	--	1
Silver Creek	Junction Dam	JD-F3	4 Riffle	Snorkel	--	Rainbow trout	75–100	--	2
Silver Creek	Junction Dam	JD-F3	4 Riffle	Snorkel	--	Rainbow trout	125–150	--	1
Silver Creek	Junction Dam	JD-F3	4 Riffle	Snorkel	--	Rainbow trout	150–175	--	2
Silver Creek	Junction Dam	JD-F3	4 Riffle	Snorkel	--	Rainbow trout	125–150	--	1
Silver Creek	Camino Dam	CD-F1	1 Pool	Snorkel	--	No fish	--	--	--
Silver Creek	Camino Dam	CD-F1	2 Riffle	Snorkel	--	Rainbow trout	75–100	--	1
Silver Creek	Camino Dam	CD-F1	3 Pool	Snorkel	--	No fish	--	--	--
Silver Creek	Camino Dam	CD-F1	4 Riffle	Snorkel	--	Sculpin	75–100	--	1
Silver Creek	Camino Dam	CD-F1	5 Pool	Snorkel	--	No fish	--	--	--
Silver Creek	Camino Dam	CD-F1	6 Riffle	Snorkel	--	Rainbow trout	75–100	--	1
Silver Creek	Camino Dam	CD-F1	7 Pool	Snorkel	--	Rainbow trout	125–150	--	1
Silver Creek	Camino Dam	CD-F1	7 Pool	Snorkel	--	Rainbow trout	75–100	--	2
Silver Creek	Camino Dam	CD-F1	7 Pool	Snorkel	--	Rainbow trout	150–175	--	1
Silver Creek	Camino Dam	CD-F1	7 Pool	Snorkel	--	Rainbow trout	50–75	--	1
SFAR	Slab Creek Dam	SCD-F3	1 Pocketwater	Snorkel	--	Rainbow trout	50–75	--	1
SFAR	Slab Creek Dam	SCD-F3	1 Pocketwater	Snorkel	--	Speckled dace	50–75	--	1
SFAR	Slab Creek Dam	SCD-F3	1 Pocketwater	Snorkel	--	Rainbow trout	125–150	--	1
SFAR	Slab Creek Dam	SCD-F3	1 Pocketwater	Snorkel	--	Rainbow trout	50–75	--	3
SFAR	Slab Creek Dam	SCD-F3	1 Pocketwater	Snorkel	--	Rainbow trout	75–100	--	2

Stream	Reach	Site	Segment	Method	Pass	Species	Total Length (mm)	Weight (g)	Count
SFAR	Slab Creek Dam	SCD-F3	1 Pocketwater	Snorkel	--	Rainbow trout	125–150	--	2
SFAR	Slab Creek Dam	SCD-F3	1 Pocketwater	Snorkel	--	Rainbow trout	125–150	--	2
SFAR	Slab Creek Dam	SCD-F3	2 Pool	Snorkel	--	Speckled dace	0–25	--	1
SFAR	Slab Creek Dam	SCD-F3	2 Pool	Snorkel	--	Sacramento sucker	250–275	--	1
SFAR	Slab Creek Dam	SCD-F3	3 Riffle	Snorkel	--	Rainbow trout	250–275	--	1
SFAR	Slab Creek Dam	SCD-F3	3 Riffle	Snorkel	--	Rainbow trout	50–75	--	5
SFAR	Slab Creek Dam	SCD-F3	3 Riffle	Snorkel	--	Undentified cyprinid	50–75	--	1
SFAR	Slab Creek Dam	SCD-F3	3 Riffle	Snorkel	--	Rainbow trout	75–100	--	1
SFAR	Slab Creek Dam	SCD-F3	4 Run	Snorkel	--	Rainbow trout	225–250	--	1
SFAR	Slab Creek Dam	SCD-F3	--	Opportunistic electrofishing[1]	--	Sculpin	72	--	1
SFAR	Slab Creek Dam	SCD-F3	--	Opportunistic electrofishing[1]	--	Sculpin	74	--	1
SFAR	Slab Creek Dam	SCD-F3	--	Opportunistic electrofishing[1]	--	Sculpin	76	--	1
SFAR	Slab Creek Dam	SCD-F3	--	Opportunistic electrofishing[1]	--	Sculpin	59	--	1
SFAR	Slab Creek Dam	SCD-F3	--	Opportunistic electrofishing[1]	--	Sculpin	75	--	1
SFAR	Slab Creek Dam	SCD-F3	--	Opportunistic electrofishing[1]	--	Sculpin	71	--	1
SFAR	Slab Creek Dam	SCD-F3	--	Opportunistic electrofishing[1]	--	Sculpin	31	--	1

Stream	Reach	Site	Segment	Method	Pass	Species	Total Length (mm)	Weight (g)	Count
SFAR	Slab Creek Dam	SCD-F3	--	Opportunistic electrofishing[1]	--	Sculpin	37	--	1
SFAR	Slab Creek Dam	SCD-F2	1 Pool	Snorkel	--	Unidentified cyprinid	25–50	--	27
SFAR	Slab Creek Dam	SCD-F2	1 Pool	Snorkel	--	Brown trout	300–325	--	1
SFAR	Slab Creek Dam	SCD-F2	2 Run	Snorkel	--	Sacramento sucker	50–75	--	2
SFAR	Slab Creek Dam	SCD-F2	2 Run	Snorkel	--	Rainbow trout	100–125	--	1
SFAR	Slab Creek Dam	SCD-F2	2 Run	Snorkel	--	Rainbow trout	150–175	--	3
SFAR	Slab Creek Dam	SCD-F2	2 Run	Snorkel	--	Rainbow trout	350–375	--	1
SFAR	Slab Creek Dam	SCD-F2	2 Run	Snorkel	--	Sacramento pikeminnow	75–100	--	1
SFAR	Slab Creek Dam	SCD-F2	2 Run	Snorkel	--	Rainbow trout	350–375	--	1
SFAR	Slab Creek Dam	SCD-F2	2 Run	Snorkel	--	Rainbow trout	250–275	--	5
SFAR	Slab Creek Dam	SCD-F2	2 Run	Snorkel	--	Rainbow trout	275–300	--	5
SFAR	Slab Creek Dam	SCD-F2	2 Run	Snorkel	--	Rainbow trout	200–225	--	4
SFAR	Slab Creek Dam	SCD-F2	3 Run	Snorkel	--	Rainbow trout	300–325	--	5
SFAR	Slab Creek Dam	SCD-F2	3 Run	Snorkel	--	Rainbow trout	200–225	--	7
SFAR	Slab Creek Dam	SCD-F2	3 Run	Snorkel	--	Rainbow trout	225–250	--	1
SFAR	Slab Creek Dam	SCD-F2	3 Run	Snorkel	--	Rainbow trout	50–75	--	1
SFAR	Slab Creek Dam	SCD-F2	3 Run	Snorkel	--	Rainbow trout	150–175	--	7
SFAR	Slab Creek Dam	SCD-F2	3 Run	Snorkel	--	Brown trout	275–300	--	1
SFAR	Slab Creek Dam	SCD-F2	3 Run	Snorkel	--	Rainbow trout	275–300	--	2

Stream	Reach	Site	Segment	Method	Pass	Species	Total Length (mm)	Weight (g)	Count
SFAR	Slab Creek Dam	SCD-F2	3 Run	Snorkel	--	Sacramento sucker	275–300	--	1
SFAR	Slab Creek Dam	SCD-F2	3 Run	Snorkel	--	Rainbow trout	75–100	--	1
SFAR	Slab Creek Dam	SCD-F2	3 Run	Snorkel	--	Rainbow trout	125–150	--	1
SFAR	Slab Creek Dam	SCD-F2	3 Run	Snorkel	--	Rainbow trout	150–175	--	1
SFAR	Slab Creek Dam	SCD-F2	3 Run	Snorkel	--	Brown trout	250–275	--	1
SFAR	Slab Creek Dam	SCD-F2	3 Run	Snorkel	--	Rainbow trout	250–275	--	6
SFAR	Slab Creek Dam	SCD-F2	3 Run	Snorkel	--	Rainbow trout	275–300	--	4
SFAR	Slab Creek Dam	SCD-F2	4 Riffle	Snorkel	--	Rainbow trout	225–250	--	3
SFAR	Slab Creek Dam	SCD-F2	4 Riffle	Snorkel	--	Rainbow trout	150–175	--	3
SFAR	Slab Creek Dam	SCD-F2	4 Riffle	Snorkel	--	Brown trout	175–200	--	2
SFAR	Slab Creek Dam	SCD-F2	4 Riffle	Snorkel	--	Rainbow trout	200–225	--	3
SFAR	Slab Creek Dam	SCD-F2	4 Riffle	Snorkel	--	Rainbow trout	100–125	--	1
SFAR	Slab Creek Dam	SCD-F2	4 Riffle	Snorkel	--	Rainbow trout	300–325	--	1
SFAR	Slab Creek Dam	SCD-F2	4 Riffle	Snorkel	--	Rainbow trout	125–150	--	1
SFAR	Slab Creek Dam	SCD-F2	4 Riffle	Snorkel	--	Rainbow trout	75–100	--	1
SFAR	Slab Creek Dam	SCD-F2	4 Riffle	Snorkel	--	Rainbow trout	200–225	--	6
SFAR	Slab Creek Dam	SCD-F2	4 Riffle	Snorkel	--	Rainbow trout	225–250	--	3
SFAR	Slab Creek Dam	SCD-F2	5 Pool	Snorkel	--	Rainbow trout	300–325	--	2
SFAR	Slab Creek Dam	SCD-F2	5 Pool	Snorkel	--	Rainbow trout	175–200	--	3
SFAR	Slab Creek Dam	SCD-F2	5 Pool	Snorkel	--	Rainbow trout	300–325	--	1
SFAR	Slab Creek Dam	SCD-F2	5 Pool	Snorkel	--	Unidentified cyprinid	0–25	--	2

Stream	Reach	Site	Segment	Method	Pass	Species	Total Length (mm)	Weight (g)	Count
SFAR	Slab Creek Dam	SCD-F2	5 Pool	Snorkel	--	Rainbow trout	75–100	--	2
SFAR	Slab Creek Dam	SCD-F2	5 Pool	Snorkel	--	Rainbow trout	175–200	--	6
SFAR	Slab Creek Dam	SCD-F2	5 Pool	Snorkel	--	Rainbow trout	150–175	--	3
SFAR	Slab Creek Dam	SCD-F2	5 Pool	Snorkel	--	Rainbow trout	250–275	--	3
SFAR	Slab Creek Dam	SCD-F2	5 Pool	Snorkel	--	Rainbow trout	300–325	--	3
SFAR	Slab Creek Dam	SCD-F2	5 Pool	Snorkel	--	Rainbow trout	250–275	--	2
SFAR	Slab Creek Dam	SCD-F2	5 Pool	Snorkel	--	Rainbow trout	200–225	--	4

Notes: -- = not measured or not applicable
g = gram
mm = millimeter
SFAR = South Fork American River

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APPENDIX B4

Fish Population Estimates

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Table B4-1. Fish Population Data, 2002–2024, for Site RRD-F1, Rubicon River Downstream of Rubicon Dam.

Year	Section	Site Length (feet)	Avg. Width (feet)	Avg. Area (square feet)	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 (gram)	Estimated Biomass (grams/ acre)	Estimated Biomass (lbs/acre)	Estimated Biomass 95 Percent Confidence Interval (lbs/acre)	
2024	Combined	259	31	7,988	Trout (brown & rainbow)	30	21-5-4	646	144	173	152	194	749.1	4,308.	9.5	8.3	10.7
	Upper	136	36	4,839	Rainbow trout	13	11-1-1	511	78	118	111	125	268.4	2,435	5.4	5.1	5.7
	Lower	123	26	3,208	Trout (brown & rainbow)	17	10-4-3	843	223	267	173	362	480.7	7.553.6	16.7	10.8	22.5
2020	Combined	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
2019	Combined	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
2005	Combined	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
2003	Combined	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
2002	Combined	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

Notes: > = greater than; lbs = pounds; mm = millimeter

Table B4-2. Fish Population Data, 2002–2024, for Site RRD-F2, Rubicon River Downstream of Rubicon Dam.

Year	Section	Site Length (feet)	Avg. Width (feet)	Avg. Area (square feet)	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 (gram)	Estimated Biomass (grams/ acre)	Estimated Biomass (lbs/acre)	Estimated Biomass 95 Percent Confidence Interval (lbs/acre)	
2024	Combined	236	35	8,260	California roach	132	74-23-35	--	--	--	--	--	--	--	--	--	--
					Speckled dace	106	46-27-33	--	--	--	--	--	--	--	--	--	--
					Sacramento sucker	15	11-3-1	--	--	--	--	--	--	--	--	--	--
2020	Combined	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	--	--	--	--	--	--	--	--	--	--
2019	Combined	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	--	--	--	--	--	--	--	--	--	--
2005	Combined	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	--	--	--	--	--	--	--	--	--	--
2003	Combined	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	--	--	--	--	--	--	--	--	--	--
2003	Upper	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	--	--	--	--	--	--	--	--	--	--

Year	Section	Site Length (feet)	Avg. Width (feet)	Avg. Area (square feet)	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 (gram)	Estimated Biomass (grams/ acre)	Estimated Biomass (lbs/acre)	Estimated Biomass 95 Percent Confidence Interval (lbs/acre)	
2002	Combined	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	--	--	--	--	--	--	--	--	--	--

Notes: -- = not measured or not applicable
> = greater than
lbs = pounds
mm = millimeter

[a] Confidence interval could not be calculated due to low capture number on one or more passes.

Table B4-3. Fish Population Data, 2002–2024, for Site BID-F1, Little Rubicon River Downstream of Buck Island Dam.

Year	Section	Site Length (feet)	Avg. Width (feet)	Avg. Area (square feet)	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 (gram)	Estimated Biomass (grams/ acre)	Estimated Biomass (lbs/acre)	Estimated Biomass 95 Percent Confidence Interval (lbs/acre)	
2024	Combined	261	42	10,961	California roach	96	72-15-9	--	--	--	--	--	--	--	--	--	--
					Sacramento sucker	1	0-1-0	--	--	--	--	--	--	--	--	--	--
	Upper	72	11	2,136	California roach	44	34-7-3	--	--	--	--	--	--	--	--	--	--
	Lower	190	61	4,384	California roach	52	38-8-6	--	--	--	--	--	--	--	--	--	--
					Sacramento sucker	1	0-1-0	--	--	--	--	--	--	--	--	--	--
2020	Upper	104	26	2,704	California roach	79	--	--	--	--	--	--	--	--	--	--	--
					Golden shiner	11	--	--	--	--	--	--	--	--	--	--	--
					Sacramento sucker	1	--	--	--	--	--	--	--	--	--	--	--
2019	Combined	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	--	--	--	--	--	--	--	--	--	--
2003	Combined	352	26	9,152	Rainbow trout	1	--[a]	15[b]	15[b]	6[b]	--[a]	--[a]	59.4	331.1[b]	0.7[b]	--[a]	--[a]
	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	--[c]	--[c]	59.4	857.3	1.9	--[c]	--[c]
					California roach	4	2-2-0	--	--	--	--	--	--	--	--	--	--
					Golden shiner	42	30-7-5	--	--	--	--	--	--	--	--	--	--

Year	Section	Site Length (feet)	Avg. Width (feet)	Avg. Area (square feet)	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 (gram)	Estimated Biomass (grams/ acre)	Estimated Biomass (lbs/acre)	Estimated Biomass 95 Percent Confidence Interval (lbs/acre)	
2002	Combined	383	27	10,341	Rainbow trout	4	--[a]	55[b]	14[b]	19[b]	--[a]	--[a]	108.3	499.0[b]	1.1[b]	--[a]	--[a]
	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
					Golden shiner	7	4-2-1	--	--	--	--	--	--	--	--	--	--

Notes: -- = not measured or not applicable
> = greater than
lbs = pounds
mm = millimeter

[a] Not calculated due to an unequal number of passes.
[b] Calculated using weighted average.
[c] Confidence interval could not be calculated due to low capture number on one or more passes.

Table B4-4. Fish Population Data, 2019–2024, for Site LLD-F3, Gerle Creek Downstream of Loon Lake Dam.

Year	Section	Site Length (feet)	Avg. Width (feet)	Avg. Area (square feet)	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 (gram)	Estimated Biomass (grams/ acre)	Estimated Biomass (lbs/acre)	Estimated Biomass 95 Percent Confidence Interval (lbs/acre)	
2024	Combined	323	24	7,604	Trout (brown & rainbow)	71	40-16-15	1,430	548	502	383	621	2881.0	2,0333.8	44.8	34.2	55.5
	Upper	117	23	2,717	Trout (brown & rainbow)	24	12-4-8	2,034	705	722	-244	1,689	846.4	25,447.0	56.1	0.0	131.2
	Lower	207	24	4,912	Trout (brown & rainbow)	47	28-12-7	1,353	553	469	386	553	2,034.6	20,299.6	44.8	36.8	52.7
2020	Combined	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
2019	Combined	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	0.0	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

Notes: > = greater than
lbs = pounds
mm = millimeter

Table B4-5. Fish Population Data, 2002–2024, for Site LLD-F2, Gerle Creek Downstream of Loon Lake Dam.

Year	Section	Site Length (feet)	Avg. Width (feet)	Avg. Area (square feet)	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 (gram)	Estimated Biomass (grams/ acre)	Estimated Biomass (lbs/acre)	Estimated Biomass 95 Percent Confidence Interval (lbs/acre)	
2024	Combined	374	41	15,215	Trout (brown & rainbow)	68	40-19-9	1,075	381	218	187	249	2,575.7	8,245.9	18.2	15.6	20.8
	Upper	244	47	11440	Trout (brown & rainbow)	44	26-12-6	1,065	385	188	154	221	1,267.5	5,400.8	11.9	9.8	14.0
	Lower	129	35	4,476	Trout (brown & rainbow)	24	14-7-3	1,095	373	261	199	323	1,308.2	14,215.6	31.3	23.9	38.7
2020	Combined	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
2019	Combined	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
2004	Combined	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
2003	Combined	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
2002	Combined	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

Notes: > = greater than
lbs = pounds
mm = millimeter

Table B4-6. Fish Population Data, 2002–2024, for Site GCD-F1, Gerle Creek Downstream of Gerle Creek Dam.

Year	Section	Site Length (feet)	Avg. Width (feet)	Avg. Area (square feet)	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 (gram)	Estimated Biomass (grams/ acre)	Estimated Biomass (lbs/acre)	Estimated Biomass 95 Percent Confidence Interval (lbs/acre)	
2024	Combined	297	36	10,561	Trout (brown & rainbow)	66	40-17-9	1,301	166	302	261	342	976.9	4,463.0	9.8	8.5	11.2
	Upper	126	33	4,199	Rainbow trout	12	5-3-4	1,601	114	397	0.0	2,216	190.1	6,277.2	13.8	0.0	77.3
	Lower	171	38	6,463	Trout (brown & rainbow)	54	35-14-5	1,770	208	386	349	423	786.8	5,616.0	12.4	11.2	13.6
2020	Combined	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	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	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
2019	Combined	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	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	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
2003	Combined	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	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	132	39	5,093	Trout (brown & rainbow)	16	9-4-3	769	--[a]	164	92	237	421.5	4,327.3	9.5	5.3	13.8
2002	Combined	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	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	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

Notes: > = greater than
lbs = pounds
mm = millimeter

[a] Could not be calculated due to poor depletion pattern of juvenile/adults

Table B4-7. Fish Population Data, 2002–2024, for Site RPD-F1, South Fork Rubicon River Downstream of Robbs Peak Dam.

Year	Section	Site Length (feet)	Avg. Width (feet)	Avg. Area (square feet)	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 (gram)	Estimated Biomass (grams/acre)	Estimated Biomass (lbs/acre)	Estimated Biomass 95 Percent Confidence Interval (lbs/acre)	
2024	Combined	283	39	10,917	Trout (brown & rainbow)	95	61-25-9	1,886	77	403	373	434	899.8	3,816.9	8.4	7.7	9.1
	Upper	130	37	4,833	Trout (brown & rainbow)	51	28-16-7	2,406	89	532	424	641	443.0	4,620.2	10.2	8.1	12.3
	Lower	153	40	6,115	Trout (brown & rainbow)	44	33-9-2	1,541	69	319	304	334	456.8	3,307.9	7.3	6.9	7.6
2020	Combined	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
2019	Combined	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
2005	Combined	341	35	11,935	Trout (brown & rainbow)	88	--[a]	1,484[b]	403	348[b]	--[a]	--[a]	2,605.5	10,296.6	22.7	--[a]	--[a]
	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
2003	Combined	340	38	13,037	Trout (brown & rainbow)	115	--[a]	2,594[b]	187	557[b]	--[a]	--[a]	1,725.2	7,438.9[b]	16.4[b]	--[a]	--[a]
	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
2002	Combined	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

Notes: > = greater than, lbs = pounds, mm = millimeter
[a] Not calculated due to an unequal number of passes
[b] Calculated using weighted average

Table B4-8. Fish Population Data, 2002–2024, for Site IHD-F1, South Fork Silver Creek Downstream of Ice House Dam.

Year	Section	Site Length (feet)	Avg. Width (feet)	Avg. Area (square feet)	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 (gram)	Estimated Biomass (grams/ acre)	Estimated Biomass (lbs/acre)	Estimated Biomass 95 Percent Confidence Interval (lbs/acre)	
2024	Combined	279	27	7,593	Trout (brown & rainbow)	61	32-21-8	1,359	368	412	328	497	1,892.8	12,784.1	28.2	22.4	34.0
	Upper	130	30	3,849	Trout (brown & rainbow)	20	9-7-4	1,185	374	331	63	598	760.3	12,563.7	27.7	5.3	50.1
	Lower	149	25	3,700	Trout (brown & rainbow)	41	23-14-4	1,618	376	538	443	632	1,132.5	14,833.4	32.7	27.0	38.5
2020	Combined	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	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	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
2019	Combined	267	26	6,796	Trout (brown & rainbow)	20	6-3-6-5	1,426[a]	119[a]	468[a]	293[a]	642[a]	571.2	13,335.6	29.4[a]	18.5[a]	40.4[a]
	Upper	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	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
2004	Combined	276	30	8,133	Trout (brown & rainbow)	79	--[b]	1,731[c]	229[c]	481[c]	--[b]	--[b]	3,309.0	21,228.1[c]	46.8[c]	--[b]	--[b]
	Upper	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	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
2003	Combined	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	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	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
2002	Combined	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	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	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

Notes: > = greater than
lbs = pounds
mm = millimeter

[a] Calculated using MicroFish 3.0 (Van Deventer, J.S., and W.S. Platts. 1989. Microcomputer Software System for Generating Population Statistics from Electrofishing Data, User's Guide for MicroFish 3.0. General Technical Report INT-254. U.S. Department of Agriculture, Forest Service, Intermountain Research Station)

[b] Not calculated due to an unequal number of passes

[c] Calculated using weighted average

Table B4-9. Fish Population Data, 2002–2024, for Site IHD-F2, South Fork Silver Creek Downstream of Ice House Dam.

Year	Section	Site Length (feet)	Avg. Width (feet)	Avg. Area (square feet)	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 (gram)	Estimated Biomass (grams/ acre)	Estimated Biomass (lbs/acre)	Estimated Biomass 95 Percent Confidence Interval (lbs/acre)	
2024	Combined	371	31	11,618	Trout (brown & rainbow)	23	6-12-3-2	418	67	110	58	162	662.7	3,172.8	7.0	3.7	10.3
					Sacramento sucker	10	2-2-4-2	--	--	--	--	--	--	--	--	--	--
	Upper	233	36	8,326	Trout (brown & rainbow)	11	3-6-2-0	287	73	66	39	94	475.2	2,859.5	6.3	3.7	8.9
					Sacramento sucker	6	2-1-2-1	--	--	--	--	--	--	--	--	--	--
	Lower	138	27	3,713	Trout (brown & rainbow)	12	3-6-1-2	689	52	212	-22	446	187.5	3,306.6	7.3	-0.8	15.3
					Sacramento sucker	4	0-1-2-1	--	--	--	--	--	--	--	--	--	--
2020	Combined	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	--	--	--	--	--	--	--	--	--	--
2019	Combined	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	--	--	--	--	--	--	--	--	--	--
2004	Combined	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

Year	Section	Site Length (feet)	Avg. Width (feet)	Avg. Area (square feet)	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 (gram)	Estimated Biomass (grams/ acre)	Estimated Biomass (lbs/acre)	Estimated Biomass 95 Percent Confidence Interval (lbs/acre)	
					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	--	--	--	--	--	--	--	--	--	--
2003	Combined	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	--	--	--	--	--	--	--	--	--	--
2002	Combined	365	30	10,950	Trout (brown & rainbow)	26	--[a]	438[b]	58	118[b]	--[a]	--[a]	1,169.1	5,034.9	11.1[b]	--[a]	--[a]
	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	--	--	--	--	--	--	--	--	--	--

Notes: -- = not measured or not applicable
> = greater than
lbs = pounds
[a] Not calculated due to an unequal number of passes
[b] Calculated using weighted average

Table B4-10. Fish Population Data, 2024, for Site JD-F3, Silver Creek Downstream of Junction Dam.[a]

Year	Site Length (feet)	Avg. Width (feet)	Avg. Area (square feet)	Species	Total Number Observed	Number of Fish/Mile	Catchable Trout/Mile (>152 mm)	Minimum Density (no. of fish/ acre)
2024	848	44	40,007	Trout (brown & rainbow)	22	137	62	24
				Rainbow trout	21	131	56	23
				Brown trout	1	6	6	6
2020	895	38	34,010	Trout (brown & rainbow)	157	926	212	197
				Rainbow trout	140	826	--	175
				Brown trout	17	100	--	21
2019	921	40	38,728	No fish	0	0	0	0

Notes: -- = not measured or not applicable
> = greater than
mm = millimeter

[a] Snorkel survey; confidence intervals and biomass were not calculated for sites surveyed via snorkeling

Table B4-11. Fish Population Data, 2002–2024, for Site CD-F1, Silver Creek Downstream of Camino Dam.[a]

Year	Site Length (feet)	Avg. Width (feet)	Avg. Area (square feet)	Species	Total Number Observed	Number of Fish/Mile	Catchable Trout/Mile (>152 mm)	Minimum Density (no. of fish/ acre)
2024	1,104	45	49,283	Rainbow trout	7	34	5	6.2
				Sculpin spp.	1	--	--	--
2020	935	39	36,465	Rainbow trout	203	1,146	288	227
2019	905	32	29,931	Rainbow trout	157	917	467	228
2002	999	49	48,765	Trout (brown & rainbow)	29	153	105	26
				Rainbow trout	26	137	79	24
				Brown trout	3	16	0	3

Notes: -- = not measured or not applicable
> = greater than
mm = millimeter

[a] Snorkel survey; confidence intervals and biomass were not calculated for sites surveyed via snorkeling.

Table B4-12. Fish Population Data, 2002–2024, for Site SCD-F3, South Fork American River Downstream of Slab Creek Dam.[a]

Year	Site Length (feet)	Avg. Width (feet)	Avg. Area (square feet)	Species	Total Number Observed	Number of Fish/Mile	Catchable Trout/Mile (>152 mm)	Minimum Density (no. of fish/ acre)
2024	1,109	176	52,522	Rainbow trout	19	90.5	10	15.8
				Sacramento sucker	1	--	--	--
				Speckled dace	2	--	--	--
				Cyprinid spp.	1	--	--	--
2020	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	1,083	40	43,212	Trout (brown & rainbow)	48	235	98	48
				Rainbow trout	44	215	88	44
				Brown trout	4	20	10	4
				Unidentified Sunfish	1	5	--	--

Notes: -- = not measured or not applicable
> = greater than
mm = millimeter

[a] Snorkel survey; confidence intervals and biomass were not calculated for sites surveyed via snorkeling

Table B4-13. Fish Population Data, 2002–2024, for Site SCD-F2, South Fork American River Downstream of Slab Creek Dam.

Year	Section	Site Length (feet)	Avg. Width (feet)	Avg. Area (square feet)	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 (gram)	Estimated Biomass (grams/ acre)	Estimated Biomass (lbs/acre)	Estimated Biomass 95 Percent Confidence Interval (lbs/acre)	
2024[a]	--	709	212	29,584	Trout (brown & rainbow)	112	--	834	767	165	--	--	--	--	--	--	--
					Rainbow trout	107	--	797	730	158	--	--	--	--	--	--	--
					Brown trout	5	--	37	7	7	--	--	--	--	--	--	--
					Sacramento pikeminnow	1	--	--	--	--	--	--	--	--	--	--	--
					Sacramento sucker	3	--	--	--	--	--	--	--	--	--	--	--
					Cyprinid spp.	29	--	--	--	--	--	--	--	--	--	--	--
2020[a]	--	627	47	29,469	Rainbow trout	52	--	438	353	81	--	--	--	--	--	--	--
					Sacramento pikeminnow	24	--	--	--	--	--	--	--	--	--	--	--
					Sacramento sucker	2	--	--	--	--	--	--	--	--	--	--	--
					Sculpin	2	--	--	--	--	--	--	--	--	--	--	--
2019[a]	--	689	52	34,473	Rainbow trout	38	--	291	107.3	48.0	--	--	--	--	--	--	--
					Sculpin spp.	6	--	46	--	7.6	--	--	--	--	--	--	--
					Sacramento sucker	1	--	8	--	1.3	--	--	--	--	--	--	--
2003	Combined	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	--	--	--	--	--	--	--	--	--	--

Year	Section	Site Length (feet)	Avg. Width (feet)	Avg. Area (square feet)	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 (gram)	Estimated Biomass (grams/ acre)	Estimated Biomass (lbs/acre)	Estimated Biomass 95 Percent Confidence Interval (lbs/acre)	
2003 (cont.)	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	--	--	--	--	--	--	--	--	--	--
2002	Combined	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	4,341	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	5,668	Rainbow trout	1	1-0-0	43	0	7.7	--[b]	--[b]	17.5	136.1	0.3	--[b]	--[b]
					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	--	--	--	--	--	--	--	--	--	--

Notes: -- = not measured or not applicable
> = greater than
lbs = pounds
mm = millimeter

[a] Snorkel survey; confidence intervals and biomass were not calculated for sites surveyed via snorkeling
[b] Could not be calculated due to unequal number of passes

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APPENDIX B5

Site-Specific Trout Density and Biomass

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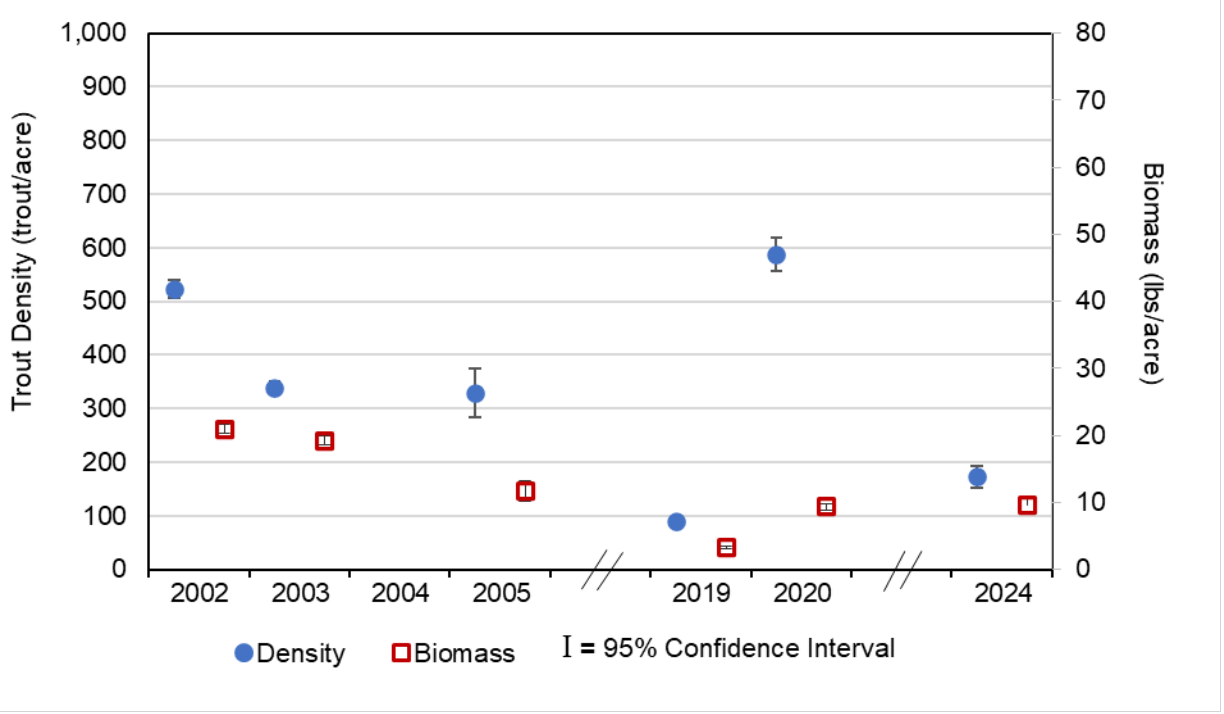


Figure B5-1. Trout density and biomass at Site RRD-F1, 2002–2024.

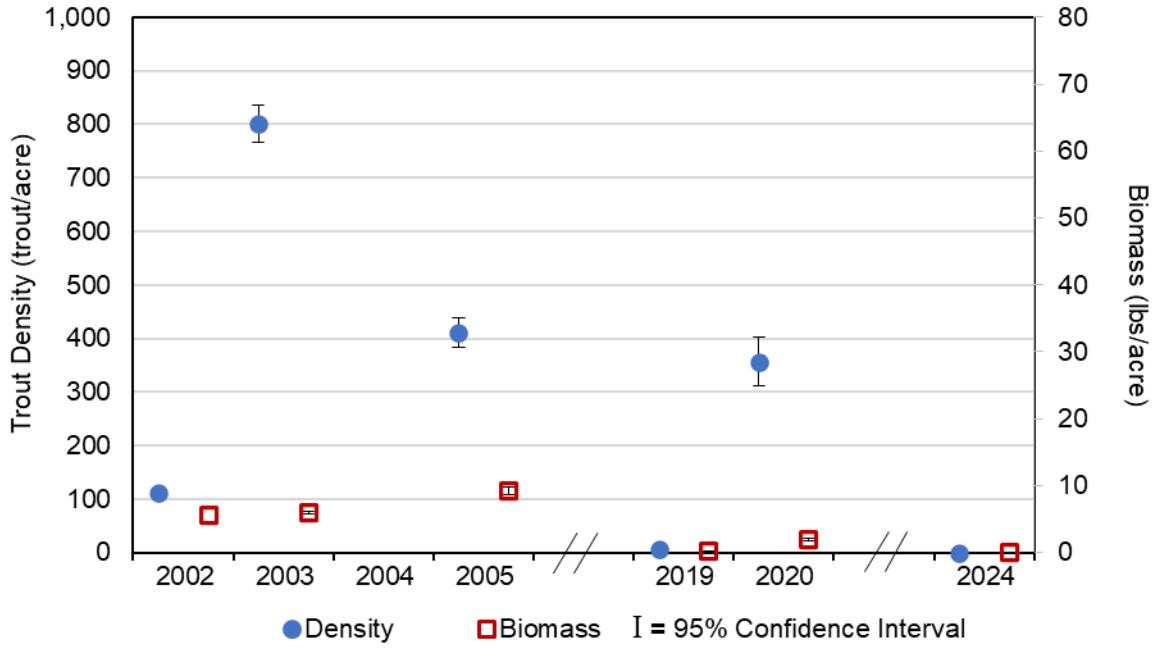


Figure B5-2. Trout density and biomass at Site RRD-F2, 2002–2024.

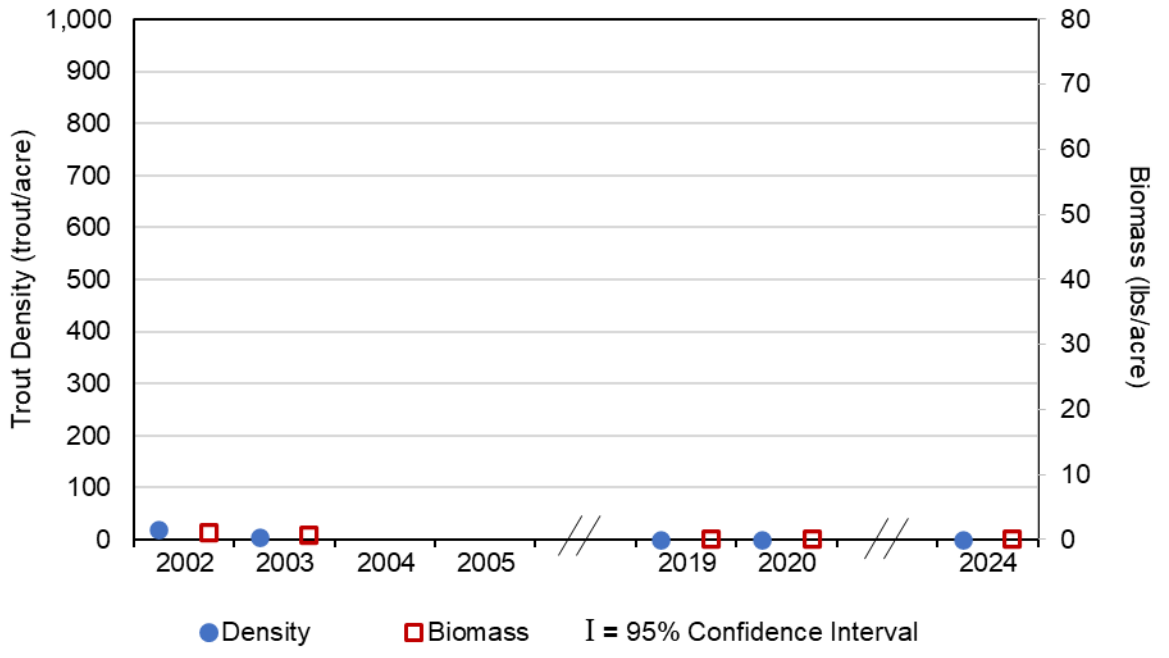
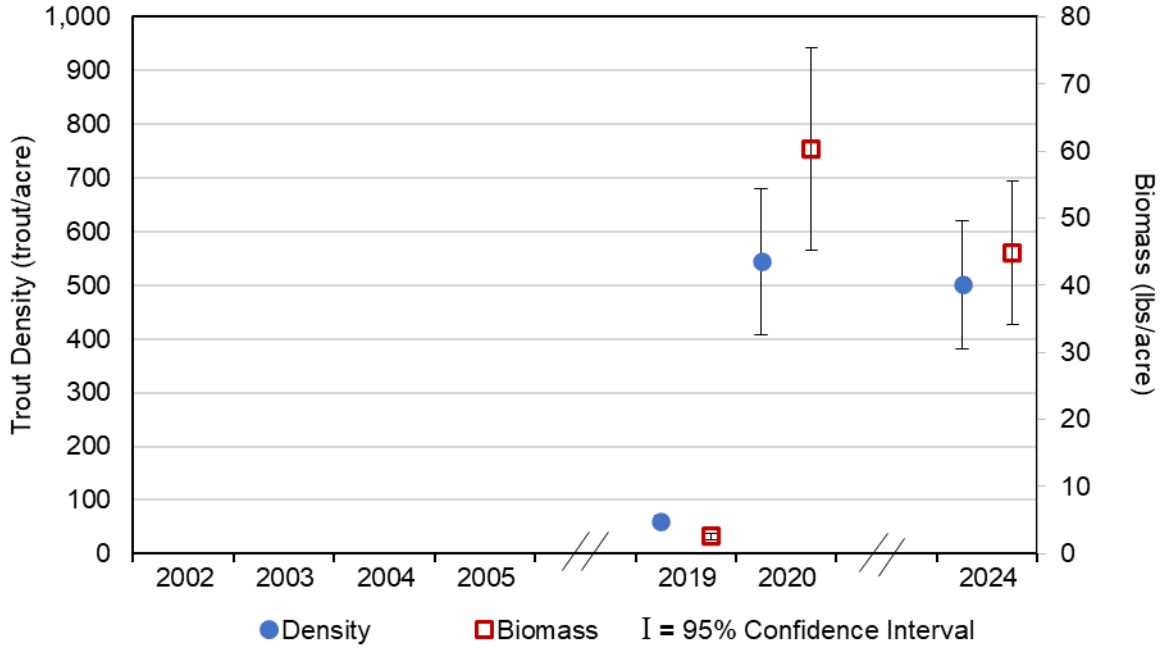


Figure B5-3. Trout density and biomass at Site BID-F1, 2002–2024.



Note: Site not surveyed in 2002–2005.

Figure B5-4. Trout density and biomass at Site LLD-F3, 2019–2024.

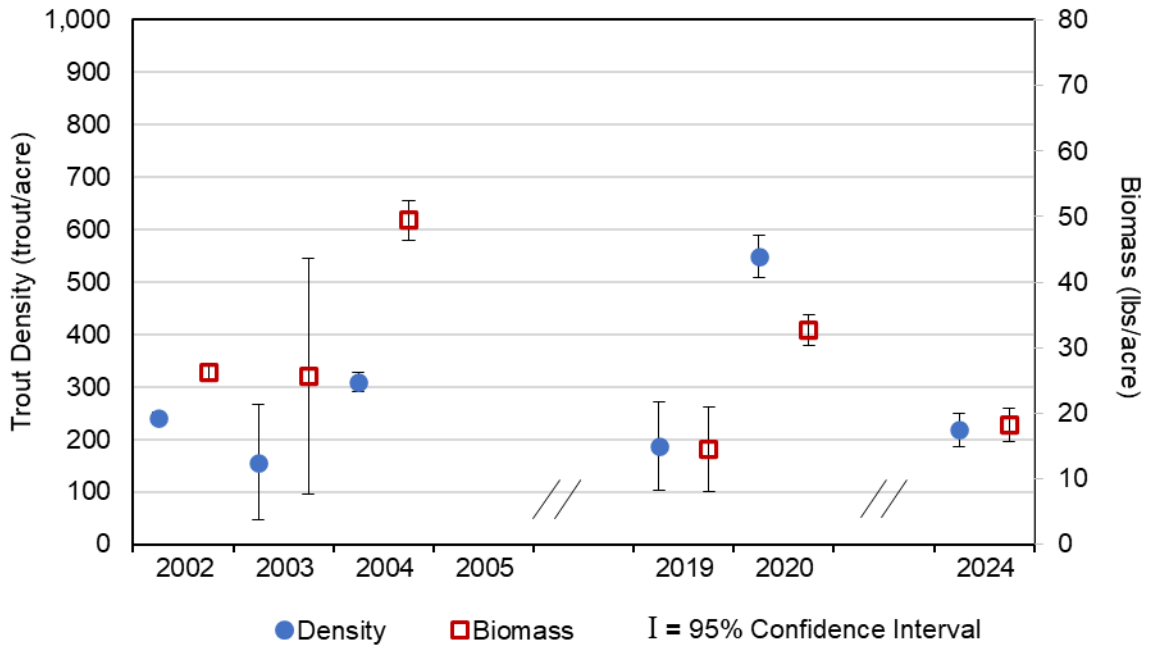


Figure B5-5. Trout density and biomass at Site LLD-F2, 2002–2024.

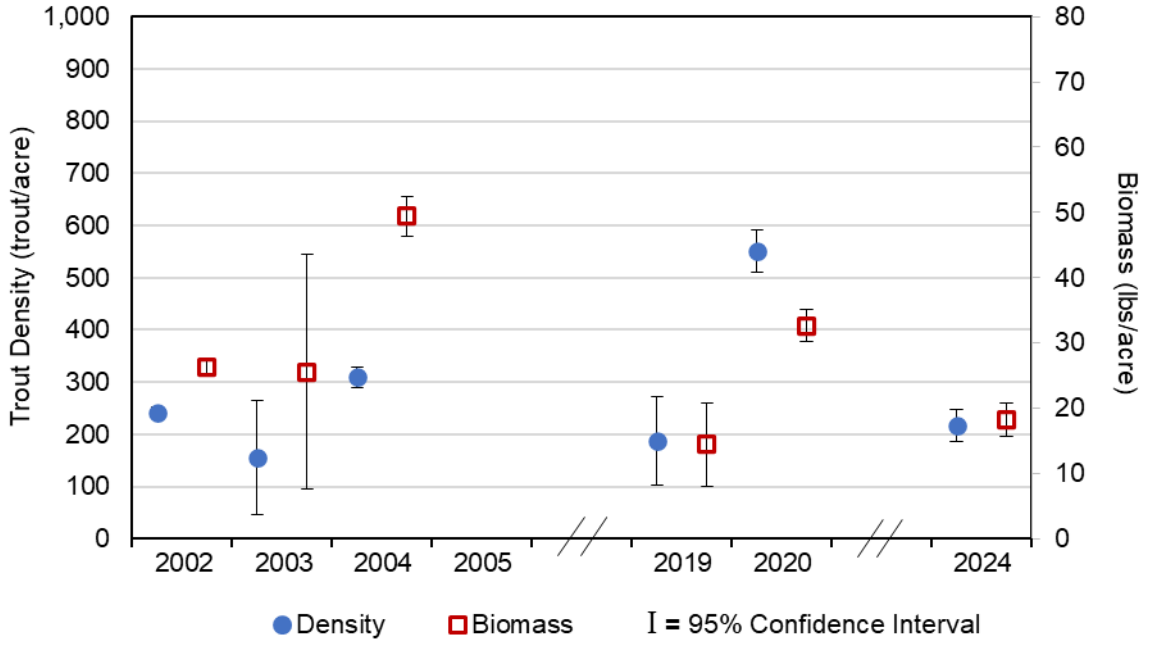


Figure B5-6. Trout density and biomass at Site GCD-F1, 2002–2024.

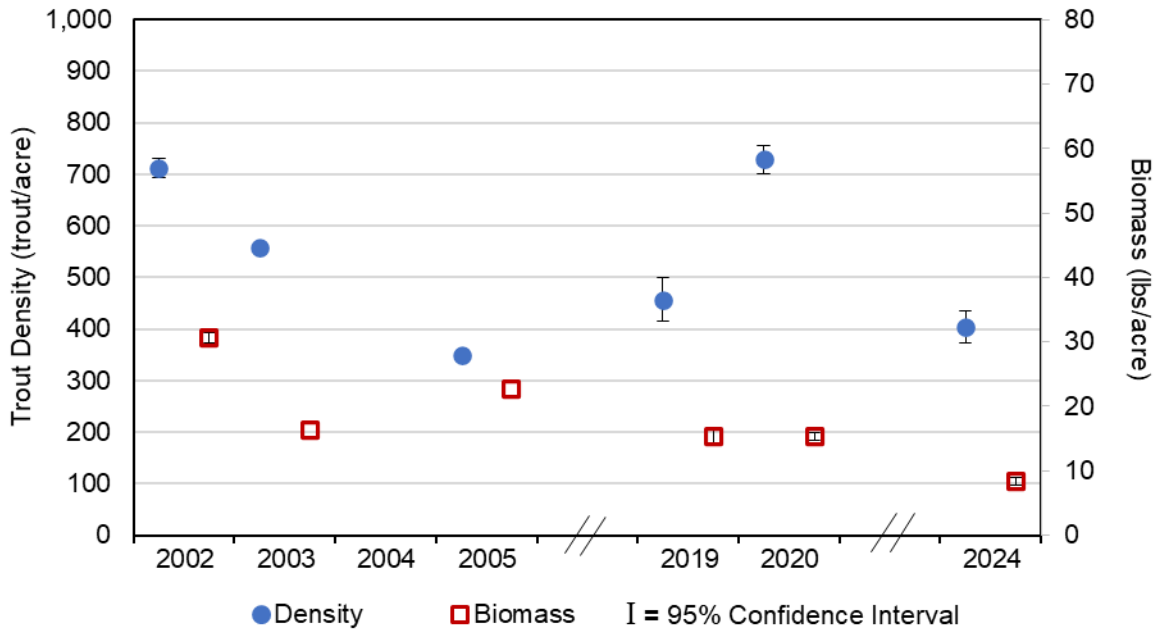


Figure B5-7. Trout density and biomass at Site RPD-F1, 2002–2024.

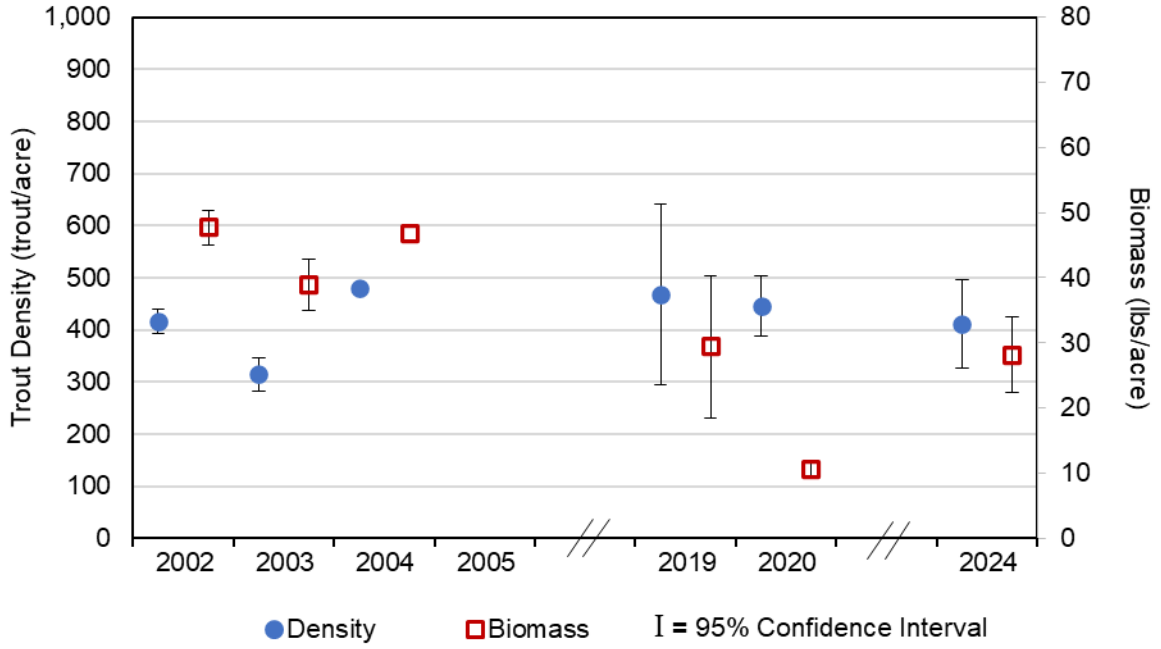


Figure B5-8. Trout density and biomass at Site IHD-F1, 2002–2024.

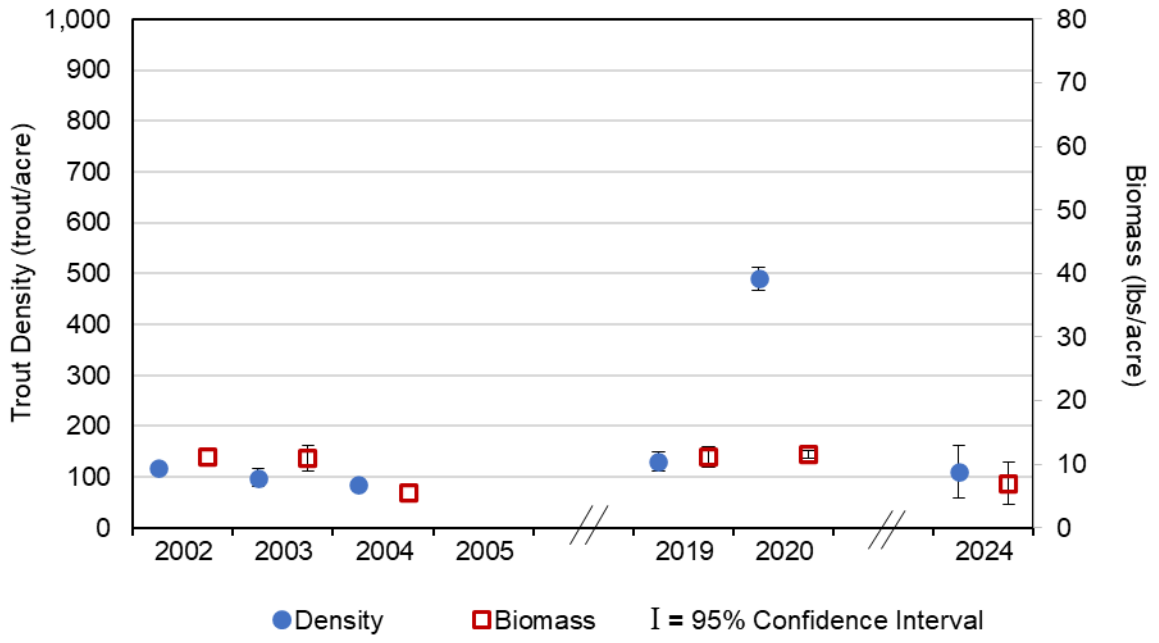


Figure B5-9. Trout density and biomass at Site IHD-F2, 2002–2024.

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APPENDIX B6

Trout Condition

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Table B6-1. Fulton's Condition Factors (*k*-values), 2002–2024.

Stream	Reach	Site	Year	Rainbow Trout			Brown Trout		
				Sample Size	Average *k*-value	Standard Error	Sample Size	Average *k*-value	Standard Error
Rubicon River	Rubicon Reservoir Dam	RRD-F1	2002	82	1.00	0.02	18	0.98	0.03
Rubicon River	Rubicon Reservoir Dam	RRD-F1	2003	50	1.08	0.02	15	1.03	0.02
Rubicon River	Rubicon Reservoir Dam	RRD-F1	2005	49	1.16	0.02	12	1.10	0.05
Rubicon River	Rubicon Reservoir Dam	RRD-F1	2019	18	1.08	0.06	2	1.10	0.03
Rubicon River	Rubicon Reservoir Dam	RRD-F1	2020	98	0.93	0.01	10	0.95	0.03
Rubicon River	Rubicon Reservoir Dam	RRD-F1	2024	29	0.99	0.05	1	0.95	0.12
Rubicon River	Rubicon Reservoir Dam	RRD-F2	2002	1	1.00	0.00	14	0.97	0.03
Rubicon River	Rubicon Reservoir Dam	RRD-F2	2003	16	1.19	0.05	69	1.07	0.02
Rubicon River	Rubicon Reservoir Dam	RRD-F2	2005	1	0.96	--	44	0.97	0.02
Rubicon River	Rubicon Reservoir Dam	RRD-F2	2019	1	0.89	--	0	--	--
Rubicon River	Rubicon Reservoir Dam	RRD-F2	2020	4	0.81	0.10	40	0.88	0.02
Rubicon River	Rubicon Reservoir Dam	RRD-F2	2024	0	--	--	0	--	--
Little Rubicon River	Buck Island Dam	BID-F1	2002	4	1.02	0.03	0	--	--

Stream	Reach	Site	Year	Rainbow Trout			Brown Trout		
				Sample Size	Average *k*-value	Standard Error	Sample Size	Average *k*-value	Standard Error
Little Rubicon River	Buck Island Dam	BID-F1	2003	1	1.17	--	0	--	--
Little Rubicon River	Buck Island Dam	BID-F1	2019	0	--	--	0	--	--
Little Rubicon River	Buck Island Dam	BID-F1	2020	0	--	--	0	--	--
Little Rubicon River	Buck Island Dam	BID-F1	2024	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-F3	2024	11	0.87	0.01	60	0.90	0.02
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	Loon Lake Dam	LLD-F2	2024	47	0.88	0.01	21	1.00	0.04
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	1.00	--
Gerle Creek	Gerle Creek Dam	GCD-F1	2020	105	0.90	0.02	1	0.84	--

Stream	Reach	Site	Year	Rainbow Trout			Brown Trout		
				Sample Size	Average *k*-value	Standard Error	Sample Size	Average *k*-value	Standard Error
Gerle Creek	Gerle Creek Dam	GCD-F1	2024	51	0.86	0.01	13	0.93	0.02
South Fork Rubicon River	Robbs Peak Dam	RPD-F1	2002	153	0.98	0.05	67	1.00	0.01
South Fork Rubicon River	Robbs Peak Dam	RPD-F1	2003	65	0.97	0.01	50	1.05	0.03
South Fork Rubicon River	Robbs Peak Dam	RPD-F1	2005	60	0.98	0.02	26	0.98	0.01
South Fork Rubicon River	Robbs Peak Dam	RPD-F1	2019	124	0.87	0.01	7	1.01	0.04
South Fork Rubicon River	Robbs Peak Dam	RPD-F1	2020	178	0.92	0.01	4	1.03	0.03
South Fork Rubicon River	Robbs Peak Dam	RPD-F1	2024	85	0.93	0.01	10	0.99	0.02
South Fork Silver Creek	Ice House Dam	IHD-F1	2002	40	0.90	0.03	25	0.86	0.05
South Fork Silver Creek	Ice House Dam	IHD-F1	2003	38	0.97	0.01	13	0.95	0.04
South Fork Silver Creek	Ice House Dam	IHD-F1	2004	60	1.07	0.03	19	1.02	0.04
South Fork Silver Creek	Ice House Dam	IHD-F1	2019	17	1.00	0.02	3	0.98	0.02
South Fork Silver Creek	Ice House Dam	IHD-F1	2020	58	0.92	0.02	9	1.01	0.02
South Fork Silver Creek	Ice House Dam	IHD-F1	2024	55	0.94	0.02	4	0.91	0.04

Stream	Reach	Site	Year	Rainbow Trout			Brown Trout		
				Sample Size	Average *k*-value	Standard Error	Sample Size	Average *k*-value	Standard Error
South Fork Silver Creek	Ice House Dam	IHD-F2	2002	12	1.01	0.03	14	1.06	0.02
South Fork Silver Creek	Ice House Dam	IHD-F2	2003	11	0.91	0.03	10	1.00	0.03
South Fork Silver Creek	Ice House Dam	IHD-F2	2004	10	0.98	0.04	10	1.03	0.05
South Fork Silver Creek	Ice House Dam	IHD-F2	2019	11	0.89	0.03	17	0.99	0.04
South Fork Silver Creek	Ice House Dam	IHD-F2	2020	34	0.91	0.03	48	0.93	0.01
South Fork Silver Creek	Ice House Dam	IHD-F2	2024	15	0.82	0.02	6	0.98	0.03
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

Note: -- = not applicable

APPENDIX B7

Site-Specific Trout Length-Frequency and Age-Class Distributions

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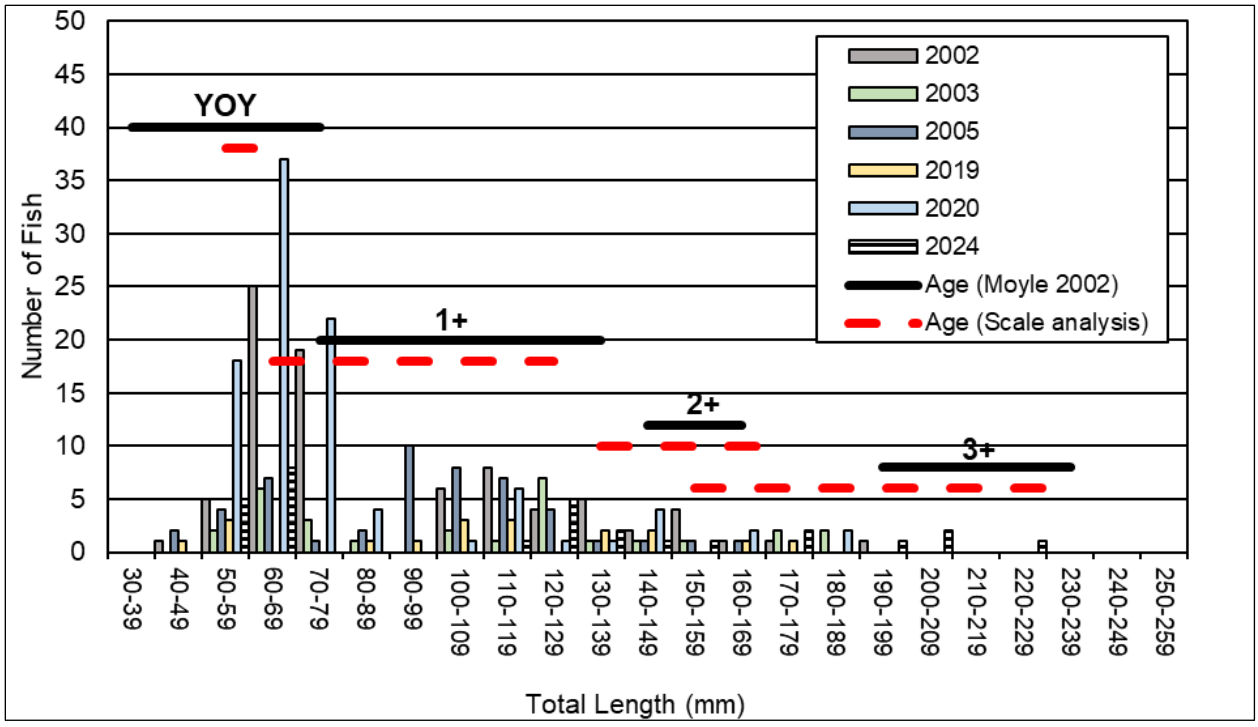


Figure B7-1. Length-frequency and age-class distribution of rainbow trout at Site RRD-F1, Rubicon River downstream of Rubicon Dam, 2002–2024.

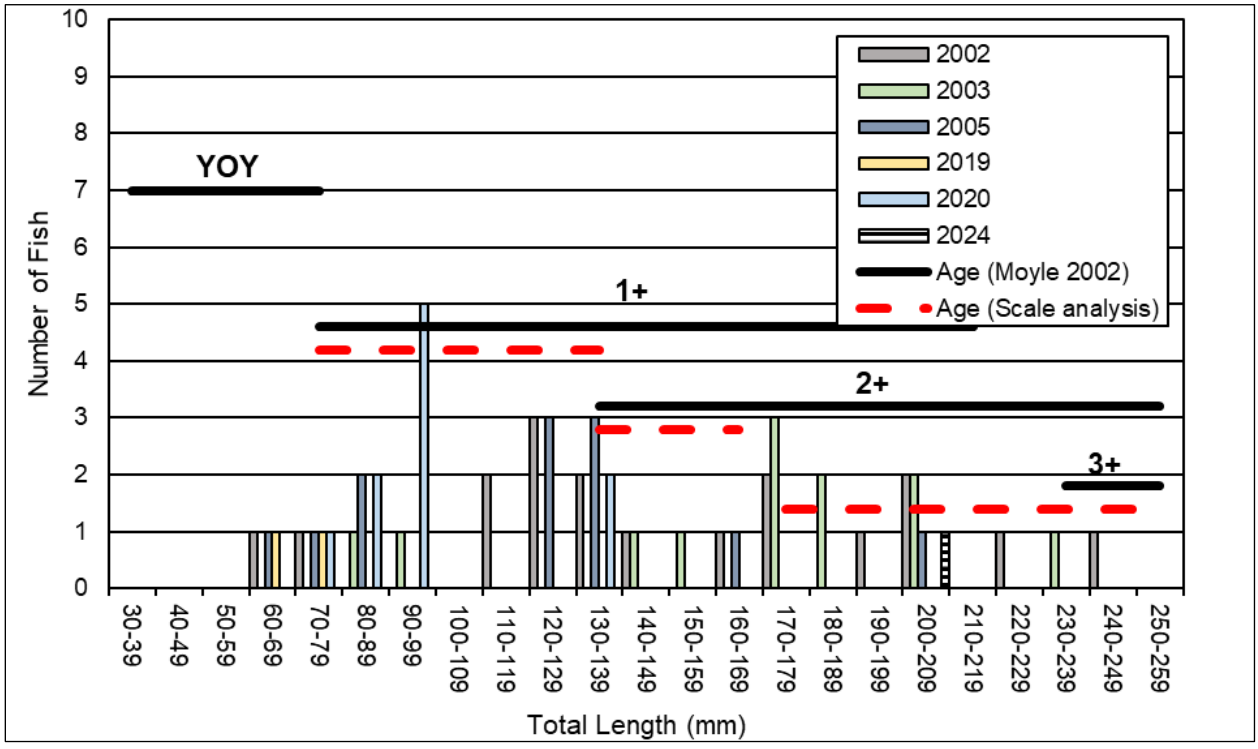


Figure B7-2. Length-frequency and age-class distribution of brown trout at Site RRD-F1, Rubicon River downstream of Rubicon Dam, 2002–2024.

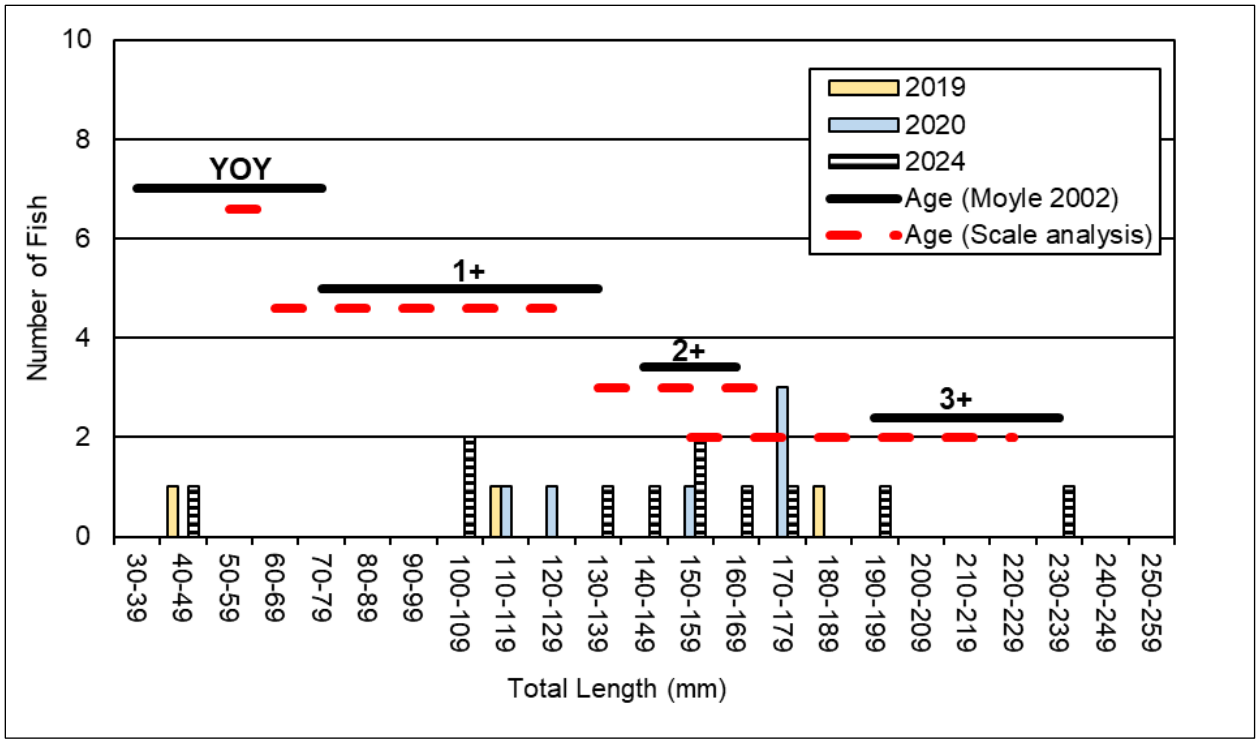


Figure B7-3. Length-frequency and age-class distribution of rainbow trout at Site LLD-F3, Gerle Creek downstream of Loon Lake Dam, 2019–2024.

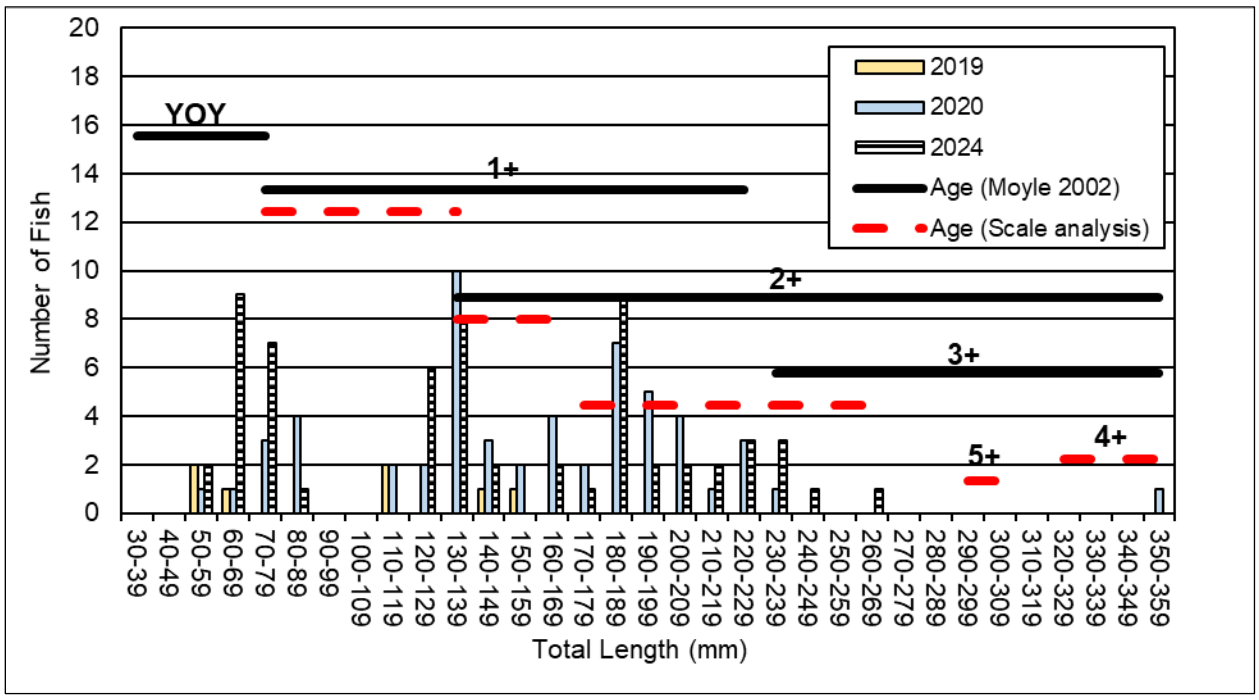


Figure B7-4. Length-frequency and age-class distribution of brown trout at Site LLD-F3, Gerle Creek downstream of Loon Lake Dam, 2019–2024.

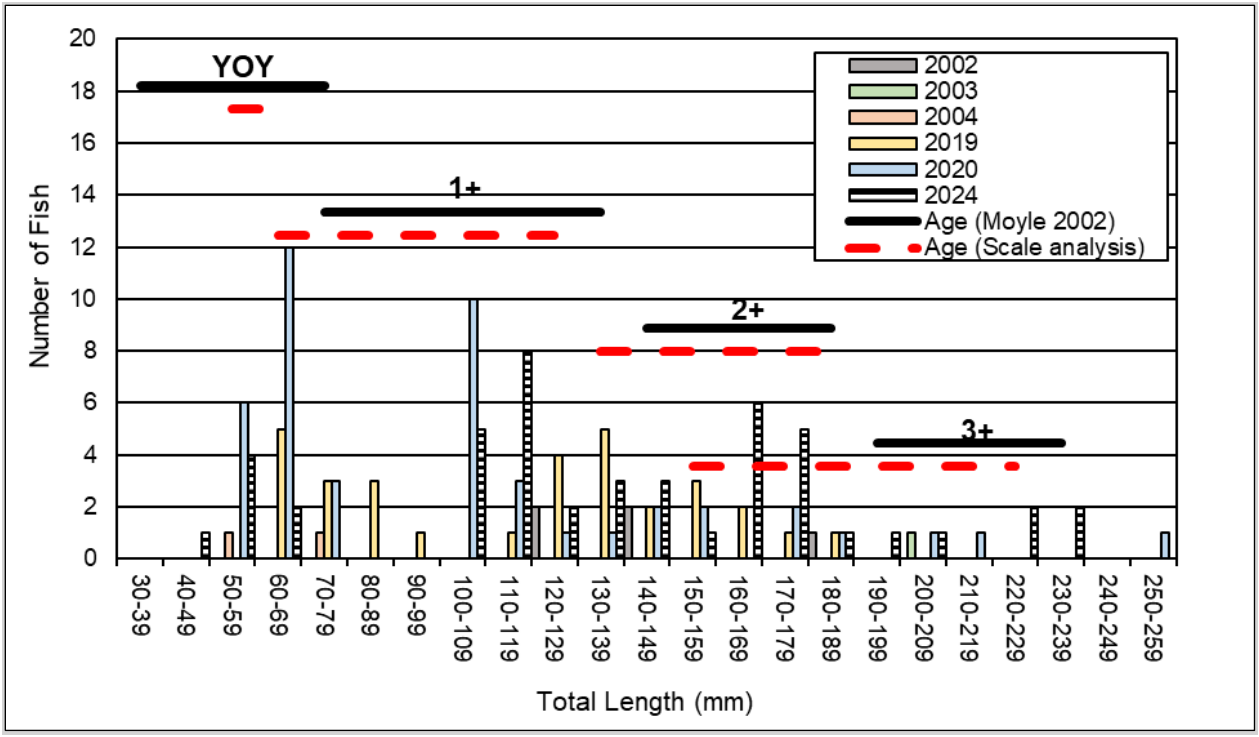


Figure B7-5. Length-frequency and age-class distribution of rainbow trout at Site LLD-F2, Gerle Creek downstream of Loon Lake Dam, 2002–2024.

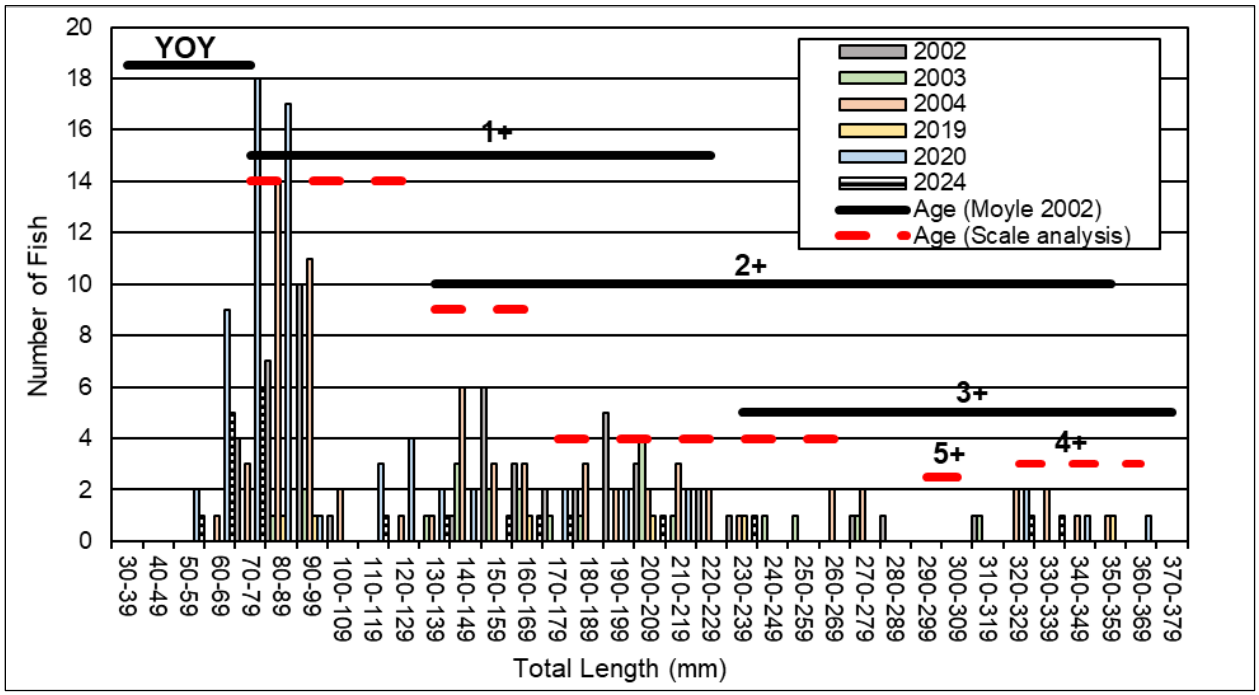


Figure B7-6. Length-frequency and age-class distribution of brown trout at Site LLD-F2, Gerle Creek downstream of Loon Lake Dam, 2002–2024.

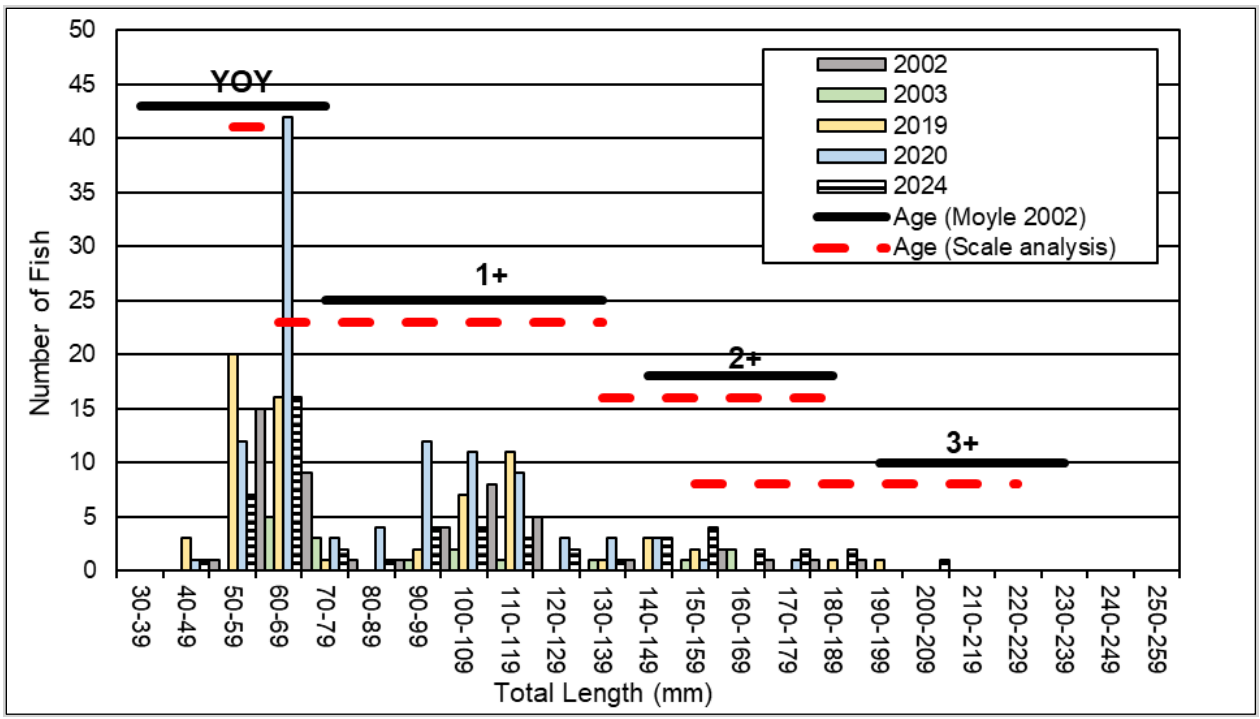


Figure B7-7. Length-frequency and age-class distribution of rainbow trout at Site GCD-F1, Gerle Creek downstream of Gerle Creek Dam, 2002–2024.

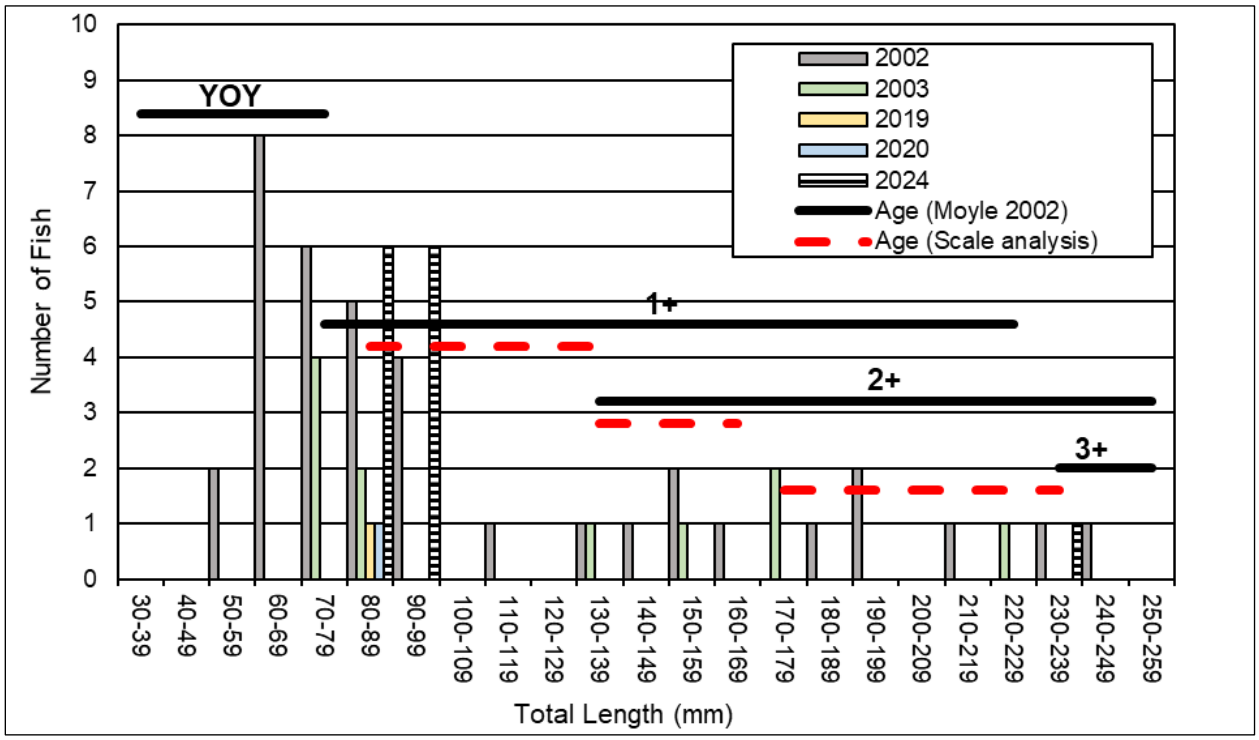


Figure B7-8. Length-frequency and age-class distribution of rainbow trout at Site GCD-F1, Gerle Creek downstream of Gerle Creek Dam, 2002–2024.

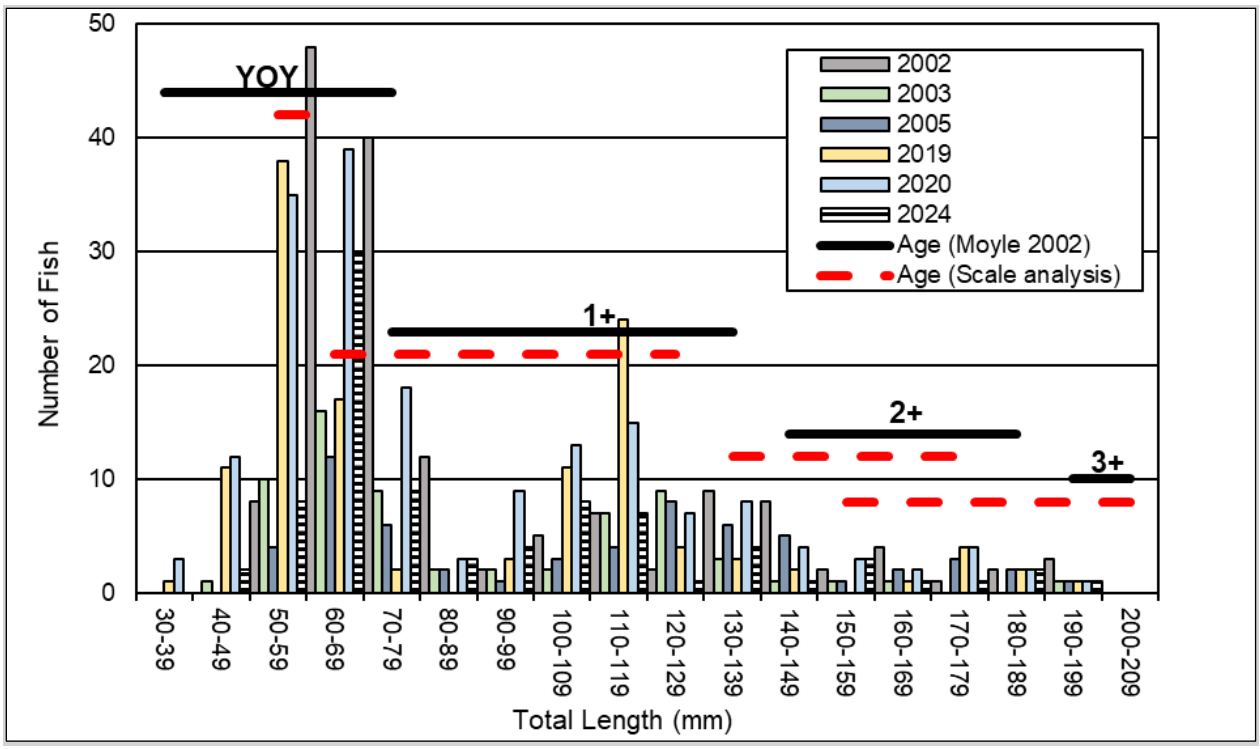


Figure B7-9. Length-frequency and age-class distribution of rainbow trout at Site RPD-F1, South Fork Rubicon River downstream of Robbs Peak Dam, 2002–2024.

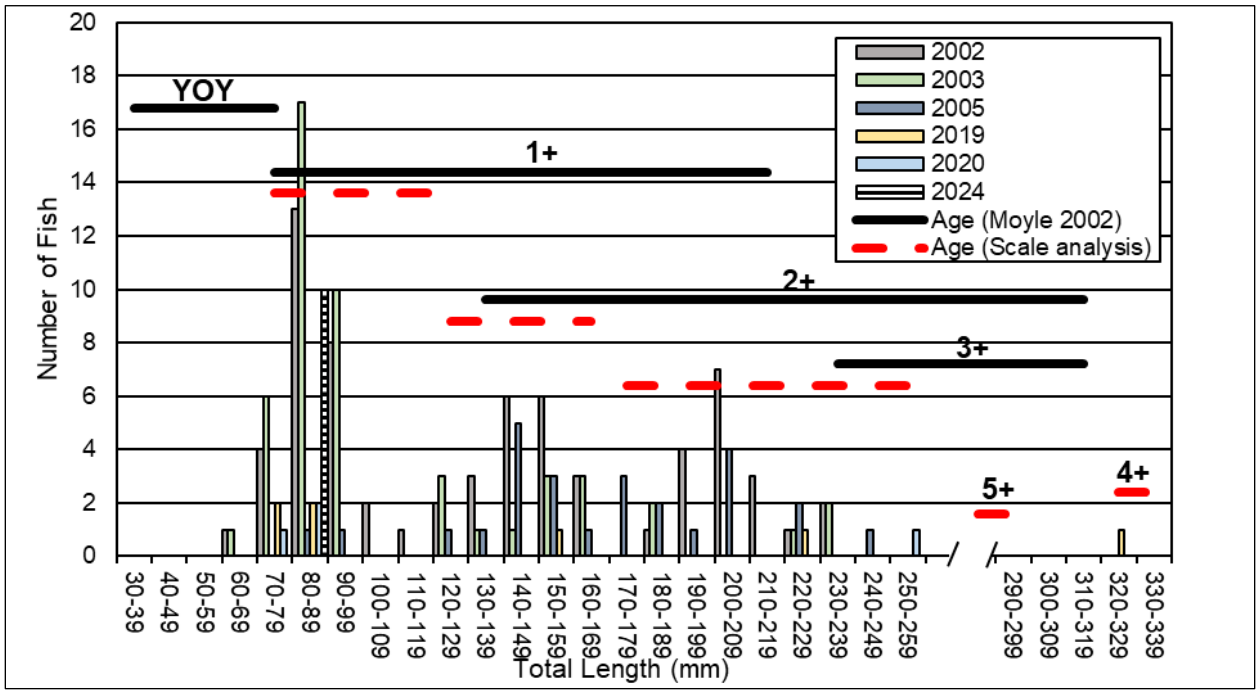


Figure B7-10. Length-frequency and age-class distribution of brown trout at Site RPD-F1, South Fork Rubicon River downstream of Robbs Peak Dam, 2002–2024.

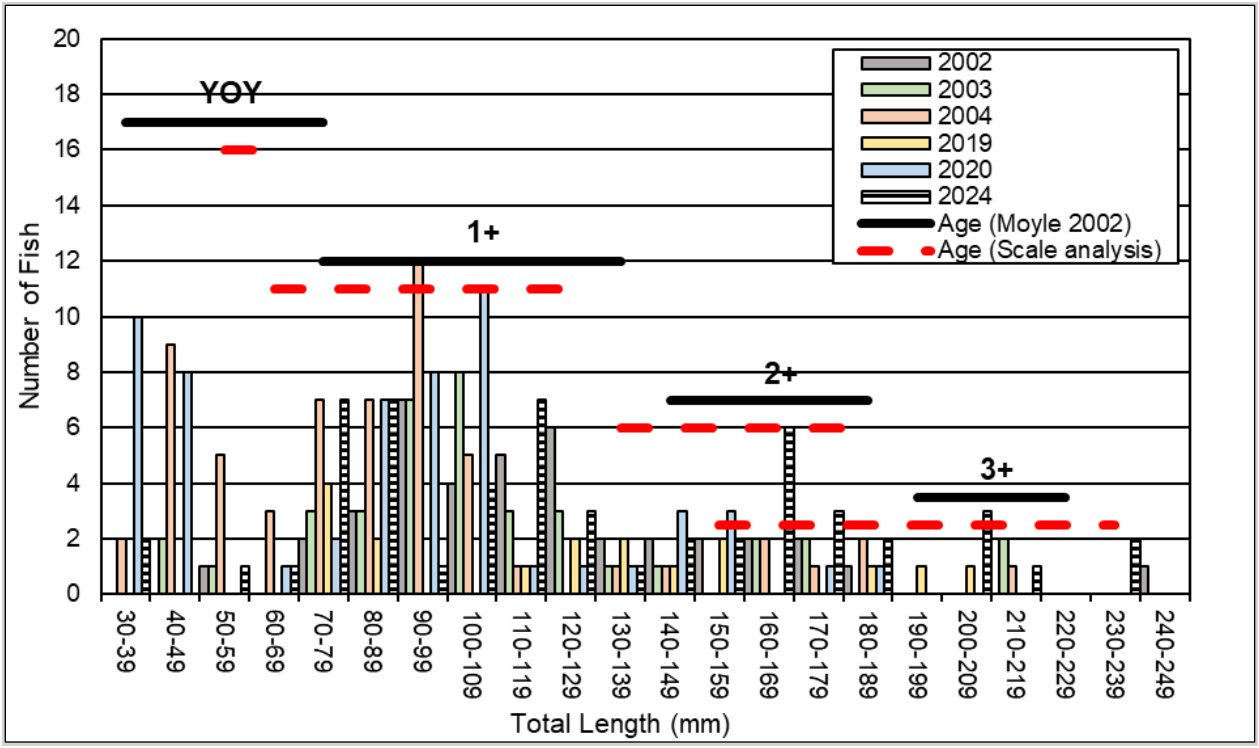


Figure B7-11. Length-frequency and age-class distribution of rainbow trout at Site IHD-F1, South Fork Silver Creek downstream of Ice House Dam, 2002–2024.

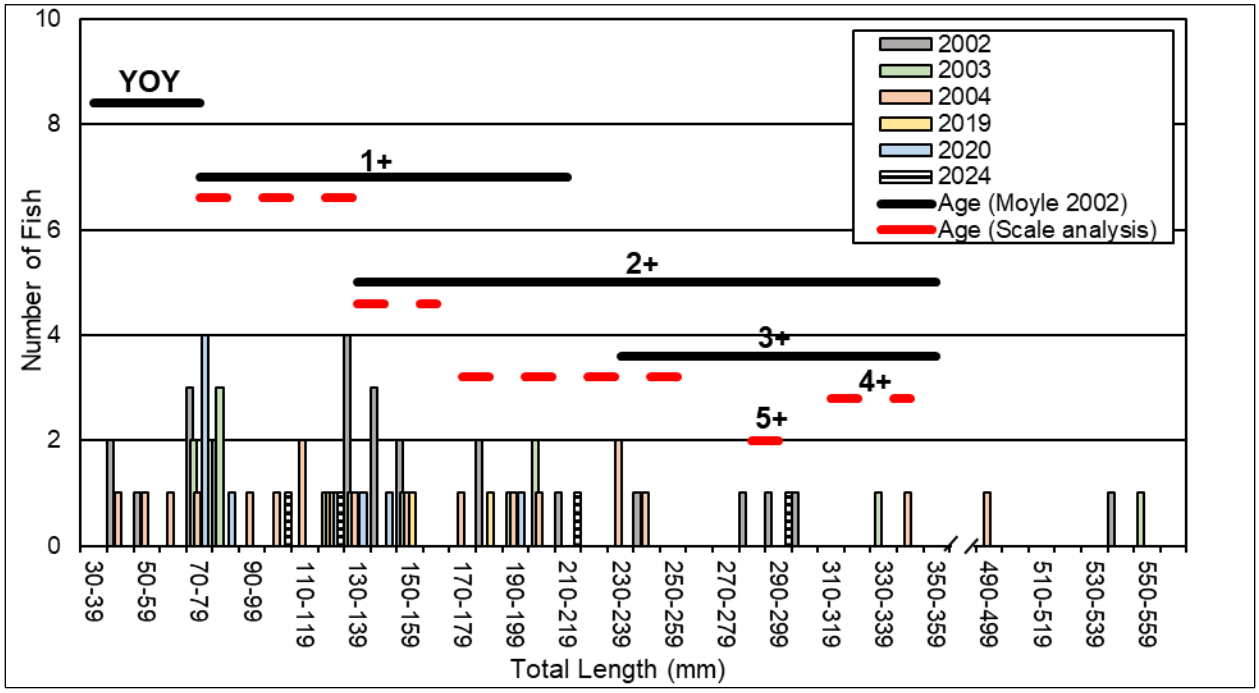


Figure B7-12. Length-frequency and age-class distribution of brown trout at Site IHD-F1, South Fork Silver Creek downstream of Ice House Dam, 2002–2024.

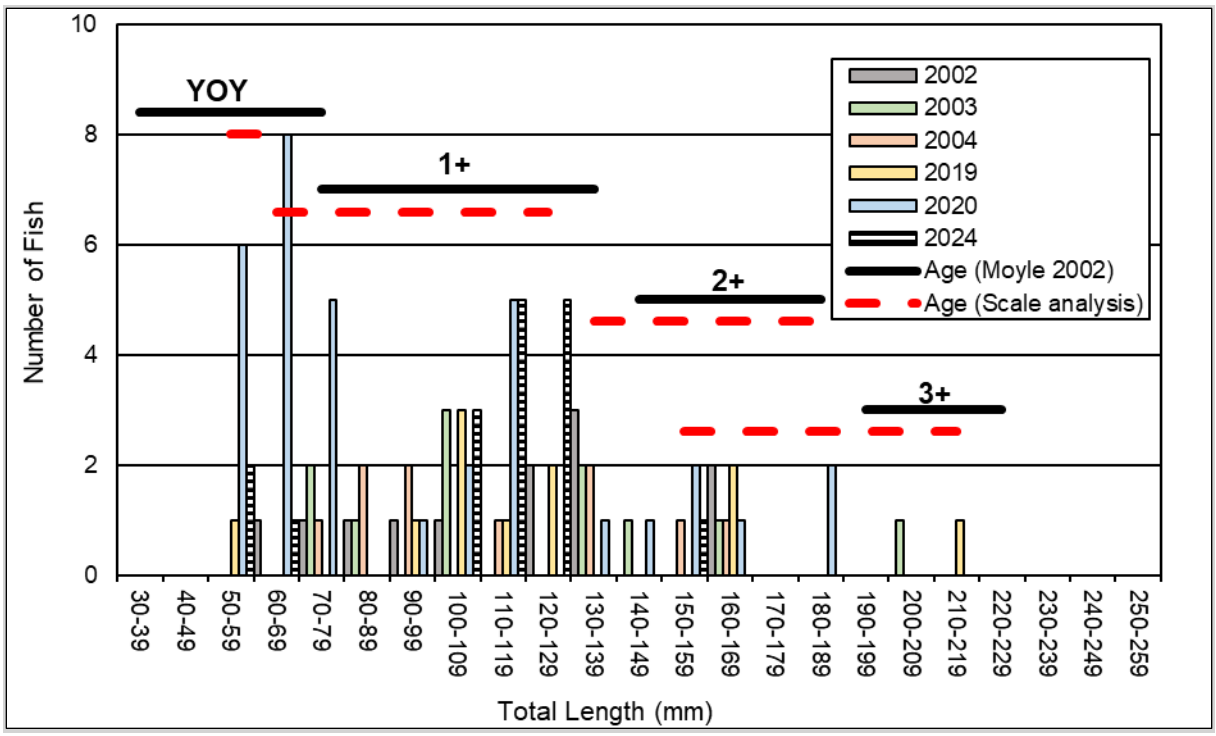


Figure B7-13. Length-frequency and age-class distribution of rainbow trout at Site IHD-F2, South Fork Silver Creek downstream of Ice House Dam, 2002–2024.

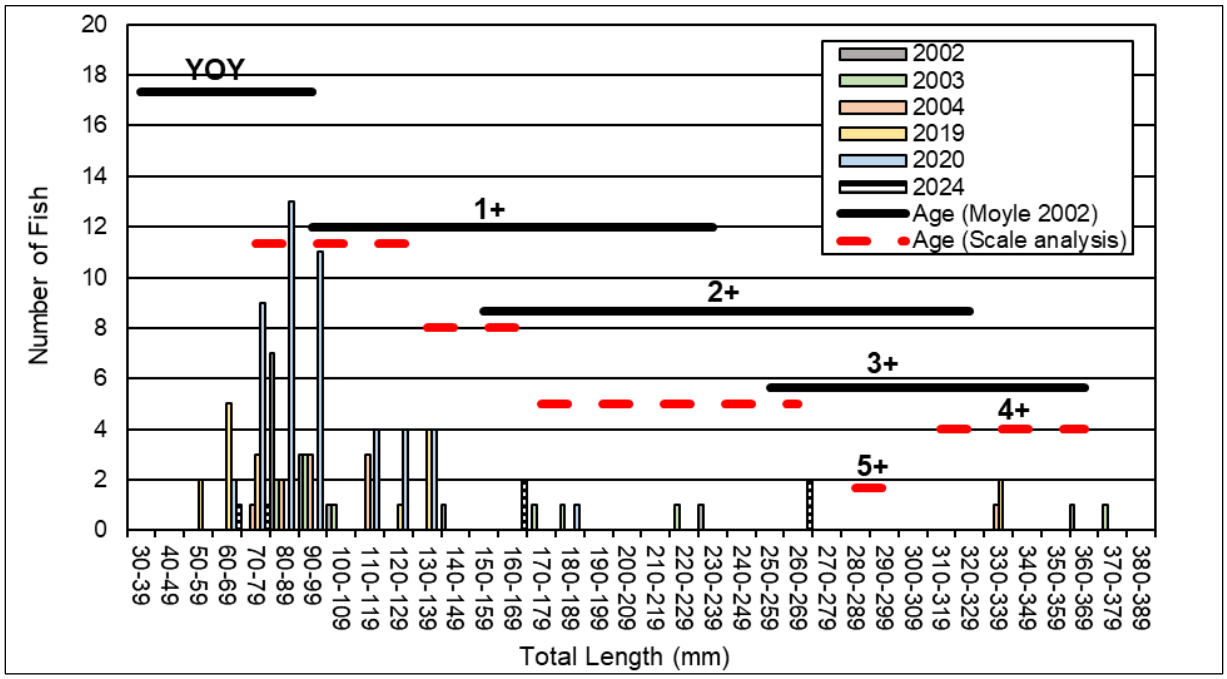


Figure B7-14. Length-frequency and age-class distribution of brown trout at Site IHD-F2, South Fork Silver Creek downstream of Ice House Dam, 2002–2024.

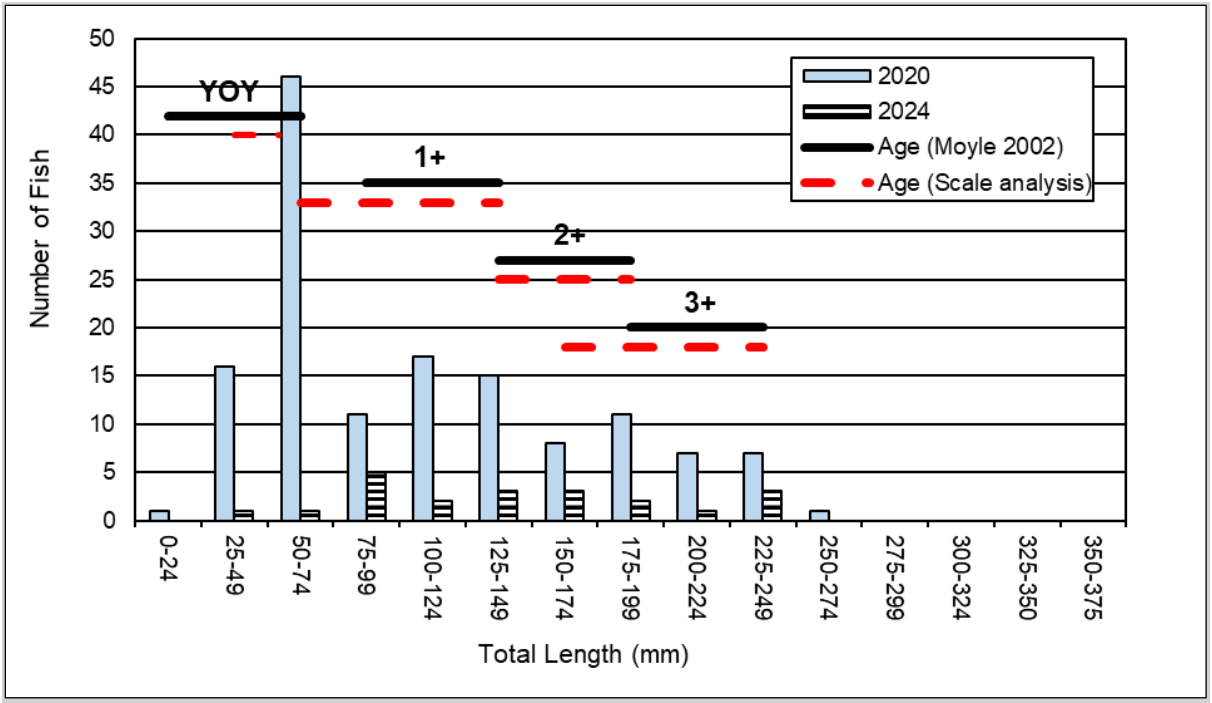


Figure B7-15. Length-frequency and age-class distribution of rainbow trout at Site JD-F3, Silver Creek downstream of Junction Dam, 2020–2024.

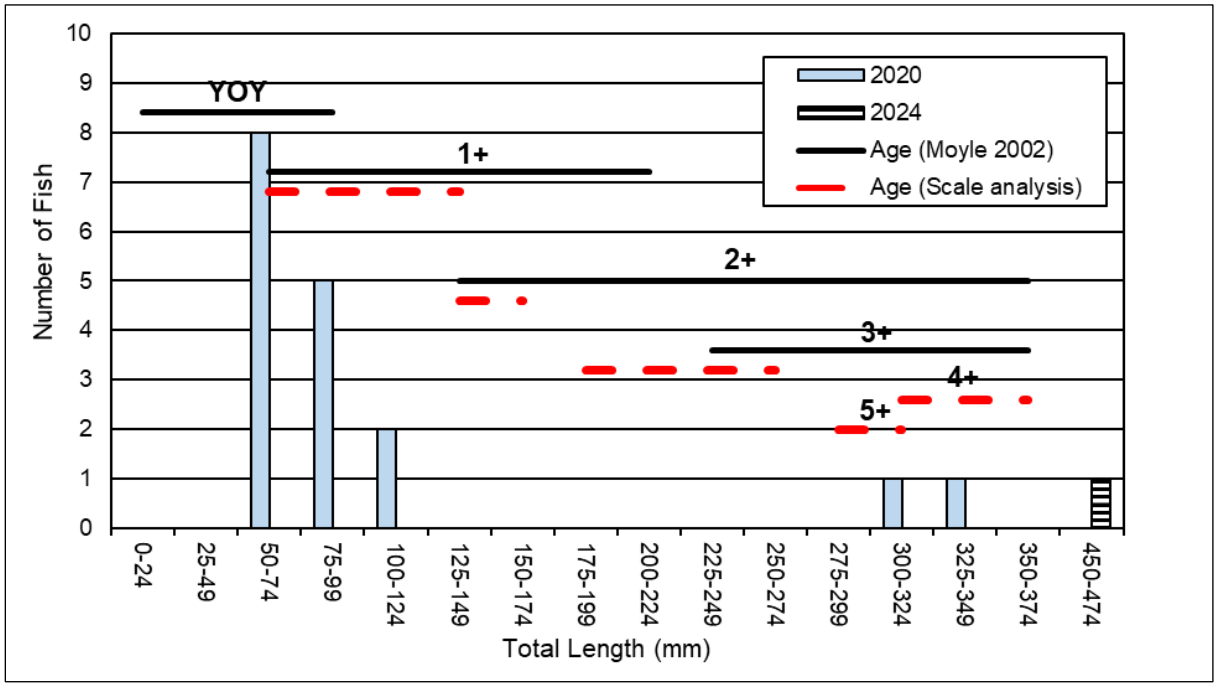


Figure B7-16. Length-frequency and age-class distribution of brown trout at Site JD-F3, Silver Creek downstream of Junction Dam, 2020–2024.

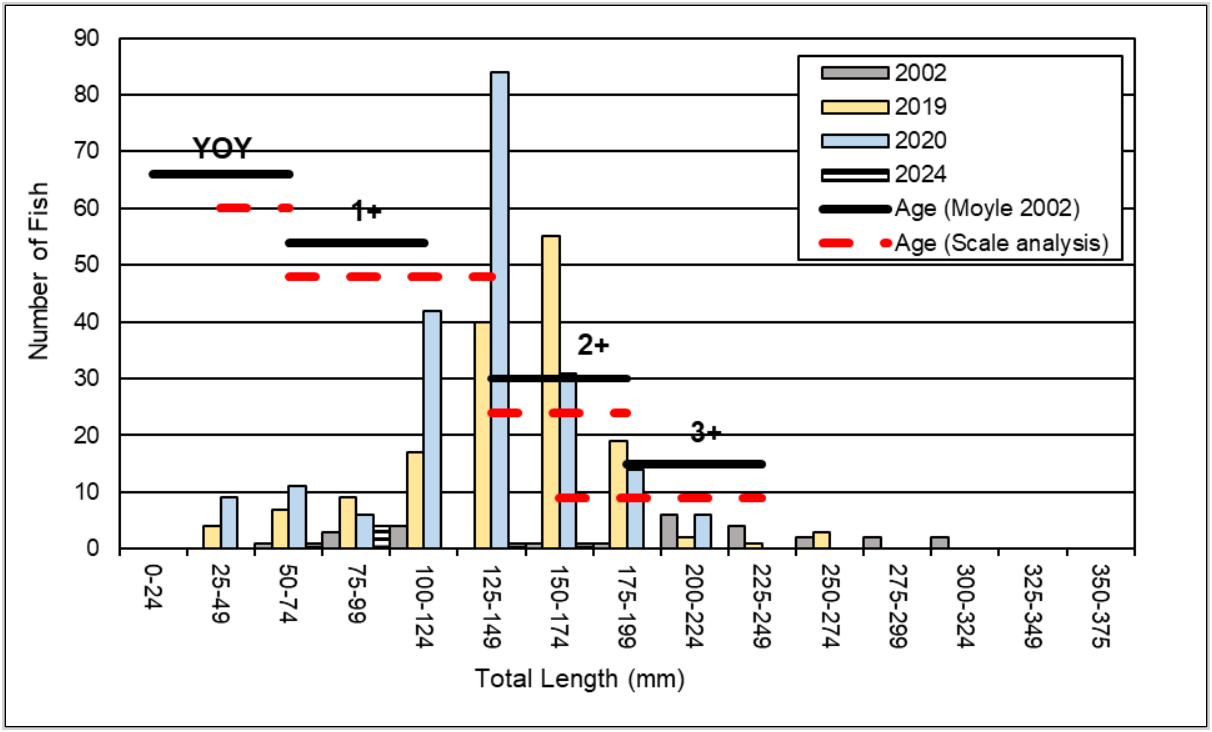


Figure B7-17. Length-frequency and age-class distribution of rainbow trout at Site CD-F1, Silver Creek downstream of Camino Dam, 2002–2024.

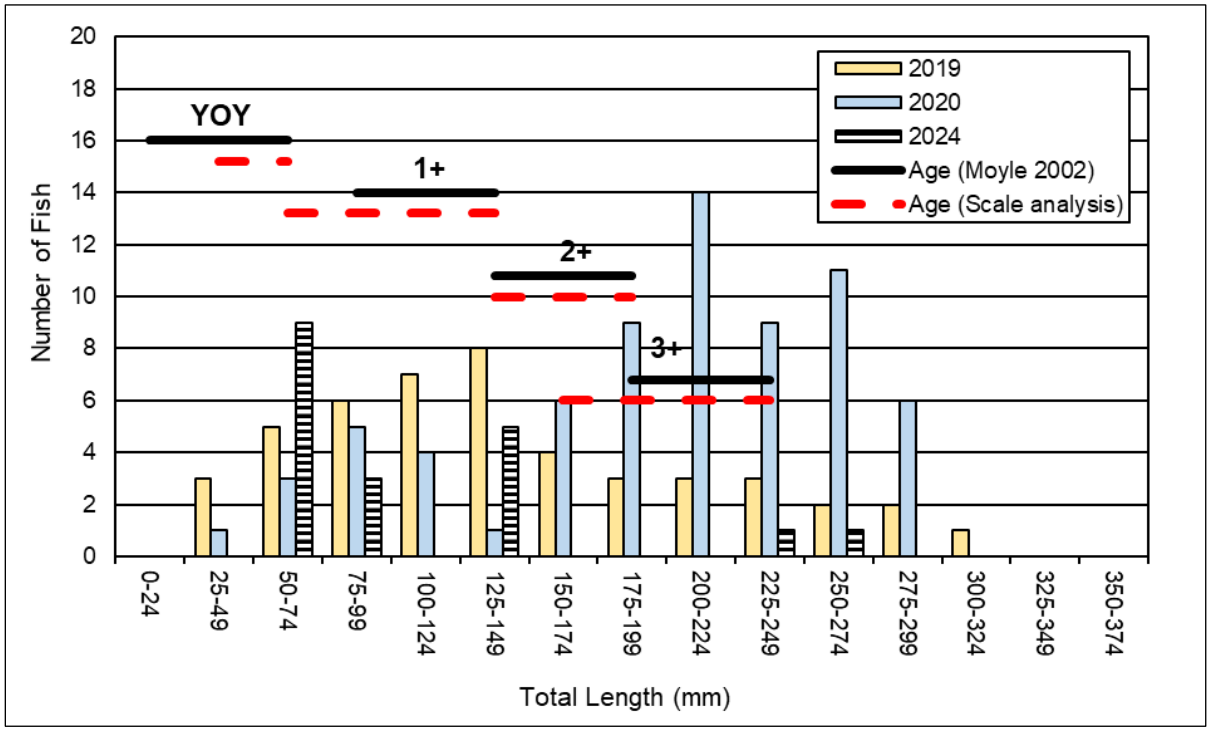


Figure B7-18. Length-frequency and age-class distribution of rainbow trout at Site SCD-F3, South Fork American River downstream of Slab Creek Dam, 2019–2024.

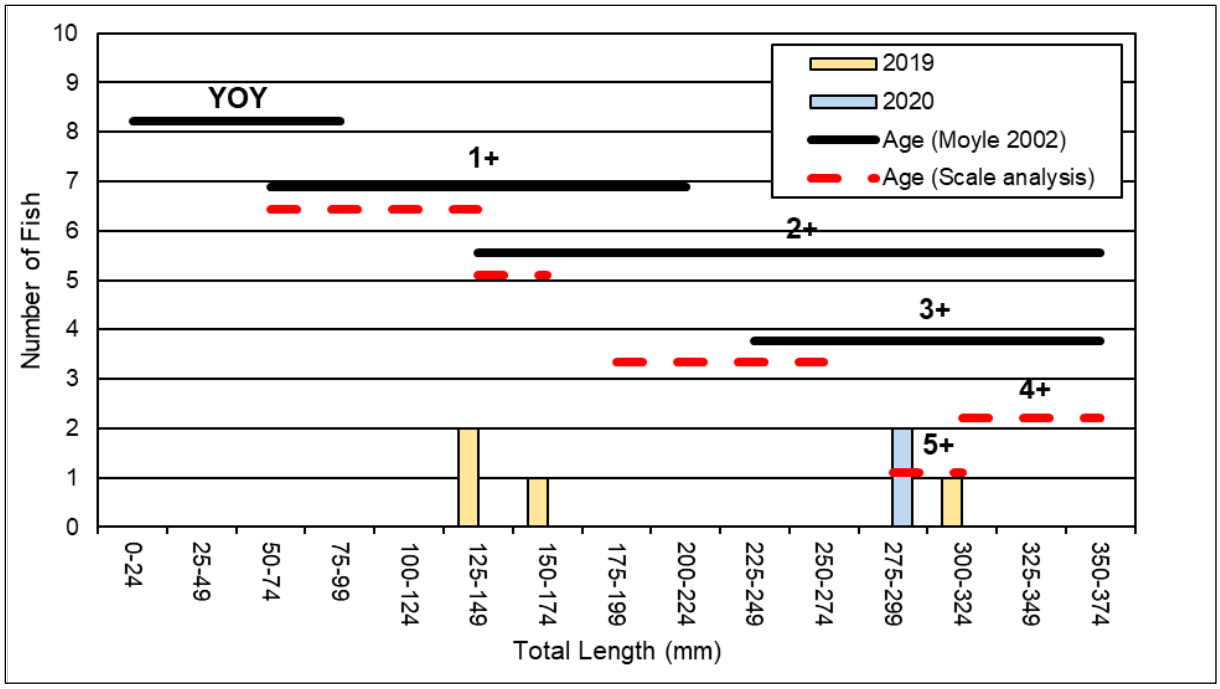


Figure B7-19. Length-frequency and age-class distribution of brown trout at Site SCD-F3, South Fork American River downstream of Slab Creek Dam, 2019–2020.

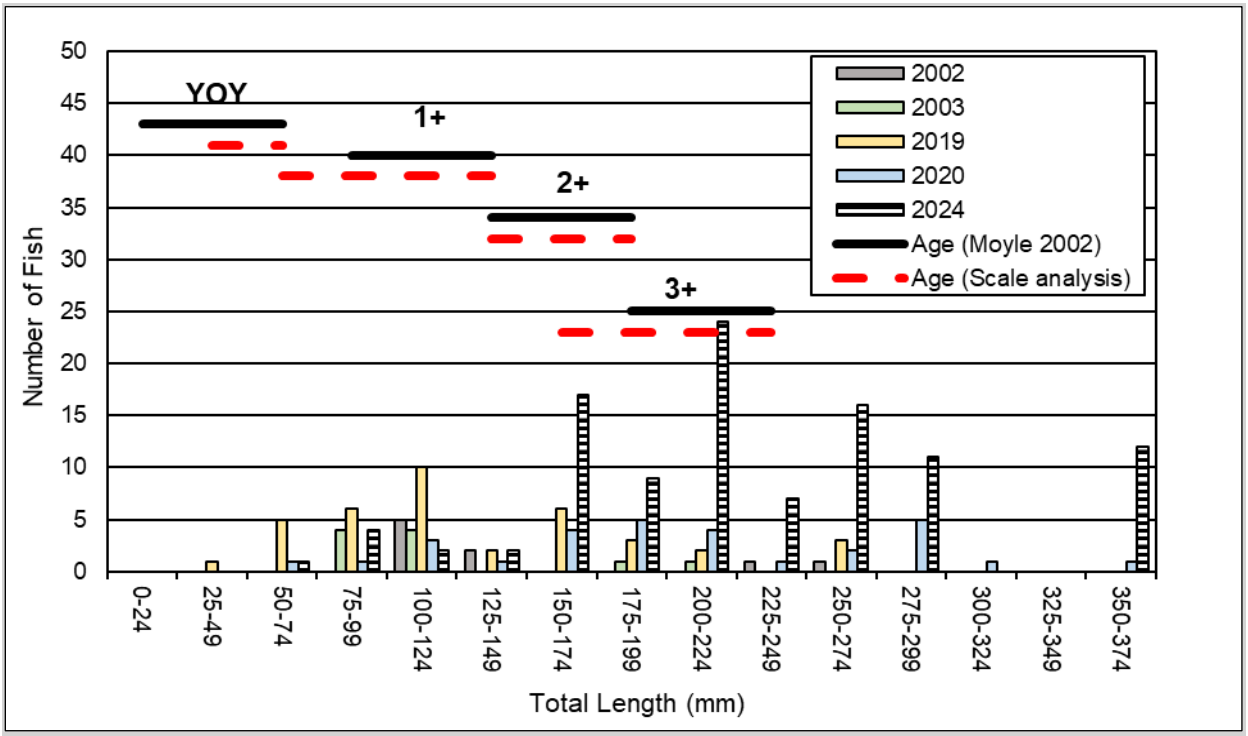


Figure B7-20. Length-frequency and age-class distribution of rainbow trout at Site SCD-F2, South Fork American River downstream of Slab Creek Dam, 2002–2024.

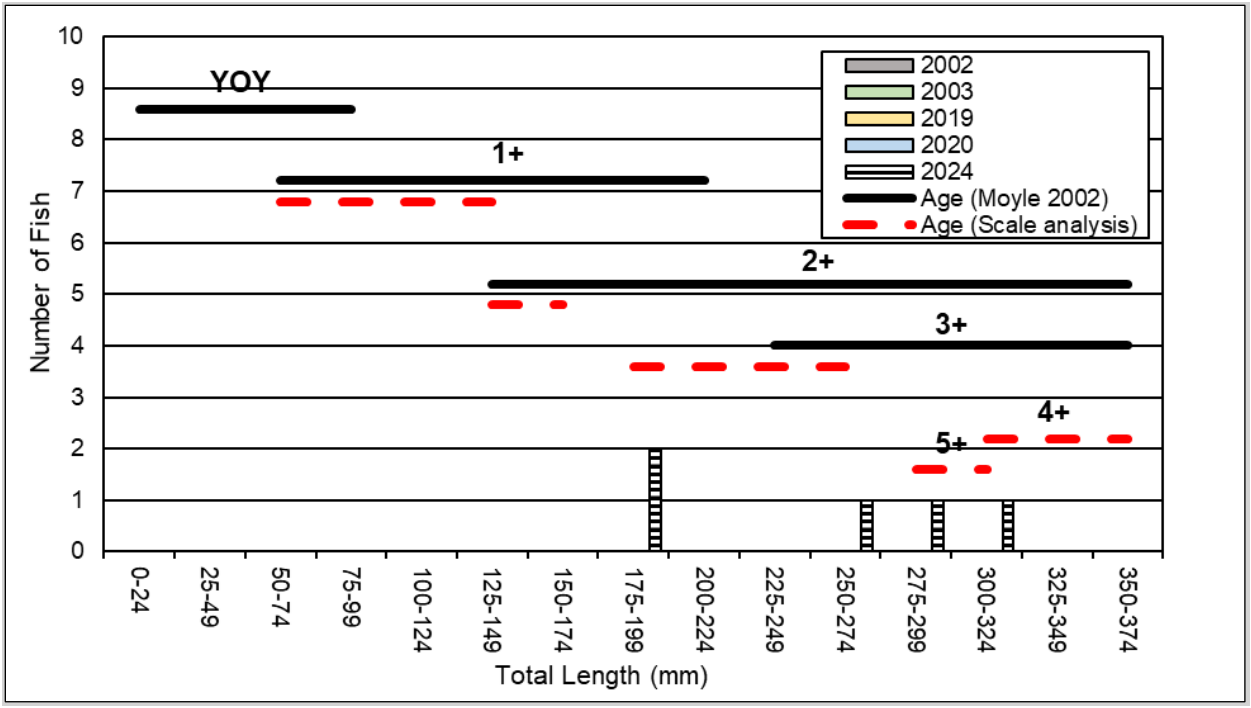


Figure B7-21. Length-frequency and age-class distribution of brown trout at Site SCD-F2, South Fork American River downstream of Slab Creek Dam, 2002–2024.

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APPENDIX B8

Scale Analysis Data

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Table B8-1. Scale Analysis Data, 2024.

Species	Sample ID	Total Length (millimeters)	Weight (grams)	Age Determined from Scale Analysis
Site RRD-F1				
Rainbow trout	7	172	48.0	2+
Rainbow trout	1	129	20.8	1+
Rainbow trout	12	65	2.8	1+
Site RRD-F2				
No salmonids observed				
Site BID-F1				
No salmonids observed				
Site LLD-F2				
Rainbow trout	3	109	10.2	1+
Rainbow trout	6	181	53.7	2+
Rainbow trout	16	103	9.4	1+
Brown trout	9	136	22.9	2+
Brown trout	7	79	4.5	1+
Brown trout	2	324	295.7	4+
Brown trout	10	178	53.1	3+
Site LLD-F3				
Rainbow trout	3	137	22.7	2+
Rainbow trout	9	103	9.5	1+
Rainbow trout	4	235	115.5	3+
Rainbow trout	2	170	45.3	2+
Brown trout	8	245	135.7	3+
Brown trout	12	74	3.6	1+
Brown trout	9	134	21.2	1+
Brown trout	14	180	54.0	3+
Site GCD-F1				
Rainbow trout	5	66	2.3	0+
Rainbow trout	8	151	28.2	3+
Rainbow trout	9	172	50.7	2+
Brown trout	7	236	135.5	3+
Brown trout	6	85	5.1	1+

Species	Sample ID	Total Length (millimeters)	Weight (grams)	Age Determined from Scale Analysis
Site RPD-F1				
Rainbow trout	10	67	3.0	0+
Rainbow trout	16	142	25.1	2+
Rainbow trout	9	191	60.2	3+
Rainbow trout	5	116	13.8	1+
Brown trout	7	87	6.5	1+
Site IHD-F1				
Rainbow trout	19	82	4.7	1+
Rainbow trout	20	205	78.3	3+
Rainbow trout	13	213	86.2	3+
Rainbow trout	2	130	19.5	1+
Brown trout	2	107	12.6	1+
Brown trout	5	297	216.5	5+
Brown trout	1	212	82.6	3+
Site IHD-F2				
Rainbow trout	2	130	19.0	2+
Rainbow trout	1	59	1.8	0+
Brown trout	3	264	185.0	3+
Brown trout	4	170	45.2	2+
Brown trout	4B	264	185.0	3+

Table B8-2. Age-class Size Ranges Determined by Scale Analysis, 2024.

Site	Age 0+			Age 1+			Age 2+			Age 3+			Age 4+			Age 5+		
	n	Total Length (mm)		n	Total Length (mm)		n	Total Length (mm)		n	Total Length (mm)		n	Total Length (mm)		n	Total Length (mm)	
		min	max		min	max		min	max		min	max		min	max		min	max
Rainbow Trout																		
RRD-F1	--	--	--	2	65	129	1	142	142	--	--	--	--	--	--	--	--	--
RRD-F2	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
LLD-F3	--	--	--	1	103	103	2	137	170	1	235	235	--	--	--	--	--	--
LLD-F2	--	--	--	2	103	109	1	181	181	--	--	--	--	--	--	--	--	--
RPD-F1	1	67	67	1	116	116	1	142	142	1	191	191	--	--	--	--	--	--
GCD-F1	1	66	66	--	--	--	1	172	172	1	151	151	--	--	--	--	--	--
IHD-F1	--	--	--	2	82	130	--	--	--	2	205	213	--	--	--	--	--	--
IHD-F2	1	59	59	--	--	--	1	130	130	--	--	--	--	--	--	--	--	--
Brown Trout																		
LLD-F2	--	--	--	1	79	79	1	136	136	1	178	178	1	324	324	--	--	--
LLD-F3	--	--	--	2	74	134	--	--	--	2	180	245	--	--	--	--	--	--
RRD-F1	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
RRD-F2	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
GCD-F1	--	--	--	1	85	85	--	--	--	1	236	236	--	--	--	--	--	--
RPD-F1	--	--	--	1	87	87	--	--	--	--	--	--	--	--	--	--	--	--
IHD-F1	--	--	--	1	107	107	--	--	--	1	212	212	--	--	--	1	297	297
IHD-F2	--	--	--	--	--	--	1	170	170	2	264	264	--	--	--	--	--	--

Notes: -- = not measured or not applicable

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APPENDIX C1

Benthic Macroinvertebrate Site Photographs

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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. Rubicon River at Site RRD-I2, 2024.



Facing upstream from Transect A



Facing downstream from Transect F



Facing upstream from Transect F



Facing downstream from Transect K

Figure C1-2. Gerle Creek at Site LLD-I3, 2024.



Facing upstream from Transect A



Facing downstream from Transect F



Facing upstream from Transect F

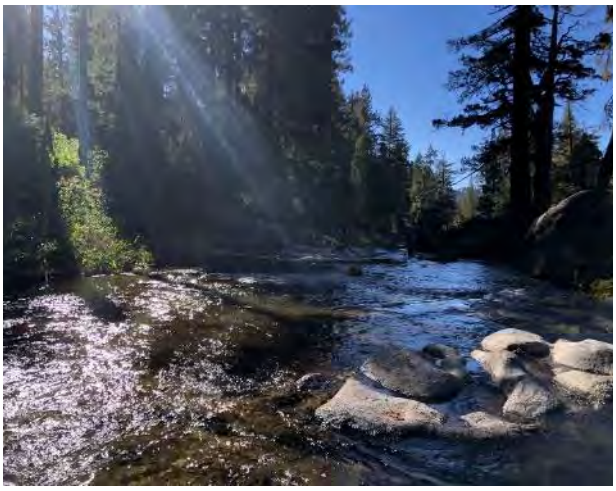


Facing downstream from Transect K

Figure C1-3. Gerle Creek at Site GCD-I2, 2024.



Facing upstream from Transect A



Facing downstream from Transect F



Facing upstream from Transect F



Facing downstream from Transect K

Figure C1-4. South Fork Rubicon River at Site RPD-I2, 2024.



Facing upstream from Transect A



Facing downstream from Transect F



Facing upstream from Transect F



Facing downstream from Transect K

Figure C1-5. South Fork Silver Creek at Site IHD-I2, 2024.



Facing upstream from Transect A



Facing downstream from Transect F



Facing upstream from Transect F



Facing downstream from Transect K

Figure C1-6. Silver Creek at Site JD-I1, 2024.



Facing upstream from Transect A



Facing downstream from Transect F



Facing upstream from Transect F



Facing downstream from Transect K

Figure C1-7. Silver Creek at Site JD-I4, 2024.



Facing upstream from Transect A



Facing downstream from Transect F

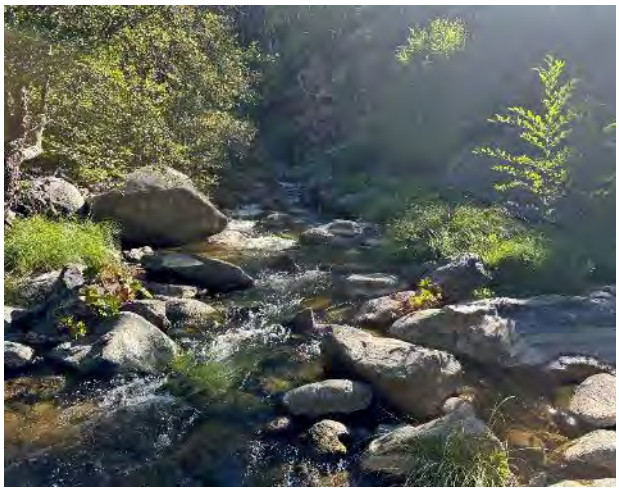


Facing upstream from Transect F



Facing downstream from Transect K

Figure C1-8. Silver Creek at Site CD-I2, 2024.



Facing upstream from Transect A



Facing downstream from Transect F



Facing upstream from Transect F



Facing downstream from Transect K

Figure C1-9. Silver Creek at Site CD-I3, 2024.



Facing upstream from Transect A



Facing downstream from Transect F



Facing upstream from Transect F



Facing downstream from Transect K

Figure C1-10. South Fork American River at Site SCD-I1, 2024.



Facing upstream from Transect A



Facing downstream from Transect F



Facing upstream from Transect F



Facing downstream from Transect K

Figure C1-11. South Fork American River at Site SCD-I3, 2024.

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APPENDIX C2

Benthic Macroinvertebrate Taxonomic List

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Table C2-1. List of Benthic Macroinvertebrate Taxa Identified by Site for Samples Collected from the Upper American River Project in 2024.

Phylum	Class	Order	Family	Final ID	Tolerance Value[1]	Functional Feeding Group[2]	Total Count											
							Site RRD-I2	Site LLD-I3	Site LLD-I3 (rep)	Site GCD-I2	Site RPD-I2	Site IHD-I2	Site JD-I1	Site JD-I4	Site CD-I2	Site CD-I3	Site SCD-I1	Site SCD-I3
Platyhelminthes	Turbellaria			Turbellaria	4	P				2		17	2	2	3	1	12	
Nemertea	Enopla	Hoplonemertea	Tetrastemmatidae	*Prostoma*	8	P										10		70
Mollusca	Bivalvia	Veneroida	Sphaeriidae	*Pisidium*	8	CF	3	12	1	6		2		3				6
Mollusca	Gastropoda	Sorbeoconcha	Pleuroceridae	*Juga*	7	SC								14				
Mollusca	Gastropoda	Basommatophora	Physidae	*Physa*	8	SC												60
Mollusca	Gastropoda	Basommatophora	Planorbidae	*Menetus opercularis*	6	SC												2
Mollusca	Gastropoda	Basommatophora	Planorbidae	*Ferrissia*	6	SC												1
Annelida	Oligochaeta			Oligochaeta	5	CG	19	18	3	35		23	135	56	21	127	3	172
Arthropoda	Arachnida	Acari		Acari	5	P				1								
Arthropoda	Arachnida	Acari	Hydryphantidae	*Protzia*	8	P	1											
Arthropoda	Arachnida	Acari	Hygrobatidae	*Atractides*	8	P					1							
Arthropoda	Arachnida	Acari	Hygrobatidae	*Hygrobates*	8	P		2	1	1	4			29	11	3	2	10
Arthropoda	Arachnida	Acari	Lebertiidae	*Lebertia*	8	P	3	6	1	9	3	23	1	8	11	5	1	11
Arthropoda	Arachnida	Acari	Limnesiidae	*Limnesia*	5	P												3
Arthropoda	Arachnida	Acari	Mideopsidae	*Mideopsis*	5	P				6				2				
Arthropoda	Arachnida	Acari	Momoniidae	*Stygomomonia*	5	P								1				
Arthropoda	Arachnida	Acari	Sperchontidae	*Sperchon*	8	P	1	1	3	1	2	1		3	11	2		3
Arthropoda	Arachnida	Acari	Sperchontidae	*Sperchonopsis*	8	P									2			
Arthropoda	Arachnida	Acari	Torrenticolidae	Torrenticolidae	5	P	3	4		10	2			3	4			
Arthropoda	Arachnida	Acari	Torrenticolidae	*Torrenticola*	5	P	3	27	6	28	3			26	7	1	2	
Arthropoda	Ostracoda			Ostracoda	8	CG				2		1	1					1
Arthropoda	Malacostraca	Amphipoda	Crangonyctidae	*Crangonyx*	4	CG									1		3	44
Arthropoda	Malacostraca	Amphipoda	Hyalellidae	*Hyalella*	8	CG												13
Arthropoda	Malacostraca	Isopoda	Asellidae	Asellidae	8	CG											1	
Arthropoda	Malacostraca	Decapoda	Astacidae	*Pacifastacus leniusculus*	6	OM												1
Arthropoda	Insecta	Ephemeroptera	Ameletidae	*Ameletus*	0	CG	2	3	2	1		2	3	8		1		
Arthropoda	Insecta	Ephemeroptera	Baetidae	*Acentrella insignificans*	4	CG										5		
Arthropoda	Insecta	Ephemeroptera	Baetidae	*Anafroptilum*	2	CG	3	3					1	2	1			4
Arthropoda	Insecta	Ephemeroptera	Baetidae	*Baetis alius*	5	CG	36		2	9	20		12	29				

Phylum	Class	Order	Family	Final ID	Tolerance Value[1]	Functional Feeding Group[2]	Total Count											
							Site RRD-I2	Site LLD-I3	Site LLD-I3 (rep)	Site GCD-I2	Site RPD-I2	Site IHD-I2	Site JD-I1	Site JD-I4	Site CD-I2	Site CD-I3	Site SCD-I1	Site SCD-I3
Arthropoda	Insecta	Ephemeroptera	Baetidae	*Baetis flavistriga* complex	4	CG	11											
Arthropoda	Insecta	Ephemeroptera	Baetidae	*Baetis piscatoris* comp.	5	CG	24				2				2	2		
Arthropoda	Insecta	Ephemeroptera	Baetidae	*Baetis tricaudatus* complex	6	CG	4	4	23	15	123	72	12	31	73	47	109	8
Arthropoda	Insecta	Ephemeroptera	Baetidae	*Diphetor hageni*	5	CG	4			3						4		
Arthropoda	Insecta	Ephemeroptera	Baetidae	*Procloeon*	4	CG	2									1		9
Arthropoda	Insecta	Ephemeroptera	Ephemerellidae	*Attenella*	2	CG						1						
Arthropoda	Insecta	Ephemeroptera	Ephemerellidae	*Caudatella*	1	CG		1	7		6	24						
Arthropoda	Insecta	Ephemeroptera	Ephemerellidae	*Caudatella hystrix*	1	CG									1			
Arthropoda	Insecta	Ephemeroptera	Ephemerellidae	*Drunella doddsi*	0	CG			12			3		1				
Arthropoda	Insecta	Ephemeroptera	Ephemerellidae	*Drunella grandis*	0	CG		3	5			13						
Arthropoda	Insecta	Ephemeroptera	Ephemerellidae	*Ephemerella*	1	CG	37	39	20	18	12		14	9	3	2	10	1
Arthropoda	Insecta	Ephemeroptera	Ephemerellidae	*Serratella*	2	CG						66	8	2				
Arthropoda	Insecta	Ephemeroptera	Heptageniidae	*Cinygma*	2	SC	2			3	1	3	8	2		6		
Arthropoda	Insecta	Ephemeroptera	Heptageniidae	*Cinygmula*	4	SC	43	14	4	2		1						
Arthropoda	Insecta	Ephemeroptera	Heptageniidae	*Ecdyonurus criddlei*	3	SC	2	2	1	2	2			1	1	1	4	
Arthropoda	Insecta	Ephemeroptera	Heptageniidae	*Epeorus*	0	SC	36	19	55	1	2			3	2	6		
Arthropoda	Insecta	Ephemeroptera	Heptageniidae	*Ironodes*	3	SC	37	7	16	13	5	5	3	11	3	6		
Arthropoda	Insecta	Ephemeroptera	Heptageniidae	*Rhithrogena*	0	SC	1	5	5			10			2	4	1	
Arthropoda	Insecta	Ephemeroptera	Leptohyphidae	*Tricorythodes*	4	CG										3		1
Arthropoda	Insecta	Ephemeroptera	Leptophlebiidae	*Paraleptophlebia*	4	CG	37	17	1	78	8		13	18	19	3	5	
Arthropoda	Insecta	Plecoptera	Capniidae	Capniidae	1	SH		1				1						
Arthropoda	Insecta	Plecoptera	Chloroperlidae	Chloroperlidae	1	P						1						
Arthropoda	Insecta	Plecoptera	Chloroperlidae	*Sweltsa*	1	P	3	11		14		12	2		2			
Arthropoda	Insecta	Plecoptera	Leuctridae	*Moselia infuscata*	0	SH				4								
Arthropoda	Insecta	Plecoptera	Nemouridae	*Malenka*	2	SH	9	2	1	6	2	50	28	2	4	3	12	
Arthropoda	Insecta	Plecoptera	Nemouridae	*Soyedina*	2	SH							1					
Arthropoda	Insecta	Plecoptera	Nemouridae	*Zapada cinctipes*	2	SH	35	20	20	35	8	77	8	14	1	1	2	
Arthropoda	Insecta	Plecoptera	Nemouridae	*Zapada frigida*	2	SH		2		4		1						

Phylum	Class	Order	Family	Final ID	Tolerance Value[1]	Functional Feeding Group[2]	Total Count											
							Site RRD-I2	Site LLD-I3	Site LLD-I3 (rep)	Site GCD-I2	Site RPD-I2	Site IHD-I2	Site JD-I1	Site JD-I4	Site CD-I2	Site CD-I3	Site SCD-I1	Site SCD-I3
Arthropoda	Insecta	Plecoptera	Nemouridae	*Zapada oregonensis* group	2	SH			2	3	1	15	2	1				
Arthropoda	Insecta	Plecoptera	Peltoperlidae	*Yoraperla*	1	SH		3		6	1	32						
Arthropoda	Insecta	Plecoptera	Perlidae	*Calineuria californica*	2	P	9	6	2	10	2		3	6	7	3	1	
Arthropoda	Insecta	Plecoptera	Perlidae	*Hesperoperla pacifica*	2	P		1		5			2	4	1	1		
Arthropoda	Insecta	Plecoptera	Perlodidae	*Cultus*	2	P									1	1		
Arthropoda	Insecta	Plecoptera	Perlodidae	*Frisonia picticeps*	2	P						1						
Arthropoda	Insecta	Plecoptera	Perlodidae	*Isoperla*	2	P		4	4		2					7	4	
Arthropoda	Insecta	Plecoptera	Perlodidae	*Kogotus/Rickera*	2	P						3	3					
Arthropoda	Insecta	Plecoptera	Perlodidae	*Skwala*	2	P	1											
Arthropoda	Insecta	Plecoptera	Taeniopterygidae	Taeniopterygidae	2	OM		1				3			6	3	1	
Arthropoda	Insecta	Trichoptera	Apataniidae	*Apatania*	1	SC		5	8		1	1						
Arthropoda	Insecta	Trichoptera	Brachycentridae	*Amiocentrus aspilus*	3	CG		4	10		1			1			1	
Arthropoda	Insecta	Trichoptera	Brachycentridae	*Micrasema*	1	MH	6	73	110	4	23	2		5	2	1	112	
Arthropoda	Insecta	Trichoptera	Calamoceratidae	*Heteroplectron californicum*	1	SH		1			2							
Arthropoda	Insecta	Trichoptera	Glossosomatidae	*Agapetus*	0	SC	3				1							
Arthropoda	Insecta	Trichoptera	Glossosomatidae	*Glossosoma*	1	SC	3	3	4	1								
Arthropoda	Insecta	Trichoptera	Helicopsychidae	*Helicopsyche*	3	SC	4											
Arthropoda	Insecta	Trichoptera	Hydropsychidae	*Arctopsyche*	1	P			4	2	43			9				
Arthropoda	Insecta	Trichoptera	Hydropsychidae	*Cheumatopsyche*	5	CF									3	11	19	1
Arthropoda	Insecta	Trichoptera	Hydropsychidae	*Hydropsyche*	4	CF	18	8	48	9	2			10	5	7	92	
Arthropoda	Insecta	Trichoptera	Hydropsychidae	*Parapsyche*	0	P				1		3						
Arthropoda	Insecta	Trichoptera	Hydroptilidae	Hydroptilidae	6	PH		2				1						
Arthropoda	Insecta	Trichoptera	Hydroptilidae	*Agraylea*	8	PH	1	3	3	10	47		1					
Arthropoda	Insecta	Trichoptera	Hydroptilidae	*Hydroptila*	6	PH	8	12	12	13	130		1	36	68	66	11	3
Arthropoda	Insecta	Trichoptera	Hydroptilidae	*Neotrichia*	4	SC										2		
Arthropoda	Insecta	Trichoptera	Hydroptilidae	*Ochrotrichia*	4	PH	1	1	25	3	9			4				
Arthropoda	Insecta	Trichoptera	Lepidostomatidae	*Lepidostoma*	1	SH	11	18	6	13	4		5	23	1	1	7	
Arthropoda	Insecta	Trichoptera	Leptoceridae	*Ceraclea*	3	OM												1

Phylum	Class	Order	Family	Final ID	Tolerance Value[1]	Functional Feeding Group[2]	Total Count											
							Site RRD-I2	Site LLD-I3	Site LLD-I3 (rep)	Site GCD-I2	Site RPD-I2	Site IHD-I2	Site JD-I1	Site JD-I4	Site CD-I2	Site CD-I3	Site SCD-I1	Site SCD-I3
Arthropoda	Insecta	Trichoptera	Leptoceridae	*Mystacides*	4	OM	1			3								7
Arthropoda	Insecta	Trichoptera	Leptoceridae	*Oecetis*	8	P				1								
Arthropoda	Insecta	Trichoptera	Limnephilidae	*Dicosmoecus gilvipes*	2	SC	3											
Arthropoda	Insecta	Trichoptera	Limnephilidae	*Psychoglypha*	2	SH		1		1								
Arthropoda	Insecta	Trichoptera	Philopotamidae	*Dolophilodes*	2	CF										1		
Arthropoda	Insecta	Trichoptera	Philopotamidae	*Wormaldia*	3	CF	3		2	4	1				1	9	15	
Arthropoda	Insecta	Trichoptera	Polycentropodidae	*Polycentropus*	6	P	1	5	1	6			1	1				1
Arthropoda	Insecta	Trichoptera	Rhyacophilidae	*Rhyacophila betteni* group	1	P	2		2	3		3	1	1	1	1	1	
Arthropoda	Insecta	Trichoptera	Rhyacophilidae	*Rhyacophila brunnea* group	1	P			4	3	6	7	2		1	1		
Arthropoda	Insecta	Trichoptera	Rhyacophilidae	*Rhyacophila hyalinata* group	1	P			5									
Arthropoda	Insecta	Trichoptera	Rhyacophilidae	*Rhyacophila sibirica* group	0	P	2		5	1				2		1		
Arthropoda	Insecta	Trichoptera	Sericostomatidae	*Gumaga*	3	SH	4	5	1	13	1			4				
Arthropoda	Insecta	Hemiptera	Corixidae	*Sigara*	8	P												1
Arthropoda	Insecta	Odonata	Aeshnidae	Aeshnidae	5	P								1				
Arthropoda	Insecta	Odonata	Aeshnidae	*Aeshna*	5	P												1
Arthropoda	Insecta	Odonata	Calopterygidae	*Hetaerina americana*	6	P												1
Arthropoda	Insecta	Odonata	Coenagrionidae	Coenagrionidae	7	P												1
Arthropoda	Insecta	Odonata	Coenagrionidae	*Argia*	7	P	1									7		3
Arthropoda	Insecta	Odonata	Cordulegastridae	*Cordulegaster dorsalis*	3	P				1								
Arthropoda	Insecta	Odonata	Gomphidae	*Octogomphus specularis*	4	P	1	3		5								
Arthropoda	Insecta	Odonata	Libellulidae	Libellulidae	9	P									1			1
Arthropoda	Insecta	Megaloptera	Corydalidae	*Orohermes crepusculus*	0	P	1	1	1	1		5		1				
Arthropoda	Insecta	Megaloptera	Sialidae	*Sialis*	4	P				14				2				1
Arthropoda	Insecta	Lepidoptera	Pyralidae	*Petrophila*	5	SC												4
Arthropoda	Insecta	Coleoptera	Dytiscidae	*Oreodytes*	5	P		1		1								

Phylum	Class	Order	Family	Final ID	Tolerance Value[1]	Functional Feeding Group[2]	Total Count										
							Site RRD-I2	Site LLD-I3	Site LLD-I3 (rep)	Site GCD-I2	Site RPD-I2	Site IHD-I2	Site JD-I1	Site JD-I4	Site CD-I2	Site CD-I3	Site SCD-I1	Site SCD-I3
Arthropoda	Insecta	Coleoptera	Dytiscidae	*Oreodytes picturatus*	5	P	1										
Arthropoda	Insecta	Coleoptera	Elmidae	*Ampumixis dispar*	4	CG		5	6		11						1	
Arthropoda	Insecta	Coleoptera	Elmidae	*Bryelmis*	4	CG					1							
Arthropoda	Insecta	Coleoptera	Elmidae	*Cleptelmis addenda*	4	CG	1	2	2		2				2	4		5
Arthropoda	Insecta	Coleoptera	Elmidae	*Dubiraphia*	6	CG												1
Arthropoda	Insecta	Coleoptera	Elmidae	*Heterlimnius*	4	CG				1		17						
Arthropoda	Insecta	Coleoptera	Elmidae	*Microcylloepus*	4	CG										2		
Arthropoda	Insecta	Coleoptera	Elmidae	*Optioservus*	4	SC		1		4	4				12	21		
Arthropoda	Insecta	Coleoptera	Elmidae	*Ordobrevia nubifera*	4	SC		1			2			4	8	16		
Arthropoda	Insecta	Coleoptera	Elmidae	*Zaitzevia parvula*	4	SC	2	8	1						4	6	1	
Arthropoda	Insecta	Coleoptera	Elmidae	*Zaitzevia posthonia*	4	SC								1				
Arthropoda	Insecta	Coleoptera	Eulichadidae	*Stenocolus scutellaris*	4	SH										1		
Arthropoda	Insecta	Coleoptera	Hydraenidae	*Hydraena*	5	SC		1	1			1					1	
Arthropoda	Insecta	Coleoptera	Hydrophilidae	*Paracymus*	5	CG											1	
Arthropoda	Insecta	Coleoptera	Psephenidae	*Eubrianax edwardsii*	4	SC	18	1			1				2			
Arthropoda	Insecta	Diptera	Ceratopogonidae	Ceratopogonidae	6	P									1			
Arthropoda	Insecta	Diptera	Ceratopogonidae	*Atrichopogon*	6	CG										2		
Arthropoda	Insecta	Diptera	Ceratopogonidae	*Bezzia/Palpomyia*	6	P	1	5		1		1						
Arthropoda	Insecta	Diptera	Ceratopogonidae	*Dasyhelea*	6	CG												3
Arthropoda	Insecta	Diptera	Ceratopogonidae	*Forcipomyia*	6	CG		1										
Arthropoda	Insecta	Diptera	Chironominae	Chironominae	6	CG	119	134	47	93	7	33	102	39	119	77	51	101
Arthropoda	Insecta	Diptera	Diamesinae	Diamesinae	2	CG		1	2	5	2	2	9	7	8	5	14	2
Arthropoda	Insecta	Diptera	Orthocladiinae	Orthocladiinae	5	CG	9	62	74	32	28	42	170	117	74	83	98	34
Arthropoda	Insecta	Diptera	Tanypodinae	Tanypodinae	7	P	6	12	3	10	1		7	22	11	7	14	4
Arthropoda	Insecta	Diptera	Dixidae	*Dixa*	2	CG	1											
Arthropoda	Insecta	Diptera	Dolichopodidae	Dolichopodidae	6	P												1
Arthropoda	Insecta	Diptera	Empididae	Clinocerinae	6	P		1	1	2			2	1	1	2		
Arthropoda	Insecta	Diptera	Empididae	*Hemerodromia*	6	P									1	1	1	2

Phylum	Class	Order	Family	Final ID	Tolerance Value[1]	Functional Feeding Group[2]	Total Count											
							Site RRD-I2	Site LLD-I3	Site LLD-I3 (rep)	Site GCD-I2	Site RPD-I2	Site IHD-I2	Site JD-I1	Site JD-I4	Site CD-I2	Site CD-I3	Site SCD-I1	Site SCD-I3
Arthropoda	Insecta	Diptera	Empididae	*Neoplasta*	6	P		2	1	1		4	4	1	2		3	1
Arthropoda	Insecta	Diptera	Empididae	*Trichoclinocera*	6	P								5				
Arthropoda	Insecta	Diptera	Psychodidae	*Maruina lanceolata*	2	SC									1			
Arthropoda	Insecta	Diptera	Simuliidae	*Simulium*	6	CF	1	2	14	10	86	30	36	10	80	4	4	1
Arthropoda	Insecta	Diptera	Stratiomyidae	*Caloparyphus/ Euparyphus*	8	CG										1		
Arthropoda	Insecta	Diptera	Tipulidae	*Antocha*	3	CG	1	1	4	1	5			4	1	4	2	
Arthropoda	Insecta	Diptera	Tipulidae	*Cryptolabis*	3	SH	2											
Arthropoda	Insecta	Diptera	Tipulidae	*Dicranomyia*	6	SH										1		
Arthropoda	Insecta	Diptera	Tipulidae	*Dicranota*	3	P				1	1							
Arthropoda	Insecta	Diptera	Tipulidae	*Hexatoma*	2	P	2			1								

Note: rep = replicate

[1] Tolerance values range from 0–10 and reflect the taxon's sensitivity to perturbations in water and habitat quality; as values increase, sensitivity decreases. Source: Richards and Rogers (2011).

[2] Functional feeding groups: CF = collector-filterer, CG = collector-gatherer, MH = macrophyte-herbivore, OM = omnivore, P = predator, PH = piercer-herbivore, SC = scraper, SH = shredder

APPENDIX C3

Benthic Macroinvertebrate Metric Values

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Table C3-1. Biological Metric Values for BMI Samples Collected for the Upper American River Project, 2024.

Metric	Site RRD-I2	Site LLD-I3	Site LLD-I3 (rep)	Site GCD-I2	Site RPD-I2	Site IHD-I2	Site JD-I1	Site JD-I4	Site CD-I2	Site CD-I3	Site SCD-I1	Site SCD-I3
Richness												
Taxonomic richness[1]	50	52	42	56	40	34	26	44	42	48	32	36
EPT taxa	37	36	35	38	30	28	23	28	25	32	18	10
Ephemeroptera taxa	16	12	13	11	10	11	9	12	10	14	5	5
Plecoptera taxa	5	10	5	9	6	11	8	5	7	7	5	0
Trichoptera taxa	16	14	17	18	14	6	6	11	8	11	8	5
Coleoptera taxa	4	8	4	3	6	2	0	2	5	6	4	2
Predator taxa	18	17	16	29	12	13	12	21	19	17	10	17
ET taxa	32	26	30	29	24	17	15	23	18	25	13	10
Shredder taxa[1]	5.0	7.6	3.6	6.8	5.3	3.8	3.9	4.0	2.8	3.5	3.0	0.0
Composition												
EPT index (%)	67	50	72	53	74	67	22	40	35	35	65	6.0
EPT taxa (%)[1]	62	60	67	57	63	66	70	53	49	57	54	23
Sensitive EPT index (%)	36	39	52	28	20	55	16	18	7	10	27	1
Shannon diversity	3.18	3.15	3.07	3.41	2.70	3.00	2.29	3.17	2.78	2.88	2.51	2.46
Dominant taxon (%)	20	21	18	15	21	13	28	19	20	21	18	29
Non-insect taxa (%)	12	11	11	16	12	14	12	21	18	12	19	33
Clinger taxa (%)[1]	57	60	70	54	69	66	50	62	69	58	64	27
Coleoptera taxa (%)[1]	7.1	12	8.8	5.0	13	4.5	0.0	4.3	12	12	10	4.9
Tolerance												
Tolerance value	3.8	3.8	3.0	4.2	5.0	3.4	4.7	4.8	5.4	5.0	4.1	6.0
Intolerant organisms (%)	28	36	47	24	19	55	17	17	7.4	8.1	27	1.2
Intolerant taxa (%)	35	40	43	37	37	60	50	36	35	33	30	7
Intolerant individuals (%)[1]	28	36	47	23	18	55	15	15	5.9	7.3	24	0.2
Tolerant organisms (%)	1.5	3.8	1.5	4.9	9.0	4.4	0.5	7.1	5.9	3.5	0.6	29
Tolerant taxa (%)	8	8	9	10	10	9	9	8	10	9	8	23
Functional Feeding Groups												
Collector-gatherers (%)	51	48	36	48	36	49	80	54	53	62	48	66
Collector-filterers (%)	4.1	3.5	11	4.8	14	5.2	6.0	3.8	15	5.3	21	1.3
Collector individuals (%)	55	51	47	53	50	54	86	58	68	67	69	68
Scrapers (%)	25	11	16	4.3	3.0	3.4	1.8	6.0	5.7	11	1.1	11
Predators (%)	6.9	15	7.3	23	11	13.2	5.0	22	13	8.9	6.6	19

Metric	Site RRD-I2	Site LLD-I3	Site LLD-I3 (rep)	Site GCD-I2	Site RPD-I2	Site IHD-I2	Site JD-I1	Site JD-I4	Site CD-I2	Site CD-I3	Site SCD-I1	Site SCD-I3
Shredders (%)	10	8.5	5.0	14.0	3.0	29	7.3	7.3	1.0	1.2	3.4	0.0
Other (%)	2.8	15	25	5.4	33	1.0	0.3	7.5	12	12	20	2.0
Non-gastropod sc (%)	25	11	16	4.3	3.0	3.4	1.8	3.7	5.7	11	1.1	0.7
Indices												
California Stream Condition Index[2]	1.15	1.25	1.21	1.06	1.07	0.86	0.77	1.03	1.01	1.05	0.89	0.42

Notes: % = percent
EPT = Ephemeroptera, Plecoptera, and Trichoptera
ET = Ephemeroptera and Trichoptera
sc = scraper

[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 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.

APPENDIX D1

Flow Data

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Table D1-1. Monthly Average Flows for the Rubicon River below Rubicon Dam (USGS 11427960 and Dam Spill).

Water Year	Average Flow (cubic feet per second)												
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Annual Mean
2003	1.2	4.4	6.8	6.6	6.3	6.8	6.4	7.3	7.5	6.9	5.0	1.6	5.6
2004	1.2	1.2	5.3	6.5	6.4	6.8	7.0	7.0	6.5	6.7	4.7	1.1	5.0
2005	2.7	6.8	6.8	6.7	6.6	6.7	6.9	21.0	7.7	6.9	6.7	1.1	7.2
2006	1.1	6.4	82.1	6.9	12.5	6.8	7.2	17.3	9.8	7.5	7.0	3.3	14.1
2007	1.7	13.2	7.1	7.1	7.3	6.9	6.9	7.2	7.0	5.5	0.7	0.5	5.9
2008	2.4	5.0	5.7	6.5	6.6	6.7	7.0	6.8	6.7	5.9	1.3	0.5	5.1
2009	1.9	6.8	6.0	6.6	6.7	6.8	9.4	27.7	6.7	6.8	3.3	0.6	7.3
2010	6.6	6.4	7.1	7.3	6.4	6.6	6.8	6.8	60.9	6.8	5.6	1.7	10.7
2011	78.2	6.7	6.9	6.7	6.6	6.7	7.1	7.6	56.1	7.9	6.7	6.1	17.0
2012	6.2	6.4	5.3	9.3	6.6	6.8	16.8	7.7	7.2	6.7	2.5	1.3	6.9
2013	1.7	6.5	26.5	6.4	6.3	6.6	7.1	7.3	12.2	6.3	3.3	0.9	7.6
2014	0.7	0.8	1.7	1.6	6.3	6.3	6.6	6.5	6.4	4.5	2.0	1.0	3.7
2015	1.4	6.7	8.0	7.8	21.5	10.6	10.8	11.7	7.2	2.9	1.4	1.3	7.5
2016	1.4	6.2	6.4	21.9	6.6	15.9	21.5	35.8	15.8	6.6	3.9	1.2	11.2
2017	105.7	7.9	76.1	81.9	143.9	15.9	23.2	56.9	27.0	12.2	7.3	7.0	48.0
2018	8.7	91.1	11.0	11.3	12.0	20.1	87.6	38.2	22.9	11.0	2.5	1.6	26.4
2019	2.5	3.5	9.9	10.0	11.0	21.0	27.3	39.7	3.0	6.9	7.0	6.7	21.4

Water Year	Average Flow (cubic feet per second)												
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Annual Mean
2020	6.2	3.0	7.5	7.1	7.2	9.0	13.0	21.9	9.3	7.1	2.5	1.3	8.0
2021	1.0	2.1	3.6	8.6	9.0	11.4	13.3	14.5	8.4	4.8	1.4	1.3	6.6
2022	74.5	6.6	6.5	6.4	8.1	17.8	18.5	26.1	20.7	7.6	3.3	2.9	16.3
2023	1.7	6.0	64.7	7.0	7.3	16.4	22.4	37.9	39.1	7.1	7.0	7.0	17.5
2024	7.8	5.6	7.0	7.0	7.0	19.0	21.9	38.0	18.4	8.1	4.3	1.9	12.2

Table D1-2. Monthly Average Flows for Gerle Creek below Loon Lake Dam (USGS 11429500).

Water Year	Average Flow (cubic feet per second)												
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Annual Mean
2003	9.8	10.3	10.0	10.2	10.2	10.6	11.3	12.1	10.8	12.6	10.0	9.5	10.6
2004	11.0	9.8	9.9	9.9	10.1	11.0	11.8	10.6	10.1	9.9	9.4	9.5	10.3
2005	12.3	9.4	9.4	9.5	9.3	10.1	10.6	12.3	9.5	9.2	9.0	9.5	10.0
2006	9.4	9.3	12.5	10.9	10.6	10.2	10.9	12.6	9.8	9.2	9.2	9.5	10.3
2007	8.6	8.9	9.2	9.2	9.5	9.5	9.5	8.5	8.4	8.3	8.1	8.6	8.8
2008	8.8	8.9	8.9	9.1	8.8	9.2	10.1	9.6	8.9	8.8	8.5	8.6	9.0
2009	8.7	9.0	8.7	8.8	9.1	9.1	9.4	10.2	9.2	9.0	8.7	8.7	9.0
2010	8.9	8.9	8.9	9.0	9.2	9.5	10.0	10.0	9.4	9.3	9.0	8.8	9.2
2011	9.3	9.1	9.1	9.1	9.2	9.1	9.2	10.0	10.8	9.2	9.0	8.8	9.3
2012	9.1	9.0	8.9	9.1	9.2	9.8	10.6	9.6	9.4	9.0	9.3	9.9	9.4
2013	9.9	10.4	10.1	9.1	9.9	10.5	10.2	10.0	9.4	8.9	9.2	9.8	9.8
2014	14.1	8.7	8.5	8.5	9.7	9.8	9.0	8.9	8.9	8.9	9.1	8.9	9.4
2015	12.8	13.1	13.4	16.2	19.3	25.1	27.7	26.0	11.2	5.6	5.6	5.6	15.1
2016	7.4	7.5	8.7	12.6	19.6	31.2	53.1	57.3	91.7	28.0	18.2	18.0	29.3
2017	21.0	17.5	19.4	20.2	33.6	59.5	62.5	67.5	50.9	36.4	22.9	22.6	36.1
2018	25.0	25.4	29.1	31.1	29.9	29.6	42.3	44.2	25.0	24.6	15.5	19.6	28.4
2019	19.7	18.5	20.2	21.3	25.2	47.1	64.4	111.5	38.4	35.6	23.0	22.3	37.4

Water Year	Average Flow (cubic feet per second)												
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Annual Mean
2020	24.6	24.7	28.7	30.2	27.0	25.3	34.2	34.4	17.7	14.5	11.2	11.6	23.7
2021	11.9	11.3	13.8	15.7	19.6	26.3	35.4	30.8	11.1	6.9	6.9	6.9	16.4
2022	8.2	8.1	9.3	13.6	25.4	37.9	41.0	60.7	25.0	24.7	15.7	15.2	23.7
2023	17.7	17.7	20.2	21.2	32.4	49.5	64.6	64.4	94.2	37.1	23.6	23.4	38.8
2024	26.2	26.6	30.4	32.5	30.9	35.0	45.2	62.4	27.3	25.8	16.9	16.2	31.3

Table D1-3. Monthly Average Flows for South Fork Silver Creek below Ice House Dam (USGS 11441500).

Water Year	Average Flow (cubic feet per second)												
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Annual Mean
2003	14.4	9.5	5.7	6.1	6.1	4.8	5.4	10.6	10.9	18.4	19.1	20.3	11.0
2004	16.2	10.0	6.6	5.2	5.4	5.8	8.6	14.0	10.1	19.5	18.7	19.1	11.3
2005	12.2	8.5	5.0	4.9	4.4	4.8	5.9	11.4	91.3	18.5	16.8	17.1	16.7
2006	169.9	16.4	6.8	5.3	4.1	4.7	8.2	10.3	9.9	18.2	17.7	17.7	24.4
2007	130.6	9.1	5.5	3.8	4.2	3.9	6.0	6.0	5.5	5.8	5.8	5.7	16.2
2008	163.6	5.9	6.0	6.1	6.0	6.0	5.8	5.9	5.8	5.7	5.9	6.4	19.3
2009	6.3	5.8	5.8	6.0	6.0	6.4	4.8	9.6	9.0	16.2	17.1	16.2	9.1
2010	13.4	13.6	114.7	4.5	4.0	3.9	4.4	9.0	9.5	16.0	16.0	16.0	18.9
2011	151.3	59.4	5.8	4.0	4.2	5.0	5.8	10.3	10.4	16.7	16.0	16.4	25.6
2012	15.2	8.8	4.6	3.8	3.7	4.8	6.0	8.1	9.9	16.7	17.2	11.3	9.2
2013	12.5	11.6	5.9	4.2	4.3	4.3	4.7	10.1	10.5	16.3	16.4	16.7	9.8
2014	13.3	8.7	4.4	3.7	4.2	3.7	5.8	5.7	5.7	5.6	5.7	5.5	6.0
2015	9.9	8.1	8.0	12.1	12.8	16.4	21.8	34.0	26.1	22.1	14.1	10.0	16.3
2016	5.5	5.4	5.8	7.2	15.3	25.9	43.2	152.3	64.7	31.3	17.6	16.0	32.6
2017	16.2	10.9	12.5	31.1	135.1	27.0	51.6	238.1	165.5	34.8	16.6	16.2	62.6
2018	16.3	9.5	12.4	20.0	20.4	22.4	46.1	145.1	68.0	34.5	16.9	18.3	35.9
2019	18.9	9.5	12.5	19.8	20.3	29.5	47.2	223.4	202.7	33.3	18.2	16.5	54.3

Water Year	Average Flow (cubic feet per second)												
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Annual Mean
2020	35.4	9.3	38.6	81.3	105.4	128.6	32.3	50.4	35.4	23.8	15.9	11.5	47.1
2021	11.0	8.1	9.0	13.7	13.7	18.0	31.5	47.2	27.7	23.3	15.7	11.9	19.3
2022	6.7	6.5	6.6	7.2	15.8	27.2	37.2	140.8	51.0	33.4	17.5	16.5	30.7
2023	16.4	9.4	14.0	19.8	20.0	27.3	47.3	242.0	109.9	33.3	16.7	16.3	48.0
2024	16.3	10.9	12.4	19.7	19.8	26.6	44.7	141.3	60.4	43.5	17.7	16.5	35.9

Table D1-4. Monthly Average Flows for Silver Creek below Camino Dam (USGS 11441900).

Water Year	Average Flow (cubic feet per second)												
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Annual Mean
2003	24.6	18.3	26.4	29.2	16.3	16.1	30.2	30.7	22.5	23.4	23.7	23.5	23.8
2004	26.1	18.8	17.5	18.3	24.3	16.7	10.9	17.7	16.8	15.1	15.0	24.9	18.5
2005	18.2	12.8	11.5	19.2	32.0	38.7	25.0	410.2	749.2	24.0	25.1	25.8	115.5
2006	24.0	12.2	556.1	474.4	171.8	192.3	1431	1021	198.1	28.5	26.1	27.2	345
2007	28.4	15.3	18.5	13.9	15.3	18.7	12.1	11.4	11.0	11.0	11.1	11.0	14.8
2008	11.0	7.3	7.0	8.2	12.3	17.5	10.0	11.6	11.6	11.6	11.0	11.0	10.8
2009	11.0	7.7	7.4	10.6	17.2	26.5	12.2	22.5	16.7	17.2	17.0	16.8	15.2
2010	16.9	10.1	11.3	17.6	23.7	21.5	22.3	20.1	243.2	19.0	19.0	19.0	36.7
2011	44.9	10.0	271.7	19.3	10.4	313.3	834.0	528.7	314.5	327.7	21.1	24.8	228
2012	24.4	11.2	11.0	57.4	11.3	25.5	20.4	11.4	11.0	11.0	11.0	11.0	18.1
2013	11.0	8.7	24.1	12.4	10.0	11.7	10.3	18.1	18.1	18.0	18.1	18.3	14.9
2014	18.1	10.2	9.3	9.4	16.8	14.7	12.9	11.0	11.0	11.1	11.7	11.2	12.3
2015	11.2	8.2	11.3	13.0	19.5	17.3	21.9	32.2	27.4	23.5	15.7	11.8	17.7
2016	6.2	6.6	32.9	71.6	26.1	243.0	44.7	182.2	59.3	34.9	18.5	10.2	61.8
2017	10.3	22.1	85.3	2005	3018	1148	1422	1739	1021	109.5	21.2	19.4	876
2018	16.7	22.7	22.0	22.3	22.3	73.4	106.5	72.7	54.9	33.7	17.2	16.8	40.2
2019	16.8	22.2	22.3	27.3	57.5	48.6	319.1	860	942.3	40.2	21.7	20.7	200

Water Year	Average Flow (cubic feet per second)												
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Annual Mean
2020	15.5	20.7	21.6	21.5	16.5	16.7	33.3	51.0	71.1	22.9	14.5	10.0	26.3
2021	9.9	8.4	185.1	13.7	16.6	18.9	31.2	41.1	27.9	23.4	15.7	11.0	33.9
2022	11.5	6.7	18.1	14.5	17.9	28.2	38.4	66.6	55.4	33.7	17.0	16.7	27.1
2023	16.7	22.2	214.9	169.8	22.4	490.6	386	1634.2	490.4	39.2	20.7	20.0	296.9
2024	16.8	22.1	22.2	22.6	24.3	61.6	45.5	255.4	59.2	34.8	18.1	16.7	50.2

Table D1-5. Monthly Average Flows for South Fork American River below Slab Creek Dam (USGS 11443500).

Water Year	Average Flow (cubic feet per second)												
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Annual Mean
2003	38.4	37.2	37.5	37.3	37.3	37.5	38.0	128.0	300.7	39.2	37.0	37.0	66.9
2004	55.0	109.6	38.0	38.0	37.9	38.0	38.0	37.9	37.8	38.0	38.0	38.1	45.3
2005	38.0	38.0	38.0	38.0	38.0	38.0	37.9	1798	1155	38.2	38.6	39.2	279.4
2006	38.5	38.0	712.0	535.1	180.6	180.6	1826	2112	384.1	38.0	37.9	38.0	503.4
2007	38.0	38.0	38.0	38.0	38.0	38.0	19.8	12.4	38.0	38.0	38.0	38.0	34.3
2008	37.9	25.3	11.7	11.7	11.8	33.5	19.0	13.9	38.0	37.9	38.0	38.0	26.5
2009	38.0	26.6	11.9	12.0	12.0	81.8	38.6	51.0	39.3	38.4	38.4	38.8	35.8
2010	38.7	38.8	38.5	38.0	38.0	38.0	38.0	38.2	561.2	37.9	38.0	38.0	81.2
2011	44.5	38.0	198.5	38.0	38.0	179.1	720.4	627.1	1129	387.8	38.2	39.0	290.7
2012	38.8	38.5	38.2	38.0	38.0	17.6	11.0	32.5	38.7	38.8	38.8	39.0	34.0
2013	39.2	39.0	90.9	38.7	39.3	38.7	41.2	38.5	38.1	38.6	38.8	38.7	43.4
2014	38.7	38.1	38.5	38.4	70.7	20.1	12.0	13.3	38.1	38.4	38.4	39.0	35.1
2015	54.7	60.8	60.9	60.9	92.1	100.0	103.5	106.1	90.8	79.2	64.7	64.9	78.1
2016	65.0	65.4	75.2	139.4	79.1	239.4	257.8	257.6	177.7	98.1	77.8	77.5	133.3
2017	97.0	78.4	156.8	1776	6146	2078	3071	3991	797.4	132.3	81.1	700.5	1574
2018	767.3	1023	1128	493.5	97.2	318.8	599.8	294.8	189.2	96.2	76.8	76.1	430.4
2019	13.1	12.7	12.2	15.7	391.3	599.3	410.2	875.8	1,362.7	100.0	88.3	88.9	329.7

Water Year	Average Flow (cubic feet per second)												
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Annual Mean
2020	100.4	391.0	580.2	448.0	372.1	527.8	474.7	152.1	100.6	98.7	82.1	69.8	282.1
2021	64.4	70.0	69.5	70.2	71.6	110.3	159.2	138.5	100.1	85.2	69.4	70.1	89.9
2022	146.3	70.4	69.2	72.6	122.8	159.0	195.6	263.1	188.5	100.5	80.8	80.4	129.1
2023	80.4	78.5	703.5	390.5	93.2	1,124.0	1,024.8	3,439.5	844.8	99.0	80.9	79.8	676.4
2024	98.8	98.5	99.1	98.6	85.7	156.4	301.2	418.4	203.4	99.8	79.5	88.3	152.5

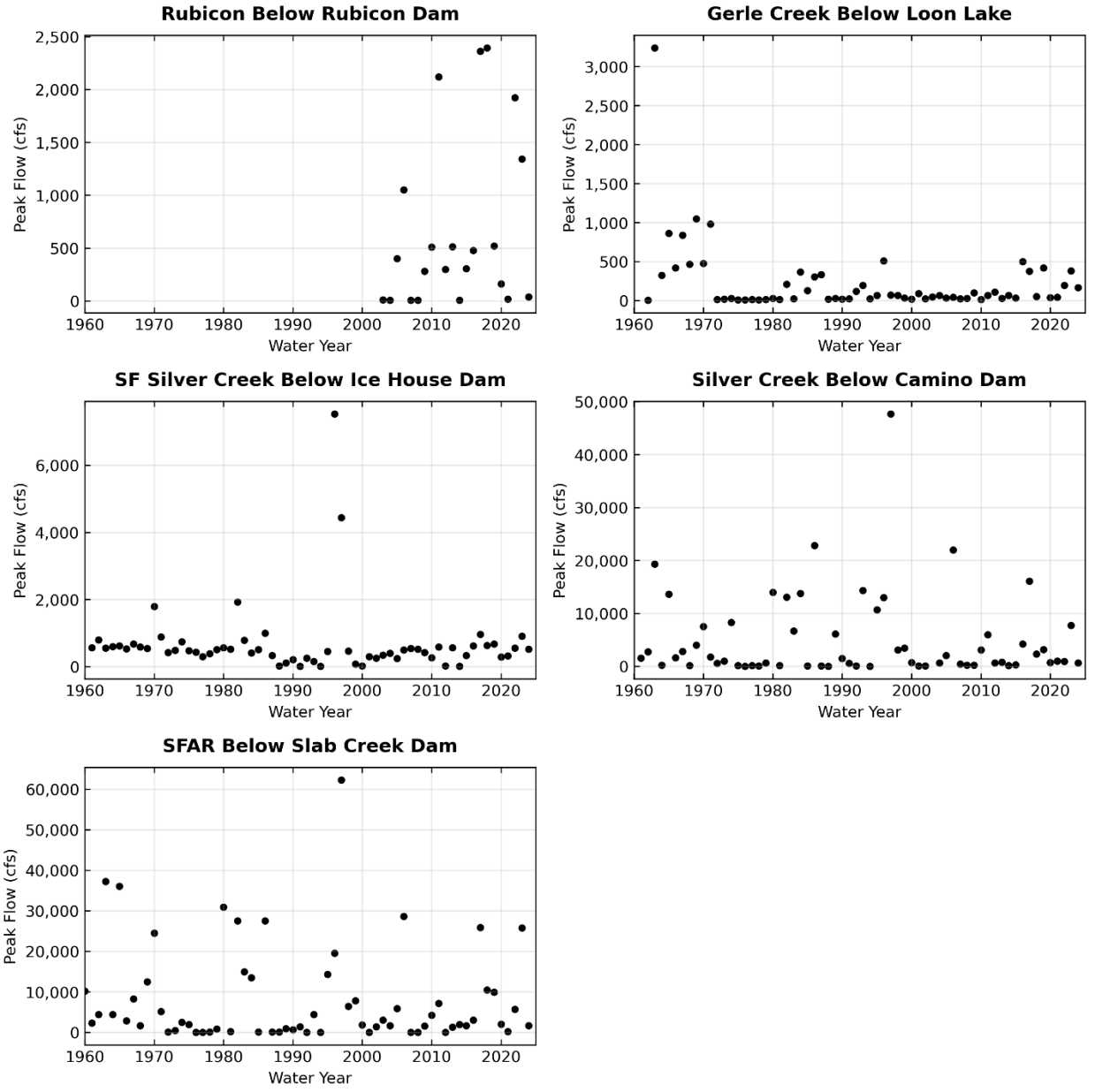


Figure D1-1. Annual peak flow for gages in the study reaches, 1960–2024.

Table D1-6. Annual Peak Flow Data for Gages Used in the Geomorphology Study.[1]

Water Year[2]	Rubicon River below Rubicon Dam + Spill over Rubicon Dam (cfs)	Gerle Creek below Loon Lake Dam (cfs)	SF Silver Creek below Ice House Dam (cfs)	Silver Creek below Camino Dam (cfs)	SFAR below Slab Creek Dam (cfs)
1923	--	--	--	--	7,350
1924	--	--	--	--	1,970
1925	--	--	785	--	18,000
1926	--	--	450	--	4,510
1927	--	--	800	--	9,350
1928	--	--	1,950	--	31,500
1929	--	--	775	--	8,300
1930	--	--	409	--	4,100
1931	--	--	217	--	1,620
1932	--	--	648	--	6,200
1933	--	--	692	--	5,930
1934	--	--	558	--	4,010
1935	--	--	760	--	10,700
1936	--	--	828	--	1,1700
1937	--	--	782	--	7,140
1938	--	--	2,640	--	34,400
1939	--	--	339	--	2,650
1940	--	--	942	--	18,400
1941	--	--	750	--	6,990
1942	--	--	959	--	13,300
1943	--	--	1,110	--	2,3100
1944	--	--	526	--	4,450
1945	--	--	750	--	1,9100
1946	--	--	636	--	7,110
1947	--	--	602	--	4,,500
1948	--	--	689	--	6,580
1949	--	--	792	--	6,460
1950	--	--	764	--	6,080
1951	--	--	3,900	--	46,000

Water Year[2]	Rubicon River below Rubicon Dam + Spill over Rubicon Dam (cfs)	Gerle Creek below Loon Lake Dam (cfs)	SF Silver Creek below Ice House Dam (cfs)	Silver Creek below Camino Dam (cfs)	SFAR below Slab Creek Dam (cfs)
1952	--	--	865	--	9,420
1953	--	--	1,090	--	10,600
1954	--	--	746	--	9,340
1955	--	--	635	--	4,950
1956	--	--	3,940	--	49,800
1957	--	--	1,070	--	10,400
1958	--	--	823	--	8,350
1959	--	--	587	--	2,850
1960	--	--	--	--	10,200
1961	--	--	568	1,540	2,320
1962	--	8	802	2,740	4,410
1963	--	3,240	560	19,300	37,200
1964	--	327	602	259	4,450
1965	--	863	627	13,600	36,000
1966	--	422	536	1,650	2,820
1967	--	839	672	2,800	8,260
1968	--	470	592	170	1,700
1969	--	1,050	545	4,020	12,500
1970	--	477	1,800	7,540	24,500
1971	--	980	890	1,770	5,100
1972	--	17	418	550	67
1973	--	20	494	978	479
1974	--	29	749	8,280	2,480
1975	--	13	476	162	1,900
1976	--	11	439	30	43
1977	--	17	296	159	30
1978	--	12	394	115	84
1979	--	17	513	677	848
1980	--	32	570	14,000	30,900
1981	--	18	519	127	184
1982	--	212	1,930	13,100	27,500

Water Year[2]	Rubicon River below Rubicon Dam + Spill over Rubicon Dam (cfs)	Gerle Creek below Loon Lake Dam (cfs)	SF Silver Creek below Ice House Dam (cfs)	Silver Creek below Camino Dam (cfs)	SFAR below Slab Creek Dam (cfs)
1983	--	25	783	6,660	15,000
1984	--	370	411	13,800	13,500
1985	--	132	514	53	97
1986	--	306	1,000	22,800	27,500
1987	--	337	334	67	72
1988	--	21	21	28	78
1989	--	31	114	6,150	935
1990	--	19	214	1,500	639
1991	--	28	19	586	1,400
1992	--	123	252	62	50
1993	--	197	159	14,300	4,400
1994	--	25	16	28	48
1995	--	67	460	10,700	14,300
1996	--	510	7,530	13,000	19,500
1997	--	74	4,440	47,700	62,300
1998	--	67	466	30,80	6,420
1999	--	33	82	3,460	7,780
2000	--	23	25	688	1,870
2001	--	94	296	70	41
2002	8	26	256	102	1,410
2003	9	48	343	--	3,070
2004	8	68	396	656	1,630
2005	400	34	249	2050	5,920
2006	1,049	45	501	22,000	28,600
2007	226	24	548	405	39
2008	8	29	527	215	39
2009	279	103	425	238	1,550
2010	510	18	266	3,110	4,260
2011	2,119	67	588	5,950	7,140
2012	298	111	24	632	46
2013	511	29	564	752	1,300

Water Year[2]	Rubicon River below Rubicon Dam + Spill over Rubicon Dam (cfs)	Gerle Creek below Loon Lake Dam (cfs)	SF Silver Creek below Ice House Dam (cfs)	Silver Creek below Camino Dam (cfs)	SFAR below Slab Creek Dam (cfs)
2014	7	69	18	126	1,980
2015	304	37	335	325	1,680
2016	480	502	622	4,240	3,020
2017	2,362	380	967	16,100	25,900
2018	2,397	54	633	2,330	10,500
2019	518	419	668	2,902	9,940
2020	161	39	295	710	2,010
2021	17	43	319	1,020	199
2022	1,923	199	560	927	5,650
2023	1343	385	907	7,740	25,800
2024	39	170	521	642	1,678

Notes: -- = No data
cfs = cubic feet per second
SF = South Fork
SFAR = South Fork American River
USGS = U.S. Geological Survey

[1] All 2019 peaks were calculated from daily average data. The peak flows for the Rubicon River were calculated by adding the USGS gage data to spill data provided by SMUD. The remainder of the peak flow data were downloaded from the USGS.

[2] Water year extends from 1 October to 30 September

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APPENDIX D2

Cross Section Location Data and Overview Maps

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Table D2-1. Cross Section Endpin Locations in State Plane Coordinate System Zone 2 (NAD 83).

Site	Cross Section	Endpin	Endpin Recovered (Y/N)	Northing (feet)	Easting (feet)	Elevation (feet)
RRD-G1	XS-1	LBP	Y	2132951.959	7065077.747	6131.594
RRD-G1	XS-1	RBP	Y	2132933.499	7065202.342	6131.57
RRD-G1	XS-2	LBP	Y	2133088.379	7065087.267	6130.597
RRD-G1	XS-2	RBP	Y	2133106.126	7065179.186	6130.524
RRD-G1	XS-3	LBP	Y	2133186.92	7065062.502	6132.122
RRD-G1	XS-3	RBP	Y	2133106.112	7065179.165	6130.572
LLD-G1	XS-1	LBP	Y	2133736.64	7038608.985	6134.475
LLD-G1	XS-1	RBP	Y	2133839.875	7038606.915	6136.145
LLD-G1	XS-2	LBP	Y	2133732.501	7038470.133	6134.781
LLD-G1	XS-2	RBP	Y	2133810.826	7038462.243	6140.117
LLD-G1	XS-3	LBP	Y	2133739.862	7038431.233	6134.58
LLD-G1	XS-3	RBP	Y	2133810.826	7038462.243	6140.117
LLD-G2	XS-1	LBP	Y	2134665.036	7030637.915	5888.904
LLD-G2	XS-1	RBP	Y	2134758.115	7030632.879	5885.093
LLD-G2	XS-2	LBP	Y	2134650.04	7030554.116	5884.378
LLD-G2	XS-2	RBP	Y	2134706.952	7030551.049	5882.902
LLD-G2	XS-3	LBP	Y	2134604.937	7030189.153	5878.376
LLD-G2	XS-3	RBP	Y	2134716.509	7030168.503	5878.638
IHD-G1	XS-1	LBP	Y	2063161.375	7022904.428	5182.897
IHD-G1	XS-1	RBP	Y	2063269.997	7022722	5183.467
IHD-G1	XS-2	LBP	Y	2062986.23	7022772.388	5181.196
IHD-G1	XS-2	RBP	Y	2063018.975	7022654.304	5181.273
IHD-G1	XS-3	LBP	Y	2062737.37	7022596.457	5180.545
IHD-G1	XS-3	RBP	Y	2062862.718	7022520.877	5182.541
IHD-G2	XS-1	LBP	Y	2071287.563	7005528.708	4584.302
IHD-G2	XS-1	RBP	Y	2071364.201	7005705.198	4582.021
IHD-G2	XS-2	LBP	Y	2071405.068	7005431.508	4586.624
IHD-G2	XS-2	RBP	Y	2071513.573	7005643.518	4582.855
IHD-G2	XS-3	LBP	Y	2071916.617	7005444.029	4578.047
IHD-G2	XS-3	RBP	Y	2071916.729	7005519.911	4578.183
CD-G1	XS-1	LBP	N	2060107.847	6966315.876	2331.794

Site	Cross Section	Endpin	Endpin Recovered (Y/N)	Northing (feet)	Easting (feet)	Elevation (feet)
CD-G1	XS-1	RBP	Y	2060460.32	6966435.095	2332.422
CD-G1	XS-2	LBP	Y	2060107.604	6966315.867	2331.886
CD-G1	XS-2	RBP	Y	2060168.565	6966213.518	2334.343
CD-G1	XS-3	LBP	Y	2060019.878	6966279.014	2330.681
CD-G1	XS-3	RBP	Y	2060056.678	6966170.834	2327.42
SCD-G1	XS-1	LBP	Y	2049350.128	6911279.692	1114.463
SCD-G1	XS-1	RBP	N	2049520.323	6911259.322	1118.599
SCD-G1	XS-2	LBP	Y	2049303.732	6911154.432	1116.239
SCD-G1	XS-2	RBP	Y	2049450.742	6911016.374	1121.791
SCD-G1	XS-3	LBP	Y	2049252.771	6910875.16	1112.942
SCD-G1	XS-3	RBP	Y	2049392.269	6910905.81	1109.953

Notes: LBP = left bank pin
N = no
NAD 83 = North American Datum of 1983
RBP = right bank pin
Y = yes

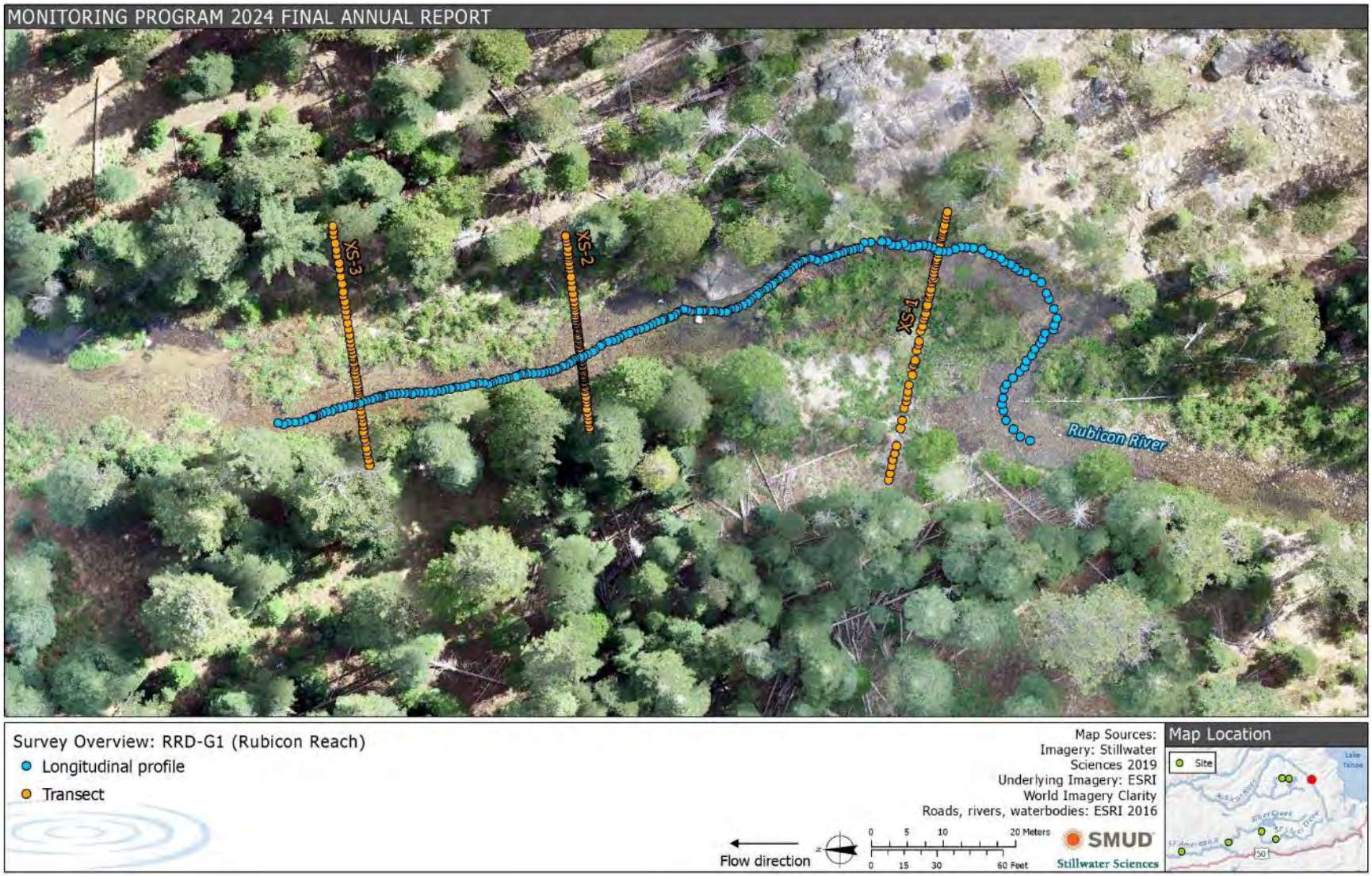


Figure D2-1. Site RRD-G1 overview map with 2024 survey points.



Figure D2-2. Site LLD-G1 overview map with 2024 survey points.



Figure D2-3. Site LLD-G2 overview map with 2024 survey points.



Figure D2-4. Site IHD-G1 overview map with 2024 survey points.

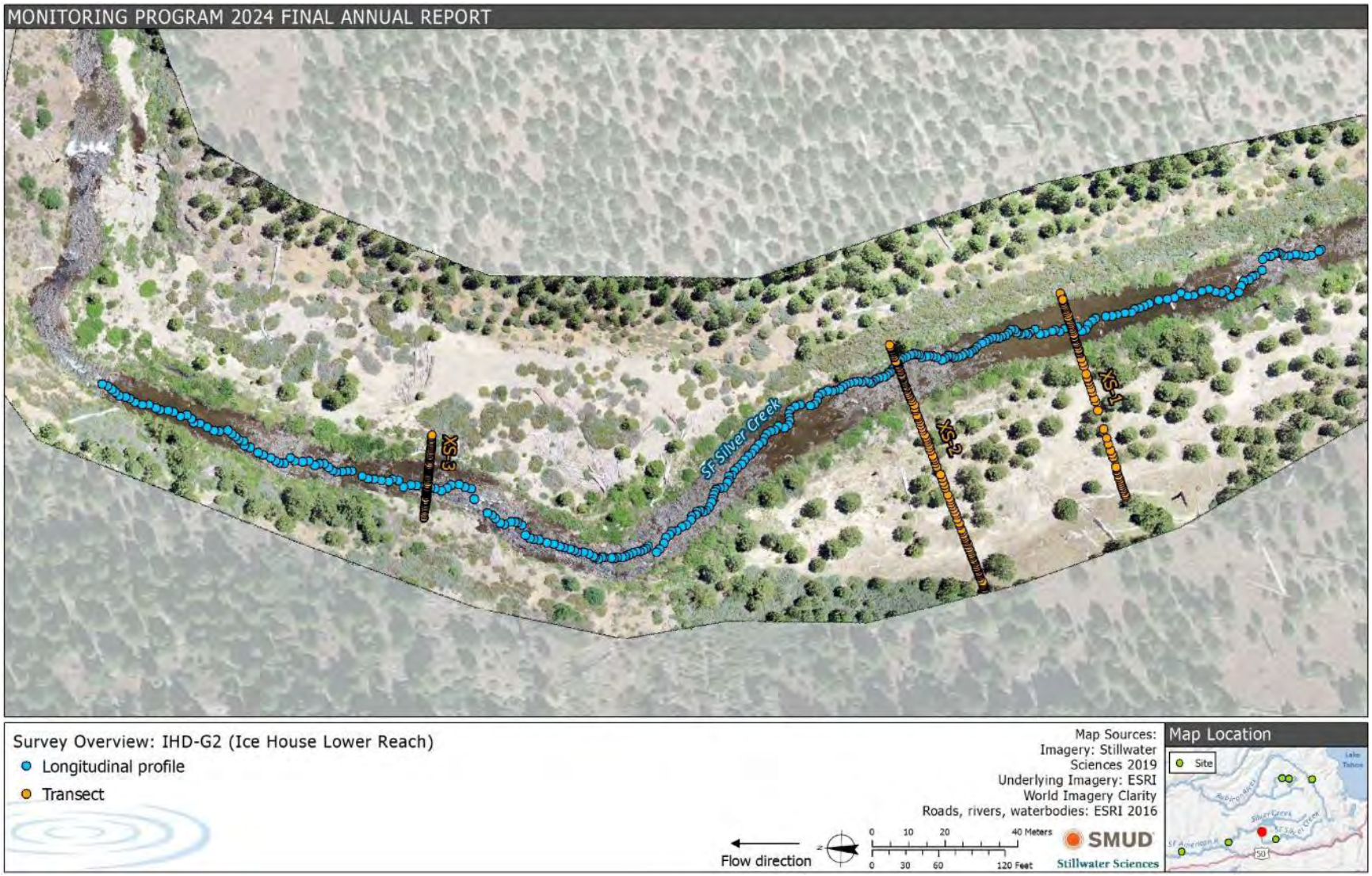


Figure D2-5. Site IHD-G2 overview map with 2024 survey points.

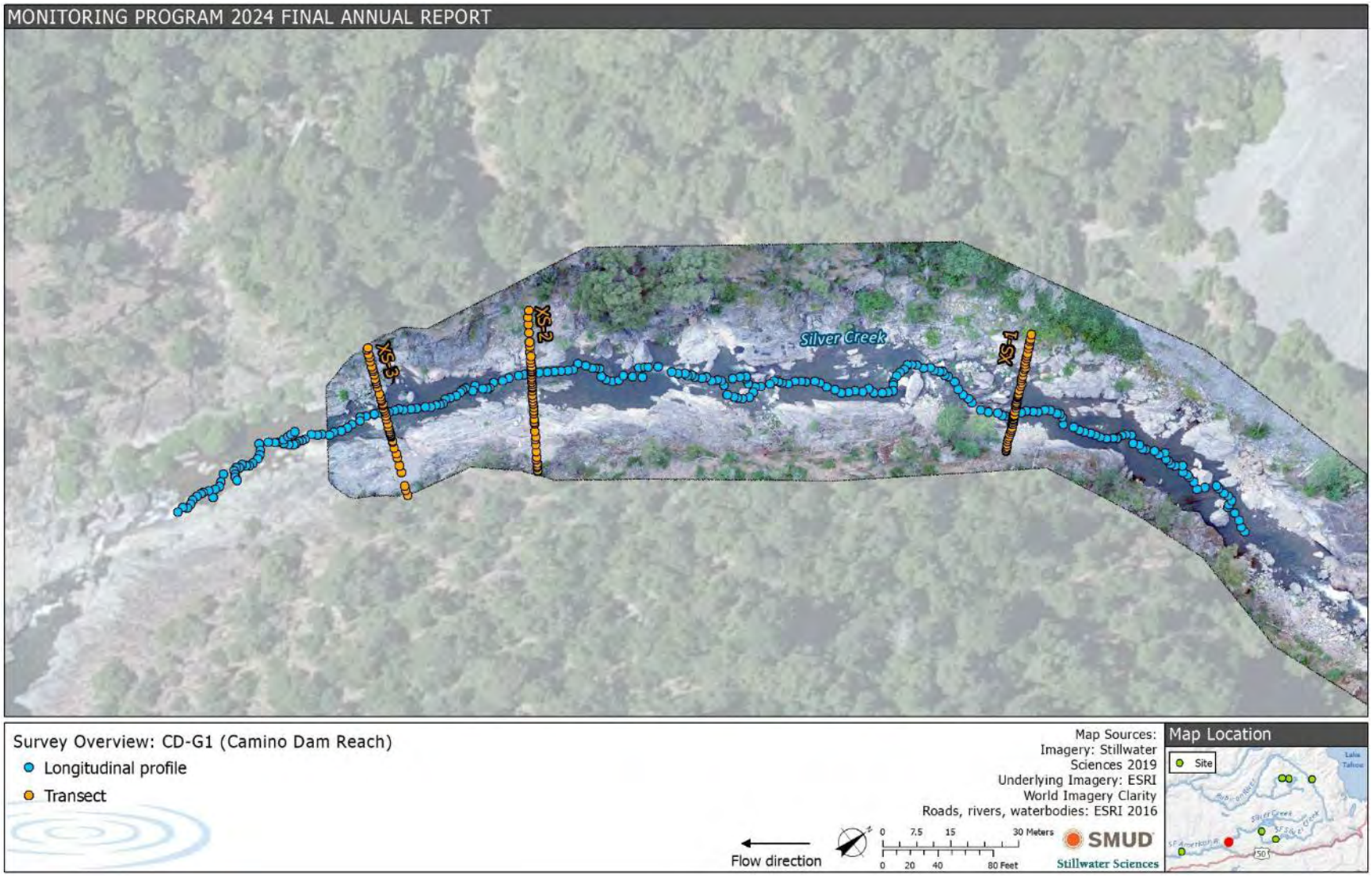


Figure D2-6. Site CD-G1 overview map with 2024 survey points.



Figure D2-7. Site SCD-G1 overview map with 2024 survey points.

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APPENDIX D3

Representative Geomorphology Site Photographs

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Rubicon River below Rubicon Dam



Figure D3-1. Upper cross section (XS-1), looking downstream from mid-channel, 2024.



Figure D3-2. Middle cross section (XS-2), looking upstream from mid-channel, 2024.



Figure D3-3. Middle cross section (XS-2), looking downstream from mid-channel, 2024.



Figure D3-4. Lower cross section (XS-3), looking upstream from right bank, 2024.

Gerle Creek below Loon Lake Dam, Upper Reach



Figure D3-5. Middle cross section (XS-2), looking upstream from right bank, 2024.



Figure D3-6. Upstream extent of longitudinal profile, looking downstream from right bank, 2024.

Gerle Creek below Loon Lake Dam, Middle Reach

Sacramento Municipal Utility District
Upper American River Project
FERC Project No. 2101



Figure D3-7. Upstream extent of longitudinal profile, looking downstream from mid-channel, 2024.



Figure D3-8. Upper cross section (XS-1), looking downstream from mid-channel, 2024.



Figure D3-9. Middle cross section (XS-2), looking upstream from mid-channel, 2024.



Figure D3-10. Middle cross section (XS-2), looking downstream from mid-channel, 2024.



Figure D3-11. Lower cross section (XS-3), looking upstream from mid-channel, 2024.

South Fork Silver Creek below Ice House Reservoir, Upper Reach

Sacramento Municipal Utility District
Upper American River Project
FERC Project No. 2101



Figure D3-12. Upper cross section (XS-1), looking downstream from mid-channel, 2024.



Figure D3-13. Middle cross section (XS-2), looking upstream from mid-channel, 2024.



Figure D3-14. Middle cross section (XS-2), looking downstream from mid-channel, 2024.



Figure D3-15. Lower cross section (XS-3), looking upstream from mid-channel, 2024.

South Fork Silver Creek below Ice House Reservoir, Lower Reach

Sacramento Municipal Utility District
Upper American River Project
FERC Project No. 2101



Figure D3-16. Middle cross section (XS-2), looking downstream from mid-channel, 2024.



Figure D3-17. Middle cross section (XS-2), looking upstream from mid-channel, 2024.



Figure D3-18. Middle cross section (XS-2), looking downstream from mid-channel, 2024.



Figure D3-19. Lower cross section (XS-3), looking upstream from mid-channel, 2024.

Silver Creek below Camino Dam



Figure D3-20. Upper cross section (XS-1), looking downstream from mid-channel, 2024.



Figure D3-21. Middle cross section (XS-2), looking upstream from mid-channel, 2024.



Figure D3-22. Middle cross section (XS-2), looking downstream from left bank, 2024.



Figure D3-23. Lower cross section (XS-3), looking upstream from mid-channel, 2024.

South Fork American River below Slab Creek Dam

Sacramento Municipal Utility District
Upper American River Project
FERC Project No. 2101



Figure D3-24. Middle cross section (XS-2), looking downstream from left bank, 2024.



Figure D3-25. Middle cross section (XS-2), looking upstream from left bank, 2024.

APPENDIX D4

Longitudinal Profiles

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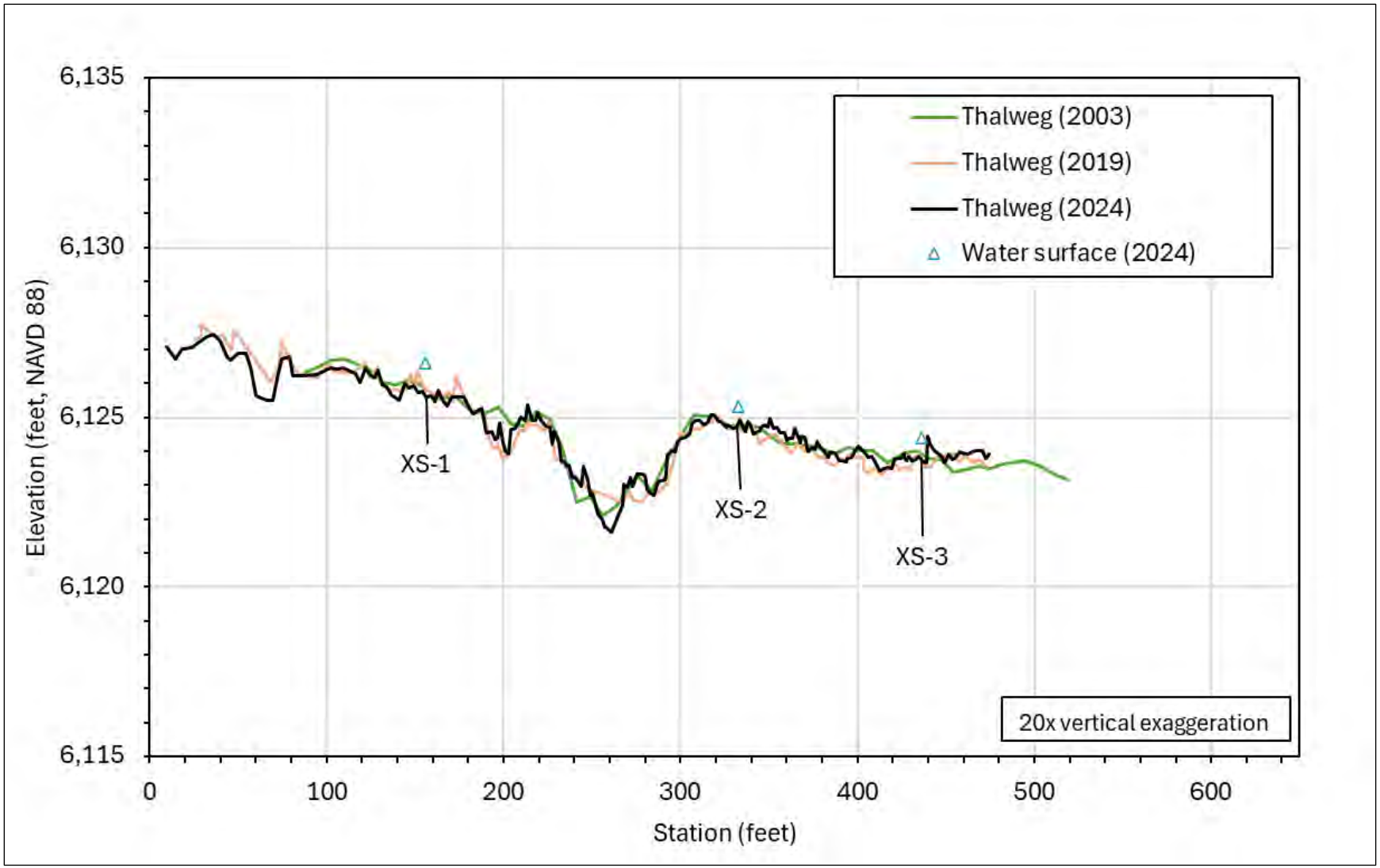


Figure D4-1. Longitudinal profiles for Site RRD-G1 (Rubicon River below Rubicon Dam) from the 2003, 2019, and 2024 surveys.

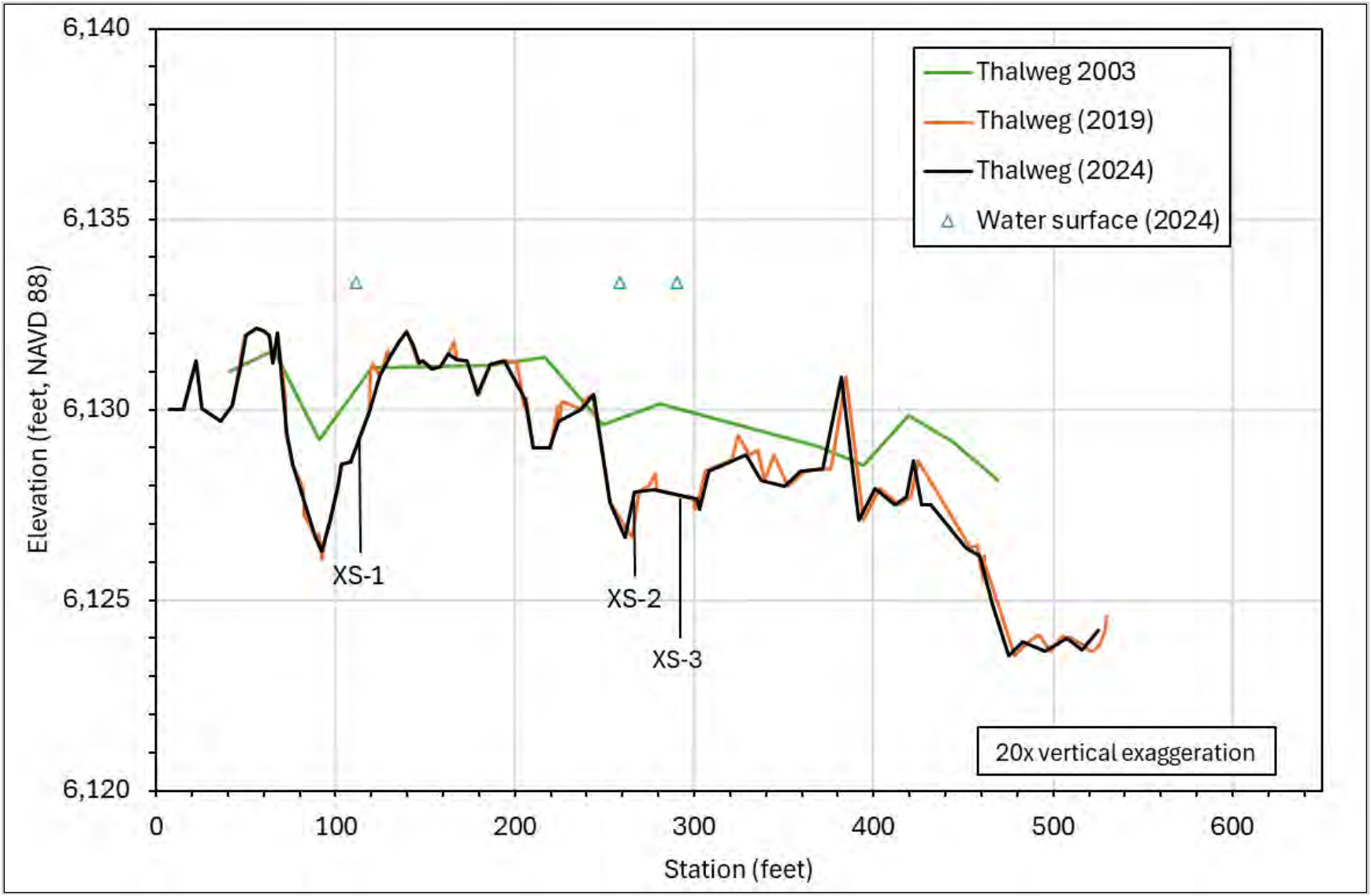


Figure D4-2. Longitudinal profiles for Site LLD-G1 (Gerle Creek below Loon Lake Dam, upper reach) from the 2019 and 2024 surveys.

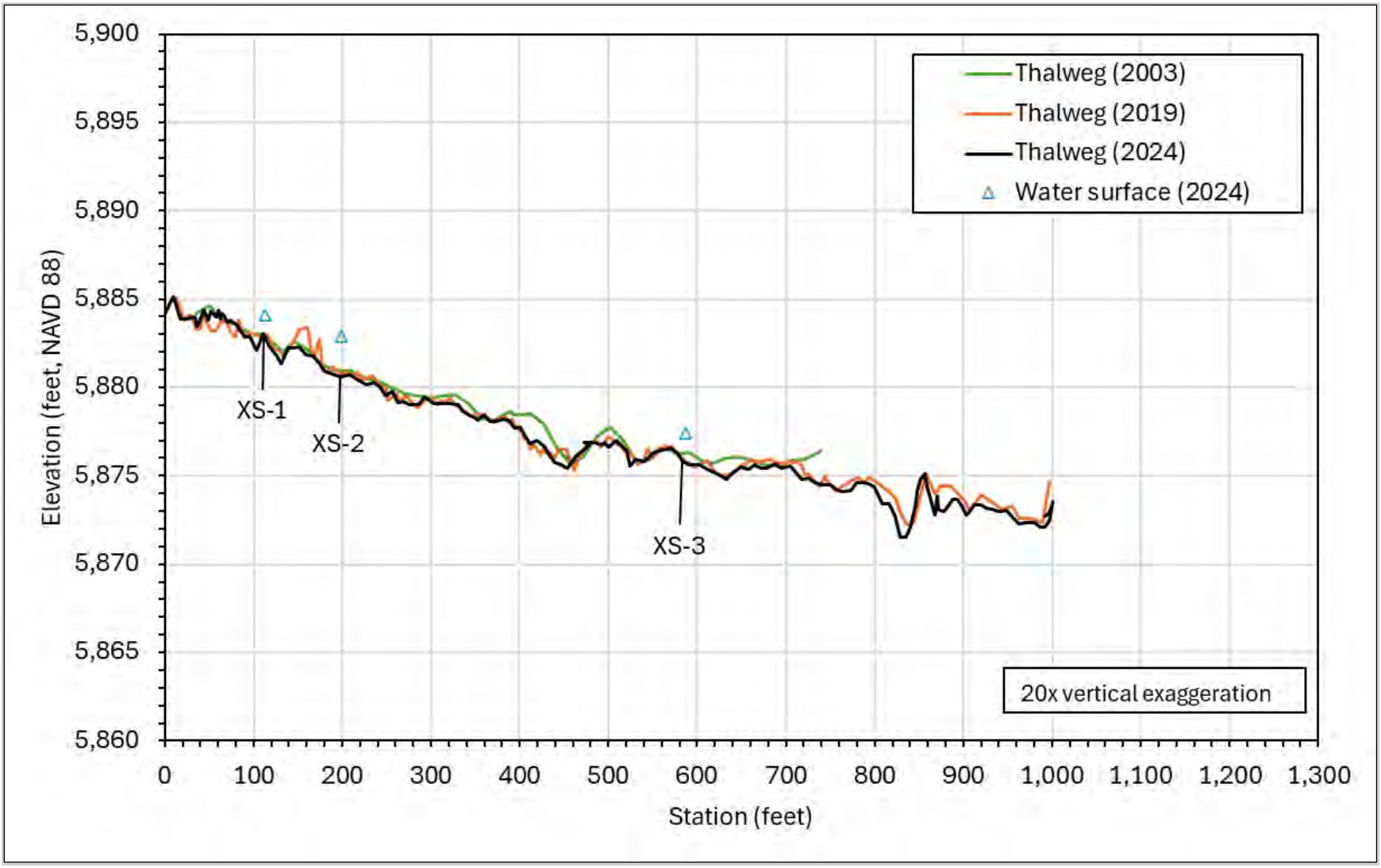


Figure D4-3. Longitudinal profiles for Site LLD-G2 (Gerle Creek below Loon Lake Dam, middle reach) from the 2003, 2019, and 2024 surveys.

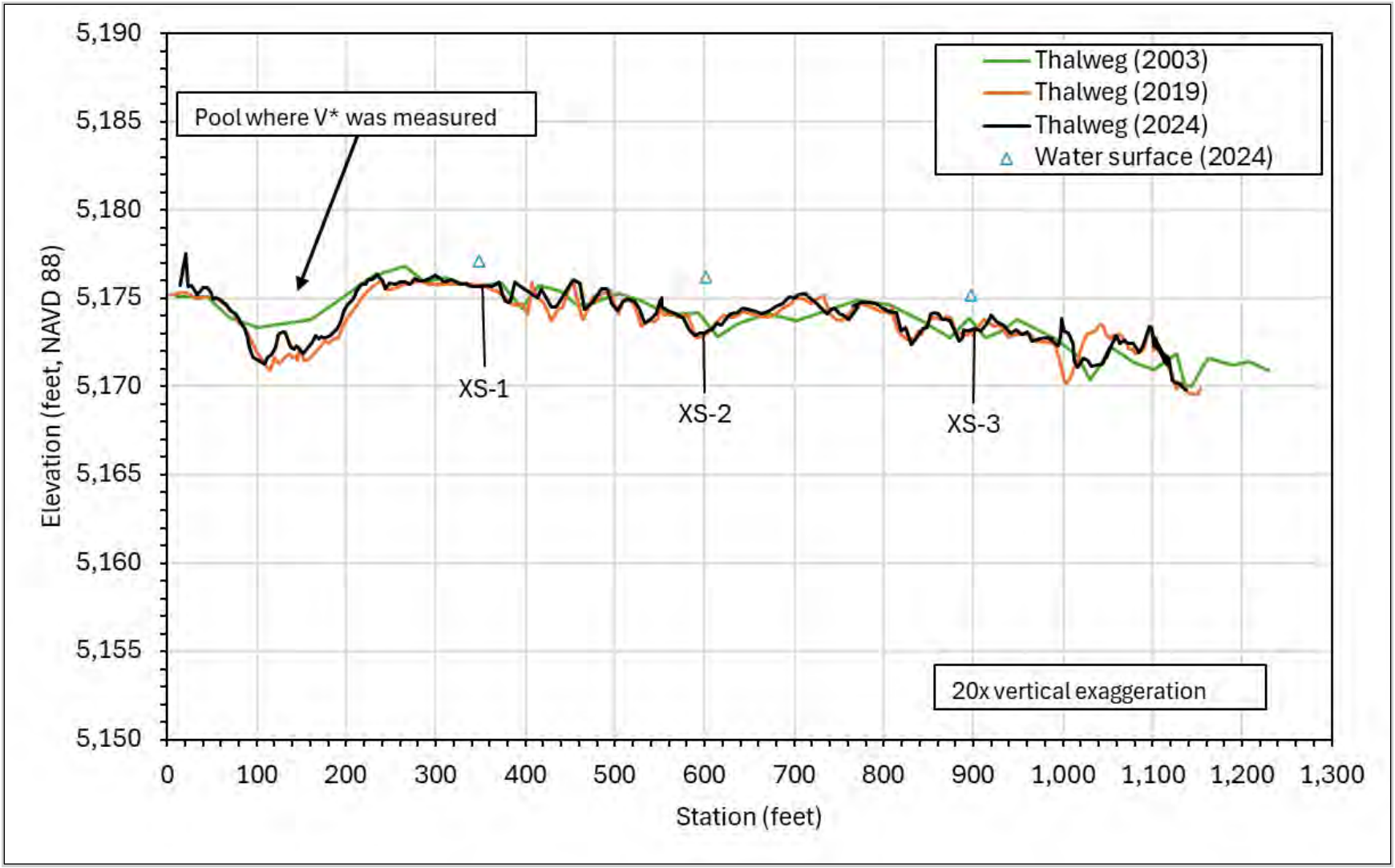


Figure D4-4. Longitudinal profiles for Site IHD-G1 (South Fork Silver Creek below Ice House Dam, upper reach) for the 2003, 2019, and 2024 surveys.

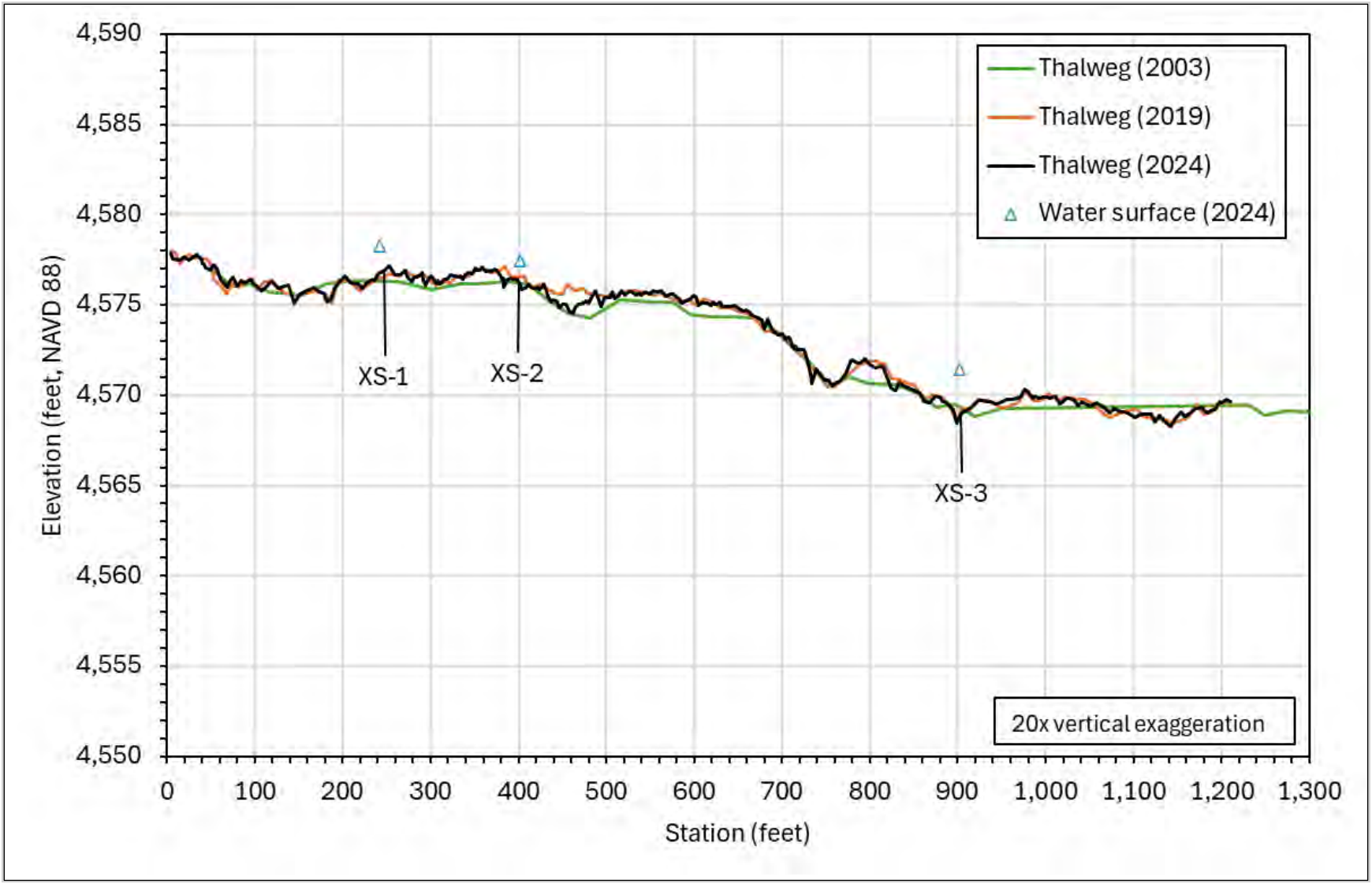


Figure D4-5. Longitudinal profiles for Site IHD-G2 (South Fork Silver Creek below Ice House Dam, lower reach) for the 2003, 2019, and 2024 surveys.

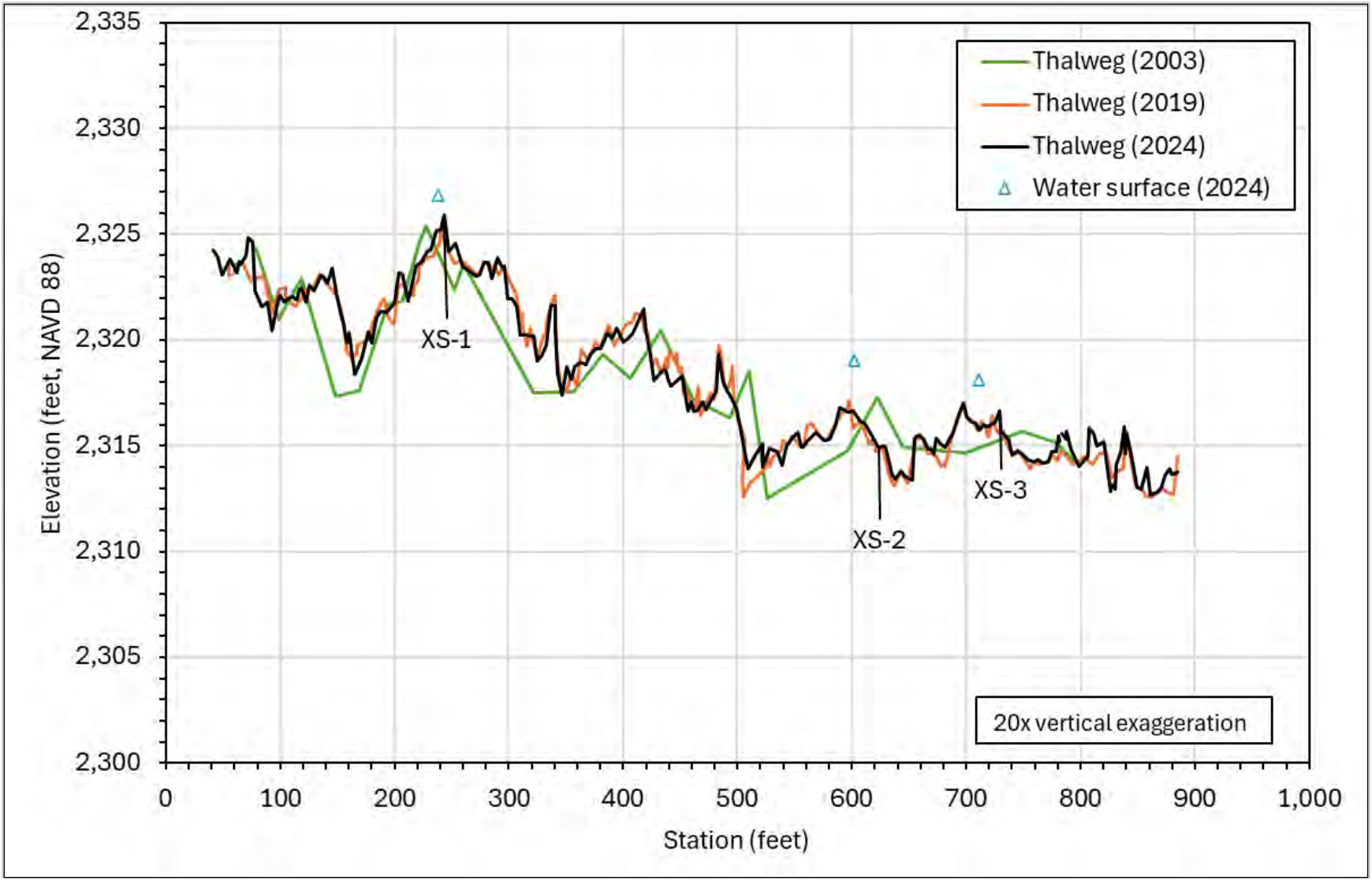
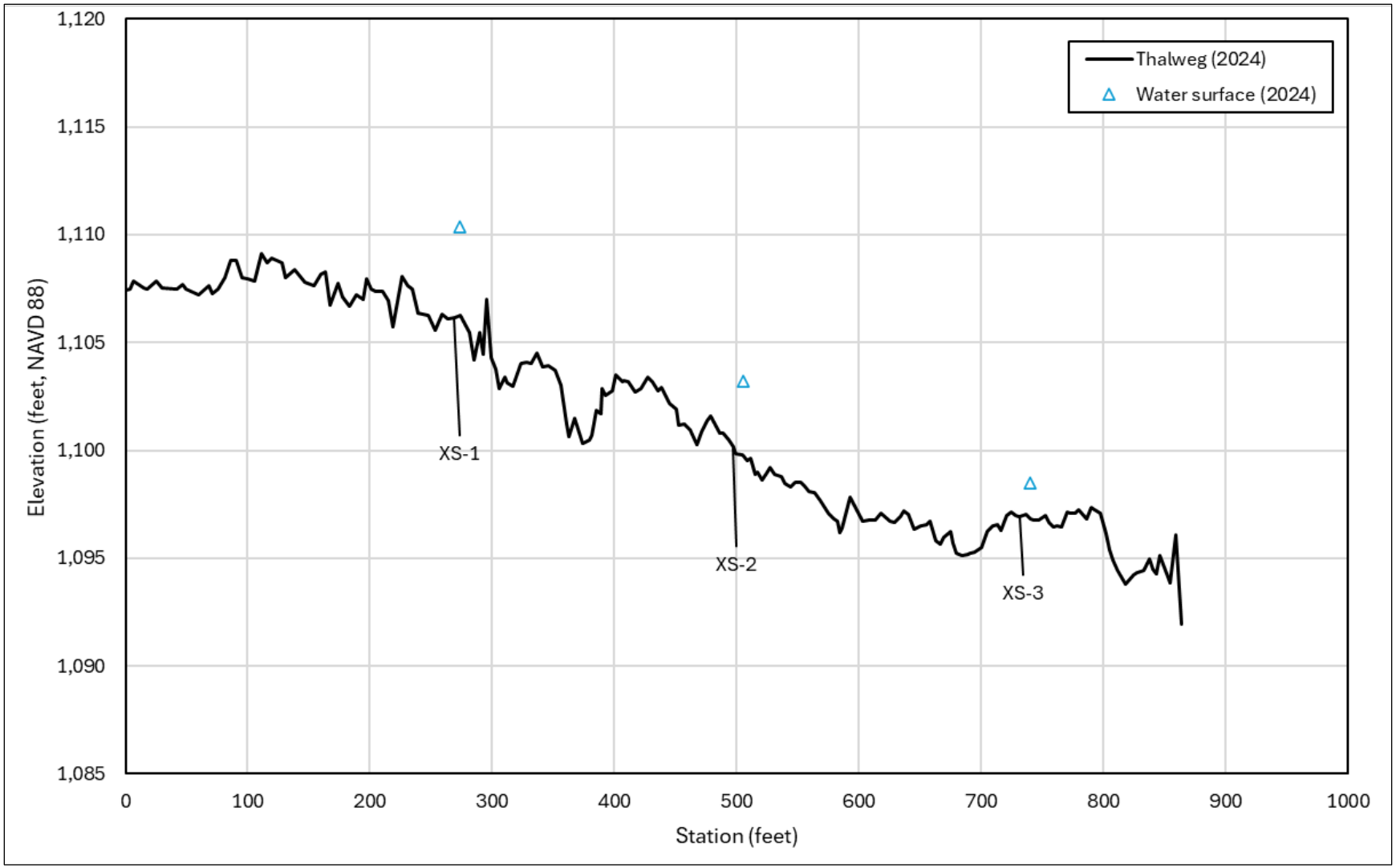


Figure D4-6. Longitudinal profile for Site CD-G1 (Silver Creek below Camino Dam) for the 2003, 2019, and 2024 surveys.



Note: A longitudinal profile was not surveyed in 2019 due to unsafe wading conditions.

Figure D4-7. Longitudinal profile for Site SCD-G1 (South Fork American River below Slab Creek Dam) from the 2024 surveys.

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APPENDIX D5

Cross Sections at Geomorphology Sites

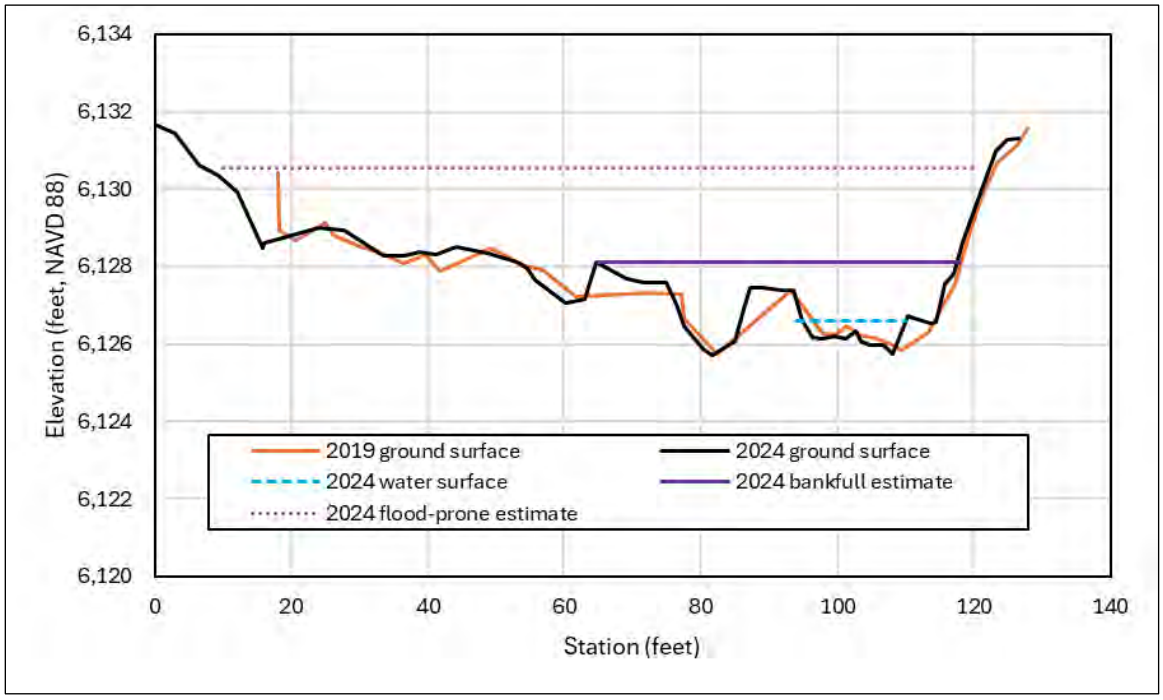
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Table D5-1. 2019 and 2024 Channel Geometry Data.

Site	Cross Section	2019 Channel Geometry						2024 Channel Geometry					
		W_{bf} (ft)	W_{fp} (ft)	D_{bf} (ft)	D_{fp} (ft)	W_{bf}/ D_{bf}	E	W_{bf} (ft)	W_{fp} (ft)	D_{bf} (ft)	D_{fp} (ft)	W_{bf}/ D_{bf}	E
RRD-G1	XS-1	69	127	1.1	4.6	63.1	1.8	54	113	1.6	5.3	33.75	2.1
	XS-2	47	90	1.6	4.3	29.5	1.9	61	86	1.5	4.8	40.6	1.4
	XS-3	41	83	1.4	3.5	29.2	2.0	40	78	1.3	3.4	30.7	1.95
LLD-G1	XS-1	25	460	3.4	13.7	7.4	18.3	25	460	2.7	9.0	9.2	18.4
	XS-2	34	260	4.7	14.0	7.2	7.6	37	260	3.4	14.0	10.8	7.0
	XS-3	28	240	3.7	10.5	7.5	8.6	33	240	4.0	11.5	8.2	7.3
LLD-G2	XS-1	46	430	1.0	4.4	47.9	9.4	47	430	0.9	3.6	52.2	9.1
	XS-2	30	570	1.2	4.3	24.2	19.3	21	570	1.3	4.0	16.1	27.1
	XS-3	38	960	1.1	4.4	35.2	25.4	36	960	1.0	4.3	36	26.6
IHD-G1	XS-1	45	136	1.6	5.0	27.8	3.0	45	147	1.6	5.1	28.1	3.3
	XS-2	26	102	3.4	5.5	7.5	4.0	26	140	3.1	9.3	8.3	5.3
	XS-3	26	49	1.6	5.2	16.4	1.9	25	120	2.8	6.2	8.9	4.8
IHD-G2	XS-1	53	121	2.3	6.8	23.2	2.3	53	100	1.9	6.4	27.9	1.9
	XS-2	56	126	1.7	5.1	32.9	2.2	56	94	2.2	6.5	25.5	1.7
	XS-3	47	72	1.8	7.0	26.4	1.5	48	68	1.9	7.5	25.2	1.4
CD-G1	XS-1	57	90	3.1	9.9	18.3	1.6	49	90	3.6	11.7	13.6	1.8
	XS-2	74	113	3.0	12.8	24.6	1.5	80	116	3.1	13.1	25.8	1.5
	XS-3	61	108	2.7	11.0	22.8	1.8	55	108	2.3	9.6	23.9	2.0
SCD-G1	XS-1	122	-	-	-	-	-	34	122	3.0	10.7	11.3	3.8
	XS-2	163	-	-	-	-	-	43	170	3.7	10.5	11.6	3.9
	XS-3	122	-	-	-	-	-	55	112	3.2	9.5	15.7	2.0

Notes:
E=entrenchment ratio
D_{bf} = bankfull depth
D_{fp} = flood-prone depth
ft=feet
W_{bf} = bankfull width
W_{fp} = flood-prone width
W_{bf}/D_{bf}=width-depth ratio
XS-1 = upstream cross section
XS-2 = intermediate cross section
XS-3 = downstream cross section

Site RRD-G1 (Rubicon River below Rubicon Dam)



Note: Because the 2003 endpin was not recovered in 2019, the 2003 cross section is not included.

Figure D5-1. Cross section XS-1 at Site RRD-G1 from 2019 and 2024.

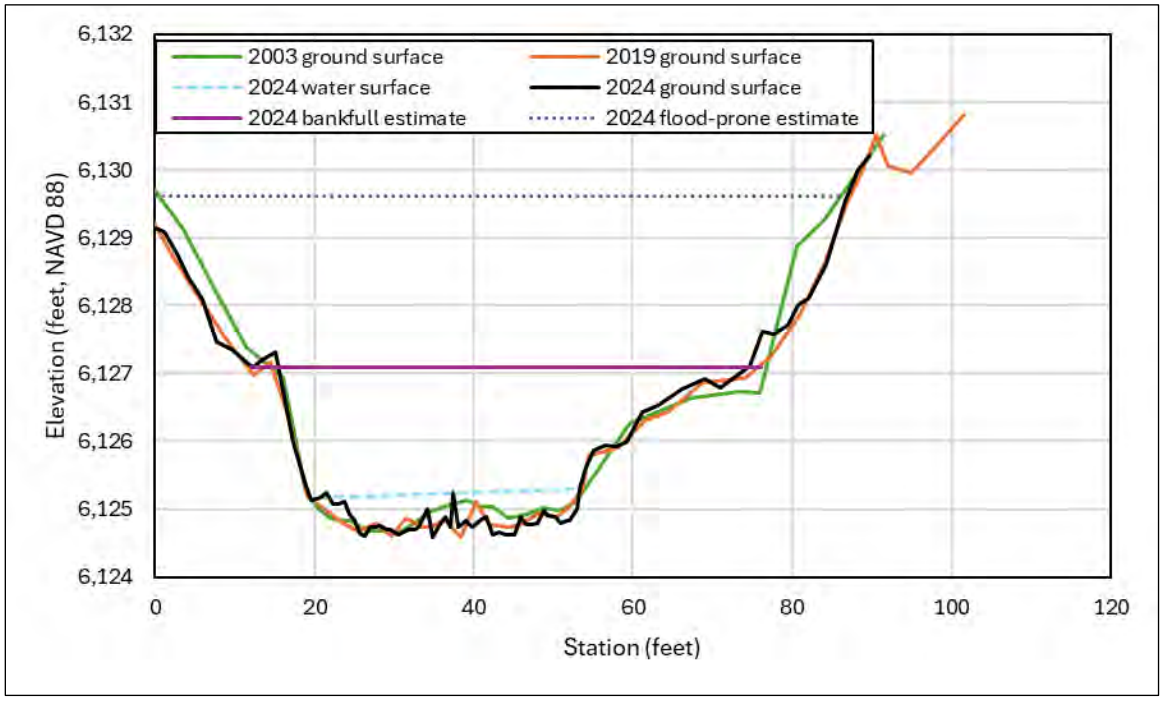


Figure D5-2. Cross section XS-2 at Site RRD-G1 from 2003, 2019, and 2024.

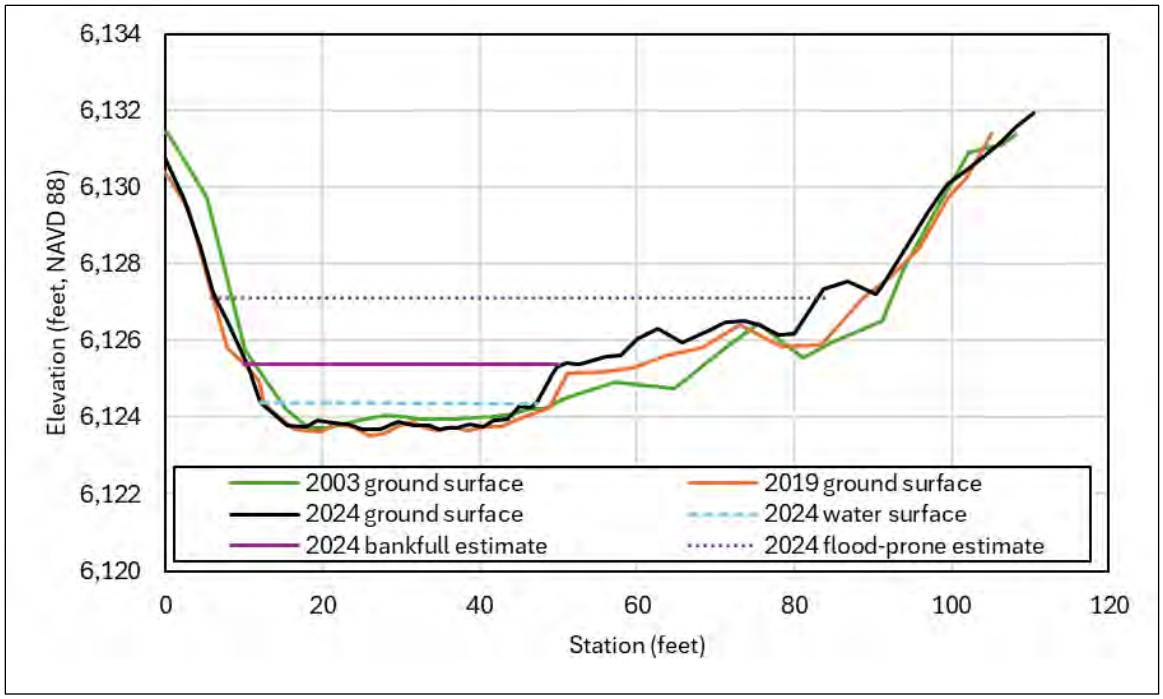
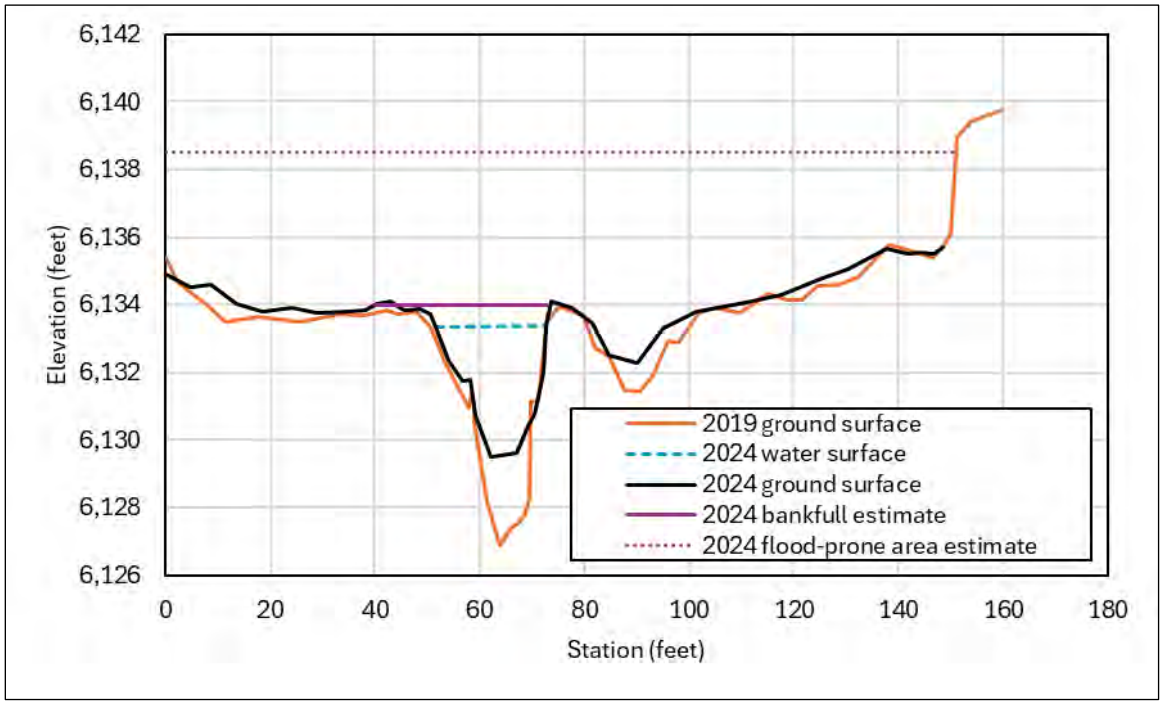


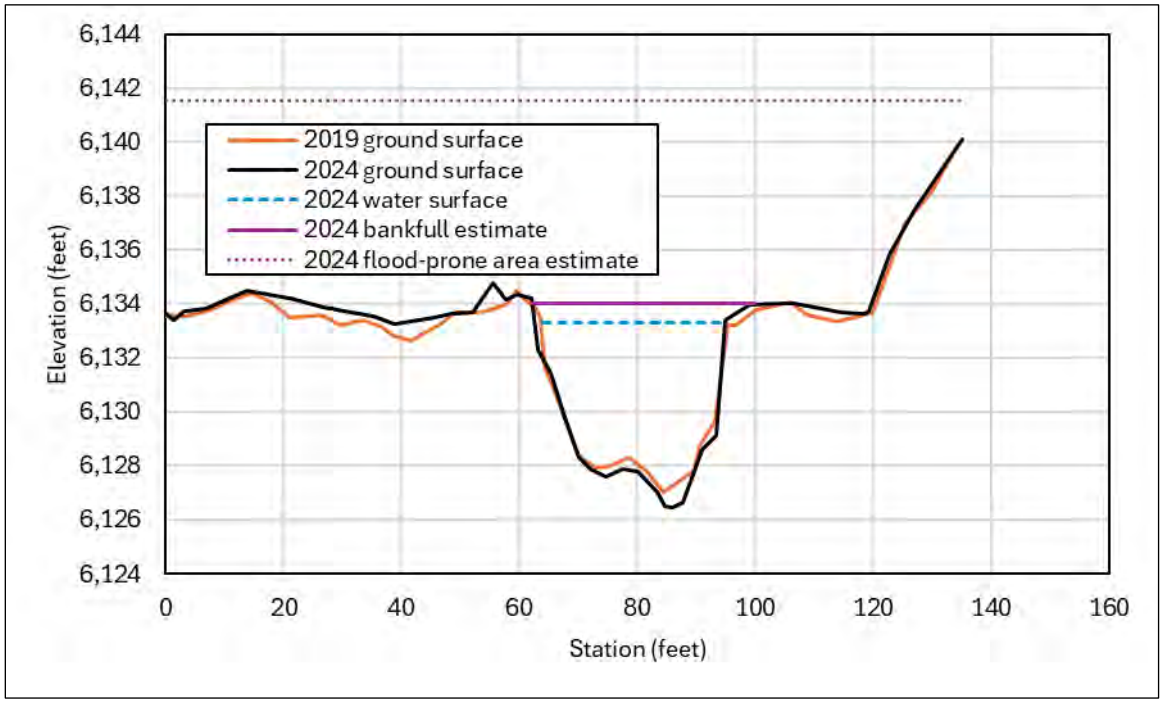
Figure D5-3. Cross section XS-3 at Site RRD-G1 from 2003, 2019, and 2024.

Site LLD-G1 (Gerle Creek below Loon Lake Dam, Upper Reach)



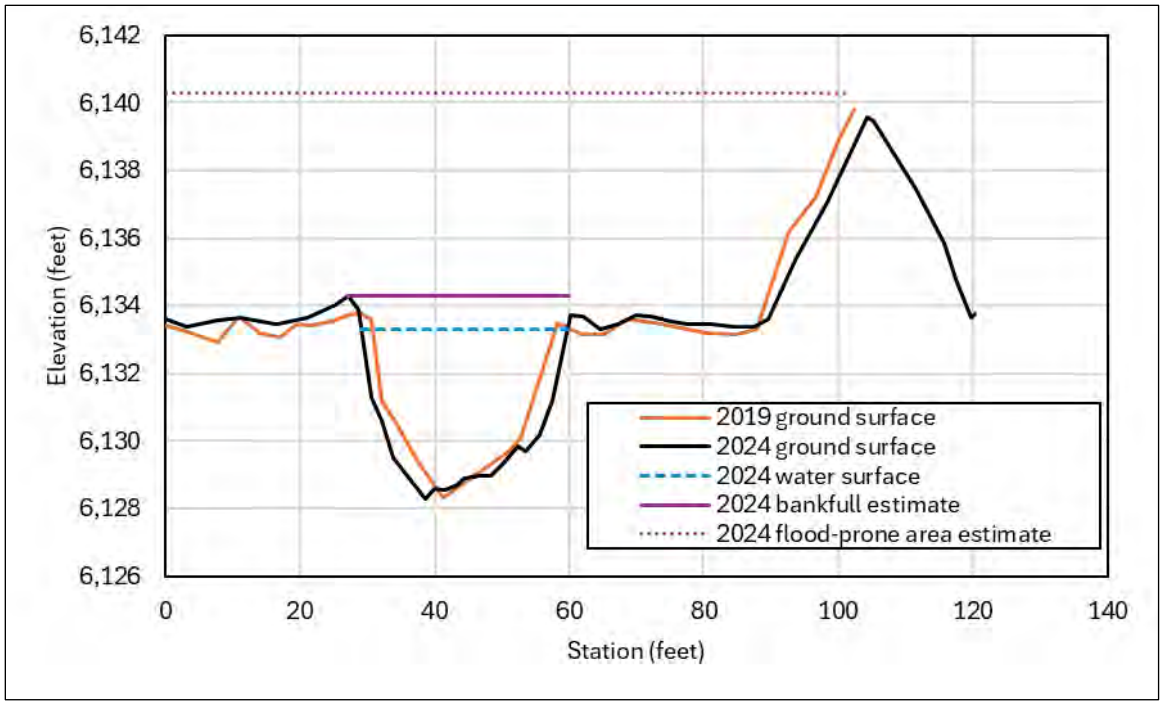
Note: Because the 2003 endpin was not recovered in 2019, the 2003 cross section is not included.

Figure D5-4. Cross section XS-1 at Site LLD-G1 from 2019 and 2024.



Note: Because the 2003 endpin was not recovered in 2019, the 2003 cross section is not included.

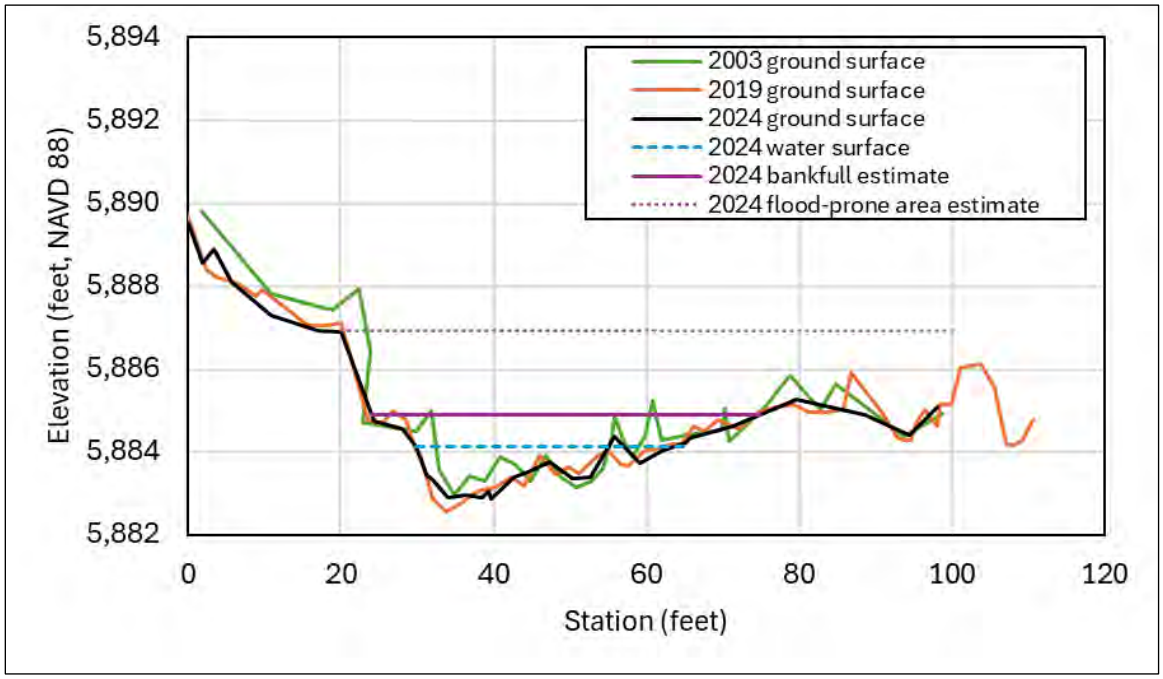
Figure D5-5. Cross section XS-2 at Site LLD-G1 from 2019 and 2024.



Note: Because the 2003 endpin was not recovered in 2019, the 2003 cross section is not included.

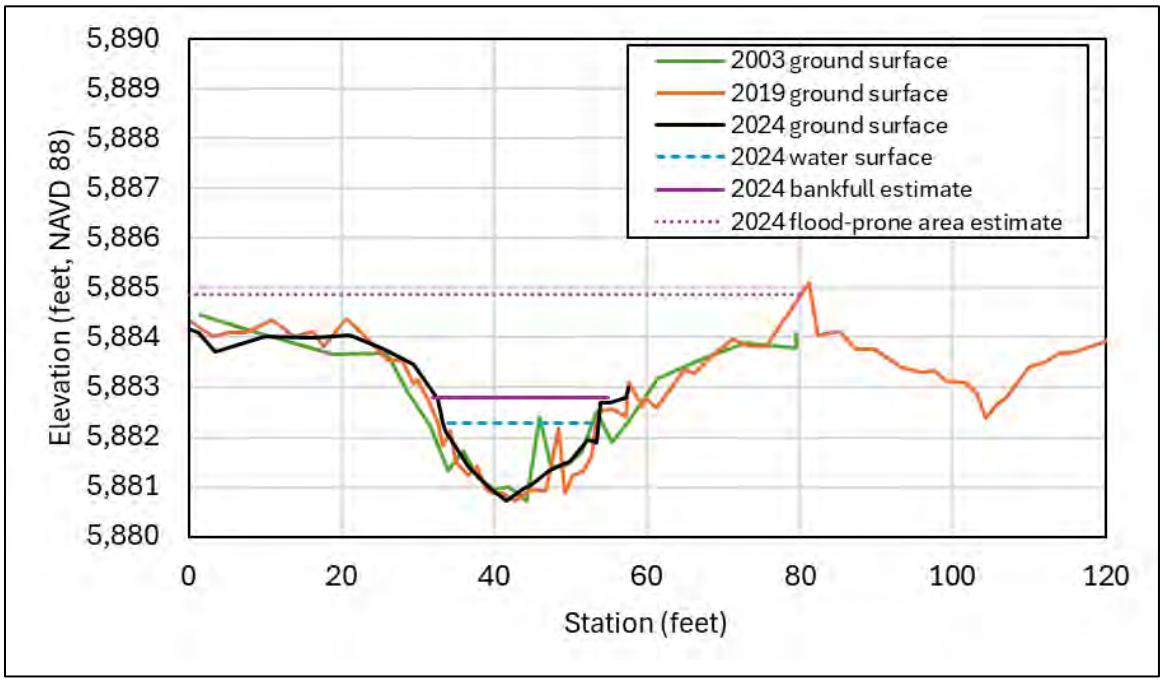
Figure D5-6. Cross section XS-3 at Site LLD-G1 from 2019 and 2024.

Site LLD-G2 (Gerle Creek below Loon Lake Dam, Middle Reach)



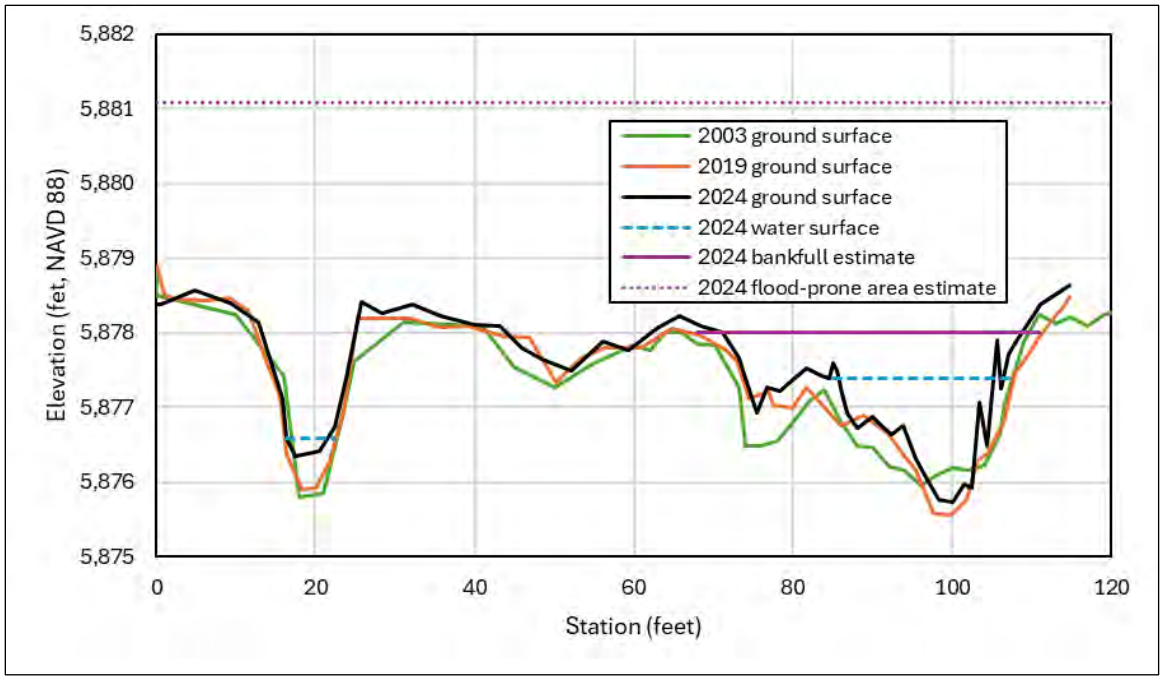
Notes: Flood-prone area estimate shows the minimum flood-prone width based on site topography.

Figure D5-7. Cross section XS-1 at Site LLD-G2 from 2003, 2015, 2016, 2019, and 2024.



Note: The 2024 profile did not extend beyond the right bank endpin.

Figure D5-8. Cross section XS-2 at Site LLD-G2 from 2003, 2015, 2016, 2019, and 2024.



Notes: Flood-prone area estimate shows the minimum flood-prone width based on site topography.

Figure D5-9. Cross section XS-3 at Site LLD-G2 from 2003, 2015, 2016, 2019, and 2024.

Site IHD-G1 (South Fork Silver Creek below Ice House Dam, Upper Reach)

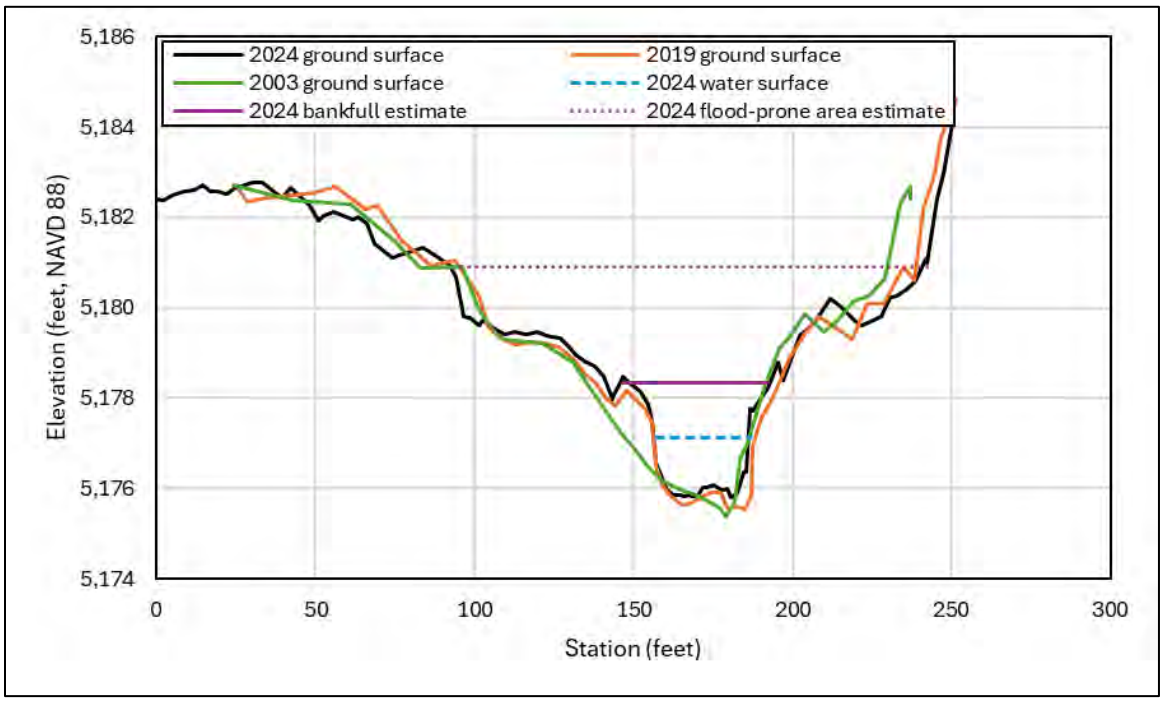
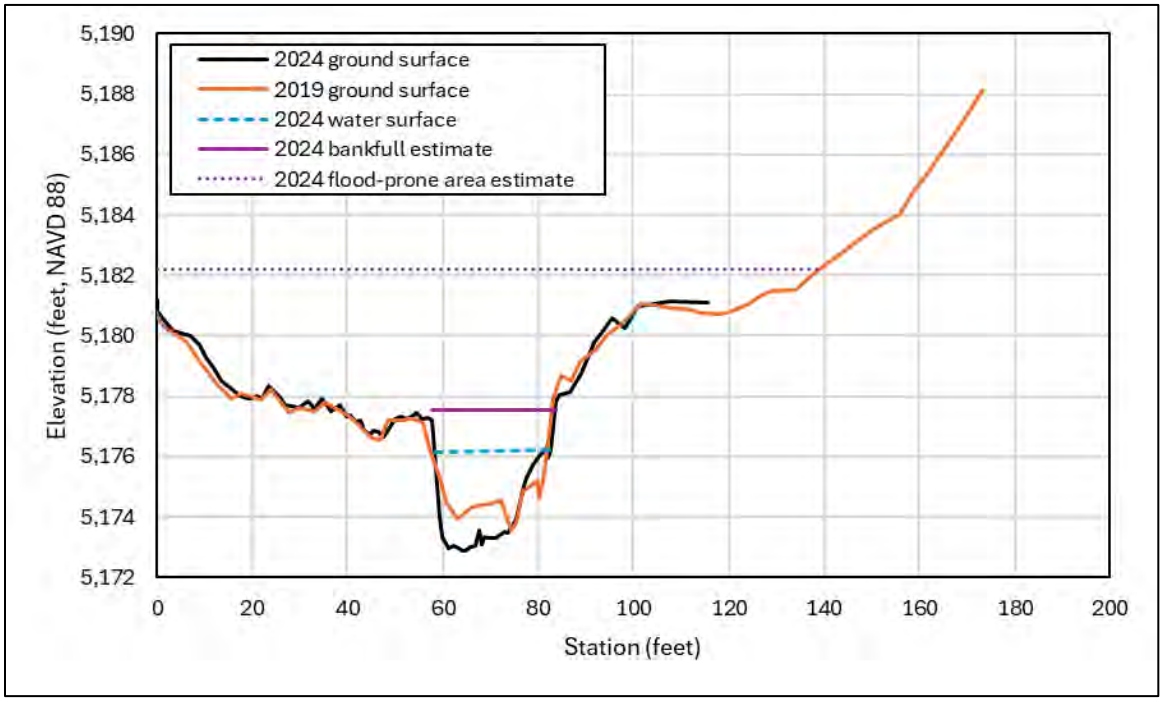
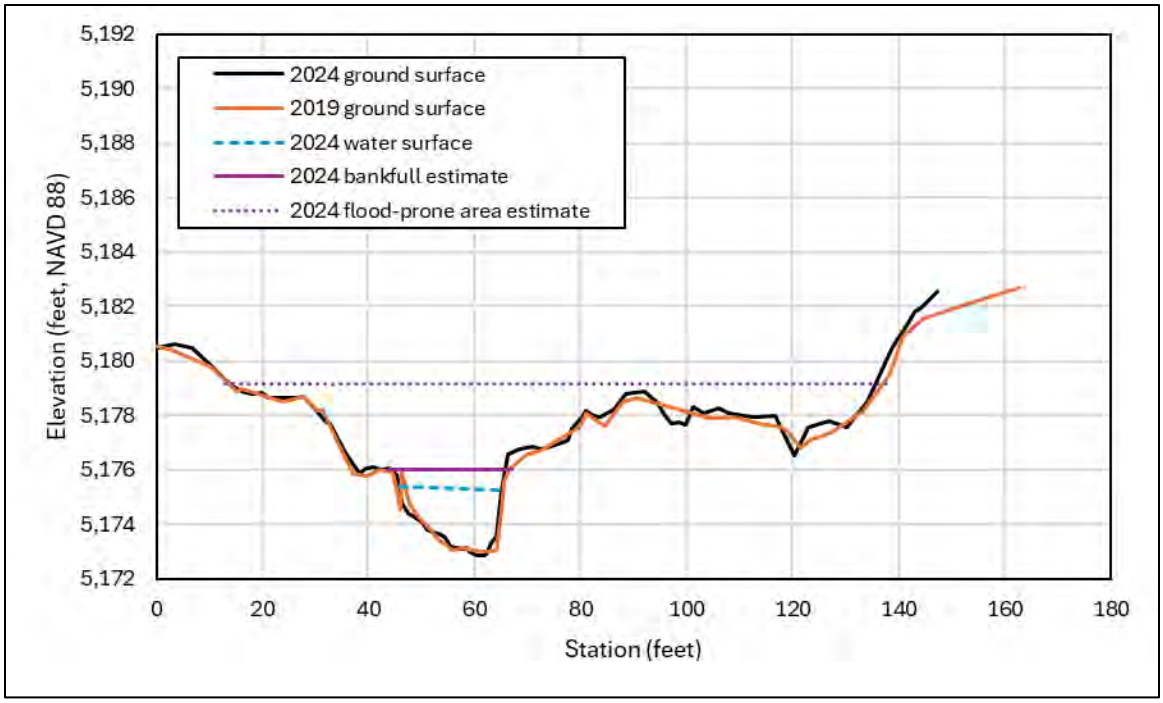


Figure D5-10. Cross section XS-1 at Site IHD-G1 from 2003, 2019, and 2024.



Note: Because the 2003 endpin was not recovered in 2019, the 2003 cross section is not included.

Figure D5-11. Cross section XS-2 at Site IHD-G1 from 2019 and 2024.



Note: Because the 2003 endpin was not recovered in 2019, the 2003 cross section is not included.

Figure D5-12. Cross section XS-3 at Site IHD-G1 from 2019 and 2024.

Site IHD-G2 (South Fork Silver Creek below Ice House, Lower Reach)

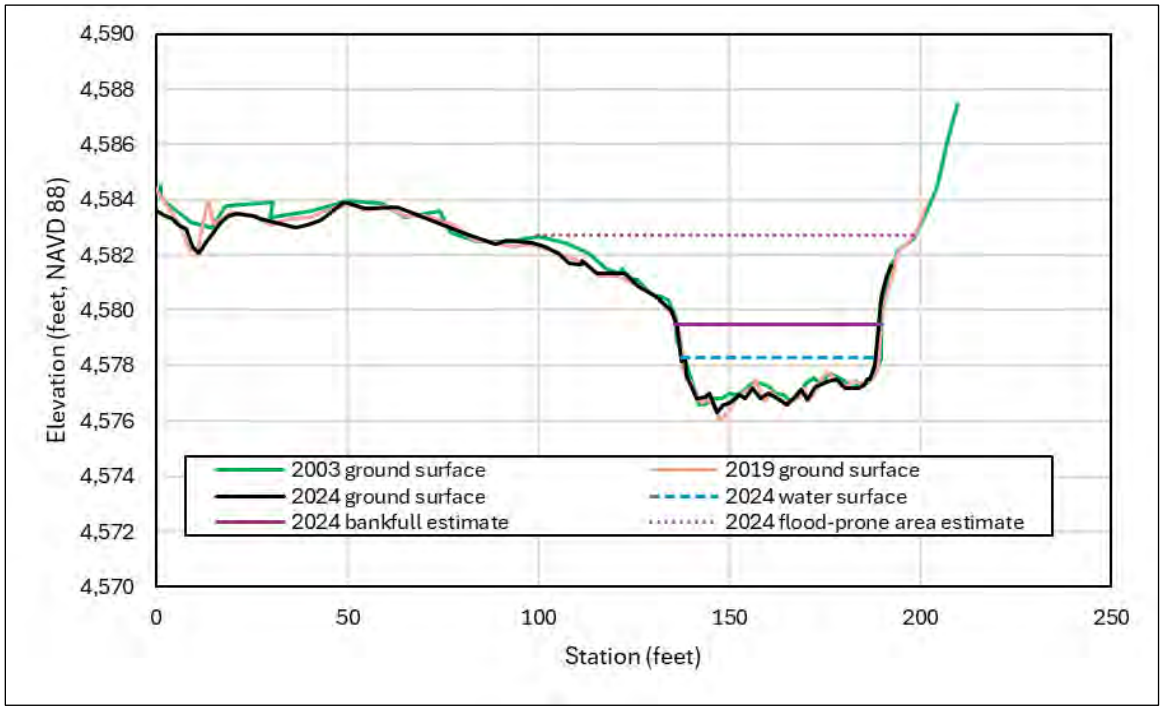
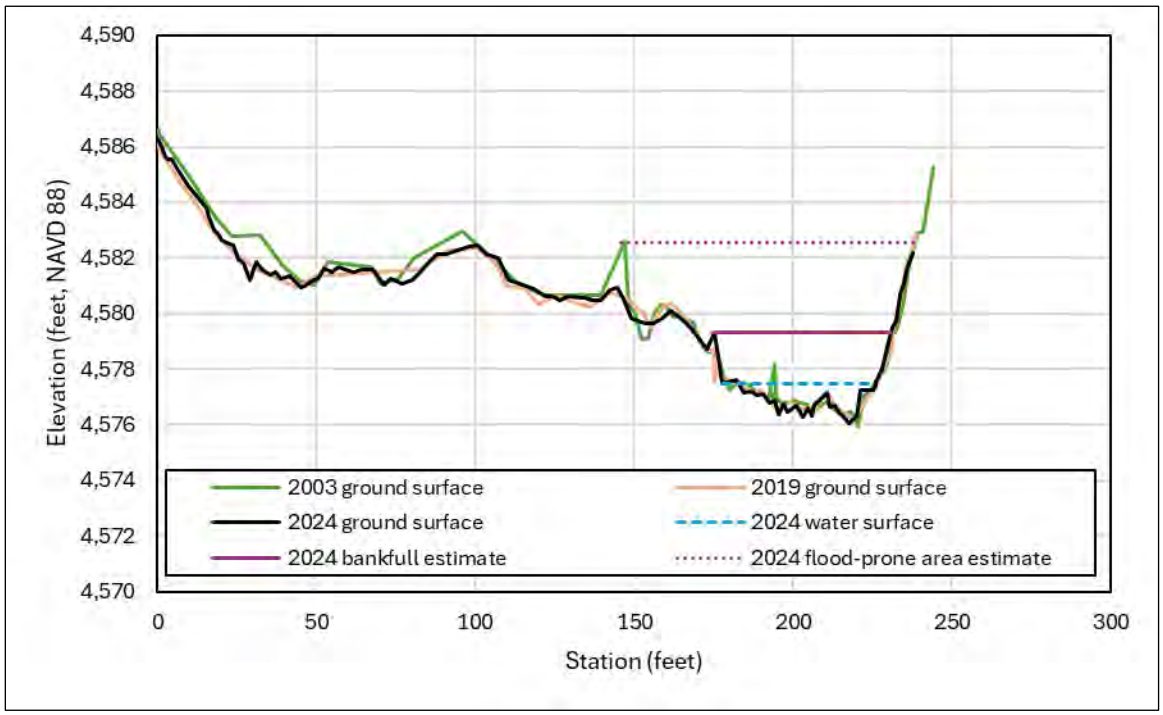


Figure D5-13. Cross section XS-1 at Site IHD-G2 from 2003, 2019, and 2024.



Notes: Additional cross sections were surveyed in 2015 and 2016 prior to and following a pulse flow test.

Figure D5-14. Cross section XS-2 at Site IHD-G2 from 2003, 2019, and 2024.

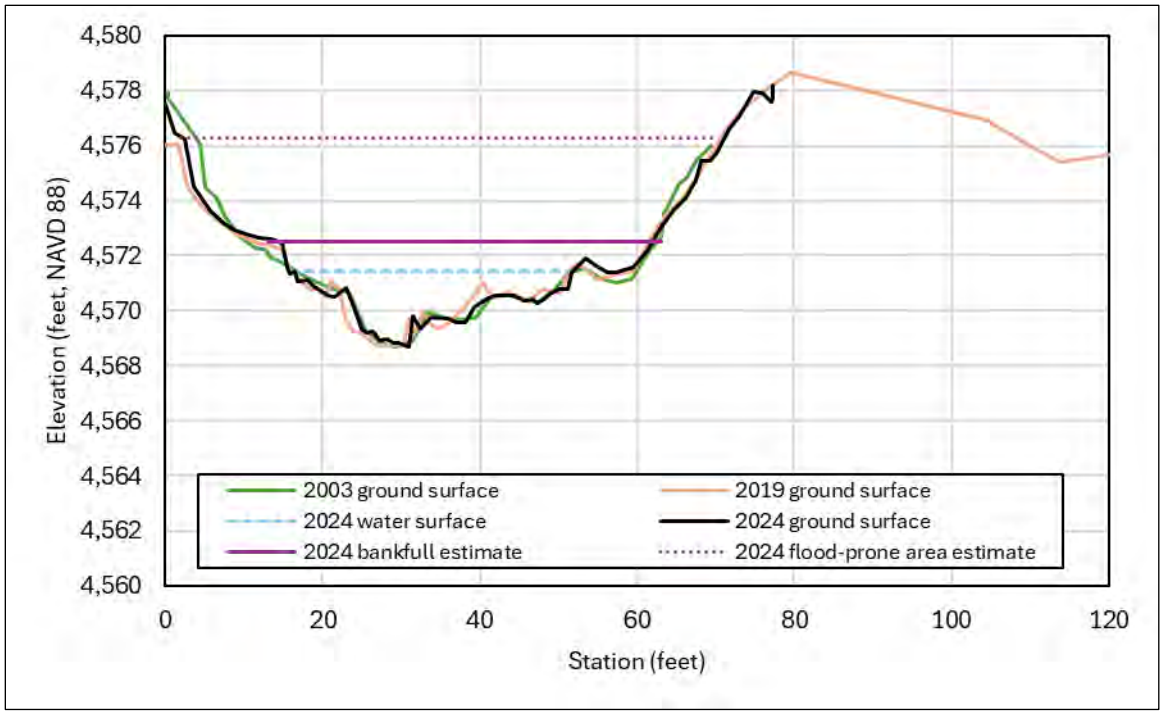
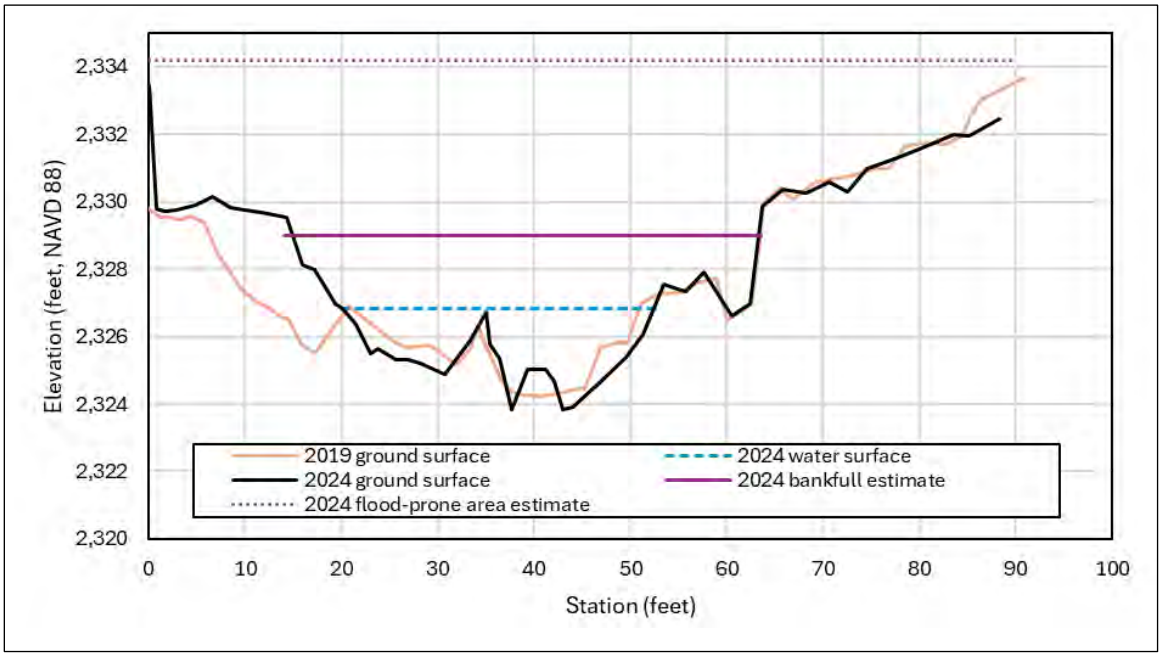


Figure D5-15. Cross section XS-3 at Site IHD-G2 from 2003, 2019, and 2024.

Site CD-G1 (Silver Creek below Camino Dam)



Notes: Because the 2003 endpin was not recovered in 2019, the 2003 cross section is not included.
Flood-prone area estimate shows the minimum flood-prone width based on site topography.

Figure D5-16. Cross section XS-1 at Site CD-G1 from 2019 and 2024.

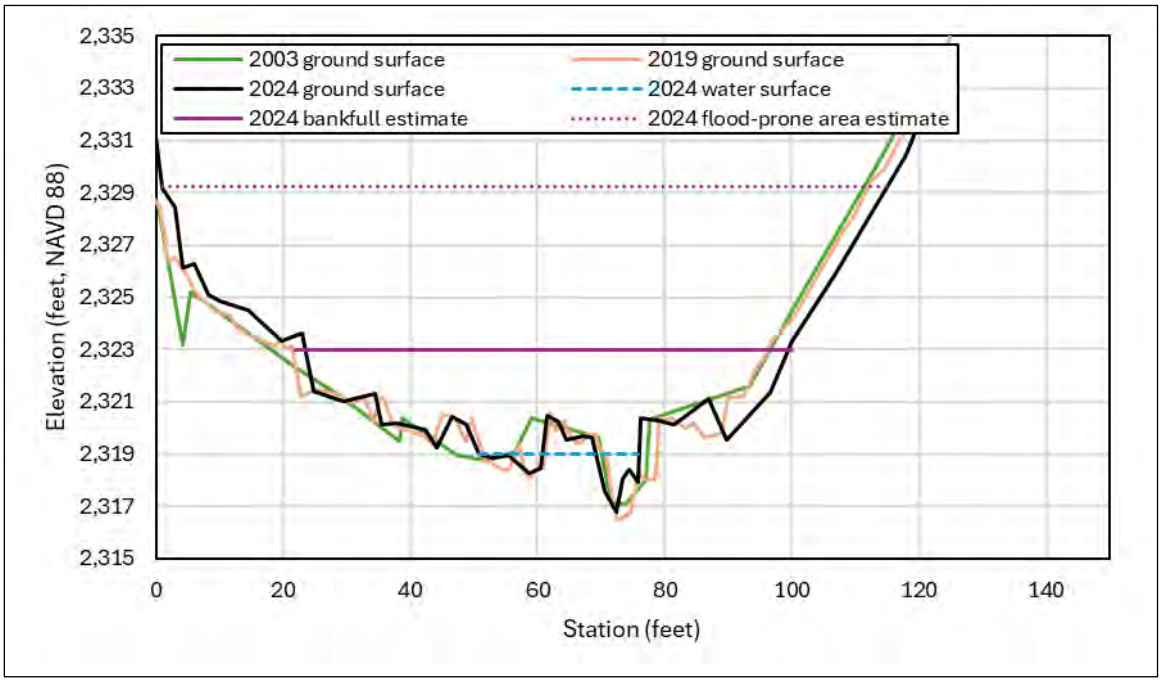


Figure D5-17. Cross section XS-2 at Site CD-G1 from 2003, 2019, and 2024.

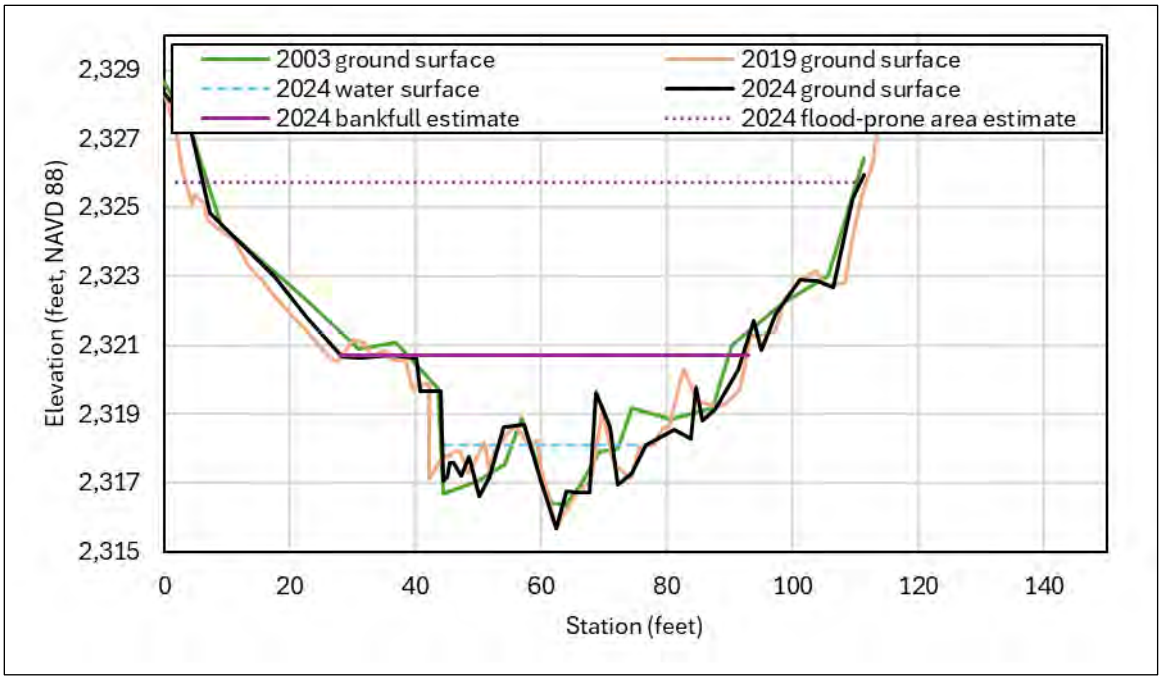
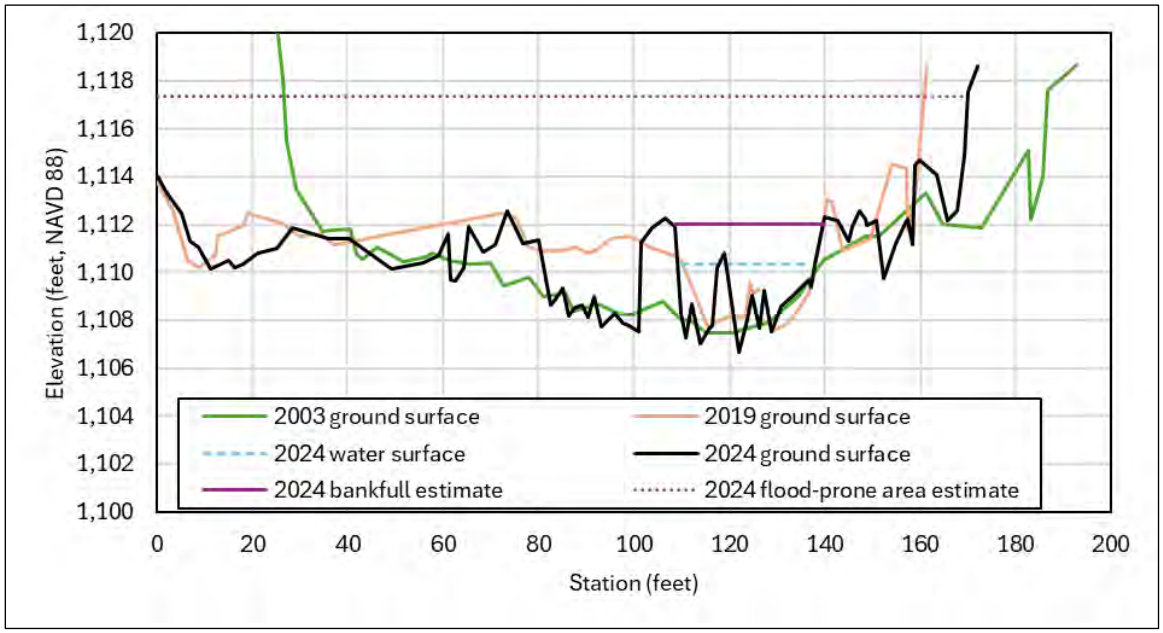


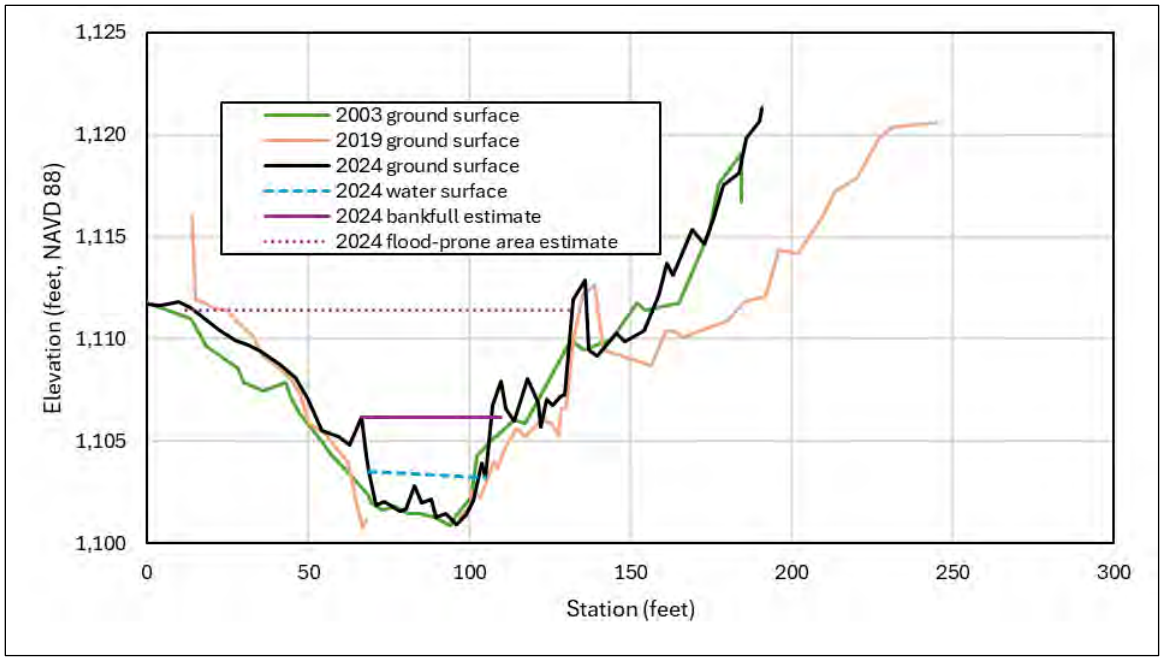
Figure D5-18. Cross section XS-3 at Site CD-G1 from 2003, 2019, and 2024.

Site SCD-G1 (South Fork American River below Slab Creek Dam)



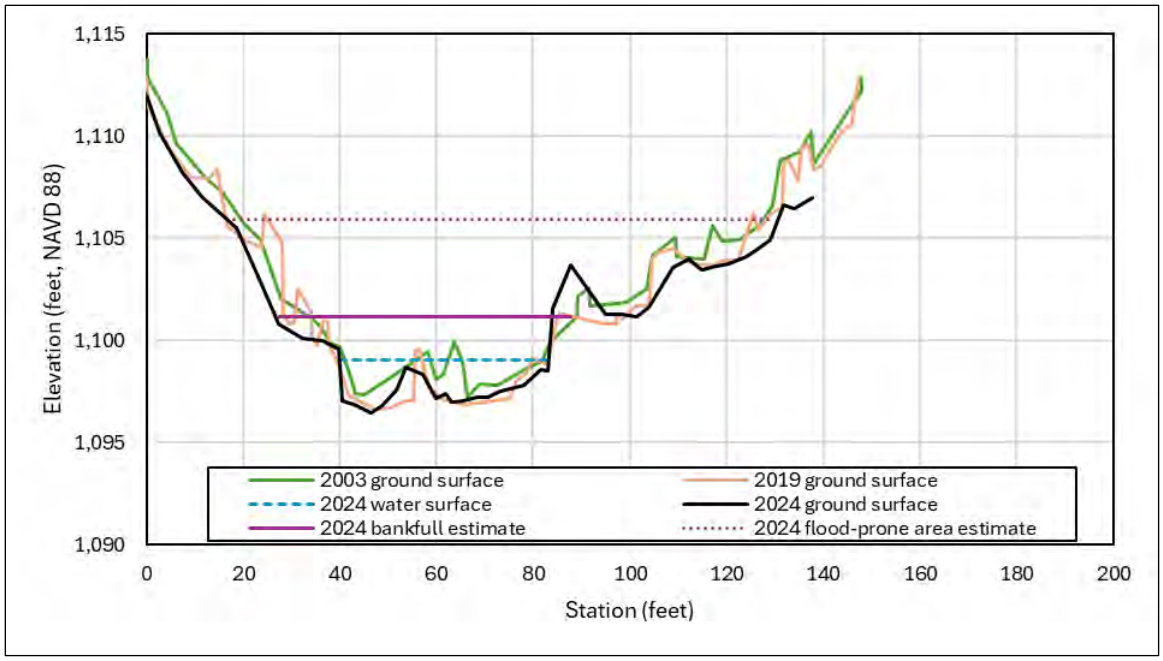
Notes: Cross section was only partially surveyed in 2019 because of unsafe wading conditions.
Apparent differences in topography between monitoring years were due to differences in cross section alignment.
Flood-prone area estimate shows the minimum flood-prone width based on site topography.

Figure D5-19. Cross section XS-1 at Site SCD-G1 from 2003, 2019, and 2024.



Note: Cross section was only partially surveyed in 2019 because of unsafe wading conditions.

Figure D5-20. Cross section XS-2 at Site SCD-G1 from 2003, 2019, and 2024.



Note: Cross section was only partially surveyed in 2019 because of unsafe wading conditions.

Figure D5-21. Cross section XS-3 at Site SCD-G1 from 2003, 2019, and 2024.

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APPENDIX D6

Pebble Counts at Geomorphology Sites

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Table D6-1. Bed Particle Size Characteristics in 2003, 2019, and 2024.

Site	Cross Section	2003 Bed Characteristics				2019 Bed Characteristics				2024 Bed Characteristics			
		D_{16} (mm)	D_{50} (mm)	D_{84} (mm)	Dominant Sediment Facies[1]	D_{16} (mm)	D_{50} (mm)	D_{84} (mm)	Dominant Sediment Facies[1]	D_{16} (mm)	D_{50} (mm)	D_{84} (mm)	Dominant Sediment Facies[1]
RRD-G1	Upstream	8	32	63	Cobble	9	41	134	Cobble	24	66	115	Cobble
	Intermediate	5	36	97		4	50	127		19	82	175	
	Downstream	5	31	69		<2	43	142		<2	40	95	
LLD-G1	Upstream	--	4	--	Sand	-	-	-	Sand	-	-	-	Sand
	Intermediate	--	<2	--		-	-	-		-	-	-	
	Downstream	--	3	--		-	-	-		-	-	-	
LLD-G2	Upstream	15	69	156	Cobble	31	95	185	Cobble	74	126	227	Cobble
	Intermediate	11	64	175		29	93	204		64	118	235	
	Downstream	34	86	170		26	80	135		43	82	146	
IHD-G1	Upstream	<2	17	30	Gravel	15	37	62	Gravel	<2	28	57	Gravel
	Intermediate	<2	10	20		6	11	18		<2	10	30	
	Downstream	<2	10	26		<2	14	27		5	18	38	
IHD-G2	Upstream	24	45	155	Bedrock/ boulder	35	84	160	Bedrock	<2	30	82	Bedrock
	Intermediate	21	88	280		55	118	220		11	78	190	
	Downstream	<2	60	400		-	-	-		-	-	-	
CD-G1	Upstream	44	74	146	Bedrock	31	66	154	Bedrock	47	74	155	Bedrock
	Intermediate	46	83	151		43	82	142		16	49	122	
	Downstream	36	74	178		39	100	317		23	54	121	
SCD-G1	Upstream	130	240	450	Boulder	-	-	-	Boulder	-	-	-	Boulder
	Intermediate	100	179	370		-	-	-		-	-	-	
	Downstream	90	190	395		-	-	-		-	-	-	

Notes: D_{16} = particle size at which 16% of the bed is finer
D_{50} = particle size at which 50% of the bed is finer
D_{84} = particle size at which 84% of the bed is finer
mm = millimeters

[1] Dominant sediment facies is the class with the highest total mapped surface area.

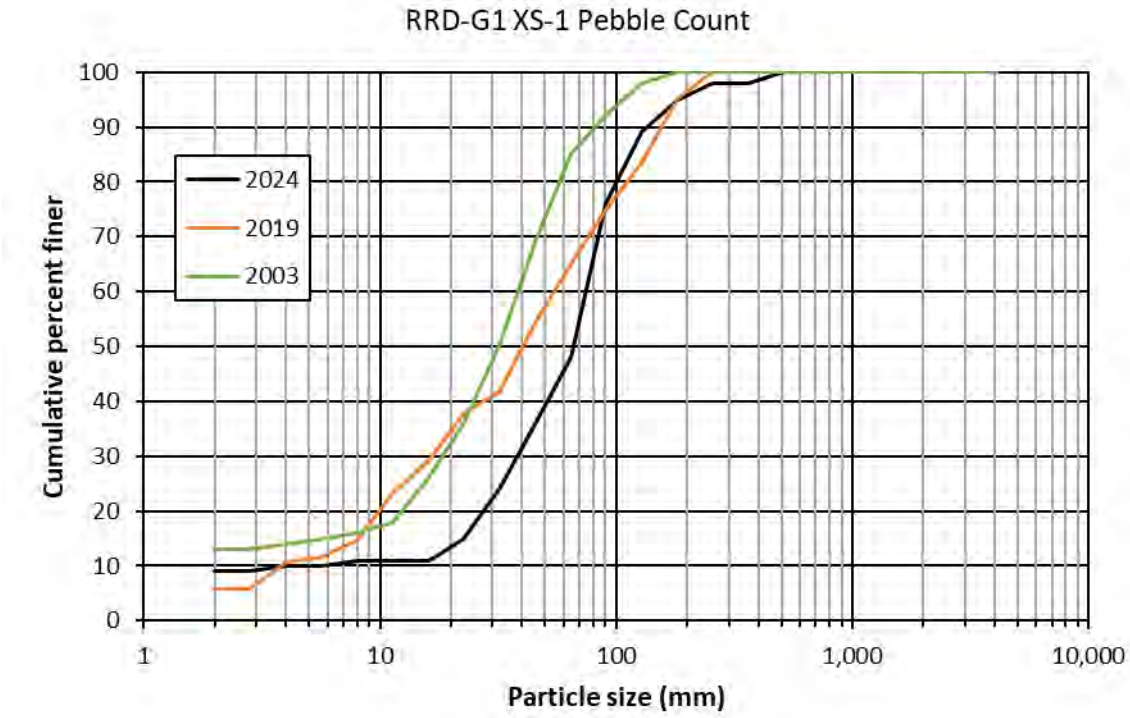


Figure D6-1. Particle size distribution at Site RRD-G1 XS-1.

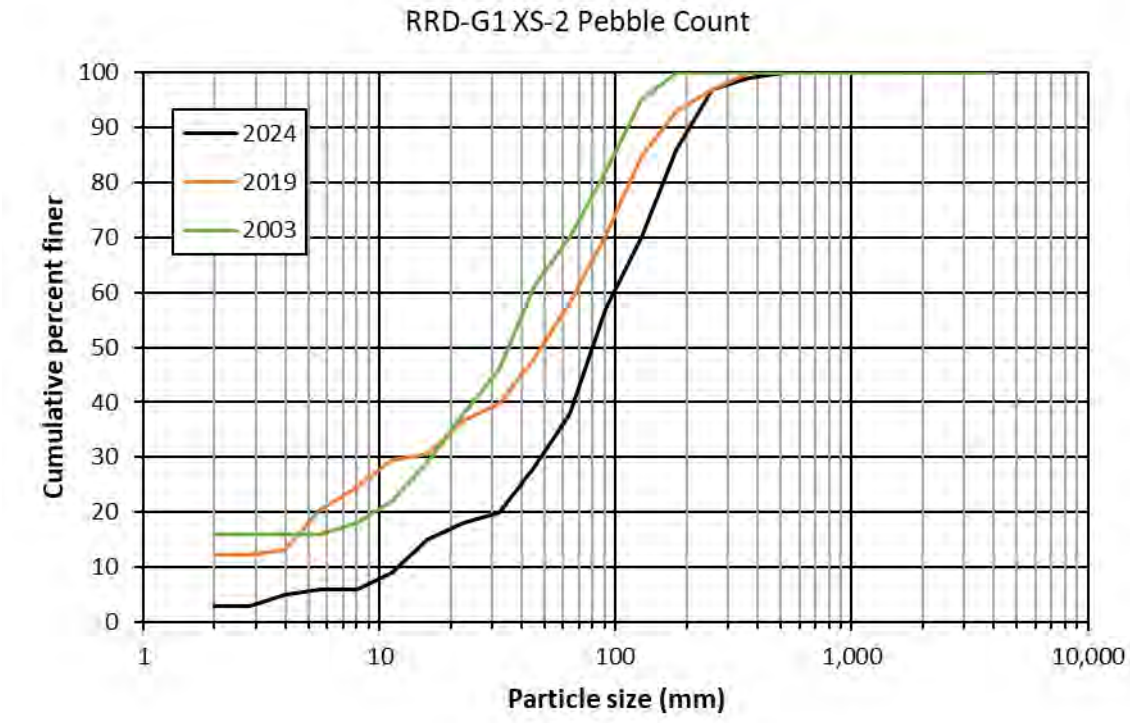


Figure D6-2. Particle size distribution at Site RRD-G1 XS-2.

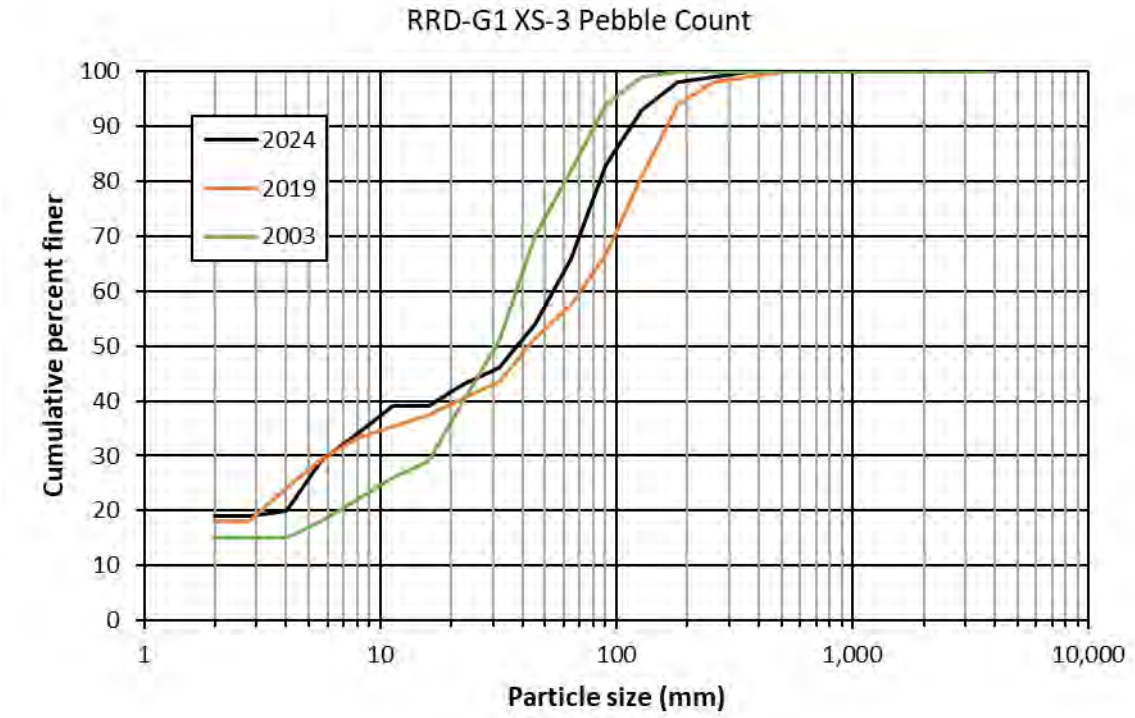


Figure D6-3. Particle size distribution at Site RRD-G1 XS-3.

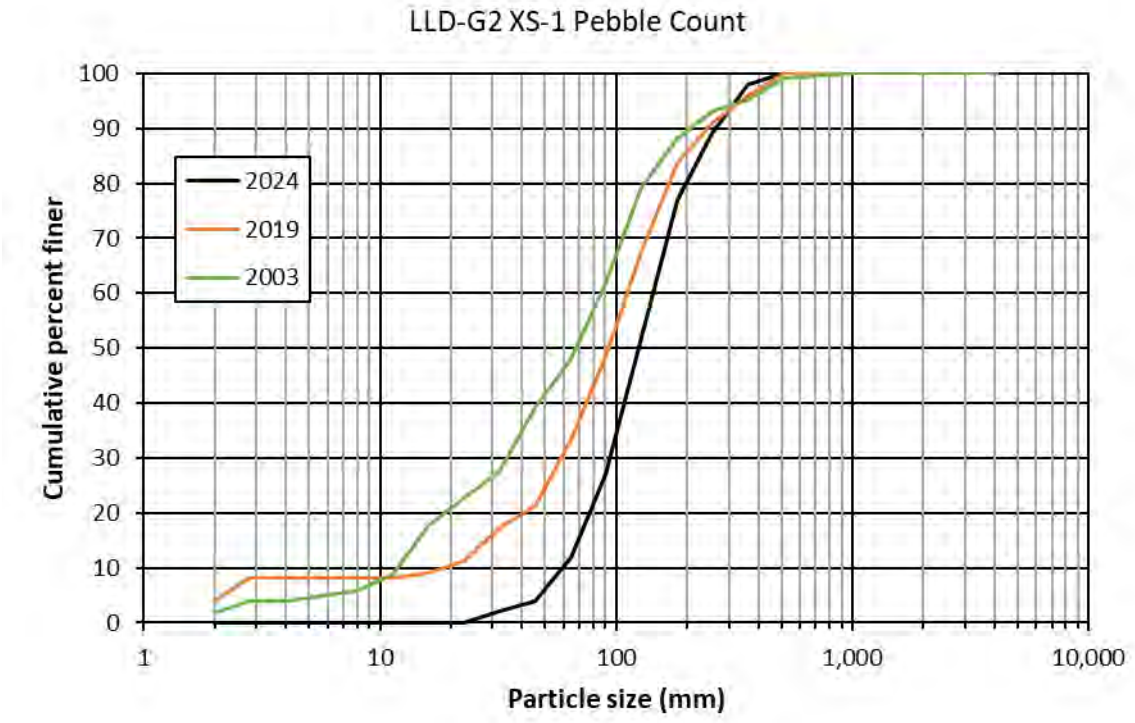


Figure D6-4. Particle size distribution at Site LLD-G2 XS-1.

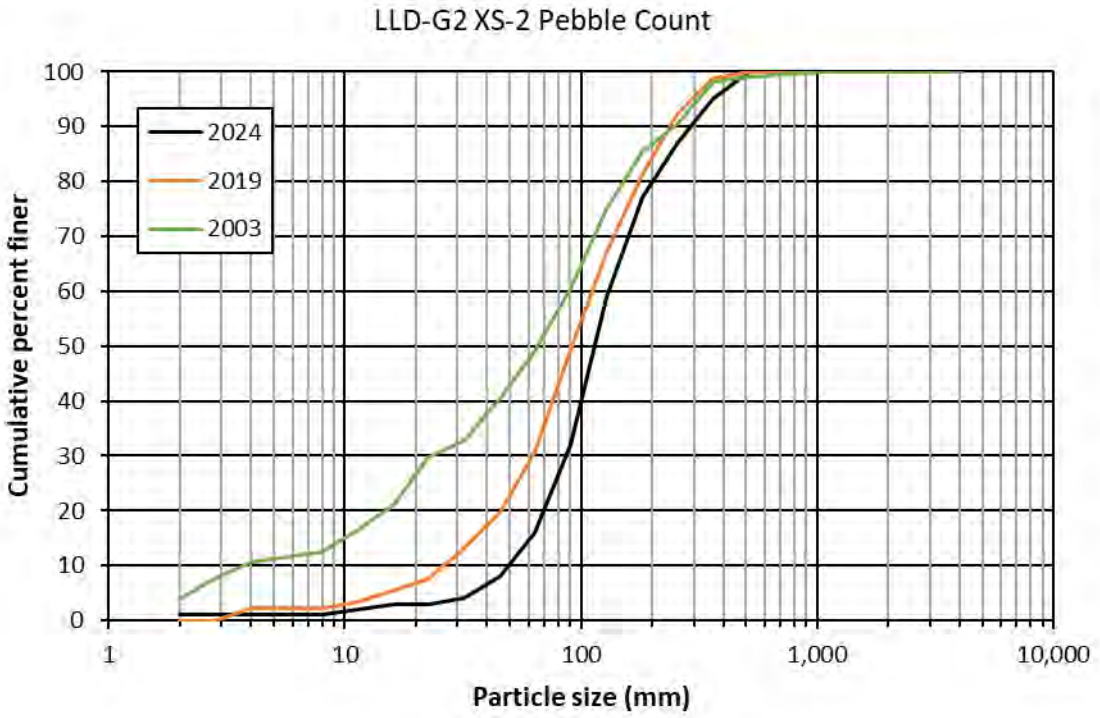


Figure D6-5. Particle size distribution at Site LLD-G2 XS-2.

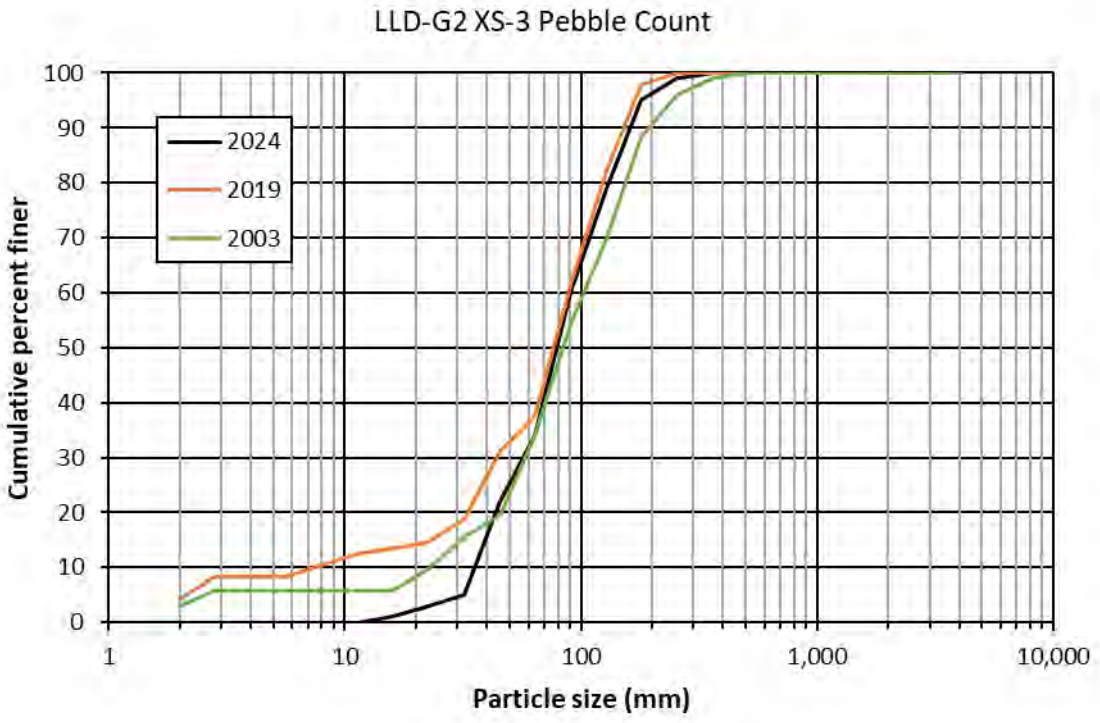


Figure D6-6. Particle size distribution at Site LLD-G2 XS-3.

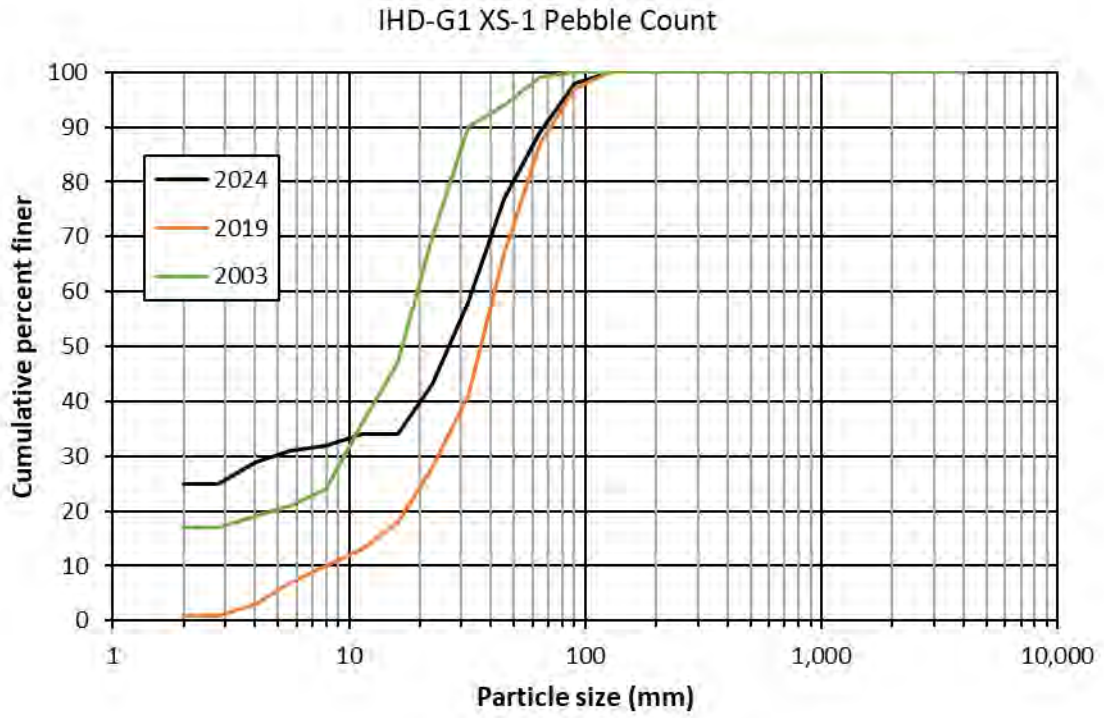


Figure D6-7. Particle size distribution at Site IHD-G1 XS-1.

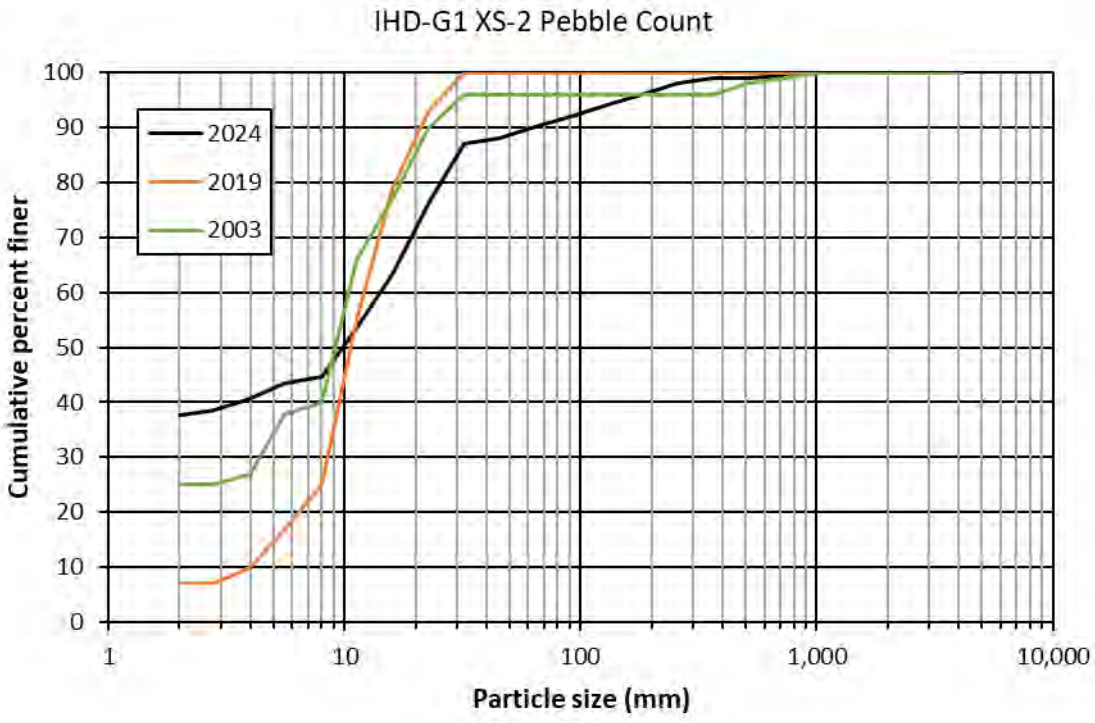


Figure D6-8. Particle size distribution at Site IHD-G1 XS-2.

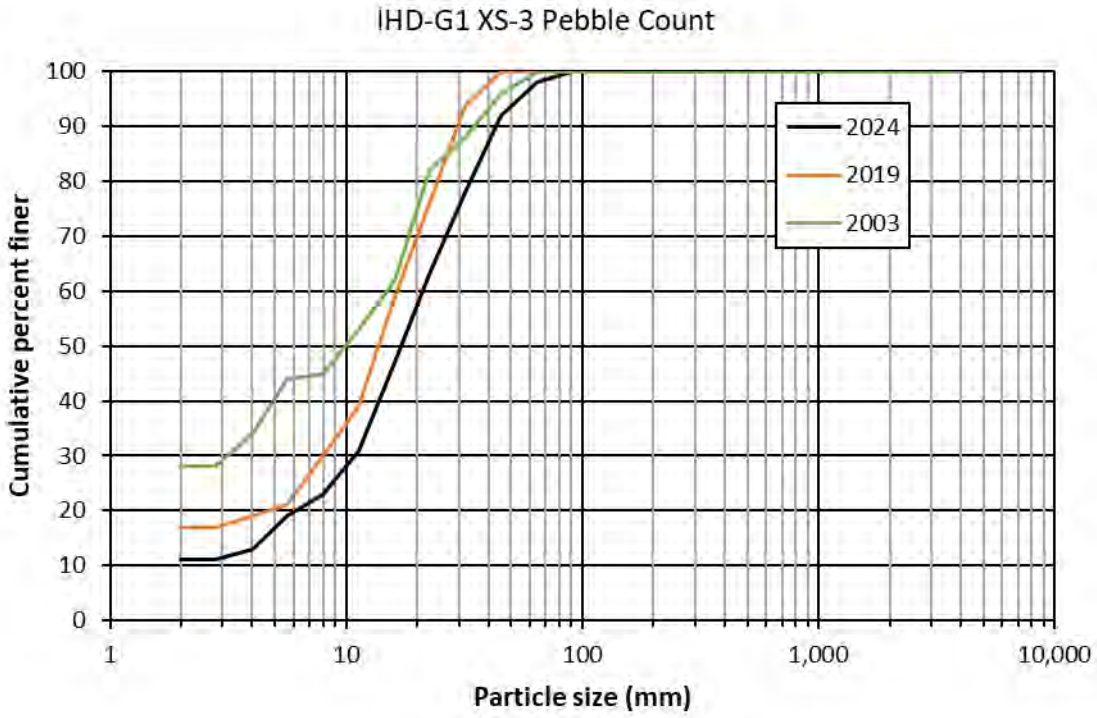


Figure D6-9. Particle size distribution at Site IHD-G1 XS-3.

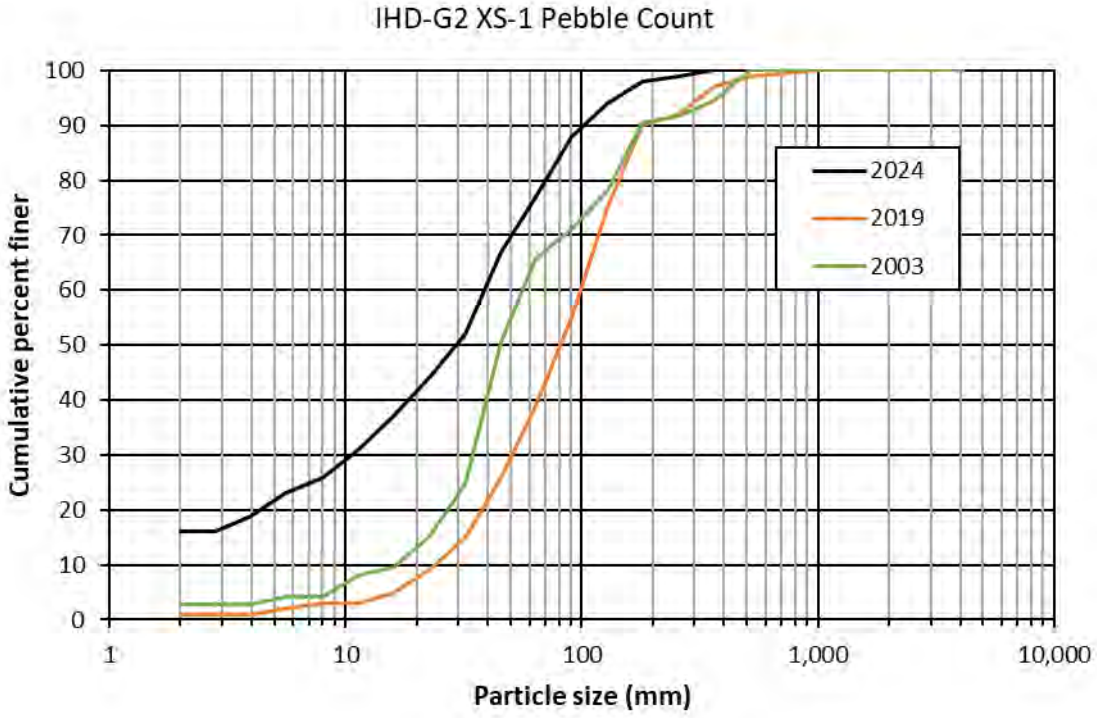


Figure D6-10. Particle size distribution at Site IHD-G2 XS-1.

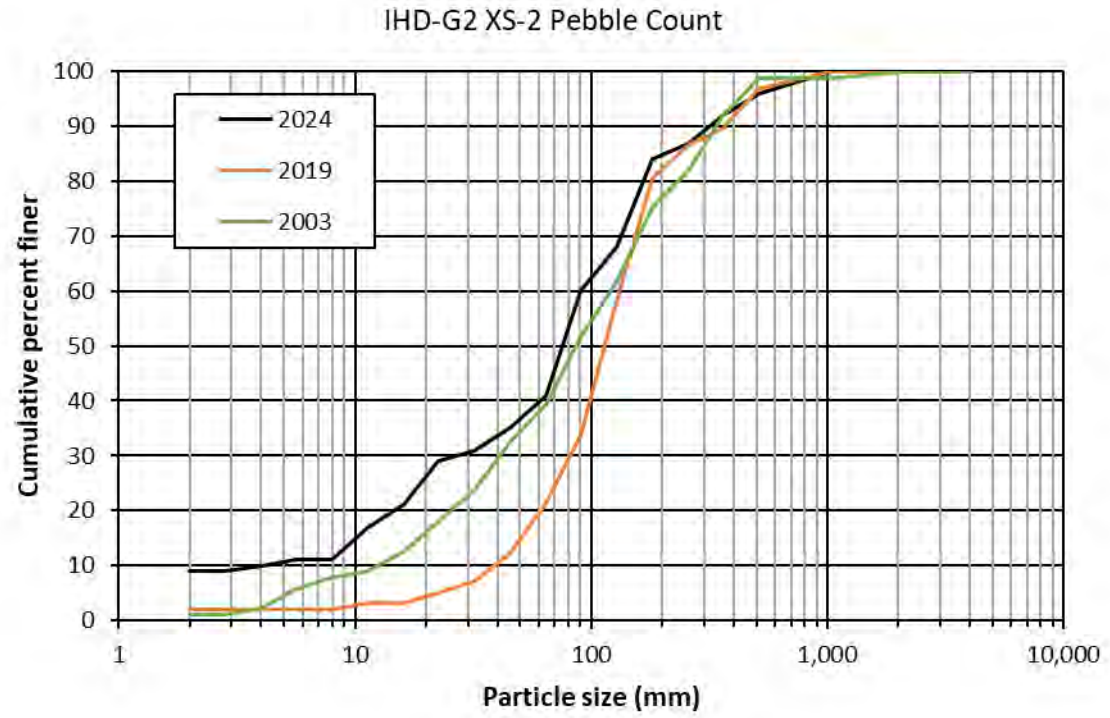


Figure D6-11. Particle size distribution at Site IHD-G2 XS-2.

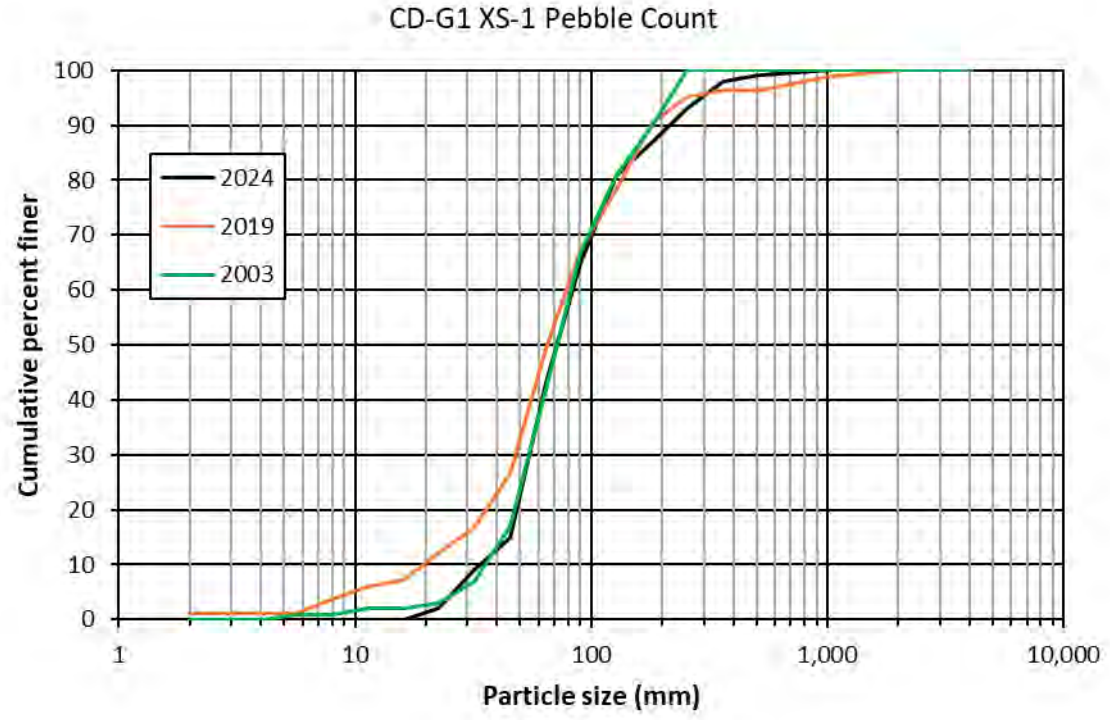


Figure D6-12. Particle size distribution at Site CD-G1 XS-1.

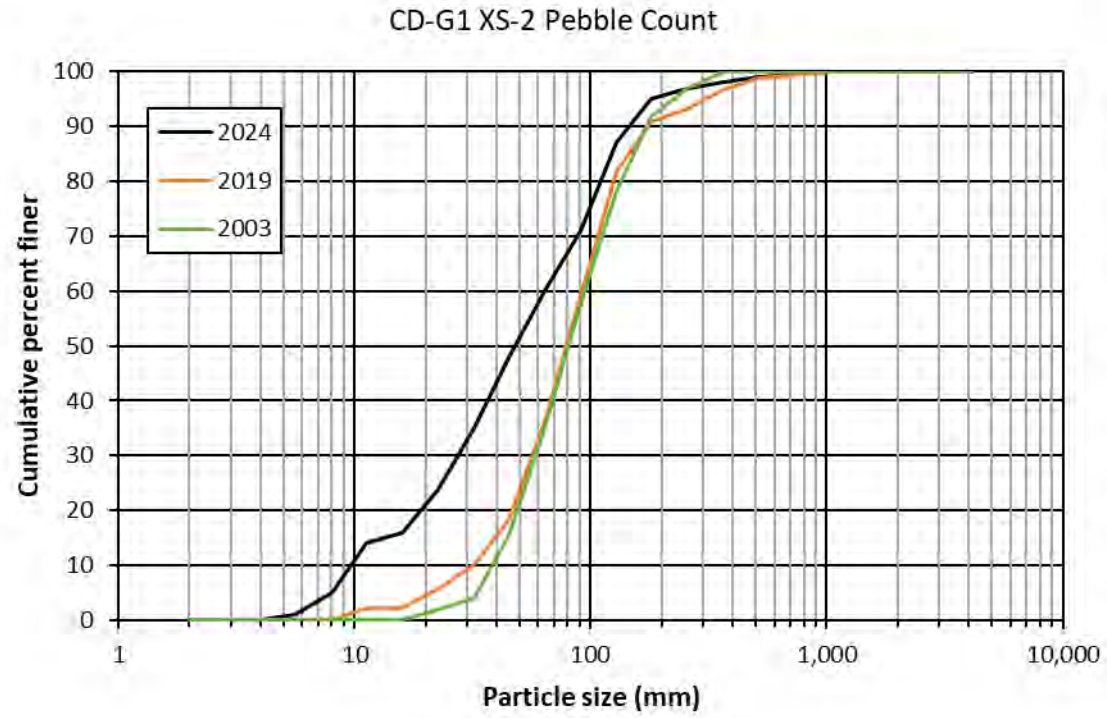


Figure D6-13. Particle size distribution at Site CD-G1 XS-2.

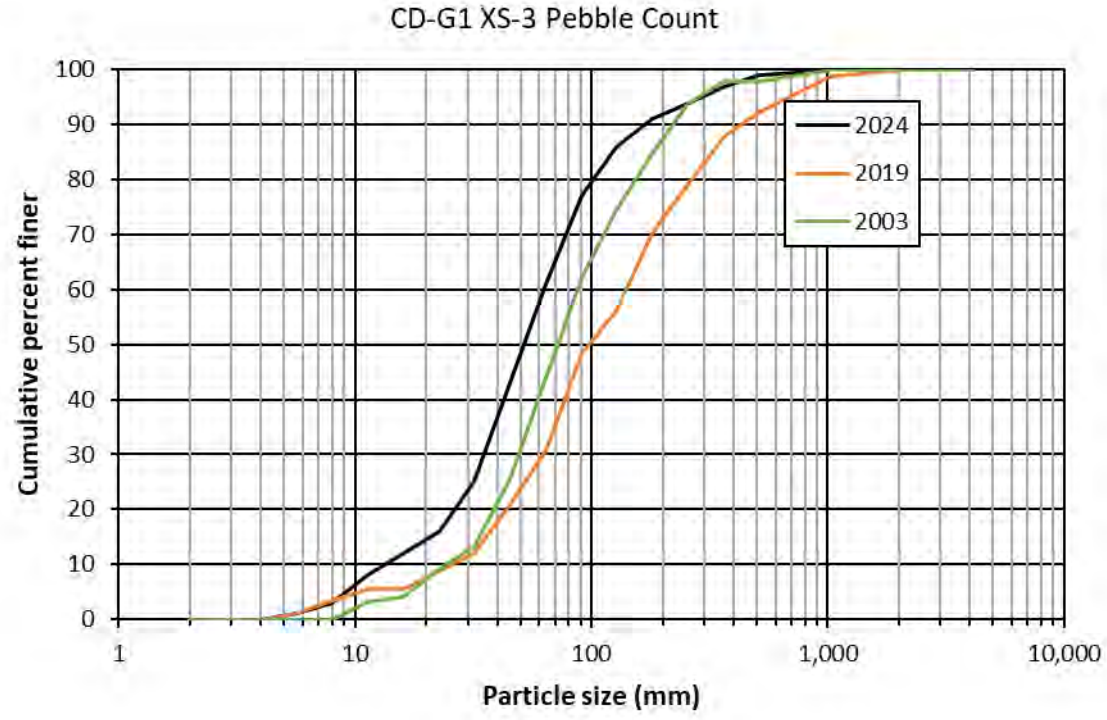


Figure D6-14. Particle size distribution at Site CD-G1 XS-3.

APPENDIX D7

Sediment Facies Maps

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Notes: Bo = boulder, Brx = bedrock, Co = cobble, Gr = gravel, Sa = sand

Figure D7-1. Facies mapping at Rubicon River below Rubicon Dam (Site RRD-G1), 2024.



Notes: Bo = boulder, Co = cobble, Gr = gravel, Sa = sand

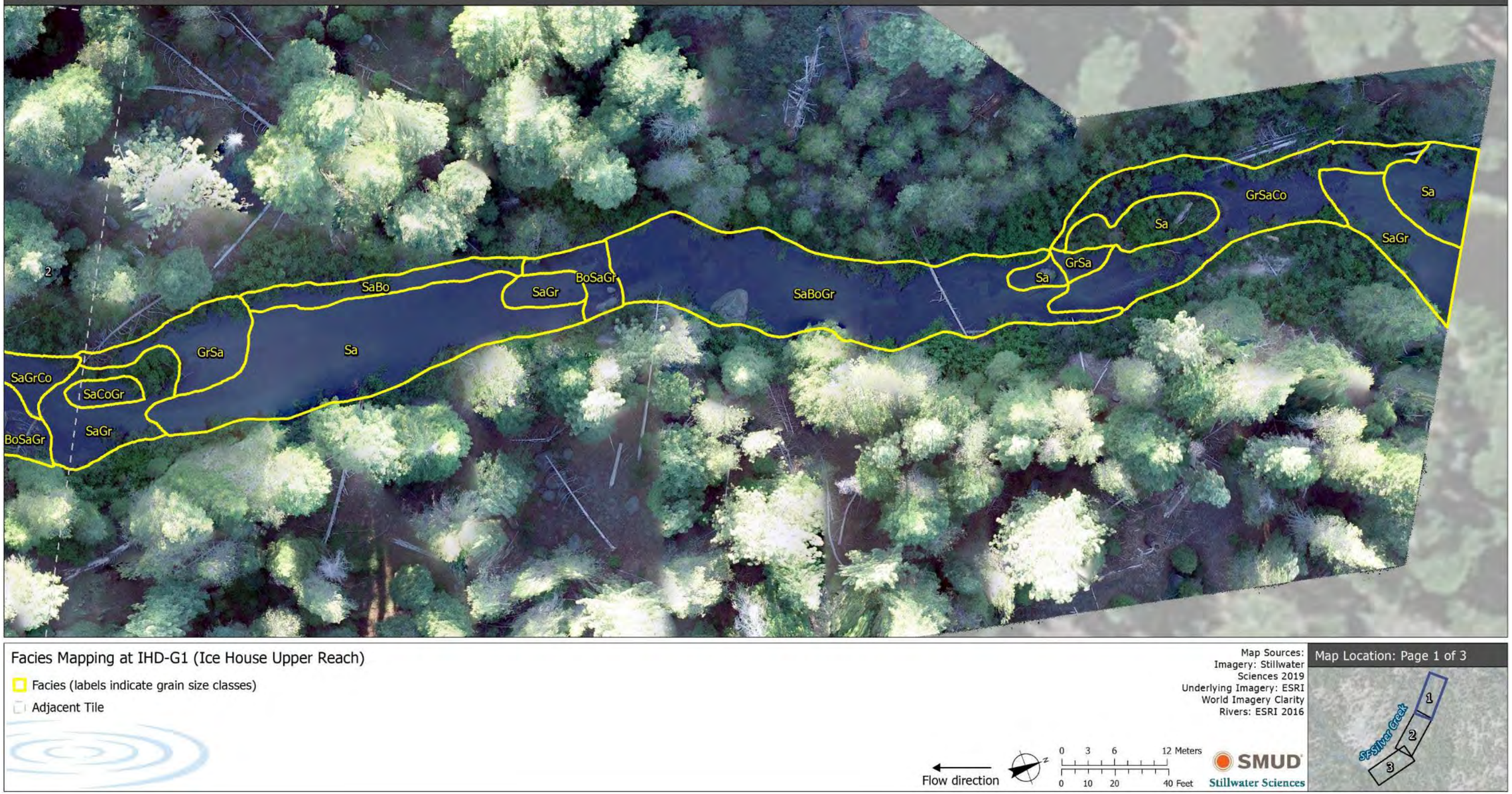
Figure D7-2. Facies mapping at Gerle Creek below Loon Lake, middle reach (Site LLD-G2), 2024, upstream tile.



Notes: Co = cobble, Gr = gravel, Sa = sand

Figure D7-3. Facies mapping at Gerle Creek below Loon Lake, middle reach (Site LLD-G2), 2024, downstream tile.

MONITORING PROGRAM 2024 FINAL ANNUAL REPORT



Notes: Bo = boulder, Co = cobble, Gr = gravel, Sa = sand

Figure D7-4. Facies mapping at South Fork Silver Creek below Ice House Dam, upper reach (Site IHD-G1), 2024, upstream tile.



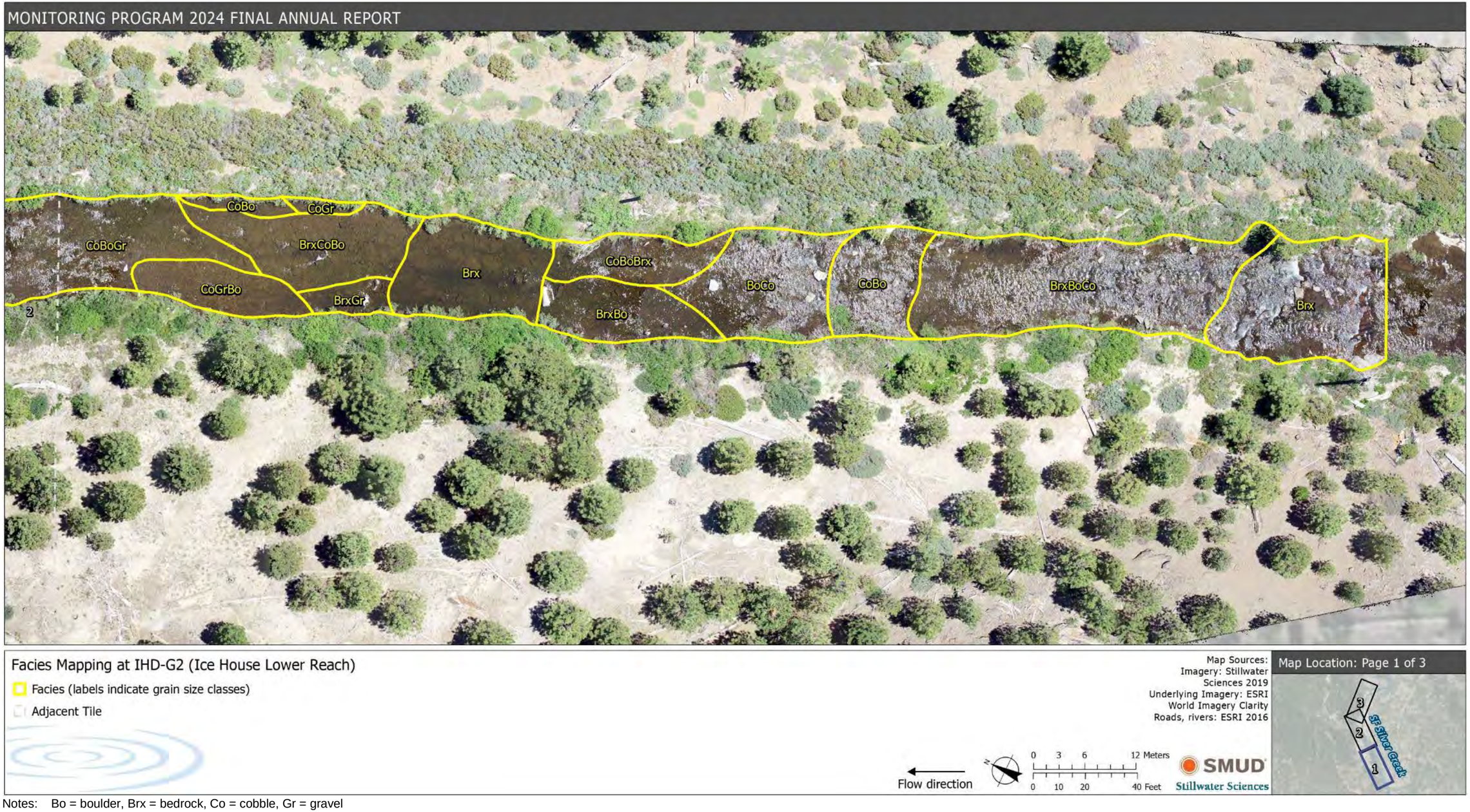
Notes: Bo = boulder, Co = cobble, Gr = gravel, Sa = sand

Figure D7-5. Facies mapping at South Fork Silver Creek below Ice House Dam, upper reach (Site IHD-G1), 2024, middle tile.



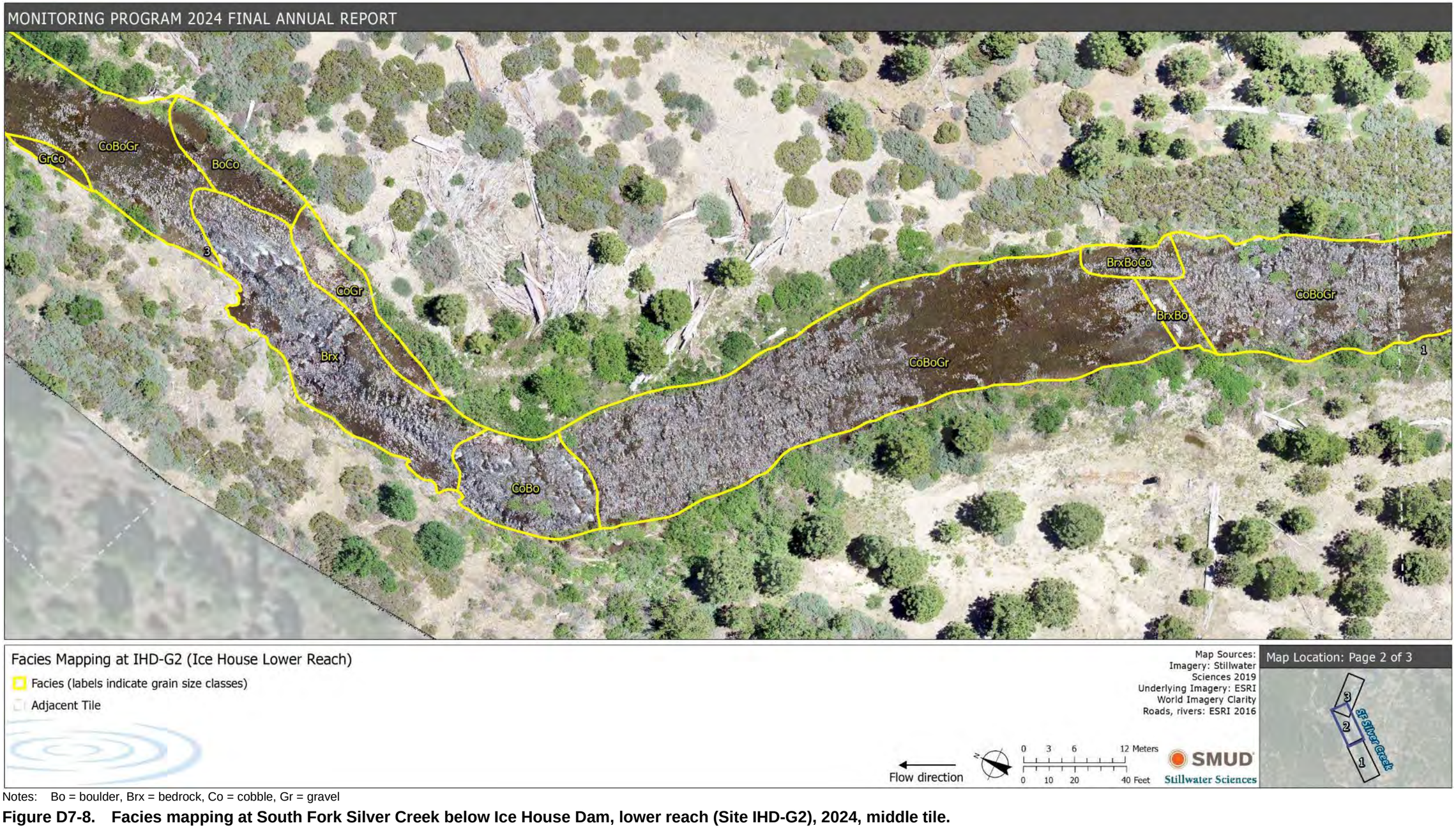
Notes: Bo = boulder, Co = cobble, Gr = gravel, Sa = sand

Figure D7-6. Facies mapping at South Fork Silver Creek below Ice House Dam, upper reach (Site IHD-G1), 2024, downstream tile.



Notes: Bo = boulder, Brx = bedrock, Co = cobble, Gr = gravel

Figure D7-7. Facies mapping at South Fork Silver Creek below Ice House Dam, lower reach (Site IHD-G2), 2024, upstream tile.



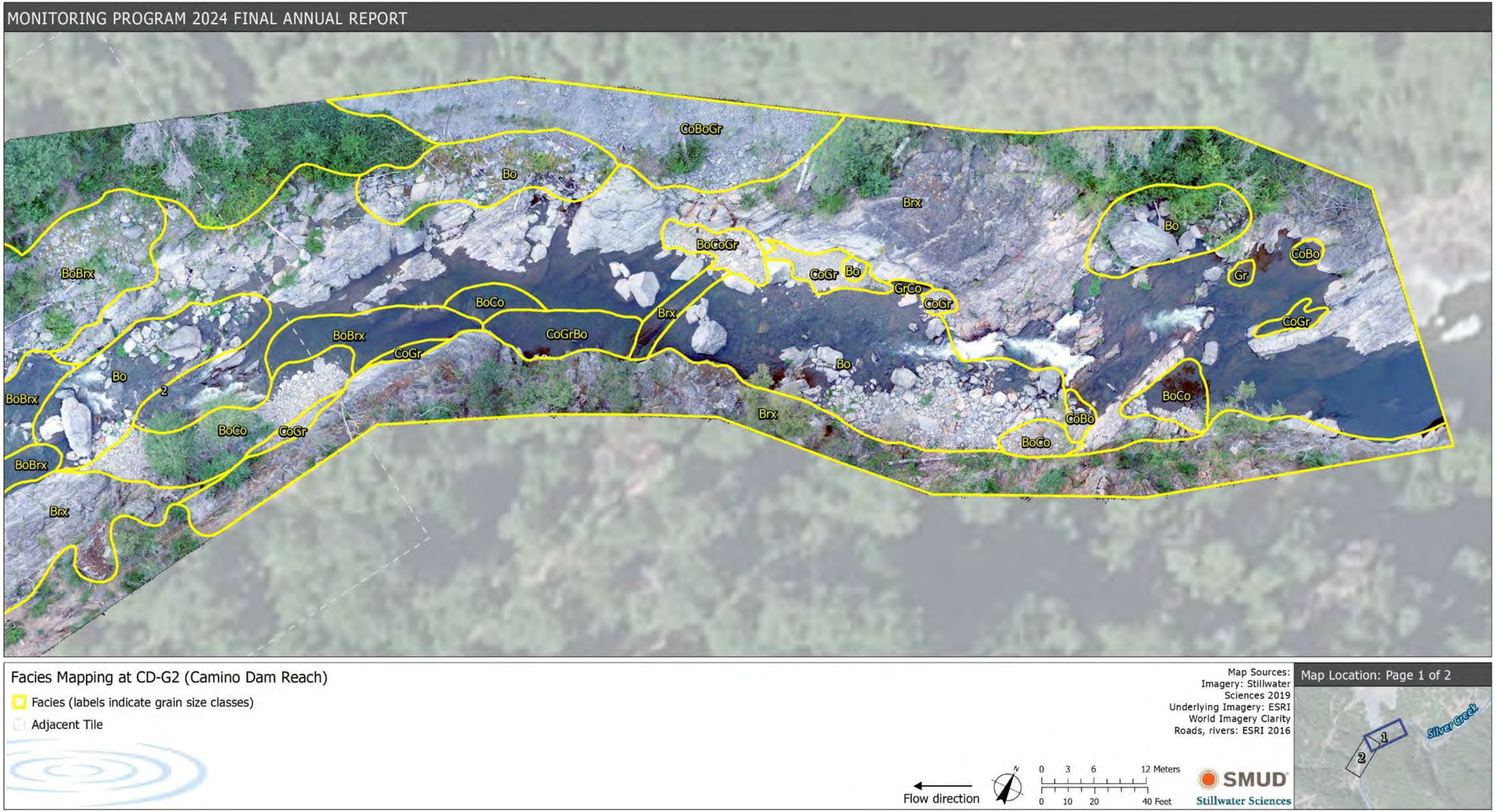
Notes: Bo = boulder, Brx = bedrock, Co = cobble, Gr = gravel

Figure D7-8. Facies mapping at South Fork Silver Creek below Ice House Dam, lower reach (Site IHD-G2), 2024, middle tile.



Notes: Bo = boulder, Brx = bedrock, Co = cobble, Gr = gravel

Figure D7-9. Facies mapping at South Fork Silver Creek below Ice House Dam, lower reach (Site IHD-G2), 2024, downstream tile.



Notes: Bo = boulder, Brx = bedrock, Co = cobble, Gr = gravel

Figure D7-10. Facies mapping at Silver Creek below Camino Dam (Site CD-G1), 2024, upstream tile.



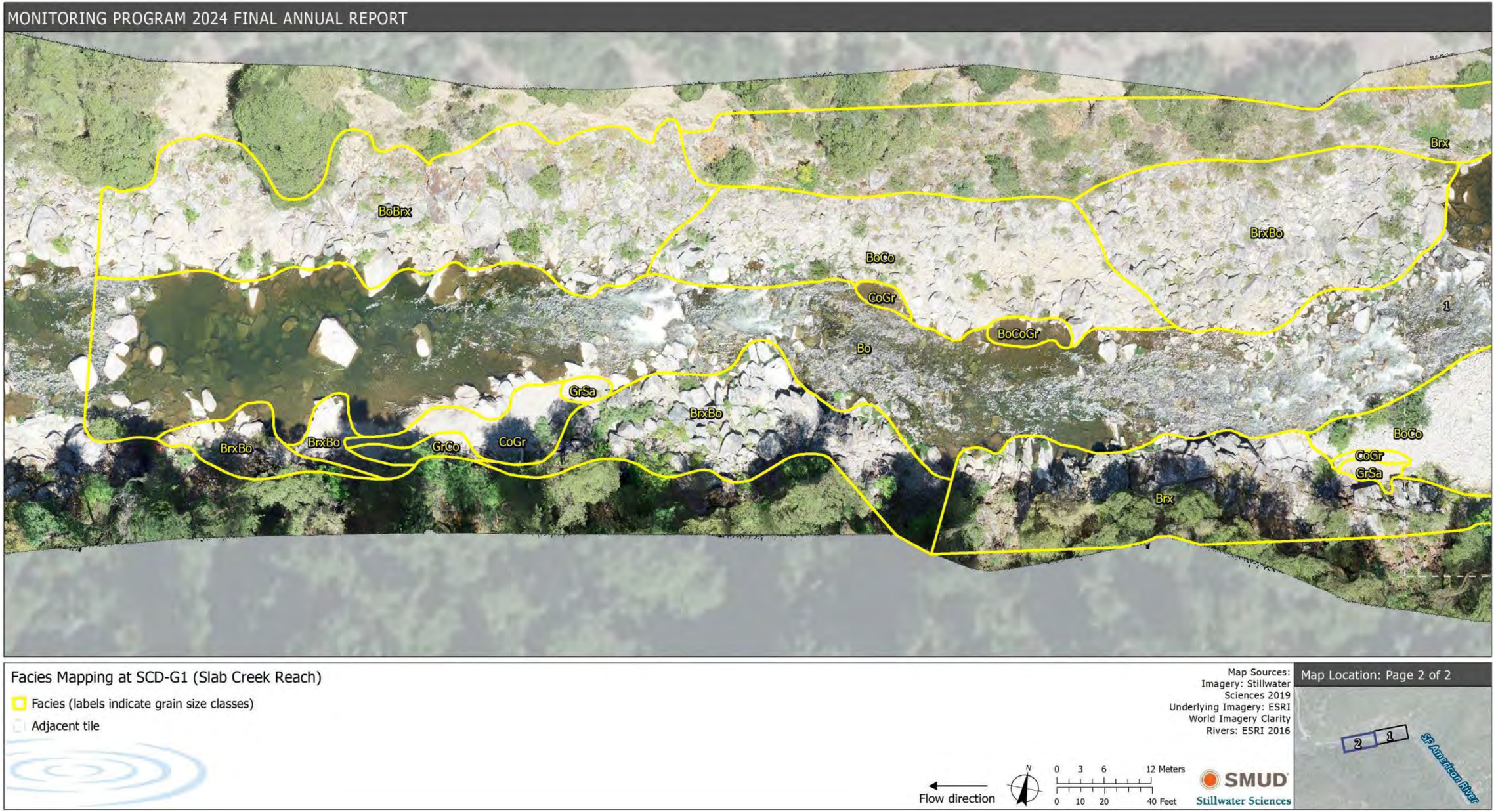
Notes: Bo = boulder, Brx = bedrock, Co = cobble, Gr = gravel, Sa = sand

Figure D7-11. Facies mapping at Silver Creek below Camino Dam (Site CD-G1), 2024, downstream tile.



Notes: Bo = boulder, Brx = bedrock, Co = cobble, Gr = gravel, Sa = sand

Figure D7-12. Facies mapping at South Fork American River below Slab Creek Dam (Site SCD-G1), 2024, upstream tile.



Notes: Bo = boulder, Brx = bedrock, Co = cobble, Gr = gravel, Sa = sand

Figure D7-13. Facies mapping at South Fork American River below Slab Creek Dam (Site SCD-G1), 2024, downstream tile.

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APPENDIX D8

Inventory of Large Woody Debris

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Table D8-1. Results from Large Woody Debris Inventories.

Site	Minimum Measured Size (feet)	Reach Length (feet)	Individual Logs	Logs in Jams (Number of Jams)	Logs with Rootwads	Total Number of Logs
RRD-G1	12	450	0	0	0	0
LLD-G1	6	700	577	0	0	577
LLD-G2	20	1,000	17	30 (10)	5	52
IHD-G1	25	1,200	13	12 (5)	2	27
IHD-G2	25	1,200	5	6 (1)	0	11
CD-G1	20	900	0	0	0	0
SCD-G1	30	750	0	0	0	0

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APPENDIX D9

Fine Sediment Storage Data

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Table D9-1. V* Survey Data for the Pool at the Upper End of Site IHD-G1 (South Fork Silver Creek below Ice House Reservoir, Upper Reach), 2024.

Profile	Distance (feet)	Water Depth (feet)	Water+Fines Depth (feet)	Residual pool+fines (feet)	Thickness of fines (feet)	Fine profile area (square feet)	Residual pool area (square feet)
Centerline	124	2.3	3.1	2.5	0.8	52.1	156.3
Centerline	121	3.6	3.8	3.1	0.2	0.5	9.4
Centerline	118	3.6	3.8	3.1	0.2	0.5	9.4
Centerline	115	3.9	3.9	3.2	0.0	0.0	9.6
Centerline	112	4.1	4.1	3.4	0.0	0.0	10.3
Centerline	109	4.2	4.3	3.6	0.1	0.3	10.8
Centerline	106	4.1	4.4	3.8	0.3	1.0	11.3
Centerline	103	4.2	4.3	3.7	0.1	0.3	11.0
Centerline	100	4.4	4.8	4.1	0.3	1.0	12.3
Centerline	97	4.9	5.1	4.4	0.2	0.5	13.3
Centerline	94	6.0	6.0	5.3	0.0	0.1	16.0
Centerline	91	6.2	6.4	5.7	0.2	0.7	17.2
Centerline	88	7.0	7.1	6.4	0.1	0.3	19.2
Centerline	85	7.1	7.4	6.7	0.3	0.9	20.2
Centerline	82	6.8	7.0	6.3	0.1	0.4	18.9
Centerline	79	7.5	8.2	7.5	0.7	2.2	22.6
Centerline	76	7.4	7.7	7.1	0.3	0.8	21.2
Centerline	73	7.2	7.8	7.2	0.6	1.8	21.5
Centerline	70	7.4	8.0	7.4	0.6	1.9	22.1
Centerline	67	7.2	7.9	7.2	0.7	2.2	21.7
Centerline	64	7.2	7.5	6.9	0.4	1.2	20.7
Centerline	61	7.2	7.9	7.2	0.7	2.2	21.7
Centerline	58	5.9	7.0	6.3	1.0	3.1	18.9
Centerline	55	5.2	6.3	5.7	1.1	3.2	17.0
Centerline	52	5.1	5.9	5.2	0.8	2.5	15.7
Centerline	49	4.6	5.6	4.9	1.0	3.0	14.8
Centerline	46	3.9	4.6	4.0	0.7	2.1	11.9
Centerline	43	3.3	4.4	3.8	1.1	3.4	11.3
Centerline	40	3.2	3.8	3.2	0.6	1.8	9.5
Centerline	37	2.9	3.2	2.6	0.3	1.0	7.7
Centerline	34	2.9	3.6	3.0	0.7	2.2	8.9
Centerline	31	2.1	3.3	2.7	1.2	3.6	8.1
Centerline	28	1.3	1.6	0.9	0.3	0.8	2.8
Centerline	25	1.6	1.8	1.1	0.1	0.4	3.3

Profile	Distance (feet)	Water Depth (feet)	Water+Fines Depth (feet)	Residual pool+fines (feet)	Thickness of fines (feet)	Fine profile area (square feet)	Residual pool area (square feet)
Centerline	22	1.3	1.4	0.7	0.1	0.2	2.2
Centerline	19	0.8	1.2	0.6	0.4	1.2	1.7
Centerline	16	0.7	1.2	0.6	0.6	1.7	1.7
Centerline	13	0.5	0.7	0.0	0.2	0.5	0.0
Centerline	10	0.3	0.7	0.0	0.3	1.0	0.0
Centerline	7	0.1	1.0	0.3	0.9	2.7	1.0
Centerline	4	0.1	1.1	0.5	1.1	2.7	1.2
Centerline	2	0.0	1.0	0.3	1.0		
River left	6	1.1	1.6	0.9	0.4	0.6	1.4
River left	9	1.2	1.6	1.0	0.4	1.2	3.0
River left	12	1.3	2.5	1.8	1.2	3.5	5.4
River left	15	1.3	2.7	2.0	1.3	4.0	6.0
River left	18	1.3	3.5	2.8	2.2	6.5	8.5
River left	21	1.4	2.5	1.8	1.1	3.2	5.4
River left	24	1.5	2.4	1.7	0.9	2.7	5.1
River left	27	1.4	3.6	3.0	2.2	6.6	8.9
River left	30	1.6	4.3	3.6	2.7	8.0	10.9
River left	33	1.7	3.0	2.3	1.2	3.6	6.9
River left	36	2.0	3.6	2.9	1.6	4.7	8.8
River left	39	2.5	4.5	3.9	2.0	6.1	11.6
River left	42	2.5	4.0	3.4	1.5	4.5	10.1
River left	45	2.8	4.4	3.7	1.5	4.6	11.1
River left	48	3.3	3.8	3.2	0.6	1.7	9.5
River left	51	2.6	3.3	2.7	0.8	2.4	8.1
River left	54	3.5	3.8	3.1	0.3	0.8	9.4
River left	57	4.5	4.7	4.1	0.2	0.7	12.2
River left	60	4.8	5.5	4.9	0.8	2.4	14.7
River left	63	4.7	5.6	4.9	0.9	3.0	17.2
River left	67	4.7	5.6	4.9	0.9	3.2	17.2
River left	70	5.0	5.8	5.2	0.8	2.5	15.6
River left	73	5.0	5.5	4.9	0.5	1.6	14.7
River left	76	5.3	6.1	5.4	0.8	2.3	16.2
River left	79	5.1	5.7	5.1	0.7	2.0	15.2
River left	82	5.4	5.8	5.1	0.4	1.1	15.4
River left	85	4.9	5.5	4.9	0.6	1.9	14.6

Profile	Distance (feet)	Water Depth (feet)	Water+Fines Depth (feet)	Residual pool+fines (feet)	Thickness of fines (feet)	Fine profile area (square feet)	Residual pool area (square feet)
River left	88	4.6	5.3	4.7	0.7	2.1	14.0
River left	91	4.1	4.8	4.1	0.7	1.7	10.3
River left	93	4.2	4.8	4.1	0.6	1.5	10.3
River left	96	3.6	4.4	3.8	0.9	2.6	11.3
River left	99	3.4	4.2	3.5	0.8	2.3	10.6
River left	102	3.3	3.9	3.3	0.6	1.5	8.2
River left	104	3.3	3.9	3.2	0.6	1.5	8.1
River left	107	3.0	3.4	2.8	0.5	1.4	8.3
River left	110	2.9	3.5	2.9	0.7	2.0	8.6
River left	113	3.4	3.5	2.8	0.1	0.3	8.5
River left	116	3.0	3.3	2.7	0.3	1.0	8.0
River left	119	3.3	3.5	2.9	0.2	0.5	8.6
River left	122	3.3	3.3	2.7	0.0	0.1	8.0
River left	125	3.1	3.3	2.6	0.2	0.7	7.9
River left	128	2.6	2.6	2.0	0.1		
River right	28	2.0	2.3	1.6	0.3	5.1	25.4
River right	25	3.8	3.9	3.3	0.2	0.5	9.8
River right	22	3.6	3.9	3.3	0.3	1.0	9.8
River right	19	4.3	4.3	3.6	0.0	0.0	10.8
River right	16	3.3	3.3	2.7	0.0	0.0	8.0
River right	13	3.2	3.2	2.6	0.0	0.0	7.8
River right	10	3.4	3.4	2.8	0.0	0.0	8.4
River right	7	4.4	4.6	3.9	0.2	0.5	11.8
River right	4	3.4	3.5	2.9	0.1	0.2	8.6
River right	1	4.4	4.4	3.7	0.0	0.0	175.8
River right	98	4.6	4.8	4.1	0.2	7.7	192.7
River right	95	5.0	5.6	4.9	0.6	1.7	14.8
River right	92	6.5	6.7	6.1	0.2	0.6	18.2
River right	89	6.9	6.9	6.2	0.0	0.0	18.6
River right	86	7.3	7.9	7.2	0.6	1.9	21.7
River right	83	7.9	8.3	7.6	0.4	1.3	22.9
River right	80	7.5	7.5	6.9	0.0	0.1	20.7
River right	77	8.1	8.3	7.6	0.2	0.5	22.9
River right	74	8.3	8.4	7.7	0.0	0.1	23.1
River right	71	7.8	8.0	7.3	0.2	0.6	21.9

Profile	Distance (feet)	Water Depth (feet)	Water+Fines Depth (feet)	Residual pool+fines (feet)	Thickness of fines (feet)	Fine profile area (square feet)	Residual pool area (square feet)
River right	68	7.4	7.5	6.9	0.2	0.5	20.7
River right	65	6.9	7.2	6.5	0.3	0.9	19.5
River right	62	6.1	6.4	5.7	0.3	0.9	17.2
River right	59	5.5	6.1	5.4	0.6	1.7	16.3
River right	56	5.3	5.9	5.2	0.6	1.7	15.7
River right	53	4.9	5.4	4.8	0.5	1.5	14.3
River right	50	4.7	4.9	4.2	0.2	0.6	12.6
River right	47	4.6	4.8	4.1	0.2	0.5	12.3
River right	44	4.0	4.6	3.9	0.6	1.7	11.8
River right	41	3.0	3.5	2.9	0.5	1.5	8.6
River right	38	3.2	3.6	3.0	0.4	1.3	9.0
River right	35	2.4	3.1	2.5	0.8	2.3	7.5
River right	32	2.0	2.6	2.0	0.6	1.9	5.9
River right	29	1.4	2.4	1.8	1.0	3.1	5.3
River right	26	1.1	1.7	1.0	0.6	1.7	3.1
River right	23	1.0	1.5	0.9	0.6	1.8	2.7
River right	20	0.9	1.5	0.8	0.6	1.9	2.5
River right	17	0.8	1.4	0.7	0.6	1.9	2.2
River right	14	0.6	1.2	0.6	0.6	1.8	1.7
River right	11	0.3	1.0	0.4	0.7	2.2	1.2
River right	8	0.3	0.8	0.2	0.5	1.5	0.5
River right	5	0.2	2.5	1.8	2.2	6.7	5.4
River right	2	0.0	2.4	1.7	2.4	5.9	4.3

APPENDIX D10

Rosgen Level III Assessments

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Table D10-1. Rosgen Level III Assessments, 2024.

Site	Bars	Meander Pattern	Stream Channel Debris/Blockages	Survey Date: Site Conditions
Site RRD-G1 (Rubicon River Below Rubicon Dam)	B-3, Many mid-channel bars	M-1, Regular meander	D-1, None (Minor amounts of small, floatable material.)	12 July 2024: Some vegetation was present on mid-channel bars. The channel was straight with no debris blockages.
Site LLD-G1 (Gerle Creek Below Loon Lake Dam)	NA	M-3, Irregular meander	D-4, Numerous (Significant buildup of medium to large sized materials, i.e. large limbs, branches, small logs, or portions of trees that may occupy 10 to 30% of the active cross-sectional area.)	9 July 2024: Bars were not observed at the site (low width-depth ratio). LWD dominates channel morphology, and the meander structure was largely a product of the spatial distribution of LWD and highly erodible banks, where bedrock is absent. This study reach is located in a previously dense grove that has transitioned to a meadow due to beaver activity. Approximately 95% of trees around the active channel were dead, downed, and decaying. Dams composed of LWD were raising the water surface elevation and creating deep scour pools.
Site LLD-G2 (Gerle Creek Below Loon Lake Dam Middle Reach)	B-4, Side bars	M-1, Regular meander	D-3, Moderate (Increasing frequency of small to medium sized material, i.e. large limbs, branches, small logs that when accumulated effect 10% or less of the active channel cross-sectional area.)	7 July 2024: Sparse alternate bars with dense vegetation; one mid-channel bar was stabilized by a stump. The channel was relatively straight with some small-amplitude bends.

Site	Bars	Meander Pattern	Stream Channel Debris/Blockages	Survey Date: Site Conditions
Site IHD-G1 (South Fork Silver Creek Below Ice House Reservoir, Upper Reach)	B-2, Point bars with few mid-channel bars	M-1, Regular meander	D-3, Moderate (Increasing frequency of small to medium sized material, i.e. large limbs, branches, small logs that when accumulated effect 10% or less of the active channel cross-sectional area.)	11 July 2024: The site had three side bars, four mid-channel bars, and floodplain deposits with evidence of recent inundation, e.g., racked vegetation in tree branches. One sandy point bar was present at the downstream end of the site. The low sinuosity, meander structure appeared to be stable due to buried boulders on channel banks.
Site IHD-G2 (South Fork Silver Creek Below Ice House Reservoir, Lower Reach)	B-2, Point bars with few mid-channel bars	M-1 Regular meander; M-4, truncated meander	D-2, Infrequent (Debris consists of small, easily moved, floatable material, i.e. leaves, needles, small limbs, twigs, etc.)	6 August 2024: Point bars were composed of gravels and cobbles and mid channel bars were well vegetated. The downstream part of reach exhibited a truncated meander due to large bedrock outcrop that composed approximately 200 feet of the left bank on outside bend.
Site CD-G1 (Silver Creek Below Camino Dam)	B-4, Side bars	M-4, Truncated meander	D-1, None (Minor amounts of small, floatable material.)	14 October 2024: This reach is predominately bedrock with very few bars. Bedrock banks restricted the meander structure. No LWD was observed at the site; the organic materials were mostly small, transportable, and easily floatable.

Site	Bars	Meander Pattern	Stream Channel Debris/Blockages	Survey Date: Site Conditions
Site SCD-G1 (South Fork American River Below Slab Creek Dam)	B-4, Side bars	M-1 Regular meander; M-4, truncated meander	D-1, None (Minor amounts of small, floatable material.)	15 October 2024: One bar on upstream end of site was composed of boulders. The channel reach was straight, with a planform confined by the valley and extensive bedrock and large boulders that stabilized the channel and limited sinuosity. Very small quantities of debris—limited to easily transportable organic materials—were present in the channel.

Note: LWD = large woody debris
NA = not applicable

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APPENDIX D11

Bank Erosion and Riparian Vegetation Assessments

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Rubicon River Below Rubicon Dam (Site RRD-G1)

Table D11-1. Bank Erosion Potential at Site RRD-G1, 2024.

	Bank a	Bank b	Bank c	Bank d
Bank height (feet)	3	2	8	5
Bankfull height (feet)	3	2	3	3
Root depth (feet)	>3	>2	4	4
Root Density (%)	100	60	70	25
Bank angle (degrees)	90	15	70-90	80
Surface protection (%)	95	80	40	15
% of total study reach	40	45	10	5

Stratification of unstable layers in banks (below bankfull): Bottom of bank

Bank material: Cobble and sand

Sediment supply: Low (sand supply may be high)

Vertical streambed stability: Stable

Bank and channel bed condition notes: Vegetation is continuous along both banks. Some cobbles are embedded in the banks. The bed is composed of cobble, gravel, and sand. Mid-channel bars are vegetated and sandy.

Table D11-2. Riparian Vegetation at Site RRD-G1, 2024.

	Density			
Vegetation type	**Low**	**Moderate**	**High**	**Notes**
Bare	1			
Forbs only	2a			
Annual grass w/ forbs	3a			
Perennial grass		4b		
Rhizomatous grasses	5a			
Riparian shrubs		6b		
High brush				Mountain alder, American dogwood, Spiraea
Combination grass/brush		8b		Perennial grasses under mountain alder, American dogwood
Deciduous overstory	9a			Not present
Deciduous w/ brush/grass understory	10b			Not present
Perennial overstory			11c	High cover of incense cedar, lodgepole pine, sugar pine
Wetland vegetation community				

Notes: Vegetated mid-channel bars with lodgepole pine and cedar; lots of perennial vegetation. Conifers encroaching on channel. The overstory is dominated by conifers with deciduous shrubs dominating the understory.

Gerle Creek Below Loon Lake Dam
Upper Reach (Site LLD-G1)

Table D11-3. Bank Erosion Potential at Site LLD-G1, 2024.

	Bank a	Bank b	Bank c	Bank d
Bank height (feet)	3	3	3	-
Bankfull height (feet)	10	10	~0	-
Root depth (feet)	NA	3	1-5	-
Root Density (%)	NA	90	40	-
Bank angle (degrees)	30-90	90	90	-
Surface protection (%)	70	20	25	-
% of total study reach	5	20	75	-

Bank material: Sand

Sediment supply: Low

Vertical streambed stability: Stable

Bank and channel bed condition notes: Bank a = bedrock, Bank b = root mats, Bank c = meadow. Channel bed and banks are overall very similar to conditions in 2019.

Table D11-4. Riparian Vegetation at Site LLD-G1, 2024.

	Density			
Vegetation type	**Low**	**Moderate**	**High**	**Notes**
Bare				
Forbs only				
Annual grass w/ forbs		3b		Very low variety and relatively low density
Perennial grasses		4b		
Riparian shrubs				
High brush				
Combination grass/brush				
Deciduous overstory				
Deciduous w/ brush/grass understory				
Perennial overstory				
Wetland vegetation community				Marsh/meadow

Notes: Saturated wetland meadows, relatively low variety of vegetation, some grasses encroaching on channel. Some aquatic grasses present on channel bottom.

Gerle Creek Below Loon Lake Dam
Middle Reach (Site LLD-G2)

Table D11-5. Bank Erosion Potential at Site LLD-G2, 2024.

	Bank a	Bank b
Bank height (feet)	1-2	4
Bankfull height (feet)	0.5-1	3.5
Root depth (feet)	1-2	1-2
Root Density (%)	35-40	35-40
Bank angle (degrees)	45-85	60-80
Surface protection (%)	90	90
% of total study reach	40	60

Stratification of unstable layers in banks (below bankfull): None

Bank material: Cobble and gravel with moderate sand

Sediment supply: Low

Vertical streambed stability: Stable

Bank and channel bed condition notes: Bank a = soil/sand floodplain in downstream end of reach. Bank b = cobble dominant banks at upstream end of reach

Table D11-6. Riparian Vegetation at Site LLD-G2, 2024.

	Density			
Vegetation type	**Low**	**Moderate**	**High**	**Notes**
Bare				
Forbs only				
Annual grass w/ forbs				
Perennial grass				
Rhizomatous grasses				
Riparian shrubs			a,b	
High brush				
Combination grass/brush				
Deciduous overstory				
Deciduous w/ brush/grass understory				
Perennial overstory			a,b	Moderate to high density
Wetland vegetation community				

South Fork Silver Creek Below Ice House Reservoir
Upper Reach (Site IHD-G1)

Table D11-7. Bank Erosion Potential at Site IHD-G1, 2024.

	Bank a	Bank b
Bank height (feet)	3.5	2.5
Bankfull height (feet)	3.5	2.5
Root depth (feet)	2-3	3-5
Root Density (%)	35-45	20-30
Bank angle (degrees)	80	80
Surface protection (%)	30	55
% of total study reach	65	35

Stratification of unstable layers in banks (below bankfull): None

Bank material: Sand

Sediment supply: Moderate (sand supply is high)

Vertical streambed stability: Stable

Bank and channel bed condition notes: Bank a = sandy banks w/ dense roots and veg. Bank b= boulders buried in sand

Table D11-8. Riparian Vegetation at Site IHD-G1, 2024.

	Density			
Vegetation type	**Low**	**Moderate**	**High**	**Notes**
Bare	1			
Forbs only		2b		
Annual grass w/ forbs		3b		
Perennial grass		4b		
Rhizomatous grasses		5b		
Low brush	6a			
High brush		7b		
Combination grass/brush			8c	
Deciduous overstory			9c	
Deciduous w/ brush/grass understory		10b		
Perennial overstory				
Wetland vegetation community				

South Fork Silver Creek Below Ice House Reservoir
Lower Reach (Site IHD-G2)

Notes: Banks are primarily composed of bedrock and boulders, so bank erosion potential not assessed.

Stratification of unstable layers in banks (below bankfull): None

Bank material: Bedrock, cobble, sand

Sediment supply: Low

Vertical streambed stability: Stable

Table D11-9. Riparian Vegetation at Site IHD-G2, 2024.

Vegetation type	Density			
	Low	Moderate	High	Notes
Bare	1			
Forbs only		2b		
Annual grass w/ forbs				
Perennial grass	4a			
Rhizomatous grasses		5b		
Low brush	6a			
High brush				
Combination grass/brush				
Deciduous overstory				
Deciduous w/ brush/grass understory				
Perennial overstory				
Wetland vegetation community				

Silver Creek Below Camino Dam
(Site CD-G1)

Notes: Banks are primarily composed of bedrock, so bank erosion potential not assessed.

Bank material: Bedrock

Sediment supply: Low

Vertical streambed stability: Stable

Bank and channel bed condition notes: Channel bed and bank conditions very similar to 2019.

Table D11-10. Riparian Vegetation at Site CD-G1, 2024.

Vegetation type	Density			
	Low	Moderate	High	Notes
Bare		1		
Forbs only				
Annual grass w/ forbs	3a			
Perennial grass				
Rhizomatous grasses				
Riparian shrubs				
High brush				
Combination grass/brush				
Deciduous overstory				
Deciduous w/ brush/grass understory	10a			
Perennial overstory				
Wetland vegetation community				

South Fork American River Below Slab Creek Dam (Site SCD-G1)

Notes: Banks are primarily composed of bedrock, so bank erosion potential not assessed.

Stratification of unstable layers in banks (below bankfull): None

Bank material: Bedrock

Sediment supply: Low

Vertical streambed stability: Stable

Bank and channel bed condition notes: Channel conditions very similar to 2019.

Table D11-11. Riparian Vegetation at Site SCD-G1, 2024.

Vegetation type	Density			
	Low	Moderate	High	Notes
Bare				
Forbs only				
Annual grass w/ forbs				
Rhizomatous grasses	5a			
Perennial grass				
Low brush	6a			
High brush				
Combination grass/brush				
Deciduous overstory				
Deciduous w/ brush/grass understory	10a			
Perennial overstory				
Wetland vegetation community				

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APPENDIX D12

Channel Stability (Pfankuch) Assessments

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Table D12-1. Channel Stability (Pfankuch) Assessment, 2024.

Location	Category		Assigned Value	
Rubicon River below Rubicon Dam (Site RRD-G1)				
Upper banks	1	Landform slope	Bank slope gradient 60+%	8
	2	Mass wasting	Infrequent. Most likely healed over. Low future potential	6
	3	Debris jam potential	Essentially absent from immediate channel area	2
	4	Vegetative bank protection	90%+ plant density. Vigor and variety suggest a deep, dense soil binding root mass	3
Lower banks	5	Channel capacity	Adequate. Bank overflows rare. W/D ratio 8–15	2
	6	Bank rock content	20–40%. With most in the 3–6-inch diameter class	6
	7	Obstructions to flow	Rocks and logs firmly embedded. Flow pattern without cutting or deposition. Stable Bed	2
	8	Cutting	Little or none. Infrequent raw banks less than 6”	4
	9	Deposition	Little or no enlargement of channel or point bars	4
Bottom	10	Rock angularity	Well rounded in all dimensions, surfaces smooth	4
	11	Brightness	Mostly dull but may have <35% bright surfaces	2
	12	Consolidation of particles	Moderately packed with some overlapping	4
	13	Bottom size distribution	Distribution shift light. Stable material 50–80%	8
	14	Scouring and deposition	5–30% affected. Scour at constrictions and where grades steepen. Some deposition in pools	12
	15	Aquatic vegetation	Perennial types scarce or absent. Yellow-green, short-term bloom may be present	4
			Site RRD-G1 Score[1]	**71 (Good)**
Gerle Creek below Loon Lake Dam, Upper Reach (Site LLD-G1)				
Upper banks	1	Landform slope	Bank slope gradient 40–60%	6
	2	Mass wasting	Infrequent. Most likely healed over. Low future potential	6
	3	Debris jam potential	Moderate to heavy amounts, predominately lager sizes	8

Location	Category		Assigned Value	
	4	Vegetative bank protection	70-90% density. Fewer species or less vigor suggest less dense or deep root mass	6
Lower banks	5	Channel capacity	Inadequate. Overbank flows common. W/D ratio >25	4
	6	Bank rock content	20% rock fragments of gravel sizes, 1–3 inches or less	8
	7	Obstructions to flow	Moderately frequent, unstable obstructions move with high flows causing bank cutting and pool filling	6
	8	Cutting	Some, intermittently at outcurves and constrictions. Raw banks may be up to 12 inches	6
	9	Deposition	Little or no enlargement of channel or point bars	4
Bottom	10	Rock angularity	Well rounded in all dimensions, surfaces smooth	4
	11	Brightness	Predominately bright, 65% exposed or scoured surfaces	4
	12	Consolidation of particles	Mostly loose assortment with no apparent overlap	6
	13	Bottom size distribution	No size change evident. Stable material 80–100%	4
	14	Scouring and deposition	30–50% affected. Deposits and scour at obstructions, constrictions, and bends. Some filling of pools	18
	15	Aquatic vegetation	Common. Algae forms in low velocity and pool areas. Moss here too	2
			Site LLD-G1 Score[1]	**92 (Fair)**
Gerle Creek below Loon Lake Dam, Middle Reach (Site LLD-G2)				
Upper banks	1	Landform slope	Bank slope gradient 30–40%	4
	2	Mass wasting	Infrequent. Most likely healed over. Low future potential	6
	3	Debris jam potential	Present, but mostly small twigs and limbs	4
	4	Vegetative bank protection	90%+ plant density. Vigor and variety suggest a deep, dense soil binding root mass	3
Lower banks	5	Channel capacity	Barely contains present peaks. Occasional overbank floods. W/D ratio 15–25	3
	6	Bank rock content	65%+ with large angular boulders. 12 inches+ common.	2
	7	Obstructions to flow	Some present causing erosive cross currents and minor pool filling. Obstructions newer and less firm	4

Location	Category		Assigned Value	
	8	Cutting	Some present causing erosive cross currents and minor pool filling. Obstructions newer and less firm	4
	9	Deposition	Little or no enlargement of channel or point bars	4
Bottom	10	Rock angularity	Corners and edges well rounded in two dimensions	3
	11	Brightness	Mostly dull but may have <35% bright surfaces	2
	12	Consolidation of particles	Moderately packed with some overlapping	4
	13	Bottom size distribution	No size change evident. Stable material 80–100%	4
	14	Scouring and deposition	<5% of bottom affected by scour or deposition	6
	15	Aquatic vegetation	Perennial types scare or absent. Yellow-green, short term bloom may be present	4
			Site LLD-G2 Score[1]	**57 (Good)**
South Fork Silver Creek below Ice House Dam, Upper Reach (Site IHD-G1)				
Upper banks	1	Landform slope	Bank slope gradient 30–40%	4
	2	Mass wasting	Infrequent. Most likely healed over. Low future potential	6
	3	Debris jam potential	Present, but mostly small twigs and limbs	4
	4	Vegetative bank protection	90%+ plant density. Vigor and variety suggest a deep, dense soil binding root mass	3
Lower banks	5	Channel capacity	Adequate. Bank overflows rare. W/D ratio 8–15	2
	6	Bank rock content	40–65%. Mostly small boulders to cobbles 6-12”	4
	7	Obstructions to flow	Some present causing erosive cross currents and minor pool filling. Obstructions newer and less firm	4
	8	Cutting	Little or none. Infrequent raw banks less than 6”	4
	9	Deposition	Little or no enlargement of channel or point bars	4
Bottom	10	Rock angularity	Corners and edges well rounded in two dimensions	3
	11	Brightness	Mixture dull and bright, i.e. 35–65% mixture range	3
	12	Consolidation of particles	Mostly loose assortment with no apparent overlap	6
	13	Bottom size distribution	Distribution shift light. Stable material 50–80%	8

Location	Category		Assigned Value	
	14	Scouring and deposition	5–30% affected. Scour at constrictions and where grades steepen. Some deposition in pools	12
	15	Aquatic vegetation	Perennial types scare or absent. Yellow-green, short-term bloom may be present	4
			Site IHD-G1 Score[1]	**71 (Good)**
South Fork Silver Creek Below Ice House Dam, Lower Reach (Site IHD-G2)				
Upper banks	1	Landform slope	Bank slope gradient 40–60%	6
	2	Mass wasting	Infrequent. Most likely healed over. Low future potential	6
	3	Debris jam potential	Essentially absent from immediate channel area	2
	4	Vegetative bank protection	70–90% density. Fewer species or less vigor suggest less dense or deep root mass	6
Lower banks	5	Channel capacity	Adequate. Bank overflows rare. W/D ratio 8–15	2
	6	Bank rock content	65%+ with large angular boulders. 12 inches+ common.	2
	7	Obstructions to flow	Rocks and logs firmly embedded. Flow pattern without cutting or deposition. Stable Bed	2
	8	Cutting	Little or none. Infrequent raw banks less than 6 inches	4
	9	Deposition	Little or no enlargement of channel or point bars	4
Bottom	10	Rock angularity	Corners and edges well rounded in two dimensions	3
	11	Brightness	Mostly dull but may have <35% bright surfaces	2
	12	Consolidation of particles	Moderately packed with some overlapping	4
	13	Bottom size distribution	No size change evident. Stable material 80–100%	4
	14	Scouring and deposition	<5% of bottom affected by scour or deposition	6
	15	Aquatic vegetation	Perennial types scare or absent. Yellow-green, short term bloom may be present	4
			Site IHD-G2 Score[1]	**57 (Good)**
Silver Creek below Camino Dam (Site CD-G1)				

Location	Category		Assigned Value	
Upper banks	1	Landform slope	Bank slope gradient 30–40%	4
	2	Mass wasting	Frequent or large, causing sediment nearly year-long	9
	3	Debris jam potential	Essentially absent from immediate channel area	2
	4	Vegetative bank protection	<50% density, fewer species and less vigor indicate poor, discontinuous and shallow root mass	12
Lower banks	5	Channel capacity	Adequate. Bank overflows rare. W/D ratio 8–15	2
	6	Bank rock content	65%+ with large angular boulders. 12 inches+ common.	2
	7	Obstructions to flow	Rocks and logs firmly embedded. Flow pattern w/out cutting or deposition. Stable Bed	2
	8	Cutting	Little or none. Infrequent raw banks less than 6”	4
	9	Deposition	Little or no enlargement of channel or point bars	4
Bottom	10	Rock angularity	Rounded corners and edges, surfaces smooth, flat	2
	11	Brightness	Mostly dull but may have <35% bright surfaces	2
	12	Consolidation of particles	Moderately packed with some overlapping	4
	13	Bottom size distribution	No size change evident. Stable material 80–100%	4
	14	Scouring and deposition	<5% of bottom affected by scour or deposition	6
	15	Aquatic vegetation	Perennial types scare or absent. Yellow-green, short-term bloom may be present	4
			Site CD-G1 Score[1]	**63 (Good)**
South Fork American River below Slab Creek Dam (Site SCD-G1)				
Upper banks	1	Landform slope	Bank slope gradient 60+%	8
	2	Mass wasting	Infrequent. Most likely healed over. Low future potential	6
	3	Debris jam potential	Essentially absent from immediate channel area	2
	4	Vegetative bank protection	<50% density, fewer species and less vigor indicate poor, discontinuous and shallow root mass	12

Location	Category		Assigned Value	
Lower banks	5	Channel capacity	Ample for present plus some increases. Peak flows contained. W/D ration <7	1
	6	Bank rock content	65%+ with large angular boulders. 12 inches+ common.	2
	7	Obstructions to flow	Rocks and logs firmly embedded. Flow pattern w/out cutting or deposition. Stable Bed	2
	8	Cutting	Little or none. Infrequent raw banks less than 6 inches	4
	9	Deposition	Little or no enlargement of channel or point bars	4
Bottom	10	Rock angularity	Corners and edges well rounded in two dimensions	3
	11	Brightness	Mixture dull and bright, i.e. 35–65% mixture range	3
	12	Consolidation of particles	Moderately packed with some overlapping	4
	13	Bottom size distribution	No size change evident. Stable material 80–100%	4
	14	Scouring and deposition	<5% of bottom affected by scour or deposition	6
	15	Aquatic vegetation	Present but spotty, mostly in backwater. Seasonal algae growth makes rocks slick	3
			Site SCD-G1 Score[1]	**64 (Good)**

[1] Score guidelines: <38 = excellent, 39–76 = good, 77–114 = fair, >114 = poor

APPENDIX E1

Riparian Vegetation Site Photographs

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Figure E1-1. Representative photograph of Site LLD-RV17.



Figure E1-2. Representative photograph of Site LLD-RV10.



Figure E1-3. Representative photograph of Site LLD-RV3.



Figure E1-4. Representative photograph of Site GCD-RV1.



Figure E1-5. Representative photograph of Site IHD-RV5.



Figure E1-6. Representative photograph of Site IHD-RV1.



Figure E1-7. Representative photograph of Site CD-RV4.



Figure E1-8. Representative photograph of Site SCD-RV5.



Figure E1-9. Representative photograph of Site SCD-RV3.



Figure E1-10. Representative photograph of Site SCD-RV1.

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APPENDIX E2

Riparian Vegetation Maps

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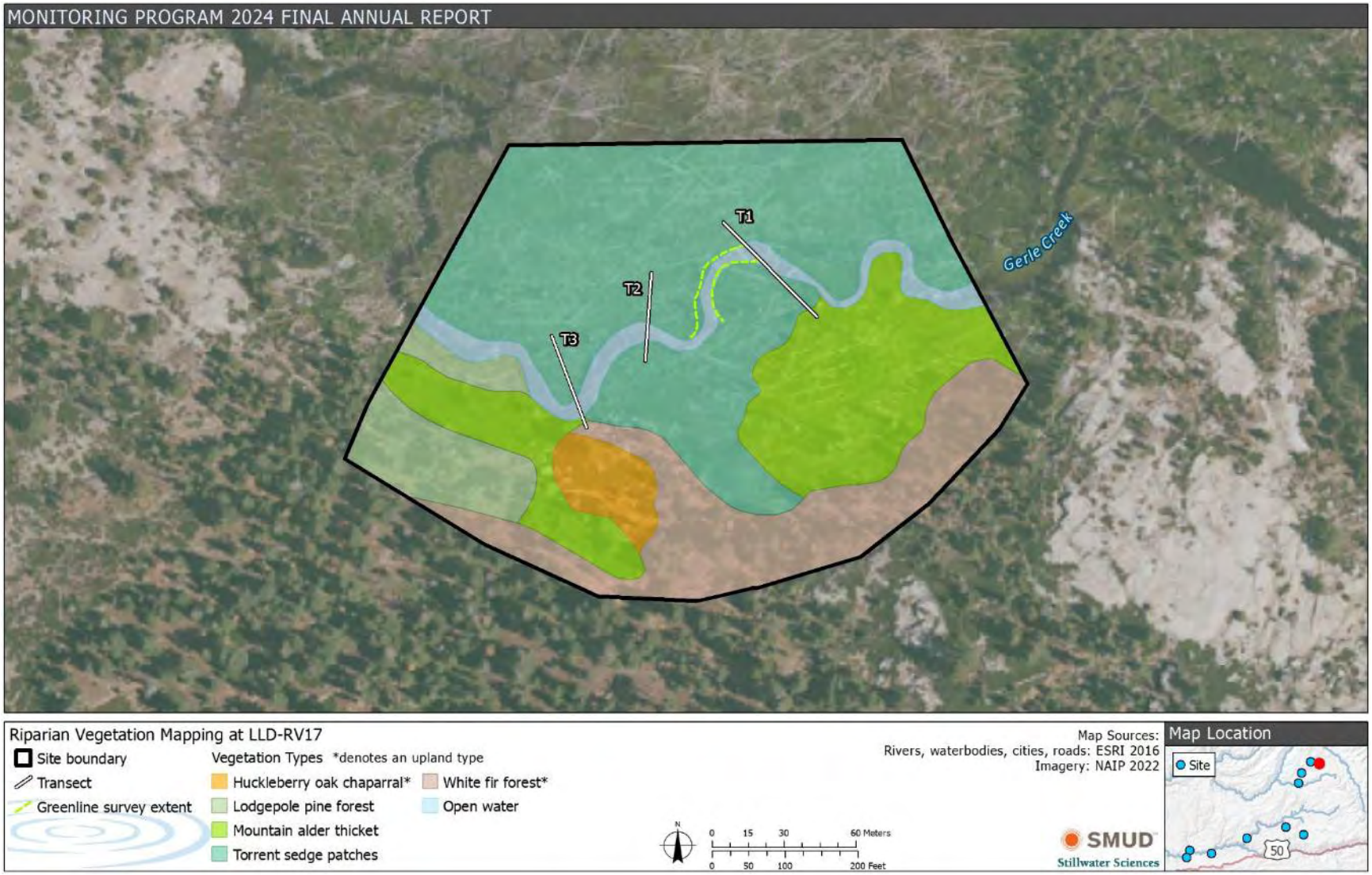


Figure E2-1. Vegetation map, greenline survey extent, and location of riparian transects at Site LLD-RV17, 2024.

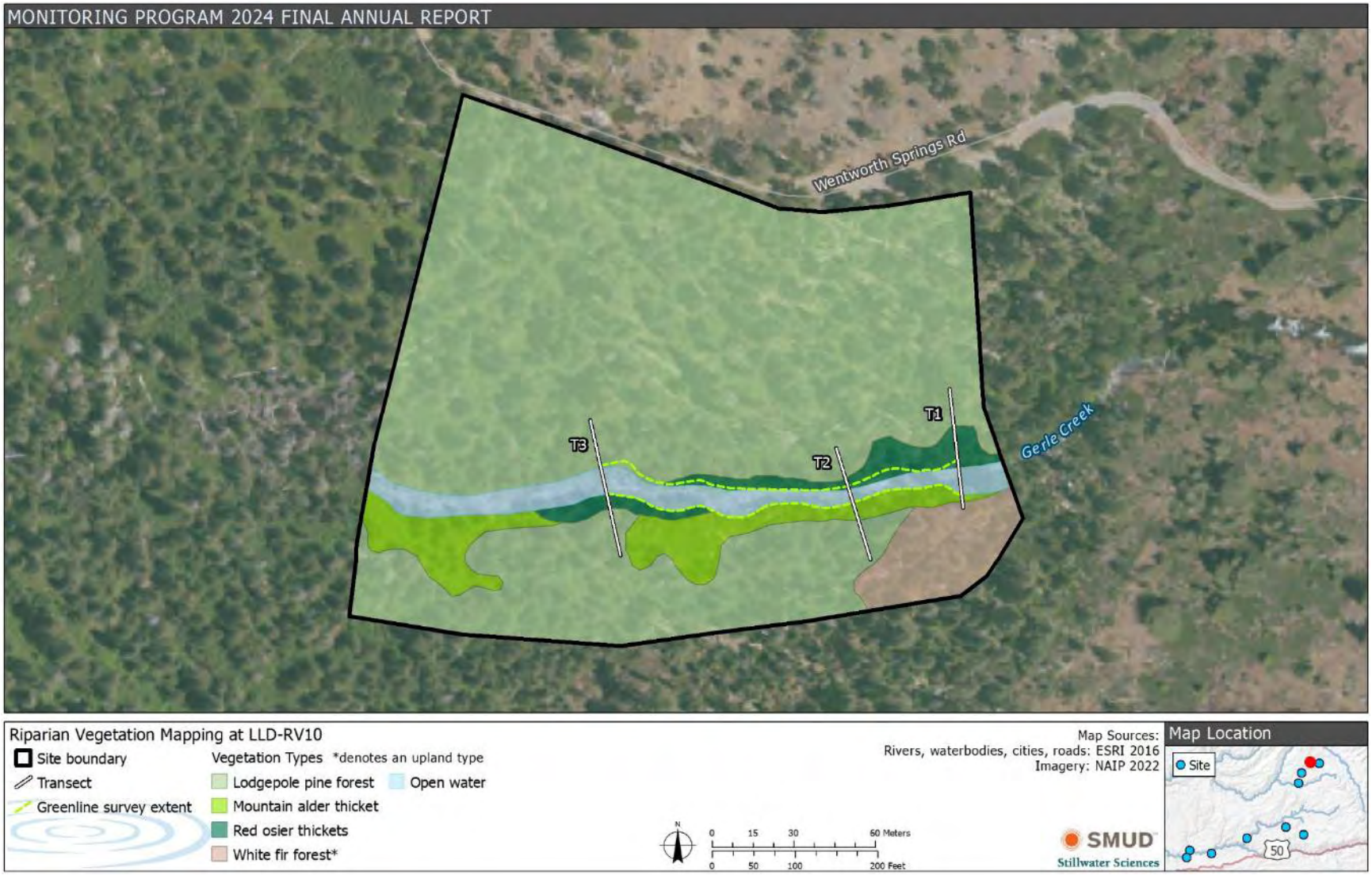


Figure E2-2. Vegetation map, greenline survey extent, and location of riparian transects at Site LLD-RV10, 2024.

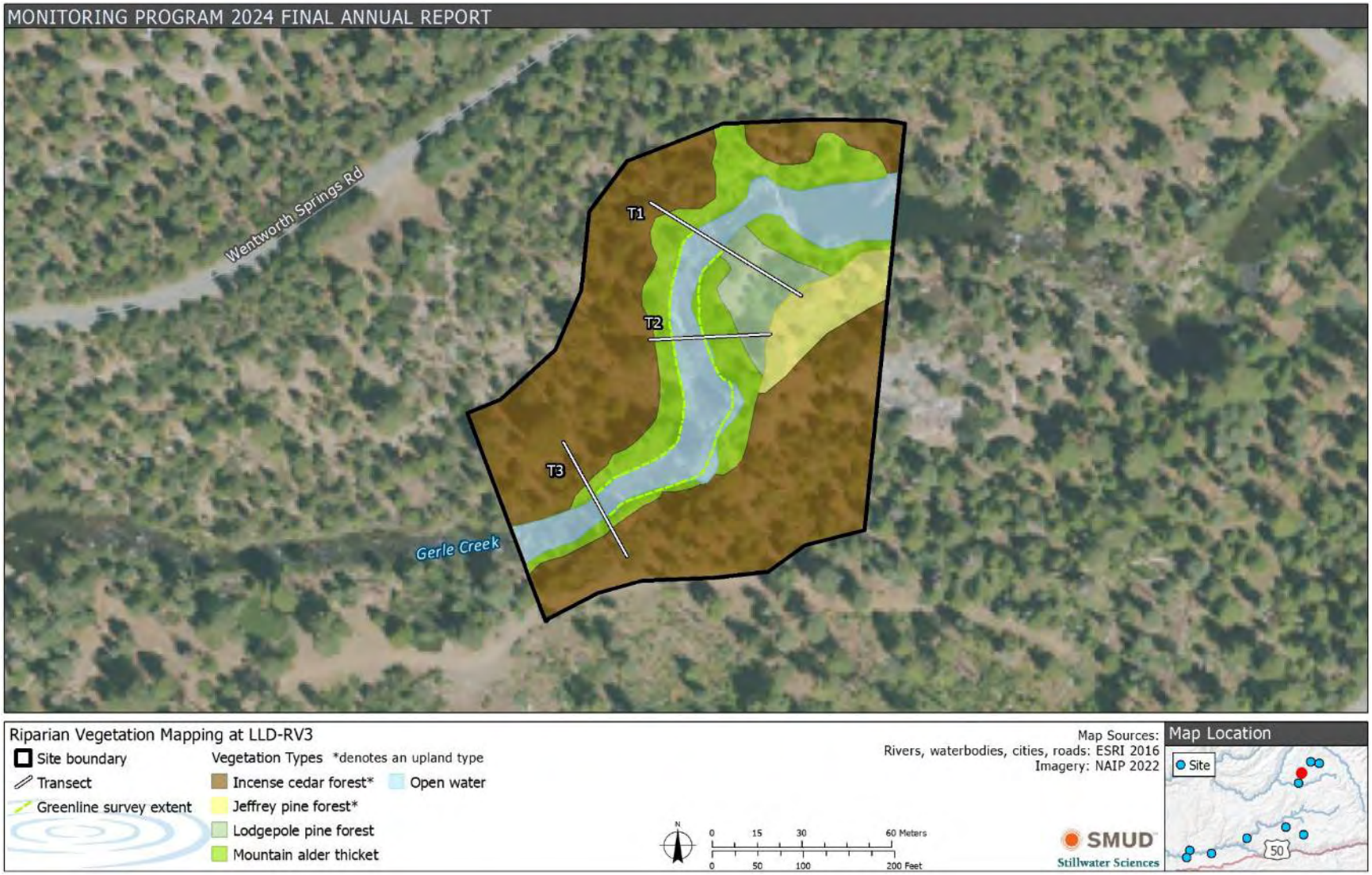


Figure E2-3. Vegetation map, greenline survey extent, and location of riparian transects at Site LLD-RV3, 2024.

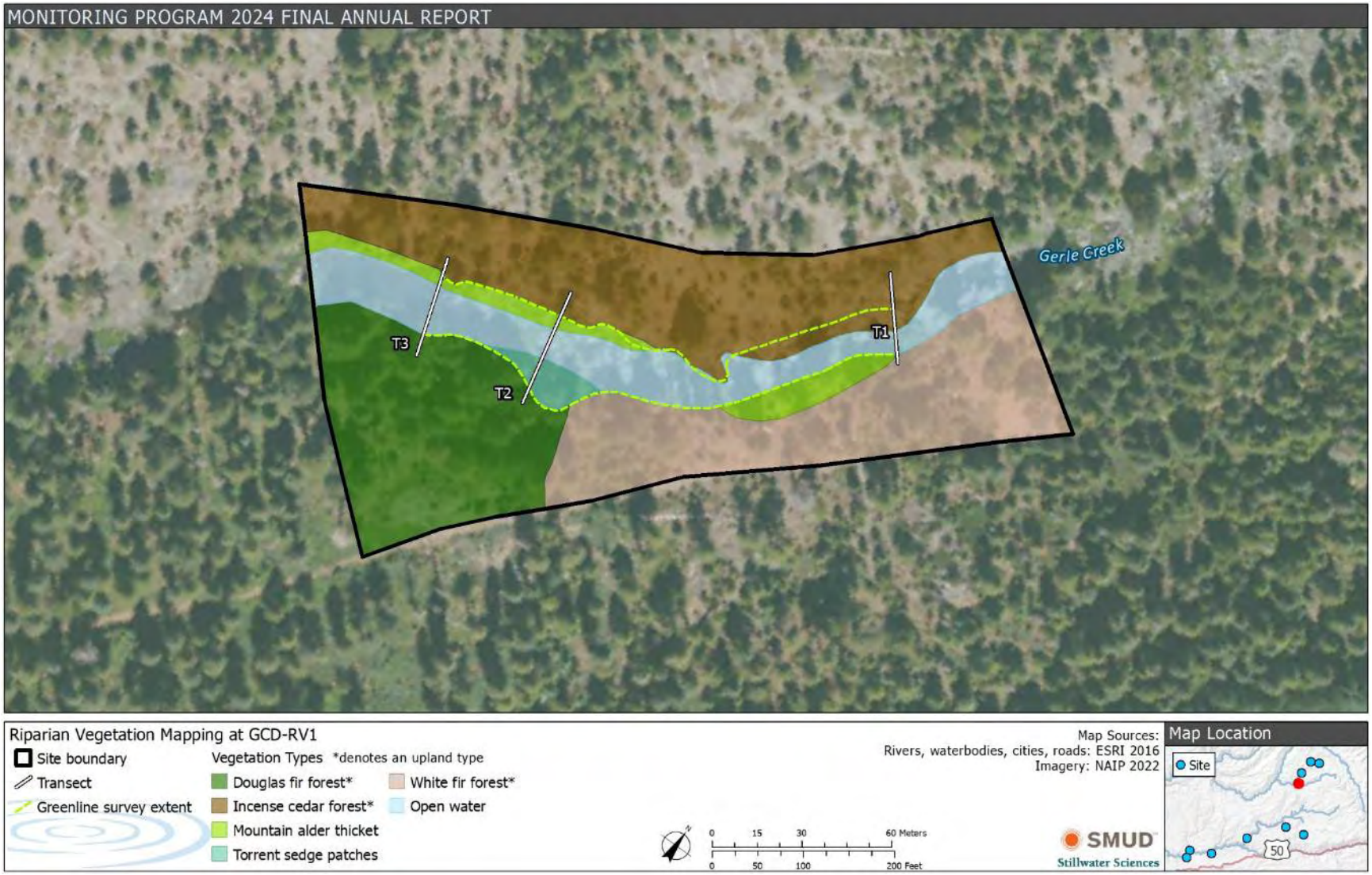


Figure E2-4. Vegetation map, greenline survey extent, and location of riparian transects at Site GCD-RV1, 2024.

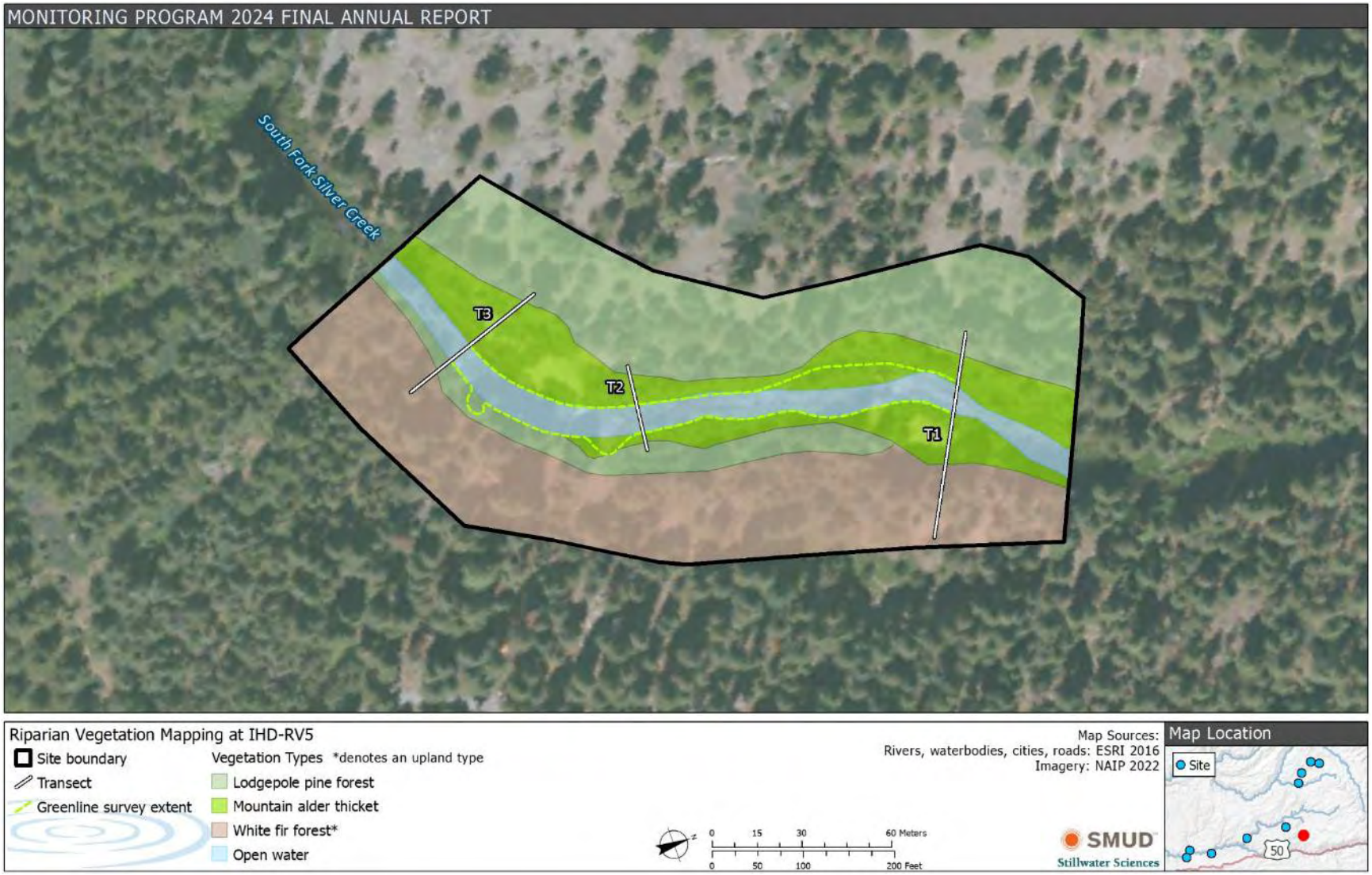


Figure E2-5. Vegetation map, greenline survey extent, and location of riparian transects at Site IHD-RV5, 2024.

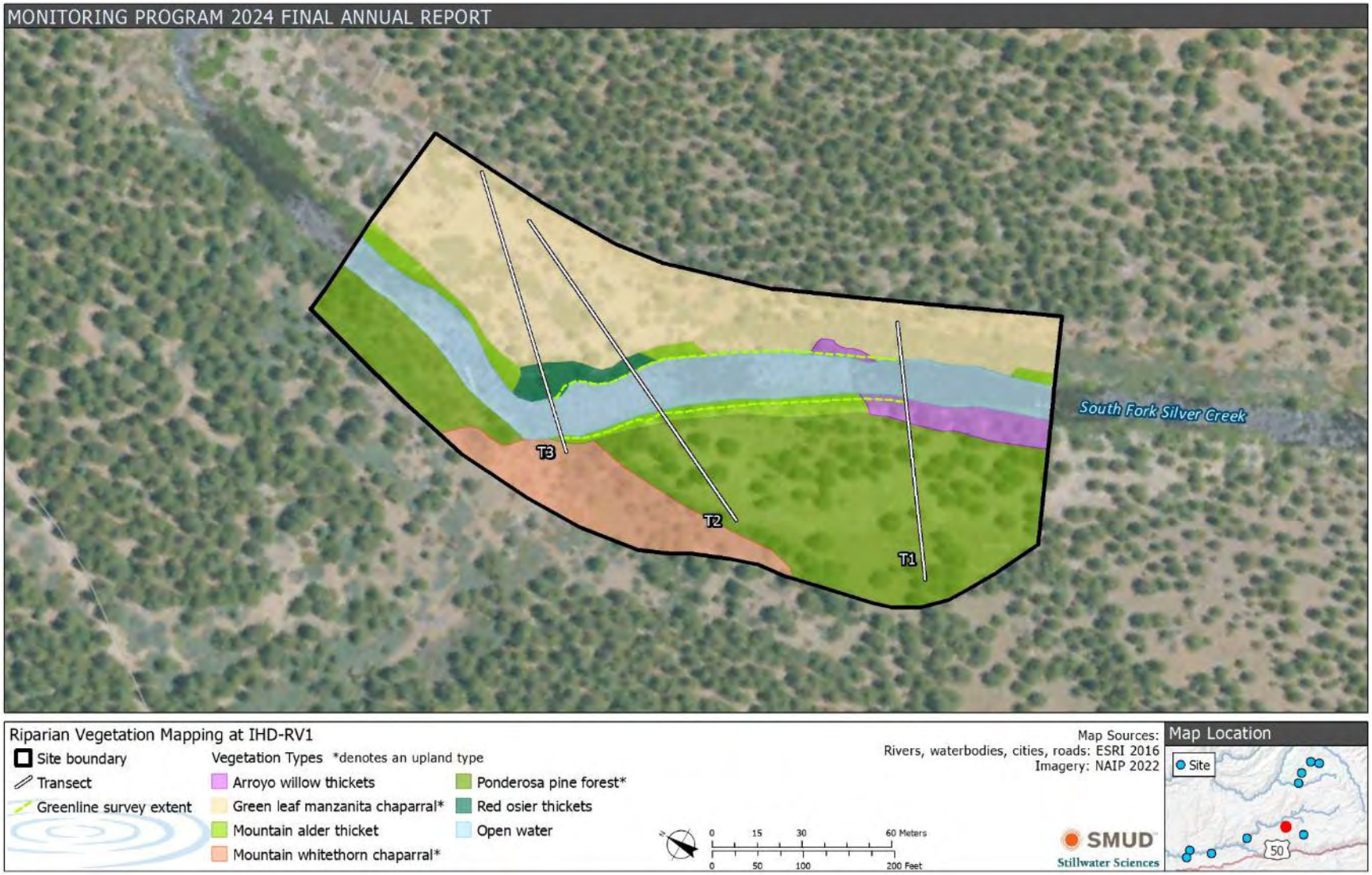


Figure E2-6. Vegetation map, greenline survey extent, and location of riparian transects at Site IHD-RV1, 2024.

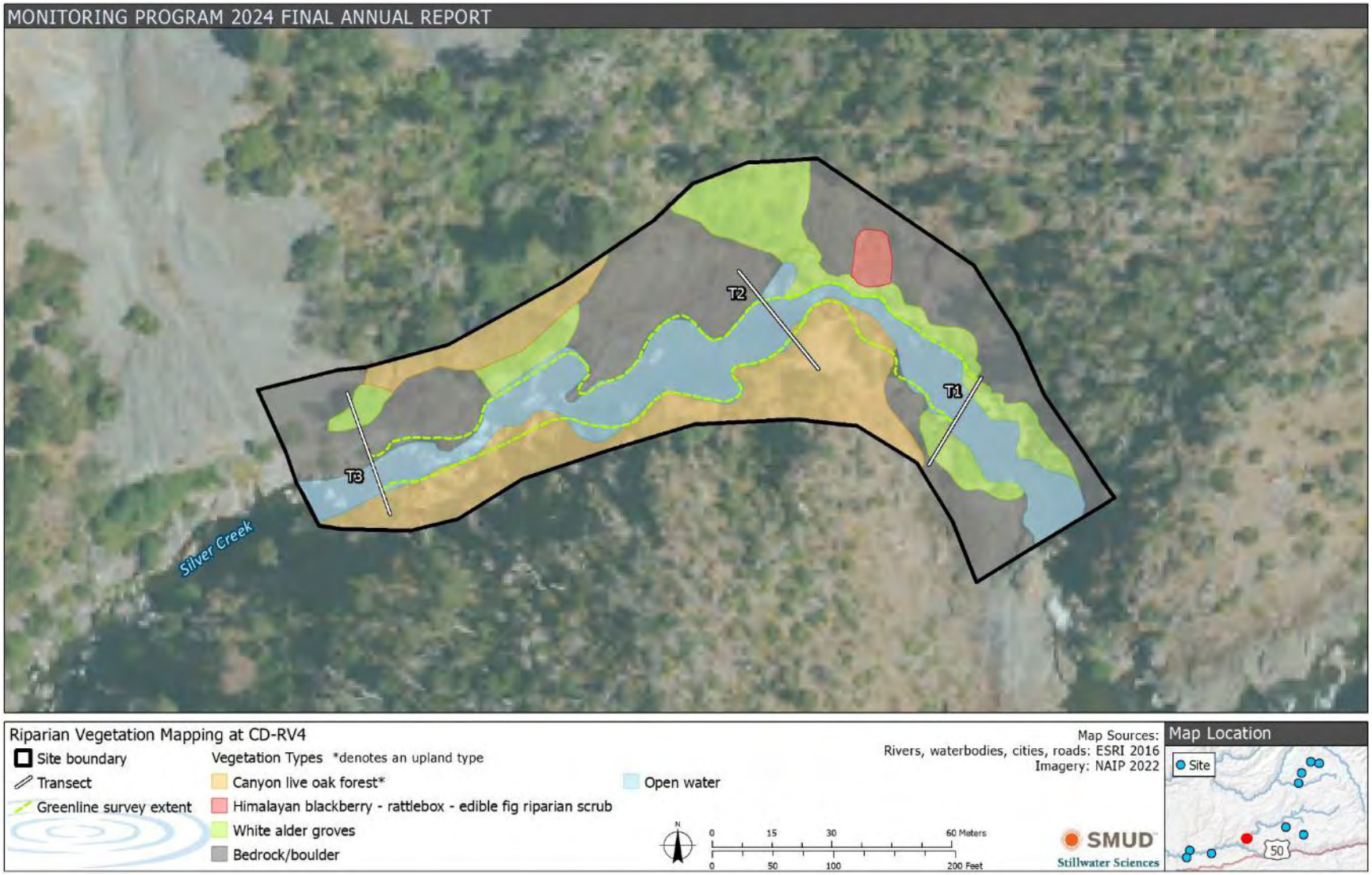


Figure E2-7. Vegetation map, greenline survey extent, and location of riparian transects at Site CD-RV4, 2024.

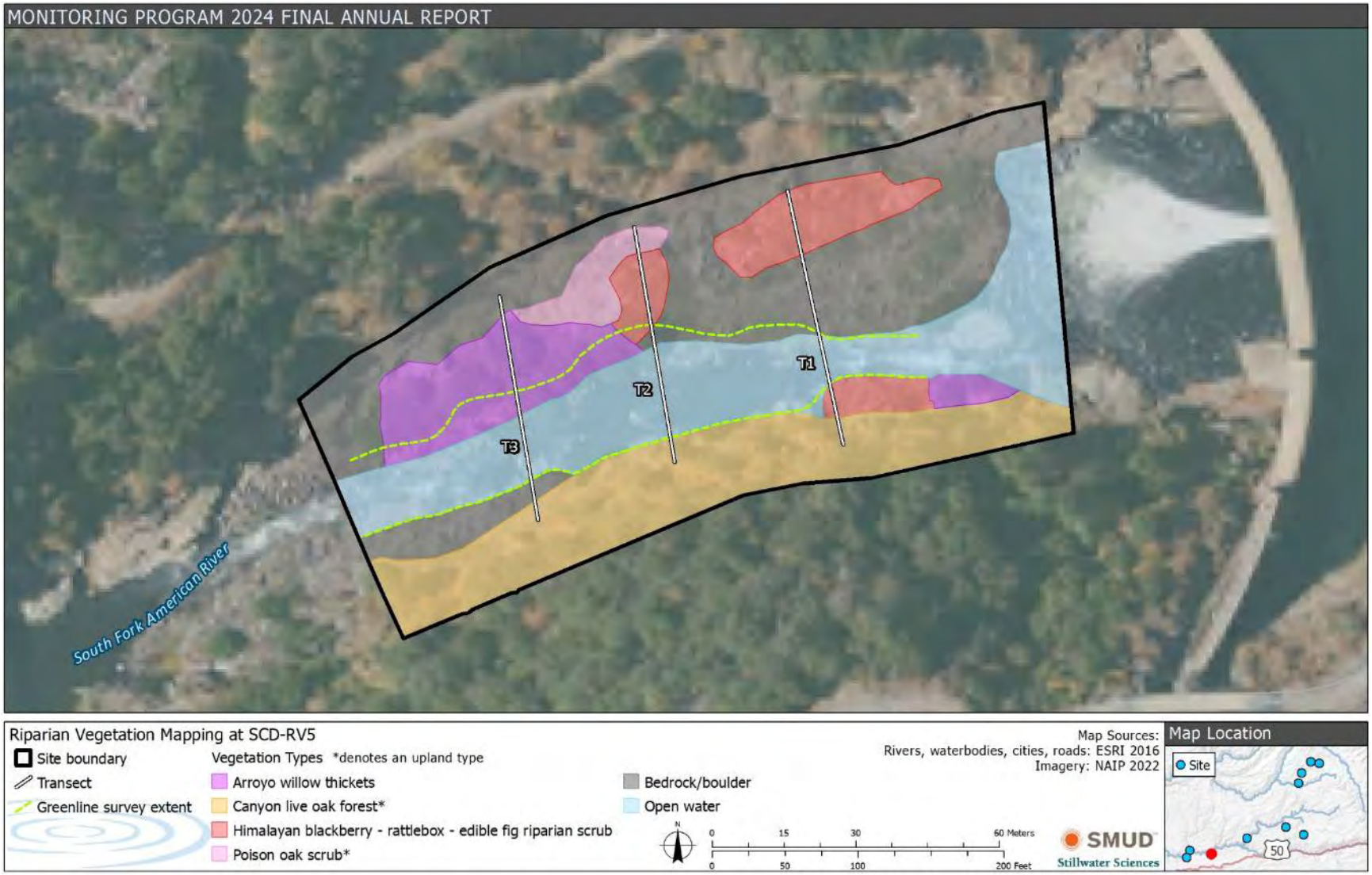


Figure E2-8. Vegetation map, greenline survey extent, and location of riparian transects at Site SCD-RV5, 2024.

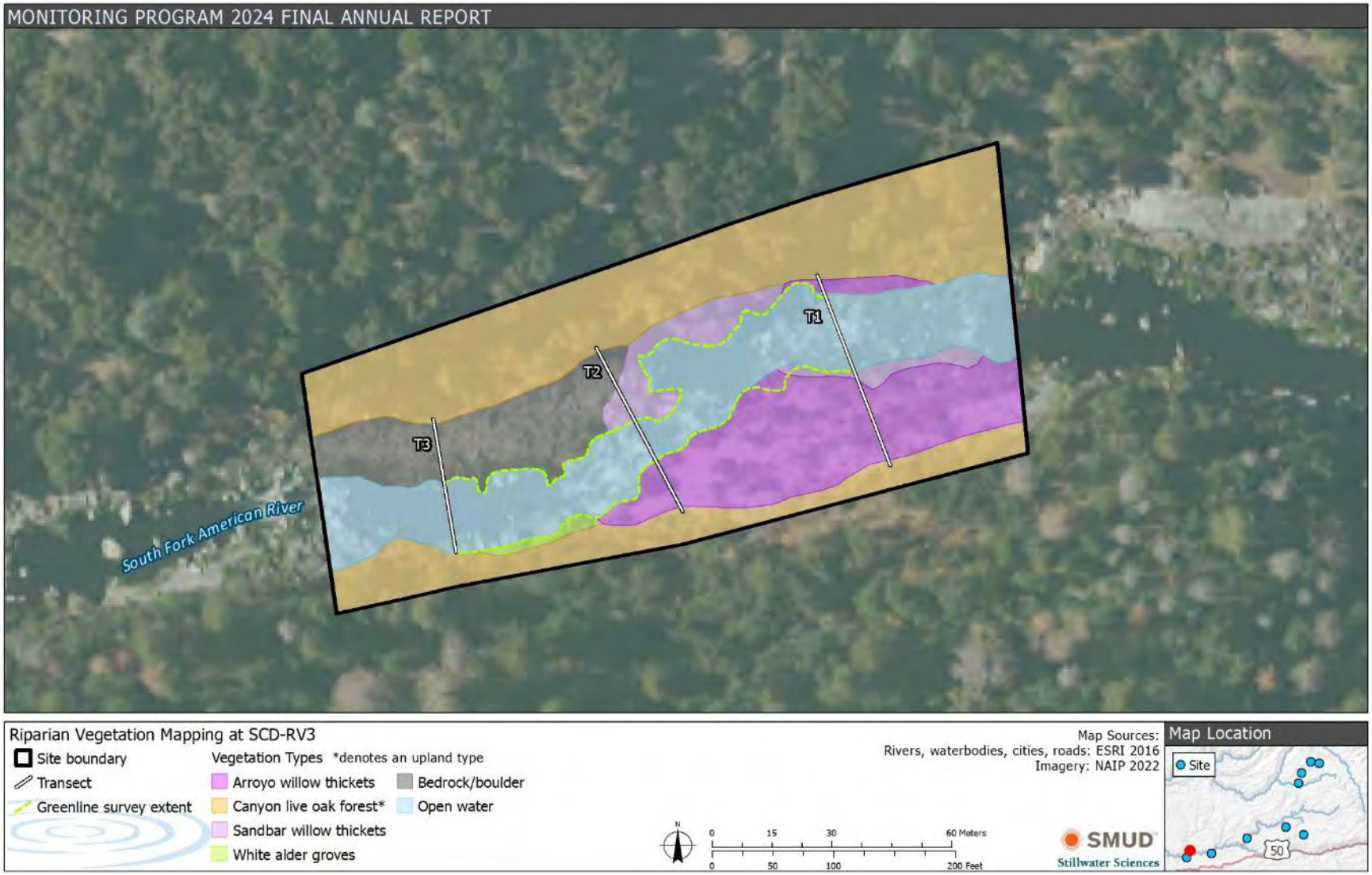


Figure E2-9. Vegetation map, greenline survey extent, and location of riparian transects at Site SCD-RV3, 2024.

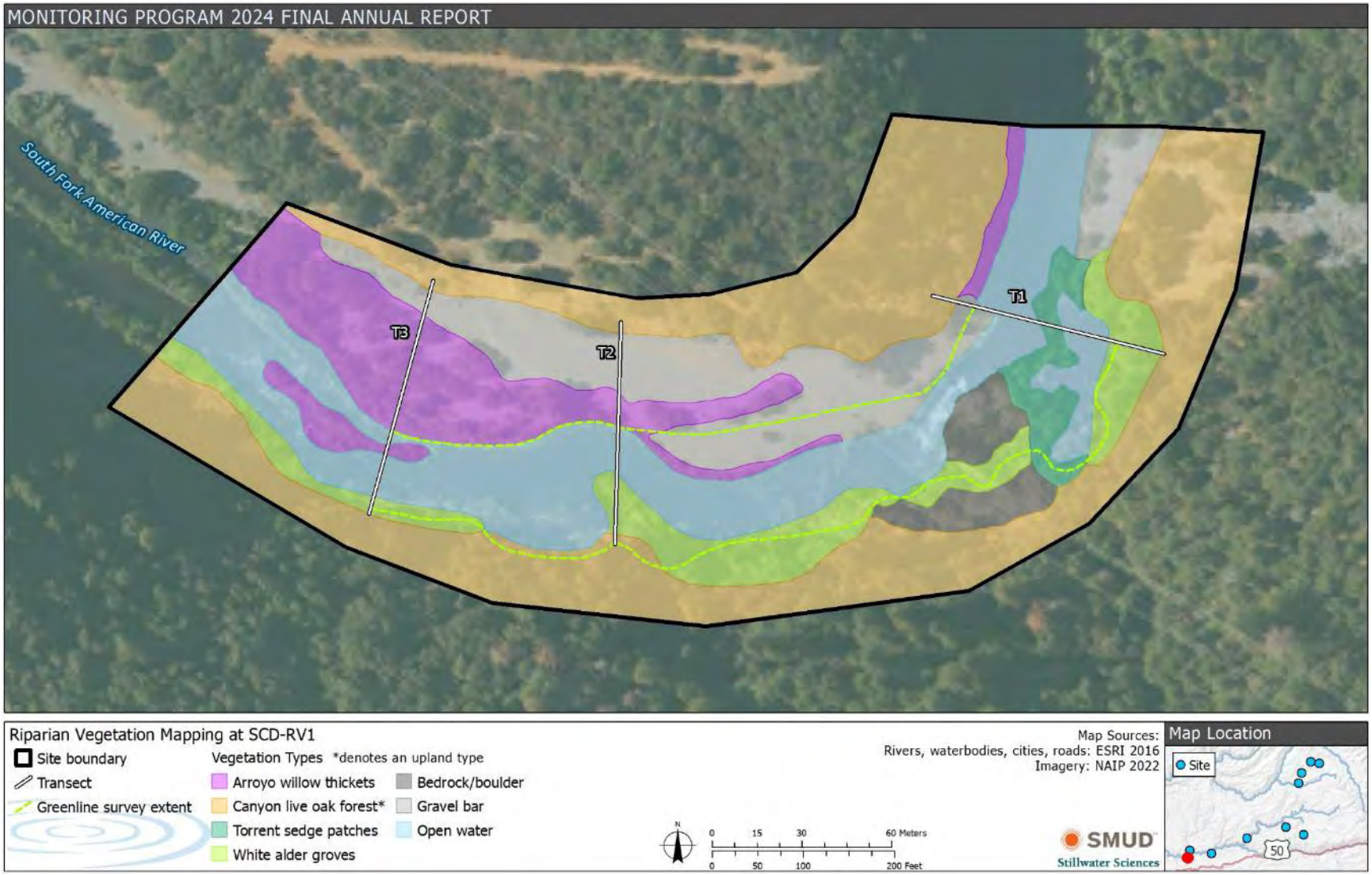


Figure E2-10. Vegetation map, greenline survey extent, and location of riparian transects at Site SCD-RV1, 2024.

APPENDIX E3

Riparian Vegetation Line-point Intercept Results

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Table E3-1. Riparian Vegetation Line-Point Intercept Results for Nativity, Wetland Indicator Status, and Percent Relative Cover of Each Species by Canopy Class within the Upper American River Project, 2024.

Site	Scientific Name	Common Name	Nativity	Wetland Indicator Status[1]	Understory (< 1 meter)		Mid-story (1 to 5 meters)		Overstory (> 5 meters)	
					Occurrences	Relative Cover	Occurrences	Relative Cover	Occurrences	Relative Cover
LLD-RV17	*Alnus incana* subsp. *tenuifolia*	Mountain alder	Native	FACW	10	7%	13	9%	0	0%
	Carex nudata	Torrent sedge	Native	OBL	85	62%	1	1%	0	0%
	Carex utriculata	Southern beaked sedge	Native	OBL	3	2%	0	0%	0	0%
	Carex vesicaria	Inflated sedge	Native	OBL	0	0%	0	0%	0	0%
	Epilobium ciliatum	Fringed willowherb	Native	FACW	1	1%	0	0%	0	0%
	Euthamia occidentalis	Western goldenrod	Native	FACW	2	1%	0	0%	0	0%
	Galium trifidum subsp. *columbianum*	Threepetal bedstraw	Native	FACW	2	1%	0	0%	0	0%
	Glyceria elata	Fowl manna grass	Native	FACW	22	16%	0	0%	0	0%
	Juncus laccatus	Shiny rush	Native	NL	4	3%	0	0%	0	0%
	Juncus oxymeris	Pointed rush	Native	FACW	2	1%	0	0%	0	0%
	Juncus xiphioides	Iris-leaved rush	Native	OBL	1	1%	0	0%	0	0%
	Muhlenbergia andina	Foxtail muhly	Native	FAC	1	1%	0	0%	0	0%
	Poaceae sp.	Grass	Native	NL	1	1%	0	0%	0	0%
	Pteridium aquilinum var. *pubescens*	Hairy brackenfern	Native	FACU	4	3%	0	0%	0	0%
	Spiraea splendens	Rose meadowsweet	Native	NL	1	1%	0	0%	0	0%
	Torreyochloa pallida var. *pauciflora*	Weak manna grass	Native	OBL	1	1%	0	0%	0	0%
LLD-RV10	*Abies concolor*	White fir	Native	NL	2	1%	5	4%	4	3%
	Alnus incana subsp. *tenuifolia*	Mountain alder	Native	FACW	16	11%	20	14%	0	0%
	Aquilegia formosa	Western columbine	Native	FAC	1	1%	0	0%	0	0%
	Athyrium filix-femina var. *cyclosorum*	Subarctic ladyfern	Native	FAC	3	2%	0	0%	0	0%
	Calocedrus decurrens	Incense cedar	Native	NL	0	0%	4	3%	3	2%
	Carex whitneyi	Whitney's sedge	Native	NL	1	1%	0	0%	0	0%
	Castilleja applegatei subsp. *pinetorum*	Wavyleaf Indian paintbrush	Native	NL	2	1%	0	0%	0	0%
	Circaea alpina subsp. *pacifica*	Small enchanter's nightshade	Native	FAC	4	3%	0	0%	0	0%
	Cornus sericea	American dogwood	Native	FACW	47	33%	25	18%	0	0%
	Elymus glaucus subsp. *glaucus*	Blue wildrye	Native	FACU	8	6%	0	0%	0	0%
	Erigeron glacialis var. *glacialis*	Subalpine fleabane	Native	FACW	3	2%	0	0%	0	0%
	Erythranthe moschata	Musk monkeyflower	Native	OBL	1	1%	0	0%	0	0%
	Galium aparine	Goose grass	Native	FACU	1	1%	0	0%	0	0%
	Hieracium albiflorum	White hawkweed	Native	NL	1	1%	0	0%	0	0%
	Hosackia oblongifolia var. *oblongifolia*	Streambank bird's-foot trefoil	Native	OBL	11	8%	0	0%	0	0%
	Juncus xiphioides	Iris-leaved rush	Native	OBL	6	4%	0	0%	0	0%
	Lonicera conjugialis	Purpleflower honeysuckle	Native	FAC	5	4%	0	0%	0	0%
	Luzula comosa var. *laxa*	Pacific woodrush	Native	FAC	1	1%	0	0%	0	0%

Site	Scientific Name	Common Name	Nativity	Wetland Indicator Status[1]	Understory (< 1 meter)		Mid-story (1 to 5 meters)		Overstory (> 5 meters)	
					Occurrences	Relative Cover	Occurrences	Relative Cover	Occurrences	Relative Cover
LLD-RV10 (cont.)	*Muhlenbergia filiformis*	Pull-up muhly	Native	FACW	1	1%	0	0%	0	0%
	Osmorhiza sp.	Sweet-cicely	Native	FACU	3	2%	0	0%	0	0%
	Pinus contorta	Lodgepole pine	Native	FAC	5	4%	21	15%	16	11%
	Pinus jeffreyi	Jeffrey pine	Native	NL	0	0%	0	0%	6	4%
	Populus tremuloides	Quaking aspen	Native	FACU	0	0%	0	0%	6	4%
	Populus trichocarpa	Black cottonwood	Native	FAC	0	0%	0	0%	9	6%
	Prunella vulgaris	Common selfheal	Native	FACU	2	1%	0	0%	0	0%
	Quercus vacciniifolia	Huckleberry oak	Native	NL	3	2%	0	0%	0	0%
	Ribes sp.	Currant	Native	FAC	1	1%	0	0%	0	0%
	Salix sp.	Willow	Native	FAC	1	1%	0	0%	0	0%
	Scirpus microcarpus	Panicled bulrush	Native	OBL	2	1%	0	0%	0	0%
	Senecio triangularis	Arrowleaf ragwort	Native	FACW	8	6%	0	0%	0	0%
	Sidalcea asprella subsp. *asprella*	Harsh checkerbloom	Native	NL	2	1%	0	0%	0	0%
	Spiraea splendens	Rose meadowsweet	Native	NL	6	4%	0	0%	0	0%
	Veratrum californicum var. *californicum*	California false hellebore	Native	FAC	4	3%	0	0%	0	0%
LLD-RV3	*Abies concolor*	White fir	Native	NL	0	0%	7	5%	9	6%
	Agrostis pallens	Dune bent grass	Native	UPL	1	1%	0	0%	0	0%
	Alnus incana subsp. *tenuifolia*	Mountain alder	Native	FACW	3	2%	7	5%	0	0%
	Calocedrus decurrens	Incense cedar	Native	NL	1	1%	6	4%	24	16%
	Carex nudata	Torrent sedge	Native	OBL	1	1%	0	0%	0	0%
	Carex sp.	Sedge	Native	FAC	1	1%	0	0%	0	0%
	Cornus sericea	American dogwood	Native	FACW	5	3%	0	0%	0	0%
	Darmera peltata	Indian rhubarb	Native	OBL	1	1%	0	0%	0	0%
	Elymus glaucus subsp. *glaucus*	Blue wildrye	Native	FACU	1	1%	0	0%	0	0%
	Equisetum arvense	Common horsetail	Native	FAC	6	4%	0	0%	0	0%
	Glyceria elata	Fowl manna grass	Native	FACW	1	1%	0	0%	0	0%
	Helenium bigelovii	Bigelow's sneezeweed	Native	FACW	2	1%	0	0%	0	0%
	Hosackia oblongifolia var. *oblongifolia*	Streambank bird's-foot trefoil	Native	OBL	8	5%	0	0%	0	0%
	Juncus xiphioides	Iris-leaved rush	Native	OBL	3	2%	0	0%	0	0%
	Kelloggia galioides	Milk kelloggia	Native	NL	1	1%	0	0%	0	0%
	Panicum acuminatum var. *fasciculatum*	Pacific panic grass	Native	FAC	1	1%	0	0%	1	1%
	Pinus contorta	Lodgepole pine	Native	FAC	0	0%	20	14%	31	21%
	Pinus jeffreyi	Jeffrey pine	Native	NL	0	0%	0	0%	4	3%
	Pinus ponderosa	Ponderosa pine	Native	FACU	0	0%	6	4%	6	4%
	Pteridium aquilinum var. *pubescens*	Hairy brackenfern	Native	FACU	3	2%	0	0%	0	0%
	Quercus vacciniifolia	Huckleberry oak	Native	NL	4	3%	1	1%	0	0%

Site	Scientific Name	Common Name	Nativity	Wetland Indicator Status[1]	Understory (< 1 meter)		Mid-story (1 to 5 meters)		Overstory (> 5 meters)	
					Occurrences	Relative Cover	Occurrences	Relative Cover	Occurrences	Relative Cover
LLD-RV3 (cont.)	*Salix exigua*	Narrowleaf willow	Native	FACW	0	0%	1	1%	0	0%
	Salix jepsonii	Jepson's willow	Native	OBL	1	1%	0	0%	0	0%
	Scirpus diffusus	Umbrella bulrush	Native	OBL	5	3%	0	0%	0	0%
	Solidago elongata	West coast Canada goldenrod	Native	FACU	1	1%	0	0%	0	0%
	Spiraea splendens	Rose meadowsweet	Native	NL	6	4%	0	0%	0	0%
	Stachys rigida	Rough hedgenettle	Native	FACW	2	1%	0	0%	0	0%
	Stachys rigida var. *rigida*	Rough hedgenettle	Native	NL	1	1%	0	0%	0	0%
	Viola glabella	Stream violet	Native	FACW	1	1%	0	0%	0	0%
GCD-RV1	*Abies concolor*	White fir	Native	NL	1	1%	5	5%	6	6%
	Alnus incana subsp. *tenuifolia*	Mountain alder	Native	FACW	7	7%	7	7%	0	0%
	Alnus rhombifolia	White alder	Native	FACW	0	0%	1	1%	0	0%
	Athyrium filix-femina var. *cyclosorum*	Subarctic ladyfern	Native	FAC	1	1%	0	0%	0	0%
	Calocedrus decurrens	Incense cedar	Native	NL	0	0%	8	7%	5	5%
	Carex nudata	Torrent sedge	Native	OBL	2	2%	0	0%	0	0%
	Chamaebatia foliolosa	Mountain misery	Native	NL	1	1%	0	0%	0	0%
	Cornus sericea	American dogwood	Native	FACW	3	3%	3	3%	0	0%
	Darmera peltata	Indian rhubarb	Native	OBL	14	13%	7	7%	0	0%
	Pinus contorta	Lodgepole pine	Native	FAC	0	0%	2	2%	5	5%
	Pinus jeffreyi	Jeffrey pine	Native	NL	0	0%	3	3%	3	3%
	Pseudotsuga menziesii var. *menziesii*	Douglas-fir	Native	FACU	0	0%	1	1%	16	15%
	Pteridium aquilinum var. *pubescens*	Hairy brackenfern	Native	FACU	5	5%	0	0%	0	0%
	Quercus vacciniifolia	Huckleberry oak	Native	NL	1	1%	0	0%	0	0%
	Rhododendron occidentale	California azalea	Native	FAC	5	5%	1	1%	0	0%
	Rosa pisocarpa subsp. *ahartii*	Ahart rose	Native	FAC	7	7%	0	0%	0	0%
	Rubus parviflorus	Thimbleberry	Native	FAC	1	1%	0	0%	0	0%
	Salix jepsonii	Jepson's willow	Native	OBL	1	1%	0	0%	0	0%
	Spiraea splendens	Rose meadowsweet	Native	NL	2	2%	0	0%	0	0%
IHD-RV5	*Abies concolor*	White fir	Native	NL	3	2%	11	7%	16	10%
	Agastache urticifolia	Nettleleaf giant hyssop	Native	FACU	1	1%	0	0%	0	0%
	Alnus incana subsp. *tenuifolia*	Mountain alder	Native	FACW	26	16%	26	16%	2	1%
	Aquilegia formosa	Western columbine	Native	FAC	1	1%	0	0%	0	0%
	Artemisia douglasiana	Mugwort	Native	FACW	6	4%	0	0%	0	0%
	Athyrium filix-femina var. *cyclosorum*	Subarctic ladyfern	Native	FAC	3	2%	0	0%	0	0%
	Boykinia occidentalis	Coastal brookfoam	Native	FAC	1	1%	0	0%	0	0%
	Bromus suksdorfii	Suksdorf's brome	Native	NL	4	2%	0	0%	0	0%
	Carex bolanderi	Bolander's sedge	Native	FAC	1	1%	0	0%	0	0%

Site	Scientific Name	Common Name	Nativity	Wetland Indicator Status[1]	Understory (< 1 meter)		Mid-story (1 to 5 meters)		Overstory (> 5 meters)	
					Occurrences	Relative Cover	Occurrences	Relative Cover	Occurrences	Relative Cover
IHD-RV5 (cont.)	*Carex fracta*	Fragile-sheathed sedge	Native	FAC	1	1%	0	0%	0	0%
	Circaea alpina subsp. *pacifica*	Small enchanter's nightshade	Native	FAC	5	3%	0	0%	0	0%
	Cornus sericea	American dogwood	Native	FACW	16	10%	9	6%	0	0%
	Drymocallis lactea var. *lactea*	Sierran woodbeauty	Native	FAC	1	1%	0	0%	0	0%
	Elymus glaucus subsp. *glaucus*	Blue wildrye	Native	FACU	17	10%	0	0%	0	0%
	Eriophyllum lanatum var. *grandiflorum*	Common woolly sunflower	Native	NL	1	1%	0	0%	0	0%
	Galium aparine	Goose grass	Native	FACU	8	5%	0	0%	0	0%
	Galium sp.	Bedstraw	Native	NL	1	1%	0	0%	0	0%
	Glyceria elata	Fowl manna grass	Native	FACW	14	9%	0	0%	0	0%
	Heracleum maximum	Cow parsnip	Native	FAC	5	3%	1	1%	0	0%
	Lathyrus sp.	Wild pea	Native	NL	3	2%	0	0%	0	0%
	Lonicera conjugialis	Purpleflower honeysuckle	Native	FAC	1	1%	0	0%	0	0%
	Lupinus sp.	Lupine	Native	NL	1	1%	0	0%	0	0%
	Phacelia heterophylla var. *virgata*	Varileaf phacelia	Native	FACU	1	1%	0	0%	0	0%
	Pinus contorta	Lodgepole pine	Native	FAC	1	1%	32	20%	29	18%
	Pinus ponderosa	Ponderosa pine	Native	FACU	0	0%	3	2%	8	5%
	Populus tremuloides	Quaking aspen	Native	FACU	0	0%	4	2%	4	2%
	Prunella vulgaris	Common selfheal	Native	FACU	3	2%	0	0%	0	0%
	Ribes nevadense	Mountain pink currant	Native	FAC	1	1%	0	0%	0	0%
	Rumex acetosella	Sheep sorrel	Naturalized	FACU	2	1%	0	0%	0	0%
	Salix laevigata	Red willow	Native	FACW	3	2%	9	6%	0	0%
	Salix lasiandra	Pacific willow	Native	FACW	1	1%	1	1%	0	0%
	Salix lasiolepis	Arroyo willow	Native	FACW	12	7%	8	5%	0	0%
	Senecio triangularis	Arrowleaf ragwort	Native	FACW	3	2%	0	0%	0	0%
	Solidago elongata	West coast Canada goldenrod	Native	FACU	3	2%	0	0%	0	0%
	Spiraea splendens	Rose meadowsweet	Native	NL	2	1%	0	0%	0	0%
	Stipa occidentalis var. *californica*	California needle grass	Native	NL	3	2%	0	0%	0	0%
	Thalictrum sparsiflorum	Fewflower meadow-rue	Native	FAC	4	2%	0	0%	0	0%
	Veronica anagallis-aquatica	Water speedwell	Naturalized	OBL	1	1%	0	0%	0	0%

Site	Scientific Name	Common Name	Nativity	Wetland Indicator Status[1]	Understory (< 1 meter)		Mid-story (1 to 5 meters)		Overstory (> 5 meters)	
					Occurrences	Relative Cover	Occurrences	Relative Cover	Occurrences	Relative Cover
IHD-RV1	*Agrostis idahoensis*	Idaho redtop	Native	FACW	1	0%	0	0%	0	0%
	Alnus incana subsp. *tenuifolia*	Mountain alder	Native	FACW	2	1%	6	2%	0	0%
	Arctostaphylos patula	Greenleaf manzanita	Native	NL	14	5%	4	1%	0	0%
	Artemisia douglasiana	Mugwort	Native	FACW	3	1%	0	0%	0	0%
	Boykinia occidentalis	Coastal brookfoam	Native	FAC	1	0%	0	0%	0	0%
	Carex leptopoda	Slender-footed sedge	Native	FAC	1	0%	0	0%	0	0%
	Ceanothus cordulatus	Mountain whitethorn	Native	NL	15	5%	3	1%	0	0%
	Ceanothus prostratus	Prostrate ceanothus	Native	NL	1	0%	0	0%	0	0%
	Cornus sericea	American dogwood	Native	FACW	5	2%	4	1%	0	0%
	Darmera peltata	Indian rhubarb	Native	OBL	6	2%	0	0%	0	0%
	Drymocallis glandulosa var. *glandulosa*	Sticky cinquefoil	Native	FAC	1	0%	0	0%	0	0%
	Elymus elymoides	Squirreltail	Native	FACU	7	2%	0	0%	0	0%
	Elymus glaucus subsp. *glaucus*	Blue wildrye	Native	FACU	13	5%	0	0%	0	0%
	Eriophyllum lanatum var. *grandiflorum*	Common woolly sunflower	Native	NL	0	0%	0	0%	0	0%
	Frangula rubra	Sierra coffee berry	Native	NL	5	2%	0	0%	0	0%
	Gayophytum diffusum	Spreading groundsmoke	Native	NL	7	2%	0	0%	0	0%
	Hypericum perforatum subsp. *perforatum*	Klamathweed	Naturalized	FACU	1	0%	0	0%	0	0%
	Juncus xiphioides	Iris-leaved rush	Native	OBL	1	0%	0	0%	0	0%
	Myrica hartwegii[2]	Sierra sweet bay	Native	FAC	7	2%	0	0%	0	0%
	Pinus contorta	Lodgepole pine	Native	FAC	0	0%	4	1%	4	1%
	Pinus ponderosa	Ponderosa pine	Native	FACU	5	2%	15	5%	17	6%
	Poa compressa	Canadian blue grass	Naturalized	FACU	2	1%	0	0%	0	0%
	Rhododendron occidentale	California azalea	Native	FAC	2	1%	1	0%	0	0%
	Ribes sp.	Currant	Native	FAC	0	0%	0	0%	0	0%
	Rosa pisocarpa subsp. *ahartii*	Ahart rose	Native	FAC	5	2%	0	0%	0	0%
	Rumex acetosella	Sheep sorrel	Naturalized	FACU	2	1%	0	0%	0	0%
	Salix lasiolepis	Arroyo willow	Native	FACW	9	3%	5	2%	0	0%
	Salix scouleriana	Scouler's willow	Native	FAC	2	1%	4	1%	0	0%
	Scirpus diffusus	Umbrella bulrush	Native	OBL	16	6%	0	0%	0	0%
	Solidago elongata	West coast Canada goldenrod	Native	FACU	8	3%	0	0%	0	0%
	Spiraea splendens	Rose meadowsweet	Native	NL	3	1%	0	0%	0	0%
	Stipa nelsonii var. *dorei*	Mountain needle grass	Native	UPL	7	2%	0	0%	0	0%
	Stipa occidentalis var. *californica*	California needle grass	Native	NL	2	1%	0	0%	0	0%
	Symphoricarpos mollis	Creeping snowberry	Native	FACU	1	0%	0	0%	0	0%

Site	Scientific Name	Common Name	Nativity	Wetland Indicator Status[1]	Understory (< 1 meter)		Mid-story (1 to 5 meters)		Overstory (> 5 meters)	
					Occurrences	Relative Cover	Occurrences	Relative Cover	Occurrences	Relative Cover
CD-RV4	*Acer macrophyllum*	Big-leaf maple	Native	FACU	0	0%	2	2%	0	0%
	Alnus rhombifolia	White alder	Native	FACW	16	17%	25	26%	17	18%
	Amelanchier alnifolia	Saskatoon serviceberry	Native	FACU	1	1%	1	1%	0	0%
	Boykinia occidentalis	Coastal brookfoam	Native	FAC	1	1%	0	0%	0	0%
	Carex nudata	Torrent sedge	Native	OBL	3	3%	1	1%	0	0%
	Carex sp.	Sedge	Native	FAC	1	1%	0	0%	0	0%
	Elymus triticoides	Beardless wild-rye	Native	FAC	2	2%	0	0%	0	0%
	Epilobium canum	California fuchsia	Native	NL	1	1%	0	0%	0	0%
	Melilotus albus	White sweetclover	Naturalized	FACU	1	1%	0	0%	0	0%
	Panicum acuminatum var. *fasciculatum*	Pacific panic grass	Native	FAC	2	2%	0	0%	0	0%
	Philadelphus lewisii	Wild mock orange	Native	NL	1	1%	2	2%	0	0%
	Pinus ponderosa	Ponderosa pine	Native	FACU	0	0%	2	2%	5	5%
	Quercus chrysolepis	Canyon live oak	Native	NL	0	0%	0	0%	3	3%
	Rhinotropis cornuta var. *cornuta*	Sierra milkwort	Native	NL	1	1%	0	0%	0	0%
	Salix laevigata	Red willow	Native	FACW	1	1%	3	3%	0	0%
	Salix lasiolepis	Arroyo willow	Native	FACW	1	1%	0	0%	0	0%
	Toxicodendron diversilobum	Western poison oak	Native	FAC	3	3%	2	2%	0	0%
	Vitis californica	California wild grape	Native	FACU	2	2%	0	0%	0	0%
SCD-RV5	*Pinus ponderosa*	Ponderosa pine	Native	FACU	1	1%	1	1%	0	0%
	Quercus chrysolepis	Canyon live oak	Native	NL	0	0%	0	0%	1	1%
	Rubus armeniacus	Himalayan blackberry	Naturalized	FAC	49	31%	5	3%	0	0%
	Salix lasiolepis	Arroyo willow	Native	FACW	14	9%	15	10%	1	1%
	Toxicodendron diversilobum	Western poison oak	Native	FAC	1	1%	0	0%	0	0%
SCD-RV3	*Acmispon americanus* var. *americanus*	American bird's-foot trefoil	Native	FACU	1	1%	0	0%	0	0%
	Artemisia douglasiana	Mugwort	Native	FACW	1	1%	1	1%	0	0%
	Brickellia californica	California brickellbush	Native	FACU	2	1%	0	0%	0	0%
	Carex nudata	Torrent sedge	Native	OBL	18	13%	0	0%	0	0%
	Cercocarpus betuloides var. *betuloides*	Birch-leaf mountain-mahogany	Native	NL	1	1%	1	1%	0	0%
	Cyperus eragrostis	Tall flatsedge	Native	FACW	1	1%	0	0%	0	0%
	Darmera peltata	Indian rhubarb	Native	OBL	2	1%	0	0%	0	0%
	Equisetum arvense	Common horsetail	Native	FAC	1	1%	0	0%	0	0%
	Frangula californica	California coffee berry	Native	NL	1	1%	0	0%	0	0%
	Melilotus albus	White sweetclover	Naturalized	FACU	1	1%	0	0%	0	0%
	Panicum acuminatum var. *fasciculatum*	Pacific panic grass	Native	FAC	2	1%	0	0%	0	0%
	Rubus armeniacus	Himalayan blackberry	Naturalized	FAC	5	4%	1	1%	0	0%
	Salix exigua	Narrowleaf willow	Native	FACW	4	3%	2	1%	0	0%

Site	Scientific Name	Common Name	Nativity	Wetland Indicator Status[1]	Understory (< 1 meter)		Mid-story (1 to 5 meters)		Overstory (> 5 meters)	
					Occurrences	Relative Cover	Occurrences	Relative Cover	Occurrences	Relative Cover
SCD-RV3 (cont.)	*Salix laevigata*	Red willow	Native	FACW	2	1%	3	2%	0	0%
	Salix lasiolepis	Arroyo willow	Native	FACW	11	8%	10	7%	0	0%
	Saponaria officinalis	Bouncingbet	Naturalized	UPL	1	1%	0	0%	0	0%
SCD-RV1	*Acmispon americanus* var. *americanus*	American bird's-foot trefoil	Native	FACU	3	1%	0	0%	0	0%
	Alnus rhombifolia	White alder	Native	FACW	4	2%	5	2%	10	4%
	Briza minor	Annual quaking grass	Naturalized	FAC	1	0%	0	0%	0	0%
	Carex nudata	Torrent sedge	Native	OBL	5	2%	0	0%	0	0%
	Heteromeles arbutifolia	Toyon	Native	NL	1	0%	1	0%	0	0%
	Heuchera micrantha	Crevice alumroot	Native	NL	1	0%	0	0%	0	0%
	Persicaria maculosa	Lady's thumb	Naturalized	FACW	1	0%	0	0%	0	0%
	Pseudotsuga menziesii var. *menziesii*	Douglas-fir	Native	FACU	0	0%	4	2%	3	1%
	Quercus chrysolepis	Canyon live oak	Native	NL	0	0%	1	0%	5	2%
	Rubus armeniacus	Himalayan blackberry	Naturalized	FAC	6	2%	0	0%	0	0%
	Salix exigua	Narrowleaf willow	Native	FACW	7	3%	8	3%	0	0%
	Salix laevigata	Red willow	Native	FACW	0	0%	2	1%	0	0%
	Salix lasiolepis	Arroyo willow	Native	FACW	9	4%	14	6%	0	0%
	Toxicodendron diversilobum	Western poison oak	Native	FAC	2	1%	0	0%	0	0%
	Umbellularia californica	California laurel	Native	FAC	0	0%	1	0%	2	1%
	Vitis californica	California wild grape	Native	FACU	2	1%	0	0%	0	0%

[1] Wetland indicator status (USACE 2020):
OBL = obligate; almost always occurs in wetland
FACW = facultative wetland; usually occurs in wetland, but may occur in non-wetland
FAC = facultative; occurs in wetland and non-wetland
FACU = facultative upland; usually occurs in non-wetland, but may occur in wetland
UPL = upland; almost never occurs in wetland
NL = not listed; generally assumed to be an upland species

[2] Sierra sweet bay (*Myrica hartwegii*) has a California Rare Plant Ranking of 4.3 (i.e., uncommon and not very threatened in California; CNPS 2024b)

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Table E3-2. Line-Point Intercept Results for Absolute Canopy Cover by Site within the Upper American River Project, 2024.

Site	Total Transect Points	Canopy Class					
		Understory (<1 meter)		Mid-story (1 to 5 meters)		Overstory (> 5 meters)	
		Species Occurrences[1]	Absolute Cover	Species Occurrences[1]	Absolute Cover	Species Occurrences[1]	Absolute Cover
LLD-RV17	138	140	101%	14	10%	0	0%
LLD-RV10	142	151	106%	75	53%	44	31%
LLD-RV3	148	60	41%	48	32%	75	51%
GCD-RV1	107	51	48%	38	36%	35	33%
IHD-RV5	163	160	98%	104	64%	59	36%
IHD-RV1	281	155	55%	46	16%	21	7%
CD-RV4	96	37	39%	38	40%	25	26%
SCD-RV5	157	65	41%	21	13%	2	1%
SCD-RV3	137	54	39%	18	13%	0	0%
SCD-RV1	245	42	17%	36	15%	20	8%

[1] Multiple species may occur at each transect point within each canopy class.

Table E3-3. Line-Point Intercept Results by Site for Recruitment within the Upper American River Project, 2024.

Site	Type	Scientific Name	Common Name	Number of Recruits
LLD-RV17	Conifer	*Pinus contorta*	Lodgepole pine	2
	Wetland shrub	*Alnus incana* subsp. *tenuifolia*	Mountain alder	13
	Total			**15**
LLD-RV10	Conifer	*Abies concolor*	White fir	5
	Conifer	*Calocedrus decurrens*	Incense cedar	5
	Conifer	*Pinus contorta*	Lodgepole pine	15
	Upland tree	*Quercus kelloggii*	Black oak	1
	Wetland shrub	*Alnus incana* subsp. *tenuifolia*	Mountain alder	18
	Wetland shrub	*Cornus sericea*	American dogwood	102
	Wetland shrub	*Salix* sp.	Willow	2
	Total			**148**

Site	Type	Scientific Name	Common Name	Number of Recruits
LLD-RV3	Conifer	*Abies concolor*	White fir	2
	Conifer	*Calocedrus decurrens*	Incense cedar	5
	Conifer	*Pinus contorta*	Lodgepole pine	2
	Conifer	*Pinus lambertiana*	Sugar pine	1
	Conifer	*Pinus ponderosa*	Ponderosa pine	1
	Wetland shrub	*Alnus incana* subsp. *tenuifolia*	Mountain alder	5
	Wetland shrub	*Cornus sericea*	American dogwood	7
	Wetland shrub	*Salix exigua*	Narrowleaf willow	1
	Wetland shrub	*Salix jepsonii*	Jepson's willow	7
	Total			**31**
GCD-RV1	Conifer	*Abies concolor*	White fir	5
	Conifer	*Calocedrus decurrens*	Incense cedar	9
	Conifer	*Pseudotsuga menziesii* var. *menziesii*	Douglas-fir	5
	Upland tree	*Acer glabrum*	Mountain maple	2
	Upland shrub	*Spiraea splendens*	Rose meadowsweet	3
	Wetland shrub	*Alnus incana* subsp. *tenuifolia*	Mountain alder	1
	Wetland shrub	*Rosa pisocarpa* subsp. *ahartii*	Ahart rose	2
	Total			**27**
IHD-RV5	Conifer	*Abies concolor*	White fir	43
	Conifer	*Pinus contorta*	Lodgepole pine	5
	Upland tree	*Populus tremuloides*	Quaking aspen	2
	Wetland tree	*Salix laevigata*	Red willow	9
	Wetland shrub	*Alnus incana* subsp. *tenuifolia*	Mountain alder	13
	Wetland shrub	*Cornus sericea*	American dogwood	5
	Wetland shrub	*Salix lasiolepis*	Arroyo willow	2
	Total			**79**

Site	Type	Scientific Name	Common Name	Number of Recruits
IHD-RV1	Conifer	*Pinus contorta*	Lodgepole pine	3
	Upland shrub	*Frangula rubra*	Sierra coffee berry	3
	Upland shrub	*Spiraea splendens*	Rose meadowsweet	2
	Wetland shrub	*Cornus sericea*	American dogwood	14
	Wetland shrub	*Myrica hartwegii*	Sierra sweet bay	3
	Wetland shrub	*Rosa pisocarpa* subsp. *ahartii*	Ahart rose	26
	Total			**51**
CD-RV4	Upland shrub	*Amelanchier alnifolia*	Saskatoon serviceberry	2
	Upland shrub	*Toxicodendron diversilobum*	Western poison oak	8
	Upland shrub	*Vitis californica*	California wild grape	2
	Wetland tree	*Alnus rhombifolia*	White alder	7
	Wetland tree	*Salix laevigata*	Red willow	1
	Wetland shrub	*Cornus sericea*	American dogwood	1
	Total			**21**
SCD-RV5	Wetland shrub	*Salix lasiolepis*	Arroyo willow	4
	Total			**4**
SCD-RV3	Upland shrub	*Vitis californica*	California wild grape	1
	Wetland tree	*Salix laevigata*	Red willow	6
	Wetland shrub	*Salix exigua*	Narrowleaf willow	40
	Wetland shrub	*Salix lasiolepis*	Arroyo willow	2
	Total			**49**
SCD-RV1	Upland shrub	*Baccharis pilularis*	Coyote brush	1
	Upland shrub	*Eriodictyon californicum*	California yerba santa	1
	Upland shrub	*Toxicodendron diversilobum*	Western poison oak	2
	Wetland tree	*Alnus rhombifolia*	White alder	1
	Wetland tree	*Salix laevigata*	Red willow	3
	Wetland shrub	*Rubus armeniacus*	Himalayan blackberry	3
	Wetland shrub	*Salix exigua*	Narrowleaf willow	11
	Wetland shrub	*Salix lasiolepis*	Arroyo willow	1
	Total			**23**

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APPENDIX E4

Riparian Vegetation Point-centered Quarter Results

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Table E4-1. Results of Point-Centered Quarter Analysis for Riparian Vegetation within the Upper American River Project, 2024.

Site	Scientific Name	Common Name	Number Of Individuals	Composition	Mean Age Class[1]	Mean Vigor[2]	Mean Number of Stems	Mean DBH per Stem (inches)	Mean Basal Area (square inches)	Density (individuals/ acre)	Cover (square feet per acre)	Relative Cover	Frequency
LLD-RV17	*Alnus incana* subsp. *tenuifolia*	Mountain alder	18	67%	3	6	8	0.5	2.5	20	0.3	12%	38%
	Pinus contorta	Lodgepole pine	9	33%	2	6	1	2.5	35.0	10	2.4	88%	33%
	Overall site		**27**	**100%**	**2**	**6**	**--**	**--**	**--**	--	**2.7**	**100%**	**--**
LLD-RV10	*Abies concolor*	White fir	6	7%	2	5	1	3.3	10.2	96	6.8	3%	19%
	Alnus incana subsp. *tenuifolia*	Mountain alder	32	39%	3	6	2	0.6	0.8	514	2.9	1%	81%
	Calocedrus decurrens	Incense cedar	3	4%	3	5	1	7.0	52.6	48	17.6	7%	14%
	Cornus sericea	American dogwood	14	17%	3	6	2	0.4	0.3	225	0.4	0%	57%
	Pinus contorta	Lodgepole pine	24	29%	3	5	1	7.3	58.5	386	156.6	62%	76%
	Populus trichocarpa	Black cottonwood	3	4%	4	5	1	14.0	206.3	48	69.0	27%	14%
	Overall site		**82**	**100%**	**3**	**5**	**--**	**--**	**--**	--	**253.4**	**100%**	**--**
LLD-RV3	*Alnus incana* subsp. *tenuifolia*	Mountain alder	26	43%	2	5	2	0.2	0.2	87	0.1	0%	57%
	Calocedrus decurrens	Incense cedar	11	18%	3	4	1	7.0	159.6	37	40.7	80%	29%
	Cornus sericea	American dogwood	4	7%	3	6	7	0.3	0.4	13	0.0	0%	14%
	Pinus contorta	Lodgepole pine	11	18%	3	5	1	5.8	35.8	37	9.1	18%	33%
	Pinus jeffreyi	Jeffrey pine	2	3%	3	6	1	0.6	0.4	7	0.0	0%	10%
	Pinus lambertiana	Sugar pine	1	2%	3	6	1	1.5	1.8	3	0.0	0%	5%
	Pinus ponderosa	Ponderosa pine	2	3%	4	5	1	4.0	12.6	7	0.6	1%	10%
	Salix exigua	Narrowleaf willow	1	2%	2	6	3	0.1	0.0	3	0.0	0%	5%
	Salix jepsonii	Jepson's willow	2	3%	2	6	5	0.1	0.0	7	0.0	0%	10%
	Overall site		**60**	**100%**	**3**	**5**	**--**	**--**	**--**	--	**50.6**	**100%**	**--**
GCD-RV1	*Acer glabrum*	Mountain maple	2	4%	3	5	2	0.3	0.1	4	0.0	1%	10%
	Alnus incana subsp. *tenuifolia*	Mountain alder	38	81%	3	5	2	0.4	0.7	75	0.4	95%	86%
	Cornus sericea	American dogwood	4	9%	2	5	2	0.2	0.3	8	0.0	4%	19%
	Lonicera cauriana	Bluefly honeysuckle	2	4%	3	5	1	0.1	0.0	4	0.0	0%	10%
	Salix jepsonii	Jepson's willow	1	2%	4	6	5	0.1	0.0	2	0.0	0%	5%
	Overall site		**47**	**100%**	**3**	**5**	--	--	**--**	--	**0.4**	**100%**	**--**

Site	Scientific Name	Common Name	Number Of Individuals	Composition	Mean Age Class[1]	Mean Vigor[2]	Mean Number of Stems	Mean DBH per Stem (inches)	Mean Basal Area (square inches)	Density (individuals/ acre)	Cover (square feet per acre)	Relative Cover	Frequency
IHD-RV5	*Abies concolor*	White fir	6	8%	3	5	1	3.5	16.1	41	4.5	9%	14%
	Alnus incana subsp. *tenuifolia*	Mountain alder	33	42%	3	5	3	0.7	1.8	223	2.7	6%	76%
	Calocedrus decurrens	Incense cedar	1	1%	2	6	1	0.1	0.0	7	0.0	0%	5%
	Cornus sericea	American dogwood	4	5%	3	6	6	0.4	1.1	27	0.2	0%	14%
	Pinus contorta	Lodgepole pine	17	22%	3	5	1	6.9	50.1	115	40.0	84%	48%
	Salix laevigata	Red willow	9	12%	2	6	3	0.3	0.5	61	0.2	0%	33%
	Salix lasiolepis	Arroyo willow	8	10%	3	6	5	0.3	0.4	54	0.1	0%	24%
	Overall site		**78**	**100%**	**3**	**5**	**--**	--	**--**	**568**	**47.8**	**100%**	**--**
IHD-RV1	*Alnus incana* subsp. *tenuifolia*	Mountain alder	15	35%	3	5	4	0.5	1.1	61	0.5	3%	43%
	Calocedrus decurrens	Incense cedar	1	2%	3	6	2	1.5	3.5	4	0.1	1%	5%
	Cornus sericea	American dogwood	6	14%	3	6	4	0.4	0.6	24	0.1	1%	24%
	Pinus contorta	Lodgepole pine	3	7%	3	6	1	9.7	76.7	12	6.5	41%	14%
	Pinus ponderosa	Ponderosa pine	5	12%	3	6	1	8.2	57.0	20	8.1	51%	19%
	Salix lasiolepis	Arroyo willow	11	26%	3	6	8	0.4	1.2	45	0.4	2%	38%
	Salix scouleriana	Scouler's willow	2	5%	4	5	7	0.8	4.3	8	0.2	2%	5%
	Overall site		**43**	**100%**	**3**	**6**	**--**	--	**--**	**342**	**15.8**	**100%**	**--**
CD-RV4	*Acer macrophyllum*	Big-leaf maple	1	5%	4	4	4	3.0	28.3	2	0.3	3%	5%
	Alnus rhombifolia	White alder	14	64%	3	6	3	4.0	43.6	21	6.4	63%	48%
	Cornus sericea	American dogwood	1	5%	2	6	8	0.1	0.1	2	0.0	0%	5%
	Pinus ponderosa	Ponderosa pine	1	5%	5	4	1	19.0	283.5	2	3.0	29%	5%
	Salix laevigata	Red willow	2	9%	4	5	9	2.5	18.5	3	0.4	4%	10%
	Salix lasiolepis	Arroyo willow	2	9%	3	6	11	0.5	2.1	3	0.0	0%	5%
	Umbellularia californica	California laurel	1	5%	3	6	4	0.8	1.8	2	0.0	0%	5%
	Overall site		**22**	**100%**	**3**	**6**	**--**	--	**--**	**127**	**10.2**	**100%**	**--**
SCD-RV5	*Alnus rhombifolia*	White alder	1	4%	2	6	8	0.4	1.0	1	0.0	1%	5%
	Frangula californica	California coffee berry	5	18%	3	6	2	0.3	0.2	4	0.0	1%	14%
	Salix lasiolepis	Arroyo willow	19	68%	3	5	33	0.4	8.2	17	1.0	91%	43%
	Toxicodendron diversilobum	Western poison oak	3	11%	4	4	3	1.4	4.6	3	0.1	8%	5%
	Overall site		**28**	**100%**	**3**	**5**	**--**	--	**--**	**74**	**1.1**	**100%**	**--**

Site	Scientific Name	Common Name	Number Of Individuals	Composition	Mean Age Class[1]	Mean Vigor[2]	Mean Number of Stems	Mean DBH per Stem (inches)	Mean Basal Area (square inches)	Density (individuals/ acre)	Cover (square feet per acre)	Relative Cover	Frequency
SCD-RV3	*Alnus rhombifolia*	White alder	8	21%	3	6	1	1.1	1.7	17	0.2	14%	24%
	Fraxinus latifolia	Oregon ash	1	3%	4	6	2	1.5	3.5	2	0.1	4%	5%
	Salix exigua	Narrowleaf willow	1	3%	3	6	20	0.3	1.0	2	0.0	1%	5%
	Salix laevigata	Red willow	9	24%	3	5	9	0.8	4.8	19	0.6	45%	29%
	Salix lasiolepis	Arroyo willow	19	50%	3	6	9	0.4	1.8	39	0.5	37%	67%
	Overall site		**38**	**100%**	**3**	**6**	**--**	--	**--**	**174**	**1.4**	**100%**	**--**
SCD-RV1	*Alnus rhombifolia*	White alder	9	21%	4	5	5	3.2	57.8	16	6.5	74%	26%
	Cephalanthus occidentalis	California button willow	3	7%	3	6	11	0.3	0.5	5	0.0	0%	9%
	Fraxinus latifolia	Oregon ash	1	2%	4	5	3	2.0	9.4	2	0.1	1%	4%
	Salix exigua	Narrowleaf willow	9	21%	3	6	10	0.7	2.4	16	0.3	3%	22%
	Salix laevigata	Red willow	5	12%	3	6	6	1.7	13.5	9	0.8	10%	22%
	Salix lasiolepis	Arroyo willow	14	33%	3	5	20	0.5	4.8	25	0.8	10%	35%
	Umbellularia californica	California laurel	1	2%	4	5	2	3.0	14.1	2	0.2	2%	4%
	Overall site		**42**	**100%**	**3**	**5**	**--**	--	**--**	**165**	**8.7**	**100%**	**--**

Note: DBH = diameter at breast height

[1] Age classes (SMUD 2016)
1 = tree and shrub seedlings ≤1 year old
2 = trees and shrubs 2–4 years old
3 = young trees (i.e., 4–10 years old) and mature shrubs (i.e., >4 years old and <20% dead)
4 = mature trees (i.e., >10 years old and <20% dead) and decadent shrubs (i.e., >4 years old and ≥20% dead)
5 = decadent trees (i.e., >10 years old and ≥20% dead)

[2] Vigor classes (SMUD 2016)
1 = dead; complete leaf death that is not attributable to normal winter or summer deciduous species
2 = critically stressed; major leaf death and/or branch die back (i.e., >50% of canopy affected)
3 = significantly stressed; prominent leaf death and/or branch die back (i.e., 21–50% of canopy affected)
4 = stressed; minimal leaf death and/or branch die back (i.e., 11–20% of canopy affected)
5 = normal; little or no sign of leaf stress (i.e., 5–10% of canopy affected)
6 = vigorous; no sign of leaf stress/very healthy-looking canopy (i.e., <5% of canopy affected)

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APPENDIX E5

Riparian Vegetation Greenline Results

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Table E5-1. Riparian Vegetation Greenline Data Results for Stability Class and Successional Status by Site within the Upper American River Project, 2024.

Site	Component	Common Name	Proportion of Greenline	Stability[1,2]	Successional Status[1,3]
LLD-RV17	*Alnus incana* subsp. *tenuifolia*	Mountain alder	1%	8	L
	Carex nudata	Torrent sedge	99%	9	L
	Totals		**100%**	**9.0**	**L (100%)**
LLD-RV10	*Alnus incana* subsp. *tenuifolia*	Mountain alder	41%	8	L
	Cornus sericea	American dogwood	45%	7	L
	Hosackia oblongifolia var. *oblongifolia*	Streambank bird's-foot trefoil	3%	5	E
	Juncus xiphioides	Iris-leaved rush	8%	7	L
	Pinus contorta	Lodgepole pine	3%	8	L
	Senecio triangularis	Arrowleaf ragwort	1%	5	E
	Spiraea splendens	Rose meadowsweet	1%	6	E
	Totals		**100%**	**7.4**	**L (96%), E (4%)**
LLD-RV3	*Alnus incana* subsp. *tenuifolia*	Mountain alder	30%	8	L
	Bedrock	–	8%	10	L
	Boulder	–	6%	10	L
	Calocedrus decurrens	Incense cedar	3%	8	L
	Carex sp.	Sedge	6%	9	L
	Darmera peltata	Umbrella plant	4%	9	L
	Helenium bigelovii	Bigelow's sneezeweed	2%	5	E
	Hosackia oblongifolia var. *oblongifolia*	Streambank bird's-foot trefoil	2%	5	E
	Juncus xiphioides	Iris-leaved rush	28%	7	L
	Salix exigua	Narrowleaf willow	4%	6	E
	Salix jepsonii	Jepson's willow	2%	7	L
	Scirpus diffusus	Umbrella bulrush	4%	9	L
	Spiraea splendens	Rose meadowsweet	1%	6	E
	Totals		**100%**	**7.9**	**L (91%), E (9%)**

Site	Component	Common Name	Proportion of Greenline	Stability[1,2]	Successional Status[1,3]
GCD-RV1	*Alnus incana* subsp. *tenuifolia*	Mountain alder	35%	8	L
	Bedrock	–	42%	10	L
	Carex sp.	Sedge	4%	9	L
	Cornus sericea	American dogwood	1%	7	L
	Darmera peltata	Umbrella plant	18%	9	L
	Totals		**100%**	**9.1**	**L (100%)**
IHD-RV5	*Alnus incana* subsp. *tenuifolia*	Mountain alder	50%	8	L
	Cornus sericea	American dogwood	3%	7	L
	No greenline	–	4%	1	E
	Pinus contorta	Lodgepole pine	3%	8	L
	Salix laevigata	Red willow	17%	7	E
	Salix lasiolepis	Arroyo willow	23%	6	E
	Totals		**100%**	**7.1**	**L (56%), E (44%)**
IHD-RV1	*Alnus incana* subsp. *tenuifolia*	Mountain alder	16%	8	L
	Bedrock	–	2%	10	L
	Cornus sericea	American dogwood	6%	7	L
	Darmera peltata	Umbrella plant	5%	9	L
	Juncus xiphioides	Iris-leaved rush	2%	7	L
	Myrica hartwegii	Sierra sweet bay	9%	8	L
	Salix lasiolepis	Arroyo willow	43%	6	E
	Scirpus diffusus	Umbrella bulrush	17%	9	L
	Totals		**100%**	**7.3**	**L (57%), E (43%)**

Site	Component	Common Name	Proportion of Greenline	Stability[1,2]	Successional Status[1,3]
CD-RV4	*Alnus rhombifolia*	White alder	26%	8	L
	Bedrock	–	63%	10	L
	Carex nudata	Torrent sedge	10%	9	L
	Salix laevigata	Red willow	1%	7	E
	Salix lasiolepis	Arroyo willow	0%	6	E
	Totals		**100%**	**9.3**	**L (99%), E (1%)**
SCD-RV5	*Alnus rhombifolia*	White alder	1%	8	L
	Bedrock	–	52%	10	L
	Boulder	–	7%	10	L
	Rubus armeniacus	Himalayan blackberry	6%	8	E
	Salix lasiolepis	Arroyo willow	31%	6	E
	Salix sp.	Willow	4%	8	L
	Totals		**100%**	**8.6**	**L (64%), E (36%)**
SCD-RV3	*Alnus rhombifolia*	White alder	3%	8	L
	Bedrock	–	18%	10	L
	Carex nudata	Torrent sedge	49%	9	L
	Darmera peltata	Umbrella plant	2%	9	L
	No greenline	–	8%	1	E
	Salix exigua	Narrowleaf willow	11%	6	E
	Salix lasiolepis	Arroyo willow	10%	6	E
	Totals		**100%**	**7.9**	**L (71%), E (29%)**

Site	Component	Common Name	Proportion of Greenline	Stability[1,2]	Successional Status[1,3]
SCD-RV1	*Alnus rhombifolia*	white alder	3%	8	L
	Bedrock		32%	10	L
	Carex nudata	torrent sedge	16%	9	L
	No Greenline		36%	1	E
	Salix exigua	narrowleaf willow	6%	6	E
	Salix laevigata	red willow	4%	7	E
	Salix lasiolepis	arroyo willow	2%	6	E
	Totals		**100%**	**6.1**	**L (51%), E (49%)**

[1] From Winward (2000) when available; otherwise interpreted based on nearest equivalent with the component's successional status.

[2] Stability class is a rating of a component's ability to buffer the forces of moving water:

1–2 = very low
3–4 = low
5–6 = mid
7–8 = high
9–10 excellent

[3] Successional status is the present state of vegetation on an area in relation to the potential natural community(ies) that could occur on that area:

E = early; community type is known to occur in the earlier stage of succession along the greenline
L = late; community type is known to occur in the latter successional stages along the greenline

Table E5-2. Crosswalk of 2024 Upper American River Project Riparian Vegetation Components to Nearest Winward (2000) Riparian Community Type, Stability Class, and Successional Stage.

Greenline Component	Winward (2000) Equivalent[1]	Stability Class[2]	Successional Stage[3]
Alnus incana subsp. *tenuifolia*	*Alnus incana*/*Cornus sericea*	8	L
Alnus rhombifolia	*Populus*/*Betula occidentalis*	8	L
Bare	Barren	1	E
Bedrock	Anchored rock	10	L
Boulder	Anchored rock	10	L
Calocedrus decurrens	Conifer/*Cornus sericea*	8	L
Carex nudata	*Carex aquatilis*	9	L
Carex sp.	*Carex aquatilis*	9	L
Cephalanthus occidentalis	*Cornus sericea*	7	L
Cobble	Barren	1	E
Cobble/boulder	Anchored rock	10	L
Cornus sericea	*Cornus sericea*	7	L
Darmera peltata	*Typha latifolia*	9	L
Fraxinus latifolia	*Populus tremuloides*/mesic forb	7	L
Helenium bigelovii	Mesic forb meadow	5	E
Hosackia oblongifolia var. *oblongifolia*	Mesic forb meadow	5	E
Juncus xiphioides	*Juncus ensifolius*	7	L
Myrica hartwegii	Low *Salix* / mesic forb	8	L
No greenline	Barren	1	E
Pinus contorta	*Pinus contorta*/*Carex scopulorum*	8	L
Robinia pseudoacacia	*Acer negundo*/*Cornus sericea*	9	L

Greenline Component	Winward (2000) Equivalent[1]	Stability Class[2]	Successional Stage[3]
Rubus armeniacus	*Salix exigua*/*Rosa woodsii*	8	E
Salix exigua	*Salix exigua*/barren	6	E
Salix jepsonii	*Salix lemmonii*/mesic forb	7	L
Salix laevigata	*Salix lasiandra*/mesic forb	7	E
Salix lasiolepis	*Salix lasiolepis*/barren	6	E
Salix sp.	*Salix*/mesic graminoid	8	L
Scirpus diffusus	*Scirpus microcarpus*	9	L
Senecio triangularis	Mesic forb meadow	5	E
Spiraea splendens	*Rosa woodsii*	6	E
Vitis californica	*Rosa woodsii*	6	E

Source: Appendix B in Winward (2000)

[1] Greenline components not listed in Winward (2000) were translated to the most equivalent community type based on species composition, life form, and field observations.

[2] Stability class is a rating of a component's ability to buffer the forces of moving water:

1–2 = very low
3–4 = low
5–6 = mid
7–8 = high
9–10 excellent

[3] Successional status is the present state of vegetation on an area in relation to the potential natural community(ies) that could occur on that area:

E = early; community type is known to occur in the earlier stage of succession along the greenline
L = late; community type is known to occur in the latter successional stages along the greenline

APPENDIX F1

Incidental Observations of Avian Species in the Study Area (2016–2024)

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Table F1-1. Incidental Observations of Avian Species in the Study Area, 2016–2024.

Common Name	Scientific Name
Cackling goose	*Branta hutchinsii*
Canada goose	*Branta canadensis*
Cinnamon teal	*Spatula cyanoptera*
Mallard	*Anas platyrhynchos*
Bufflehead	*Bucephala albeola*
Common merganser	*Mergus merganser*
Mountain quail	*Oreortyx pictus*
Pied-billed grebe	*Podilymbus podiceps*
Red-necked grebe	*Podiceps grisegena*
Eared grebe	*Podiceps nigricollis*
Western grebe	*Aechmophorus occidentalis*
Band-tailed pigeon	*Patagioenas fasciata*
Mourning dove	*Zenaida macroura*
Common nighthawk	*Chordeiles minor*
Vaux's swift	*Chaetura vauxi*
Killdeer	*Charadrius vociferus*
Spotted sandpiper	*Actitis macularius*
California gull	*Larus californicus*
Common loon	*Gavia immer*
Double-crested cormorant	*Nannopterum auritum*
Great blue heron	*Ardea herodias*
Turkey vulture	*Cathartes aura*
Osprey	*Pandion haliaetus*
Sharp-shinned hawk	*Accipiter striatus*
Cooper's hawk	*Accipiter cooperii*
American goshawk	*Accipiter atricapillus*
Red-tailed hawk	*Buteo jamaicensis*
Great horned owl	*Bubo virginianus*
California spotted owl	*Strix occidentalis occidentalis*
Belted kingfisher	*Megaceryle alcyon*
Red-breasted sapsucker	*Sphyrapicus ruber*
Downy woodpecker	*Dryobates pubescens*

Common Name	Scientific Name
Hairy woodpecker	*Dryobates villosus*
White-headed woodpecker	*Dryobates albolarvatus*
Northern flicker	*Colaptes auratus*
Pileated woodpecker	*Dryocopus pileatus*
American kestrel	*Falco sparverius*
Peregrine falcon	*Falco peregrinus*
Olive-sided flycatcher	*Contopus cooperi*
Western wood-pewee	*Contopus sordidulus*
Dusky flycatcher	*Empidonax oberholseri*
Western 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*
Mountain chickadee	*Poecile gambeli*
Tree swallow	*Tachycineta bicolor*
Violet-green swallow	*Tachycineta thalassina*
Northern rough-winged swallow	*Stelgidopteryx serripennis*
Barn swallow	*Hirundo rustica*
Bushtit	*Psaltriparus minimus*
Golden-crowned kinglet	*Regulus satrapa*
Red-breasted nuthatch	*Sitta canadensis*
White-breasted nuthatch	*Sitta carolinensis*
Brown creeper	*Certhia americana*
Rock wren	*Salpinctes obsoletus*
American dipper	*Cinclus mexicanus*
Mountain bluebird	*Sialia currucoides*
Townsend's solitaire	*Myadestes townsendi*
Hermit thrush	*Catharus guttatus*
American robin	*Turdus migratorius*
Evening grosbeak	*Coccothraustes vespertinus*

Common Name	Scientific Name
Purple finch	*Haemorhous purpureus*
Cassin's finch	*Haemorhous cassinii*
Pine siskin	*Spinus pinus*
Chipping sparrow	*Spizella passerina*
Fox sparrow	*Passerella iliaca*
Dark-eyed junco	*Junco hyemalis*
California towhee	*Melozone crissalis*
Rufous-crowned sparrow	*Aimophila ruficeps*
Green-tailed towhee	*Pipilo chlorurus*
Spotted towhee	*Pipilo maculatus*
Red-winged blackbird	*Agelaius phoeniceus*
Brown-headed cowbird	*Molothrus ater*
Brewer's blackbird	*Euphagus cyanocephalus*
Orange-crowned warbler	*Leiothlypis celata*
Nashville warbler	*Leiothlypis ruficapilla*
Macgillivray's warbler	*Geothlypis tolmiei*
Yellow warbler	*Setophaga petechia*
Yellow-rumped warbler	*Setophaga coronata*
Hermit warbler	*Setophaga occidentalis*
Wilson's warbler	*Cardellina pusilla*
Western tanager	*Piranga ludoviciana*
Black-headed grosbeak	*Pheucticus melanocephalus*

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APPENDIX F2

California Department of Fish and Wildlife
Bald Eagle Nesting Survey Forms

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STATE OF CALIFORNIA THE
RESOURCE AGENCY
DEPARTMENT OF FISH AND GAME

BALD EAGLE BREEDING SURVEY INSTRUCTIONS

The breeding season of bald eagles in California extends primarily from February through July. Each year cooperating agencies, organizations, and private individuals participate in a statewide monitoring program to document nesting activities at each nesting territory. In 1997, 160 recently active breeding territories were surveyed, and the number increases yearly.

Annual breeding season surveys are an important part of the population recovery effort. Survey information is used by resource agencies to aid breeding territory management or protection activities. Additionally, population status and trends must be monitored annually to provide the data needed for assessing population recovery.

Specific assignments and scheduling of observer time are usually handled at the agency district or regional office level. In general, agencies are responsible for surveys or territories on or near their own lands, with Department of Fish and Game also surveying on private lands. Field personnel should coordinate with other agencies or volunteers to avoid duplication of effort or to arrange for survey help.

The bald eagle breeding population is increasing annually. So, it is important that suspected new nesting territories be adequately checked, especially early in the breeding season.

Territories should be checked at least three times during the nesting season, although more frequent checking is preferred. Emphasis should be placed on checking during incubation and early nesting periods.

1. **Early March (early incubation)** – Territories in northern California should be checked in the first half of March, if possible, or as soon thereafter as road or weather conditions allow. The purpose of the first check is to determine whether a territory is occupied (record presence of adults, courtship behavior, evidence of nest repair or construction, incubation).
2. **Late April or early May (early nesting period)** – This check is needed to confirm that a territory is unoccupied, or if occupied in March, to determine whether the breeding pair is still tending the nest (incubating eggs or tending young nestlings).
3. **Mid-June (late nesting period)** – The main purpose of this check is to determine how many nestlings are approaching fledgling age.

Survey dates maybe modified from these recommended time periods if the territories can be checked more frequently or if particular breeding pairs are known to begin nesting especially early or late in the season.

We recommend that observers report the stage of development of nestlings in accordance with An Illustrated Guide for Identifying Developmental Stages of Bald Eagle Nestlings in the Field, by G.P. Carpenter (April 1990). This booklet is available from the San Francisco Zoological Society, Sloat Blvd. At the Pacific Ocean, San Francisco, CA 94132 (415-753-7080).

SUBMITTAL OF SURVEY FORMS

Please report observations on the **CALIFORNIA BALD EALGE NESTING TERRITORY FORM.** Please mail all

completed forms by September 1 of the survey year to:

California Department of Fish and Game
Wildlife Branch
1812 Ninth St.
Sacramento, CA 95814
ATTN: Shannon Skalos

Forms will be maintained in Department files and annual survey results will be compiled on the basis of these reports. If you have any questions, please contact Shannon Skalos at the above address or at sskalos@dfg.ca.gov. Electronic forms can be found at http://www.dfg.ca.gov/wildlife/nongame/survey_monitor.html.

California Department of Fish and Game
CALIFORNIA BALD EAGLE NESTING

TERRITORY SURVEY FORM

Territory Code: UVR

County: El Dorado **Survey Year:** 2024

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

Name (or general location of territory): Union Valley Reservoir

Name of nearest water body: Union Valley Reservoir

Location of Nest Site:

UTM E: 725334 **UTM N**: 4305602 **Zone:** 10S

No. of nests in territory - **Intact:** 1 **Remnant:** 0

Nest Tree: Species: Ponderosa Pine **Year Last Used:** 2023

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 ponderosa pine located NW of site #19 in Sunset Campground with nest in good condition.

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 (Time)	Observations/Notes
Cooper Walton Marissa Montjoy	03.20.24 (17:07 to 19:05)	**Early Breeding Season Survey:** • 17:07: No sign of BAEA at or in nest at Sunset Campground upon arrival, but down visible on exterior. • 18:25: Adult BAEA vocalizations heard in vicinity of nest. • 18:37–18:43: Repeated BAEA vocalizations coming from nest. • 18:47: Head and wing of adult BAEA visible above edge of nest suggesting incubation. • No recreational activity at campground or on reservoir; no BAEA disturbance observed.

Observers	Date (Time)	Observations/Notes
Cooper Walton Annabelle Howe	05.16.24 (9:20 to 11:13)	**Mid Breeding Season Survey:** • 09:20: Adult BAEA perched on branch adjacent to nest in Sunset Campground. Nest structure appeared to have minor structural alterations compared to early breeding season survey observations. • 09:26: Adult BAEA vocalization heard in distance. • 10:25: Adult BAEA (female) remained in perch adjacent to nest. BAEA nestling wings briefly visible above edge of nest. • 10:43: Adult BAEA (female) flew from nest to perch (sugar pine) at edge of water. • 11:13: BAEA nestling wings periodically visible over edge of nest. Female BAEA remained in perch (sugar pine). Sporadic adult BAEA vocalizations continued in distance. • Recreational activity low (3–5 fishing boats/personal crafts); road repairs with heavy equipment adjacent to Sunset Campground; no BAEA disturbance observed.
Camille Hymes Bethany Leach	06.04.24 (11:30 to 11:50)	**Additional Reproductive Status Check** • 11:30: BAEA nestling visible in nest. • 11:40: Adult BAEA flew E above nest tree through Sunset Campground toward Union Valley Boat Ramp. • 11:45: Second BAEA nestling visible in nest, both nestlings vocalizing.

Observers	Date (Time)	Observations/Notes
Cooper Walton Krista Orr Annabelle Howe	07.01.24 (20:15 to 23:00) 07.02.24 (04:45 to 16:30)	**<u>Late Breeding Season Survey</u>:** **<u>07.01.24</u>** • 20:15: Single BAEA juvenile visible on nest, periodically vocalizing. • 23:00: Adult BAEA vocalizing SW of nest in Sunset Campground, in vicinity of Fashoda Peninsula **<u>07.02.24</u>** • 04:45–5:45: Periodic juvenile BAEA juvenile vocalizations. • 06:00: Two juvenile BAEA present at nest tree – one in nest and one on branch ~15–20 feet below nest. • 06:30: Juvenile in nest relocated to adjacent branch. • 08:24: Adult BAEA landed on nest, both BAEA juveniles heard vocalizing – likely food delivery. • 06:00–11:30: BAEA juveniles remained in same locations, occasionally branching. • 11:30–15:30: Biologists surveyed other suitable BAEA nesting habitat on Union Valley Reservoir (including Camino Cove and Granlee's Point) from shoreline vantage points and boat; no additional evidence of BAEA nesting observed. • 15:30: Adult BAEA flying SE towards Jones Fork Campground. • 16:30: BAEA juveniles present in same locations in nest tree at Sunset Campground. • Recreational activity high – Sunset Campground full, but camping prohibited in sites adjacent to the nest tree and numerous boats on reservoir; no BAEA disturbance observed.
Annabelle Howe Marissa Montjoy	7.11.24 (09:40 to 10:20)	**<u>Additional Reproductive Status Check:</u>** • 09:40–10:20: No sign of either juvenile BAEA at nest or in nest tree at Sunset Campground, suggesting fledging. • 10:20: Juvenile BAEA flying S from shore of reservoir and landing in perch (ponderosa pine) near access trail to reservoir.

SUMMARY:

A. Successful Nestlings: 2 **No. of young known fledged:** 1 **or probably fledged:** 1

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

How many adults seen in the territory?

Was there evidence of nest repair or construction?

Were adults seen in the nest?

Were adults in incubating posture?

Number of nestlings observed?

Failed during incubation or nesting stage?

Other remarks: Successful nesting in 2016 and 2017 with two fledged juveniles in each year; failed attempt in 2018 (courtship and nesting building observed in early breeding season, but no activity during subsequent visits); failed attempts in years 2019–2022 (nest building and/or adult in incubation posture observed), but no subsequent reproductive activity recorded. Successful attempt in 2023 with two fledged juveniles.

Observer Contact Information:
Surveys conducted by Stillwater Sciences, contractors for the Sacramento Municipal Utility District. For additional information contact Darold Perry, SMUD Supervisor – Hydro License Implementation (Darold.Perry@smud.org).

STATE OF CALIFORNIA THE
RESOURCE AGENCY
DEPARTMENT OF FISH AND GAME

BALD EAGLE BREEDING SURVEY INSTRUCTIONS

The breeding season of bald eagles in California extends primarily from February through July. Each year cooperating agencies, organizations, and private individuals participate in a statewide monitoring program to document nesting activities at each nesting territory. In 1997, 160 recently active breeding territories were surveyed, and the number increases yearly.

Annual breeding season surveys are an important part of the population recovery effort. Survey information is used by resource agencies to aid breeding territory management or protection activities. Additionally, population status and trends must be monitored annually to provide the data needed for assessing population recovery.

Specific assignments and scheduling of observer time are usually handled at the agency district or regional office level. In general, agencies are responsible for surveys or territories on or near their own lands, with Department of Fish and Game also surveying on private lands. Field personnel should coordinate with other agencies or volunteers to avoid duplication of effort or to arrange for survey help.

The bald eagle breeding population is increasing annually. So, it is important that suspected new nesting territories be adequately checked, especially early in the breeding season.

Territories should be checked at least three times during the nesting season, although more frequent checking is preferred. Emphasis should be placed on checking during incubation and early nesting periods.

1. **Early March (early incubation)** – Territories in northern California should be checked in the first half of March, if possible, or as soon thereafter as road or weather conditions allow. The purpose of the first check is to determine whether a territory is occupied (record presence of adults, courtship behavior, evidence of nest repair or construction, incubation).
2. **Late April or early May (early nesting period)** – This check is needed to confirm that a territory is unoccupied, or if occupied in March, to determine whether the breeding pair is still tending the nest (incubating eggs or tending young nestlings).
3. **Mid-June (late nesting period)** – The main purpose of this check is to determine how many nestlings are approaching fledgling age.

Survey dates maybe modified from these recommended time periods if the territories can be checked more frequently or if particular breeding pairs are known to begin nesting especially early or late in the season.

We recommend that observers report the stage of development of nestlings in accordance with An Illustrated Guide for Identifying Developmental Stages of Bald Eagle Nestlings in the Field, by G.P. Carpenter (April 1990). This booklet is available from the San Francisco Zoological Society, Sloat Blvd. At the Pacific Ocean, San Francisco, CA 94132 (415-753-7080).

SUBMITTAL OF SURVEY FORMS

Please report observations on the **CALIFORNIA BALD EALGE NESTING TERRITORY FORM**. Please mail all

completed forms by September 1 of the survey year to:

California Department of Fish and Game
Wildlife Branch
1812 Ninth St.
Sacramento, CA 95814
ATTN: Shannon Skalos

Forms will be maintained in Department files and annual survey results will be compiled on the basis of these reports. If you have any questions, please contact Shannon Skalos at the above address or at sskalos@dfg.ca.gov. Electronic forms can be found at http://www.dfg.ca.gov/wildlife/nongame/survey_monitor.html.

California Department of Fish and Game
CALIFORNIA BALD EAGLE NESTING

TERRITORY SURVEY FORM

Territory Code: IHR

County: El Dorado **Survey Year:** 2024

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

Name (or general location of territory): Ice House Reservoir

Name of nearest water body: Ice House Reservoir

Location of Nest Site:

UTM E: 729950 **UTM N**: 4300602 **Zone:** 10S

No. of nests in territory - **Intact:** 1 **Remnant:** 0

Nest Tree: Species: Incense Cedar **Year Last Used:** 2023

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: Large incense cedar with broken top (nest just below the remaining snag).

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
Cooper Walton Marissa Montjoy	03.21.24 (07:25 to 11:15)	**Early Breeding Season Survey:** • 08:04: Adult BAEA (male) perched in Douglas fir along ridge E of Ice House Dam. • 08:16: Adult BAEA (male) departed perch, flew W across reservoir, and into trees on W shore. • 08:31: Adult BAEA (male) flying and eventually landing in new perch on peninsula E of Ice House Dam. • 08:37: Adult BAEA (male) flew SE from perch towards nest and out of sight. • 09:30–11:15: Biologists launched boat to survey from water and access S shore near nest tree. • 09:40: Adult BAEA (male) perched in incense cedar with snag-top NW of nest. • 09:50: Adult BAEA (female) visible on nest in incubation posture. Nest structure rebuilt following damage observed in 2023. • 09:45–10:45: Adult BAEA (male) relocated to three separate trees around nest before settling in previously documented perch (incense cedar) NW of nest. • No recreational activity at campgrounds or on reservoir and no BAEA disturbance observed.

Observers	Date	Observations/Notes
Cooper Walton Annabelle Howe	05.16.24 (07:25 to 08:30)	**<u>Mid Breeding Season Survey</u>:** • 07:25: Adult BAEA (female) perched on branch above nest. • 07:38: Adult BAEA (female) flew N across reservoir towards Northwind Campground. Adult BAEA (male) also observed in vicinity, repeatedly diving towards water. CORA harassing pair. • 07:40: Adult BAEA (female) landed in perch (ponderosa pine) near Northwind Campground. • 07:41: Adult BAEA (male) captured gosling and flew S across reservoir to stump on shoreline to pluck prey. • 07:46: Adult BAEA (male) departed plucking post and delivered food to nest. • 07:47: Adult BAEA (female) joined male on nest. • 07:48: Adult BAEA (male) fed BAEA nestling. Adult BAEA (female) flew N across reservoir and out of sight. • 08:30: Adult BAEA (male) remained in nest feeding BAEA nestling. • No recreational activity at campgrounds or on reservoir and no BAEA disturbance observed.
Camille Hymes Bethany Leach	06.04.24 (10:15 to 10:25)	**<u>Additional Reproductive Status Check</u>:** • 10:15: Adult and nestling BAEA both visible in nest. • 10:20: Adult feeding BAEA nestling.

Observers	Date	Observations/Notes
Cooper Walton Krista Orr Annabelle Howe	07.01.24 (18:45 to 20:45) 07.02.24 (09:00 to 13:30)	**Late Season Breeding Survey:** **07.01.24** • 18:50: Juvenile BAEA perched above nest. • 18:55: Adult BAEA perched in ponderosa pine E of nest tree. • 18:58: Juvenile BAEA flapping wings and branching. • 19:10: Adult BAEA flew from perch and landed in incense cedar along shore N of nest tree. • 20:46: Juvenile BAEA settled into nest to roost. Adult BAEA remained on perch. **07.02.24** • 09:00: Juvenile BAEA perched on nest. • 10:00: Biologists launched boat to observe nest from S shore of reservoir. • 10:15: Adult BAEA flew W over south shore towards Ice House Dam. • 10:50–13:30: Juvenile BAEA perched on branch adjacent to nest, flapping wings and occasionally vocalizing. Juvenile appeared healthy and close to fledging. • Recreational activity moderate (approximately 5 fishing boats, several SUPs, and many swimmers on north shore); no BAEA disturbance observed.

SUMMARY:

A. Successful Nestlings: 1 No. of young known fledged: 1 or probably fledged: 0

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

How many adults seen in the territory?

Was there evidence of nest repair or construction?

Were adults seen in the nest?

Were adults in incubating posture?

Number of nestlings observed?

Failed during incubation or nesting stage?

Other remarks: Nest initially observed in 2022 with successful nesting (one fledged juvenile). Nesting attempt initiated in 2023, before nest structure was severely damaged and attempt was abandoned.

Observer Contact Information:
Surveys conducted by Stillwater Sciences, contractors for the Sacramento Municipal Utility District (SMUD). For additional information contact Darold Perry, SMUD Hydro License Implementation Supervisor at Darold.Perry@smud.org.

APPENDIX G1

Foothill Yellow-Legged Frog Photographs

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Figure G1-1. Adult male (49 mm) (left) and individual in habitat (right), Site CD-A3, 21 August 2024.



Figure G1-2. Tadpole (41 mm) (left) and habitat (right), Site CD-A3, 21 August 2024.



Figure G1-3. Tadpole (52 mm), Site CD-A3, 24 September 2024.



Figure G1-4. Adult female (75 mm) (left) and habitat (right), Site CD-A4, 11 June 2024.



Figure G1-5. Adult male (37 mm) (left) and individual in habitat (right), Site CD-A4, 11 June 2024.



Figure G1-6. Adult female (56 mm) (left) and individual in habitat (right), Site CD-A4, 16 July 2024.



Figure G1-7. Sub-adult (32 mm) (left) and individual in habitat (right), Site CD-A4, 16 July 2024.



Figure G1-8. Sub-adult (40 mm) (recapture from 16 July survey), Site CD-A4, 24 September 2024.

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APPENDIX G2

Western Pond Turtle Photographs at Site SCD-A1

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Figure G2-1. Adult male (142 mm) (left) and habitat (right), 12 June 2024.



Figure G2-2. Adult female (135 mm) (left) and habitat (right), 12 June 2024.



Figure G2-3. Adult female (137 mm) (left) and habitat (right), 17 July 2024.



Figure G2-4. Adult male (130 mm) (left) and habitat (right), 17 July 2024.



Figure G2-5. Adult female (141 mm), 20 August 2024.



Figure G2-6. Adult female (144 mm) (left) and habitat (right), 20 August 2024.



Figure G2-7. Adult male (171 mm) (left) and habitat (right), 20 August 2024.



Figure G2-8. Adult female (135 mm), 25 September 2024.



Figure G2-9. Adult male (120 mm), 25 September 2024.



Figure G2-10. Adult male (154 mm) (left) and upland habitat at observation (right), 25 September 2024.

APPENDIX G3

Representative Habitat Photographs

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Figure G3-1. Riffle and braided side-channel habitat with Indian rhubarb and sedge, looking upstream, Site JD-A15, 15 July 2024.



Figure G3-2. Long run habitat, looking upstream, Site JD-A15, 10 June 2024.



Figure G3-3. Backwater pool habitat, looking upstream, Site JD-A15, 10 June 2024.



Figure G3-4. Run habitat and bedrock banks with willow and alder on margins, looking downstream, Site CD-A3, 11 June 2024.



Figure G3-5. Shallow edgewater pool habitat, Site CD-A3, 21 August 2024.



Figure G3-6. Run habitat and bedrock banks, looking downstream, Site CD-A3, 11 June 2024.



Figure G3-7. Glide habitat, looking upstream, Site CD-A4, 11 June 2024.



Figure G3-8. Braided channel habitat and riparian vegetation, looking upstream, Site CD-A4, 16 July 2024.



Figure G3-9. Backwater habitat with alder and sedge, Site CD-A4, 22 August 2024.



Figure G3-10. Cobble bar habitat, looking downstream, Site SCD-A1, 12 June 2024.



Figure G3-11. Deep, slow-moving pool habitat, Site SCD-A1, 12 June 2024.



Figure G3-12. Braided backwater habitat with sedge, looking downstream, Site SCD-A1, 20 August 2024.

APPENDIX G4

Incidental Species Photographs

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Figure G4-1. Sierra newts (left) and egg mass (right), Site JD-A15, 10 June 2024.



Figure G4-2. Sierra garter snake, Site CD-A3, 11 June 2024.



Figure G4-3. Common garter snake, Site CD-A3, 21 August 2024.



Figure G4-4. Young-of-year Sierran treefrog (left) (17 July) and California toad (right) (12 June), Site SCD-A1, 2024.



Figure G4-5. American bullfrog tadpole (left) (17 July) and juvenile (right) (24 September), Site SCD-A1, 2024.

APPENDIX H

Comparison of Sierra Nevada Yellow-Legged Frog Monitoring Site Photo Points

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Rubicon Reservoir Inlet (Site RUB-A1)

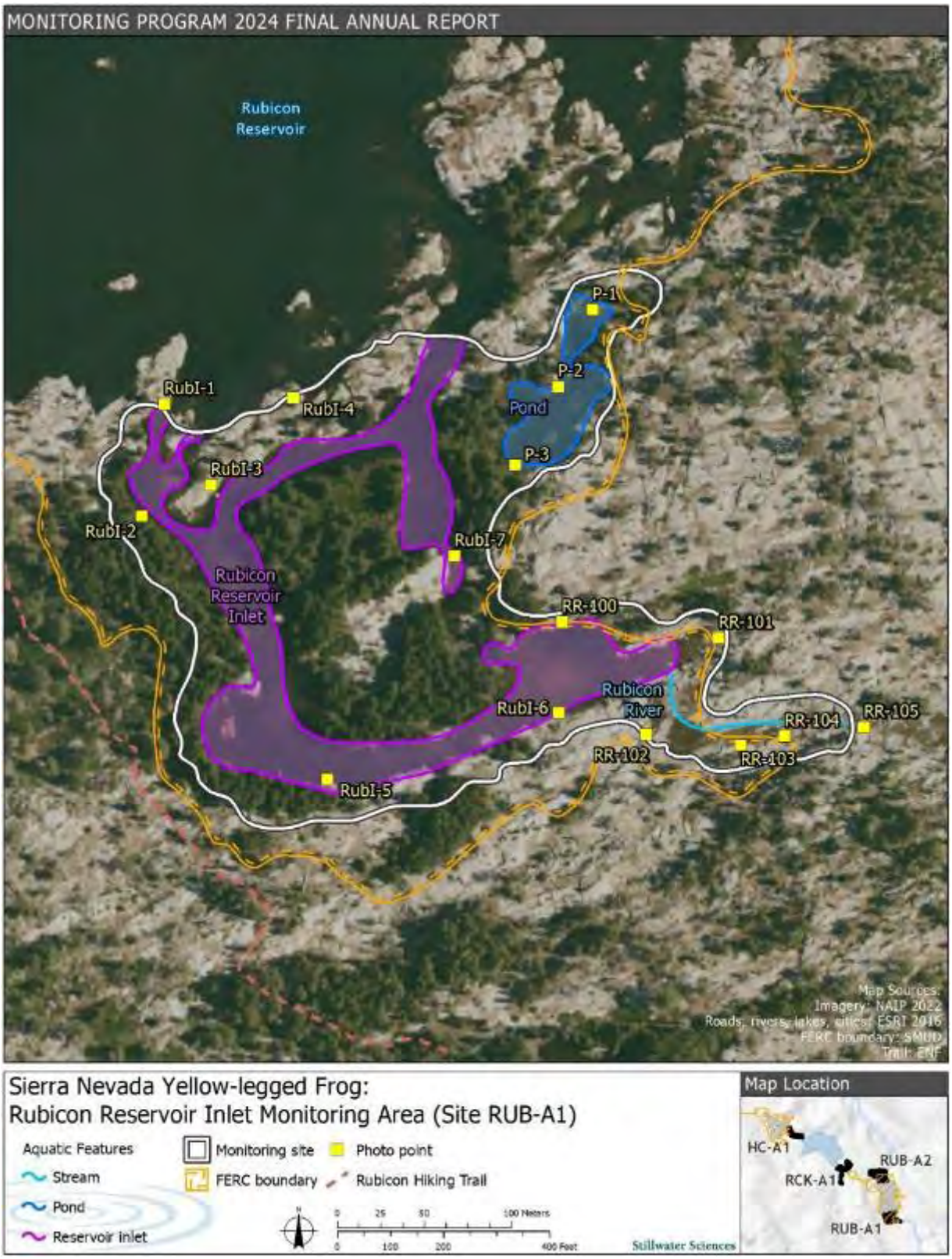


Figure H-1. Photo points at the Rubicon Reservoir Inlet Monitoring Site (Site RUB-A1), 2024.



Figure H-2. Photo Point RubI-1 (U/S), August 2019 (left) and 2024 (right).



Figure H-3. Photo Point RubI-1 (D/S), September 2019 (left) and 2024 (right).



Figure H-4. Photo Point RubI-2, July 2019 (left) and 2024 (right).



Figure H-5. Photo Point RubI-3 (U/S), August 2019 (left) and 2024 (right).



Figure H-6. Photo Point RubI-3 (D/S), July 2019 (left) and 2024 (right)



Figure H-7. Photo Point RubI-4, September 2019 (left) and 2024 (right).

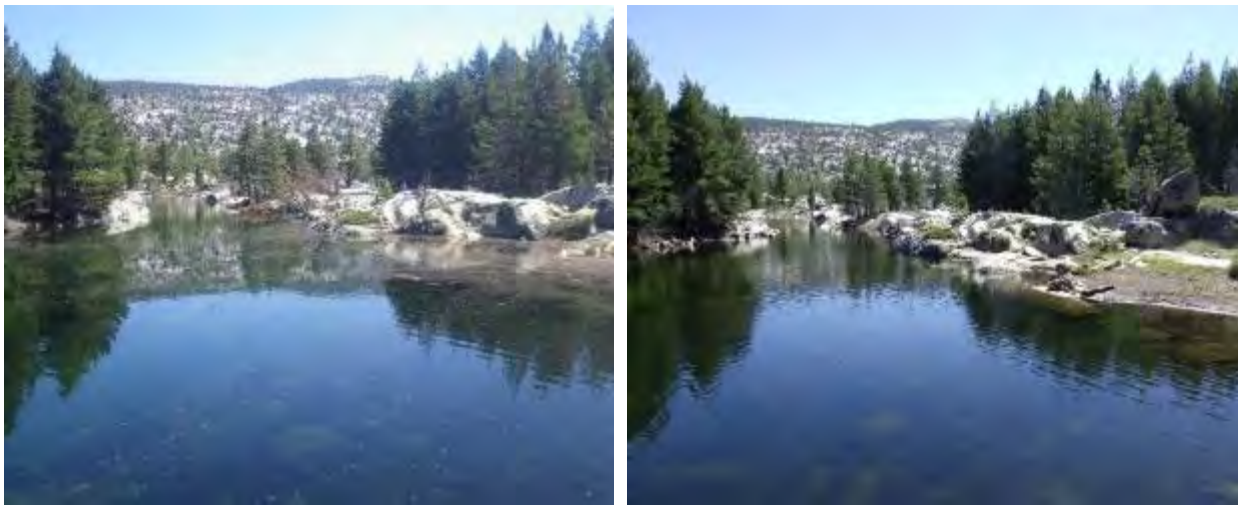


Figure H-8. Photo Point RubI-5 (U/S), August 2019 (left) and 2024 (right).

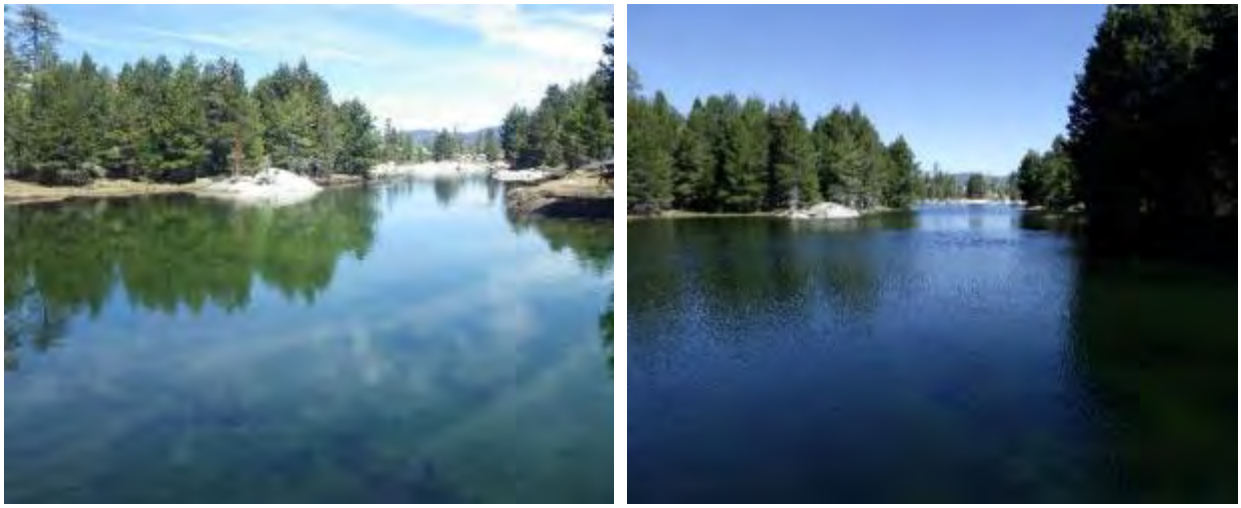


Figure H-9. Photo Point RubI-5 (D/S), July 2019 (left) and 2024 (right).



Figure H-10. Photo Point RubI-6 (U/S), August 2019 (left) and 2024 (right).



Figure H-11. Photo Point RubI-6 (D/S), September 2019 (left) and 2024 (right).



Figure H-12. Photo Point RubI-6 (ACR), July 2019 (left) and 2024 (right)



Figure H-13. Photo Point RubI-7 (D/S), September 2019 (left) and 2024 (right).



Figure H-14. Photo Point RR-100 (U/S), September 2019 (left) and 2024 (right).



Figure H-15. Photo Point RR-100 (D/S), August 2019 (left) and 2024 (right).



Figure H-16. Photo Point RR-101, August 2019 (left) and 2024 (right).



Figure H-17. Photo Point RR-102 (U/S), July 2019 (left) and 2024 (right).



Figure H-18. Photo Point RR-103 (D/S), August 2019 (left) and 2024 (right)



Figure H-19. Photo Point RR-104 (U/S), September 2019 (left) and 2024 (right).



Figure H-20. Photo Point RR-105 (U/S), August 2019 (left) and 2024 (right).



Figure H-21. Photo Point RR-105 (D/S), July 2019 (left) and 2024 (right).



Figure H-22. Photo Point P-1, July 2019 (left) and 2024 (right).



Figure H-23. Photo Point P-2, August 2019 (left) and 2024 (right).



Figure H-24. Photo Point P-3, September 2019 (left) and 2024 (right).

Rubicon Reservoir Outlet (Site RUB-A2)



Figure H-25. Photo points at the Rubicon Reservoir Outlet Monitoring Site (Site RUB-A2), 2024



Figure H-26. Photo Point RR-1 (U/S), July 2019 (left) and 2024 (right).



Figure H-27. Photo Point RR-1 (D/S), August 2019 (left) and 2024 (right).

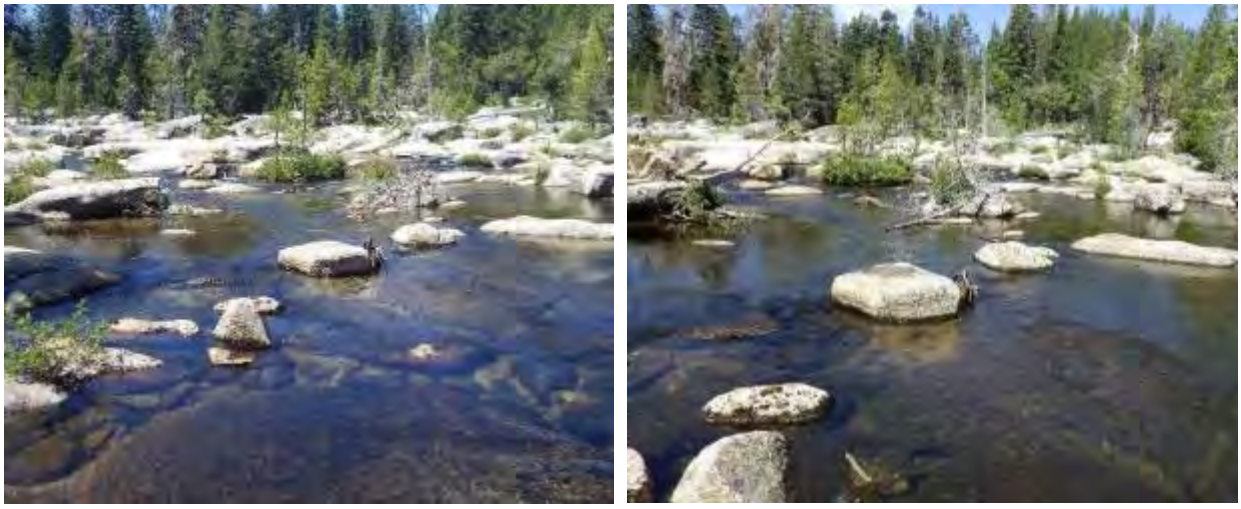


Figure H-28. Photo Point RR-2 (U/S), August 2019 (left) and 2024 (right).



Figure H-29. Photo Point RR-3 (U/S), July 2019 (left) and 2024 (right).



Figure H-30. Photo Point RR-4, September 2019 (left) and 2024 (right).

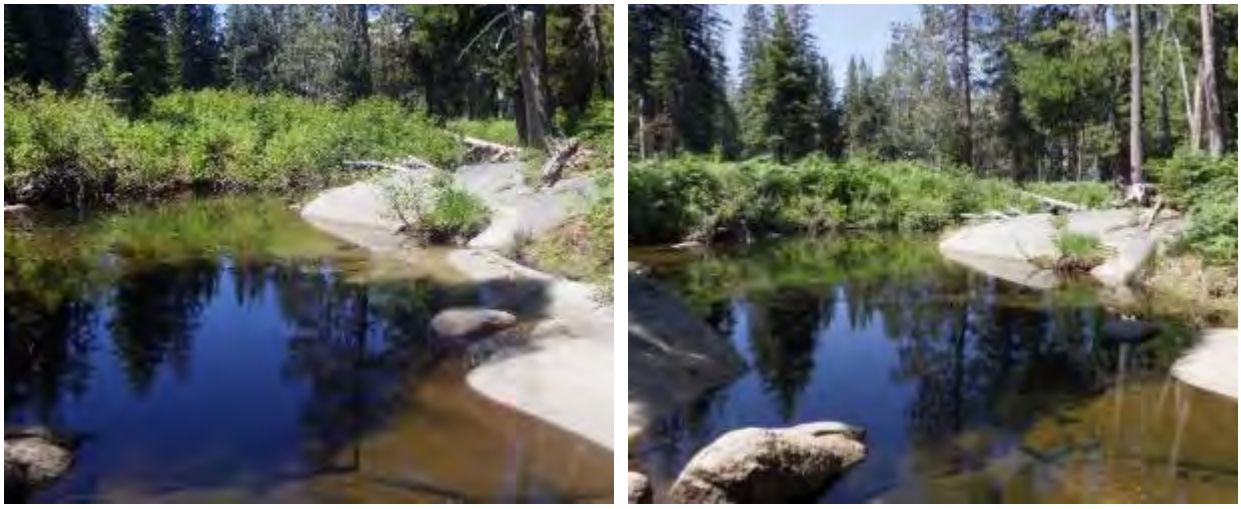


Figure H-31. Photo Point RR-4, July 2019 (left) and 2024 (right).



Figure H-32. Photo Point RR-6 (U/S), August 2019 (left) and 2024 (right).



Figure H-33. Photo Point RR-6 (D/S), September 2019 (left) and 2024 (right).



Figure H-34. Photo Point RR-7 (U/S), July 2019 (left) and 2024 (right).



Figure H-35. Photo Point RR-7 (D/S), August 2019 (left) and 2024 (right).

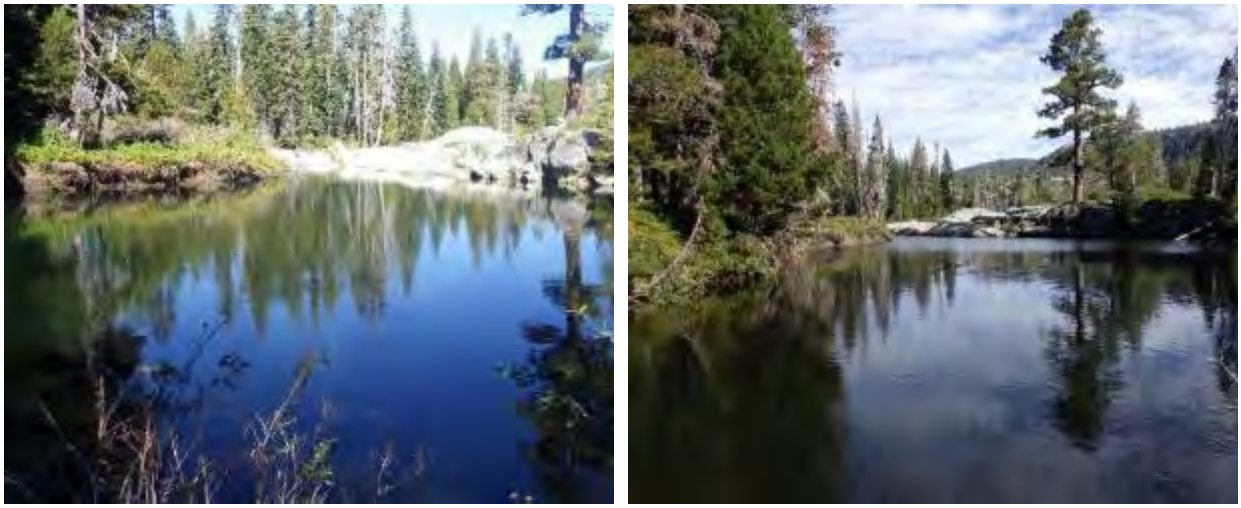


Figure H-36. Photo Point RR-8 (D/S), September 2019 (left) and 2024 (right).



Figure H-37. Photo Point DS-1 (U/S), August 2019 (left) and 2024 (right).



Figure H-38. Photo Point DS-3, August 2019 (left) and 2024 (right).



Figure H-39. Photo Point DS-4, September 2019 (left) and 2024 (right).



Figure H-40. Photo Point DS-5 (U/S), September 2019 (left) and 2024 (right).



Figure H-41. Photo Point DS-5 (D/S), July 2019 (left) and 2024 (right).



Figure H-42. Photo Point PE-1, August 2019 (left) and 2024 (right).

Rockbound Lake Outlet (Site RCK-A1)

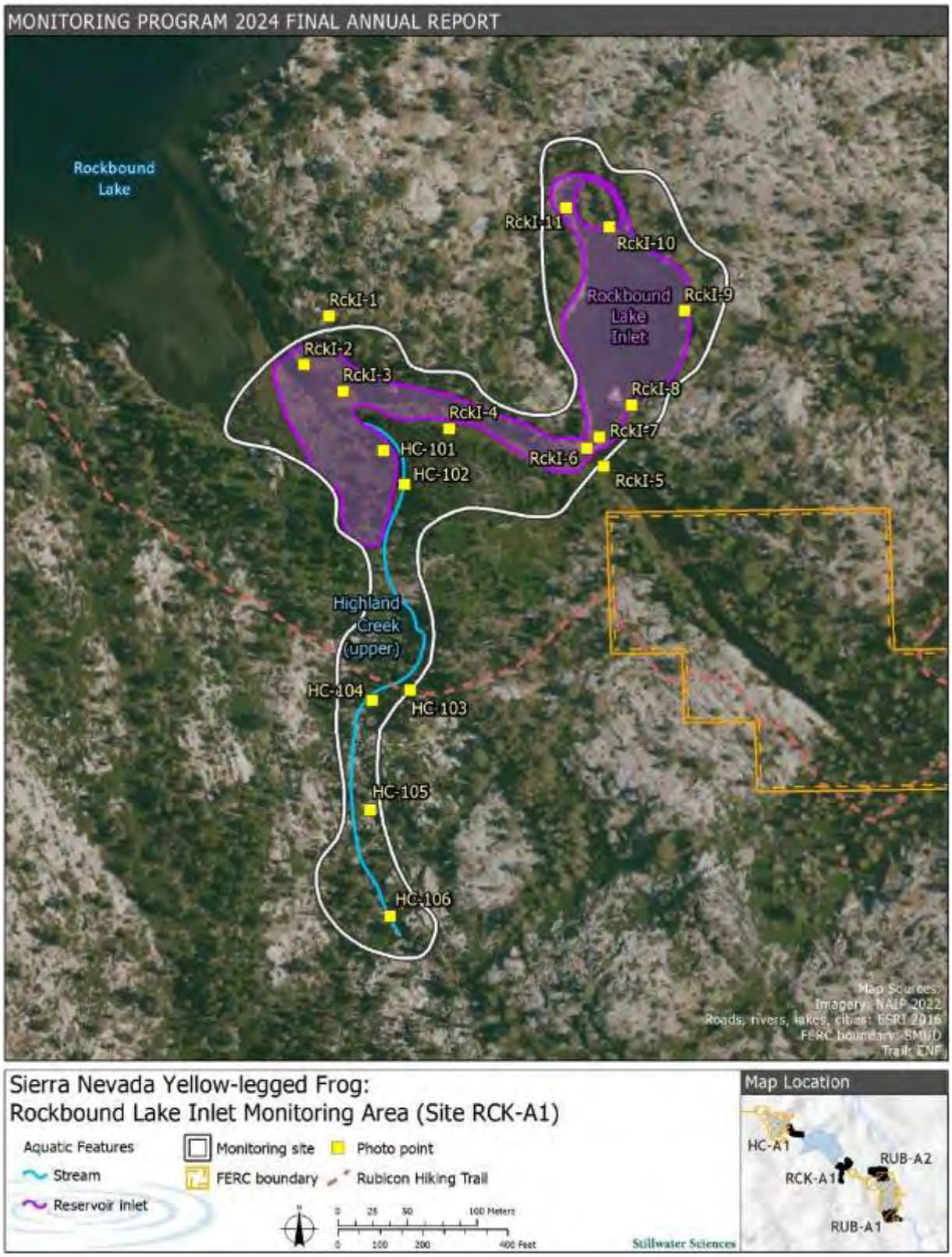


Figure H-43. Photo points at the Rockbound Lake Inlet Monitoring Site (Site RCK-A1), 2024



Figure H-44. Photo Point RckI-1 (U/S), September 2019 (left) and 2024 (right).



Figure H-45. Photo Point RckI-1 (D/S), July 2019 (left) and 2024 (right).



Figure H-46. Photo Point RckI-2 (U/S), September 2019 (left) and 2024 (right).



Figure H-47. Photo Point RckI-2 (ACR), August 2019 (left) and 2024 (right).



Figure H-48. Photo Point RckI-2 (D/S), September 2019 (left) and 2024 (right).



Figure H-49. Photo Point RckI-3 (U/S), September 2019 (left) and 2024 (right).



Figure H-50. Photo Point RckI-3 (D/S), August 2019 (left) and 2024 (right).



Figure H-51. Photo Point RckI-4 (U/S), August 2019 (left) and 2024 (right).



Figure H-52. Photo Point RckI-4 (D/S), July 2019 (left) and 2024 (right).

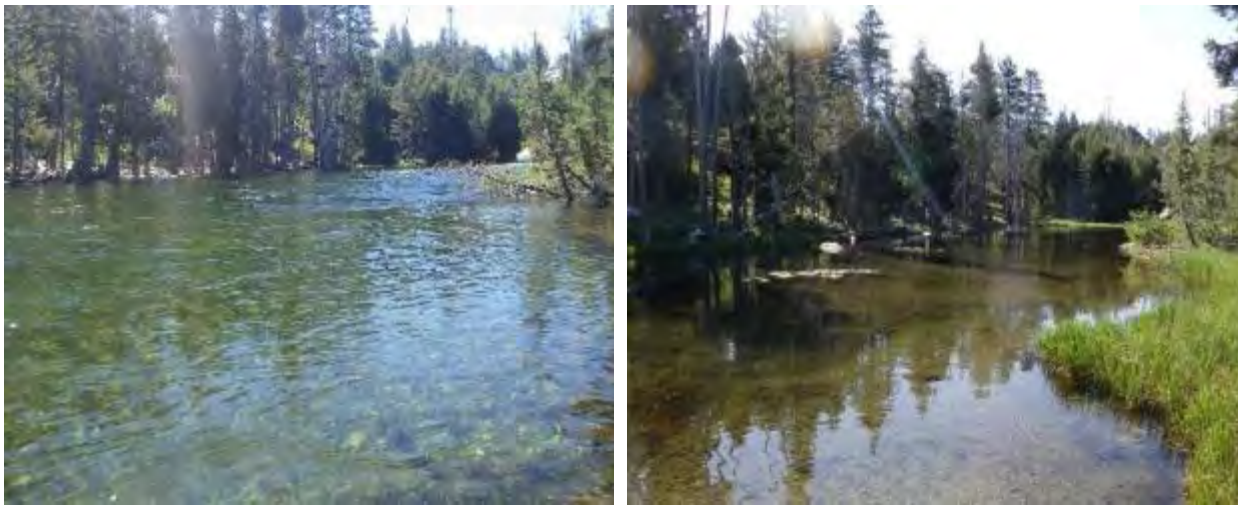


Figure H-53. Photo Point RckI-5 (U/S), July 2019 (left) and 2024 (right).



Figure H-54. Photo Point RckI-5 (D/S), September 2019 (left) and 2024 (right).



Figure H-55. Photo Point RckI-6 (U/S), August 2019 (left) and 2024 (right).



Figure H-56. Photo Point RckI-7, July 2019 (left) and 2024 (right).



Figure H-57. Photo Point RckI-8, September 2019 (left) and 2024 (right).



Figure H-58. Photo Point RckI-9, August 2019 (left) and 2024 (right).

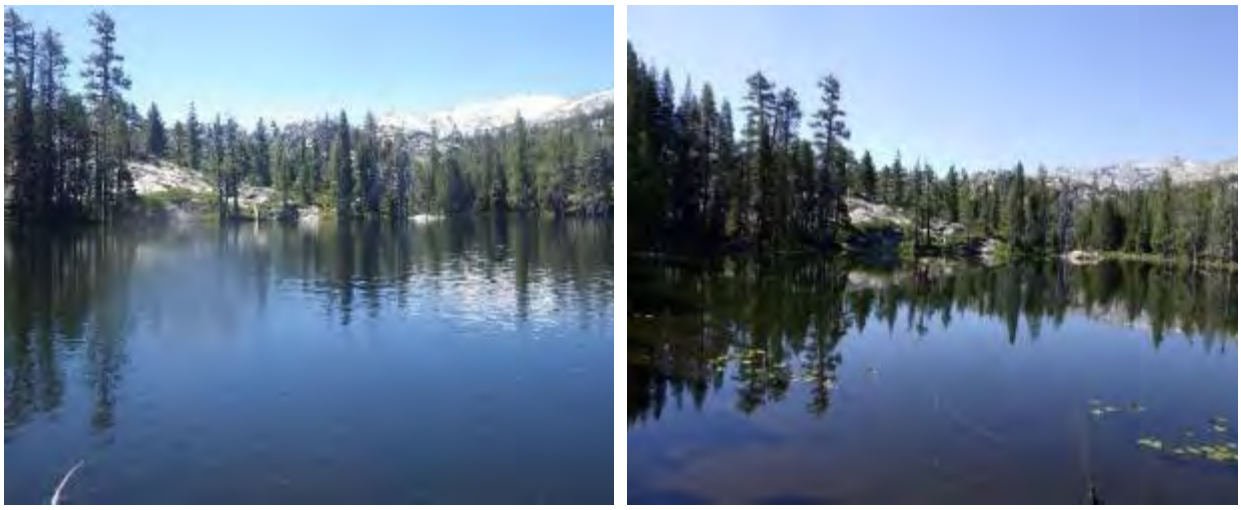


Figure H-59. Photo Point RckI-10 (U/S), July 2019 (left) and 2024 (right).



Figure H-60. Photo Point RckI-10 (D/S), August 2019 (left) and 2024 (right).



Figure H-61. Photo Point RckI-11 (U/S), August 2019 (left) and 2024 (right).



Figure H-62. Photo Point RckI-11 (ACR), July 2019 (left) and 2024 (right).



Figure H-63. Photo Point RckI-11 (D/S), September 2019 (left) and 2024 (right).



Figure H-64. Photo Point HC-101 (U/S), July 2019 (left) and 2024 (right).



Figure H-65. Photo Point HC-101 (D/S), September 2019 (left) and 2024 (right).



Figure H-66. Photo Point HC-102, August 2019 (left) and 2024 (right).



Figure H-67. Photo Point HC-103 (U/S), July 2019 (left) and 2024 (right).



Figure H-68. Photo Point HC-103 (D/S), September 2019 (left) and 2024 (right).



Figure H-69. Photo Point HC-104, August 2019 (left) and 2024 (right).



Figure H-70. Photo Point HC-105, July 2019 (left) and 2024 (right).



Figure H-71. Photo Point HC-106 (U/S), July 2019 (left) and 2024 (right).

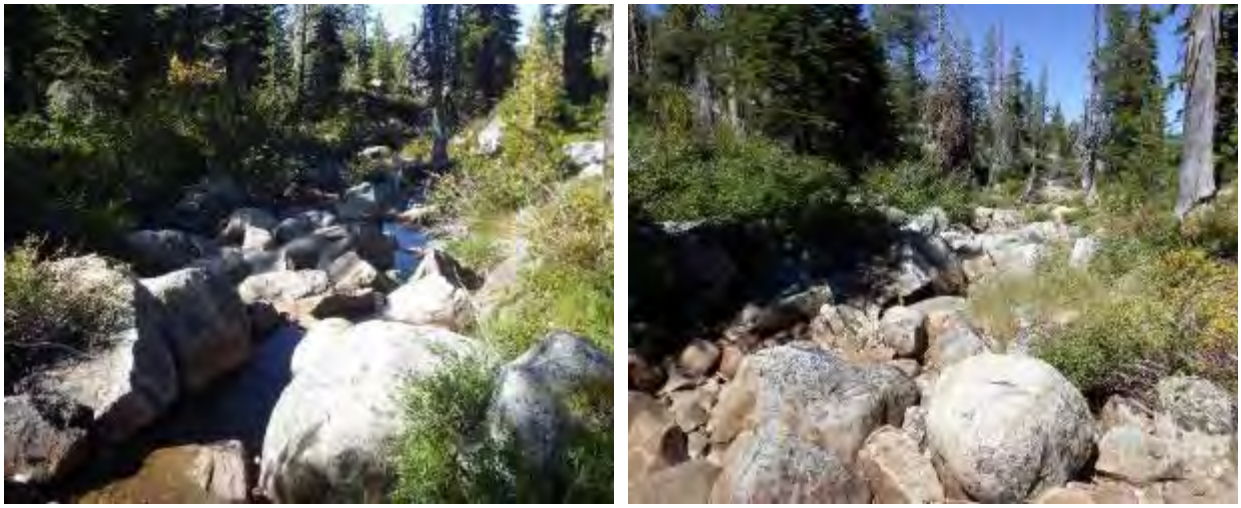


Figure H-72. Photo Point HC-106 (D/S), September 2019 (left) and 2024 (right).

Highland Creek (Site HC-A1)



Figure H-73. Photo points at the Highland Creek Monitoring Site (Site HC-A1), 2024.



Note: Photo point was moved to capture the stream condition.

Figure H-74. Photo Point HC-1, September 2019 (left) and 2024 (right).



Figure H-75. Photo Point HC-2, July 2019 (left) and 2024 (right).



Figure H-76. Photo Point HC-3 (U/S), August 2019 (left) and 2024 (right).



Figure H-77. Photo Point HC-3 (D/S), September 2019 (left) and 2024 (right).



Figure H-78. Photo Point HC-4, July 2019 (left) and 2024 (right).



Figure H-79. Photo Point HC-5 (U/S), August 2019 (left) and 2024 (right).



Figure H-80. Photo Point HC-5 (D/S), September 2019 (left) and 2024 (right).



Figure H-81. Photo Point HC-6, August 2019 (left) and 2024 (right).



Figure H-82. Photo Point HC-7 (U/S), July 2019 (left) and 2024 (right).



Figure H-83. Photo Point HC-7 (D/S), August 2019 (left) and 2024 (right).



Figure H-84. Photo Point HC-8, August 2019 (left) and 2024 (right).



Figure H-85. Photo Point HC-9 (U/S), September 2019 (left) and 2024 (right).



Figure H-86. Photo Point HC-9 (D/S), August 2019 (left) and 2024 (right).

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APPENDIX I1

Bear Encounter Forms

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For office use only:

Report collected by: _____ (USFS/camp host)

Date: _____

Notes: _____

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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.

1. Person(s) involved:

Name: [redacted]

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 + Small dog
(number of people who encountered the bear)

5. Time of encounter: Month: 07 Day: 16 Year: 24 Time: 2-3 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 _____

7. Number and description of bears (how many, what color, size, adult or cub, sex?):
700lb Mama Black Bear + Cub

8. What was the bear doing when you first saw it?
Walking around site. Opened Beverage ice Chest

9. Did you react to the bear?
Yelled & Flashlight

10. How did the bear react to your response?
Ran away. Came back 2x's

11. Was human food present?

a. Some food/trash NOT in bear resistant container
b. All food/trash in bear resistant container
c. No food present/odor only
d. Food hung in tree
e. Some food in vehicle
f. Unknown

12. Did the bear eat any human food?

a. No
b. Yes (what?) _____
c. Unknown

13. Did the bear damage property?

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

14. Did the bear(s) harm anyone?

a. No
b. Yes* (describe) _____

15. Details of bear-human interaction (optional):
Comments: Need larger Bear Boxes

*** 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.**



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For office use only:

Report collected by: _____ (USFS/camp host)

Date: _____

Notes: _____

_____

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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.

1. Person(s) involved:

Name: [redacted]

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: 8

(number of people who encountered the bear)

5. Time of encounter: Month: 7 Day: 15 Year: 24 Time: 7:00 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?):

N/A - Did not see it

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

Did not see it. Just heard the campsite next to us screaming of the bear.

9. Did you react to the bear?

No Reaction

10. How did the bear react to your response?

N/A

11. Was human food present?

a. Some food/trash NOT in bear resistant container
b. All food/trash in bear resistant container
c. No food present/odor only
d. Food hung in tree
e. Some food in vehicle
f. Unknown

12. Did the bear eat any human food?

a. No
b. Yes (what?) _____
c. Unknown

13. Did the bear damage property?

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

14. Did the bear(s) harm anyone?

a. No
b. Yes* (describe) _____

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

*** 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.**



For office use only:

Report collected by: _____ (USFS/camp host)

Date: _____

Notes: _____

_____



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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.

1. Person(s) involved:

Name: [redacted] _____

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: 4
(number of people who encountered the bear)

5. Time of encounter: Month: 7/15/24 Day: ____ Year: ____ Time: approx. 0100 to 0300 (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

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

didn't see

9. Did you react to the bear?

Shouted

10. How did the bear react to your response?

Ran away

11. Was human food present?

a. Some food/trash NOT in bear resistant container
b. All food/trash in bear resistant container
c. No food present/odor only
d. Food hung in tree
e. Some food in vehicle
f. Unknown

12. Did the bear eat any human food?

a. No
b. Yes (what?) _____
c. Unknown

13. Did the bear damage property?

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

14. Did the bear(s) harm anyone?

a. No
b. Yes* (describe) _____

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

*** 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.**



Sunset 3 ✓

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.*

1. Person(s) involved:

Name: [redacted]

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: 20
(number of people who encountered the bear)

5. Time of encounter: Month: 7 Day: 24 Year: 24 Time: 1:30 am/pm

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Report collected by: _____ (USFS/camp host)

Date: _____

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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?):

Adult, Brown. 1 Big not Small. Male

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

Breaking in to cooler

9. Did you react to the bear?

yes with car alarm

10. How did the bear react to your response?

moved but didnt leave

11. Was human food present?

a. Some food/trash NOT in bear resistant container
b. All food/trash in bear resistant container
c. No food present/ordor only
d. Food hung in tree
e. Some food in vehicle
f. Unknown

12. Did the bear eat any human food?

a. No b. Yes (what?) cookies, watermelon, milk, cucumbers....
c. Unknown

13. Did the bear damage property?

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

14. Did the bear(s) harm anyone?

a. No b. Yes* (describe) _____

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

Went up to tent and pushed up on the doorway interacting with my feet.

* 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.

Sing ~~t~~ 3

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.*

1. Person(s) involved:

Name: [redacted]

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: 24 Year: 2024 Time: 2:00 am/pm

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Report collected by: _____ (USFS/camp host)

Date: _____

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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 Union Valley Sunset #89

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

1, medium

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

Getting into my cooler

9. Did you react to the bear?

Shined a flash light and it ran

10. How did the bear react to your response?

Yelled

11. Was human food present?

(a.) Some food/trash NOT in bear resistant container
b. All food/trash in bear resistant container
c. No food present/ordor only
d. Food hung in tree
e. Some food in vehicle
f. Unknown

12. Did the bear eat any human food?

a. No (b.) Yes (what?) Yogart
c. Unknown

13. Did the bear damage property?

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

14. Did the bear(s) harm anyone?

~~a.~~ No b. Yes* (describe)

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

* 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.

Sunset 3 ✓

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.

1. Person(s) involved:

Name: [redacted]

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: 4
(number of people who encountered the bear)

5. Time of encounter: Month: 7 Day: 24 Year: 2024 Time: 1:11-5 (am)/pm

(Site - 104)

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For office use only:

Report collected by: _____ (USFS/camp host)

Date: _____

Notes: _____

_____

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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?):

2 bears, adult, brown, sex - unknown

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

Roaming the campsite by the container, then approx. next to our tent.

9. Did you react to the bear?

turned panic button on of car.

10. How did the bear react to your response?

looked at the car then left.

11. Was human food present?

a. Some food/trash NOT in bear resistant container
b. All food/trash in bear resistant container
c. No food present/odor only
d. Food hung in tree
e. Some food in vehicle
f. Unknown

12. Did the bear eat any human food?

a. No
b. Yes (what?) _____
c. Unknown

13. Did the bear damage property?

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

14. Did the bear(s) harm anyone?

a. No
b. Yes* (describe) _____

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

_____

_____

_____

*** 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.**





For office use only:

Report collected by: _____ (USFS/camp host)

Date: _____

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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.*

1. Person(s) involved:

Name: [redacted]

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: 10
(number of people who encountered the bear)

5. Time of encounter: Month: 07 Day: 12 Year: 2024 Time: 12:40 (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 bear

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

going towards cooler

9. Did you react to the bear?

Yes, slowly moved into tent

10. How did the bear react to your response?

Stared at me and continued agressively attacking the cooler.

11. Was human food present?

(a.) Some food/trash NOT in bear resistant container
(b. All food/trash in bear resistant container)
c. No food present/ordor only
d. Food hung in tree
e. Some food in vehicle
f. Unknown

12. Did the bear eat any human food?

a. No (b. Yes (what?) cheese, eggs, flour tortilla
c. Unknown

13. Did the bear damage property?

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

14. Did the bear(s) harm anyone?

(a. No) b. Yes* (describe) _____

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

Heard and saw bear approach cooler by bear box slowly retrieved to tent. Remained in tents silent until we made our car alarms go off. The bear returned and we continued the car alarms until it left.

* 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.



For office use only:

Report collected by: Katie Ring (USFS/camp host)

Date: 7-9-24

Notes: Sunset 1 E. Fashoda



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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.

1. Person(s) involved:

Name: [redacted]

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: 5
(number of people who encountered the bear)

5. Time of encounter: Month: 7 Day: 9 Year: 2024 Time: 11:00 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?):

didn't see bear - i did hear it

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

n/a

9. Did you react to the bear?

no

10. How did the bear react to your response?

bear didn't react to us

11. Was human food present?

(a) Some food/trash NOT in bear resistant container
b. All food/trash in bear resistant container
c. No food present/odor only
d. Food hung in tree
e. Some food in vehicle
f. Unknown

12. Did the bear eat any human food?

a. No
(b.) Yes (what?) lunch meat, cheese, butter, ketchup, hotdog hamburger meat, bacon,
c. Unknown

13. Did the bear damage property?

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

14. Did the bear(s) harm anyone?

(a.) No
b. Yes* (describe) _____

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

*** 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.**



KEEP ME WILD

For office use only:

Report collected by: Katie Rung (USFS/camp host)

Date: 7-10-24

Notes: Sunset 1 & Fosheda

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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.

1. Person(s) involved:

Name: [redacted]

2. Describe yourself:

a. Visitor

b. Camp host

c. USFS employee

d. Contractor

e. Other A

3. Visitor activity:

a. Camping – developed campground

b. Camping – undeveloped campsite/wilderness

c. Day use area

d. Hiking on maintained trail

e. Other A

4. Group size: 3
(number of people who encountered the bear)

5. Time of encounter: Month: 07 Day: 10 Year: 2024 Time: 2:45A = 3:30 (am)/pm AM

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 F

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

8. What was the bear doing when you first saw it?
We did not see the bear, only heard him in others ice chests and walked past our tent.

9. Did you react to the bear?
No, we stayed silent.

10. How did the bear react to your response?
N/A

11. Was human food present?
a. Some food/trash NOT in bear resistant container
b. All food/trash in bear resistant container
c. No food present/odor only
d. Food hung in tree
e. Some food in vehicle
f. Unknown

12. Did the bear eat any human food?
a. No
b. Yes (what?) _____
c. Unknown

13. Did the bear damage property?
a. No
b. Yes (list property and estimate costs) Not aws

14. Did the bear(s) harm anyone?
a. No
b. Yes* (describe) unknown

15. Details of bear-human interaction (optional):
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.**





For office use only:

Report collected by: Katie Ruiz (USFS/camp host)

Date: 7-10-24

Notes: Sunset 1 & Fastoola



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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.

1. Person(s) involved:

Name: [redacted]

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: 10 Year: 24 Time: 12:00 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-Female Cinammonbear + 1-cub

8. What was the bear doing when you first saw it?
It went by our tent

9. Did you react to the bear?
no

10. How did the bear react to your response?
Nonit

11. Was human food present?

a. Some food/trash NOT in bear resistant container
b. All food/trash in bear resistant container
c. No food present/odor only
d. Food hung in tree
e. Some food in vehicle
f. Unknown

12. Did the bear eat any human food?

a. No
b. Yes (what?) _____
c. Unknown

13. Did the bear damage property?

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

14. Did the bear(s) harm anyone?

a. No
b. Yes* (describe) _____

15. Details of bear-human interaction (optional):
She just walked by with her cub

*** 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.**



KEEP ME WILD

For office use only:

Report collected by: Katie Prinz (USFS/camp host)

Date: 7-9-24

Notes: Sunset 1 & Fashoda

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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.

1. Person(s) involved:

Name: [redacted]

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: July Day: 9 Year: 24 Time: 10:30 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 #7
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 Brown Adult Size of Bear Container

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

_____

_____

9. Did you react to the bear?
Shined Flashlight

10. How did the bear react to your response?
walked away

11. Was human food present?

a. Some food/trash NOT in bear resistant container
b. All food/trash in bear resistant container
c. No food present/odor only
d. Food hung in tree
e. Some food in vehicle
f. Unknown

12. Did the bear eat any human food?

a. No
b. Yes (what?) _____
c. Unknown

13. Did the bear damage property?

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

14. Did the bear(s) harm anyone?

a. No
b. Yes* (describe) _____

15. Details of bear-human interaction (optional):
Dark camp I was standing and heard him Drinking out of bucket Shined Light and he left.

*** 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.**





For office use only:

Report collected by: Katie Puiry (USFS/camp host)

Date: 7-3-24

Sunset / Fashcta

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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.*

1. Person(s) involved:

Name: [redacted]

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: 3 Year: 24 Time: 3-5 (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 1

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

1- bear - about 600 lbs probably male - no cubs

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

He was walking around our tent and others campsites. He tried to get into bear boxes and opted for our small box. He was looking for food. didn't seem aggressive.

9. Did you react to the bear?

Yes, tried to scare it away

10. How did the bear react to your response?

The first time it got scared & left. The second time it stared at us and took off with a look.

11. Was human food present?

(a.) Some food/trash NOT in bear resistant container
b. All food/trash in bear resistant container
c. No food present/ordor only
d. Food hung in tree
e. Some food in vehicle
f. Unknown

12. Did the bear eat any human food?

a. No (b.) Yes (what?) Some berries, Chocolate and Drinks.
c. Unknown

13. Did the bear damage property?

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

14. Did the bear(s) harm anyone?

(a.) No b. Yes* (describe) _____

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

The first interaction was him trying to get into the bear box and opted for the smaller box we forgot to put in the bear box. I scared him away and then he came back. I tried to scare him again and he looked right at us for several seconds and took off with the tote and proceeded to have some delicious Juice boxes & berries.

* 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.

We saw him again the next day walking around at around 7pm-8pm and then again the following morning around 5am. We were here for 7 days and we saw him 3 different days.



For office use only:

Report collected by: Katie Peinz (USFS/camp host)

Date: 7-10-24

Notes: Sunset 1 ; Fashoda



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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.

1. Person(s) involved:

Name: [redacted]

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: 10 Year: 24 Time: approx 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~~ (circled)
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 did not see. felt and heard

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

Sounds like it was getting into an empty ice chest

9. Did you react to the bear?

Yelled a bear

10. How did the bear react to your response?

left quickly but came back

11. Was human food present?

a. Some food/trash NOT in bear resistant container (circled)
b. All food/trash in bear resistant container
c. No food present/odor only
d. Food hung in tree
e. Some food in vehicle
f. Unknown

12. Did the bear eat any human food?

a. No
b. Yes (what?) Chocolate (circled)
c. Unknown

13. Did the bear damage property?

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

14. Did the bear(s) harm anyone?

a. No (circled)
b. Yes* (describe) _____

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

Found choc wrapper in my campsite

*** 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.**





For office use only:

Report collected by: Katie Prill (USFS/camp host)

Date: 7-13-24

Sunset 1 : Fashoda



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.*

1. Person(s) involved:

Name: [redacted]

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: 5
(number of people who encountered the bear)

5. Time of encounter: Month: 8 Day: 13 Year: 2024 Time: 12:50 (am)/pm

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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?):

N/A

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

eating from our cooler

9. Did you react to the bear?

NO

10. How did the bear react to your response?

N/A

11. Was human food present?

a. Some food/trash NOT in bear resistant container
b. All food/trash in bear resistant container
c. No food present/ordor only
d. Food hung in tree
e. Some food in vehicle
f. Unknown

12. Did the bear eat any human food?

a. No b. Yes (what?) Cream / Almond Milk
c. Unknown

13. Did the bear damage property?

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

14. Did the bear(s) harm anyone?

a. No b. Yes* (describe) _____

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

* 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.



For office use only:

Report collected by: _____ (USFS/camp host)

Date: _____

Notes: _____

_____



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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.

1. Person(s) involved:

Name: [redacted]

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: 8
(number of people who encountered the bear)

5. Time of encounter: Month: 07 Day: 16 Year: 24 Time: 3:30 (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?):

1-2 Large brown Cub

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

get into the bear box, Took the tote out and draged it down the hill

9. Did you react to the bear?

We kept quiet and made Sure Everyone Stayed in their tent

10. How did the bear react to your response?

Enjoyed our watermelon + Snacks

11. Was human food present?

(a.) Some food/trash NOT in bear resistant container
b. All food/trash in bear resistant container
c. No food present/odor only
d. Food hung in tree
e. Some food in vehicle
f. Unknown

12. Did the bear eat any human food?

a. No (b.) Yes (what?) Chocolate, Watermelon, + Marshmallo
c. Unknown

13. Did the bear damage property?

a. No (b.) Yes (list property and estimate costs) Cooler - Coleman Xtreme 3/100.00

14. Did the bear(s) harm anyone?

(a.) No b. Yes* (describe) _____

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

as little as possible, husband opened the window with a flashlight looked out and seen bears at bear box pulling our food out

*** 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.**



For office use only:

Report collected by: _____ (USFS/camp host)

Date: _____

Notes: _____

_____

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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.

1. Person(s) involved:

Name: [redacted] _____

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: 7 Day: 3 Year: 2024 Time: 8:30 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?):

one bear, brown, adult

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

walking around

9. Did you react to the bear?

NO

10. How did the bear react to your response?

just looked at it

11. Was human food present?

a. Some food/trash NOT in bear resistant container
(b.) All food/trash in bear resistant container
c. No food present/odor only
d. Food hung in tree
e. Some food in vehicle
f. Unknown

12. Did the bear eat any human food?

(a.) No b. Yes (what?) _____
c. Unknown

13. Did the bear damage property?

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

14. Did the bear(s) harm anyone?

(a.) No b. Yes* (describe) _____

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

*** 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.**





For office use only:

Report collected by: Katie Reinz (USFS/camp host)

Date: 6-12-24

Notes: Tipped over dumpster - Bent Lid on another dumpster.



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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.

1. Person(s) involved:

Name: [redacted]

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: 12

(number of people who encountered the bear)

5. Time of encounter: Month: 6 Day: 12 Year: 24 Time: 4:45 (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 , adult

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

going through trash

9. Did you react to the bear?

NO

10. How did the bear react to your response?

NO

11. Was human food present?

a. Some food/trash NOT in bear resistant container
(b.) All food/trash in bear resistant container
c. No food present/odor only
d. Food hung in tree
e. Some food in vehicle
f. Unknown

12. Did the bear eat any human food?

(a.) No
b. Yes (what?) _____
c. Unknown

13. Did the bear damage property?

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

14. Did the bear(s) harm anyone?

(a.) No
b. Yes* (describe) _____

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

*** 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.**



KEEP ME WILD

For office use only:

Report collected by: _____ (USFS/camp host)

Date: _____

Notes: _____

_____

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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.

1. Person(s) involved:

Name: [redacted]

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: 8 Day: 10 Year: 24 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, Black, Adult

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

Sniffing around camp site

9. Did you react to the bear?

yes

10. How did the bear react to your response?

Flash light annoyed bear & walked off.

11. Was human food present?

a. Some food/trash NOT in bear resistant container
(b.) All food/trash in bear resistant container
c. No food present/odor only
d. Food hung in tree
e. Some food in vehicle
f. Unknown

12. Did the bear eat any human food?

(a. No) b. Yes (what?) _____
c. Unknown

13. Did the bear damage property?

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

14. Did the bear(s) harm anyone?

(a. No) b. Yes* (describe) _____

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

*** 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.**



KEEP ME WILD

For office use only:

Report collected by: _____ (USFS/camp host)

Date: _____

Notes: _____

_____

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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.

1. Person(s) involved:

Name: [redacted]

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: 5
(number of people who encountered the bear)

5. Time of encounter: Month: 7 Day: 26 Year: 2024 Time: 2 (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 BEAR

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

HEARD IT EATING OUR FOOD

9. Did you react to the bear?

no

10. How did the bear react to your response?

11. Was human food present?

a. Some food/trash NOT in bear resistant container
b. All food/trash in bear resistant container
c. No food present/odor only
d. Food hung in tree
e. Some food in vehicle
f. Unknown

12. Did the bear eat any human food?

a. No
b. Yes (what?) BACON, HAMBURGER, LUNCHMEAT (HAM, TURKEY), SAUSAGES, MARSHMALLOWS, GRAPES, STEAK,
c. Unknown

13. Did the bear damage property?

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

14. Did the bear(s) harm anyone?

a. No
b. Yes* (describe) _____

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

*** 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.**





For office use only:

Report collected by: _____ (USFS/camp host)

Date: _____

Notes: _____

_____



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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.

1. Person(s) involved:

Name: [redacted]

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: 24 Year: 24 Time: 2 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 bear

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

moving around the travel trailer

9. Did you react to the bear?

I made noise from within the trailer

10. How did the bear react to your response?

The bear left

11. Was human food present?

a. Some food/trash NOT in bear resistant container
b. All food/trash in bear resistant container
(c.) No food present/~~odor only~~
d. Food hung in tree
e. Some food in vehicle
f. Unknown

12. Did the bear eat any human food?

(a.) No
b. Yes (what?) _____
c. Unknown

13. Did the bear damage property?

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

14. Did the bear(s) harm anyone?

(a.) No
b. Yes* (describe) _____

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

*** 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.**



KEEP ME WILD

For office use only:

Report collected by: _____ (USFS/camp host)

Date: _____

Notes: _____

_____

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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.

1. Person(s) involved:

Name: [redacted]

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: 5
(number of people who encountered the bear)

5. Time of encounter: Month: 8 Day: 27 Year: '24 Time: 9:30 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~~ Site 31
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 brown young adult

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

Rummaging through our site's trash (pg. up food) between trailer and truck & 15 feet from 4 campers sitting around campfire

9. Did you react to the bear?

As 1 camper returned from bathroom, bear saw light & bolted

10. How did the bear react to your response?

Bear ran across road, stopped to eat what he'd stolen, then started to return to the receptacle to get more. Camper yelled & banged pots & bear left for good.

11. Was human food present?

a. Some food/trash NOT in bear resistant container
b. All food/trash in bear resistant container
c. No food present/odor only
d. Food hung in tree
e. Some food in vehicle
f. Unknown

12. Did the bear eat any human food?

a. No
b. Yes (what?) can covered w/plastic lid in which we'd put the dog's vomited eggs & piggie
c. Unknown

13. Did the bear damage property?

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

14. Did the bear(s) harm anyone?

a. No
b. Yes* (describe) _____

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

Bear seemed not to be afraid of human but wasn't aggressive; was not afraid to try to go back to the trash receptacle though.

*** 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.**





For office use only:

Report collected by: _____ (USFS/camp host)

Date: _____

Notes: _____

_____



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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.

1. Person(s) involved:

Name: [redacted]

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: 8 Day: 5 Year: '24 Time: 2'15 (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 III
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. What was the bear doing when you first saw it?

Bear growling at my 16yo son's tent on campsite #119.

9. Did you react to the bear? (#petrified)

My son was quiet for 10 min. but

10. How did the bear react to your response? then bangedon his stanley

Eventually it movedon. w/ a pocket knife.

11. Was human food present?

a. Some food/trash NOT in bear resistant container
b. All food/trash in bear resistant container
c. No food present/odor only
d. Food hung in tree
e. Some food in vehicle
f. Unknown

12. Did the bear eat any human food?

a. No b. Yes (what?) _____
c. Unknown

13. Did the bear damage property?

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

14. Did the bear(s) harm anyone?

a. No b. Yes* (describe) _____

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

_____

_____

_____

*** 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.**





For office use only:

Report collected by: _____ (USFS/camp host)

Date: _____

Notes: _____

_____



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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.

1. Person(s) involved:

Name: [redacted]

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: 5
(number of people who encountered the bear) 1-5

5. Time of encounter: Month: 8 Day: 6 Year: 2024 Time: [redacted] (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.) ~~VII~~ 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?):

Not sure – but saw at least one black bear shaking trash

8. What was the bear doing when you first saw it? ~~site~~ & then destroyed ice chest & other things @ #118. Ate all their meat, etc.

9. Did you react to the bear?

We banged pots & pans.

10. How did the bear react to your response?

looked up & then continued. (we watched from our site)

11. Was human food present?

(a) Some food/trash NOT in bear resistant container
b. All food/trash in bear resistant container
c. No food present/odor only
d. Food hung in tree
e. Some food in vehicle
f. Unknown

12. Did the bear eat any human food?

a. No (b) Yes (what?) meat
c. Unknown

13. Did the bear damage property?

a. No (b) Yes (list property and estimate costs) large ice chest & ___?

14. Did the bear(s) harm anyone?

(a) No b. Yes* (describe) _____

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

_____

_____

_____

*** 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.**

KEEP ME WILD

For office use only:

Report collected by: _____ (USFS/camp host)

Date: _____

Notes: _____

_____

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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.

1. Person(s) involved:

Name: [redacted]

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: 8 Day: 28 Year: 24 Time: 11 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. What was the bear doing when you first saw it?

Stood up and pushed on car window with me in car.

9. Did you react to the bear?

Turned lights off inside car.

10. How did the bear react to your response?

Walked away

11. Was human food present?

a. Some food/trash NOT in bear resistant container
(b.) All food/trash in bear resistant container
c. No food present/odor only
d. Food hung in tree
e. Some food in vehicle
f. Unknown

12. Did the bear eat any human food?

(a.) No b. Yes (what?) _____
c. Unknown

13. Did the bear damage property?

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

14. Did the bear(s) harm anyone?

(a.) No b. Yes* (describe) _____

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

*** 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.**



For office use only:

Report collected by: _____ (USFS/camp host)

Date: _____

Notes: _____

_____



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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.

1. Person(s) involved:

Name: [redacted]

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: 08 Day: 28 Year: 2024 Time: 11:1130 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

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

Ripping my food Screen tent

9. Did you react to the bear?

No

10. How did the bear react to your response?

N/A

11. Was human food present?

a. Some food/trash NOT in bear resistant container
b. All food/trash in bear resistant container
c. No food present/odor only (Wine on table & packet of Coffee)
d. Food hung in tree
e. Some food in vehicle
f. Unknown

12. Did the bear eat any human food?

a. No
b. Yes (what?) _____
c. Unknown

13. Did the bear damage property?

a. No
b. Yes (list property and estimate costs) Screen Tent $90~

14. Did the bear(s) harm anyone?

a. No
b. Yes* (describe) _____

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

He / or She ripped Tent Screen but did not Enter 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.**

KEEP ME WILD

For office use only:

Report collected by: _____ (USFS/camp host)

Date: _____

Notes: _____

_____

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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.

1. Person(s) involved:

Name: [redacted]

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: 9 Day: 8 Year: 2024 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 Site 1 (Double Site)

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

Maybe 2, one Large Bear Seen, Small tracks found When the Sun came up.

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

Digging in Soda/water ice Chest. found 2 Capri Sun packs Punctured & Drank.

9. Did you react to the bear?

Yes

10. How did the bear react to your response?

DiDnt Care, turned & Looked then walked Down the road

11. Was human food present?

(a.) Some food/trash NOT in bear resistant container
(b.) All food/trash in bear resistant container
c. No food present/odor only
d. Food hung in tree
e. Some food in vehicle
f. Unknown

only soda, water, Capri sun out in ice Chest.

12. Did the bear eat any human food?

a. No
(b.) Yes (what?) 2 Capri Suns
c. Unknown

13. Did the bear damage property?

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

14. Did the bear(s) harm anyone?

(a.) No
b. Yes* (describe) _____

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

Bear Just walked through Got into ice Chest under tent trailer I woke up and Hollered and it left. found a Capri Sun Next to the ice Chest and one Behind a Log in camp.

*** 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.**





For office use only:

Report collected by: _____ (USFS/camp host)

Date: _____

Notes: _____

_____



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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.

1. Person(s) involved:

Name: [redacted]

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: 12
(number of people who encountered the bear)

5. Time of encounter: Month: 8 Day: 11 Year: 2024 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?):

1, black bear adult

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

trying to steal food

9. Did you react to the bear?

yelled

10. How did the bear react to your response?

ran away

11. Was human food present?

a. Some food/trash NOT in bear resistant container
b. All food/trash in bear resistant container
c. No food present/odor only
d. Food hung in tree
e. Some food in vehicle
f. Unknown

12. Did the bear eat any human food?

a. No
b. Yes (what?) _____
c. Unknown

13. Did the bear damage property?

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

14. Did the bear(s) harm anyone?

a. No
b. Yes* (describe) _____

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

*** 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.**





For office use only:

Report collected by: _____ (USFS/camp host)

Date: _____

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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.*

1. Person(s) involved:

Name: [redacted]

2. Describe yourself:

(a. Visitor) camping

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: Everyone in our camp area (15-20?)
(number of people who encountered the bear)

5. Time of encounter: Month: 6 Day: 28 Year: 24 Time: 5 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 — up on the hill
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 brown bear, small (Teen?)

8. What was the bear doing when you first saw it?
The bear was sitting by the bathrooms, then move to the camps (right side facing the lake)

9. Did you react to the bear?
Not really, but the people around us was making sounds and flashing a flash light

10. How did the bear react to your response?
The bear ran off for a little

11. Was human food present?

a. Some food/trash NOT in bear resistant container
b. All food/trash in bear resistant container
c. No food present/ordor only
d. Food hung in tree
e. Some food in vehicle
f. Unknown

12. Did the bear eat any human food?
We were making food on the grill

a. No b. Yes (what?) _____
c. Unknown

13. Did the bear damage property?
a. No b. Yes (list property and estimate costs) _____

14. Did the bear(s) harm anyone?
a. No b. Yes* (describe) _____

15. Details of bear-human interaction (optional):
The bear just sat there and our camp group was just looking at the bear. The other people were getting too close and taking Vedios.

* 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.



For office use only:

Report collected by: _____ (USFS/camp host)

Date: _____

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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.*

1. Person(s) involved:

Name: [redacted]

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~~ 15 people?
(number of people who encountered the bear)

5. Time of encounter: Month: June Day: 28th Year: 2024 Time: 5-onward 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?):
Ten(2) brown

8. What was the bear doing when you first saw it?
Bro chilling at Dodbreeam acting foil

9. Did you react to the bear?
Nah

10. How did the bear react to your response?
He was just hanging out tbh

11. Was human food present?
(a) Some food/trash NOT in bear resistant container
b. All food/trash in bear resistant container
c. No food present/ordor only
d. Food hung in tree
e. Some food in vehicle
f. Unknown

12. Did the bear eat any human food?
(a) No b. Yes (what?) _____
c. Unknown

13. Did the bear damage property?
(a) No b. Yes (list property and estimate costs) _____

14. Did the bear(s) harm anyone?
(a) No b. Yes* (describe) _____

15. Details of bear-human interaction (optional):
Bear was being a good boy and being cute posing for the camera as stupid idots were going up to it and taking pictures

* 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.



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.*

1. Person(s) involved:

Name: [redacted]

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: 6 Day: 28 Year: 24 Time: 7.00 P.M. am/pm

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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 _____

SPACE #1

7. Number and description of bears (how many, what color, size, adult or cub, sex?):
1 BROWN BEAR. LOOKED TO BE ABOUT 800 POUNDS

8. What was the bear doing when you first saw it?
IT WAS ACROSS THE ROAD FROM MY CAMPSITE. CHECKING THE CAMPGROUND. NEIBORS CHASED IT UP THE HILL. TEN MINUTS LATER IT WAS BACK DIRECTLY ACROS FROM MY CAMPSITE STAIRING AT ME. I GOT IN MY VAN AND WATCHED IT. THEN IT CAME ONTO THE STREET AND WALKED DOWN TO THE REST OF THE CAMP.

9. Did you react to the bear?
(NO) WALKED SLOWLY TO MY VAN.

10. How did the bear react to your response?
STOOD THERE KEEPING AN EYE ON ME AND THE REST OF THE CAMPGROUND.

11. Was human food present?

a. Some food/trash NOT in bear resistant container
b. All food/trash in bear resistant container
c. No food present/ordor only
d. Food hung in tree
e. Some food in vehicle
f. Unknown

12. Did the bear eat any human food?
a. No b. Yes (what?) THERE WAS NOTHING IN MY SITE.
c. Unknown

13. Did the bear damage property?
a. No b. Yes (list property and estimate costs) _____

14. Did the bear(s) harm anyone?
a. No b. Yes* (describe) _____

15. Details of bear-human interaction (optional):
JUST IGNORANT CAMPERS CHASING IT UP IN THE HILLS.

* 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.



For office use only:

Report collected by: _____ (USFS/camp host)

Date: _____

Notes: _____

_____



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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.

1. Person(s) involved:

Name: [redacted]

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: 15 Year: 2024 Time: 5:20 (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 - Big - Adult

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

Dragging Garbage

9. Did you react to the bear?

Vehicle was @ Rest Room was just outside door

10. How did the bear react to your response?

Ran at first then stood its ground

11. Was human food present?

(a.) Some food/trash NOT in bear resistant container
b. All food/trash in bear resistant container
(c.) No food present/odor only
d. Food hung in tree
e. Some food in vehicle
f. Unknown

12. Did the bear eat any human food?

a. No
(b.) Yes (what?) Potato Bread
c. Unknown

13. Did the bear damage property?

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

14. Did the bear(s) harm anyone?

(a. No)
b. Yes* (describe) _____

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

stood it ground @ first took steps towards us a few then ran off unsure where growls came from

*** 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.**





For office use only:

Report collected by: _____ (USFS/camp host)

Date: _____

Notes: _____

_____



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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.

1. Person(s) involved:

Name: [redacted]

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: 18
(number of people who encountered the bear)

5. Time of encounter: Month: 08 Day: 01 Year 2024 Time: 5:00 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?):
Black, Adult, 1 bear, Around 200 lbs

8. What was the bear doing when you first saw it?
Getting in my Ice Chest

9. Did you react to the bear?
Just shined a flashlight At it.

10. How did the bear react to your response?
walked off, but stuck around in the campground

11. Was human food present?
a. Some food/trash NOT in bear resistant container
b. All food/trash in bear resistant container
c. No food present/odor only
d. Food hung in tree
e. Some food in vehicle
f. Unknown

12. Did the bear eat any human food?
a. No
b. Yes (what?) Candy, fruit
c. Unknown

13. Did the bear damage property?
a. No
b. Yes (list property and estimate costs) _____

14. Did the bear(s) harm anyone?
a. No
b. Yes* (describe) _____

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

*** 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.**



APPENDIX I2

Bear Encounter Summary

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Bear Encounter Form - Bear Management Monitoring, Crystal Basin Recreation Area - UARP, Eldorado National Forest

2024 Results Summary

Description	Visitor Activity	Group Size	Date/Time of Encounter	Location	Number / description of bear(s)	Description of interaction w/ bear	Food Present	Consumption by Bear	Property Damage	Did the bear harm anyone	Comments
visitor	camping-developed campground	4	7/15/24 11:00 AM	fashoda campground	na	Shouted	some food/trash NOT in bear resistant container	unknown	no	no	
visitor	camping-developed campground	8	7/15/2024 na	fashoda campground	na	No reaction	all food/trash in bear resistant container	no	no	no	
visitor	camping-developed campground	2	7/16/24 2:00 PM	fashoda campground	~700 lb sow w/ cub	Yelled and flashlight. Bears ran away.	all food/trash in bear resistant container	unknown	no	no	Need larger bear boxes
camp host	camping-developed campground	20	7/24/24 1:30 AM	sunset campground/boat launch	Adult, brown, 1 big not small. Male	Breaking into cooler. Used car alarm. Moved but didn’t leave.	some food/trash NOT in bear resistant container	yes	yes	no	Went up to tent and pushed up on the doorway interacting with my feet.
visitor	camping-developed campground	6	7/24/24 2:00 AM	sunset campground/boat launch	1, medium	Getting into my cooler. Shined a flashlight and it ran.	some food/trash NOT in bear resistant container	yes	yes	no	
visitor	camping-developed campground	4	7/24/24 1:00 AM	sunset campground/boat launch	2 bears, adult, brown, sex-unknown	Roaming the campsite by the container then again next to tent. turned on panic button to car. Looked at the car then left.	all food/trash in bear resistant container	no	no	no	
visitor	camping-developed campground	10	7/12/24 12:40 AM	sunset campground/boat launch	1 adult bear	Going towards cooler. Slowly moved into tent. Stared at me and continued to aggressively attack the cooler. Made our car alarm go off.	some food/trash NOT in bear resistant container	yes	no	no	
visitor	camping-developed campground	5	7/9/24 11:00 PM	fashoda campground	didn’t see bear-I did hear it. Bear didn’t react to us.	No reaction.	some food/trash NOT in bear resistant container	yes	no	no	

visitor	camping-developed campground	3	7/10/24 2:45 AM	fashoda campground	1 large bear. Did not see bear, only heard him in others ice chests and walked past our tent	We statyed silent.	unknown	unknown	no	no	
visitor	camping-developed campground	2	7/10/24 12:00 PM	fashoda campground	1-female cinammon bear + 1 cub	Went past tent.	all food/trash in bear resistant container	no	no	no	She walked by with her cub.
visitor	camping-developed campground	2	7/9/24 10:30 PM	sunset campground/boat launch	1-brown adult size of bear container	Shined flashlight. Walked away.	all food/trash in bear resistant container	no	no	no	Dark camp. I was standing and heard him drinking out of a bucket. Shined light and he left.
visitor	camping-developed campground	2	7/3/24 3:00 AM	sunset campground/boat launch	1-bear - adult 600 lbs probably male - no cubs	Tried to get into bear boxes. Tried to scare him away.	some food/trash NOT in bear resistant container	yes	no	no	Saw bear 3 times across several days.
visitor	camping-developed campground	1	7/10/24 10:00 PM	sunset campground/boat launch	1 did not see. Felt and heard	Sounds like it was getting into an empty ice chest. Yelled at bear. Left quickly but came back.	some food/trash NOT in bear resistant container	yes	no	no	Found a chocolate wrapper in my campsite.
visitor	camping-developed campground	5	7/13/24 12:50 AM	fashoda campground	na	Eating from cooler. Did not react to bear.	some food/trash NOT in bear resistant container	yes	no	no	
visitor	camping-developed campground	8	7/16/24 3:30 AM	fashoda campground	1-2 large brown cub	Got into the bear box and took food down hill. Stayed quiet and made sure everyone was safe.	some food/trash NOT in bear resistant container	yes	yes	no	As little as possible, husband opened the window with a fashlight, looked out and saw the bear at the bear box pulling out our food.
visitor	camping-developed campground	3	7/3/24 8:30 PM	sunset campground/boat launch	one bear, brown, adult	Walking around, no reaction, just looked at him.	all food/trash in bear resistant container	no	no	no	

visitor	camping-developed campground	12	6/12/24 4:45 AM	fashoda campground	1, black, adult	Going through trash.	all food/trash in bear resistant container	no	no	no	
visitor	camping-developed campground	2	8/10/24 3:00 AM	sunset campground/boat launch	1, black, adult	Sniffing around campsite. Flashlight annoyed bear and walked off.	all food/trash in bear resistant container	no	no	no	
visitor	camping-developed campground	5	7/26/24 2:00 AM	fashoda campground	1 black bear	Heard it eating our food. Did not react to bear.	some food/trash NOT in bear resistant container	yes	no	no	
visitor	camping-developed campground	1	7/24/24 2:00 AM	sunset campground/boat launch	1 bear	Moving around the travel trailer. I made noise. Bear left	no food present/ odor only	no	no	no	
visitor	camping-developed campground	5	8/7/24 9:30 PM	sunset campground/boat launch	1 brown bear young adult	Rummaging through our sites trash receptical. Bear left after flashlight from camper.	some food/trash NOT in bear resistant container	yes	no	no	Bear not afraid of humans but wasn't aggressive. Was not afraid to return to trash receptical.
visitor	camping-developed campground	1	8/5/24 2:15 AM	sunset campground/boat launch	1 bear	Growling at my 16 yo sons tent on campsite 119. Made noise and eventually bear moved on.	all food/trash in bear resistant container	no	no	no	
visitor	camping-developed campground	5	8/6/24 1:00 AM	sunset campground/boat launch	not sure - but at least one black bear	Shaking trash, destroyed ice chest, banged pots and pans, bear continued.	some food/trash NOT in bear resistant container	yes	yes	no	
visitor	camping-developed campground	1	8/28/24 11:00 PM	sunset campground/boat launch	1	Stood up and pushed on car windo with me in car. Turned lights off inside car. Walked away.	all food/trash in bear resistant container	no	no	no	

visitor	camping-developed campground	1	8/28/24 11:00 PM	sunset campground/boat launch	1 black bear	Did not react to bear.	all food/trash in bear resistant container	no	yes	no	He/she ripped tent screen but did not enter it.
visitor	camping-developed campground	3	9/8/24 1:00 AM	northwind campground	maybe 2, one large, small tracks found	Digging in ice chest. Reacted to bear. Didn't care and continued down road.	some food/trash NOT in bear resistant container	yes	no	no	Bear walked through. Got into ice chest under tent trailer. I woke up and hollered and it left. Found a capris sun next to the ice chest and one behind log in camp.
visitor	camping-developed campground	12	8/11/24 2:30 AM	ice house campground	1, black bear adult	Trying to steal food. Yelled, ran away.	all food/trash in bear resistant container	unknown	no	no	
visitor	camping-developed campground	15	6/28/24 5:00 AM	union valley bike trail	1 brown bear, small	People yelled and flashed lights. The bear ran off for a little.	some food/trash NOT in bear resistant container	unknown	no	no	Bear sat in camp while some watched and others got close to video.
visitor	camping-developed campground	15	6/28/24 5:00 PM	na	teen, brown	Did not react to bear.	some food/trash NOT in bear resistant container	no	no	no	People were approaching the bear for photos.
visitor	camping-developed campground	2	6/28/24 7:00 PM	jones fork campground	1 brown bear 800 lbs.	Did not react to bear.	all food/trash in bear resistant container	no	no	no	Campers chased it up the hill.
visitor	camping-developed campground	2	7/15/24 5:30 AM	jones fork campground	1 black bear adult	Dragging garbage.	some food/trash NOT in bear resistant container	yes	no	no	Stood its ground at first then took off towards garbage.
visitor	camping-developed campground	18	8/1/24 5:00 PM	strawberry point campground	black, adult, ~ 200 lbs.	Getting into my ice chest, shinned a flashlite at it, walked off but stuck around.	some food/trash NOT in bear resistant container	yes	no	no	

APPENDIX J

Water Temperature Graphs

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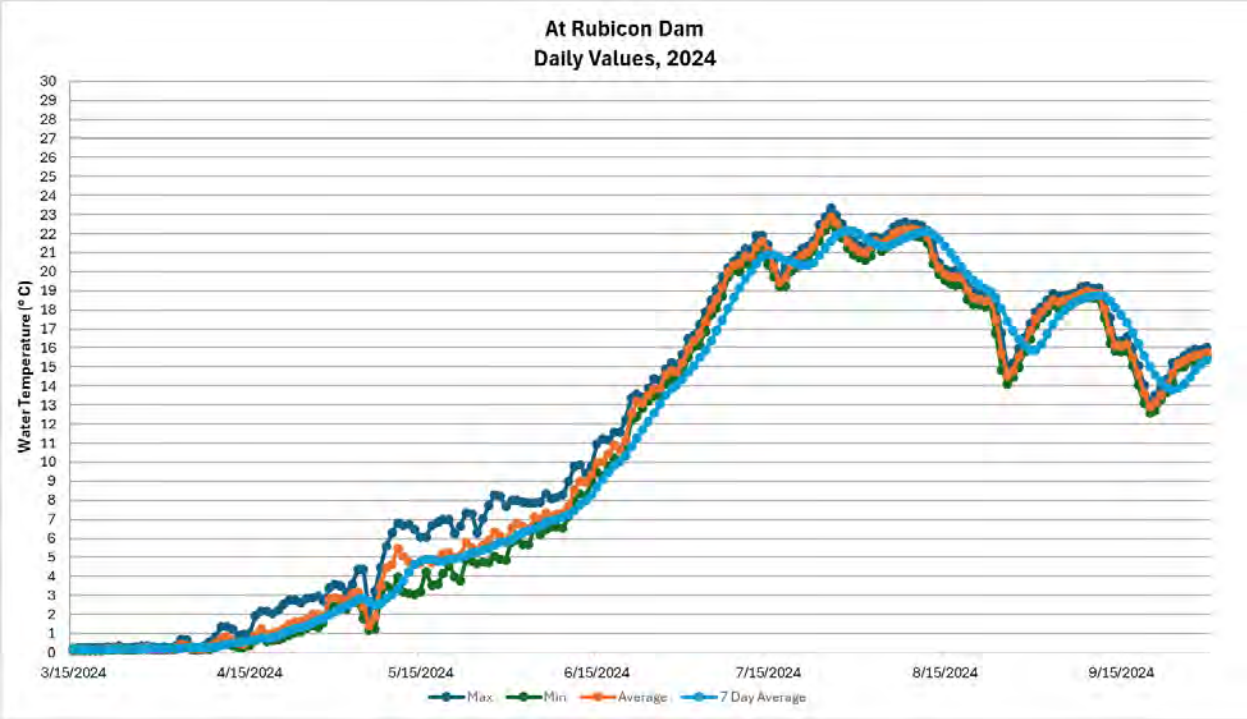


Figure J-1. Rubicon River immediately below Rubicon Reservoir Dam (Site RR5).

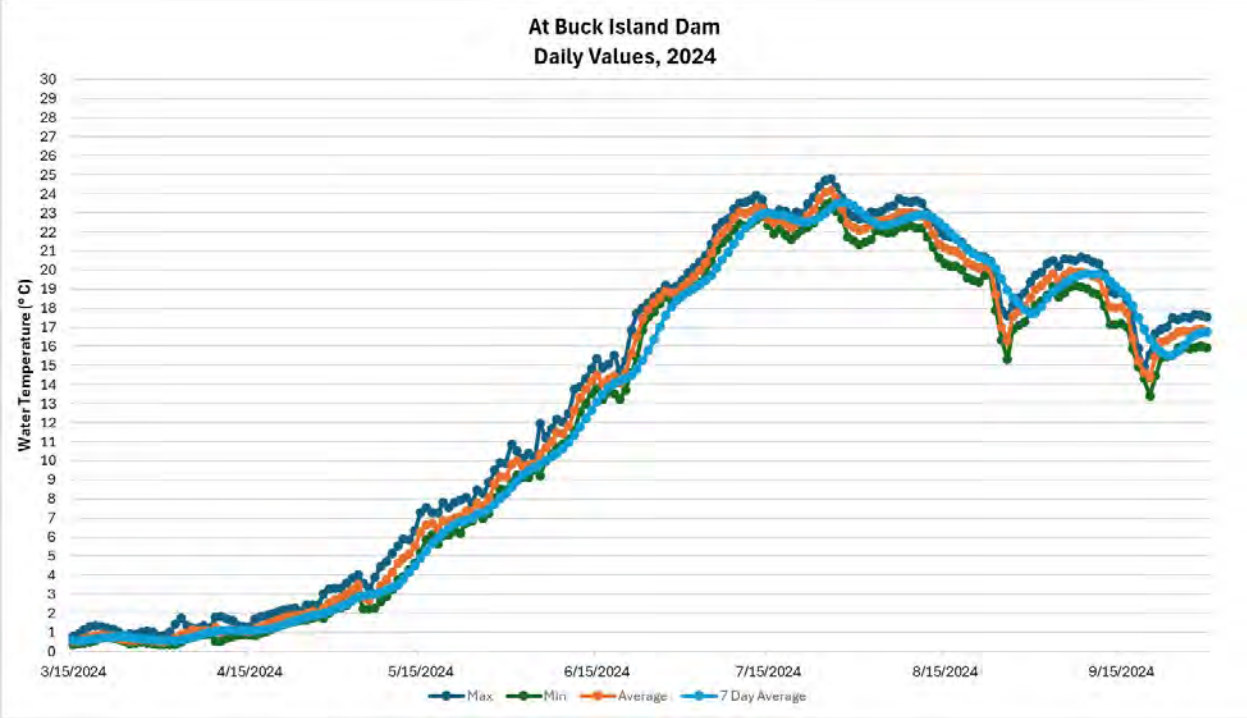


Figure J-2. Little Rubicon River immediately below Buck Island Reservoir Dam (Site LRR3).

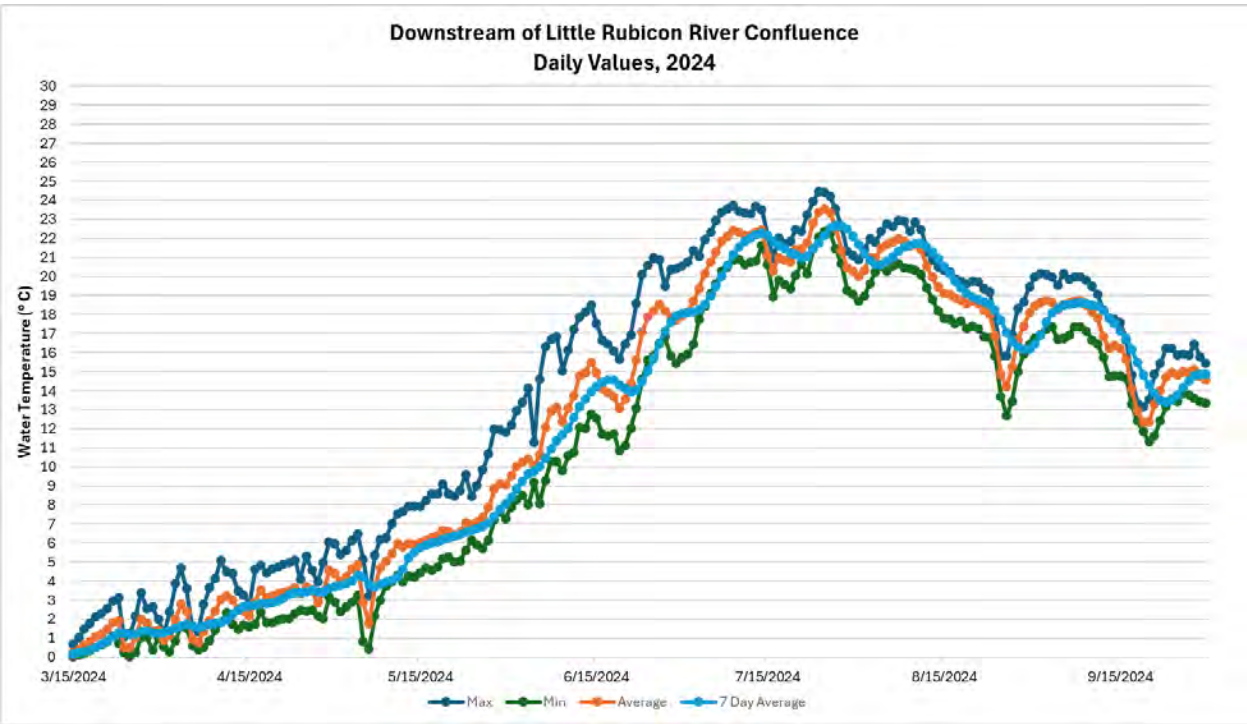


Figure J-3. Rubicon River below confluence of Little Rubicon River at the Project boundary (Site RR1).

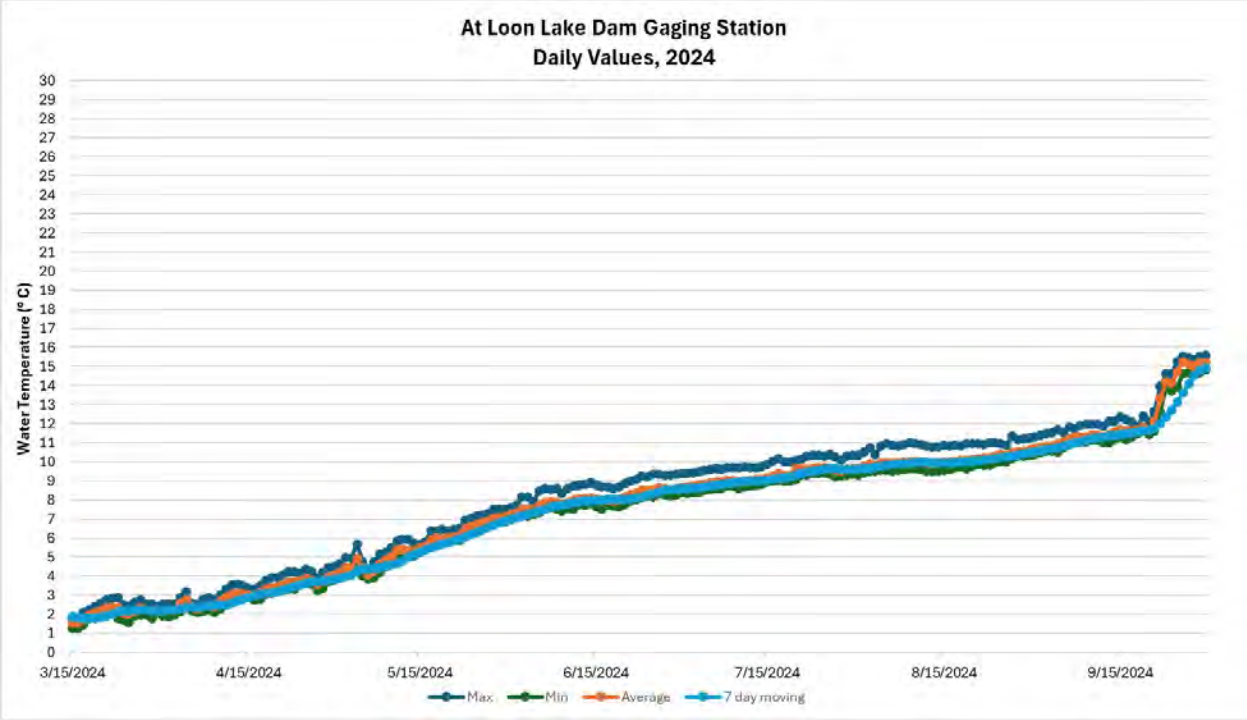


Figure J-4. Gerle Creek Immediately below Loon Lake Dam (Site GC7).

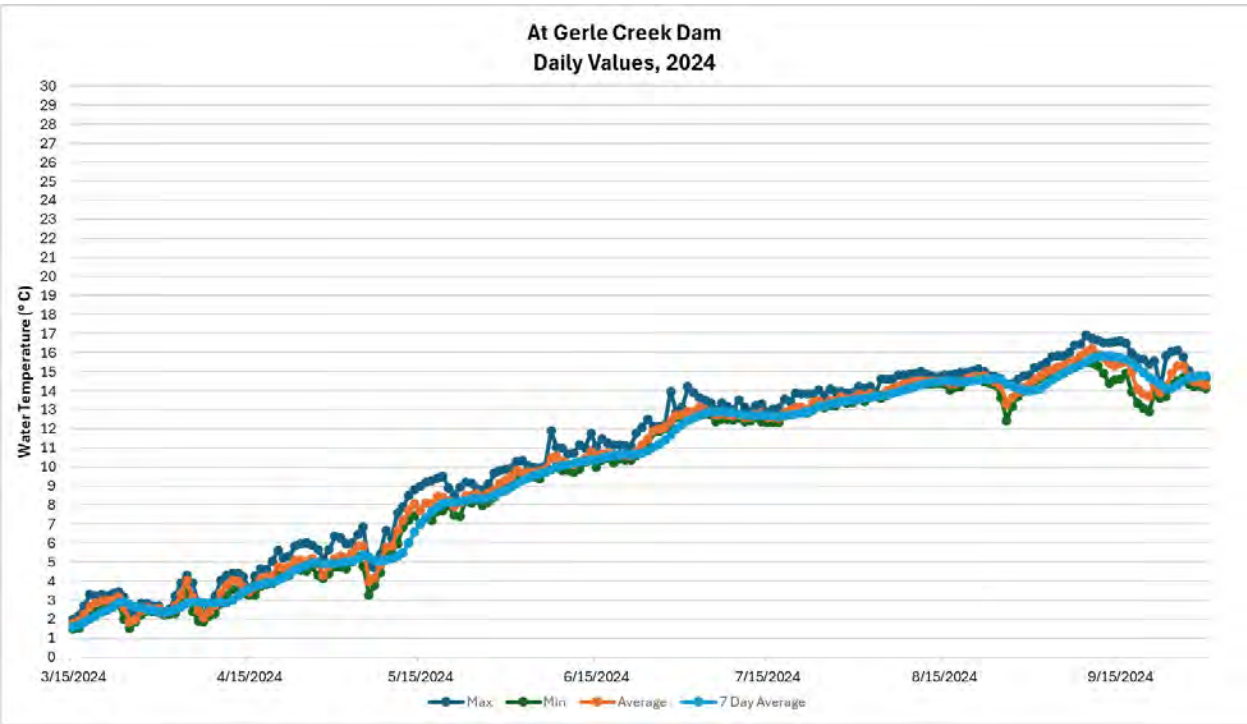


Figure J-5. Gerle Creek immediately below Gerle Creek Dam (Site GC8).

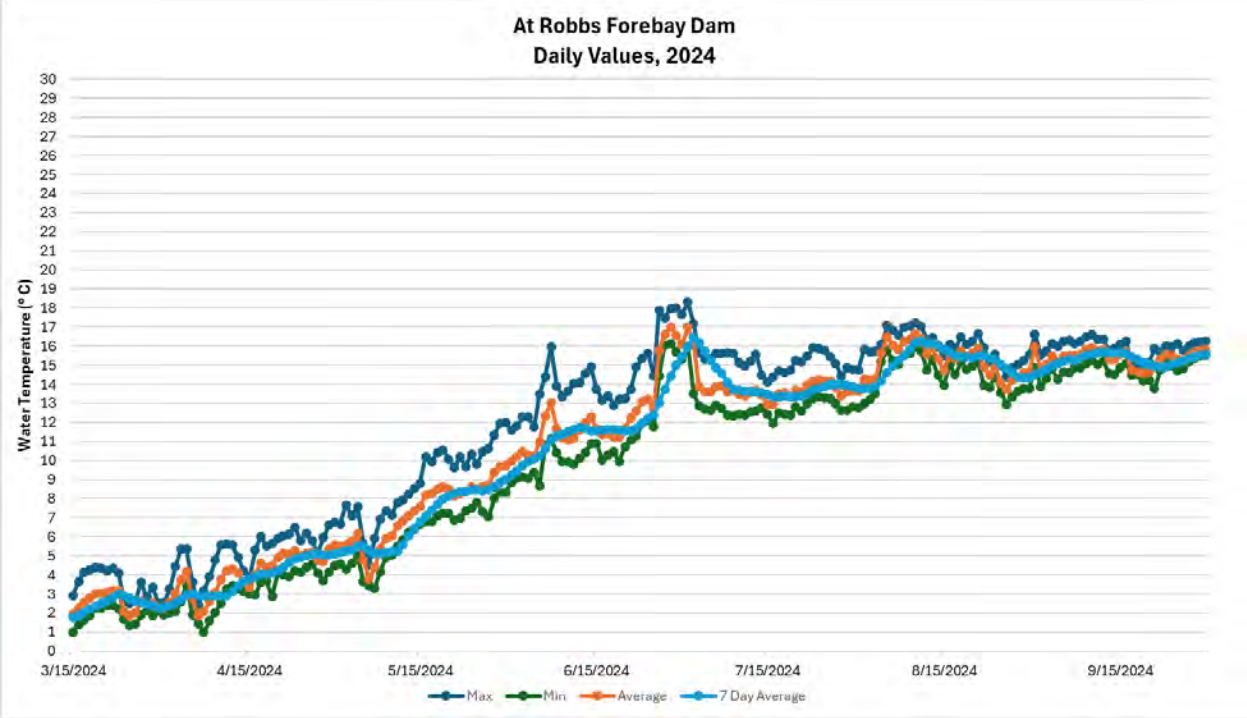


Figure J-6. South Fork Rubicon River immediately below Robbs Peak Dam (Site SFRR5).

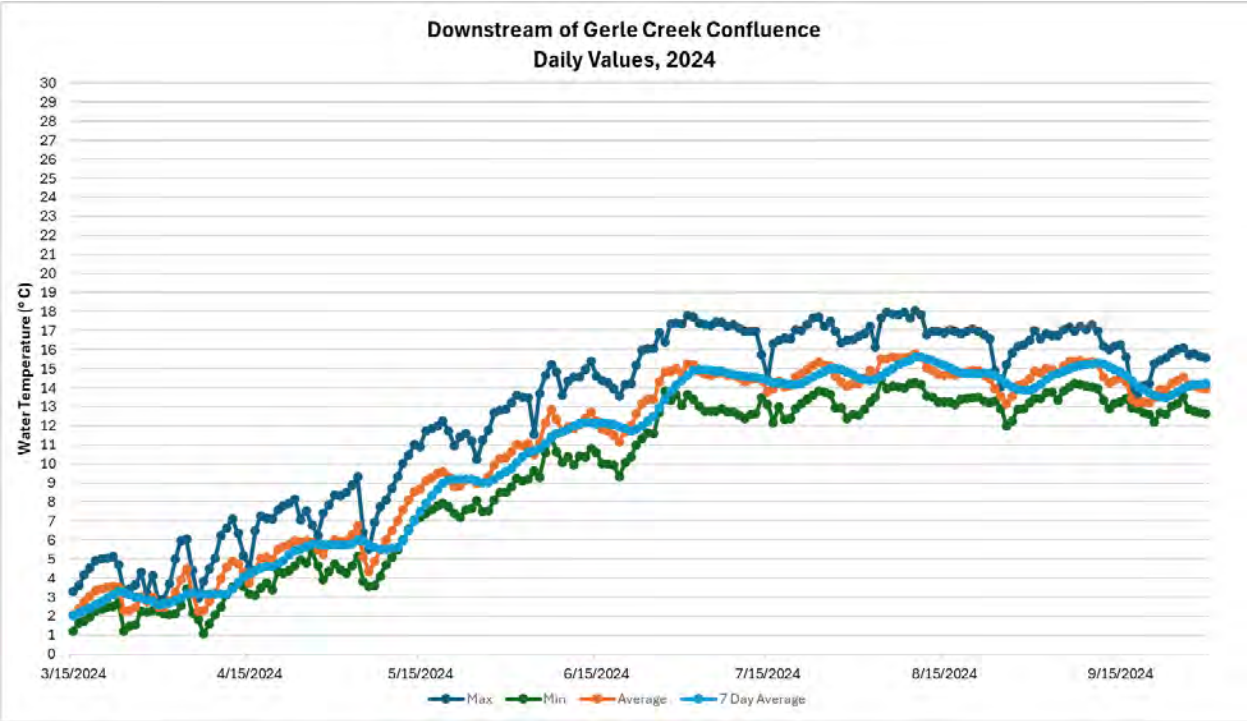


Figure J-7. South Fork Rubicon River below confluence of Gerle Creek (Site SFRR6).

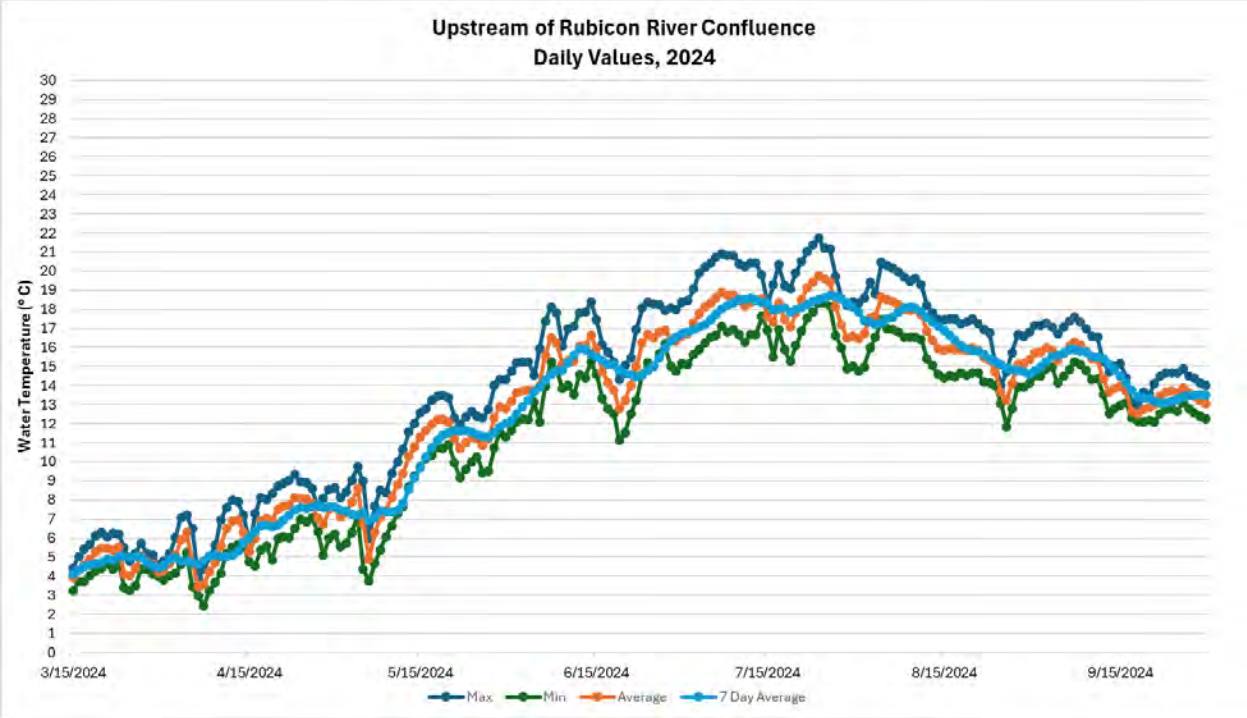


Figure J-8. South Fork Rubicon River immediately upstream of confluence with the Rubicon River (Site SFRR7).

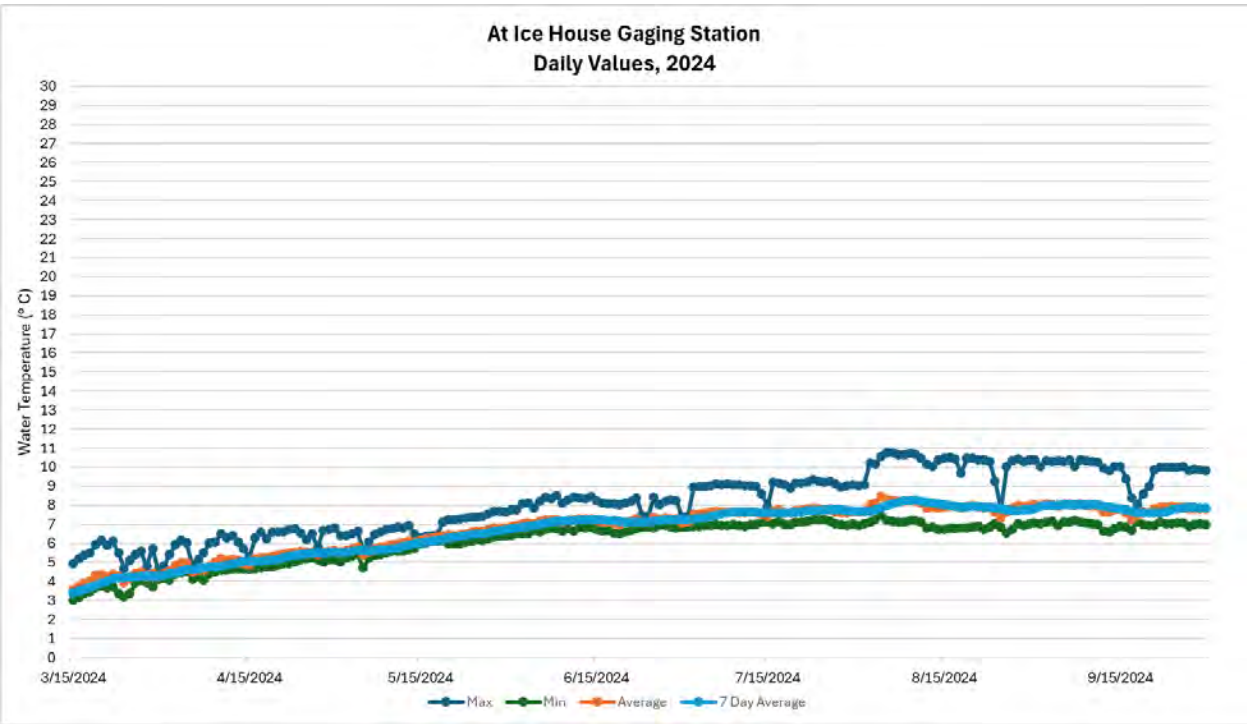


Figure J-9. South Fork Silver Creek immediately below Ice House Dam (Site SFSC7).

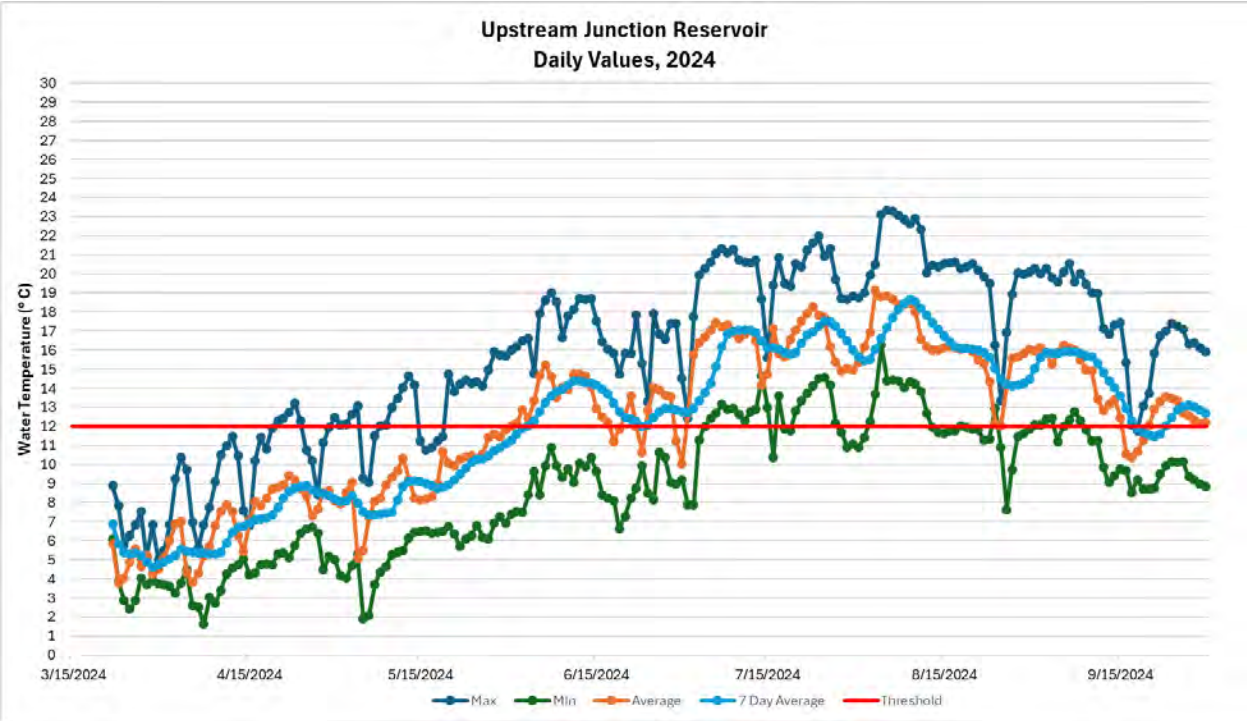


Figure J-10. South Fork Silver Creek immediately upstream of Junction Reservoir (Site SFSC8).

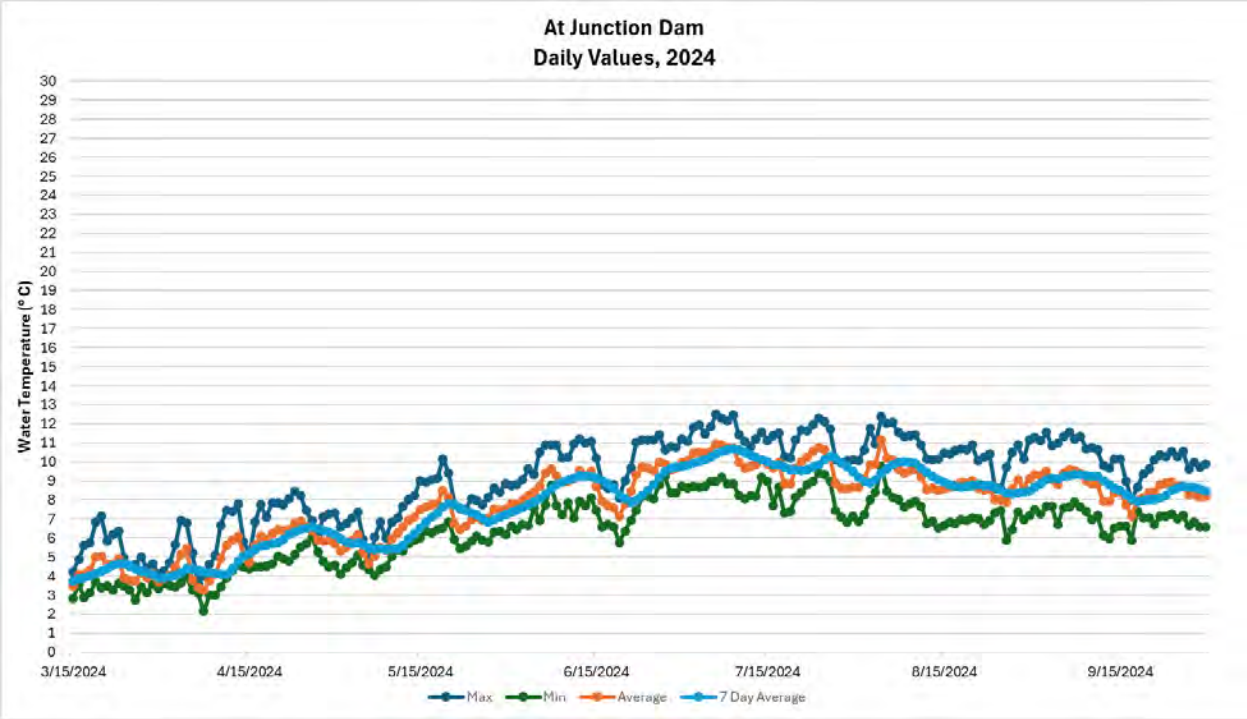


Figure J-11. Silver Creek immediately below Junction Dam (Site SC5).

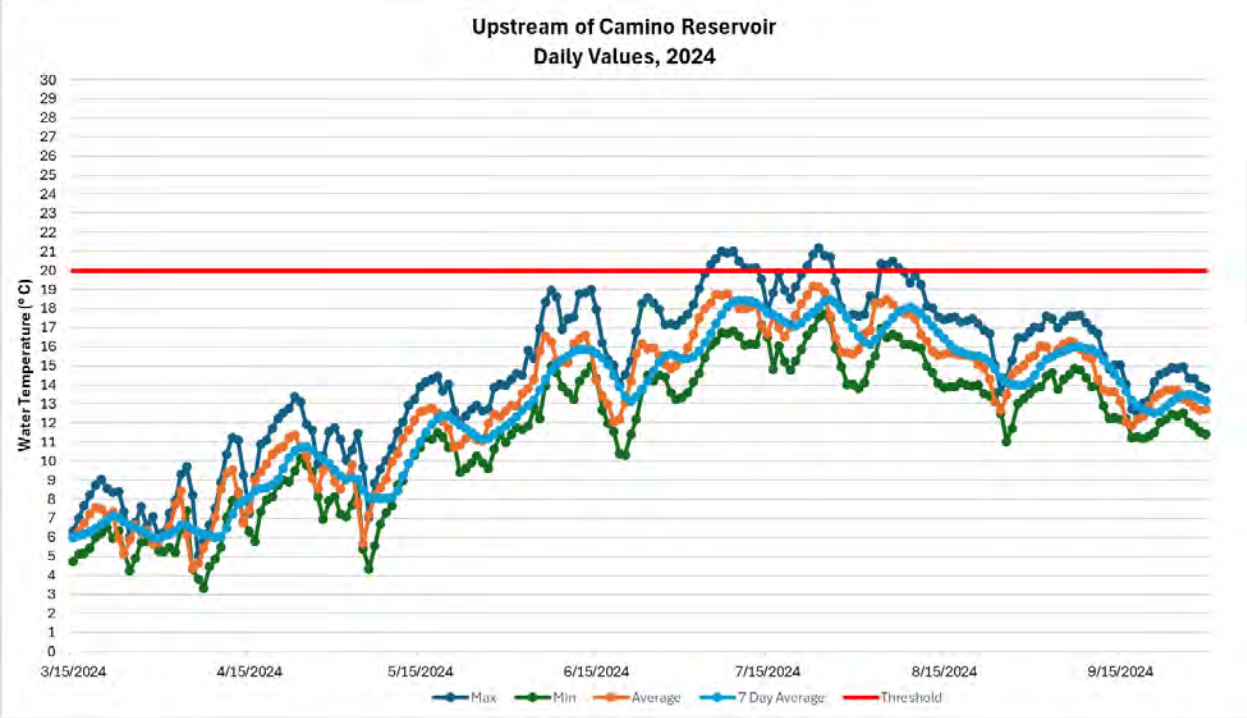


Figure J-12. Silver Creek immediately above Camino Dam (Site SC6).

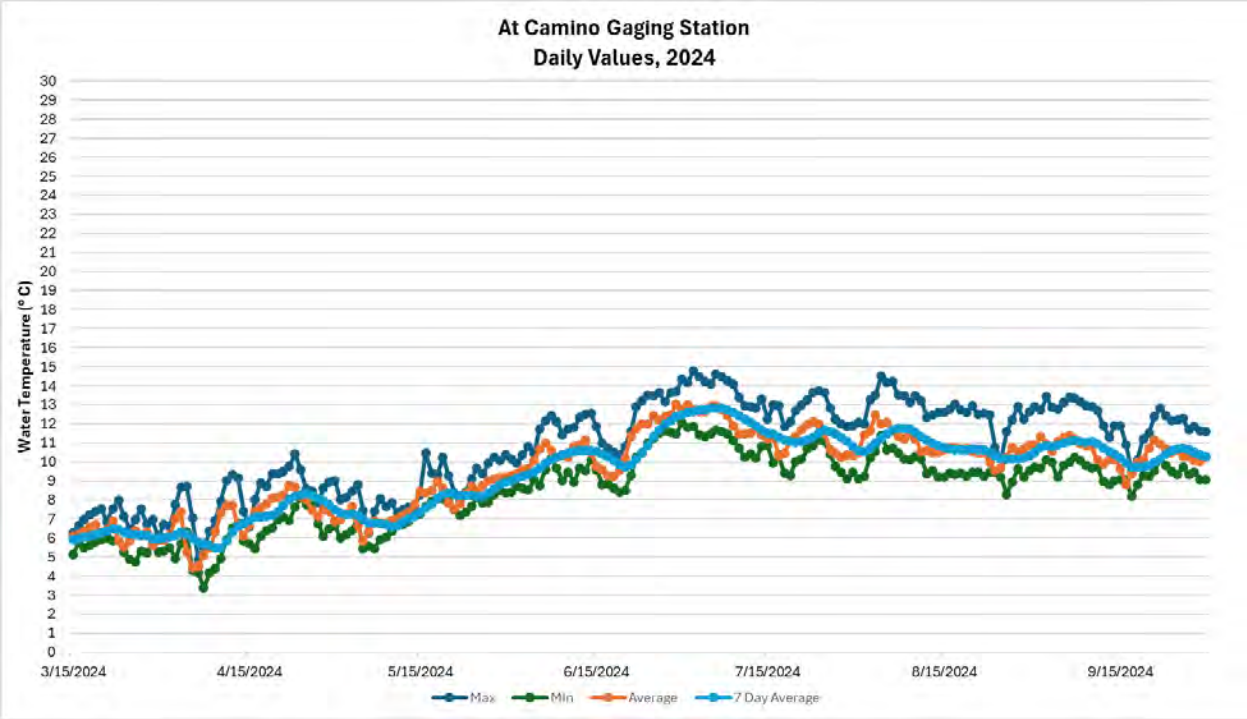


Figure J-13. Silver Creek immediately below Camino Dam (Site SC7).

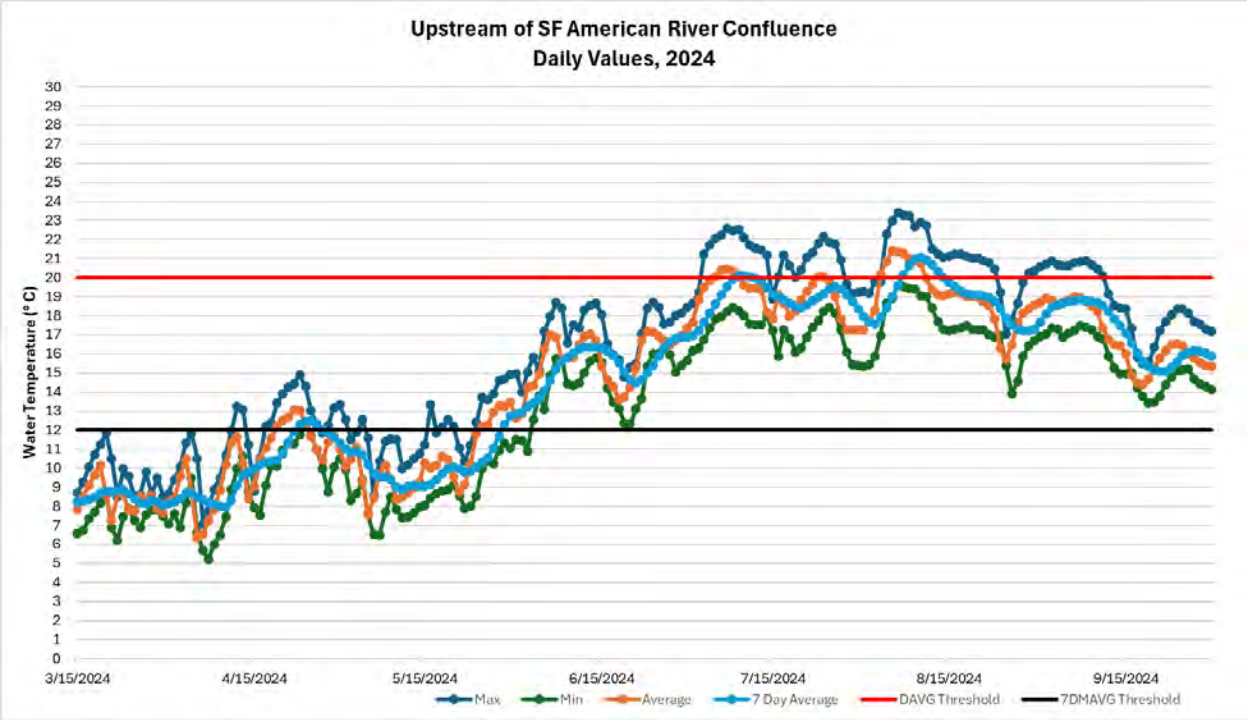


Figure J-14. Silver Creek immediately upstream of the South Fork American River (Site SC8).

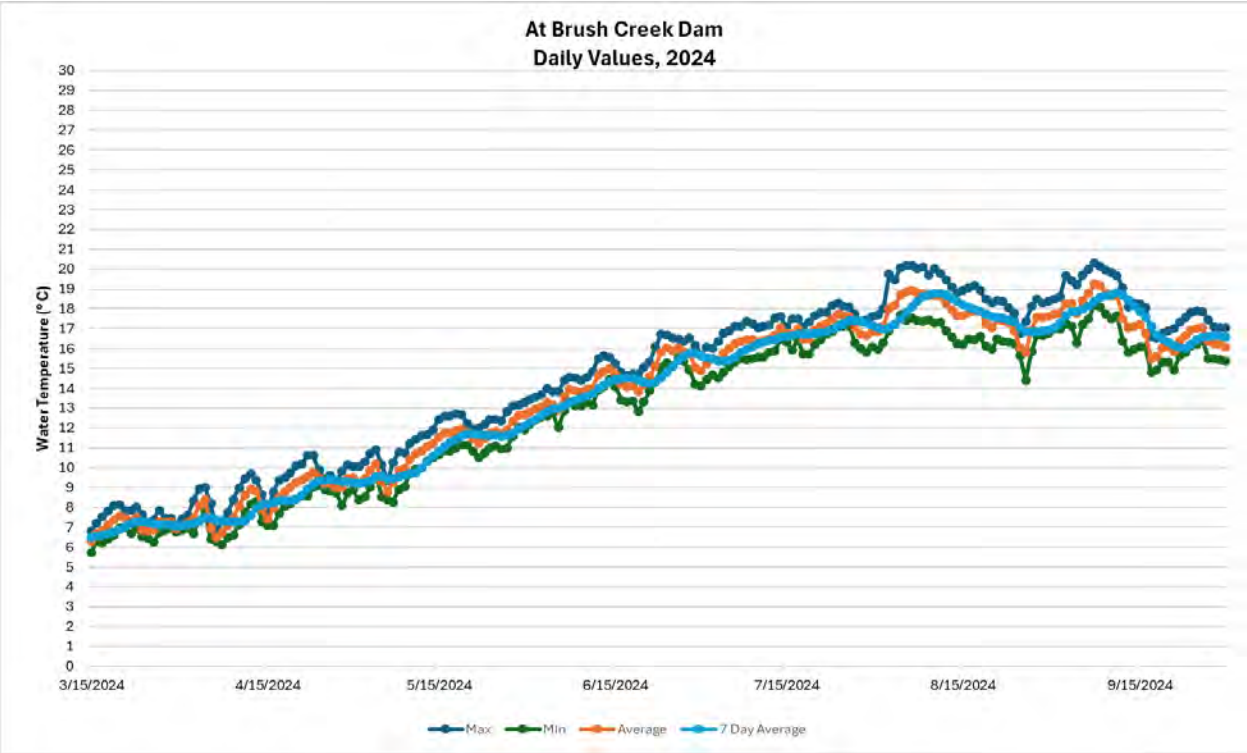


Figure J-15. Brush Creek immediately below Brush Creek Reservoir Dam (Site BC4).

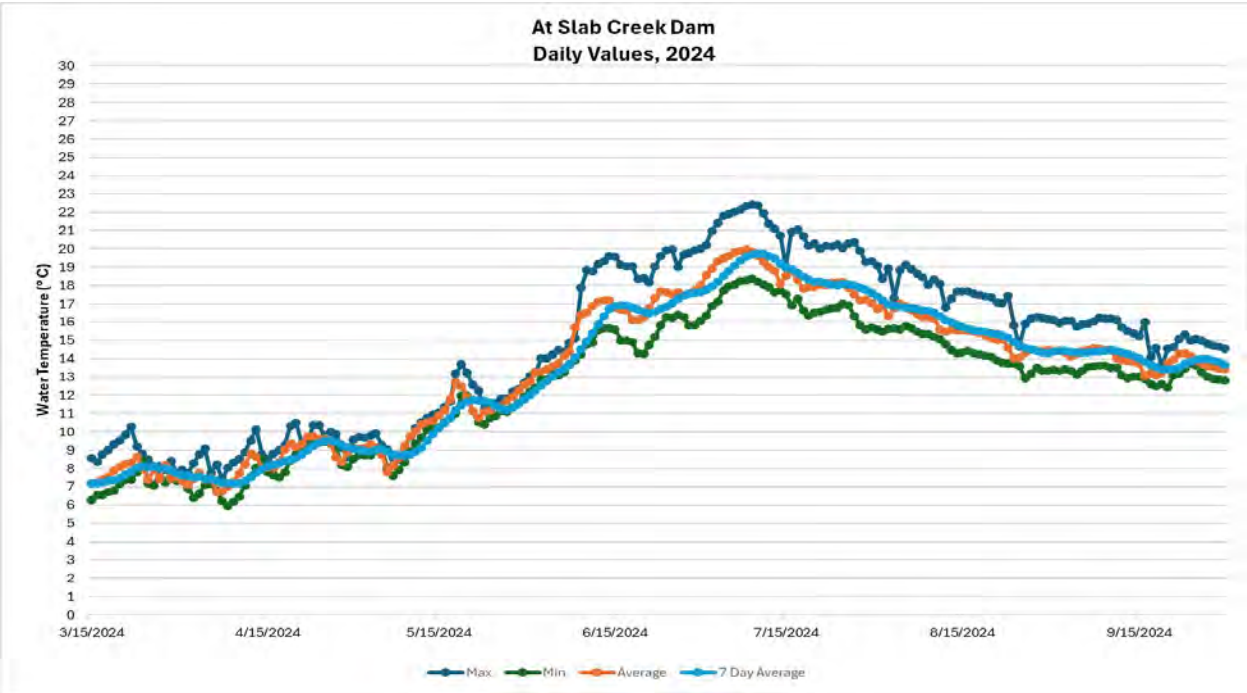


Figure J-16. South Fork American River immediately below Slab Creek Dam (Site SFAR13).

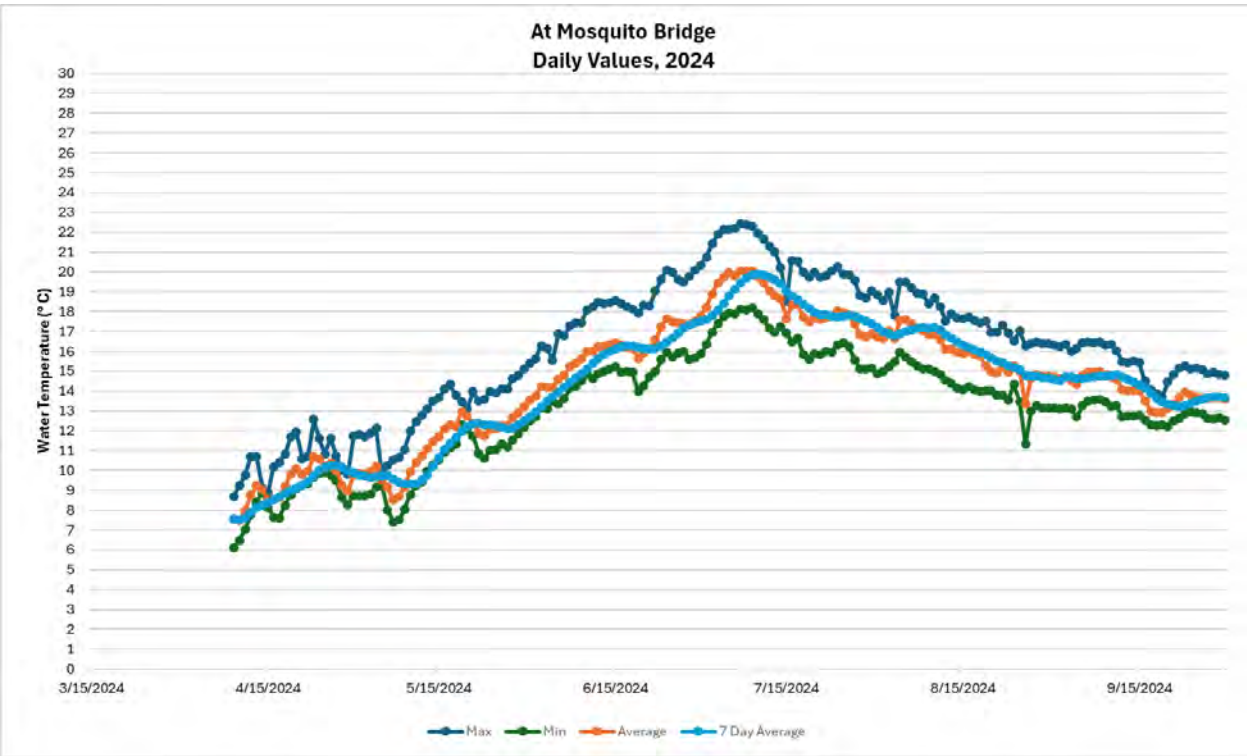


Figure J-17. South Fork American River at Mosquito Road (SFAR7) .

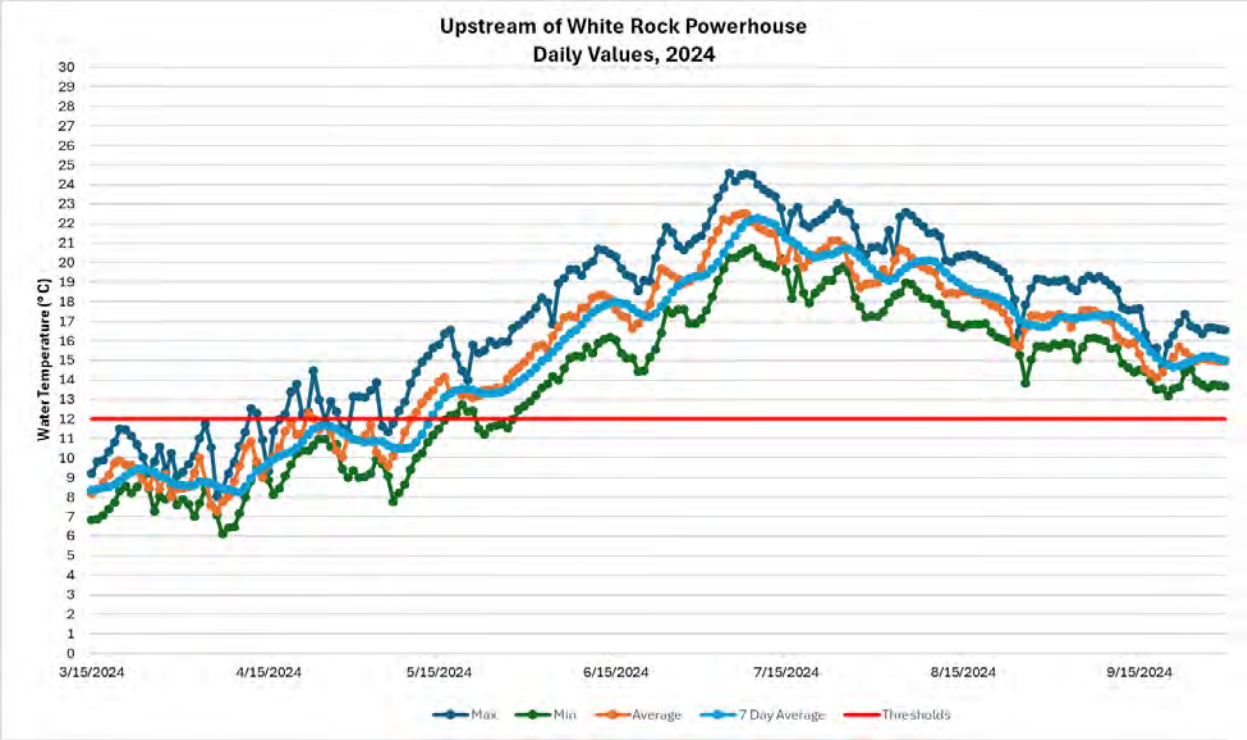


Figure J-18. South Fork American River approximately 0.5 mile upstream of White Rock Powerhouse (SFAR15).

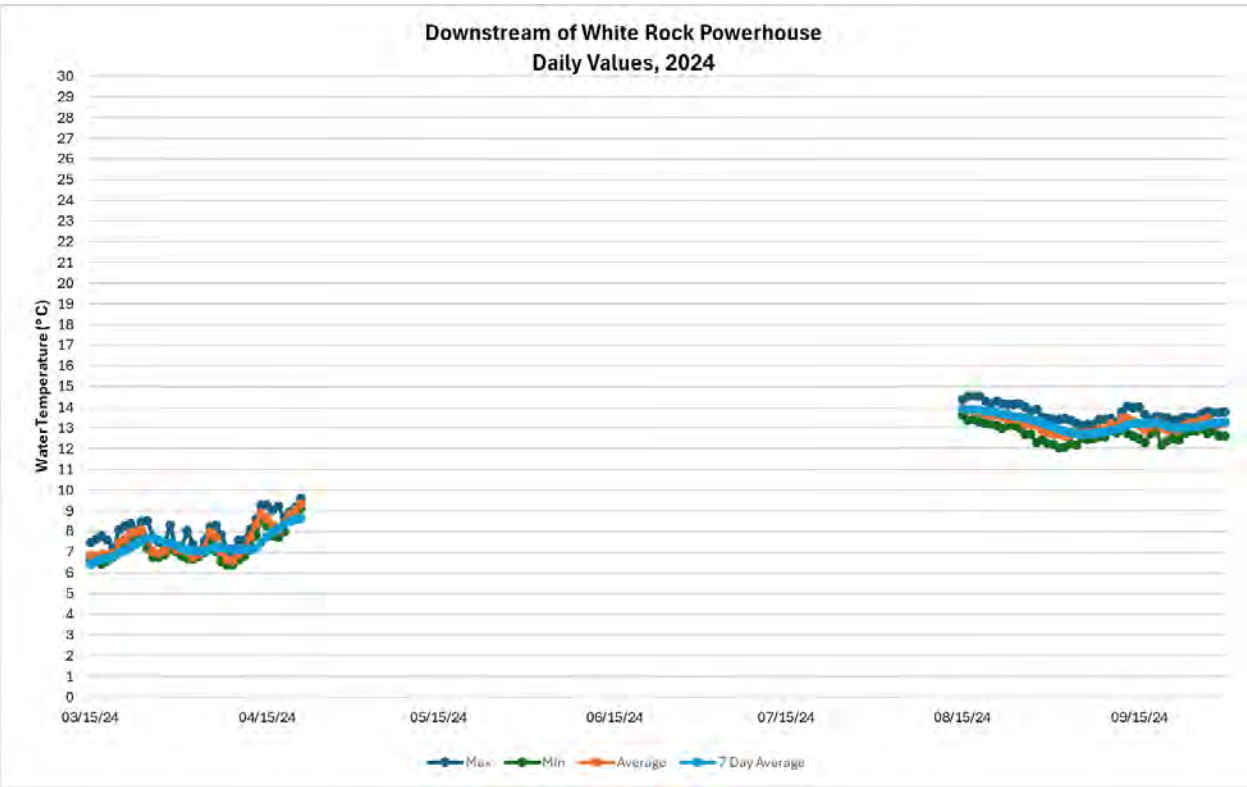


Figure J-19. South Fork American River to record White Rock Powerhouse discharge temps (SFAR16).