2017 Rainbow Trout Monitoring
El Dorado Hydroelectric Project
(FERC Project No. 184)

Prepared for:

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1.0 INTRODUCTION

The El Dorado Irrigation District (EID or District) owns and operates the El Dorado Hydroelectric Project (Project No. 184), which is licensed by the Federal Energy Regulatory Commission (FERC). The Project No. 184 Monitoring Program requires monitoring of Rainbow Trout populations in six stream reaches associated with Project No. 184 facilities. The specific monitoring requirements for Rainbow Trout are defined in the Project 184 Rainbow Trout Monitoring Plan (Plan; EID 2010).

Rainbow Trout (*Oncorhynchus mykiss*) surveys were conducted between 1998 and 2001 (ECORP 2002) as part of the FERC relicensing effort. Results from these surveys were used to develop the ecological resource objectives as identified in Appendix B, Section 1 of the El Dorado Relicensing Settlement Agreement. Biomass indices (pounds per surface acre) were developed to serve as a baseline for ecological resource objective monitoring.

Post-license monitoring for Rainbow Trout is required for two consecutive years at the beginning of each five-year period. The purpose of this monitoring is to evaluate the status of Rainbow Trout populations in comparison to the ecological resource objectives. The first of these paired monitoring efforts took place in 2011 and 2012. This report provides results of Rainbow Trout monitoring conducted in 2017 and compares 2016-2017 monitoring results to 2011-2012 monitoring results.

2.0 METHODS

2.1 Site Selection

The RBT Plan specifies monitoring at a total of six sites in Project-affected reaches. These reaches include the following:

- Lower Echo Creek (Site EC-1)
- Lower Pyramid Creek (Site PY-1)
- Caples Creek below Kirkwood (Site CA-3)
- Silver Fork American River at Forgotten Flat (Site SV-4)
- Lower Alder Creek (Site AR-1)
- South Fork American River below Carpenter Creek (Site SO-2)

Four sites (PY-1, CA-3, SV-4, and AR-1) are located on tributaries to the South Fork American River, one site (SO-2) is located on the South Fork American River, and one site (EC-1) is located on Echo Creek, a tributary to the Upper Truckee River. Site locations are provided in Figure 1. GPS coordinates for the upstream and downstream boundary of each sampling site is shown in Table 1. All sites sampled in 2017 were identical to those sampled in 2011, 2012, and 2016.

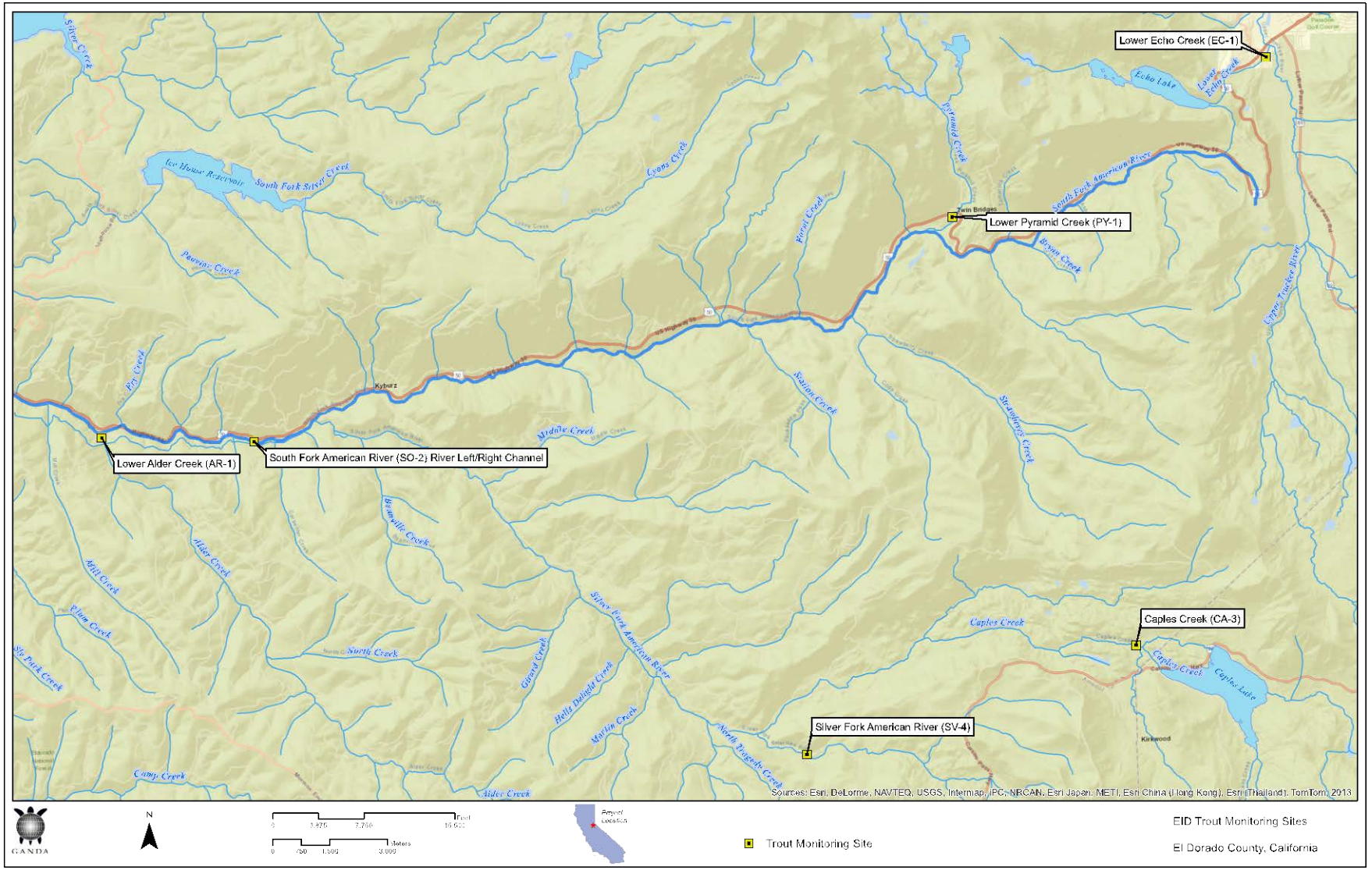

Figure 2-1. Project 184 trout monitoring locations.

Table 2-1. GPS coordinates for sample site boundaries

Sampling Site	Upstream Boundary UTM (NAD 83)		Downstream Boundary UTM (NAD 83)	
	Easting	Northing	Easting	Northing
South Fork American River (SO-2) River Left Channel	731696	4293821	731619	4293831
South Fork American River (SO-2) River Right Channel	731711	4293856	731654	4293877
Lower Echo Creek (EC-1)	757989	4303817	758051	4303851
Lower Pyramid Creek (PY-1)	749869	4299695	749807	4299675
Silver Fork American River (SV-4)	746079	4285687	746025	4285771
Lower Alder Creek (AR-1)	727760	4293904	727704	4294001
Caples Creek (CA-3)	754663	4288588	754590	4288559

Source: FERC Project No. 184 Rainbow Trout Monitoring 2016 (AECOM, 2017)

2.2 Electrofishing Surveys

GANDA conducted trout population monitoring in September and October, 2017 following the methods detailed in the RBT Plan (EID 2010). A crew of 2–8 GANDA biologists fished each site from bottom to top using one to four backpack electrofishers (Smith Root Model 20B and Halltech HT-2000). Three passes were conducted at each site. One crew member was dedicated to moving fish between buckets and holding areas, caring for captured fish, and maintaining proper oxygenation of the holding water. Shocker settings (e.g., voltage and frequency) were kept the same for all passes, and shocking duration (or effort) for each pass was recorded as the number of seconds of operation for each unit. Salt was added at the following sites where conductivity was too low to allow for effective electrofishing: Pyramid Creek, Caples Creek, Forgotten Flat, and South Fork American River.

Fish collected during each pass were processed immediately upon completion of that pass. All specimens were identified to species, weighed to the nearest gram using an electronic balance, and measured to fork length (FL) using a metric fish board. Following each pass, processed fish were placed in a live car in an instream holding area located outside the site. After the completion of the survey, all collected fish were redistributed throughout the site.

2.3 Physical Habitat and Water Quality

Physical habitat and in situ water quality parameters were assessed concurrently with the electrofishing surveys. Physical habitat parameters included measures of site dimensions, flow, substrate composition, percent canopy cover, stream gradient, habitat types, cover type, and trout spawning habitat as defined on the standard field data form. All sites were re-located using GPS and documented with digital photographs. The YSI meter was photographed to capture a snapshot of the *in situ* water quality data (unfortunately many site photos and the *in situ* water quality results were lost due to a camera malfunction). Site dimensions were characterized along eleven transects set perpendicular to the flow and spaced equally along the length of the site. Using a stadia rod, stream depths were measured at one-quarter, one-half, and three-quarters stream width along each transect.

Other physical habitat parameters on the field data form were estimated visually over the total site area. These parameters included: percentage of the bed substrate composed of silt, clay, sand, gravel, cobble, boulder, and bedrock; percent gradient, riffle, run, and pool composition. Size classes for stream substrate material were as follows: sand= <1–2 mm, gravel= 2 mm–64 mm, cobble= 64 mm–25 cm, and boulder= >25 cm (bedrock was not defined by a dimensional

measurement). Water quality measurements included basic in situ parameters: water temperature, dissolved oxygen concentration, pH, and conductivity.

2.4 Data Analysis

Electrofishing data were compiled and analyzed using the MicroFish 3.0 software package, based on the removal-depletion model (Van Deventer and Platts 1989). Standing stock estimates for fish abundance and biomass were calculated for Rainbow Trout for each site. In cases where the lower 95 percent confidence limit for population estimates was lower than the total catch; this limit was set equal to the total catch. Biomass was calculated based on total weight measured per species and extrapolated to fit the population estimate for the whole site. Any specimens weighing less than one gram were assigned a weight of 0.5 grams. Biomass was standardized per unit area of stream surveyed (pounds per surface acre).

3.0 RESULTS

Generally, fish communities surveyed in the South Fork American River watershed were typical for west slope Sierra Nevada streams, and included Rainbow Trout (*Oncorhynchus mykiss*), Brown Trout (*Salmo trutta*), Brook Trout (*Salvelinus fontinalis*), Sacramento Sucker (*Catostomus occidentalis*), California Roach (*Hesperoleucus symmetricus*), Speckled Dace (*Rhinichthys osculus*) and Prickly Sculpin (*Cottus asper*). The fish community in Echo Creek in the adjacent the Lahontan Basin included Rainbow Trout (*Oncorhynchus mykiss*), Brown Trout (*Salmo trutta*), Lahontan Redside (Richardsonius egregious), Paiute Sculpin (*Cottus beldingi*), and Bluegill (*Lepomis macrochirus*).

Site descriptions are provided in Sections 3.1 through 3.6 below. Estimated Rainbow Trout densities and biomass are shown in Table 3-1 and in Figures 3-1 and 3-2. A summary of water quality parameters is shown in Table 3-2. A summary of habitat parameters and habitat composition is shown in Table 3-3 and Table 3-4, respectively. Available photographs of sample sites are provided in Appendix A. Copies of original 2017 electrofishing field notes and datasheets are provided in Appendix B.

3.1 Lower Echo Creek (EC-1)

Site EC-1 was sampled on 21 September, 2017. The site consists of single thread channel. One shocker and netter were used for this site. The site was 90 m long. Mean channel width was 5.3 meters. Fish captured included 15 Rainbow Trout, 116 Brown Trout, 35 Paiute Sculpin, 1

Lahontan Redside, and 5 Bluegill. Rainbow Trout density was estimated to be 268 fish per mile and the Rainbow Trout biomass was estimated to be 6.7 pounds per surface acre (Table 3-1).

3.2 Lower Pyramid Creek (PY-1)

Site PY-1 was sampled on 9 October, 2017. The site consists of single thread channel. Two pairs of shockers and netters were used for this site. The site was 100 m long. Mean channel width was 7.3 meters. Fish captured included 59 Rainbow Trout and 6 Brown Trout. Rainbow Trout density was estimated to be 1,400 fish per mile and Rainbow Trout biomass was estimated to be 26.7 pounds per surface acre (Table 3-1).

3.3 Caples Creek below Kirkwood Creek (CA-3)

Site SV-4 was sampled on 29 September, 2017. The site consists of single thread channel. Two pairs of shockers and netters were used for this site. The site was 104 m long. Mean channel width was 8.1 meters. Fish captured included 56 Brook Trout and 3 Brown Trout. No Rainbow Trout were captured in 2017; therefore, Rainbow Trout density was zero fish per mile Rainbow Trout biomass was zero pounds per surface acre (Table 3-1).

3.4 Silver Fork American at Forgotten Flat (SV-4)

Site SV-4 was sampled on 10 October, 2017. The site consists of single thread channel. Two pairs of shockers and netters were used for this site. The site was 100 m long. Mean channel width was 11.3 meters. Fish captured included 64 Rainbow Trout and 10 brown trout. Rainbow Trout density was estimated to be 1,207 fish per mile and Rainbow Trout biomass was estimated to be 9.0 pounds per surface acre (Table 3-1).

3.5 Lower Alder Creek (AR-1)

Site AR-1 was sampled on 27 September, 2017. The site consists of single thread channel. Two pairs of shockers and netters were used for this site. The site was 109 m long. Mean channel width was 6.6 meters. Fish captured included 108 Rainbow Trout, 72 California Roach, and 15 Sacramento Sucker. Rainbow Trout density was estimated to be 1,810 fish per mile and Rainbow Trout biomass was estimated to be 7.5 pounds per surface acre (Table 3-1).

3.6 South Fork American River below Carpenter Creek (SO-2)

Site SO-2 was sampled on 28 September, 2017. The site consists of a main channel and a side channel. Four pairs of shockers and netters were used for the main channel, and two pairs in the side channel. The site was 100 m long. Mean width of the main channel was 18.2 meters, and the mean width of the side channel was 9.7 m. Fish captured included 198 Rainbow Trout, 2 Brown Trout, 41 Sacramento Sucker, and 4 Speckled Dace. Rainbow Trout density was estimated to be 3,589 fish per mile (Table 3.1) and Rainbow Trout biomass was estimated to be 7.1 pounds per surface acre.

Table 3-1. 2017 Rainbow Trout catch, density, and biomass.

Sampling Site	Depletion Pattern	Rainbow Trout captured (number)	Total Weight (grams)	Estimated Density (Rainbow Trout per mile)	Estimated Biomass in Reach (grams)	Estimated biomass in Reach (pounds)	Estimated Biomass (pounds per surface acre)	Biomass Objective (pounds per surface acre)
L. Echo (EC-1)	11, 4, 0	15	354	268	354	0.8	6.7	11.8
L. Pyramid (PY-1)	25, 22, 12	59	1,479	1,400	2,181	4.8	26.7	6.5
Caples (CA-3)	0, 0, 0	0	0	0	0	0	0	9.1
Silver Fork (SV-4)	34, 20, 10	64	972	1,207	1,139	2.5	9.0	19.7
L. Alder (AR-1)	59, 35, 14	108	539	1,810	614	1.4	7.5	74.6
SF American (SO-2)	117, 50, 31	198	1,982	3,589	2,232	4.9	7.1	33.9

Table 3-2. 2017 water quality parameters and streamflow.

Sampling Site	Temp (°C)	Sp. Cond ($\mu S/cm^3$)	DO (mg/l)	pH (units)	Streamflow (cubic feet per second)
L. Echo (EC-1)	7.07	42	9.13	7.2	0.1
L. Pyramid (PY-1)	7.37	27	9.3	7.8	15
Caples (CA-3)[1]	NA	NA	NA	NA	21
Silver Fork (SV-4) [1]	NA	NA	NA	NA	20
L. Alder (AR-1)	12.1	48	9.0	7.9	0.7
SF American (SO-2) [1]	NA	NA	NA	NA	56

[1]YSI data were recorded on photographs which were lost at some sites.

Table 3-3. 2017 Sample site dimensions and physical habitat characteristics

Sampling Site	Length (meters)	Mean Width (meters)	Area (meters^2)	Surface area (acres)	Max Depth (meters)	Mean Depth (meters)
L. Echo (EC-1)	90	5.3	477	0.12	0.54	0.16
L. Pyramid (PY-1)	100	7.3	730	0.18	0.76	0.30
Caples (CA-3)	104	8.1	845	0.21	1.35	0.33
Silver Fork (SV-4)	100	11.3	1126	0.28	1.22	0.42
L. Alder (AR-1)	109	6.6	726	0.18	1.42	0.48
SF American (SO-2)	100	27.9	2790	0.93	1.15	0.45
SF American (SO-2) Side channel	100	9.7	970		0.94	0.39

Table 3-4. 2017 Habitat parameters (percentages)

Sampling Site	Pool	Riffle	Run		Sand	Gravel	Cobble	Boulder	Bedrock
L. Echo (EC-1)	30	15	55		20	50	20	10	0
L. Pyramid (PY-1)	30	25	45		25	40	15	10	10
Caples (CA-3)	25	25	50		10	70	20	0	0
Silver Fork (SV-4)	40	50	10		20	40	20	20	0
L. Alder (AR-1)	30	20	50		25	5	30	35	5
SF American (SO-2)	50	30	20		15	40	25	15	5

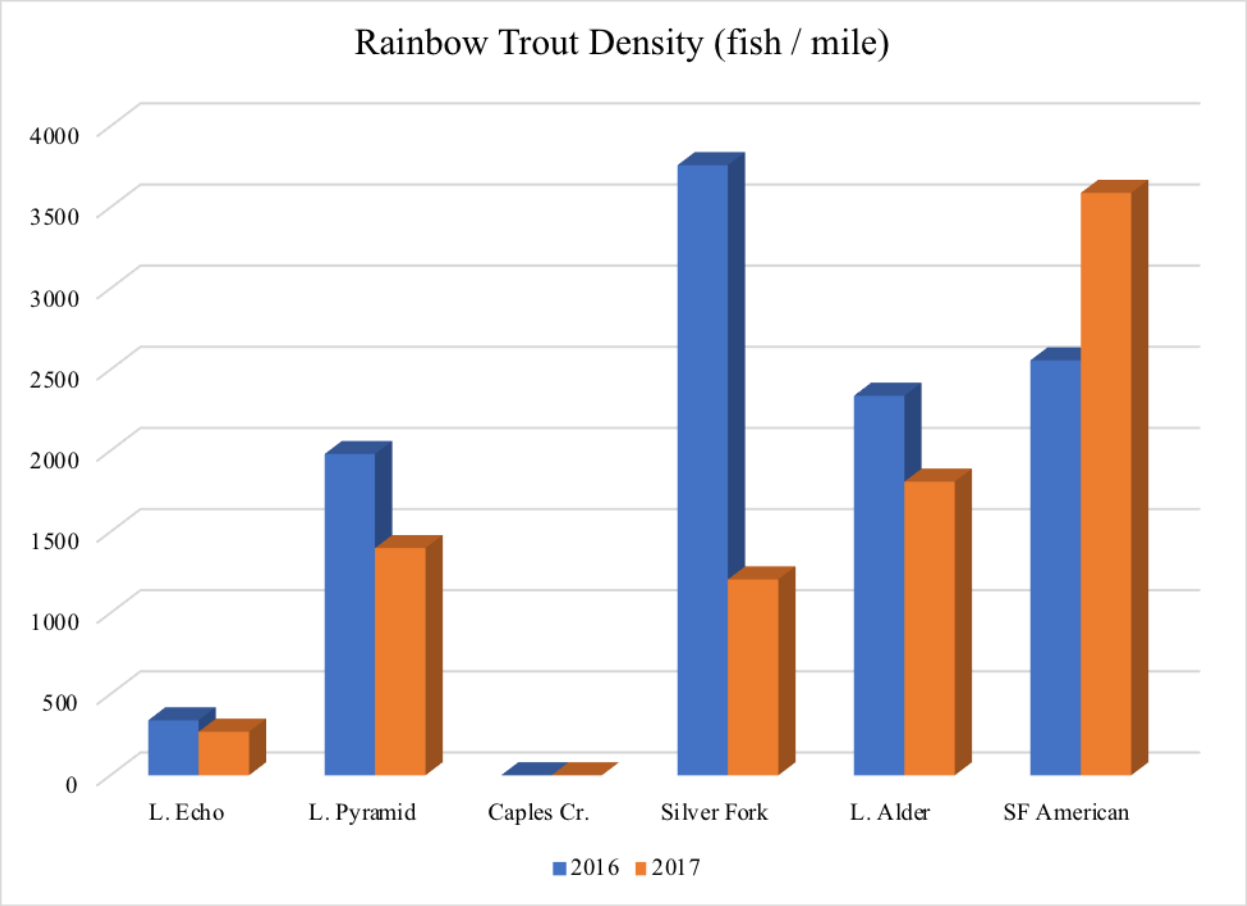

Figure 3-1. Comparison of Rainbow Trout Density (fish per mile) in 2016 and 2017.

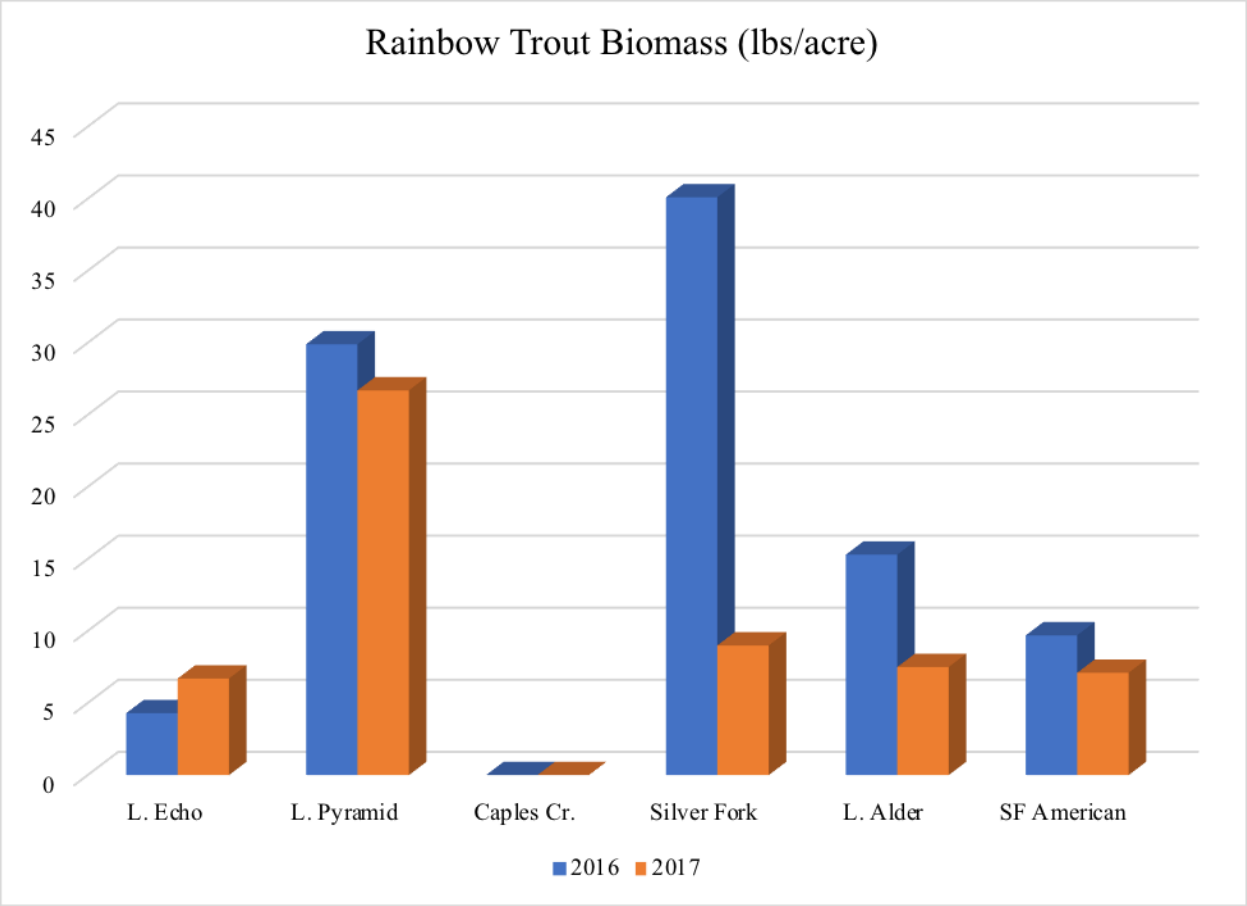

Figure 3-2. Comparison of Rainbow Trout Biomass (pounds per surface acre) in 2016 and 2017.

4.0 DISCUSSION

The Plan specifies biomass targets (pounds per surface acre) for Rainbow Trout as the objective metric for evaluating the health of the six project streams. Rainbow Trout were chosen as the indicator of habitat quality because Rainbow Trout are a Forest Management Indicator Species. The objective as specified by the Plan is that the means developed from sampling efforts conducted in 1998, 1999, 2000, 2001, and 2002 do not decrease by more than 20 percent. A comparison of 2011-2012 and 2016-2017 monitoring data relative to the ecological resource objectives are provided in Table 4-1. A comparison of the Rainbow Trout biomass through time is presented in Table 4-1. The first 5-year study period (Period 1) is represented by data from 2011 and 2012; the second 5-year study period (Period 2) is represented by data from 2016 and 2017.

Mean biomass was higher in 2016 than in 2017 at most sites. At most sites the biomass in 2017 was lower than in 2011, and slightly higher than in 2012. Rainbow Trout were not present at the Caples Creek site in 2011, 2016, or 2017. Mean Rainbow Trout biomass estimates for the second 5-year study period (Period 2) were less than the biomass objective at four sites: Lower Echo Creek (EC-1), Caples Creek below Kirkwood (CA-1), Lower Alder Creek (AR-1), and South Fork American River below Carpenter Creek (SO-2).

Table 4-1. Comparison of Rainbow Trout biomass (pounds per surface acre) between study years/periods.

Sampling Site	Biomass Objective	**Δ20 % Threshold**	2011 Biomass	2012 Biomass	**Period 1 Mean**	2016 Biomass	2017 Biomass	**Period 2 Mean**
L. Echo (EC-1)	11.8	**9.4**	3.5	2.4	**2.9**	4.3	6.7	**5.7**
L. Pyramid (PY-1)	6.5	**5.2**	38.8	8.7	**23.7**	29.9	26.7	**28.3**
Caples (CA-3)	9.1	**7.3**	0	0.1	**0.1**	0	0	**0**
Silver Fork (SV-4)	19.7	**15.8**	27.4	8.4	**17.9**	40.1	9.0	**24.6**
L. Alder (AR-1)	74.6	**59.7**	42.2	8.2	**25.2**	15.3	7.5	**11.4**
SF American (SO-2)	33.9	**27.1**	20.6	12	**16.3**	9.7	7.1	**8.4**

Mean Rainbow Trout biomass estimates for the second 5-year study period (Period 2) exceeded the biomass objective at two sites: Lower Pyramid Creek (PY-1) and Silver Fork American River at Forgotten Flat (SV-4). Similar results were observed in 2011 and 2012 (Period 1), in which the same four sites were below Plan objectives and the same two sites exceeded Plan objectives.

5.0 RECOMENDATIONS

Based on 2011, 2012, 2016, and 2017 Rainbow Trout surveys, the following recommendations may be considered in future monitoring efforts:

1. Evaluate biomass and fish density for all species of trout, rather than Rainbow Trout alone. For example, Rainbow Trout comprise only approximately 10 percent of the overall trout in Echo Creek, and were not present at the Caples Creek site in 3 of the four years. Since the composition of Rainbow Trout with respect to all trout varies between sites, basing the metrics on the total trout biomass and density would provide an better representation of the trout population and community structure in each stream reach and may be a better indicator of the overall health of the cold-water ecosystem.
2. Consider relocating the monitoring site for Caples Creek to a location further downstream where, based upon ongoing monitoring by CDFW, Rainbow Trout are anticipated to be present in greater numbers. To the extent that Rainbow Trout are the target species of the monitoring, they should be present in the sites monitored. Rainbow Trout were only present in Caples Creek at the current monitoring site in one of the four years surveyed.
3. Consider modifying the mainstem SFAR site in size by either reducing overall length or sampling the main channel only. The current SFAR site was established in 2011 because there were no records of the study site location used during previous monitoring efforts. Deep pools (> 6 feet) are common in the SFAR downstream of Carpenter Creek, which limits potential site locations due to restrictions inherent to backpack electrofishing. The current site consists of a main channel and side channel and was selected because it contained riffle, run, and pool habitats that could, for the most part, be effectively sampled by backpack electrofishing. However, even under the best field conditions, the current site is physically challenging and poses a safety risk to survey staff due to the large and slippery substrate, deep water, and the overall length of the survey site. When establishing the site in 2011, crews made the survey site approximately 100 meters long because that is a standard length typical of this sampling method. This resulted in two 100 meter survey reaches, one 100 meter reach on the main channel and one 100 meter reach on the side channel). Reducing the overall length of the site or eliminating the side channel from the sampling effort would reduce the effort to that equivalent to one large site, as compared to what are effectively two large sites that need to be sampled in a single day.

The District plans to develop a proposal to implement these recommendations in future Rainbow Trout monitoring efforts. The District plans to distribute the proposal for review and consideration of approval to the FS, SWRCB, and ERC well in advance of the next monitoring effort, which is scheduled for 2021.

6.0 REFERENCES

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VanDeventer, J.S. and W.S. Platts. 1989. Microcomputer software system for generating population statistics from electrofishing data: users guide for Microtish 3.0. Gen. Tech. Rept. INT-254. USDA Forest Service, Intermountain Forest and Range Experiment Station, Ogden, UT. 29 p.

Appendix A

2017 Site Photos

Echo Creek (EC-1). Top looking downstream

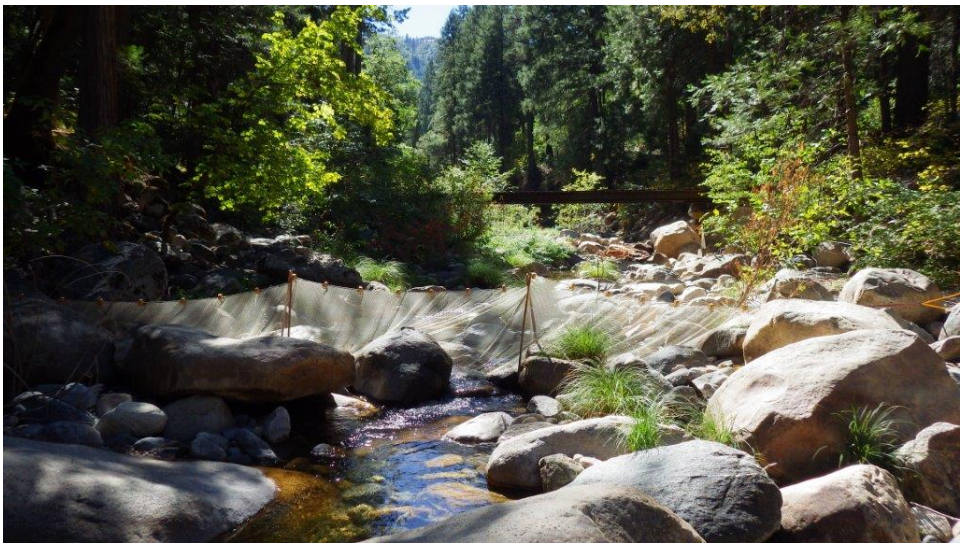
Echo Creek (EC-1). Bottom

Caples Creek (CA-3). Upstream net

Caples Creek (CA-3). Looking downstream from mid-site

Silver Fork (SV-4) Upstream net

Silver Fork (SV-4). Downstream net



Alder Creek (AR-1). Downstream net

South Fork American (SO-2). Looking upstream at the side channel.

South Fork American (SO-2). Looking upstream with side channel on the left and main channel on the right

Brook Trout from Caples Creek (CA-3)

Rainbow Trout from Silver Fork (SV-4)

Brown Trout from Silver Fork (SV-4)

Appendix B

2017 Field Datasheets

2017 EID ELECTROFISHING DATASHEET
Project 184

DATE: 9/21/

SITE ID: FC-1 **DESCRIPTION:** Fecho creek

UTM (BOTTOM): _____ UTM (TOP): _____

PERSONNEL: ARAMAYO, Kryzer

START/END TIME: 8:30 _____ START/END AIR TEMP: 32° _____

IN SITU WATER QUALITY

INSTRUMENT TYPE: YSI TIME: 8:49

WATER TEMP: 7.07 SPP COND/COND: 42/28 SAL: .02 TDS: 0.028

DO (CONC): 75.4 DO(SAT): 9.13 pH: 7.16 pHmV: -10.6 ORP: 215.3

SHOCKER DATA

#UNITS USED: 1 TYPE(S): SR-20b SETTINGS: 500V @35 F 30 duty

SHOCKER DURATION (seconds) PASS 1: 1180 PASS 2: 922 PASS 3: 648 PASS 4: _____

EFISHING NOTES: _____

_____

SITE CHARACTERISTICS

POOL/RIFFLE/RUN (%): 30 / 15 / 55 GRADIENT (%): 10% CANOPY (%): 35%

CLAY: 0 SILT: 0 SAND: 20 GRAV: 50 COBB: 20 BLDR: 10 BDRCK: 0

SHELTER/HABITAT RATINGS *(0= no cover; 1= 1-10%, 2= 11-20%; 3= 21-30%...etc...8= 71-80%9= 81-90%; 10= 91-100%)*

SURF TURB[1]: 1 OBJ COV[1]: 2 UND BANK[1]: 1 OVRHG VEG[1]: 2 SPAWN HAB[2]: 2

[1] *Estimated surface area providing cover for an 8" fish;* [2] *Estimated surface area suitable for trout spawning (see ratings above)*

X-SECTIONAL WIDTHS AND DEPTHS (11 transects evenly spaced) TOTAL SITE LENGTH (m): _____

STATION (m)	0	9	18	27	36	45	54	63	72	81	90
WIDTH (m)	3.8	5.1	7.4	4.6	4.2	6.8	9.4	4.5	4.8	3.9	3.5
¼ DEPTH (m)	.11	.31	.25	.13	.09	.23	.08	.13	.21	.28	.19
½ DEPTH (m)	.06	.15	.27	.10	.07	.22	0	.13	.05	.06	.05
¾ DEPTH (m)	.12	.54	.21	.06	.08	.2	.05	.09	.2	.05	.2

FISH LENGTH/WEIGHT DATA PER PASS BY SPECIES: SITE: TEC-1 DATE: 9/21/17

1st PASS

RBT		BRM		Sculpin		Bluegill		Redside		BROWN		1st PASS COUNT
L	W	L	W	L	W	L	W			51	1	
147	39	238	172	82	8	138	68	135	25	56	2	
155	45	55	2	87	9	138	62			60	2	
48	0.5	65	3	77	6	143	60			57	2	
93	11	117	17	60	3	143	69			58	2	
44	.5	61	3	46	1	128	44			41	1	
167	46	118	20	51	2					55	2	
126	18	122	20	80	6					50	2	
162	48	125	22	83	7					60	2	
122	18	182	75	62	3					50	[redacted]	1
105	13	201	107	53	3					100	11	
58	2	135	27	55	2					77	4	
		137	30	68	4					58	2	
		131	25	70	10					52	1	
		97	9	52	3					62	3	
		131	19	50	2					105	13	
		59	2	48	2					58	2	
		128	23	62	4					51	2	
		170	60	78	6					61	2	
		62	3							62	3	
		55	2							60	2	
		111	13							57	2	
		60	2							62	2	
		66	4							60	2	
		107	12							51	1	
		55	1							181	69	
		108	13							65	23	
		104	14							60	2	
		60	2							55	1	
		118	17							60	3	
		52	2							49	1	
		46	0.5							48	1	
		60	3							58	2	
		49	1							55	1	
		59	2							59	2	
		64	3							60	2	
		64	3							60	2	
		130	45									
		50	2									
		57	2									
		60	2									
		49	1									

POSS CUT THROAT →

FISH LENGTH/WEIGHT DATA PER PASS BY SPECIES: SITE: EC-1 DATE: 9-21-17

2ND PASS

RBT	
L	W
105	13
112	16
112	16
170	68

BRN	
L	W
113	15
69	4
64	3
60	2
63	3
47	1
59	2
44	1
52	1
116	16
62	3
52	1
120	24
101	11
60	2

SCULPIN	
L	W
78	6
75	5
80	6
20	[illegible]
70	7
68	4
52	2
55	3
26	1
62	3

BROWN (cont)	
120	17
65	3
65	3
121	22
68	3
51	1
58	3
54	2
59	2
60	2
54	2

3RD PASS

RBT	
L	W

BROWN	
L	W
209	96
150	40
61	2
108	14
105	13
56	2
56	2
58	2
134	26
61	3
130	25
125	22

SCULPIN	
L	W
67	4
45	1
63	3
69	4
71	4
75	6
58	3

2017 EID ELECTROFISHING DATASHEET

Project 184

DATE: 9 Oct 2017

SITE ID: Pyramid Creek DESCRIPTION: P4-1

UTM (BOTTOM): ______ UTM (TOP): ______

PERSONNEL: RA, CB,

START/END TIME: ______ START/END AIR TEMP: ______

IN SITU WATER QUALITY

INSTRUMENT TYPE: YSI TIME: 10:00

WATER TEMP: 7.37°C SPP COND/COND: 27 SAL: ______ TDS: ______

DO (CONC): ~~7.05~~ 9.30 DO(SAT): 78.0 pH: 7.79 pHmV: ______ ORP: ______

SHOCKER DATA

#UNITS USED: ______ TYPE(S): Smith Root 20-B SETTINGS: ______

SHOCKER DURATION (seconds) PASS 1: 725 694 PASS 2: 585 630 PASS 3: 385 488 PASS 4: ______

EFISHING NOTES: ______

SITE CHARACTERISTICS

POOL/RIFFLE/RUN (%): 30 / 25 / 45 GRADIENT (%): 2% CANOPY (%): 35%

CLAY: 0 SILT: 0 SAND: 25 GRAV: 40 COBB: 15 BLDR: 10 BDRCK: 10

SHELTER/HABITAT RATINGS *(0= no cover; 1= 1-10%, 2= 11-20%; 3= 21-30%...etc...8= 71-80%9= 81-90%; 10= 91-100%)*

SURF TURB[1]: 1 OBJ COV[1]: 1 UND BANK[1]: 1 OVRHG VEG[1]: 2 SPAWN HAB[2]: 1

[1] *Estimated surface area providing cover for an 8" fish;* [2] *Estimated surface area suitable for trout spawning (see ratings above)*

X-SECTIONAL WIDTHS AND DEPTHS (11 transects evenly spaced) TOTAL SITE LENGTH (m): ______

w

STATION (m)	0	1	2	3	4	5	6	7	8	9	10	
WIDTH (m)		9.7	6.5	8.75	6.9	7.5	5.7	5.5	4.6	7.8	10.05	
¼ DEPTH (m)		.31	.76	.41	.19	.46	.02	.15	.35	.03	.23	RB
½ DEPTH (m)		.45	.58	.64	0	.28	.35	.20	.61	.13	.28	
¾ DEPTH (m)		.46	.26	.10	.11	.02	.75	.22	.29	.16	.25	LB

FISH LENGTH/WEIGHT DATA PER PASS BY SPECIES: SITE: Pyramid DATE: 9 Oct 2014

PASS 1

Rbt L	Rbt W	Brn L	Brn W
160	52g	145	39g
125	25g	190	73
183	70g	154	41
155	40	130	22
211	98		
133	27		
145	33		
100	12		
177	66		
157	40		
81	5		
162	48		
90	5		
78	4		
84	6		
123	17		
105	13		
84	6		
117	19		
135	25		
97	9		
91	10		
89	8		
82	7		
136	27		

Pass 2

Rbt L	Rbt W	BRN L	BRN W
135	22	121	21
127	25		
79	5		
146	31		
116	16		
150	36		
138	31		
165	42		
83	~~46~~ 47		
78	3		
144	31		
124	22		
85	8		
99	9		
124	22		
124	20		
120	30		
126	22		
137	28		
130	23		
150	34		
88	7		

Pass 3

Rbt L	Rbt W	BRN L	BRN W
235	130	126	24
132	29		
124	19		
124	22		
140	33		
110	20		
78	7		
103	13		
112	16		
95	9		
148	36		
82	6		

2017 EID ELECTROFISHING DATASHEET
Project 184

DATE: 9/29/17

SITE ID: Garden Creek DESCRIPTION: _____

UTM (BOTTOM): _____ UTM (TOP): _____

PERSONNEL: Arsenault, C. Breon, G. Lewis, R. Jackman, _____

START/END TIME: 1038 START/END AIR TEMP: _____

IN SITU WATER QUALITY

INSTRUMENT TYPE: ~~Smith~~ TIME: _____

WATER TEMP: _____ SPP COND/COND: _____ SAL: _____ TDS: _____

DO (CONC): _____ DO(SAT): _____ pH: _____ pHmV: _____ ORP: _____

SHOCKER DATA

#UNITS USED: 2 TYPE(S): Smith Root 20-B SETTINGS: _____

SHOCKER DURATION (seconds) PASS 1: 817 774 PASS 2: 754 632 PASS 3: 523 543 PASS 4: _____

EFISHING NOTES: _____

_____

SITE CHARACTERISTICS

POOL/RIFFLE/RUN (%): 25 / 25 / 50 GRADIENT (%): 10% CANOPY (%): 0

CLAY: ~ SILT: — SAND: 10 GRAV: 70 COBB: 20 BLDR: 0 BDRCK: —

SHELTER/HABITAT RATINGS *(0= no cover; 1= 1-10%, 2= 11-20%; 3= 21-30%...etc...8= 71-80%9= 81-90%; 10= 91-100%)*

SURF TURB[1]: 1 OBJ COV[1]: 2 UND BANK[1]: 3 OVRHG VEG[1]: 1 SPAWN HAB[2]: 84

[1] Estimated surface area providing cover for an 8" fish; [2] Estimated surface area suitable for trout spawning (see ratings above)

X-SECTIONAL WIDTHS AND DEPTHS (11 transects evenly spaced) TOTAL SITE LENGTH (m): 104

STATION (m)	1	2	3	4	5	6	7	8	9	10	11
(feet) WIDTH (m)	41'	23'6"	35.8	31'11"	13.6	26.3	24.3	34.4	23.8	20.3	15.8 (inches)
¼ DEPTH (m)	dry	1.35	.14	.25	.6	.59	.22	.43	.21	.33	.25
½ DEPTH (m)	0.06	1.32	dry	.1	.48	.28	.22	.32	.27	.55	.36
¾ DEPTH (m)	.28	0.36	.05	.32	.20	.12	.16	.02	.27	.40	.32

(meters)

FISH LENGTH/WEIGHT DATA PER PASS BY SPECIES: SITE:_____ DATE: 9/29/17

pass 1

Brown trout		Brook trout			Brown		Brook		Brown		Brook	
					pass 2				pass 3			
L (mm)	W (g)	L (mm)	W (g)	notes	L	W	L	W	L	W	L	W
230	157	~~70~~	3		~~233~~	~~149~~	233	149	265	236	212	109
		241	162	♂	215	112	171	64			153	44
		81	6				172 ~~197~~	70			141	30
		62	3				188	79			142	32
		164	48				168	61			86	7
		61	2				142	31			69	3
		42	<1				61	2			61	3
		152	48				49	2			49	<1
		120	21				76	5				
		52	1				60	3				
		61	2				71	3				
		52	<1	Dead			74	4				
		65	3	dead			53	2				
		70	4				68	3				
		65	3				73	2				
		52	2				68	2				
		71	3				70	4				
		70	4				63	3				
		68	3									
		48	<1									
		156	41									
		125	27									
		70	3									
		64	2									
		76	4									
		69	3									
		77	5									
		52	3									
		60	3									
		58	2	DEAD								

2017 EID ELECTROFISHING DATASHEET
Project 184

DATE: 10-10-17

SITE ID: SV-4 DESCRIPTION: Silver fork - Forgotten Flat

UTM (BOTTOM): _____ UTM (TOP): _____

PERSONNEL: IAC, KDW, BJK, KRM, RAA, CB

START/END TIME: _____ START/END AIR TEMP: _____

IN SITU WATER QUALITY

INSTRUMENT TYPE: YSI TIME: _____

WATER TEMP: _____ SPP COND/COND: _____ SAL: _____ TDS: _____

DO (CONC): _____ DO(SAT): _____ pH: _____ pHmV: _____ ORP: _____

SHOCKER DATA

#UNITS USED: 2 TYPE(S): Smith Root 20b SETTINGS: _____

SHOCKER DURATION (seconds) PASS 1: 1412 / 1167 PASS 2: 1131 / 921 PASS 3: 822 / 937 PASS 4: _____

EFISHING NOTES: _____

SITE CHARACTERISTICS

POOL/RIFFLE/RUN (%): 40 / 50 / 10 GRADIENT (%): 2 CANOPY (%): 15

CLAY: 0 SILT: 0 SAND: 20 GRAV: 50 COBB: 20 BLDR: 20 BDRCK: 0

SHELTER/HABITAT RATINGS *(0= no cover; 1= 1-10%, 2= 11-20%; 3= 21-30%...etc...8= 71-80%9= 81-90%; 10= 91-100%)*

SURF TURB[1]: 2 OBJ COV[1]: 2 UND BANK[1]: 1 OVRHG VEG[1]: 1 SPAWN HAB[2]: 1

[1] Estimated surface area providing cover for an 8" fish; [2] Estimated surface area suitable for trout spawning (see ratings above)

X-SECTIONAL WIDTHS AND DEPTHS (11 transects evenly spaced) TOTAL SITE LENGTH (m): 100

STATION (m)	0	10	20	30	40	50	60	70	80	90	100
WIDTH (m)	10.4	6.2	8.4	9.4	9.5	15.4	18.3	15.9	10.8	9.9	10.0
¼ DEPTH (m)	42	62	31	11	20	34	50	52	78	91	19
½ DEPTH (m)	49	61	35	31	25	30	23	65	65	122	35
¾ DEPTH (m)	39	29	16	35	38	21	DRY	DRY	39	91	32

FISH LENGTH/WEIGHT DATA PER PASS BY SPECIES: SITE: SV-4 DATE: 10-10-17

RAINBOW		BROWN		RAINBOW		BROWN		RAINBOW	
LGTH	WGT	LGTH	WGT	LGTH	WGT	LGTH	WGT	LGTH	WGT
173	61	86	7	190	45	135	28	48	2
142	32	138	29	68	4	135	27	62	3
175	60	149	34	52	1	85	7	78	4
125	23	88	9	125	23	79	5	119	16
112	19	130	25	109	17			109	13
58	3	85	8	120	21			128	23
127	25			134	25			154	49
146	40			118	17			160	52
55	1			60	2			122	19
158	48			141	35			133	30
60	2			100	13			PASS #3	
131	27			64	2				
122	19			122	22				
59	2			82	6				
104	12			62	3				
124	21			52	2				
55	2			66	4				
105	13			60	3				
112	16			60	3				
118	20			53	2				
63	3			133	30				
60	3								
63	2			PASS #2					
114	19								
115	16								
57	2								
57	2								
65	3								
77	5								
48	1								
52	2								
103	12								
62	2								
115	11								
PASS #1									

JAR 1473 1131
KOW 11167 925

2017 EID ELECTROFISHING DATASHEET
Project 184

DATE: 9/27/17

SITE ID: AR-1 DESCRIPTION: Alder Creek

UTM (BOTTOM): ______ UTM (TOP): ______

PERSONNEL: Rob Arramayo, Cynthia Breene, Brylon Dacdon

START/END TIME: 1100 START/END AIR TEMP: ______

IN SITU WATER QUALITY

INSTRUMENT TYPE: YSI 556 TIME: 1125

WATER TEMP: 12.1°C SPP COND/COND: 48 mS cm³ SAL: ______ TDS: ______

DO (CONC): 9.0 mg/L DO(SAT): ______ pH: 7.9 pHmV: ______ ORP: ______

SHOCKER DATA

#UNITS USED: 2 TYPE(S): Smith Route 20B SETTINGS: 500V; 35 freq; 30% duty cycle

SHOCKER DURATION (seconds) PASS 1: ~~2233~~ 4026 PASS 2: ~~[illegible]~~ 1159 PASS 3: ~~629~~ 882 PASS 4: NA

EFISHING NOTES: No Salt was Used

SITE CHARACTERISTICS

POOL/RIFFLE/RUN (%): 30 / 20 / 50 GRADIENT (%): 1 CANOPY (%): 15

CLAY: 0 SILT: 0 SAND: 25 GRAV: 5 COBB: 30 BLDR: 35 BDRCK: 5

SHELTER/HABITAT RATINGS *(0= no cover; 1= 1-10%, 2= 11-20%; 3= 21-30%...etc...8= 71-80%9= 81-90%; 10= 91-100%)*

SURF TURB[1]: 1 OBJ COV[1]: 2 UND BANK[1]: 1 OVRHG VEG[1]: 1 SPAWN HAB[2]: 1

[1] *Estimated surface area providing cover for an 8" fish;* [2] *Estimated surface area suitable for trout spawning (see ratings above)*

X-SECTIONAL WIDTHS AND DEPTHS (11 transects evenly spaced) TOTAL SITE LENGTH ~~(m)~~: 359 ft =

STATION (m)	1	2	3	4	5	6	7	8	9	10	11
WIDTH (m)	8ft	11'4"	27ft	30'8"	29'5"	33'7"	31'9"	20'3"	11ft	13'7"	22'
¼ DEPTH (m)	1m	1.09m	1.5m	0.58m	0.21m	0.12m	0.12m	0.22m	0.00	0.15m	0.11
½ DEPTH (m)	1.35m	0.87m	1.5m	0.87m	0.28 m	0.01m	0.00m	0.25m	0.20m	0.09m	0.12m
¾ DEPTH (m)	1.28m	0.77m	1.42m	0.59m	0.25m	0.28m	0.22m	0.00	0.31m	0.11m	0.00m

~~1.3.5~~

~~12.4~~

11

FISH LENGTH/WEIGHT DATA PER PASS BY SPECIES: SITE: Alder DATE: 27 Sept 2017

PASS 1

	Rbt			Roach			S. chev			RBT			Roach	
	L	W		L	W		L	W		L	W		L	W
1	58	2g		39	<1		70	5		120	22		25	<1
	95	9		33	<1		73	5		70	4		35	<1
2	59	2		39	<1		61	3		67	3		28	<1
3	69	4		37	<1		69	4		55	2			
4	65	3		38	<1	3g	68	5		55	2			
5	60	3		28	<1		60	3		67	3			
6	52	2		30	<1		63	3		126	24			
7	59	2		31	<1		73	5		61	3			
8	82	6		25	<1					56	3			
9	73	4		36	<1					58	2			
10	59	2		36	<1					70	3			
11	59	2		37	<1					46	1			
12	52	2		37	<1					70	5			
13	62	2		30	<1					62	3			
14	52	2		34	<1					64	3			
15	62	3		25	<1					139	27			
	58	2		37	<1					124	—			
	53	1		71	5					123	22			
	153	38		28	<1					63	2			
	47	1		23	<1					105	14			
	59	2		80	9					49	2			
	60	2		85	8									
	75	5		39	<1									
	58	4		32	<1									
	65	3		35	<1									
	52	2		95	13									
	80	6		31	<1									
	51	1		30	<1	3g								
	65	3		35	<1									
	57	2		38	<1									
	75	4		40	<1									
	60	3		37	<1									
	43	1		35	<1									
	53	2	dead	35	<1									
	52	2		101	14									
	108	16		75	7									
	71	4		35	<1									
	90	9		84	11									

FISH LENGTH/WEIGHT DATA PER PASS BY SPECIES: SITE: Alder DATE: 27 Sept 2012

PASS 2

Rbt L	Rbt W
60	2(9)
42	1
64	2
63	2
51	1
75	5
56	2
70	5
65	3
60	3
63	3
49	2
60	2
64	2
50	2
60	2
59	2
102	11
60	2
150	35
106	13
60	3
68	3
64	2
62	3
51	2
65	3
63	3
51	2
65	3
68	3
60	2
60	3
49	1
70	4

Roach L	Roach W	
90	11	
26	<1	
39	<1	
38	<1	
29	<1	
78	6	
40	<1	DEAD
40	<1	
32	<1	
35	<1	
28	<1	
29	<1	
25	<1	
30	<1	
35	<1	
30	<1	
40	<1	
93	12	
20	<1	
30	<1	

Sucker L	Sucker W	
114	20	
30	<1	
50	2	DEAD
68	4	
58	3	

PASS 3

Rbt L	Rbt W	
45	1	Dead
54	2	
146	36	
55	2	
55	2	
63	2	
58	2	
65	3	
57	2	
41	<1	
47	2	
65	2	
59	2	
75	5	

Roach L	Roach W
36	<1
43	<1
32	<1
35	<1
32	<1
40	<1
39	<1
36	<1
30	<1
42	<1
45	<1

Sucker L	Sucker W
140	35
55	2

882
629

2017 EID ELECTROFISHING DATASHEET

Project 184

DATE: 9-28-17

SITE ID: SO-2 DESCRIPTION: SF American River below Carpenter Creek

UTM (BOTTOM): _____ UTM (TOP): _____

PERSONNEL: BK, RS, KM, KW, RA, BD, CH, CB

START/END TIME: _____ START/END AIR TEMP: _____

IN SITU WATER QUALITY

INSTRUMENT TYPE: _____ TIME: _____

WATER TEMP: _____ SPP COND/COND: _____ SAL: _____ TDS: _____

DO (CONC): _____ DO(SAT): _____ pH: _____ pHmV: _____ ORP: _____

SHOCKER DATA

#UNITS USED: 4 TYPE(S): HalTech HT2000 SmithRoot 2017 SETTINGS: _____

SHOCKER DURATION (seconds) PASS 1: 917 KDW 1321 REJ 878 BD NOREAD BJK PASS 2: 1 SIDECHANNEL 1197 1023 REJ PASS 3: 2123 REJ 696 KDW 840 RAM PASS 4: 3 SIDECHANNEL 857 REJ 812 KDW

EFISHING NOTES: _____

PASS 2: 2030 KDW, 653 BD, 855 REJ, • NO READ GL; SIDECHANNEL 1061, 1368

SITE CHARACTERISTICS

POOL/RIFFLE/RUN (%): 50 / 30 / 20 GRADIENT (%): 1% CANOPY (%): 15%

CLAY: 0 SILT: 0 SAND: 15 GRAV: 40 COBB: 25 BLDR: 15 BDRCK: 5

SHELTER/HABITAT RATINGS *(0= no cover; 1= 1-10%, 2= 11-20%; 3= 21-30%...etc...8= 71-80%9= 81-90%; 10= 91-100%)*

SURF TURB[1]: 2 OBJ COV[1]: 2 UND BANK[1]: 1 OVRHG VEG[1]: 1 SPAWN HAB[2]: 1

[1] *Estimated surface area providing cover for an 8" fish;* [2] *Estimated surface area suitable for trout spawning (see ratings above)*

X-SECTIONAL WIDTHS AND DEPTHS (11 transects evenly spaced) TOTAL SITE LENGTH (m): 100

101.4
99.7

MAIN

STATION (m)	0	10	20	30	40	50	60	70	80	90	100
WIDTH (m)	21.0	23.7	21.9	18.2	20.1	16.4	17.3	14.6	13.7	15.2	11.8
¼ DEPTH (m)	25	27	29	36	62	72	63	64	31	36	40
½ DEPTH (m)	48	42	DRY	43	61	60	60	104	55	72	56
¾ DEPTH (m)	115	78	38	55	38	13	72	57	41	50	58
SIDECHANNEL	8.2	9.1	7.3	6.8	9.8	10.0	11.8	14.6	11.8	9.1	8.0
	21	27	45	39	46	49	25	19	35	60	94
	40	21	28	52	22	23	25	17	60	64	64
	30	29	45	70	41	28	35	48	50	33	10

FISH LENGTH/WEIGHT DATA PER PASS BY SPECIES: SITE:_____ DATE: 9-28-17

SUCKER		RAINBOW		BROWN		RAINBOW		RAINBOW		SUCKER		RAINBOW		DACE	
LGTH	WGT	LGTH	WGT	LGTH	WGT	LGTH	WGT	LGTH	WGT	LGTH	WGT	LGTH	WGT	LGTH	WGT
167	53	65	3	165	51	120	22	73	6	175	67	183	63	91	14
110	17	58	2	↓SIDE CHANNEL↓		170	56	65	3	190	95	194	76	↓ SIDE CHANNEL ↓	
81	9	52	1	61	3	120	18	67	5	161	57	168	49		
150	43	205	110			45	1	190	79	192	91	180	57		
165	70	115	19			128	26	78	6	218	129	80	5		
228	154	143	38	DACE (MAIN)		67	5	58	2	190	89	132	24	RAINBOW	
195	106	170	49	LGTH	WGT	60	2 Mort	175	56	171	68	45	1	LGTH	WGT
150	44	52	4	89	12	57	2	52	1	171	74	121	23	↓ SIDE CHANNEL ↓	
125	28	76	5	75	5	120	18	58	3	131	34	59	3	74	5
155	46	132	29			80	7	178	63	161	58	120	23	39	<1
135	32	78	6			74	4	170	34	151	45	78	7	84	7
170	47	122	22			95	13	74	5	110	19	79	7	68	4
85	9	137	25			50	1	68	3	↓ SIDE CHANNEL ↓		62	8	59	3
210	105	51	1			50	1	185	67	168	52	60	3	65	2
205	117	118	16			74	4	47	1	136	33	74	5	57	2
175	59	140	29			170	53	122	20			139	26	65	2
167		170	64			45	1	70	5			201	87	46	3
63		49	1			55	2	53	1			124	22	133	26
1		148	38			175	6	62	3			60	1		
↓SIDE CHANNEL↓		113	16			49	2	78	5			55	1		
140	41	145	36			61	3	70	4			49	1		
50	3	170	67			64	3	185	67			80	3		
		67	5			↓SIDE CHANNEL↓		56	2			54	2		
		160	54			52	2	200	81			70	5		
		175	59			55	2	81	7			40	1		
		68	5			70	5	200	79			146	35		
		135	34			73	5	70	5			↓ SIDE CHANNEL ↓			
		170	46			48	1	80	6			56	1 Mort		
		67	7			52	2	115	16			138	32		
		155	47			50	2	175	60			79	6		
		61	2			180	70	95	7			122	18		
		68	4			68	5	67	4			77	5		
		62	3			120	21	48	1			56	2		
		62	3			75	5	78	7			131	27		
		48	1			59	2	78	5			55	2		
		175	65			78	5	45	1			68	4		
		75	4			73	5					75	5		
		53	1			48	1					47	1		
		60	3			63	3					80	6		
		133	28			74	6					49	1		
		75	5			120	13					71	4		

— PASS #1 —

PASS #2

FISH LENGTH/WEIGHT DATA PER PASS BY SPECIES: SITE:_____ DATE: 9-08

RAINBOW		SUCKERS	
LGTH	WGT	LGTH	WGT
262	189	211	136
118	20	210	138
70	3	158	54
79	6	125	20
70	6	137	37
114	17	144	41
62	3	159	51
62	2	121	23
80	6	164	63

MIRT

SIDE CHANNEL

RAINBOW		DACE	
LGTH	WGT	LGTH	WGT
158	47	75	6
50	1		
123	32		
48	1		
78	10		
72	6		
67	5		
78	6		
61	3		
77	6		
78	5		
58	2		

PASS #3