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Kern River No. 3 Hydroelectric Project 2023 Fish Population Monitoring Report – Draft

Southern California Edison Company
FERC Project No. 2290-006

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Cover photos: Top–fish monitoring on the North Fork of the Kern River, 2023; bottom–Sacramento sucker captured during fish monitoring on the North Fork of the Kern River, 2023.

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LIST OF ACRONYMS AND ABBREVIATIONS

Abbreviation/Acronym	Definition
μS/cm	microsiemen per centimeter
ºC	degrees Celsius
CDFW	California Department of Fish and Wildlife
FERC	Federal Energy Regulatory Commission
Forest Service	U.S. Department of Agriculture, Forest Service
GPS	Global Positioning System
KR3 Project	Kern River No. 3 Hydroelectric Project, FERC Project 2290
m	meter
m^2	square meter
mg/L	milligram per liter
mm	millimeter
NFKR	North Fork Kern River
Plan	Kern River No. 3 Project Fish Monitoring Plan
SCE	Southern California Edison
YOY	young-of-the-year

1 INTRODUCTION

1.1 Background

Southern California Edison (SCE) owns and operates the Kern River No. 3 Hydroelectric Project, Federal Energy Regulatory Commission (FERC) Project No. 2290 (KR3 Project), located along the North Fork Kern River (NFKR) near the town of Kernville in Kern and Tulare counties, California. The KR3 Project is classified as a run-of-the-river hydroelectric project with a total installed capacity of 40.2 megawatts. The KR3 Project is located on both private lands owned by SCE and on National Forest System lands within the Sequoia National Forest managed by the U.S. Department of Agriculture, Forest Service (Forest Service).

FERC issued the current operating license for the KR3 Project on December 24, 1996. Article 411 of the license required that SCE develop a fish monitoring plan in consultation with the Forest Service, California Department of Fish and Wildlife, U.S. Fish and Wildlife Service, and the U.S. National Parks Service (ENTRIX 1997). Article 411 states the following:

> Within six months from the date of issuance of this license, the Licensee shall file with the Commission for approval a plan to monitor fish populations (Monitoring Plan). The Monitoring Plan shall include, but not be limited to, an implementation schedule, standard techniques for assessing fish populations, and sampling fish populations in 5 locations once every 5 years for the term of the license. The monitoring shall be 100 meter stations using techniques similar to those utilized in studies conducted for Exhibit E of the Licensee's application. A report shall be provided to the signatory agencies to the Settlement Agreement and to the Commission within 120 days of the end of each reporting period.
>
> The Licensee shall prepare the Monitoring Plan after consultation with the California Department of Fish and Game, the U.S. Forest Service, U.S. Fish and Wildlife Service, and the U.S. National Park Service....

In May 2004, FERC issued a final order that amended the license to include the final Forest Service 4(e) conditions, per Section 4(e) of the Federal Power Act. Forest Service 4(e) Condition No. 5, *Fish and Wildlife Plan*, provided additional specifications on the fish population monitoring effort on the NFKR. The relevant portion of Condition No. 5 states the following:

> The Licensee [SCE] shall monitor fish populations in five locations along the Kern River. Two sites above the diversion, two sites between the diversion and Goldledge Campground and one site in the lower portion of the diverted reach. Monitoring should consist of standard techniques for assessing fish populations. The methods used should be similar to those used for preparation of Exhibit E for this process. Monitoring shall be conducted at each station every five years during the term of the license. Sampling should be conducted during the fall. A plan for monitoring must be agreed to by the agencies and the Licensee.

In response to these license requirements, SCE filed the Kern River No. 3 Project Fish Monitoring Plan (Plan) (ENTRIX 1997) with FERC on June 23, 1997. The Plan was subsequently approved by FERC Order on October 7, 1997. The principal objective of the monitoring program, as described in the Plan, is to provide information on the abundance of fish near the KR3 Project area over time.

Fish population monitoring was conducted in October 1998, 2006, 2011, and 2016. Subsequent monitoring scheduled for October 2021 was postponed due to storms and runoff in the Windy Fire burn scar, which resulted in high flows and turbidity that prevented safe and effective sampling. Monitoring was postponed again in 2022 due to substantial rainfall resulting in high turbidity in the river that prevented effective sampling. With agency concurrence, SCE postponed scheduled monitoring until 2023 to allow for safe and effective monitoring conditions, and updated methodologies to allow for better comparisons across sites.

1.2 Study Area Description

The study area includes two monitoring sites located upstream of Fairview Dam and four monitoring sites located in the bypassed reach of the NFKR between Fairview Dam and the KR3 Powerhouse, including one site, Headquarters, located near Headquarters Campground added in 2023 (Table 1-1, Figure 1-1).

Monitoring sites from the Plan were either located within the same, or nearby, habitat units surveyed during prior surveys. Global Positioning System (GPS) coordinates and habitat unit lengths were used to verify site locations, and in general, the reach length was set to match the length of the habitat units measured in 2011 and 2016. However, the electrofishing site at Roads End was moved upstream by 530 feet in 2023 due to higher flows and deep (>4 feet) sections preventing effective electrofishing at the previously sampled site. Additionally, as agreed upon during agency consultation, the Hospital Flat snorkel site was extended and an additional site near Headquarters Campground was added, both to include deeper pool habitats to target adult hardhead.

GPS coordinates (Universal Transverse Mercator World Geodetic System 84) at the upstream and downstream ends of each survey reach were recorded (Table 1-1). Photos of each study site were taken from the upstream end and downstream end of each unit, and any elements of interest were documented.

Table 1-1. Fish monitoring site locations, 2023.

Site	Survey Method	Upstream End		Downstream End	
		Longitude	Latitude	Longitude	Latitude
Above Johnsondale Bridge	Direct Observation	35.97889	-118.484456	35.978204	-118.484812
Above Fairview Dam	Direct Observation	35.962542	-118.478541	35.962468	-118.477918
Roads End	Electrofishing	35.931173	-118.487633	35.931146	-118.488376
	Direct Observation	35.930793	-118.489818	35.93053	-118.490430
Goldledge	Electrofishing	35.877787	-118.457151	35.877273	-118.457582
	Direct Observation	35.879219	-118.456503	35.878615	-118.456738
Hospital Flat	Electrofishing	35.828006	-118.461338	35.827539	-118.462027
	Direct Observation	35.826287[1]	-118.464183[1]	35.825306[1]	-118.464732[1]
		35.834439	-118.453381	35.834194	-118.453576
Headquarters	Direct Observation	35.798184[1]	-118.452164[1]	35.796702[1]	-118.451798[1]

[1] An additional deep pool was sampled in 2023 to target adult hardhead habitat.

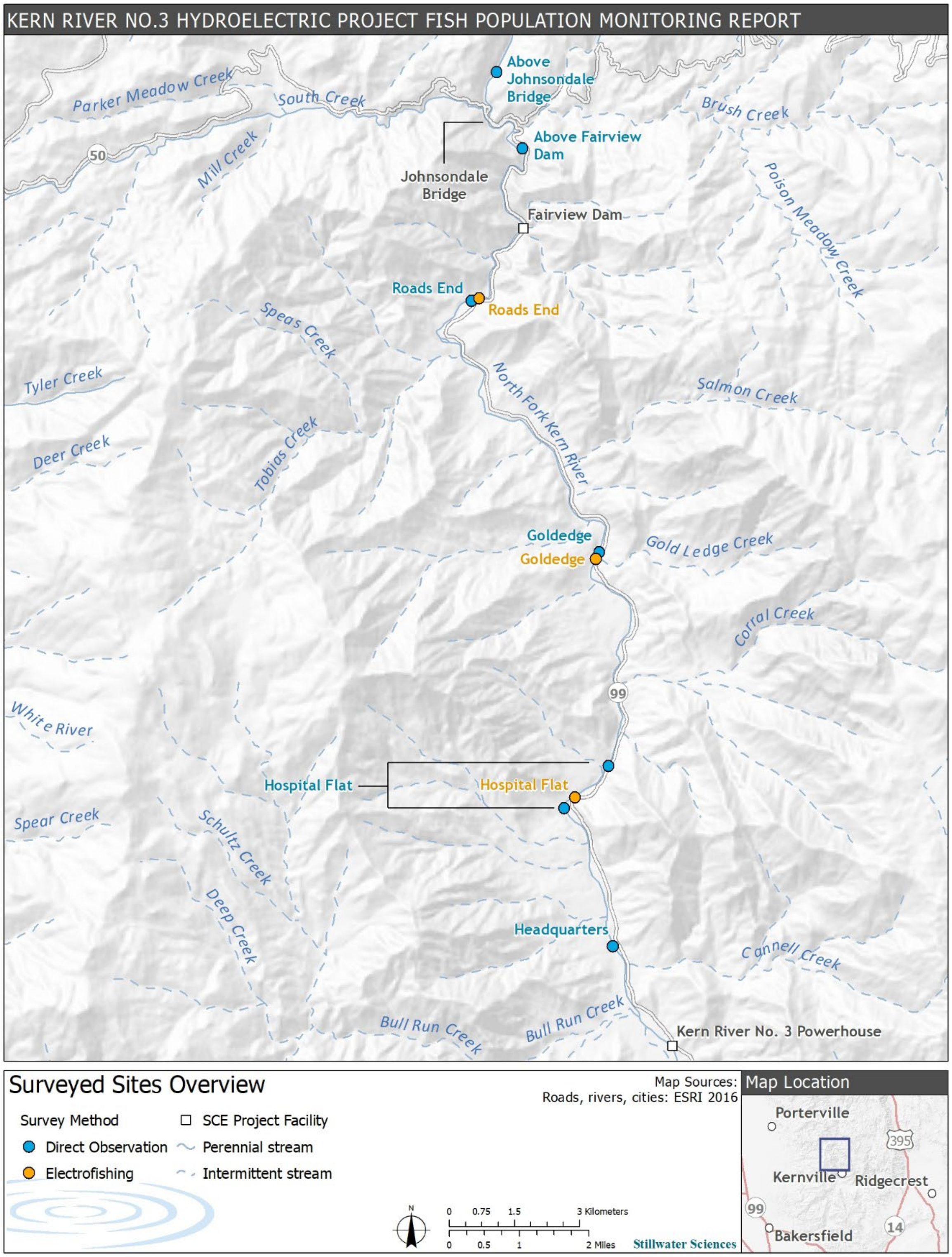


Figure 1-1. Fish monitoring site locations, North Fork Kern River, 2023.

2 METHODS

A team of five to seven biologists from Stillwater Sciences (Stillwater) conducted fish population monitoring on October 4–12, 2023, using multiple-pass electrofishing and multiple-pass direct observation (snorkeling) techniques. The analyses used for the 2023 assessment combined data from prior survey years and results were standardized to more commonly used units. Sampling and analytical methods are described in more detail below.

2.1 Stream Habitat

Habitat data were collected at each electrofishing and direct observation site. Data collected at each site included stream channel length, width, depth, gradient, substrate composition, habitat type, and fish cover types. Sampling site length and channel width were measured using a laser range finder. The channel widths were measured at 11 equidistant cross-sections at each sampling site, with the first and last cross-sections at the upstream and downstream limits of the sampling unit. Depths were measured using a stadia rod at one-quarter, one-half, and three-quarters of the distance across each of the width cross-sections from the right to left bank. Stream gradient (water surface slope) over the total length of each sampling site was measured using a clinometer.

Stream habitat, fish cover, and substrate types were visually estimated by percent surface area of the total sampling site. Stream *habitat* types were defined as:

- *Pool* habitat included areas with nearly zero velocity and relatively deep/pooled water;
- *Run* habitat included areas with uniform, laminar flow and moderate depth;
- *Riffle* habitats included areas with shallow depth and visible surface turbulence; and
- *Pocket water* included areas where eddies or scour holes are formed behind boulders or other large instream objects in a moderate- to fast-moving stream section.

Fish *cover* types include surface turbulence, instream objects, undercut bank, and overhanging vegetation within 48 inches of the water surface. The *substrate* types, distinguished by size in millimeters (mm), were:

- Organic debris or vegetation
- Fine sediment (less than 2 mm)
- Sand (2 to 8 mm)
- Gravel (8 to 75 mm)
- Cobble (75 to 305 mm)
- Boulder (greater than 305 mm)
- Bedrock

A Yellow Springs Instrument Professional Plus water quality meter was used to measure water temperature (degrees Celsius [°C]), dissolved oxygen (milligrams per liter [mg/L]), pH (standard units), and conductivity (microsiemen per centimeter [µS/cm] to °C) at each sampling site. Streamflow upstream and downstream of Fairview Dam was estimated for each day of surveying from SCE gages.

2.2 Electrofishing

Quantitative electrofishing surveys were conducted at three sites downstream of Fairview Dam following a multiple-pass depletion protocol (comprehensive sampling) described by Reynolds (1996), in which captured fish are temporarily removed from the sample site during sequential passes and returned to the stream once sampling is completed. Biologists used 1/8-inch mesh block nets to prevent migration into and out of the sample site and to facilitate an accurate assessment of the sample population. The electrofishing crew consisted of seven biologists—two to three biologists were equipped with Smith-Root LR-24 or LR-20 backpack electrofishing units, and the remaining biologists were responsible for netting fish. Electrofishing unit settings were selected at the beginning of the first pass at each sample site using an auto-run feature and were adjusted based on fish response.

Captured fish were placed in 5-gallon buckets equipped with aerators, and then transferred to a large, aerated holding tank for processing. No anesthetic was applied to the captured fish. All captured fish longer than 40 mm were identified to species, measured for length to the nearest millimeter fork length, and weighed to the nearest tenth of a gram. When large numbers of a fish species less than 40 mm were encountered, a subsample of at least 50 fish were measured to fork length and weighed; the remaining fish were counted and, if trout, were weighed in bulk. Each fish processed was examined for disease or injury and its condition noted on the field datasheets. Scale samples were collected from rainbow trout (*Oncorhynchus mykiss*) for age determinations, and the origin of each rainbow trout was determined to be either wild or hatchery by visually assessing wear on fins and/or stubbed rostrums (snouts). Scale samples from captured trout were taken from above the lateral line just below the dorsal fin and stored in labeled envelopes indicating sample site, date, species, and fork length.

2.3 Direct Observation Sampling

Direct observation sampling was conducted via snorkeling at all monitoring sites by a team of five biologists. Snorkel surveys were conducted in habitats that were too deep to effectively sample by electrofishing. Daytime underwater visibility was determined at each site immediately prior to the snorkel survey. Visibility was determined by measuring the horizontal distance (feet) from which a diver could see a Secchi disk facing into the sun and facing away from the sun. Prior to sampling, all divers observed a graduated rod to calibrate length estimations and familiarized themselves with local species traits in a non-sampling pool. Consistent with prior monitoring years, direct observations of fish were grouped into the following total length size classes: 0–3, 3–6, 6–12, 12–16, and 16+ inches.

The stream channel was visually divided into swimming lanes parallel to the direction of stream flow. Where possible, divers swam upstream in an aligned group approximately 6 feet apart. Snorkelers identified, counted, and made visual total-length estimates of fish within their respective lanes while moving at a slow, uniform pace.

At the monitoring site Above Johnsondale Bridge, high flows prevented snorkelers from swimming upstream in the middle of the channel, and the river right bank was not safely accessible. Consequently, two snorkelers floated from the upstream extent of the unit down the middle of the channel, while the left bank was surveyed from downstream to upstream. Only the portion of the stream surveyed was included in the density and biomass estimates.

Three repeat passes were made through each site to account for variability among observations and to allow for bounded count population estimates. Upon completion of the survey, fish observations were compiled and recorded on datasheets. Small cyprinids less than 40 mm long that could not be adequately identified during snorkel surveys as either hardhead (*Mylopharadon conocephalus*) or Sacramento pikeminnow (*Ptychocheilus grandis*) were classified as "mixed minnow."

2.3.1 Snorkeling Methods Comparison

The first snorkel site was surveyed in both daylight and at night. A comparison of night and day snorkeling results was then made to determine the most effective survey timing for the remainder of the direct observation monitoring sites. Direct observation sampling for the methods comparison was conducted following the protocols described in Section 2.3 above, within 1 day of each other, and within the same unit boundaries. The number of fish observed, species composition, and size class distribution were compared between day and night snorkeling to determine the survey timing that provided the most accurate and comprehensive observation totals.

2.4 Analysis

2.4.1 Population Estimates

Fish capture data from each electrofishing pass were tallied for focal species (rainbow trout, Sacramento sucker [*Catostomus occidentalis*], and Sacramento pikeminnow) and entered into MicroFish 3.0 (Van Deventer and Platts 1989), where a maximum-likelihood, k-pass removal method was used to estimate population size and generate 95% confidence intervals.

At electrofishing sites where depletion numbers did not allow use of the maximum likelihood estimator (i.e., low counts, or where the number of fish observed during each subsequent pass did not decrease), the population estimate for the site was set to the total number of that species captured at the site. For sites where the lower bounds of the 95% confidence intervals were estimated to be lower than the total number of fish observed, the values of the lower bounds of the 95% confidence intervals were adjusted to equal the sum of fish captured during all passes.

Data collected during direct observation snorkel surveys were used to estimate population size using the bounded counts estimator (Robson and Whitlock 1964):

$$\widetilde{y}_B = d_{[m]} + (d_{[m]} - d_{[m-1]})$$

where $d_{[m]}$ is the maximum number of fish counted during any pass and $d_{[m-1]}$ is the second highest count; counts were arranged in ascending order as:

$$d_{[1]} \leq d_{[2]} \leq d_{[3]} \leq \cdots \leq d_{[m-1]} \leq d_{[m]}$$

Ninety-five percent confidence intervals were calculated for 2023 observations based on Robson and Whitlock (1964) and Routledge (1982), as cited in Mohr and Hankin (2005). The lower bound (N_L) was calculated as:

$$N_L = d_{[m]}$$

The upper bound (N_U) was calculated as:

$$N_U = d_{[m]} + [(1-\alpha)/\alpha] \cdot [d_{[m]} - d_{[m-1]}]$$

where *α* is the level of significance (i.e., *α*=0.05 for calculation of a 95 percent confidence interval) unless $d_{[m]} = d_{[m-1]}$, in which case the upper bound for the confidence interval is equivalent to the abundance estimate, and the coverage probability for the confidence interval tends to be poor (Robson and Whitlock 1964). In these instances, an adjustment proposed by Routledge (1982) provides improved coverage probabilities to the confidence intervals used, where upper bound is estimated as:

$$N_U = d_{[m]} + (1-\alpha)/(\alpha f)$$

where *f* is the number of times that the highest dive count is repeated.

Assumptions underlying the use of the bounded counts estimator include:

- No fish are double-counted on any given pass.
- All fish present can be observed.
- Diver observation probability is constant over all *m* dives.

2.4.2 Species Densities, Biomass, and Age Class Distribution

Density and biomass data from prior monitoring reports were standardized to commonly used units (i.e., number of fish per acre and pounds per acre of stream). Where no population estimates were available from single-pass snorkel surveys during prior monitoring years, the total number of fish observed was used in lieu of the population estimate to calculate minimum density and biomass estimates. Where population estimates were available, density estimates were calculated for target species from the population estimates of the site divided by the site surface area:

$$\text{Density (number/acre)} = \frac{\text{Site population estimate}}{\text{Site surface area (acre)}}$$

Biomass estimates (pounds per surface acre) were calculated for individual trout species at each site using multiple pass regression analysis software developed by Van Deventer and Platts (1989).

Biomass per acre (*B.ac*) was calculated as:

$$\hat{B}.ac = \overline{w} \cdot \hat{d} \text{ ,}$$

where $\overline{w}$ is the average fish weight and $\hat{d}$ is the estimated density for the segment.

Rainbow trout scales were analyzed using a dissecting microscope to allow annual rings, or annuli, to be distinguished for age estimation and to validate age/size class determinations according to methods described by Lux (1971).

3 RESULTS

3.1 Stream Habitat

Stream flow in 2023 at sites upstream of Fairview Dam ranged from 569 to 627 cubic feet per second (cfs) and from 83 to 84 cfs at the sites downstream of Fairview Dam (Table 3-1). Water quality conditions indicated well oxygenated water with temperatures from 10 to 18ºC and moderately low conductivity. Runs were the most prevalent habitat type within the sites, and surface turbulence and instream objects provided the most fish cover. Underwater visibility during direct observation surveys ranged from 6 to 32 feet facing the sun and 5 to 18 feet facing away from the sun. Physical habitat, water quality, and habitat characteristics measurements are provided for each sampling site in Table 3-1.

Representative photos of monitoring sites are provided in Appendix A. Summary tables of habitat data are provided in Appendix B.

Table 3-1. Habitat and water quality measurements at monitoring sites, 2023.

Site	Above Johnsondale Bridge	Above Fairview Dam	Roads End		Goldledge		Hospital Flat		Headquarters
Sampling Method	Direct Obs.	Direct Obs.	Electrofish	Direct Obs.	Electrofish	Direct Obs.	Electrofish	Direct Obs.	Direct Obs.
Date	Oct. 6	Oct. 4	Oct. 9	Oct. 5	Oct. 7	Oct. 5	Oct. 11	Oct. 5, 6	Oct. 7
Streamflow and Site Dimensions									
Approximate streamflow (cfs)	569	627	83	84	83	84	83	84, 84	83
Site length (m)	83.0	50.6	65.1	62.9	72.4	71.8	82.0	171.7	169.0
Mean width (m)	24.3	32.9	17.8	17.6	26.2	20.1	26.4	24.2	31.4
Surface area (m^2)	2,017	1,665	1,159	1,107	1,897	1,443	2,165	4,155	5,307
Mean depth (m)	1.0	1.1	0.5	0.7	0.4	0.8	0.6	0.9	1.0
Maximum depth (m)	1.8	2.0	1.1	1.2	0.9	1.2	1.4	2.6	2.2
Gradient (%)	<1	3	<1	3	1.5	1	<1	1	0
Water Quality									
Time	11:47	16:29	11:15	11:00	10:25	14:53	12:46	16:31	11:17
Water temperature (ºC)	11.4	13.1	12.9	12.1	13.1	15.4	13.4	17.7	12.1
Conductivity (µS/cm to °C)	68.4	69.6	77.7	71.2	108.0	108.4	108.3	114.8	71.2
Dissolved oxygen (mg/L)	10.97	10.18	10.34	11.80	9.39	10.6	9.42	9.42	11.80
Habitat Type (% of site)									
Pool	0	0	0	0	5	0	30	5	100
Run	95	50	95	10	5	85	70	0	0
Riffle	0	50	5	0	90	0	0	0	0
Pocket water	5	<1	0	90	0	15	0	95	0

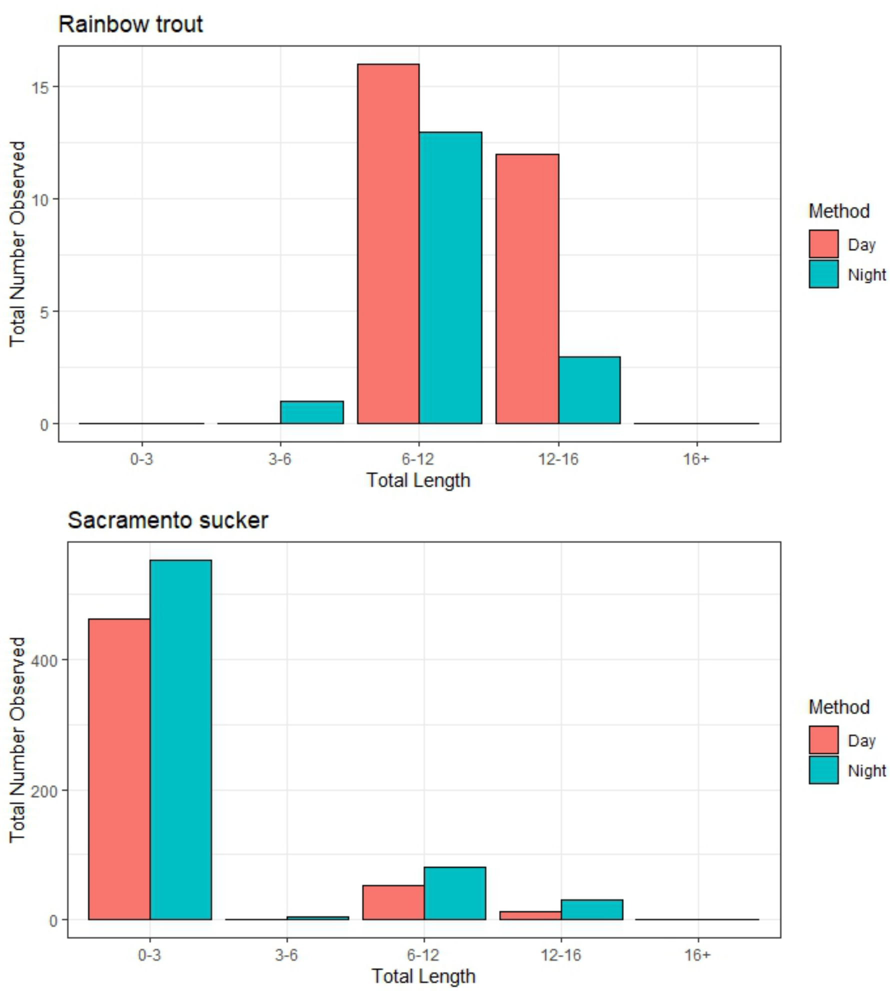
Site	Above Johnsondale Bridge	Above Fairview Dam	Roads End		Goldledge		Hospital Flat		Headquarters
Sampling Method	**Direct Obs.**	**Direct Obs.**	**Electrofish**	**Direct Obs.**	**Electrofish**	**Direct Obs.**	**Electrofish**	**Direct Obs.**	**Direct Obs.**
Date	**Oct. 6**	**Oct. 4**	**Oct. 9**	**Oct. 5**	**Oct. 7**	**Oct. 5**	**Oct. 11**	**Oct. 5, 6**	**Oct. 7**
Fish Cover (% of site)									
Surface turbulence	<5	30	<1	45	30	15	0	30	0
Instream object	0	0	25	0	11	<1	31	10	0
Undercut bank	<1	0	<1	0	5	<1	0	5	5
Overhanging vegetation	<1	<1	0	0	1	0	0	0	<1
Substrate (% of site, visual estimates)									
Organic debris / vegetation	0	<1	NA	0	NA	<1	NA	0	0
Fines (<2 mm)	0	<1	0	0	0	<1	0	0	5
Sand (2–7 mm)	15	<1	5	5	10	10	10	5	45
Gravel (8–75 mm)	0	5	0	0	5	<1	5	<1	0
Cobble (76–300 mm)	75	70	35	70	50	10	45	<1	35
Boulder (>300 mm)	5	20	35	70	50	10	35	90	10
Bedrock	5	5	0	0	5	5	5	5	0

Notes: °C = degree Celsius
< = less than
> = greater than
cfs = cubic feet per second
m = meter
m^2 = square meter
mg/L = milligram per liter
mm = millimeter

3.2 Snorkeling Methods Comparison

Results of an initial comparison of daytime and nighttime snorkeling at the Roads End direct observation site demonstrated little variability in species composition and abundance (Figure 3-1). Fish composition at the Roads End site during the methods comparison included rainbow trout and Sacramento sucker. Higher counts of rainbow trout between 6 and 16 inches in length were observed during daytime surveys, while slightly fewer Sacramento suckers of all size bins were observed during daytime surveys compared with nighttime surveys. Because there were no discernable patterns or benefits observed between the two methods, daytime snorkeling was conducted for the remainder of the effort considering survey logistics and safety.

The lower pool segment of the Hospital Flat snorkeling site was also resurveyed at night to ensure that no potential hardhead were missed during the daytime snorkeling effort; the same species composition was observed during day and night snorkeling efforts. Data for both surveys are included in Appendix C.



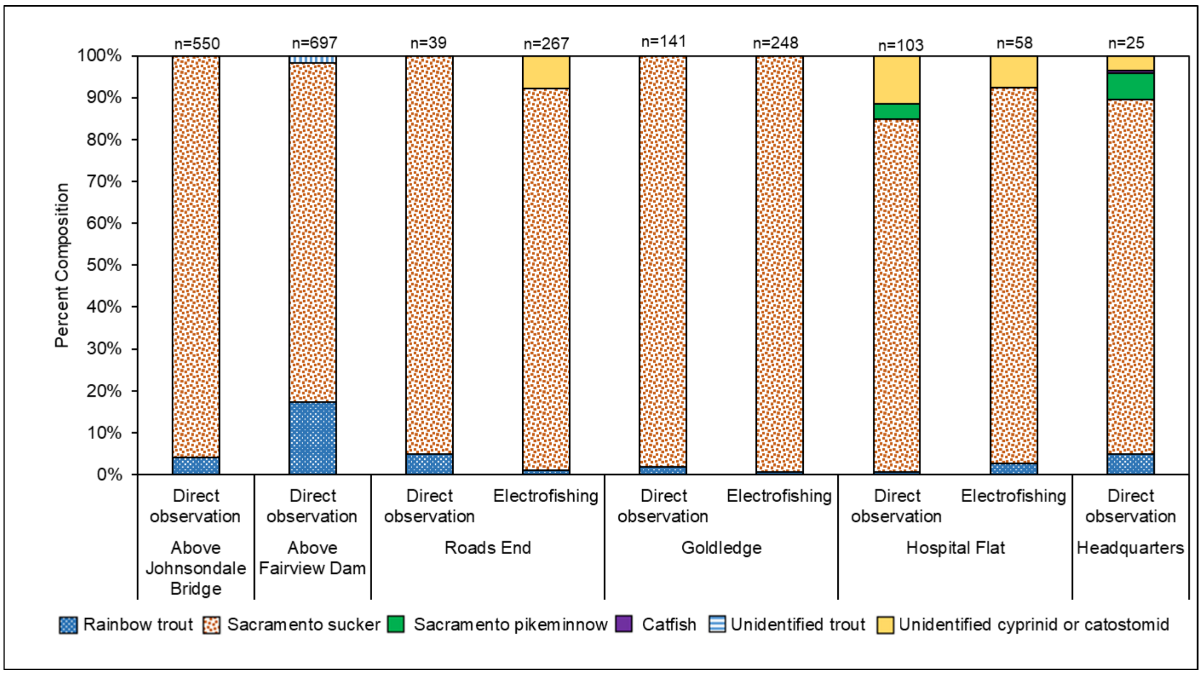
Note: For the methods comparison, the total number observed is the total number of fish observed across all snorkeling passes.

Figure 3-1. Comparison of fish species observed during daytime and nighttime snorkeling at the Roads End direct observation monitoring site, 2023.

3.3 Fish Species Composition and Distribution

Native Sacramento sucker and Sacramento pikeminnow, and non-native rainbow trout and catfish were observed during 2023 fish monitoring. Sacramento sucker was the dominant species observed across all sites in 2023 (Figure 3-2). A total of 61 rainbow trout were observed across all direct observation sites, where only one rainbow trout was captured at each electrofishing site. Sacramento pikeminnow were only observed at the two downstream-most sites. Catfish (channel catfish [*Ictalurus punctatus*] and unidentified catfish species) were observed for the first time during the Fish Population Monitoring efforts; however, they were observed only at the downstream-most site, which was added in 2023. Numerous larval fish were observed and identified as either cyprinid or catostomid during surveys. The total number of each fish species captured by electrofishing and highest count of each fish species observed during snorkeling at each of the sampling sites in 2023 is provided in Table 3-2. Individual fish capture and observation data are provided in Appendix C.

Although no brown trout (*Salmo trutta*) were observed during the 2023 surveys, one brown trout, with an estimated total length of 6 to 12 inches, was observed incidentally in a pool downstream of the monitoring site Above Fairview Dam during snorkeler calibration.



Note: Catfish includes channel catfish (*Ictalurus punctatus*) and unidentified catfish species.

Figure 3-2. Fish species composition at sites surveyed in the North Fork Kern River, 2023.

Table 3-2. Number of fish observed by electrofishing and direct observation at monitoring sites, 2023.

Site	Electrofishing[1]			Direct Observation[1]					
Species	**RBT**	**SKR**	**UNKC**	**RBT**	**PKM**	**SKR**	**UNKC**	**CAT**	**UNKT**
Above Johnsondale Bridge	NA			1	0	24	0	0	0
Above Fairview Dam	NA			10	0	47	0	0	1
Roads End	1	94	8	12	0	236	0	0	0
Goldledge	1	140	0	5	0	262	0	0	0
Hospital Flat	1	35	3	4	26	587	80	0	0
Headquarters	NA			29	37	497	21	4	0

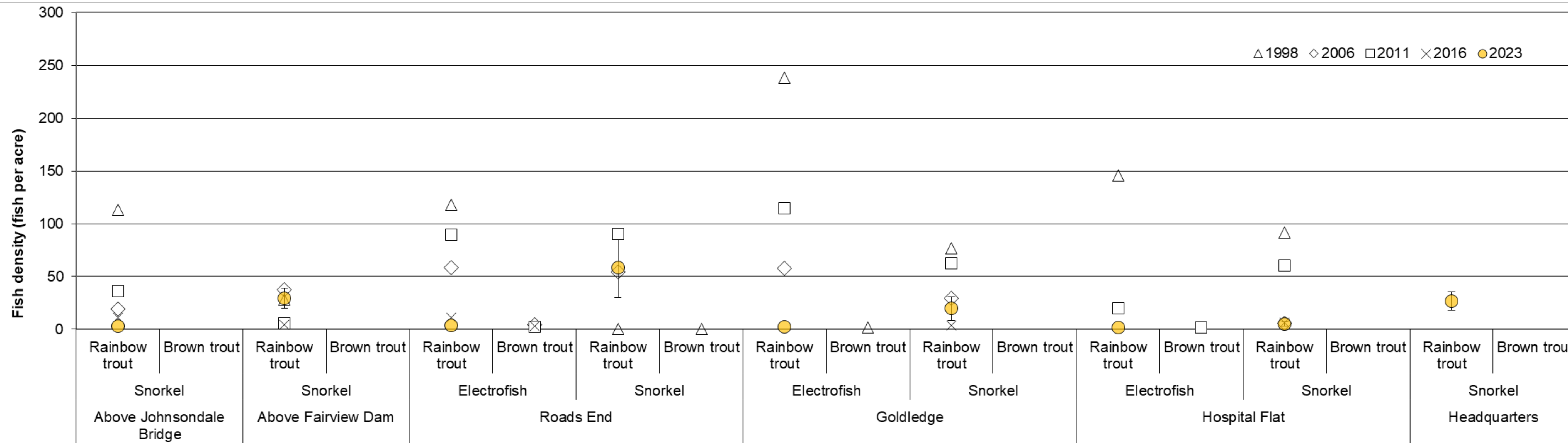
Notes: CAT = Catfish species
NA = Not applicable
PKM = Sacramento pikeminnow
RBT = Rainbow trout
SKR = Sacramento sucker
UNKC = Unidentified cyprinid (minnow) or catostomid (sucker)
UNKT = Unidentified trout

[1] The total number of fish captured (electrofishing) or highest count observed in one pass (snorkeling) by species was used to determine observation totals.

3.4 Population Density and Biomass

Trout densities were relatively low in 2023 compared with prior survey years, and densities show a consistently decreasing trend from 1998 to 2023 (Figure 3-3). While Sacramento pikeminnow have been observed in low numbers historically across all survey sites, they were absent from most sites in 2023 (Figure 3-4). Conversely, Sacramento sucker densities were relatively high at the deeper snorkel sites and relatively low to moderate at electrofishing sites, compared with prior survey years, with no discernable patterns over time (Figure 3-4).

Low trout biomass levels in 2023 generally reflect the few fish captured at electrofishing sites (Figure 3-5). Density, biomass, and trout condition data are provided in Appendix B.



Note: Confidence intervals could not be calculated for rainbow trout captured at electrofishing sites in 2023 due to low catch rates.

Figure 3-3. Estimated rainbow trout and brown trout densities (fish/acre) at electrofishing and direct observation (snorkel) sites in 1998 (ENTRIX 1999), 2006 (ECORP 2007), 2011 (SCE 2012), 2016 (SCE 2016), and 2023.

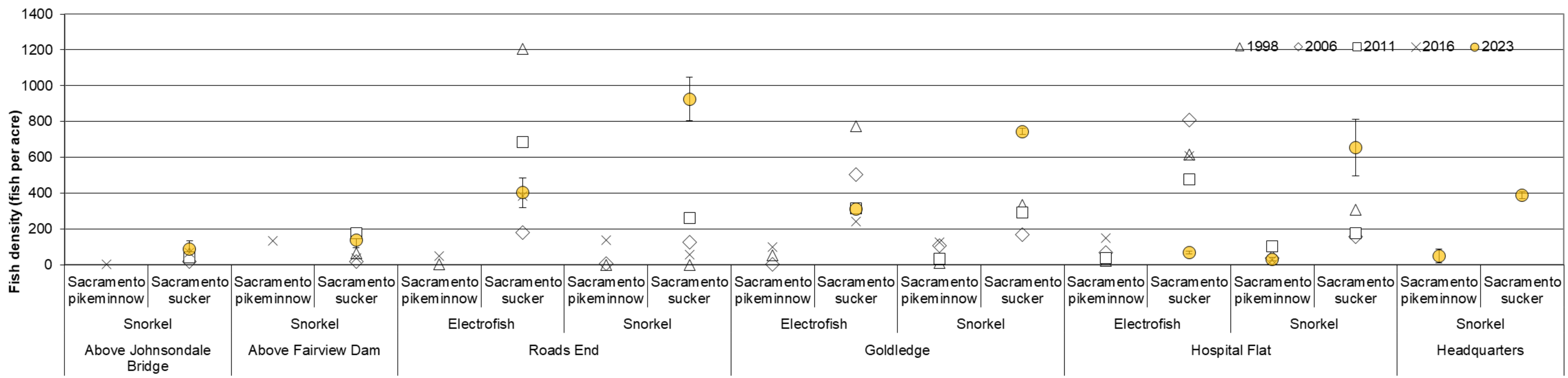
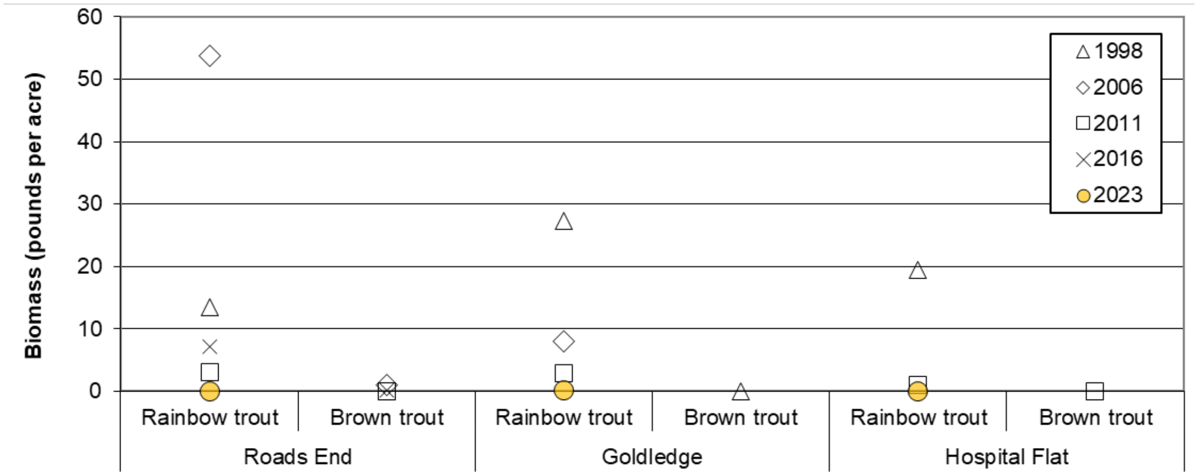


Figure 3-4. Estimated Sacramento pikeminnow and Sacramento sucker densities (fish/acre) at electrofishing and direct observation (snorkel) sites in 1998 (ENTRIX 1999), 2006 (ECORP 2007), 2011 (SCE 2012), 2016 (SCE 2016), and 2023.



Note: Confidence intervals could not be calculated for rainbow trout captured at electrofishing sites in 2023 due to low catch rates.

Figure 3-5. Trout biomass (pounds/acre) at electrofishing sites in 1998 (ENTRIX 1999), 2006 (ECORP 2007), 2011 (SCE 2012), 2016 (SCE 2016), and 2023.

3.5 Age Structure and Length Distribution

Rainbow trout showed an atypical age-class distribution, with most individuals observed within the 6- to 12-inch (153 to 305 mm) size class and no fish observed under 3 inches (75 mm), indicating low natural recruitment in 2023. This distribution may reflect recent fish stocking activities (discussed below in Section 4.1). The two rainbow trout captured at electrofishing sites in 2023 with fork lengths of 75 and 84 mm belonged to the young-of-the-year (YOY) age class, and the rainbow trout with a fork length of 248 mm belonged to the 2+ age class, according to scale analysis. These trout were in good condition and did not show any signs of hatchery marking (e.g., worn or deformed fins). The YOY trout appeared to be from natural spawning, which indicates limited recruitment in 2023.

Sacramento sucker showed a more typical age-class distribution, with most individuals observed falling within the 0- to 3-inch (0 to 75 mm) size class and fewer fish in the larger size classes. Sacramento sucker was the most abundant species observed in 2023 and included a large cohort of YOY and larval fish (Figure 3-2).

The Sacramento pikeminnow observed were all within the 6- to 12-inch (153 to 305 mm) size class, which would indicate low recruitment in 2023; however, it is possible that a portion of the 100+ unidentified cyprinids (minnows) or catostomids (suckers) were larval pikeminnow (Table 3-2, Figure 3-6).

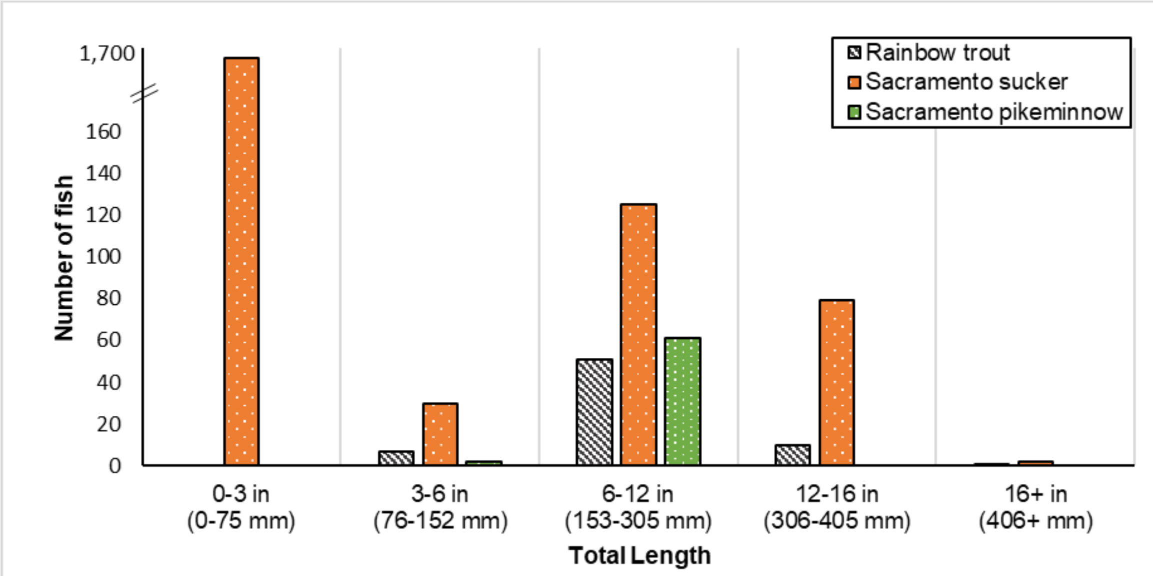


Figure 3-6. Length-frequency distribution of fish observed at electrofishing and direct observation sites, 2023.

4 DISCUSSION AND RECOMMENDATIONS

4.1 Discussion

4.1.1 Survey Conditions

Stream flows upstream of Fairview Dam (569–627 cfs) resulted in challenging conditions for direct observation surveys and required modifications of snorkeling methods within swift habitat. Additionally, although flows downstream of Fairview Dam were near minimum flow levels (80 cfs), conditions for backpack electrofishing at one location (Roads End) were nonetheless swift and deep, requiring the site to be shifted slightly upstream. These challenges and modifications to the methods and site location may have affected sampling effectiveness; however, a suitable alternative site was located near the original electrofishing site at Roads End, and all data were standardized to the survey area, which minimizes any effect of survey area changes.

4.1.2 Fish Populations

Portions of the NFKR are managed as a put-and-take trout fishery by CDFW (FERC and Forest Service 1996, CDFW 2021). CDFW regularly stocks the NFKR with catchable rainbow trout (i.e., trout weighing between 0.25 and 0.75 pound each), currently from the San Joaquin River Hatchery, and in 2023, more than 9,800 rainbow trout were released in the reach between Brush Creek (a tributary of the NFKR with its confluence upstream of Fairview Dam; see Figure 1-1) and the KR3 Powerhouse prior to the fish sampling effort (SCE 2021; Branch, pers. comm., 2024). Although relatively few trout were observed in 2023, most were rainbow trout within the catchable size group (e.g., 6–12 inches), likely reflecting the recent stocking within the reaches. Given the low numbers of rainbow trout observed both upstream and downstream of Fairview Dam, it is unclear if those fish dispersed outside of the survey areas during the higher flows in

2023, or whether high recreational fishing pressure removed the large quantities of stocked trout from survey reaches prior to the surveys.

Three naturally spawned rainbow trout were captured at electrofishing sites downstream of Fairview Dam, which are presumed to be from naturalized historical (non-sterile) stocked populations. Given that divers were unable to differentiate between naturally spawned and hatchery-appearing trout during snorkel surveys, it is possible that additional naturally spawned fish were present and unaccounted for at snorkel sites.

The limited recruitment of YOY rainbow trout in 2023 may also reflect the stocking of catchable-size trout within the study area. Between 2001 and 2020, an average of 41,100 rainbow trout were planted in the NFKR annually between Brush Creek and the KR3 Powerhouse (CDFW 2021). Although not native to the survey area, naturalized rainbow trout from historical stocked populations may be affected by the stocking of larger trout, which compete for resources and may prey upon smaller trout (Vincent 1987). Additionally, the stocking amounts, timing, and distribution of sterile versus non-sterile rainbow trout in the North Fork Kern River is uncertain (Branch, pers. comm., 2024). The stocking of sterile rainbow trout may decrease the overall fecundity of the remnant naturalized population, because the stocked sterile trout may unsuccessfully attempt to reproduce with naturalized non-sterile trout, decreasing the overall reproductive success of the local population (Knipling 1955). If a majority of stocked fish within the study reaches were sterile, this may have had an effect on natural recruitment in the reaches.

The limited recruitment of rainbow trout in 2023 could also reflect poor spawning conditions during the preceding five years of drought, including the second driest year on record in 2022, and/or flood-level flows in 2023. However, both rainbow trout and Sacramento suckers spawn in the spring and early summer, on the descending limb of the snowmelt runoff, and the suckers showed a strong recruitment of YOY fish in 2023, although their spawning timing appears to have been delayed.

While Sacramento pikeminnow were previously observed at all sites downstream of Fairview Dam, they were observed in 2023 only at the two downstream-most direct observation sites—Hospital Flat and Headquarters. Similarly, even with additional deep pool habitat sampled in the reach downstream of Fairview Dam, no hardhead were observed at any monitoring site in 2023 and have not been observed at monitoring sites in the NFKR since 1998.

4.2 Recommendations

Although the Plan originally included electrofishing upstream of Fairview Dam, the sites upstream of Fairview Dam were surveyed using only direct observation in 2006, 2011, 2016, and now 2023 due to flow conditions (either high-flow conditions, or as in 2016, to avoid undue stress to native fish during drought conditions) (ECORP 2007, SCE 2012, SCE 2016). In 2021, the resource agencies and SCE adopted prior recommendations to continue direct observation surveys upstream of Fairview Dam.

Given the large size of the NFKR and current population of suckers, stocked trout, and few other species, Stillwater Sciences found limited benefit to the electrofishing surveys and recommends any future monitoring include methods that can be implemented consistently across a greater range of flows. Direct observation may accommodate a greater range of flows; however, as experienced in 2021 and 2022, surveys may be affected by fall storm flows and increased turbidity. Therefore, Stillwater Sciences also recommends direct observation surveys occur earlier in summer, when not limited by other factors, such as high flows.

Continuing the three-pass snorkel methods, in lieu of multiple-pass electrofishing, would still allow for estimates of fish abundance and density. Although biomass could not be calculated for snorkel sites, information on biomass is available on stocked trout populations from stocking records. If adopted, Stillwater Sciences also recommends continuing the comparison of day/night snorkeling methods at the beginning of each monitoring year to establish the ideal survey timing under different hydrological conditions. Lastly, Stillwater Sciences recommends modifying the size bins for direct observation surveys to 25- or 50-mm size bins to allow for more precision in data analysis.

5 CONSULTATION

The draft 2023 Fish Population Monitoring Report was provided to CDFW, Forest Service, National Parks Service, and U.S. Fish and Wildlife Service on January 26, 2024, for review. No comments were received on the draft report.

Agency representatives from the Forest Service and CDFW attended a consultation meeting on February 14, 2024, to discuss the 2023 monitoring results and any preliminary comments. During the meeting, SCE presented a summary of monitoring results, discussion, and recommendations. Documentation of agency consultation, including attendees and notes from the consultation meeting, are included in Appendix D.

6 LITERATURE CITED

Branch, W. 2024. Personal Communication with William Branch (Senior Hatchery Supervisor, CDFW San Joaquin River Hatchery) regarding stocking practices and hatchery operations. January 2024.

CDFW (California Department of Fish and Wildlife). 2021. Historical Stocking Records for Kern River Sections 4, 5, and 6, 2001–2020.

ECORP (ECORP Consulting, Inc.). 2007. Kern River No. 3 Hydroelectric Project FERC No. 2290-006, Fish Population Monitoring 2006. Submitted to Southern California Edison Company.

ENTRIX (ENTRIX, Inc.) 1997. Fish Monitoring Plan. Prepared by ENTRIX, Inc., Walnut Creek, California for Southern California Edison, San Dimas, California.

ENTRIX. 1999. Kern River No. 3 Hydroelectric Project, FERC NO. 2290-006, Fish Population Monitoring 1998. Prepared by ENTRIX, Inc., Walnut Creek, California for Southern California Edison, San Dimas, California.

FERC and Forest Service (Federal Energy Regulatory Commission and U.S. Forest Service, Dept., of Agriculture).1996. Environmental Assessment for Hydropower License, Kern River No. 3 Hydroelectric Project, FERC Project No. 2290. FERC, Office of Hydropower Licensing, Washington, D.C. March.

Knipling, E. F. 1955. Possibilities of insect control of eradication through the use of sexually sterile males. Journal of Economic Entomology 48:459-462.

Lux, F. E. -1971. Age Determination of Fishes (Revised), U.S. Fish Wild Serv., Fish. Fishery Leaflet No. 637.

Mohr, M. S., and D. G. Hankin. 2005. Two-phase survey designs for estimation of fish abundance in small streams. Unpublished Manuscript. Preprint from D.G. Hankin, Department of Fisheries Biology, Humboldt State University, Arcata, California.

Reynolds, J. B. 1996. Electrofishing. Pages 83–120 *in* B. R. Murphy and D. W. Willis, editors. Fisheries techniques. Second Edition. American Fisheries Society, Bethesda, Maryland.

Robson, D. S., and J. H. Whitlock. 1964. Estimation of a truncation point. Biometrika 51: 33–39.

Routledge, R. D. 1982. The method of bounded counts: when does it work. Journal of Wildlife Management 46: 757–761.

SCE (Southern California Edison). 2012. Kern River No. 3 Hydroelectric Project, FERC No. 2290-006, Fish Population Monitoring 2011. Submitted to Southern California Edison Company, San Dimas, California.

SCE. 2016. Daily mean discharge in cubic feet/second for Water Year October 1999 through September 2016. Site 401 'Kern River near Kernville'; USGS # 11186000. Provided by Southern California Edison.

SCE. 2021. Kern River No. 3. Hydroelectric Project (FERC Project no. 2290), Pre-Application Document. Southern California Edison Company, San Dimas, California.

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.

Vincent, E. R. 1987. Effects of stocking catchable-size hatchery rainbow trout on two wild trout species in the Madison River and O'Dell Creek, Montana. North American Journal of Fisheries Management 7:91-105.

Appendices

Appendix A

Representative Photographs of Fish Monitoring Sites and Captured Fish

Figure A-1. Upstream end of direct observation site Above Johnsondale Bridge, looking downstream, North Fork Kern River, October 6, 2023.

Figure A-2. Downstream end of direct observation site Above Johnsondale Bridge, looking upstream, North Fork Kern River, October 6, 2023.

Figure A-3. Middle of direct observation site Above Fairview Dam, looking from river left, North Fork Kern River, October 4, 2023.

Figure A-4. Upstream block net at Roads End electrofishing site, looking downstream, North Fork Kern River, October 9, 2023.

Figure A-5. Downstream block net at Roads End electrofishing site, looking upstream, North Fork Kern River, October 9, 2023.

Figure A-6. Downstream end of Roads End direct observation site, looking upstream, North Fork Kern River, October 4, 2023.

Figure A-7. Roads End direct observation site, looking at downstream end, North Fork Kern River, October 4, 2023.

Figure A-8. Upstream block net at Goldledge electrofishing site, looking downstream, North Fork Kern River, October 7, 2023.

Figure A-9. Downstream block net at Goldledge electrofishing site, looking upstream, North Fork Kern River, October 7, 2023.

Figure A-10. Upstream end of Goldledge direct observation site, looking downstream, North Fork Kern River, October 5, 2023.

Figure A-11. Downstream end of Goldledge direct observation site, looking upstream, North Fork Kern River, October 5, 2023.

Figure A-12. Upstream end of Hospital Flat electrofishing site, looking downstream, North Fork Kern River, October 11, 2023.

Figure A-13. Downstream block net at Hospital Flat electrofishing site, looking upstream, North Fork Kern River, October 11, 2023.

Figure A-14. Upstream end of prior Hospital Flat direct observation site, looking downstream, North Fork Kern River, October 5, 2023.

Figure A-15. Downstream end of prior Hospital Flat direct observation site, looking upstream, North Fork Kern River, October 5, 2023.

Figure A-16. Upstream end of the Hospital Flat direct observation pool added in 2023, looking downstream, North Fork Kern River, October 6, 2023.

Figure A-17. Downstream end of the Hospital Flat pool direct observation pool, looking upstream, North Fork Kern River, October 6, 2023.

Figure A-18. Upstream end of Headquarters direct observation site, looking downstream, North Fork Kern River, October 7, 2023.

Figure A-19. Downstream end of Headquarters direct observation site, looking upstream, North Fork Kern River, October 7, 2023.

Figure A-20. Sacramento sucker (*Catostomus occidentalis*) captured at Roads End electrofishing site, North Fork Kern River, October 9, 2023.

Figure A-21. Sacramento sucker (*Catostomus occidentalis*) captured at Roads End electrofishing site, North Fork Kern River, October 9, 2023.

Figure A-22. Rainbow trout (*Oncorhynchus mykiss*) captured at Hospital Flat electrofishing site, North Fork Kern River, October 11, 2023.

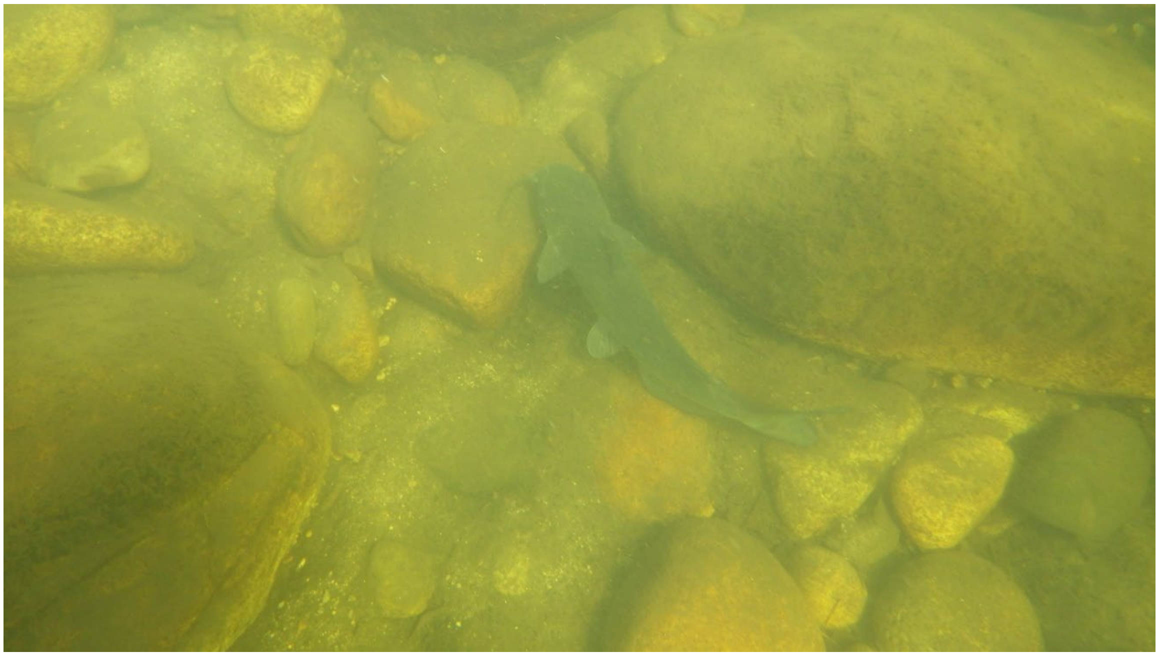


Figure A-23. Unidentified catfish species (*Ictalurus* spp.) observed at Headquarters direct observation site, North Fork Kern River, October 7, 2023.

Appendix B

Fish Population Surveys Data Summary Tables and Length-Frequency Histograms, 1998–2023

Table B-1. Physical habitat conditions at three electrofishing sites, North Fork Kern River, 1998, 2006, 2011, 2016, and 2023.

Parameter	Roads End					Goldledge					Hospital Flat				
Year sampled	1998	2006	2011	2016	2023[1]	1998	2006	2011	2016	2023	1998	2006	2011	2016	2023
Date	10/13	10/28	10/10	10/23	10/9	10/13	10/28	10/10	10/18	10/7	10/13	10/28	10/10	10/19	10/11
Time (military)	1015	1445	1150	1500	1115	1300	900	1202	1330	1025	1309	900	1033	1030	1246
Site Dimensions															
Site (reach) length (m)	70.0	100.0	105.0	94.2	65.1	75.0	60.0	66.0	73.2	72.4	82.0	90.0	90.0	82.8	82.0
Mean width (m)	14.4	17.6	18.4	15.3	17.8	27.0	27.8	28.1	26.7	26.2	30.9	29.1	29.2	27.0	26.4
Surface area (m^2)	1,014	1,760	1,935	1,437	1,159	2,040	1,666	1,848	1,952	1,897	2,543	2,619	2,617	2,232	2164.8
Mean Depth (m)	0.9	0.5	0.7	0.5	0.5	0.6	0.4	0.5	0.4	0.4	0.5	0.5	0.6	0.5	0.6
Maximum Depth (m)	1.3	0.9	1.3	0.9	1.1	1.1	1	1	0.8	0.9	1.3	1.7	1.4	0.9	1.4
Water Quality															
Water temperature (°C)	8	8.3	12	8.44	12.9	12	7.4	12.9	10.51	13.1	12	7.7	11.5	8.95	13.4
Specific conductivity (µS/cm)	70	71	87	192	101	100	85	122	218	140	100	85	128	219	139.2
Dissolved oxygen (mg/L)	9.8	10.3	10.8	10.3	10.34	9.4	11.4	8.4	10	9.39	9	11.1	9.8	10.5	9.42
Habitat Type (% of site)															
Pool	0	0	5	10	0	0	25	15	10	5	0	25	5	5	30
Run	100	65	40	30	95	40	35	25	25	5	25	75	80	80	70
Riffle	0	35	30	15	5	40	40	55	60	90	75	0	5	5	0
Pocketwater	0	0	25	45	0	20	0	5	5	0	0	0	10	10	0
Substrate (% of site)															
Fines	0	0	5	<5	0	2	3	5	5	0	0	2	5	5	0
Sand	10	20	5	10	5	15	17	20	10	10	15	48	30	30	10
Gravel	5	5	10	5	0	13	15	15	10	5	30	5	10	5	5
Cobble	25	15	30	40	35	29	30	30	50	50	40	35	25	50	45
Boulder	60	60	50	45	60	50	35	30	25	30	15	10	30	10	35
Bedrock	0	0	0	0	0	0	0	0	0	5	0	0	0	0	5

Notes: °C = degree Celsius
µS/cm = microsiemen per centimeter
m = meter
m^2 = square meter
mg/L = milligram per liter

[1] The electrofishing site at Goldledge was moved upstream in 2023 from the prior site location due to depth and flow conditions that prevented effective sampling.

Table B-2. Physical habitat conditions at direct observation sites, North Fork Kern River, 1998, 2006, 2011, 2016, and 2023.

Parameter	Above Johnsondale Bridge					Above Fairview Dam					Roads End					Goldledge					Hospital Flat					Headquarters
Year sampled	**1998**	**2006**	**2011**	**2016**	**2023**	**1998**	**2006**	**2011**	**2016**	**2023**	**1998**	**2006**	**2011**	**2016**	**2023[1]**	**1998**	**2006**	**2011**	**2016**	**2023**	**1998**	**2006**	**2011**	**2016**	**2023**	**2023**
Date	10/17	11/1	10/15	10/21	10/6	10/18	10/26	10/16	10/21	10/4	--	10/31	10/15	10/20	10/5	10/15	10/26	10/15	10/18	10/5	10/14	10/26	10/9	10/19	10/5, 10/6	10/7
Time	1220	1030	1543	1020	1147	1015	1030	952	1230	1629	--	930	1133	1415	1100	1145	1530	935	1535	1453	1145	1300	1530	1415	1631, 1653	1117
Site Dimensions																										
Site (reach) length (m)	50	30	51	85.3	83	50	50	41	53.9	50.6	--	40	49	45.3	62.9	50	50	68	59.4	71.8	30	30	32	32.9	171.7	169
Mean width (m)	20	25	26.4	23.6	24.3	15	30	30.3	26.6	32.9	--	18.7	21.9	19.7	17.6	18	30	20.9	18.2	20.1	25	25	21	19.6	24.2	31.4
Surface area (m^2)	1,000	750	1,349	2,015	2,017	750	1,500	1,247	1,437	1,665	--	748	1,082	891	1107	900	1,500	1,424	1,084	1,443	750	750	679	646	4,155	5307
Mean depth (m)	2	1.5	--	1.2	1	1.5	1	--	0.9	1.1	--	0.5	0.7	0.6	0.7	1.8	0.4	0.7	0.7	0.8	1.4	1	0.8	0.6	0.9	1
Maximum depth (m)	2.5	2.5	~2	2.1	1.8	3	2	~2.5	2.3	2	--	1	1.2	1	1.2	3.7	1.2	1.6	1.2	1.2	2	2	1.4	1.1	2.6	2.2
Water Quality																										
Water temperature (°C)	--	6.5	12.5	7.58	11.4	--	7.6	10.7	10.01	13.1	--	5.8	11.7	11.31	12.1	--	10.7	12.2	13.17	15.4	--	11.3	14.6	13.34	17.7, 18.4	12.1
Specific conductivity (µS/cm)	--	93	85	190	--	--	75	86	187	90.1	--	67	85	187	94.4	--	81	116	215	132.7	--	80	126	213	133.6, 134.9	71.2
Dissolved oxygen (mg/L)	--	11.4	9.2	10.39	10.97	--	11.2	10	9.91	10.18	--	12	9.5	9.7	11.8	--	10.4	9.7	9.4	10.6	--	10.1	8.8	9.5	9.54, 8.97	11.8
Habitat Type (% of site)																										
Pool	0	20	30	85	0	0	0	5	20	0	--	5	5	0	0	100	5	20	<5	0	0	5	35	10	82	100
Run	100	65	60	5	95	100	100	85	40	50	--	70	55	55	10	0	90	65	75	85	0	90	10	75	0	0
Riffle	0	15	5	5	0	0	0	5	10	45	--	25	5	5	0	0	5	0	5	0	0	5	5	5	0	0
Pocketwater	0	0	5	5	5	0	0	5	30	5	--	0	35	40	90	0	0	15	20	15	100	0	50	10	18	0
Substrate (% of site)																										
Fines	0	2	5	10	0	0	2	5	0	<1	--	2	5	5	0	0	3	5	<2	<1	0	1	5	5	0	0
Sand	30	18	20	40	15	20	8	20	10	<1	--	20	15	20	5	30	20	30	25	10	5	1	25	20	5	5
Gravel	10	10	5	10	0	10	12	5	10	5	--	8	10	15	0	0	2	5	5	<1	5	8	5	5	0	45
Cobble	20	35	20	10	75	50	8	25	30	70	--	40	20	15	75	0	50	25	25	10	30	25	20	20	65	0
Boulder	40	30	40	30	5	10	60	30	30	20	--	30	50	45	20	10	25	35	45	75	60	65	45	50	29	35
Bedrock	0	5	10	0	5	10	10	15	20	5	--	0	0	0	0	60	0	0	0	5	0	0	0	0	1	10

Notes: °C = degree Celsius
µS/cm = microsiemen per centimeter
m = meter
m^2 = square meter
mg/L = milligram per liter

[1] An additional pool was added to the Hospital Flat direct observation site and sampled on 10/6/2023 to target adult hardhead habitat.

Table B-3. Estimates of fish density for rainbow trout, brown trout, Sacramento sucker, and Sacramento pikeminnow at electrofishing and direct observation sites, North Fork Kern River, 1998, 2006, 2011, 2016, and 2023.

Site	Survey Method	Year[1]	Density (fish/acre)			
			Rainbow trout	Brown trout	Sacramento pikeminnow	Sacramento sucker
Above Johnsondale Bridge	Direct Observation	1998	113	0	0	65
		2006	19	0	0	19
		2011	36	0	0	42
		2016	11	0	3	68
		2023	3	0	0	88
Above Fairview Dam	Direct Observation	1998	28	0	0	65
		2006	38	0	0	16
		2011	6	0	0	174
		2016	4	0	135	36
		2023	29	0	0	136
Roads End	Electrofishing	1998	118	0	4	1205
		2006	59	5	0	178
		2011	89	2	0	686
		2016	11	3	48	386
		2023	3	0	0	402
	Direct Observation	1998	--	--	--	--
		2006	54	0	5	124
		2011	91	0	0	260
		2016	0	0	136	54
		2023	59	0	0	925
Goldledge	Electrofishing	1998	238	2	51	773
		2006	58	0	2	504
		2011	114	0	0	314
		2016	0	0	98	242
		2023	2	0	0	311
	Direct Observation	1998	76	0	9	333
		2006	30	0	105	170
		2011	63	0	31	293
		2016	4	0	127	0
		2023	20	0	0	744

Site	Survey Method	Year[1]	Density (fish/acre)			
			Rainbow trout	Brown trout	Sacramento pikeminnow	Sacramento sucker
Hospital Flat	Electrofishing	1998	146	0	22	616
		2006	0	0	68	810
		2011	20	2	36	476
		2016	0	0	150	607
		2023	2	0	0	67
	Direct Observation	1998	92	0	0	308
		2006	5	0	38	156
		2011	60	0	102	175
		2016	6	0	25	0
		2023	5	0	31	653
Headquarters	Direct Observation	2023	27	0	49	388

[1] Densities for 1998, 2006, 2011, and 2016 were calculated using the total number of fish observed. Densities in 2023 were calculated using population estimates for the monitoring site.

Table B-4. Estimates of fish biomass for rainbow trout, brown trout, Sacramento sucker, and Sacramento pikeminnow at electrofishing sites, North Fork Kern River,1998, 2006, 2011, 2016, and 2023.

Site	Year	Biomass (lbs/acre)			
		Rainbow trout	Brown trout	Sacramento pikeminnow	Sacramento sucker
Roads End	1998	13.38	0.00	0.68	441.38
	2006	53.68	0.96	0.00	116.34
	2011	3.01	0.05	0.00	195.84
	2016	7.17	0.12	0.70	204.50
	2023	<0.1	0.00	0.00	152.37
Goldledge	1998	27.33	0.03	0.53	206.13
	2006	8.06	0.00	0.00	215.34
	2011	2.92	0.00	0.00	63.56
	2016	0.00	0.00	1.94	93.50
	2023	0.18	0.00	0.00	36.38
Hospital Flat	1998	19.43	0.00	0.29	82.87
	2006	0.00	0.00	4.87	13.46
	2011	1.01	0.03	0.40	10.76
	2016	0.00	0.00	1.19	3.17
	2023	<0.1	0.00	0.00	9.40

Table B-5. Natural-spawned rainbow trout size, condition, and relative abundance at electrofishing sites, North Fork Kern River, 1998, 2006, 2011, 2016, and 2023.

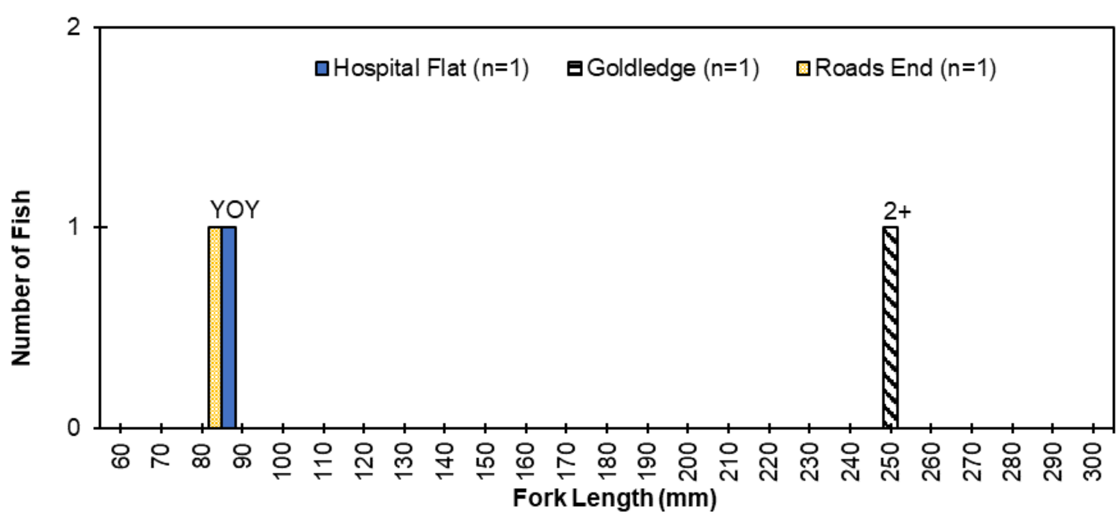
Age Class	Length Range (mm)[1]	Average Length (mm)	Average Weight (g)	Average Condition Factor (K-value[2])	Percent Natural Spawned
Roads End					
1998					
Age 0+	91–95	94	9	1.1	23
Age 1+	103–136	119	21	1.2	35
Age 2+	156–201	183	72	1.2	23
Age 3+	211–229	217	113	1.1	19
2006					
Age 0+	102	102	12	1.2	2
Age 1+	92–215	146	42	1.1	79
Age 2+	186–220	210	114	1.2	19
2011					
Age 0+	76–138	104	14	1.2	85
Age 1+	182–192	189	78	1.2	11
Age 2+	255	255	192	1.2	4
2016					
Age 0+	---	---	---	---	0
Age 1+	108	108	15	1.2	25
Age 2+	---	---	---	---	0
Age 3+	241	241	157	1.1	25
Age 4+	244–415	330	494	1.2	50
2023					
Age 0+	75	75	4	1.1	100
Age 1+	---	---	---	---	0
Age 2+	---	---	---	---	0
Goldledge					
1998					
Age 0+	81–101	92	9	1.2	28
Age 1+	101–135	115	18	1.2	44
Age 2+	156–232	192	81	1.1	25
Age 3+	189-252	221	123	1.1	3
2006					
Age 0+	89	89	7	1.0	7
Age 1+	113–178	141	36	1.2	80
Age 2+	237–252	246	183	1.2	13

Age Class	Length Range (mm)[1]	Average Length (mm)	Average Weight (g)	Average Condition Factor (K-value[2])	Percent Natural Spawned
2011					
Age 0+	93–139	111	15	1.1	76
Age 1+	170–226	195	77	1.0	22
Age 2+	259	259	179	1.0	2
2016					
	No trout captured at this site in 2016				
2023					
Age 0+	---	---	---	---	0
Age 1+	---	---	---	---	0
Age 2+	248	248	173	1.0	100
Hospital Flat					
1998					
Age 0+	77–98	87	8	1.2	11
Age 1+	98–147	117	19	1.2	53
Age 2+	162–222	195	78	1.1	29
Age 3+	200–244	215	117.5	1.1	8
2006					
	No trout captured at this site in 2006				
2011					
Age 0+	79–132	106	15	1	78
Age 1+	221–228	225	124	1	22
Age 2+	---	---	---	---	0
2016					
	No trout captured at this site in 2016				
2023					
Age 0+	84	84	7	1.2	100
Age 1+	---	---	---	---	0
Age 2+	---	---	---	---	0

1 Use of fork and/or total length was inconsistent, or not reported over the monitoring period
2 K-value (Fulton's Condition Factor) = (Weight/Fork Length) x 100,000 (Ricker 1975)

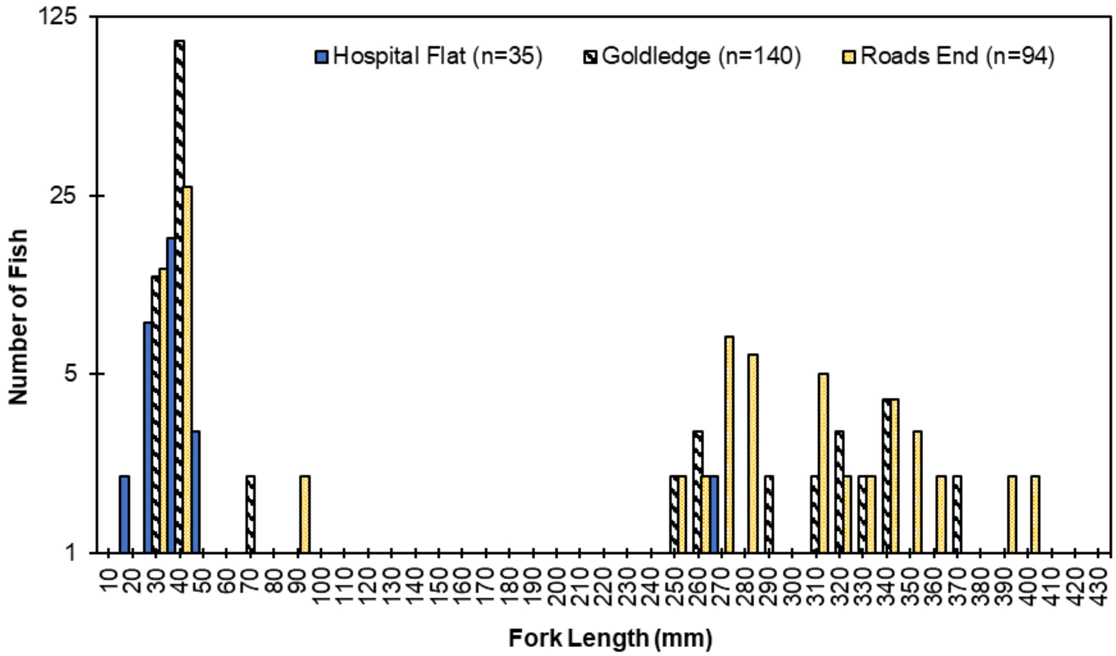
Table B-6. Fish observed during daytime and nighttime snorkeling comparisons at Roads End direct observation site, North Fork Kern River, 2023.

Survey Method	Species	Size Bin (inches)	Total Number of Fish Observed[1]		
			Pass 1	Pass 2	Pass 3
Day Snorkel	Rainbow trout	0–3	0	0	0
		3–6	0	0	0
		6–12	5	6	5
		12–16	3	6	3
		16+	0	0	0
	Sacramento sucker	0–3	191	207	64
		3–6	0	0	0
		6–12	35	10	7
		12–16	10	2	0
		16+	0	0	0
Night Snorkel	Rainbow trout	0–3	0	0	0
		3–6	0	0	1
		6–12	5	7	1
		12–16	1	2	0
		16+	0	0	0
	Sacramento sucker	0–3	120	210	223
		3–6	1	3	0
		6–12	44	26	11
		12–16	12	11	8
		16+	0	0	1



Note: Results of scale analysis of trout captured at Hospital Flat and Roads End are listed above each column.

Figure B-1. Length frequency distribution of rainbow trout captured at Hospital Flat, Goldledge, and Roads End electrofishing sites, 2023.



Note: Tally counts of Sacramento sucker in the 0-40mm fork length size bin are included in the 30-40mm column.

Figure B-2. Length frequency distribution of Sacramento sucker captured at Hospital Flat, Goldledge, and Roads End electrofishing sites, North Fork Kern River, 2023.

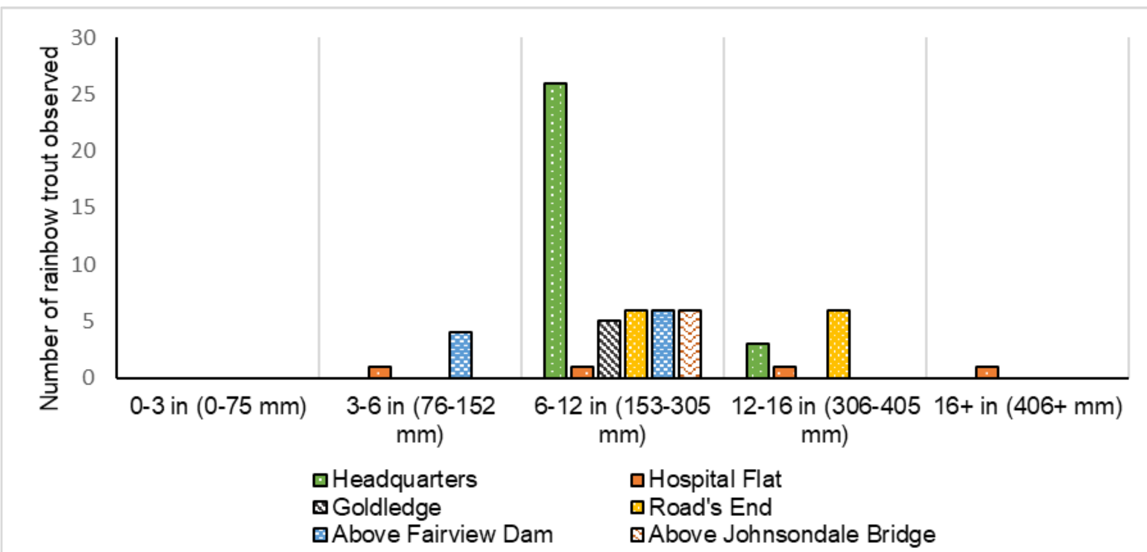


Figure B-3. Length frequency distribution of rainbow trout observed at direct observation sites, North Fork Kern River, 2023.

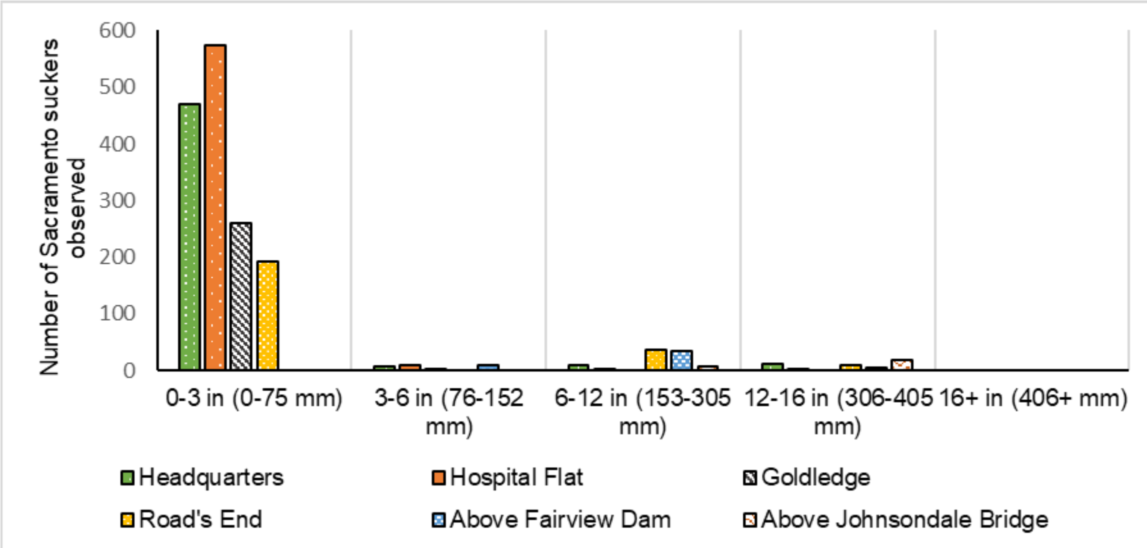


Figure B-4. Length frequency distribution of Sacramento sucker observed at direct observation sites, North Fork Kern River, 2023.

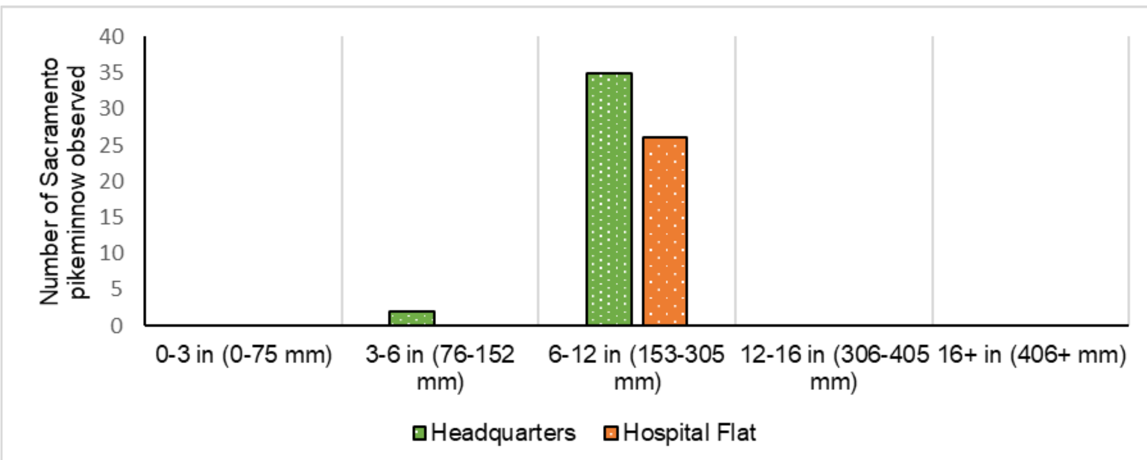


Figure B-5. Length frequency distribution of Sacramento pikeminnow observed at direct observation sites, North Fork Kern River, 2023.

Appendix C

Individual Fish Capture and Observation Data, 2023

Table C-1. Individual fish capture data at electrofishing sites, North Fork Kern River, 2023.

Date	Site	Sample Method	Pass	Species	Fork Length (mm)	Count	Weight	Condition
10/9/2023	Roads End	Electrofishing	1	SSK	391	1	690	
10/9/2023	Roads End	Electrofishing	1	SSK	308	1	400	
10/9/2023	Roads End	Electrofishing	1	SSK	271	1	250	
10/9/2023	Roads End	Electrofishing	1	SSK	340	1	490	
10/9/2023	Roads End	Electrofishing	1	SSK	275	1	260	
10/9/2023	Roads End	Electrofishing	1	SSK	147	1	42.7	
10/9/2023	Roads End	Electrofishing	1	SSK	336	1	470	
10/9/2023	Roads End	Electrofishing	1	SSK	385	1	570	
10/9/2023	Roads End	Electrofishing	1	SSK	334	1	460	
10/9/2023	Roads End	Electrofishing	1	SSK	330	1	410	
10/9/2023	Roads End	Electrofishing	1	SSK	344	1	420	
10/9/2023	Roads End	Electrofishing	1	SSK	310	1	340	
10/9/2023	Roads End	Electrofishing	1	SSK	355	1	500	
10/9/2023	Roads End	Electrofishing	1	SSK	260	1	218.3	
10/9/2023	Roads End	Electrofishing	1	SSK	269	1	232.1	
10/9/2023	Roads End	Electrofishing	1	SSK	272	1	233.3	
10/9/2023	Roads End	Electrofishing	1	SSK	242	1	160.9	
10/9/2023	Roads End	Electrofishing	1	SSK	277	1	235.9	
10/9/2023	Roads End	Electrofishing	1	SSK	370	1	590	
10/9/2023	Roads End	Electrofishing	1	SSK	252	1	184.4	
10/9/2023	Roads End	Electrofishing	1	SSK	208	1	112.2	
10/9/2023	Roads End	Electrofishing	1	SSK	250	1	177.1	
10/9/2023	Roads End	Electrofishing	1	SSK	270	1	231.7	
10/9/2023	Roads End	Electrofishing	1	SSK	229	1	147	

Date	Site	Sample Method	Pass	Species	Fork Length (mm)	Count	Weight	Condition
10/9/2023	Roads End	Electrofishing	1	SSK	75	1	5.4	
10/9/2023	Roads End	Electrofishing	1	SSK	82	1	7.2	
10/9/2023	Roads End	Electrofishing	1	SSK	114	1	10.1	
10/9/2023	Roads End	Electrofishing	1	RBT	75	1	4.1	Natural
10/9/2023	Roads End	Electrofishing	1	SSK	86	1	7.3	
10/9/2023	Roads End	Electrofishing	1	SSK	25–50	17	---	
10/9/2023	Roads End	Electrofishing	1	UNKC	25–50	6	---	
10/9/2023	Roads End	Electrofishing	2	SSK	391	1	690	
10/9/2023	Roads End	Electrofishing	2	SSK	342	1	480	
10/9/2023	Roads End	Electrofishing	2	SSK	385	1	580	
10/9/2023	Roads End	Electrofishing	2	SSK	380	1	560	
10/9/2023	Roads End	Electrofishing	2	SSK	354	1	460	
10/9/2023	Roads End	Electrofishing	2	SSK	344	1	440	
10/9/2023	Roads End	Electrofishing	2	SSK	335	1	390	
10/9/2023	Roads End	Electrofishing	2	SSK	272	1	250	
10/9/2023	Roads End	Electrofishing	2	SSK	264	1	215.7	
10/9/2023	Roads End	Electrofishing	2	SSK	268	1	200.1	
10/9/2023	Roads End	Electrofishing	2	SSK	269	1	213	
10/9/2023	Roads End	Electrofishing	2	SSK	94	1	10.1	
10/9/2023	Roads End	Electrofishing	2	SSK	35	1	0.4	
10/9/2023	Roads End	Electrofishing	2	UNKC	24	1	0.2	
10/9/2023	Roads End	Electrofishing	2	SSK	263	1	210.5	
10/9/2023	Roads End	Electrofishing	2	SSK	281	1	239.7	
10/9/2023	Roads End	Electrofishing	2	UNKC	22	1	0.1	
10/9/2023	Roads End	Electrofishing	2	SSK	411	1	810	
10/9/2023	Roads End	Electrofishing	2	SSK	301	1	330	

Date	Site	Sample Method	Pass	Species	Fork Length (mm)	Count	Weight	Condition
10/9/2023	Roads End	Electrofishing	2	SSK	328	1	390	
10/9/2023	Roads End	Electrofishing	2	SSK	303	1	310	
10/9/2023	Roads End	Electrofishing	2	SSK	28	1	0.1	
10/9/2023	Roads End	Electrofishing	2	SSK	28	1	0.1	
10/9/2023	Roads End	Electrofishing	2	SSK	30	1	0.2	
10/9/2023	Roads End	Electrofishing	2	SSK	35	1	0.2	
10/9/2023	Roads End	Electrofishing	2	SSK	34	1	0.2	
10/9/2023	Roads End	Electrofishing	2	SSK	26	1	0.1	
10/9/2023	Roads End	Electrofishing	2	SSK	312	1	340	
10/9/2023	Roads End	Electrofishing	2	SSK	314	1	380	
10/9/2023	Roads End	Electrofishing	2	SSK	275	1	230	
10/9/2023	Roads End	Electrofishing	2	SSK	262	1	220	
10/9/2023	Roads End	Electrofishing	2	SSK	39	1	0.7	
10/9/2023	Roads End	Electrofishing	2	SSK	34	1	0.3	
10/9/2023	Roads End	Electrofishing	2	SSK	34	1	0.3	
10/9/2023	Roads End	Electrofishing	2	SSK	29	1	0.1	
10/9/2023	Roads End	Electrofishing	2	SSK	47	1	0.8	
10/9/2023	Roads End	Electrofishing	2	SSK	37	1	0.4	
10/9/2023	Roads End	Electrofishing	2	SSK	22	1	0.1	
10/9/2023	Roads End	Electrofishing	3	SSK	304	1	290	
10/9/2023	Roads End	Electrofishing	3	SSK	187	1	74.8	
10/9/2023	Roads End	Electrofishing	3	SSK	32	1	0.2	
10/9/2023	Roads End	Electrofishing	3	SSK	26	1	0.1	
10/9/2023	Roads End	Electrofishing	3	SSK	25	1	0.1	
10/9/2023	Roads End	Electrofishing	3	SSK	28	1	0.1	
10/9/2023	Roads End	Electrofishing	3	SSK	37	1	0.4	

Date	Site	Sample Method	Pass	Species	Fork Length (mm)	Count	Weight	Condition
10/9/2023	Roads End	Electrofishing	3	SSK	20	1	0.1	
10/9/2023	Roads End	Electrofishing	3	SSK	27	1	0.1	
10/9/2023	Roads End	Electrofishing	3	SSK	28	1	0.2	
10/9/2023	Roads End	Electrofishing	3	SSK	38	1	0.2	
10/9/2023	Roads End	Electrofishing	3	SSK	29	1	0.1	
10/9/2023	Roads End	Electrofishing	3	SSK	28	1	0.1	
10/11/2023	Hospital Flat	Electrofishing	1	SSK	362	1	550	
10/10/2023	Goldledge	Electrofishing	1	SSK	331	1	440	
10/10/2023	Goldledge	Electrofishing	1	SSK	315	1	340	
10/10/2023	Goldledge	Electrofishing	1	SSK	316	1	430	
10/10/2023	Goldledge	Electrofishing	1	SSK	334	1	420	
10/10/2023	Goldledge	Electrofishing	1	SSK	248	1	191.9	
10/10/2023	Goldledge	Electrofishing	1	SSK	253	1	199	
10/10/2023	Goldledge	Electrofishing	1	SSK	220	1	151.4	
10/10/2023	Goldledge	Electrofishing	1	SSK	282	1	250	
10/10/2023	Goldledge	Electrofishing	1	SSK	310	1	350	
10/10/2023	Goldledge	Electrofishing	1	SSK	365	1	580	
10/10/2023	Goldledge	Electrofishing	1	SSK	244	1	153.7	
10/10/2023	Goldledge	Electrofishing	1	SSK	325	1	340	
10/10/2023	Goldledge	Electrofishing	1	SSK	318	1	360	
10/10/2023	Goldledge	Electrofishing	1	SSK	298	1	320	
10/10/2023	Goldledge	Electrofishing	1	SSK	335	1	410	
10/10/2023	Goldledge	Electrofishing	1	SSK	367	1	530	
10/10/2023	Goldledge	Electrofishing	1	SSK	272	1	225.5	
10/10/2023	Goldledge	Electrofishing	1	SSK	254	1	164.7	
10/10/2023	Goldledge	Electrofishing	1	RBT	248	1	172.7	Natural

Date	Site	Sample Method	Pass	Species	Fork Length (mm)	Count	Weight	Condition
10/10/2023	Goldledge	Electrofishing	1	SSK	69	1	4	
10/10/2023	Goldledge	Electrofishing	1	SSK	39	1	0.7	
10/10/2023	Goldledge	Electrofishing	1	SSK	32	1	0.4	
10/10/2023	Goldledge	Electrofishing	1	SSK	32	1	0.6	
10/10/2023	Goldledge	Electrofishing	1	SSK	52	1	1.9	
10/10/2023	Goldledge	Electrofishing	1	SSK	33	1	0.3	
10/10/2023	Goldledge	Electrofishing	1	SSK	28	1	0.1	
10/10/2023	Goldledge	Electrofishing	1	SSK	33	1	0.5	
10/10/2023	Goldledge	Electrofishing	1	SSK	29	1	0.1	
10/10/2023	Goldledge	Electrofishing	1	SSK	30	1	0.5	
10/10/2023	Goldledge	Electrofishing	1	SSK	44	1	1.1	
10/10/2023	Goldledge	Electrofishing	1	SSK	28	1	0.2	
10/10/2023	Goldledge	Electrofishing	1	SSK	33	1	0.2	
10/10/2023	Goldledge	Electrofishing	1	SSK	27	1	0.2	
10/10/2023	Goldledge	Electrofishing	1	SSK	33	1	0.2	
10/10/2023	Goldledge	Electrofishing	1	SSK	28	1	0.2	
10/10/2023	Goldledge	Electrofishing	1	SSK	32	1	0.2	
10/10/2023	Goldledge	Electrofishing	1	SSK	27	1	0.1	
10/10/2023	Goldledge	Electrofishing	1	SSK	33	1	0.3	
10/10/2023	Goldledge	Electrofishing	1	SSK	34	1	0.4	
10/10/2023	Goldledge	Electrofishing	1	SSK	34	1	0.3	
10/10/2023	Goldledge	Electrofishing	1	SSK	27	1	0.3	
10/10/2023	Goldledge	Electrofishing	1	SSK	34	1	0.3	
10/10/2023	Goldledge	Electrofishing	1	SSK	26	1	0.4	
10/10/2023	Goldledge	Electrofishing	1	SSK	37	1	0.8	
10/10/2023	Goldledge	Electrofishing	1	SSK	37	1	0.7	

Date	Site	Sample Method	Pass	Species	Fork Length (mm)	Count	Weight	Condition
10/10/2023	Goldledge	Electrofishing	1	SSK	25–50	47	---	
10/10/2023	Goldledge	Electrofishing	1	SSK	62	1	3.5	
10/10/2023	Goldledge	Electrofishing	2	SSK	302	1	70	
10/10/2023	Goldledge	Electrofishing	2	SSK	322	1	400	
10/10/2023	Goldledge	Electrofishing	2	SSK	337	1	480	
10/10/2023	Goldledge	Electrofishing	2	SSK	32	1	0.5	
10/10/2023	Goldledge	Electrofishing	2	SSK	27	1	0.4	
10/10/2023	Goldledge	Electrofishing	2	SSK	29	1	0.4	
10/10/2023	Goldledge	Electrofishing	2	SSK	28	1	0.3	
10/10/2023	Goldledge	Electrofishing	2	SSK	25–50	31	---	
10/10/2023	Goldledge	Electrofishing	3	SSK	25–50	8	---	
10/10/2023	Goldledge	Electrofishing	3	SSK	284	1	260	
10/10/2023	Goldledge	Electrofishing	3	SSK	259	1	240	
10/11/2023	Hospital Flat	Electrofishing	1	SSK	413	1	765	
10/11/2023	Hospital Flat	Electrofishing	1	SSK	302	1	350	
10/11/2023	Hospital Flat	Electrofishing	1	SSK	272	1	230	
10/11/2023	Hospital Flat	Electrofishing	1	SSK	279	1	295	
10/11/2023	Hospital Flat	Electrofishing	1	SSK	29	1	0.1	
10/11/2023	Hospital Flat	Electrofishing	1	SSK	51	1	1.9	
10/11/2023	Hospital Flat	Electrofishing	1	SSK	48	1	0.9	
10/11/2023	Hospital Flat	Electrofishing	1	SSK	46	1	1.2	
10/11/2023	Hospital Flat	Electrofishing	1	SSK	37	1	0.4	
10/11/2023	Hospital Flat	Electrofishing	1	SSK	34	1	0.5	
10/11/2023	Hospital Flat	Electrofishing	1	UNKC	16	1	---	
10/11/2023	Hospital Flat	Electrofishing	1	SSK	45	1	0.8	
10/11/2023	Hospital Flat	Electrofishing	1	SSK	39	1	0.8	

Date	Site	Sample Method	Pass	Species	Fork Length (mm)	Count	Weight	Condition
10/11/2023	Hospital Flat	Electrofishing	1	SSK	50	1	1.7	
10/11/2023	Hospital Flat	Electrofishing	1	SSK	29	1	0.3	
10/11/2023	Hospital Flat	Electrofishing	1	SSK	45	1	0.8	
10/11/2023	Hospital Flat	Electrofishing	1	SSK	36	1	0.6	
10/11/2023	Hospital Flat	Electrofishing	1	SSK	34	1	0.6	
10/11/2023	Hospital Flat	Electrofishing	1	SSK	48	1	1.5	
10/11/2023	Hospital Flat	Electrofishing	1	SSK	47	1	1.4	
10/11/2023	Hospital Flat	Electrofishing	1	SSK	53	1	1.7	
10/11/2023	Hospital Flat	Electrofishing	1	SSK	43	1	1	
10/11/2023	Hospital Flat	Electrofishing	1	SSK	42	1	1	
10/11/2023	Hospital Flat	Electrofishing	1	SSK	49	1	1.6	
10/11/2023	Hospital Flat	Electrofishing	1	SSK	41	1	0.8	
10/11/2023	Hospital Flat	Electrofishing	1	SSK	52	1	2	
10/11/2023	Hospital Flat	Electrofishing	1	SSK	46	1	1.2	
10/11/2023	Hospital Flat	Electrofishing	1	SSK	44	1	1.1	
10/11/2023	Hospital Flat	Electrofishing	2	SSK	46	1	1.1	
10/11/2023	Hospital Flat	Electrofishing	2	SSK	37	1	0.4	
10/11/2023	Hospital Flat	Electrofishing	2	SSK	35	1	0.4	
10/11/2023	Hospital Flat	Electrofishing	2	UNKC	22	1	0.1	
10/11/2023	Hospital Flat	Electrofishing	2	SSK	41	1	0.8	
10/11/2023	Hospital Flat	Electrofishing	2	SSK	42	1	0.9	
10/11/2023	Hospital Flat	Electrofishing	2	SSK	39	1	0.8	
10/11/2023	Hospital Flat	Electrofishing	2	UNKC	10	1	0.1	
10/11/2023	Hospital Flat	Electrofishing	2	RBT	84	1	7	Natural
10/11/2023	Hospital Flat	Electrofishing	2	SSK	49	1	1	

Notes: mm = millimeter, RBT = rainbow trout, SSK = Sacramento sucker, UNKC = unknown larval cyprinid or catostomid

Table C-2. Fish observation data at direct observation sites, North Fork Kern River, 2023.

Date	Site	Comparison Method	Sample Method	Pass	Species	Total Length (inches)	Count
10/6/2023	Above Johnsondale Bridge	NA	Direct Observation	1	SSK	12–16	5
10/6/2023	Above Johnsondale Bridge	NA	Direct Observation	1	SSK	12–16	6
10/6/2023	Above Johnsondale Bridge	NA	Direct Observation	1	SSK	6–12	3
10/6/2023	Above Johnsondale Bridge	NA	Direct Observation	1	SSK	12–16	6
10/6/2023	Above Johnsondale Bridge	NA	Direct Observation	1	SSK	6–12	4
10/6/2023	Above Johnsondale Bridge	NA	Direct Observation	2	SSK	12–16	1
10/6/2023	Above Johnsondale Bridge	NA	Direct Observation	2	SSK	6–12	4
10/6/2023	Above Johnsondale Bridge	NA	Direct Observation	2	SSK	12–16	1
10/6/2023	Above Johnsondale Bridge	NA	Direct Observation	2	RBT	6–12	1
10/6/2023	Above Johnsondale Bridge	NA	Direct Observation	2	SSK	12–16	4
10/6/2023	Above Johnsondale Bridge	NA	Direct Observation	3	SSK	6–12	7
10/6/2023	Above Johnsondale Bridge	NA	Direct Observation	3	SSK	12–16	2
10/6/2023	Above Johnsondale Bridge	NA	Direct Observation	3	RBT	6–12	1
10/6/2023	Above Johnsondale Bridge	NA	Direct Observation	3	SSK	6–12	2
10/6/2023	Above Johnsondale Bridge	NA	Direct Observation	3	SSK	12–16	1
10/6/2023	Above Johnsondale Bridge	NA	Direct Observation	3	SSK	12–16	3
10/4/2023	Above Fairview Dam	NA	Direct Observation	1	SSK	6–12	15
10/4/2023	Above Fairview Dam	NA	Direct Observation	1	SSK	12–16	3
10/4/2023	Above Fairview Dam	NA	Direct Observation	1	SSK	3–6	2
10/4/2023	Above Fairview Dam	NA	Direct Observation	1	RBT	3–6	2
10/4/2023	Above Fairview Dam	NA	Direct Observation	1	UNKT	0–3	1
10/4/2023	Above Fairview Dam	NA	Direct Observation	1	RBT	6–12	1
10/4/2023	Above Fairview Dam	NA	Direct Observation	1	SSK	6–12	1
10/4/2023	Above Fairview Dam	NA	Direct Observation	1	SSK	0–3	1
10/4/2023	Above Fairview Dam	NA	Direct Observation	1	RBT	6–12	1

Date	Site	Comparison Method	Sample Method	Pass	Species	Total Length (inches)	Count
10/4/2023	Above Fairview Dam	NA	Direct Observation	1	SSK	6–12	3
10/4/2023	Above Fairview Dam	NA	Direct Observation	1	SSK	6–12	2
10/4/2023	Above Fairview Dam	NA	Direct Observation	1	SSK	12–16	2
10/4/2023	Above Fairview Dam	NA	Direct Observation	2	SSK	3–6	1
10/4/2023	Above Fairview Dam	NA	Direct Observation	2	SSK	6–12	1
10/4/2023	Above Fairview Dam	NA	Direct Observation	2	SSK	12–16	2
10/4/2023	Above Fairview Dam	NA	Direct Observation	2	SSK	6–12	10
10/4/2023	Above Fairview Dam	NA	Direct Observation	2	SSK	3–6	8
10/4/2023	Above Fairview Dam	NA	Direct Observation	2	RBT	3–6	3
10/4/2023	Above Fairview Dam	NA	Direct Observation	2	RBT	6–12	4
10/4/2023	Above Fairview Dam	NA	Direct Observation	2	RBT	3–6	1
10/4/2023	Above Fairview Dam	NA	Direct Observation	2	RBT	6–12	1
10/4/2023	Above Fairview Dam	NA	Direct Observation	2	SSK	6–12	21
10/4/2023	Above Fairview Dam	NA	Direct Observation	2	SSK	12–16	2
10/4/2023	Above Fairview Dam	NA	Direct Observation	2	SSK	6–12	2
10/4/2023	Above Fairview Dam	NA	Direct Observation	2	RBT	6–12	1
10/4/2023	Above Fairview Dam	NA	Direct Observation	3	SSK	12–16	1
10/4/2023	Above Fairview Dam	NA	Direct Observation	3	SSK	6–12	2
10/4/2023	Above Fairview Dam	NA	Direct Observation	3	SSK	3–6	11
10/4/2023	Above Fairview Dam	NA	Direct Observation	3	RBT	3–6	4
10/4/2023	Above Fairview Dam	NA	Direct Observation	3	SSK	6–12	1
10/4/2023	Above Fairview Dam	NA	Direct Observation	3	RBT	3–6	1
10/4/2023	Above Fairview Dam	NA	Direct Observation	3	RBT	6–12	2
10/4/2023	Above Fairview Dam	NA	Direct Observation	3	SSK	0–3	1
10/4/2023	Above Fairview Dam	NA	Direct Observation	3	SSK	6–12	20
10/4/2023	Above Fairview Dam	NA	Direct Observation	3	SSK	12–16	2

Date	Site	Comparison Method	Sample Method	Pass	Species	Total Length (inches)	Count
10/4/2023	Above Fairview Dam	NA	Direct Observation	3	RBT	6–12	1
10/5/2023	Roads End	Day comparison	Direct Observation	1	SSK	6–12	30
10/5/2023	Roads End	Day comparison	Direct Observation	1	SSK	12–16	7
10/5/2023	Roads End	Day comparison	Direct Observation	1	RBT	6–12	5
10/5/2023	Roads End	Day comparison	Direct Observation	1	RBT	12–16	3
10/5/2023	Roads End	Day comparison	Direct Observation	1	SSK	0–3	32
10/5/2023	Roads End	Day comparison	Direct Observation	1	SSK	6–12	1
10/5/2023	Roads End	Day comparison	Direct Observation	1	SSK	12–16	2
10/5/2023	Roads End	Day comparison	Direct Observation	1	SSK	12–16	1
10/5/2023	Roads End	Day comparison	Direct Observation	1	SSK	6–12	4
10/5/2023	Roads End	Day comparison	Direct Observation	1	SSK	0–3	159
10/5/2023	Roads End	Day comparison	Direct Observation	2	SSK	0–3	160
10/5/2023	Roads End	Day comparison	Direct Observation	2	RBT	6–12	1
10/5/2023	Roads End	Day comparison	Direct Observation	2	RBT	6–12	5
10/5/2023	Roads End	Day comparison	Direct Observation	2	RBT	12–16	6
10/5/2023	Roads End	Day comparison	Direct Observation	2	SSK	0–3	37
10/5/2023	Roads End	Day comparison	Direct Observation	2	SSK	0–3	10
10/5/2023	Roads End	Day comparison	Direct Observation	2	SSK	6–12	10
10/5/2023	Roads End	Day comparison	Direct Observation	2	SSK	12–16	2
10/5/2023	Roads End	Day comparison	Direct Observation	3	SSK	0–3	170+
10/5/2023	Roads End	Day comparison	Direct Observation	3	SSK	6–12	3
10/5/2023	Roads End	Day comparison	Direct Observation	3	RBT	6–12	5
10/5/2023	Roads End	Day comparison	Direct Observation	3	RBT	12–16	3
10/5/2023	Roads End	Day comparison	Direct Observation	3	SSK	0–3	18
10/5/2023	Roads End	Day comparison	Direct Observation	3	SSK	0–3	42
10/5/2023	Roads End	Day comparison	Direct Observation	3	SSK	6–12	4

Date	Site	Comparison Method	Sample Method	Pass	Species	Total Length (inches)	Count
10/5/2023	Roads End	Day comparison	Direct Observation	3	SSK	0–3	4
10/4/2023	Roads End	Night comparison	Direct Observation	1	RBT	12–16	1
10/4/2023	Roads End	Night comparison	Direct Observation	1	SSK	0–3	45
10/4/2023	Roads End	Night comparison	Direct Observation	1	SSK	3–6	1
10/4/2023	Roads End	Night comparison	Direct Observation	1	SSK	12–16	4
10/4/2023	Roads End	Night comparison	Direct Observation	1	RBT	6–12	2
10/4/2023	Roads End	Night comparison	Direct Observation	1	SSK	6–12	37
10/4/2023	Roads End	Night comparison	Direct Observation	1	SSK	12–16	8
10/4/2023	Roads End	Night comparison	Direct Observation	1	RBT	6–12	2
10/4/2023	Roads End	Night comparison	Direct Observation	1	RBT	6–12	1
10/4/2023	Roads End	Night comparison	Direct Observation	1	SSK	6–12	2
10/4/2023	Roads End	Night comparison	Direct Observation	1	SSK	0–3	48
10/4/2023	Roads End	Night comparison	Direct Observation	1	SSK	0–3	27
10/4/2023	Roads End	Night comparison	Direct Observation	1	SSK	6–12	5
10/4/2023	Roads End	Night comparison	Direct Observation	2	SSK	3–6	3
10/4/2023	Roads End	Night comparison	Direct Observation	2	SSK	6–12	12
10/4/2023	Roads End	Night comparison	Direct Observation	2	SSK	12–16	4
10/4/2023	Roads End	Night comparison	Direct Observation	2	RBT	6–12	3
10/4/2023	Roads End	Night comparison	Direct Observation	2	RBT	12–16	2
10/4/2023	Roads End	Night comparison	Direct Observation	2	RBT	6–12	1
10/4/2023	Roads End	Night comparison	Direct Observation	2	SSK	6–12	4
10/4/2023	Roads End	Night comparison	Direct Observation	2	SSK	12–16	4
10/4/2023	Roads End	Night comparison	Direct Observation	2	RBT	6–12	1
10/4/2023	Roads End	Night comparison	Direct Observation	2	SSK	6–12	1
10/4/2023	Roads End	Night comparison	Direct Observation	2	SSK	0–3	164
10/4/2023	Roads End	Night comparison	Direct Observation	2	SSK	0–3	46

Date	Site	Comparison Method	Sample Method	Pass	Species	Total Length (inches)	Count
10/4/2023	Roads End	Night comparison	Direct Observation	2	SSK	6–12	9
10/4/2023	Roads End	Night comparison	Direct Observation	2	SSK	12–16	3
10/4/2023	Roads End	Night comparison	Direct Observation	2	RBT	6–12	2
10/4/2023	Roads End	Night comparison	Direct Observation	3	SSK	12–16	2
10/4/2023	Roads End	Night comparison	Direct Observation	3	RBT	6–12	1
10/4/2023	Roads End	Night comparison	Direct Observation	3	SSK	6–12	1
10/4/2023	Roads End	Night comparison	Direct Observation	3	SSK	12–16	3
10/4/2023	Roads End	Night comparison	Direct Observation	3	SSK	0–3	1
10/4/2023	Roads End	Night comparison	Direct Observation	3	SSK	6–12	10
10/4/2023	Roads End	Night comparison	Direct Observation	3	SSK	12–16	3
10/4/2023	Roads End	Night comparison	Direct Observation	3	SSK	16+	1
10/4/2023	Roads End	Night comparison	Direct Observation	3	RBT	3–6	1
10/4/2023	Roads End	Night comparison	Direct Observation	3	SSK	0–3	61
10/4/2023	Roads End	Night comparison	Direct Observation	3	SSK	0–3	161
10/5/2023	Goldledge	NA	Direct Observation	1	SSK	0–3	93
10/5/2023	Goldledge	NA	Direct Observation	1	SSK	6–12	17
10/5/2023	Goldledge	NA	Direct Observation	1	SSK	12–16	2
10/5/2023	Goldledge	NA	Direct Observation	1	SSK	3–6	9
10/5/2023	Goldledge	NA	Direct Observation	1	SSK	3–6	2
10/5/2023	Goldledge	NA	Direct Observation	1	SSK	6–12	16
10/5/2023	Goldledge	NA	Direct Observation	1	SSK	12–16	2
10/5/2023	Goldledge	NA	Direct Observation	1	RBT	6–12	3
10/5/2023	Goldledge	NA	Direct Observation	1	SSK	0–3	40
10/5/2023	Goldledge	NA	Direct Observation	1	SSK	6–12	13
10/5/2023	Goldledge	NA	Direct Observation	1	SSK	16+	1
10/5/2023	Goldledge	NA	Direct Observation	1	SSK	0–3	61

Date	Site	Comparison Method	Sample Method	Pass	Species	Total Length (inches)	Count
10/5/2023	Goldledge	NA	Direct Observation	1	SSK	6–12	2
10/5/2023	Goldledge	NA	Direct Observation	1	SSK	12–16	1
10/5/2023	Goldledge	NA	Direct Observation	2	SSK	0–3	76
10/5/2023	Goldledge	NA	Direct Observation	2	SSK	0–3	60+
10/5/2023	Goldledge	NA	Direct Observation	2	SSK	12–16	1
10/5/2023	Goldledge	NA	Direct Observation	2	SSK	6–12	1
10/5/2023	Goldledge	NA	Direct Observation	2	SSK	0–3	65
10/5/2023	Goldledge	NA	Direct Observation	2	SSK	3–6	4
10/5/2023	Goldledge	NA	Direct Observation	2	SSK	6–12	3
10/5/2023	Goldledge	NA	Direct Observation	2	SSK	0–3	9
10/5/2023	Goldledge	NA	Direct Observation	2	SSK	6–12	1
10/5/2023	Goldledge	NA	Direct Observation	2	RBT	6–12	1
10/5/2023	Goldledge	NA	Direct Observation	3	SSK	0–3	76
10/5/2023	Goldledge	NA	Direct Observation	3	SSK	3–6	2
10/5/2023	Goldledge	NA	Direct Observation	3	RBT	6–12	1
10/5/2023	Goldledge	NA	Direct Observation	3	SSK	0–3	115
10/5/2023	Goldledge	NA	Direct Observation	3	SSK	0–3	60
10/5/2023	Goldledge	NA	Direct Observation	3	RBT	6–12	1
10/5/2023	Goldledge	NA	Direct Observation	3	SSK	0–3	9
10/5/2023	Goldledge	NA	Direct Observation	3	RBT	6–12	1
10/5/2023	Goldledge	NA	Direct Observation	4	SSK	0–3	13
10/5/2023	Goldledge	NA	Direct Observation	4	SSK	3–6	1
10/5/2023	Goldledge	NA	Direct Observation	4	SSK	6–12	2
10/5/2023	Goldledge	NA	Direct Observation	4	RBT	6–12	2
10/5/2023	Goldledge	NA	Direct Observation	4	RBT	6–12	2
10/5/2023	Goldledge	NA	Direct Observation	4	SSK	0–3	46

Date	Site	Comparison Method	Sample Method	Pass	Species	Total Length (inches)	Count
10/5/2023	Goldledge	NA	Direct Observation	4	SSK	6–12	1
10/5/2023	Goldledge	NA	Direct Observation	4	SSK	0–3	67
10/5/2023	Goldledge	NA	Direct Observation	4	SSK	6–12	1
10/5/2023	Goldledge	NA	Direct Observation	4	RBT	6–12	1
10/5/2023	Goldledge	NA	Direct Observation	4	SSK	0–3	90
10/5/2023	Hospital Flat	NA	Direct Observation	1	SSK	0–3	4
10/5/2023	Hospital Flat	NA	Direct Observation	1	SSK	6–12	6
10/5/2023	Hospital Flat	NA	Direct Observation	1	SSK	0–3	3
10/5/2023	Hospital Flat	NA	Direct Observation	1	SSK	0–3	26
10/5/2023	Hospital Flat	NA	Direct Observation	1	SSK	3–6	2
10/5/2023	Hospital Flat	NA	Direct Observation	1	SSK	0–3	20
10/5/2023	Hospital Flat	NA	Direct Observation	1	SSK	3–6	1
10/5/2023	Hospital Flat	NA	Direct Observation	1	RBT	6–12	2
10/5/2023	Hospital Flat	NA	Direct Observation	2	SSK	0–3	12
10/5/2023	Hospital Flat	NA	Direct Observation	2	SSK	3–6	1
10/5/2023	Hospital Flat	NA	Direct Observation	2	SSK	0–3	28
10/5/2023	Hospital Flat	NA	Direct Observation	2	SSK	3–6	1
10/5/2023	Hospital Flat	NA	Direct Observation	2	SSK	0–3	36
10/5/2023	Hospital Flat	NA	Direct Observation	2	SSK	3–6	2
10/5/2023	Hospital Flat	NA	Direct Observation	2	SSK	0–3	7
10/5/2023	Hospital Flat	NA	Direct Observation	2	SSK	3–6	1
10/5/2023	Hospital Flat	NA	Direct Observation	2	SSK	6–12	2
10/5/2023	Hospital Flat	NA	Direct Observation	2	RBT	6–12	1
10/5/2023	Hospital Flat	NA	Direct Observation	3	SSK	0–3	55
10/5/2023	Hospital Flat	NA	Direct Observation	3	SSK	0–3	13
10/5/2023	Hospital Flat	NA	Direct Observation	3	SSK	3–6	1

Date	Site	Comparison Method	Sample Method	Pass	Species	Total Length (inches)	Count
10/5/2023	Hospital Flat	NA	Direct Observation	3	RBT	3–6	1
10/5/2023	Hospital Flat	NA	Direct Observation	3	RBT	6–12	1
10/5/2023	Hospital Flat	NA	Direct Observation	3	SSK	0–3	7
10/5/2023	Hospital Flat	NA	Direct Observation	3	SSK	0–3	60
10/5/2023	Hospital Flat	NA	Direct Observation	3	SSK	3–6	1
10/6/2023	Hospital Flat	Day comparison	Direct Observation	1	SSK	0–3	135
10/6/2023	Hospital Flat	Day comparison	Direct Observation	1	SSK	3–6	3
10/6/2023	Hospital Flat	Day comparison	Direct Observation	1	UNKC	0–3	18
10/6/2023	Hospital Flat	Day comparison	Direct Observation	1	SSK	6–12	1
10/6/2023	Hospital Flat	Day comparison	Direct Observation	1	SSK	0–3	10
10/6/2023	Hospital Flat	Day comparison	Direct Observation	1	SSK	6–12	8
10/6/2023	Hospital Flat	Day comparison	Direct Observation	1	SSK	12–16	2
10/6/2023	Hospital Flat	Day comparison	Direct Observation	1	PKM	6–12	8
10/6/2023	Hospital Flat	Day comparison	Direct Observation	1	SSK	0–3	100+
10/6/2023	Hospital Flat	Day comparison	Direct Observation	1	PKM	6–12	6
10/6/2023	Hospital Flat	Day comparison	Direct Observation	1	SSK	6–12	4
10/6/2023	Hospital Flat	Day comparison	Direct Observation	1	PKM	16+	1
10/6/2023	Hospital Flat	Day comparison	Direct Observation	1	SSK	0–3	70
10/6/2023	Hospital Flat	Day comparison	Direct Observation	1	SSK	0–3	130
10/6/2023	Hospital Flat	Day comparison	Direct Observation	1	PKM	3–6	4
10/6/2023	Hospital Flat	Day comparison	Direct Observation	1	RBT	6–12	1
10/6/2023	Hospital Flat	Day comparison	Direct Observation	1	SSK	3–6	4
10/6/2023	Hospital Flat	Day comparison	Direct Observation	1	SSK	12–16	1
10/6/2023	Hospital Flat	Day comparison	Direct Observation	1	PKM	12–16	1
10/6/2023	Hospital Flat	Day comparison	Direct Observation	2	SSK	0–3	25
10/6/2023	Hospital Flat	Day comparison	Direct Observation	2	UNKC	0–3	15

Date	Site	Comparison Method	Sample Method	Pass	Species	Total Length (inches)	Count
10/6/2023	Hospital Flat	Day comparison	Direct Observation	2	SSK	0–3	135
10/6/2023	Hospital Flat	Day comparison	Direct Observation	2	SSK	3–6	10
10/6/2023	Hospital Flat	Day comparison	Direct Observation	2	SSK	6–12	3
10/6/2023	Hospital Flat	Day comparison	Direct Observation	2	RBT	6–12	1
10/6/2023	Hospital Flat	Day comparison	Direct Observation	2	SSK	0–3	150+
10/6/2023	Hospital Flat	Day comparison	Direct Observation	2	SSK	0–3	83
10/6/2023	Hospital Flat	Day comparison	Direct Observation	2	UNKC	0–3	10
10/6/2023	Hospital Flat	Day comparison	Direct Observation	2	UNKC	0–3	30
10/6/2023	Hospital Flat	Day comparison	Direct Observation	2	SSK	0–3	25
10/6/2023	Hospital Flat	Day comparison	Direct Observation	2	PKM	6–12	9
10/6/2023	Hospital Flat	Day comparison	Direct Observation	2	SSK	6–12	4
10/6/2023	Hospital Flat	Day comparison	Direct Observation	2	SSK	12–16	2
10/6/2023	Hospital Flat	Day comparison	Direct Observation	2	SSK	0–3	120
10/6/2023	Hospital Flat	Day comparison	Direct Observation	2	SSK	3–6	6
10/6/2023	Hospital Flat	Day comparison	Direct Observation	2	PKM	6–12	8
10/6/2023	Hospital Flat	Day comparison	Direct Observation	2	UNKC	0–3	25
10/6/2023	Hospital Flat	Day comparison	Direct Observation	2	SSK	12–16	1
10/6/2023	Hospital Flat	Day comparison	Direct Observation	3	SSK	0–3	110
10/6/2023	Hospital Flat	Day comparison	Direct Observation	3	SSK	3–6	4
10/6/2023	Hospital Flat	Day comparison	Direct Observation	3	RBT	12–16	1
10/6/2023	Hospital Flat	Day comparison	Direct Observation	3	SSK	0–3	130
10/6/2023	Hospital Flat	Day comparison	Direct Observation	3	RBT	16+	1
10/6/2023	Hospital Flat	Day comparison	Direct Observation	3	SSK	0–3	40
10/6/2023	Hospital Flat	Day comparison	Direct Observation	3	PKM	6–12	2
10/6/2023	Hospital Flat	Day comparison	Direct Observation	3	SSK	6–12	1
10/6/2023	Hospital Flat	Day comparison	Direct Observation	3	PKM	6–12	13

Date	Site	Comparison Method	Sample Method	Pass	Species	Total Length (inches)	Count
10/6/2023	Hospital Flat	Day comparison	Direct Observation	3	SSK	12–16	3
10/6/2023	Hospital Flat	Day comparison	Direct Observation	3	SSK	0–3	45
10/6/2023	Hospital Flat	Day comparison	Direct Observation	3	UNKC	0–3	20
10/6/2023	Hospital Flat	Day comparison	Direct Observation	3	SSK	3–6	1
10/6/2023	Hospital Flat	Day comparison	Direct Observation	3	SSK	0–3	115
10/6/2023	Hospital Flat	Day comparison	Direct Observation	3	SSK	3–6	1
10/6/2023	Hospital Flat	Day comparison	Direct Observation	3	PKM	6–12	11
10/6/2023	Hospital Flat	Day comparison	Direct Observation	3	UNKC	0–3	15
10/8/2023	Hospital Flat	Night comparison	Direct Observation	1	SSK	0–3	49
10/8/2023	Hospital Flat	Night comparison	Direct Observation	1	UNKM	3–6	1
10/8/2023	Hospital Flat	Night comparison	Direct Observation	1	SSK	0–3	57
10/8/2023	Hospital Flat	Night comparison	Direct Observation	1	SSK	3–6	5
10/8/2023	Hospital Flat	Night comparison	Direct Observation	1	SSK	6–12	12
10/8/2023	Hospital Flat	Night comparison	Direct Observation	1	SSK	12–16	2
10/8/2023	Hospital Flat	Night comparison	Direct Observation	1	SSK	16+	1
10/8/2023	Hospital Flat	Night comparison	Direct Observation	1	PKM	6–12	18
10/8/2023	Hospital Flat	Night comparison	Direct Observation	1	RBT	6–12	1
10/8/2023	Hospital Flat	Night comparison	Direct Observation	1	RBT	16+	1
10/8/2023	Hospital Flat	Night comparison	Direct Observation	1	SSK	0–3	2
10/8/2023	Hospital Flat	Night comparison	Direct Observation	1	SSK	3–6	1
10/8/2023	Hospital Flat	Night comparison	Direct Observation	1	SSK	6–12	2
10/8/2023	Hospital Flat	Night comparison	Direct Observation	1	SSK	12–16	1
10/8/2023	Hospital Flat	Night comparison	Direct Observation	1	RBT	6–12	2
10/8/2023	Hospital Flat	Night comparison	Direct Observation	1	PKM	12–16	1
10/8/2023	Hospital Flat	Night comparison	Direct Observation	1	SSK	0–3	1
10/8/2023	Hospital Flat	Night comparison	Direct Observation	1	SSK	12–16	5

Date	Site	Comparison Method	Sample Method	Pass	Species	Total Length (inches)	Count
10/8/2023	Hospital Flat	Night comparison	Direct Observation	1	RBT	12–16	1
10/8/2023	Hospital Flat	Night comparison	Direct Observation	1	RBT	16+	1
10/8/2023	Hospital Flat	Night comparison	Direct Observation	1	RBT	12–16	2
10/8/2023	Hospital Flat	Night comparison	Direct Observation	1	PKM	6–12	1
10/8/2023	Hospital Flat	Night comparison	Direct Observation	1	SSK	6–12	1
10/8/2023	Hospital Flat	Night comparison	Direct Observation	1	SSK	12–16	1
10/8/2023	Hospital Flat	Night comparison	Direct Observation	2	SSK	6–12	2
10/8/2023	Hospital Flat	Night comparison	Direct Observation	2	SSK	3–6	1
10/8/2023	Hospital Flat	Night comparison	Direct Observation	2	SSK	0–3	62
10/8/2023	Hospital Flat	Night comparison	Direct Observation	2	UNKM	3–6	1
10/8/2023	Hospital Flat	Night comparison	Direct Observation	2	SSK	0–3	87
10/8/2023	Hospital Flat	Night comparison	Direct Observation	2	SSK	3–6	3
10/8/2023	Hospital Flat	Night comparison	Direct Observation	2	PKM	3–6	2
10/8/2023	Hospital Flat	Night comparison	Direct Observation	2	PKM	6–12	4
10/8/2023	Hospital Flat	Night comparison	Direct Observation	2	RBT	6–12	1
10/8/2023	Hospital Flat	Night comparison	Direct Observation	2	SSK	16+	2
10/8/2023	Hospital Flat	Night comparison	Direct Observation	2	SSK	0–3	2
10/8/2023	Hospital Flat	Night comparison	Direct Observation	2	SSK	6–12	2
10/8/2023	Hospital Flat	Night comparison	Direct Observation	2	RBT	12–16	1
10/8/2023	Hospital Flat	Night comparison	Direct Observation	2	RBT	16+	1
10/8/2023	Hospital Flat	Night comparison	Direct Observation	2	RBT	6–12	2
10/8/2023	Hospital Flat	Night comparison	Direct Observation	2	PKM	6–12	2
10/8/2023	Hospital Flat	Night comparison	Direct Observation	2	SSK	6–12	1
10/8/2023	Hospital Flat	Night comparison	Direct Observation	2	SSK	0–3	1
10/8/2023	Hospital Flat	Night comparison	Direct Observation	3	SSK	12–16	6
10/8/2023	Hospital Flat	Night comparison	Direct Observation	3	SSK	6–12	2

Date	Site	Comparison Method	Sample Method	Pass	Species	Total Length (inches)	Count
10/8/2023	Hospital Flat	Night comparison	Direct Observation	3	SSK	16+	2
10/8/2023	Hospital Flat	Night comparison	Direct Observation	3	RBT	12–16	2
10/8/2023	Hospital Flat	Night comparison	Direct Observation	3	PKM	6–12	1
10/8/2023	Hospital Flat	Night comparison	Direct Observation	3	SSK	0–3	71
10/8/2023	Hospital Flat	Night comparison	Direct Observation	3	SSK	16+	1
10/8/2023	Hospital Flat	Night comparison	Direct Observation	3	PKM	3–6	1
10/8/2023	Hospital Flat	Night comparison	Direct Observation	3	PKM	6–12	3
10/8/2023	Hospital Flat	Night comparison	Direct Observation	3	SSK	0–3	3
10/8/2023	Hospital Flat	Night comparison	Direct Observation	3	SSK	6–12	1
10/8/2023	Hospital Flat	Night comparison	Direct Observation	3	PKM	6–12	5
10/8/2023	Hospital Flat	Night comparison	Direct Observation	3	SSK	0–3	2
10/8/2023	Hospital Flat	Night comparison	Direct Observation	3	SSK	3–6	1
10/8/2023	Hospital Flat	Night comparison	Direct Observation	3	SSK	0–3	49
10/8/2023	Hospital Flat	Night comparison	Direct Observation	3	UNKM	3–6	1
10/8/2023	Hospital Flat	Night comparison	Direct Observation	3	SSK	6–12	1
10/8/2023	Hospital Flat	Night comparison	Direct Observation	3	SSK	12–16	1
10/8/2023	Hospital Flat	Night comparison	Direct Observation	3	PKM	6–12	1
10/7/2023	Headquarters	NA	Direct Observation	1	CAT	16+	1
10/7/2023	Headquarters	NA	Direct Observation	1	SSK	12–16	12
10/7/2023	Headquarters	NA	Direct Observation	1	SSK	0–3	40
10/7/2023	Headquarters	NA	Direct Observation	1	SSK	3–6	5
10/7/2023	Headquarters	NA	Direct Observation	1	SSK	6–12	1
10/7/2023	Headquarters	NA	Direct Observation	1	SSK	12–16	1
10/7/2023	Headquarters	NA	Direct Observation	1	RBT	6–12	5
10/7/2023	Headquarters	NA	Direct Observation	1	RBT	12–16	1
10/7/2023	Headquarters	NA	Direct Observation	1	SSK	0–3	55

Date	Site	Comparison Method	Sample Method	Pass	Species	Total Length (inches)	Count
10/7/2023	Headquarters	NA	Direct Observation	1	SSK	3–6	2
10/7/2023	Headquarters	NA	Direct Observation	1	RBT	6–12	2
10/7/2023	Headquarters	NA	Direct Observation	1	RBT	12–16	1
10/7/2023	Headquarters	NA	Direct Observation	1	PKM	6–12	1
10/7/2023	Headquarters	NA	Direct Observation	1	SSK	0–3	206
10/7/2023	Headquarters	NA	Direct Observation	1	SSK	0–3	8
10/7/2023	Headquarters	NA	Direct Observation	1	SSK	3–6	2
10/7/2023	Headquarters	NA	Direct Observation	1	RBT	6–12	2
10/7/2023	Headquarters	NA	Direct Observation	1	RBT	3–6	1
10/7/2023	Headquarters	NA	Direct Observation	1	PKM	6–12	8
10/7/2023	Headquarters	NA	Direct Observation	1	UNKC	0–3	1
10/7/2023	Headquarters	NA	Direct Observation	1	SSK	0–3	50
10/7/2023	Headquarters	NA	Direct Observation	1	RBT	6–12	9
10/7/2023	Headquarters	NA	Direct Observation	1	RBT	12–16	2
10/7/2023	Headquarters	NA	Direct Observation	1	SSK	6–12	16
10/7/2023	Headquarters	NA	Direct Observation	1	SSK	12–16	3
10/7/2023	Headquarters	NA	Direct Observation	1	CC	12–16	1
10/7/2023	Headquarters	NA	Direct Observation	1	PKM	6–12	1
10/7/2023	Headquarters	NA	Direct Observation	2	RBT	6–12	6
10/7/2023	Headquarters	NA	Direct Observation	2	RBT	12–16	1
10/7/2023	Headquarters	NA	Direct Observation	2	SSK	6–12	3
10/7/2023	Headquarters	NA	Direct Observation	2	SSK	12–16	2
10/7/2023	Headquarters	NA	Direct Observation	2	CAT	12–16	1
10/7/2023	Headquarters	NA	Direct Observation	2	RBT	6–12	20
10/7/2023	Headquarters	NA	Direct Observation	2	RBT	12–16	2

Date	Site	Comparison Method	Sample Method	Pass	Species	Total Length (inches)	Count
10/7/2023	Headquarters	NA	Direct Observation	2	SSK	6–12	19
10/7/2023	Headquarters	NA	Direct Observation	2	SSK	12–16	4
10/7/2023	Headquarters	NA	Direct Observation	2	PKM	12–16	1
10/7/2023	Headquarters	NA	Direct Observation	2	SSK	0–3	30
10/7/2023	Headquarters	NA	Direct Observation	2	SSK	0–3	200
10/7/2023	Headquarters	NA	Direct Observation	2	SSK	0–3	50
10/7/2023	Headquarters	NA	Direct Observation	2	SSK	3–6	2
10/7/2023	Headquarters	NA	Direct Observation	2	PKM	6–12	7
10/7/2023	Headquarters	NA	Direct Observation	2	PKM	3–6	1
10/7/2023	Headquarters	NA	Direct Observation	2	SSK	0–3	25
10/7/2023	Headquarters	NA	Direct Observation	2	SSK	0–3	150
10/7/2023	Headquarters	NA	Direct Observation	2	CC	12–16	1
10/7/2023	Headquarters	NA	Direct Observation	3	CAT	16+	3
10/7/2023	Headquarters	NA	Direct Observation	3	SSK	12–16	7
10/7/2023	Headquarters	NA	Direct Observation	3	RBT	6–12	1
10/7/2023	Headquarters	NA	Direct Observation	3	RBT	16+	1
10/7/2023	Headquarters	NA	Direct Observation	3	PKM	6–12	2
10/7/2023	Headquarters	NA	Direct Observation	3	SSK	0–3	40
10/7/2023	Headquarters	NA	Direct Observation	3	SSK	3–6	3
10/7/2023	Headquarters	NA	Direct Observation	3	SSK	0–3	195
10/7/2023	Headquarters	NA	Direct Observation	3	UNKC	0–3	1
10/7/2023	Headquarters	NA	Direct Observation	3	RBT	6–12	13
10/7/2023	Headquarters	NA	Direct Observation	3	RBT	12–16	3
10/7/2023	Headquarters	NA	Direct Observation	3	SSK	6–12	10
10/7/2023	Headquarters	NA	Direct Observation	3	SSK	12–16	4
10/7/2023	Headquarters	NA	Direct Observation	3	PKM	6–12	3

Date	Site	Comparison Method	Sample Method	Pass	Species	Total Length (inches)	Count
10/7/2023	Headquarters	NA	Direct Observation	3	SSK	0–3	28
10/7/2023	Headquarters	NA	Direct Observation	3	UNKC	0–3	10
10/7/2023	Headquarters	NA	Direct Observation	3	SSK	0–3	69
10/7/2023	Headquarters	NA	Direct Observation	3	SSK	3–6	3
10/7/2023	Headquarters	NA	Direct Observation	3	UNKC	0–3	10
10/7/2023	Headquarters	NA	Direct Observation	3	PKM	6–12	30
10/7/2023	Headquarters	NA	Direct Observation	3	PKM	3–6	2
10/7/2023	Headquarters	NA	Direct Observation	3	RBT	6–12	1
10/7/2023	Headquarters	NA	Direct Observation	3	RBT	12–16	1
10/7/2023	Headquarters	NA	Direct Observation	3	SSK	0–3	138
10/7/2023	Headquarters	NA	Direct Observation	3	RBT	6–12	1
10/7/2023	Headquarters	NA	Direct Observation	3	RBT	12–16	1

Notes: SSK = Sacramento sucker, RBT = rainbow trout, PKM = Sacramento pikeminnow, CC = channel catfish, CAT = unidentified catfish species, UNKT = unknown trout, UNKM = unknown cyprinid, UNKC = unknown larval cyprinid or catostomid

Appendix D

Consultation

From: David Moore
To: Abimael Leon; Chole Hansum; Arvind Bhuta; Watson, Alfred -FS; Karen Miller; Monique Sanchez; Dawn Alvarez; Rice, Barbara M
Cc: Martin Ostendorf; Russell Liebig; Colleen Kamoroff; Annabelle Howe; Jillian Roach
Subject: SCE's KR3 2023 Fish Population Monitoring Draft Report
Date: Friday, January 26, 2024 5:23:56 PM
Attachments: Kern 3_FishPop_2023_Report_Agency Draft.pdf

Dear Agency Representative,

As part of the current license for the Kern River No. 3 Project (KR3), SCE is to conduct fish population monitoring in accordance with the Fish Population Monitoring Plan (License Article 411). As you recall, SCE had to postpone the 5-year monitoring in 2021 and again in 2022 due to unsafe/poor stream conditions. SCE was able to complete the fish monitoring effort in the fall of 2023.

The attached draft report contains the results of the 2023 monitoring survey and is being provided to you for a 30-day review and comment period. SCE would appreciate receiving any comments by February 26th, in order to meet the Commissions filing deadline of March 1, 2024. SCE will host a meeting on **Wed Feb 14th from 1-2 PM** to review the conclusions and recommendations presented in the report and to facilitate any questions or comments you may have (meeting invite to follow shortly).

Please contact me if you have any questions regarding this request.

Thank you,
David Moore
Southern California Edison
T: 626-861-5918

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KERN RIVER NO. 3 (KR3) HYDROELECTRIC PROJECT (P-2290)
SOUTHERN CALIFORNIA EDISON
FISH POPULATION MONITORING REPORT
AGENCY INFORMATION MEETING

Date:	February 14, 2024
Time:	1:00 pm – 2:00 pm
Purpose of Meeting:	• Review 2023 Fish Population Monitoring Effort • Questions/Comments

ATTENDEES

NAME	**ORGANIZATION**
David Moore	SCE, Kern 3 Compliance/Relicensing Project Manager
Al Watson	USFS-Sequoia National Forest (SQF), Kern River District Ranger
Karen Miller	USFS, FERC Program Manager, Public Services Staff Officer
Abimael Leon	CDFW, FERC Coordinator
Ronald Rozar	USFS-SQF, Wildlife Biologist
Monique Sancez	USFS, Regional Hydropower Team (RHAT)
Jillian Roach	ERM, Sr. Compliance/Relicensing Project Manager
Annabelle Howe	Stillwater Sciences, Aquatic Resources
Russ Liebig	Stillwater Sciences, Aquatic Resources

MEETING NOTES
Introduced meeting attendees and reviewed meeting agenda.

Meeting slide deck attached.

Notes below summarize questions and next steps:

- Al Watson (SQF): any surprises on the data found/observed
  - Response: The fish observed in 2023 are similar as to what has been observed in the past in that rainbow trout are declining in the reach and no hardhead were observed, even as SCE conducted focused deep pool snorkeling lower in the reach.
- Al Watson (SQF): Is this pattern/species distribution typical/seen in other rivers?
  - Response: Hard to make broad generalizations as this reach is heavily stocked and the species distribution we observed is expected in terms for presence of native vs non-native species.
  - HH were observed early monitoring, but have seen them continually move downstream, and have not been observed since 1998.
- Al Watson (SQF): Given that the area has experienced several drought years, with one large water year in 2023, did that have any impact on species?
  - Response: It could be possible that low water years influenced recruitment of some fish species. However, this year field teams did see high recruitment of Sacrament suckers this year. While it was a high flow year, we would have assumed to see higher recruitment of rainbow trout as well.
- Monique Sanchez (SQF): How deep are some of these pools snorkeled?

    - Response: The deeper pools were located at the downstream sites, with the deepest sections approx. 9 ft. Visibility was good and biologists could see down to bottom. Sacramento suckers were distinguishable from minnows due to their downturned mouth and behavior (foraging along the bottom of the river). If biologists were unable to detect differences between species, they were grouped into a combined minnow and sucker category.
- Monique Sanchez (SQF): If turbidity is an issue during sampling, are there other sampling methods that could be utilized (hardhead specifically)?
    - Response: If there is an assay available, could sample for eDNA in the reach. However, eDNA can only be used to determine if that species was present in the river, it would not provide species density or age class distribution information.
- Monique Sanchez (SQF): This survey was delated due to impacts from Windy Fire, have there been other delays in the past years?
    - Response: Yes, this has happened in past years and the 5yr sampling sequence has been delayed due to high turbidity issues and surveys were delayed seasonally and even postponed until following year as high turbidity and/or higher flows prevented electrofishing effectively/safely.

Next Steps:

- Provide any written comments on the report to Dave Moore by February 26, 2024.
- Reviewed the FERC Revised Process Plan and Schedule and Licensing timeline and due dates based on updated schedule published February 2, 2024.

Kern No. 3 Project (FERC Project No. 2290)

Fish Population Monitoring 2023 Study Results

February 14, 2024; 1:00 PM – 2:00 PM

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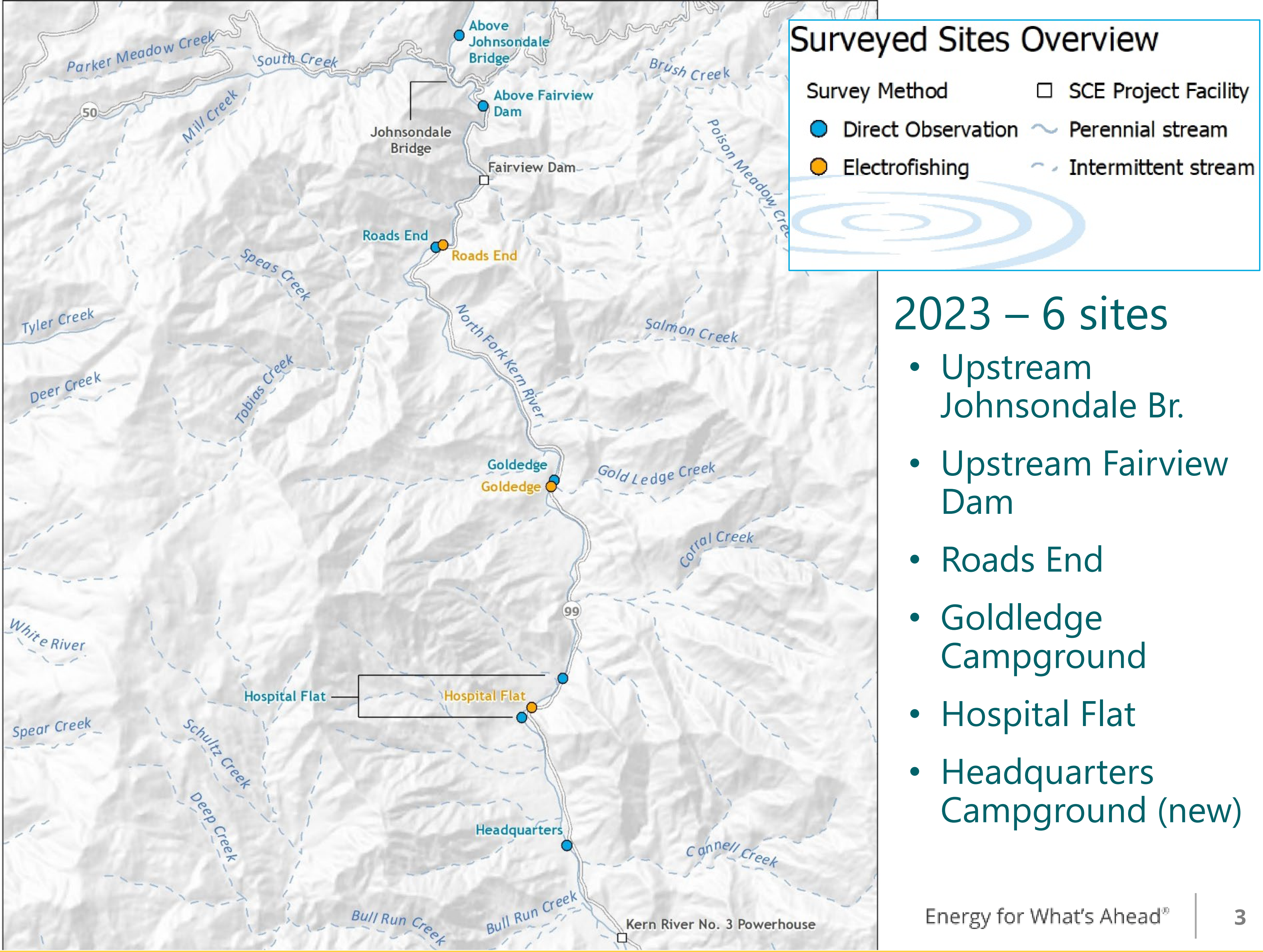
Meeting Agenda

- ❑Welcome & Introductions
- ❑Purpose and Objective of Meeting
- ❑Review of 2023 Fish Population Study Results
- ❑Differences from Study Plan and Recommendations
- ❑Questions / Comments
- ❑Next Steps

Fish Monitoring Study

- Current License Requirement (License Article 411)
- Monitor fish populations every 5 years at 5 sites along the NFKR
- Uses both backpack electrofishing and snorkel methods



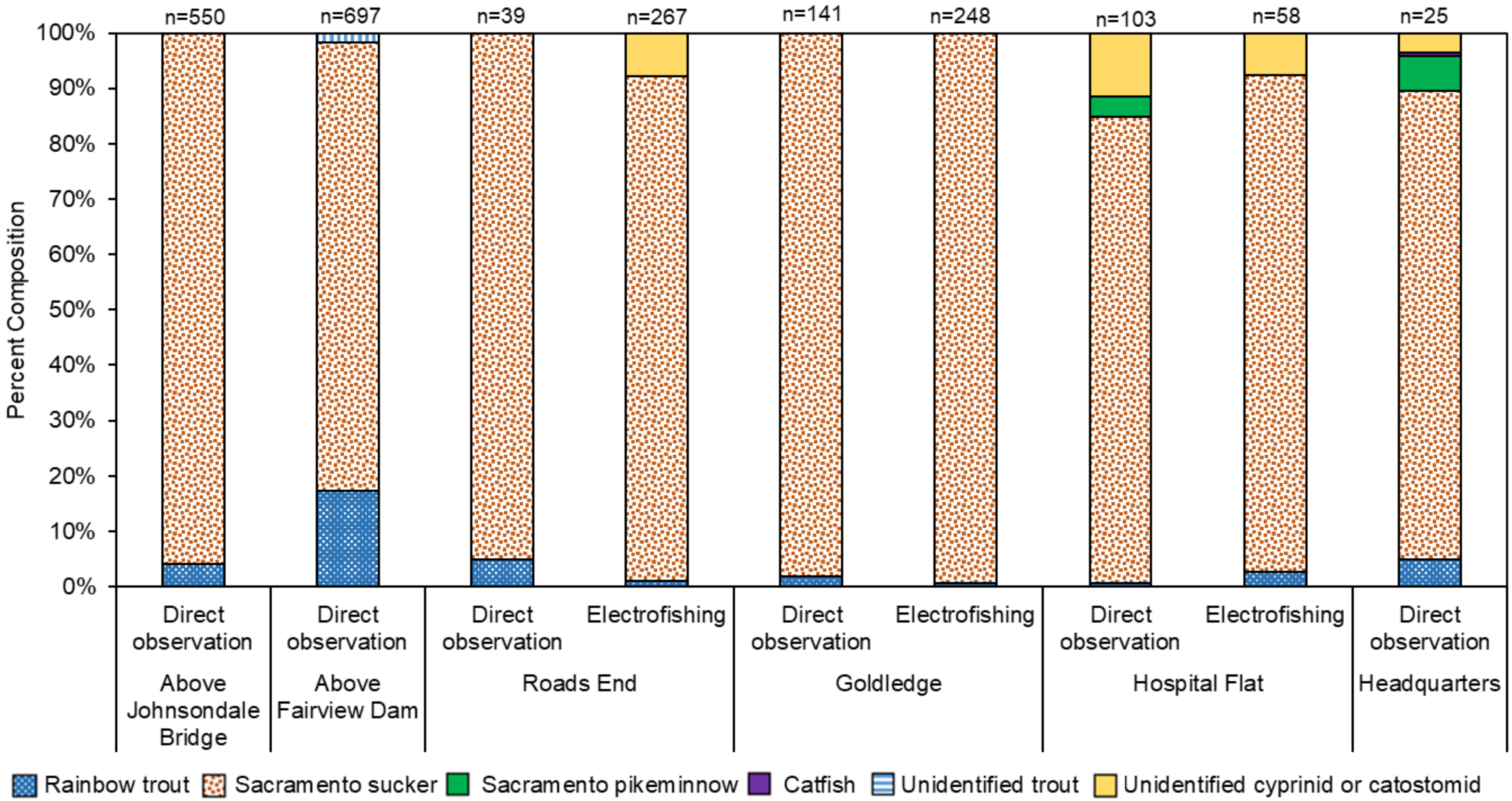
2023 – 6 sites

- Upstream Johnsondale Br.
- Upstream Fairview Dam
- Roads End
- Goldledge Campground
- Hospital Flat
- Headquarters Campground (new)

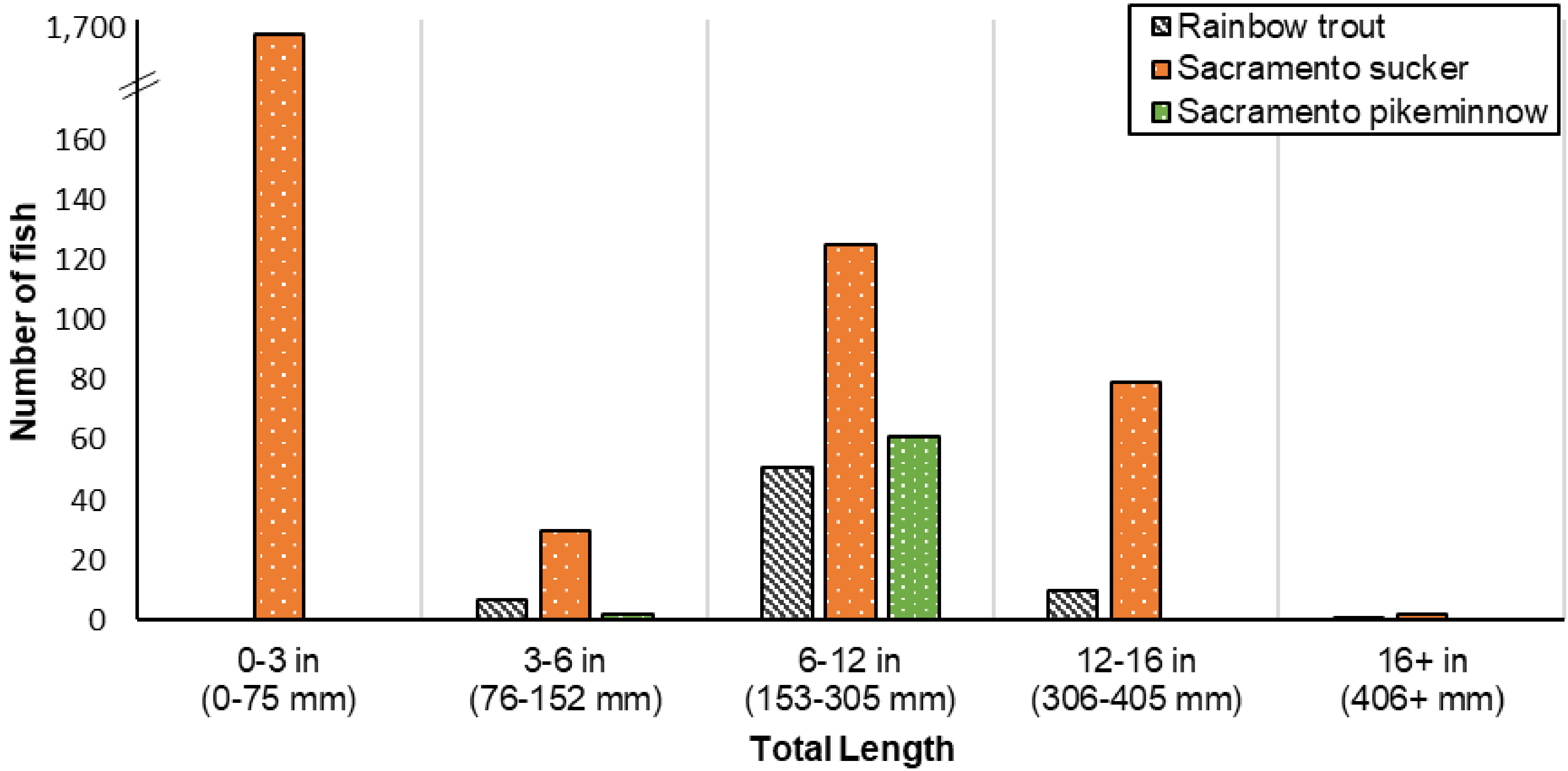
Methods

- 3-pass snorkeling
  - 2 sites above Fairview Dam
  - 4 sites between Fairview Dam and the KR3 Powerhouse
  - Day/night methods comparison
- Multiple-pass electrofishing
  - 3 sites between Fairview Dam and the KR3 Powerhouse

North Fork Kern River Species Composition, Oct. 2023



North Fork Kern River Size Groups, Oct. 2023

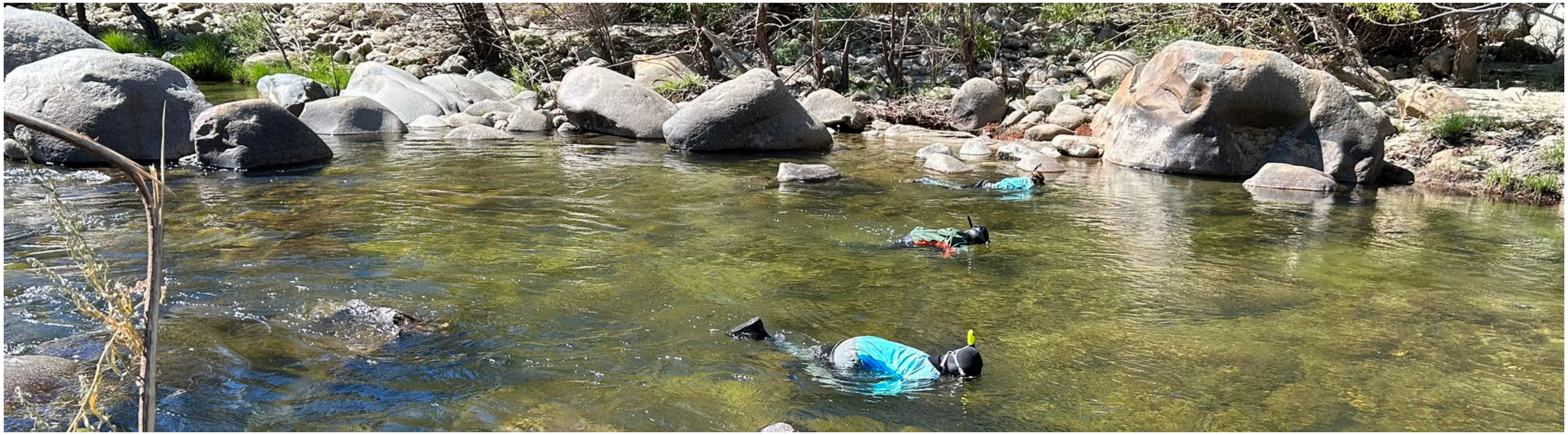


Differences from Study Plan Methods

- Conditions at the Roads End site were swift and deep, compared to prior years, requiring the backpack electrofishing site to be shifted slightly upstream
- Surveyed additional pool habitat lower in the Fairview Dam Bypass Reach

Recommendations for Future Monitoring

- Conduct snorkel surveys in lieu of electrofishing
- Survey earlier in the summer to avoid fall rain events
- Continue 3-pass snorkel methods:
    - day/night comparison
    - 25-50 mm size bins



Questions / Comments

Next Steps

- **February 26, 2024**: Provide any written comments to SCE via email to Dave Moore (David.moore@sce.com)
- **March 1, 2024**: SCE to file final Fish Population Report with FERC

Thank You

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