AQ 3 – FISH POPULATION TECHNICAL MEMORANDUM

KERN RIVER NO. 1 HYDROELECTRIC PROJECT
FERC PROJECT NO. 1930

PREPARED FOR:

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°C	degrees Celsius
µS/cm	microsiemens per centimeter
AQ TM	AQ 2 – Water Quality and Water Temperature Technical Memorandum
AQ 2 TSP	AQ 2 – Water Quality and Water Temperature Technical Study Plan
AQ 3 ITM	AQ 3 – Fish Population Interim Technical Memorandum
AQ 3 TM	AQ 3 – Fish Population Technical Memorandum
AQ 3 TSP	AQ 3 – Fish Population Technical Study Plan
cfs	cubic feet per second
CPUE	catch-per-unit effort
DLA	Draft License Application
E-Cat	cataraft electrofisher
FERC	Federal Energy Regulatory Commission
FL	fork length
GPS	global positioning system
ISR	Initial Study Report
KR1	Kern River No.1
mm	millimeter
n	number
OEHHA	Office of Environmental Health Hazard Assessment
Project	Kern River No. 1 Hydroelectric Project, FERC No. 1930
SCE	Southern California Edison
TL	total length
YOY	young-of-the-year

1.0 INTRODUCTION

This AQ 3 – Fish Population Technical Memorandum (AQ 3 TM) describes the data and findings for fish population monitoring completed in 2024 and 2025 in support of Southern California Edison's (SCE) Kern River No. 1 (KR1) Hydroelectric Project (Project) relicensing, Federal Energy Regulatory Commission (FERC) Project No. 1930. The AQ 3 – Fish Population Technical Study Plan (AQ 3 TSP) was included in SCE's Revised Study Plan filed on February 13, 2024 (SCE 2024). In its March 14, 2024 Study Plan Determination, FERC approved the AQ 3 TSP without modifications (FERC 2024). The AQ – 3 Interim Technical Memorandum (AQ 3 ITM) describing 2024 methods and results was included in the Initial Study Report (ISR) filed with FERC on March 12, 2025, and an updated AQ 3 ITM was provided in the Draft License Application (DLA) filed on December 18, 2025.

Data in this final AQ 3 TM were collected in the Democrat Dam Impoundment in October of 2024 and in the Project bypass reach in the fall of 2025.[1] As described in the AQ 3 ITM, flows in the Kern River were too high to safely sample the bypass reach in the fall of 2024 but conditions were suitable in the fall of 2025.

2.0 STUDY OBJECTIVES

The objectives of the fish population study as outlined in the AQ 3 TSP (SCE 2024) included the following:

- Document fish species composition, distribution, and abundance in the Democrat Dam Impoundment and bypass reach.
- Characterize fish size, condition factor, and approximate population age class structure in the Democrat Dam Impoundment and bypass reach.

3.0 STUDY AREA AND STUDY SITES

The study area included the Democrat Dam Impoundment and the bypass reach from Democrat Dam to the Kern River No. 1 Powerhouse Tailrace (Table 3-1, Map 3-1, and Map 4-1). Sampling in 2024 and 2025 was conducted during the late summer or fall base-flow period. Democrat Dam Impoundment shoreline electrofishing included multiple passes throughout most of the approximately 1-mile-long impoundment (Map 4-1). Sampling sites in the bypass reach were approximately 100-meters-long or longer and included historical sampling sites (see ENTRIX 2009). Mesohabitat characterization (i.e., riffle, run, pool) in the bypass reach based on aerial image mapping (Google Earth) and field observations were used to identify representative sampling sites within mesohabitat types in approximately similar proportion to the larger geomorphic river segment. Final sampling locations in the bypass reach were determined in the field based on access, safety, historical sampling sites, and mesohabitat types. Appendix A includes photos of specific river sampling sites.

[1] The bypass reach is the 10.2-mile-long section of the Kern River downstream of Democrat Dam where Project operations result in the diversion of a portion of the water from the river.

4.0 METHODS

The study followed the methods described in AQ 3 TSP (SCE 2024), except for the following minor variance related to the timing of sampling.

4.1 STUDY PLAN VARIANCE

Electrofishing was conducted in the Democrat Dam Impoundment in 2024; however, trammel netting in the impoundment was completed in the fall of 2025. Sampling in the bypass reach could not be completed in 2024 due to unsafe, high-flow conditions. Bypass reach sampling was completed in early December of 2025 when flow conditions were low enough to sample safely and effectively.

4.2 DEMOCRAT DAM IMPOUNDMENT SAMPLING (2024-2025)

SCE sampled approximately 4.65 miles of shoreline habitat from October 15 to 17, 2024, using a Smith-Root™ light-duty cataraft electrofisher (E-Cat) with oars and a small outboard motor (Map 4-1). Biologists sampled most of the approximately 1-mile-long impoundment, including shoreline margins and open water habitat up to 6-feet-deep. Each E-Cat sampling pass (route) is shown on Map 4-1. In addition to fish population data, SCE also collected edible-sized sport fish pursuant to the AQ 2 – Water Quality and Water Temperature Technical Study Plan (AQ 2 TSP) for total mercury and methylmercury fish tissue analysis. Additional details about the sampling methods for fish tissue mercury analysis are provided in the AQ 2 – Water Quality and Water Temperature Technical Memorandum (AQ 2 TM).

On September 30 and October 1, 2025, SCE deployed trammel nets to sample deep water portions of the Democrat Dam Impoundment. Two 300-foot-long, 8-feet-deep trammel nets were set for approximately 4-hours. One net was set in the late afternoon, and one net was set in the morning (Map 4-1).

4.3 BYPASS REACH SAMPLING (2025)

Five sampling sites (Sites A-E) were established in the field during reconnaissance in September 2025. Mesohabitat characterization (based on Google Earth imagery) was used to confirm that the sampling sites were representative of habitat (e.g., riffles, pools, runs) within the 10.2-mile-long bypass reach. The sites were sampled with backpack electrofishing units in early December (December 1 - December 5, 2025), when flows were approximately 20 cubic feet per second (cfs) and low enough to safely wade and sample effectively.[2]

- At each site, a team of approximately 10 biologists (3 backpack units and 6-7 netters) were deployed. The survey team started at the bottom of each habitat unit and moved in an upstream direction to collect fish. At four of five sites (Sites B-E),

[2] As noted in the AQ 3 ITM, SCE proposed to use an E-Cat to sample the bypass reach if site conditions and access allowed. After further evaluation of the site in 2024 and 2025, SCE determined that an E-Cat was not feasible in the bypass reach due to access constraints and safety considerations (i.e., steep banks, unstable terrain).

the sampling area was partitioned into smaller habitat units based on mesohabitat type (e.g., run, riffle, pool) using block nets. At these sites, block nets were installed at the top and bottom of each individual habitat unit to allow for multi-pass depletion sampling (e.g., Reynolds 1996; Van Deventer and Platts 1989; Rexstad and Burnham 1992). Due to the difficult sampling environment (i.e., difficult terrain, deep water; see Appendix A photos), block nets could not be installed and multi-pass depletion sampling could not be conducted at Site A. Captured fish from each pass were kept in separate live wells or 5-gallon buckets and recorded separately.

- Trammel nets (300-foot-long, 8-feet-deep) were used to capture fish in deep pools (> 2.5 meters) immediately downstream of Sites D and E, Table 3-1; Maps 3-1d and 3-1e). Trammel nets were set for approximately 4 hours during the late afternoon and early evening. Trammel nets were not deployed at the remaining three sampling sites in the bypass reach due to shallow pool depths, large substrate impediments, or unsafe access (e.g., steep, rocky banks).

4.4 FISH PROCESSING

Fish processing included the following:

- Fish were enumerated, identified to species, and measured to fork length (FL) or total length (TL) (millimeter [mm]) as appropriate for the species, and weighed to the nearest gram.[3,4]

- Fish were returned to the river when sampling was completed at each site.

- Global Positioning System (GPS) coordinates were collected at the top and bottom of each sampled habitat unit in the bypass reach and at the upstream end of each trammel net; a GPS track was recorded for all E-Cat sampling routes in the impoundment.

- Deployment and retrieval times of the trammel nets and electrofishing start and end times were recorded.

- The length of habitat units sampled in the Democrat Dam Impoundment were measured to calculate fish abundance by length (i.e., fish/mile).

- The lengths and widths of the habitat units sampled in the bypass reach were measured to calculate fish abundance and density metrics (i.e., fish/mile and fish/acre).

[3] Sampling protocols and field forms were consistent with Flosi et al. 1998.

[4] Fork length (tip of snout to fork of tail) was measured for species with a forked caudal fin. Total length was measured for species without a forked caudal fin.

4.5 NORTHWESTERN POND TURTLE AND INCIDENTAL SPECIES OBSERVATIONS

Incidental observations of northwestern pond turtle (*Actinemys marmorata)* and other aquatic species were made during E-Cat sampling in the Democrat Dam Impoundment in 2024. Observations were also made from a two-person inflatable kayak in 2024 in portions of the reservoir inaccessible to the E-Cat. Incidental observations of northwestern pond turtles and other aquatic species were also made during 2025 sampling in the bypass reach and trammel netting in the impoundment.

4.6 DATA ANALYSIS

The following analyses were completed:

- In the Democrat Dam Impoundment, fish abundance was reported by species and by catch-per-unit-effort (CPUE) (fish/net-hour) for trammel netting or catch rate (fish/mile) for E-Cat electrofishing.

- In the bypass reach, fish abundance was reported by species at each sampling site during backpack electrofishing surveys and trammel netting. At Sites B-E, where multi-pass depletion backpack electrofishing was performed, fish population estimates were developed for each species using depletion data analyzed in MicroFish software.[5] Site A was not suitable for multi-pass depletion sampling (i.e., difficult sampling terrain), so depletion sampling population estimates were not developed for this site.

- Site-specific population estimates were used to calculate fish standing crop metrics (i.e., fish/mile and fish/acre) and biomass (pounds/mile and pounds/acre) at Sites B-E.

- Fish assemblage data collected in 2024 and 2025 in the Democrat Dam Impoundment was compared to previous sampling data from 1994 and 1995 (ENTRIX 1994, ENTRIX 1995).

- Fish assemblage data collected in 2025 from the bypass reach was compared to previous sampling in the late 1990s and early 2000s (ENTRIX 2009) and to recent sampling in the Borel Project (FERC No. 382) reach of the Kern River (Cardno 2021), which is located upstream of Democrat Dam Impoundment and downstream of Lake Isabella.

- A distribution map of fish species in the study area was developed using the quantitative abundance estimates and qualitative sampling data.

[5] Multi-pass depletion sampling and MicroFish are commonly used to generate population estimates for fish species (Reynolds 1996; Van Deventer and Platts 1989; Rexstad and Burnham 1992).

- A fish life stage periodicity chart (by calendar month) was developed for each species based on Moyle (2002), consultation with qualified fisheries biologists, and fish population sampling data.

- Length-frequency histograms of fish collected in the Democrat Dam Impoundment and bypass reach were generated to evaluate the general age-class structure of the fish assemblage.

- Fulton's condition factor (Ricker 1975) was calculated for larger-bodied fish collected during the study. Fish smaller than 150 mm FL or TL were excluded from the condition factor analysis due to lower measurement precision and variable growth patterns in small juvenile fish.

- Upon request, an electronic database (Excel spreadsheet) can be provided of all fish sampling data (date, location, fish species, fish size, sampling pass, etc.) to resource agencies and interested stakeholders.

4.7 IN-SITU WATER TEMPERATURE AND SPECIFIC CONDUCTANCE

Water temperature and specific conductance were recorded at each sampling site in the bypass reach and Democrat Dam Impoundment with a calibrated YSI ProDSS water quality meter.

5.0 RESULTS SUMMARY

5.1 FISH SPECIES AND LIFE STAGE PERIODICITY

SCE collected ten fish species in the impoundment and eight species in the bypass reach. Two species were native: hardhead minnow (*Mylopharodon conocephalus*) and Sacramento sucker (*Catostomus occidentalis*). Hardhead minnow is a California Species of Special Concern and Forest Service Sensitive Species. All other species were introduced, non-native species. These included rainbow trout (*Oncorhynchus mykiss*), smallmouth bass (*Micropterus dolomieu*), largemouth bass (*M. salmoides*), black crappie (*Pomoxis nigromaculatus*), bluegill sunfish (*Lepomis macrochirus*), common carp (*Cyprinus carpio*), channel catfish (*Ictalurus punctatus*), brown bullhead catfish (*Ameiurus nebulosus*), white catfish (*A. catus*), and threadfin shad (*Dorosoma petenense*). The fish species collected during fish population monitoring in Democrat Dam Impoundment (Section 5.2) and in the bypass reach (Section 5.3) are shown in Table 3-2.

An approximate life stage periodicity (i.e., life history chronology) chart by month for each fish species in the Project area is provided in Table 3-3. Actual spawning and rearing timelines may vary in response to environmental and hydrological conditions. Adult and juvenile fish are present in the bypass reach year-round. The most sensitive spawning window for species like hardhead and smallmouth bass is approximately mid-March through May.

Rainbow trout are stocked annually in the bypass reach and in the Kern River between Democrat Dam and Lake Isabella. There is no known rainbow trout spawning activity in the bypass reach and little to no wild recruitment of juvenile rainbow trout (SCE 2023). Therefore, rainbow trout in the bypass reach represent a 'put and take' fishery where mature trout are stocked in the spring and reside in the bypass reach until they are harvested.

5.2 DEMOCRAT DAM IMPOUNDMENT FISH SAMPLING (2024 AND 2025)

5.2.1 Species Captured, Density, and Catch per Unit Effort

SCE collected 379 fish (10 species) from the Democrat Dam Impoundment during electrofishing and trammel netting surveys in 2024 and 2025 (Table 3-2, Table 3-4, and Table 3-5). Native species included hardhead minnow and Sacramento sucker. Introduced species included brown bullhead catfish, channel catfish, white catfish, common carp, black crappie, bluegill sunfish, largemouth bass, and threadfin shad. Threadfin shad are likely present in the Democrat Dam Impoundment because of spill events from Lake Isabella. No smallmouth bass (*M. dolomieu*) or rainbow trout (*Oncorhynchus mykiss*) were captured in the impoundment.

The most abundant species collected during 2024 electrofishing in the Democrat Dam Impoundment were largemouth bass (number [n]=131, 39.8 percent), threadfin shad (n=96, 29.2 percent), and Sacramento sucker (n=50, 15.2 percent) (Figure 3-1, top chart). By weight, Sacramento sucker (49.7 percent) and common carp (34.2 percent) accounted for most of the biomass, followed by largemouth bass (10.4 percent) (Figure 3-1, bottom chart). Linear catch rates during 2024 electrofishing in the impoundment ranged from 31 to 125 fish/mile per pass for all fish species combined (Table 3-6 and Figure 3-2). The highest species-specific catch rates were for largemouth bass (28.2 fish/mile) and Sacramento sucker (10.8 fish/mile). The lowest species-specific catch rates were for channel catfish (0.2 fish/mile), hardhead minnow (0.4 fish/mile), and white catfish (0.5 fish/mile).

In 2025, white catfish was the most abundant species collected in the impoundment during trammel netting (n=44, 88.0 percent) and accounted for most of the biomass (85.0 percent) (Figure 3-3). CPUE during 2025 trammel net sampling in the Democrat Dam Impoundment was highest for white catfish (5.33 fish/net hour), followed by channel catfish (0.36 fish/net hour), largemouth bass (0.24 fish/net hour), and hardhead minnow (0.12 fish/net hour) (Table 3-7). All fish were captured in the trammel net that was set in the evening of September 30, 2025, closer to Democrat Dam (Map 4-1). No fish were captured in the trammel net that was set on the morning of October 1, 2025, farther upstream (Map 4-1). Trammel nets captured some of the same species and size classes captured by electrofishing but with a higher catch of white catfish due to the deep benthic orientation of the nets.

5.2.2 Fish Tissue Methylmercury

Pursuant to the AQ 2 TSP, SCE collected 29 edible-sized sport fish during 2024 impoundment sampling for total mercury and methylmercury fish tissue analysis. The catch included ten largemouth bass, three black crappie, five bluegill sunfish, one channel catfish, one white catfish, and nine brown bullhead catfish. Fish ranged in size from 151 to 545 mm FL or TL. Samples were processed by the Marine Pollution Studies Lab in Moss Landing, California. All 29 of the fish tissue samples exceeded or were equal to the reference methylmercury concentration of 0.08 mg/kg (Office of Environmental Health Hazard Assessment [OEHHA] 2005). Methylmercury tissue concentrations ranged from 0.08 mg/kg to 0.57 mg/kg and were positively correlated with fish size and trophic level. Additional information on the fish tissue methylmercury analysis is provided in the AQ 2 TM (SCE 2026) and the DLA filed with FERC on December 18, 2025.

5.2.3 Length-Frequency

Length-frequency histograms were created for species collected during E-Cat sampling in the Democrat Dam Impoundment in 2024. A length-frequency histogram for all species collected during the electrofishing surveys is provided in Figure 3-4. Length-frequency histograms for individual species are provided in Appendix B. Fish between 50- and 150-mm FL were the most frequently collected, consisting primarily of threadfin shad and largemouth bass. Low to moderate numbers of fish between 150- and 400-mm FL were observed, consisting of largemouth bass, bluegill sunfish, black crappie, brown bullhead catfish, white catfish, and hardhead. Several large Sacramento suckers and common carp ranging in size from 400-mm to > 600-mm FL were collected. Length-frequency histograms for 2025 trammel net sampling in the impoundment were not developed, as the monofilament mesh size of the nets (4-inch) resulted in a relatively selective size of fish that could be captured. The length of all 50 fish collected in the impoundment in 2025 with trammel nets ranged from 174-mm to 445-mm FL.

5.2.4 Condition Factor and Fish Health

The average condition factor for all species collected in the Democrat Dam Impoundment during 2024 and 2025 sampling ranged from 1.14 to 2.92, indicating that most fish were in healthy condition (Table 3-8). The lowest condition factor for an individual fish (0.69) was observed in a largemouth bass. For native species, condition factors for individual fish ranged from 1.38 to 1.48 (hardhead minnow; average condition factor of 1.43) and 0.84 to 2.55 (Sacramento sucker; average condition factor of 1.35) (Table 3-8). Diseases or parasites were encountered incidentally in some fish but were not widespread. A large hardhead was captured in poor health with an unidentified wound in 2024 (Appendix C, Photo C-1). The wound was not consistent with an external parasite or electrofishing injury and may have been due to internal infection or injury from catch by recreational fishers.

Representative photos of native and introduced fish species captured in the impoundment are provided in Appendix C.

5.2.5 Comparison to Historical Data

Catch data from 2024 boat electrofishing and 2025 trammel net sampling in the Democrat Dam Impoundment were compared to data from sampling conducted in 1994 (ENTRIX 1994) and 1995 (ENTRIX 1995) as part of the last relicensing effort for the Project (Figure 3-5). Overall, more fish were collected in 2024-2025 (n=379, sum of both sampling years) than in 1994 (n=39) or 1995 (n=227); however, the sampling effort varied across sampling years. The sampling effort in 1994 included four pulls of a 50-foot beach seine, deployment of three monofilament gill nets fished for 24 hours each, nine minnow traps each set for 72 hours, and boat electrofishing (unknown area). In 1995, the sampling effort consisted of four pulls of a 50-foot beach seine, deployment of two monofilament gill nets fished for 24 hours each, nine minnow traps each set for 72 hours, three hoop nets (also called Indiana trap nets) fished for 24 hours each, and boat electrofishing (unknown area).

Few fish were collected in 1994; high flows (400 cfs) and cold water likely resulted in reduced fish activity and low catch numbers (ENTRIX 1995). In 1995, 13 species were captured, and the assemblage was dominated by white crappie (*Pomoxis annularis*), (43.6 percent), brown bullhead catfish (32.2 percent), and largemouth bass (11.0 percent); fewer (10 individuals or less) bluegill sunfish, common carp, hitch (*Lavinia exilicauda*), hardhead, mosquitofish (*Gambusia affinis*), rainbow trout (stocked), Sacramento pikeminnow (*Ptychocheilus grandis*), Sacramento sucker, smallmouth bass, and white catfish made up the rest of the catch. The species composition was generally similar in 1995 and 2024-2025 with the fish community mostly comprised of non-native, warm water fish species. In 2024-2025, more largemouth bass, Sacramento sucker, hardhead, bluegill sunfish, common carp, and white catfish were observed than in 1995. Hitch, mosquitofish, rainbow trout, Sacramento pikeminnow, smallmouth bass, and white crappie were collected in 1994 and/or 1995 but were not observed in 2024 or 2025 within the Democrat Dam Impoundment. Conversely, black crappie and threadfin shad were collected in 2024 but not in 1994 or 1995.

5.3 BYPASS REACH FISH SAMPLING (2025)

5.3.1 Riverine Habitat Characterization

Mesohabitat categorization of the bypass reach using Google earth aerial imagery demonstrated that the bypass reach is approximately 40 percent riffle and 60 percent pool/run. Sites A-E were representative of the overall mesohabitat composition of the bypass reach and contained the mesohabitat types identified in the larger reach (i.e., riffle, pool). Sampling sites were dominated by pools and riffles (Table 3-1).

5.3.2 Species Composition, Standing Crop, Population Estimates, and Catch per Unit Effort

SCE collected 591 fish (8 species) in the bypass reach during electrofishing and trammel netting surveys in 2025 (Table 3-2, Table 3-4, Table 3-9, and Figure 3-6). Two native species (hardhead minnow and Sacramento sucker) and six introduced species (brown

bullhead catfish, channel catfish, white catfish, largemouth bass, smallmouth bass, and rainbow trout) were collected. Overall, the bypass reach was dominated by native fish. Sacramento sucker (~63 percent), hardhead minnow (~ 14.3 percent), and brown bullhead catfish (~ 15 percent) were the most abundant species.

Fish assemblage data from backpack electrofishing at each site were overlaid on aerial imagery (Figure 3-7)[6] and shown by site (Figures 3-8a – 8e) to evaluate the spatial distribution of fish within the bypass reach. Species composition was similar from upstream to downstream; however, the total number of fish captured generally increased from upstream to downstream. Native species (hardhead minnow and/or Sacramento sucker) were observed at all five sites. Brown bullhead abundance generally increased from upstream to downstream. Largemouth bass were present at all sites except Site E and smallmouth bass were observed only at Sites B and D. A single rainbow trout was captured at Site D. The density and biomass per acre of all species combined generally increased from upstream to downstream. The upstream to downstream trend was primarily dominated by Sacramento suckers. Excluding Sacramento suckers, the density was similar by site and biomass was highest in sites C and D. The number of fish captured via backpack electrofishing, population estimates, and standing crop estimates (density and biomass) are presented in Table 3-4, Table 3-9, Figure 3-9, and Figure 3-10. Each sampling site is discussed below.

5.3.2.1 Site A

Due to the difficult sampling environment at Site A (i.e., difficult terrain, deep water; see Appendix A photos), block nets could not be installed, and multi-pass depletion sampling could not be conducted. Instead, approximately 90 percent of stream margin habitat and 40 percent of the total wetted habitat was surveyed at this site to qualitatively assess species composition. Fifty fish were collected at Site A (Table 3-4, Table 3-9, and Figure 3-8a). The fish community was dominated by Sacramento sucker (66.0 percent; 33 fish) and hardhead minnow (24.0 percent; 12 fish); a small number of largemouth bass, brown bullhead catfish, and white catfish made up the remainder of the catch (Figure 3-8a and Table 3-9). Site A had the highest abundance of adult hardhead minnow. No rainbow trout or smallmouth bass were observed at this site. Given the difficult terrain and single-pass approach, the fish assemblage metrics could not be compared to sites B-D.

5.3.2.2 Site B

Ninety-two fish were collected at Site B (Table 3-4, Table 3-9, and Figure 3-8b). The fish community was dominated by hardhead minnow (41.3 percent; 38 fish) and Sacramento sucker (38.0 percent; 35 fish), followed by largemouth bass (9.8 percent; 9 fish), brown bullhead catfish (5.5 percent; 5 fish) and smallmouth bass (5.5 percent; 5 fish) (Figure 3-8b and Table 3-9). Overall, based on fish population estimates, Site B had the lowest combined species density (fish/mile, fish/acre) in the bypass reach (Table 3-9 and Figure 3-9). Site B also had the lowest biomass (pounds/mile, pounds/acre) (Table 3-9 and

[6] Trammel net data were not included in electrofishing species composition charts given the limited number and diversity of captured fish.

Figure 3-10). Site B had the highest abundance of juvenile hardhead minnow. No rainbow trout were captured at this site.

5.3.2.3 Site C

At Site C, 118 fish were collected (Table 3-4, Table 3-9, and Figure 3-8c). The fish community was dominated by Sacramento sucker (64.4 percent; 76 fish), followed by hardhead minnow (17.8 percent; 21 fish) and brown bullhead catfish (11.9 percent; 14 fish). Largemouth bass and channel catfish each made up approximately 3 percent of the catch, with 3 and 4 individuals captured, respectively (Table 3-9 and Figure 3-8c). Based on fish population estimates, Site C had the second highest combined species density and biomass across all sampling sites when the analysis included Sacramento suckers, and the highest combined species density and biomass without Sacramento suckers (Table 3-9, Figure 3-9, and Figure 3-10). No rainbow trout or smallmouth bass were captured at this site.

5.3.2.4 Site D

At Site D, 159 fish were collected (Table 3-4, Table 3-9, and Figure 3-8d), including 136 fish captured during backpack electrofishing and 23 fish captured with trammel nets. Based on the number of fish captured during backpack electrofishing, species composition at Site D was dominated by Sacramento sucker (55.1 percent; 75 fish) and brown bullhead catfish (30.9 percent; 42 fish), followed by largemouth bass (8.1 percent; 11 fish) and lesser numbers of smallmouth bass (2.9 percent; 4 fish), channel catfish (2.2 percent; 3 fish), and rainbow trout (0.7 percent; 1 fish) (Table 3-9 and Figure 3-8d). Based on calculated fish population estimates, Site D had lower combined species density and biomass estimates than Site C or Site E, but higher species density and biomass than Site B (Table 3-9, Figure 3-9, and Figure 3-10). Fish captured by trammel net sampling in the deep pool downstream of Site D were primarily adult Sacramento sucker (22 fish). One adult white catfish was also captured. No hardhead minnows were captured at this site via backpack electrofishing or trammel net.

5.3.2.5 Site E

At Site E, 172 fish were collected (Table 3-4, Table 3-9, and Figure 3-8e) during backpack electrofishing. No fish were captured during trammel netting in the large, deep pool immediately downstream of this site. The species composition was dominated by Sacramento sucker (77.3 percent; 133 fish), followed by brown bullhead catfish (14.5 percent; 25 fish) and hardhead minnow (8.1 percent; 14 fish) (Table 3-9 and Figure 3-8e). Due to the large number of Sacramento suckers captured, Site E had the highest combined species density and biomass estimate of all stream sampling sites (Table 3-9, Figure 3-9, and Figure 3-10). However, when Sacramento suckers were excluded from the analysis, Site E had combined species density and biomass estimates lower than Sites C and D, but higher than Site B. No rainbow trout or smallmouth bass were captured at this site.

5.3.3 Bypass Reach Trammel Net Catch Per Unit Effort

CPUE during 2025 trammel net sampling in the bypass reach for the two sampling sites combined (Sites D and E) was highest for Sacramento sucker (1.78 fish/net hour), followed by white catfish (0.08 fish/net hour) (Table 3-10).

5.3.4 Length-Frequency

Length-frequency histograms were created for species collected during backpack electrofishing sampling in the bypass reach. A length-frequency histogram by species for all sampling sites is shown in Figure 3-11. Individual length-frequency histograms for each individual sampling site and species are provided in Appendix B. Length-frequency histograms for trammel net sampling in the bypass reach were not developed, as the monofilament mesh size of the nets (4-inch) resulted in a relatively selective size of fish that could be captured. All fish captured during 2025 trammel net sampling in the bypass reach (22 Sacramento suckers and one white catfish) were between 290-510 mm FL.

Evaluation of age classes in the bypass reach based on length-frequencies was possible for Sacramento sucker, hardhead, smallmouth bass, largemouth bass, and brown bullhead catfish. Age class analysis was not possible for other fish species due to an insufficient number of fish.

Sacramento suckers in the bypass reach represented three size cohorts (Figure 3-11, Appendix B). The smallest cohort, which ranged from approximately 90 – 180 mm FL, was likely all young-of-the-year (YOY) fish. The middle cohort, which ranged from approximately 230 – 310 mm FL, likely consisted of 1+ aged fish. The largest cohort, ranging from approximately 370 – 470 mm FL, likely consisted of 2+ and greater aged fish (Figure 3-11, Appendix B).

Two size cohorts were apparent in hardhead minnow captured in the bypass reach. The smallest cohort, which ranged from approximately 60 – 100 mm FL, was YOY individuals, and the second cohort, which ranged from approximately 160 – 210 mm FL, likely consisted of individuals 1+ and older. A few larger adult hardhead minnows over 250 mm FL were also captured, but catch data were insufficient to establish a definitive cohort (Figure 3-11, Appendix B).

One cohort of smallmouth bass (approximately 100 – 140 mm FL) was observed in the bypass reach and generally included juvenile YOY fish. These juvenile smallmouth bass were generally larger than the juvenile largemouth bass captured in the bypass reach, likely reflecting earlier spawning dates of smallmouth bass. A few larger individuals over 180 mm FL were also captured (Figure 3-11, Appendix B).

Only one cohort of largemouth bass (approximately 60 – 120 mm FL) was observed in the bypass reach and generally included juvenile YOY fish. A few larger individuals over 180 mm FL were also captured (Figure 3-11, Appendix B).

Two cohorts of brown bullhead catfish were observed in the bypass reach, ranging from approximately 50 – 100 mm TL (YOY) and 120 – 160 mm TL (likely 1+ and older age fish)

(Figure 3-11, Appendix B). Length differences between these two cohorts were not as pronounced in this species due to the shorter maximum length.

5.3.5 Condition Factor and Fish Health

The average condition factor for all species observed in the bypass reach during 2025 backpack electrofishing and trammel net sampling ranged from 1.00 to 1.27, representing fish in healthy condition (Table 3-11). For native species, the average condition factor for hardhead minnow was 1.01 and the average condition factor for Sacramento sucker was 1.19. The single rainbow trout captured at Site D had a condition factor of 1.0.[7] The average condition factor for largemouth bass was 1.24 and the one smallmouth bass captured with an FL greater than 150 mm had a condition factor of 1.27. For other non-native catfish species (brown bullhead catfish, channel catfish, and white catfish) condition factors for individual fish ranged from 0.96-1.44 (Table 3-11).

There were no obvious signs of disease or other indications of poor health in fish sampled in the bypass reach. Lack of parasites or disease indicators combined with normal body condition averages were indicative of fish populations in good health. Photos of native and non-native fish species captured in the bypass reach are provided in Appendix C.

5.3.6 Comparison to Recent and Historical Data

The fish assemblage data collected in 2025 in the bypass reach was compared to historical data from 1999-2008 (ENTRIX 2009) in the bypass reach and recent data collected at the Borel Project on the Kern River between Lake Isabella and the Democrat Dam Impoundment (Cardno 2021) (Table 3-12). Overall, more fish were collected in 2025 (n=591) than during the 1999-2008 sampling, where the number of fish varied from 90 to 419 depending on year, or during 2020 sampling in the Borel Project area (n=574). However, the sampling effort varied between studies and sampling years. During 1999-2008 sampling, surveys consisted of backpack or barge electrofishing in 150-foot-long (45.7 m) reaches at five sites, for a total of 750 feet (229 m). Sampling in 2020 as part of the Borel Project consisted of boat or backpack electrofishing in three reaches totaling 1,129 feet (344 m). With the increased length of river sampled in the bypass reach in 2025, a wider range of habitat types were represented than in previous years including a greater proportion of riffle habitat.

In general, the fish assemblage observed in 2025 was similar to what was documented in previous years, consisting of many introduced, cool and warm water game and non-game fish species. Species richness in the bypass reach varied year to year, ranging from 6 species in 2006 to 12 species in 2002; 8 species were collected in the bypass reach in 2025 and 11 species were collected in the Borel reach in 2020 (Table 3-12).

[7] Condition factors for trout can range from <0.6 to >2.0 (Carlander 1969), where starving fish often have a condition factor <0.7 (Reimers 1963; Carlander 1969), and exceptionally healthy fish have high condition factors (e.g., >1.5).

Species composition in the bypass reach in 2025 was characterized by more hardhead minnows and a greater proportion of native species as compared to previous years (1999-2008); in 2025, hardhead and Sacramento sucker comprised 77.5 percent of the total catch in the bypass reach. More hardhead minnows were captured in 2025 than in all other previous sample years in the bypass reach combined (Table 3-12). The presence of a robust cohort of juvenile hardhead minnow, combined with the presence of large adults, indicates ongoing reproduction and survival in the bypass reach. Sacramento suckers, which historically comprised a large proportion of the overall fish assemblage in the bypass reach, were the most abundant species collected in 2025.

Smallmouth bass abundance in the bypass reach was lower in 2025 than in previous sampling years and lower than in the Borel Project reach in 2020 (Table 3-12). Largemouth bass abundance in 2025 was comparable to historical data. Rainbow trout continued to occur at low densities in the bypass reach in 2025 as was documented during historical sampling years (i.e., 2001 and 2008).

Several non-native species captured in the bypass reach in previous years were not observed during 2025 sampling, including goldfish (*Carassius auratus*), common carp, and mosquitofish (*Gambusia affinis*). However, brown bullhead catfish were more abundant in 2025 than in previous years. No species were captured in 2025 that had not been observed in previous sampling.

5.4 NORTHWESTERN POND TURTLE AND OTHER INCIDENTAL OBSERVATIONS

Two northwestern pond turtles were observed in the Democrat Dam Impoundment on October 16, 2024. One juvenile (estimated to be 2 to 3 years old) was observed along the northern shoreline of the impoundment. The individual appeared to be healthy and in good condition. An adult male northwestern pond turtle was also observed basking in the northeast portion of the impoundment. Additionally, a red-eared slider was seen foraging underwater in the impoundment in the fall of 2024. Locations of northwestern pond turtle individuals observed in the impoundment are shown in Map 4-1.

No northwestern pond turtles were observed during 2025 fish population sampling efforts or site reconnaissance visits in the bypass reach. During the 2025 fish population surveys, suitable basking and aquatic refuge habitats were visually scanned prior to entering the site to search for presence of northwestern pond turtles. However, cool air temperatures and reduced solar exposure during fish population surveys in December 2025 may have limited the potential for observing basking or foraging northwestern pond turtles. Suitable basking habitat primarily consisting of exposed bedrock or boulders was observed throughout the reach. Some suitable breeding habitat (i.e., grassy terraces above the high-water mark with friable soil) was also observed.

Three invasive aquatic species were observed during the study. One American bullfrog (*Lithobates catesbeianus*) tadpole was observed at Site B during backpack electrofishing sampling (see Appendix C, Photo C-12). Asian clam (*Corbicula fluminea*) and curly-leaf pondweed (*Potamogeton crispus*) were observed throughout the study area during sampling in 2024 and 2025 (Appendix C, Photo C-13).

5.5 IN-SITU WATER TEMPERATURE AND SPECIFIC CONDUCTANCE

In-situ water temperature and specific conductance data were collected in the Democrat Dam Impoundment and the bypass reach during 2024 and 2025 fisheries sampling. Water temperature during 2024 sampling efforts in the impoundment ranged from 19.5 – 20.8 degrees Celsius (°C) and specific conductivity was approximately 135 – 147 microsiemens per centimeter (µS/cm). During bypass reach sampling in 2025, water temperature ranged from 8.5 to 9.2°C, and specific conductivity was approximately 110 – 165 µS/cm, with the highest conductivity observed at Site C. Additional information on water temperature and water quality data collected in the bypass reach and the impoundment during 2024 and 2025 is provided in the AQ 2 TM (SCE 2026).

6.0 STUDY-SPECIFIC CONSULTATION

The following study-specific consultation was conducted:

- **August 8, 2024:** A Technical Working Group meeting for aquatic resources was held to obtain stakeholder and resource agency input on the implementation of the fish population study. Details of field studies were covered, including specific locations of the fish sampling sites.

- **February 28, 2025:** The initial AQ 3 – ITM was provided to relicensing stakeholders for a 90-day review. SCE presented the results of the 2024 fish population monitoring study in the ISR and at the ISR meeting held on March 19, 2025. No comments on the AQ 3 ITM were received.

- **December 18, 2025:** SCE filed an updated AQ 3 ITM (exclusive of 2025 results) as an appendix to the DLA. To date, no comments have been received.

7.0 OUTSTANDING STUDY PLAN ELEMENTS

There are no outstanding study plan elements.

8.0 REFERENCES

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TABLES

Table 3-1. Fish Population Sampling Site Locations in the Kern River No.1 Bypass Reach and Democrat Dam Impoundment

Study Sites [1, 2]	River Mile	GPS at Downstream Starting Location		Unit Name[3]	Habitat Type	Unit Length (meters)	Unit Width (meters)	Average Depth (meters)	Max. Depth (meters)	Sampling Date	Sampling Method
		Latitude	Longitude								
Democrat Dam Impoundment	54.5-55.5	35.52615	-118.67446	-	Res.	1,609	-	-	-	10/15-10/17 (2024)	Electrofishing (cataraft)
	54.5	35.52691	-118.67441	DD-T1	Res.	NA	NA	NA	NA	9/30/2025	Trammel Net
	55.5	35.52923	-118.66623	DD-T2	Res.	NA	NA	NA	NA	10/1/2025	Trammel Net
Site A - Kern River Bypass Reach	52.5	35.50465	-118.69156	A-1	Riffle	60	21	0.90	2.7	12/5/2025	Backpack Electrofishing
	52.8	35.50928	-118.69100	A-2	Pool	65	24	0.90	2.7	12/4/2025	Backpack Electrofishing
Site B - Kern River Bypass Reach	51.25	35.49304	-118.70433	B-1	Pool	45	14	0.45	1.1	12/4/2025	Backpack Electrofishing
	51.3	35.49307	-118.70382	B-2	Riffle	48	20	0.36	1.1		Backpack Electrofishing
Site C - Kern River Bypass Reach	50.25	35.48312	-118.71192	C-1	Pool	36	14	0.70	1.5	12/3/2025	Backpack Electrofishing
	50.3	35.48357	-118.71188	C-2	Riffle	58	14	0.54	1.7		Backpack Electrofishing
Site D - Kern River Bypass Reach	48.9	35.47625	-118.72101	D-1	Pool	54	16	0.67	1.2	12/2/2025	Backpack Electrofishing
	48.95	35.47596	-118.72047	D-2	Riffle	62	23	0.39	1.0		Backpack Electrofishing
	48.8	35.47680	-118.72330	D-T1	Pool	NA	NA	NA	NA		Trammel Net
	48.7	35.47615	-118.72424	D-T2	Pool	NA	NA	NA	NA		Trammel Net
Site E - Kern River Bypass Reach	47.15	35.48106	-118.74316	E-1	Riffle	16	16	0.39	0.6	12/1/2025	Backpack Electrofishing
	47.15	35.48109	-118.74301	E-2	Pool	40	14	0.79	1.7		Backpack Electrofishing
	47.2	35.48076	-118.74289	E-3	Riffle	42	16	0.27	0.9		Backpack Electrofishing
	47.1	35.48214	-118.74327	E-T1	Pool	NA	NA	NA	NA	12/3/20205	Trammel Net

Notes: [1] Study site locations in 2025 were representative of those used in the historical studies (1998-2008) to allow for comparison with recent data, with some variations due to site safety and geomorphological changes.
[2] See Maps AQ 3-1(a-e) for an overview of stream sampling sites and unit locations.
[3] Study sites were subdivided into units based on the habitat types within the sample area where applicable.
Key: NA = not applicable

Table 3-2. Fish Species Observed During Fish Population Sampling in the Kern River No. 1 Bypass Reach and Democrat Dam Impoundment

Study Site	Fish Species											
	Native Species		Non-Native/Introduced Species									
	Hardhead	Sacramento sucker	Rainbow trout	Smallmouth bass	Largemouth bass	Black crappie	Bluegill sunfish	Brown bullhead	Common carp	Channel catfish	White catfish	Threadfin shad
Democrat Dam Impoundment	•	•	-	-	•	•	•	•	•	•	•	•
Site A - Kern River Bypass Reach	•	•	-	-	•	-	-	•	-	-	•	-
Site B - Kern River Bypass Reach	•	•	-	•	•	-	-	•	-	-	-	-
Site C - Kern River Bypass Reach	•	•	-	-	•	-	-	•	-	•	-	-
Site D - Kern River Bypass Reach	-	•	•	•	•	-	-	•	-	•	•	-
Site E - Kern River Bypass Reach	•	•	-	-	-	-	-	•	-	-	-	-

Key: • = Species observed at this site
- = Species not observed at this site

Table 3-3. Life Stage Periodicities for Species Observed during Fish Population Sampling in the Kern River No. 1 Bypass Reach and Democrat Dam Impoundment [1]

Month	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
Hardhead minnow												
Spawning												
Larval												
Juvenile												
Adult												
Sacramento sucker												
Spawning												
Larval												
Juvenile												
Adult												
Rainbow trout												
Spawning												
Fry												
Juvenile												
Adult												
Smallmouth bass												
Spawning												
Fry												
Juvenile												
Adult												
Largemouth bass												
Spawning												
Fry												
Juvenile												
Adult												
Black crappie												
Spawning												
Larval												
Juvenile												
Adult												
Bluegill sunfish												
Spawning												
Larval												
Juvenile												
Adult												
Brown bullhead catfish												
Spawning												
Larval												
Juvenile												

Month	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
Adult												
Common carp												
Spawning												
Larval												
Juvenile												
Adult												
Channel catfish												
Spawning												
Larval												
Juvenile												
Adult												
White catfish												
Spawning												
Larval												
Juvenile												
Adult												
Threadfin shad												
Spawning												
Larval												
Juvenile												
Adult												

Notes: [1] Periodicity estimates are based on available literature including reports from adjacent watersheds and published life history references for California freshwater fishes. Actual spawning and rearing timelines may vary in response to varying environmental and hydrological conditions.

Sources: SCE. 2009. Final Report Kern River No.1 Hydroelectric Project Smallmouth Bass Study.
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Table 3-4. Summary of Fish Abundance and Distribution - Fish Population Sampling in the Kern River No. 1 Bypass Reach and Democrat Dam Impoundment

Study Site	Fish Species												
	Hardhead	**Sacramento sucker**	**Rainbow trout**	**Smallmouth bass**	**Largemouth bass**	**Brown bullhead**	**Black crappie**	**Bluegill**	**Common carp**	**Channel catfish**	**Threadfin shad**	**White catfish**	**Site Total**
Dem. Dam Impound[1]	2	50	0	0	131	15	7	8	13	1	96	6	329
Dem. Dam Impound[2]	1	0	0	0	2	0	0	0	0	3	0	44	50
Total	**3**	**50**	**0**	**0**	**133**	**15**	**7**	**8**	**13**	**4**	**96**	**50**	**379**
Bypass Site A[1]	12	33	0	0	2	2	0	0	0	0	0	1	50
Bypass Site B[1]	38	35	0	5	9	5	0	0	0	0	0	0	92
Bypass Site C[1]	21	76	0	0	3	14	0	0	0	4	0	0	118
Bypass Site D[1]	0	75	1	4	11	42	0	0	0	3	0	0	136
Bypass Site D[2]	0	22	0	0	0	0	0	0	0	0	0	1	23
Bypass Site E[1]	14	133	0	0	0	25	0	0	0	0	0	0	172
Bypass Site E[2]	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	**85**	**374**	**1**	**9**	**25**	**88**	**0**	**0**	**0**	**7**	**0**	**2**	**591**

Notes: [1] Sampled with backpack electrofishers.
[2] Sampled with trammel nets.

Table 3-5. Species and Fork Length Range of Fish Collected from Democrat Dam Impoundment, 2024–2025 (E-Cat and Trammel Net)

Species	Total Fish Captured (n)	Length Range (mm)[1]	Percent Catch by Species
Largemouth bass	133	44-520	35.1
Threadfin shad	96	43-103	25.3
Sacramento sucker	50	81-525	13.2
White catfish	50	150-445	13.2
Brown bullhead catfish	15	159-251	4.0
Common carp	13	475-610	3.4
Bluegill sunfish	8	44-169	2.1
Black crappie	7	104-223	1.8
Channel catfish	4	211-545	1.1
Hardhead minnow	3	86-374	0.8
Total	**379**	**43-610**	**100%**

Notes: [1] Fork length was measured for all species with a forked caudal fin; total length was measured for species without a forked caudal fin (i.e., brown bullhead catfish).
Key: mm = millimeter
n = number

Table 3-6. Catch Rates by Sampling Pass (Fish per Mile Sampled) from E-Cat Electrofishing in Democrat Dam Impoundment, 2024

Date	Pass	Length of Pass (miles)	Total No. Fish	Fish/mi	Species																	
					Hardhead Minnow		Sacramento Sucker		Largemouth Bass		Black Crappie		Bluegill Sunfish		Brown Bullhead		Common Carp		Channel Catfish		White Catfish		Threadfin Shad	
					n	Fish/mi	n	Fish/mi	n	Fish/mi	n	Fish/mi	n	Fish/mi	n	Fish/mi	n	Fish/mi	n	Fish/mi	n	Fish/mi	n	Fish/mi
10/15/2024	1	0.48	15	31	–	–	9	18.8	–	–	–	–	–	–	1	2.1	–	–	–	–	1	2.1	4	8.3
	2	0.48	60	125	1	2.1	5	10.4	10	20.8	3	6.3	3	6.3	2	4.2	–	–	–	–	3	6.3	33	68.8
	3	0.41	45	110	1	2.4	3	7.3	17	41.5	2	4.9	–	–	–	–	2	4.9	–	–	–	–	20	48.8
	4	0.47	31	66	–	–	7	14.9	22	46.8	–	–	–	–	–	–	2	4.3	–	–	–	–	–	–
10/16/2024	1	1.09	62	57	–	–	4	3.7	30	27.5	1	0.9	2	1.8	5	4.6	2	1.8	1	0.9	1	0.9	16	14.7
	2	0.37	6	16	–	–	–	–	5	13.5	–	–	1	2.7	–	–	–	–	–	–	–	–	–	–
	3	0.62	25	40	–	–	13	21	6	9.7	–	–	–	–	2	3.2	4	6.5	–	–	–	–	–	–
10/17/2024	1	0.46	57	124	–	–	6	13	29	63	–	–	2	4.3	2	4.3	2	4.3	–	–	1	2.2	14	30.4
	2	0.27	28	104	–	–	3	11.1	12	44.4	–	–	–	–	3	11.1	1	3.7	–	–	–	–	9	33.3
Total[1]		**4.65**	**329**	**–**	**2**	**0.4**	**50**	**10.8**	**131**	**28.2**	**6**	**1.3**	**8**	**1.7**	**15**	**3.2**	**13**	**2.8**	**1**	**0.2**	**6**	**0.5**	**96**	**2.3**

Notes: [1] Total fish/mi estimates for each species were calculated by dividing the total number of captured fish by the total sample distance (4.65 miles).
Key: fish/mi = fish per mile
n = number

Table 3-7. Catch per Unit Effort from Trammel Net Sampling in Democrat Dam Impoundment, 2025[1]

Date	Total Nets Deployed	Total Deployment Hours	Average Hours Per Net	Totals		Hardhead minnow		Largemouth bass		Channel catfish		White catfish	
				Total Fish	Fish per net hour	Total Fish	Fish per net hour	Total Fish	Fish per net hour	Total Fish	Fish per net hour	Total Fish	Fish per net hour
9/30/2025-10/1/2025	2	8.26	4.13	50	6.05	1	0.12	2	0.24	3	0.36	44	5.33

Notes: [1] Two 300-foot-long, 8-feet-deep trammel nets were set for approximately 4-hours. One net was set in the late afternoon, and one net was set in the morning.

Table 3-8. Condition Factors of Species Captured during 2024-2025 Sampling in Democrat Dam Impoundment

Species	Number of Fish ≥ 150 mm[1, 2]	Fulton's Condition Factor		
		Average	Minimum	Maximum
White catfish	50	1.19	0.99	1.65
Sacramento sucker	49	1.35	0.84	2.55
Largemouth bass	27	1.45	0.69	2.40
Brown bullhead catfish	15	1.3	0.75	1.68
Common carp	13	2.02	1.25	2.66
Black crappie	6	1.52	1.34	1.79
Bluegill sunfish	5	2.92	2.31	3.53
Channel catfish	4	1.14	0.83	1.58
Hardhead minnow	2	1.43	1.38	1.48

Notes: [1] Includes fish captured by electrofishing cataraft (E-Cat) and trammel net sampling.
[2] Condition factor analysis excludes fish under 150 mm in length.
Key: mm = millimeter(s)

Table 3-9. Density, Biomass, and Population Estimates of Fish Species Captured at Backpack Electrofishing Sites in the Kern River No. 1 Bypass Reach, 2025[1]

Site Name	Species	Number of Fish Captured[2]	Population Estimate[3]	Species Density		Species Biomass	
				Fish Per Mile	Fish Per Acre	Pounds per Mile	Pounds per Acre
Site A	Sacramento sucker	33	no multi-pass depletion sampling performed at Site A in 2025[6]				
	Hardhead minnow	12					
	Brown bullhead catfish	2					
	Largemouth bass	2					
	White catfish	1					
	Rainbow trout	0					
	Smallmouth bass	0					
	Channel catfish	0					
	Total[4]	**50**					
Site B	Hardhead minnow	38	41	1,382.40	179.7	19	2.4
	Sacramento sucker	35	39	1,315.40	171.3	486.9	65.2
	Largemouth bass	9	9	312.3	47.1	7.2	1.1
	Smallmouth bass	5	5	167.6	21.1	37.9	4.8
	Brown bullhead catfish	5	5	172.9	25.6	1.9	0.3
	Rainbow trout	0	0	0	0	0	0
	Channel catfish	0	0	0	0	0	0
	White catfish	0	0	0	0	0	0
	Total	**92**	**99**	**3,350.50**	**444.8**	**552.9**	**73.7**
Site C	Sacramento sucker	76	85	2,561.90	460.5	1,792.50	322.2
	Hardhead minnow	21	34	1418.3	254.9	17.5	3.2
	Brown bullhead catfish	14	14	575	103.4	44.6	8
	Channel catfish	4	6	268.2	48.2	55.1	9.9
	Largemouth bass	3	3	134.1	24.1	49.5	8.9
	Rainbow trout	0	0	0	0	0	0

Site Name	Species	Number of Fish Captured[2]	Population Estimate[3]	Species Density		Species Biomass	
				Fish Per Mile	Fish Per Acre	Pounds per Mile	Pounds per Acre
	Smallmouth bass	0	0	0	0	0	0
	White catfish	0	0	0	0	0	0
	Total	**118**	**142**	**3,794.20**	**770.3**	**1,959.30**	**352.2**
Site D	Sacramento sucker	75	93	2,418.00	265.6	2,798.70	305.9
	Brown bullhead catfish	42	50	1,466.80	223	92	13.9
	Largemouth bass	11	11	327.8	51.5	28.2	4.4
	Smallmouth bass	4	4	115.3	16.9	4.7	0.7
	Channel catfish	3	3	85.6	12.2	22	2.7
	Rainbow trout	1	(1)[5]	26	2.8	9.4	1
	Hardhead minnow	0	0	0	0	0	0
	White catfish	0	0	0	0	0	0
	Total	**136**	**161**	**4,439.40**	**572.1**	**2,955.00**	**328.6**
Site E	Sacramento sucker	133	157	10,188.50	1,617.80	7,198.00	1,139.1
	Brown bullhead catfish	25	25	993.2	176.4	11.7	2.1
	Hardhead minnow	14	16	737.8	121.8	40	6.6
	Rainbow trout	0	0	0	0	0	0
	Smallmouth bass	0	0	0	0	0	0
	Largemouth bass	0	0	0	0	0	0
	Smallmouth bass	0	0	0	0	0	0
	White catfish	0	0	0	0	0	0
	Total	**172**	**198**	**11,919.50**	**1,916.00**	**7,249.70**	**1,147.80**

Notes: [1] Density, biomass, and population estimates are calculated based on the lengths of individual sampled units within each site, rather than the total site length.
[2] Number of fish collected by backpack electrofishing.
[3] Fish population estimates were calculated using MicroFish software from electrofishing data.
[4] MicroFish population estimates were calculated separately for each species. The totals represented here are therefore simple sums and not statistically independent population, biomass, or density estimates.
[5] ( ) Insufficient information for maximum likelihood population estimate; actual catch was used for population estimate.
[6] Due to the difficult sampling environment (i.e., difficult terrain, deep water; see Appendix A photos), block nets could not be installed and multi-pass depletion sampling could not be conducted at Site A.

Table 3-10. Catch per Unit Effort from Trammel Net Sampling in the Kern River No. Bypass Reach, 2025

Date	Site	Total Nets Deployed	Total Deployment Hours	Average Hours Per Net	Totals		Sacramento sucker		White catfish	
					Total Fish	Fish per net hour	Total Fish	Fish per net hour	Total Fish	Fish per net hour
12/2/2025	Site D	2	8.33	4.17	23	2.76	22	2.64	1	0.12
12/3/2025	Site E	1	4.00	4.00	0	0.00	0	0.00	0	0.00
Bypass Reach Total		**3**	**12.33**	**4.08**	**23**	**1.87**	**22**	**1.78**	**1**	**0.08**

Table 3-11. Condition Factors of Species Captured during 2025 Stream Sampling in the Kern River No. 1 Bypass Reach

Species	Number of Fish ≥ 150 mm [1,2]	Fulton's Condition Factor		
		Average	Minimum	Maximum
Sacramento sucker	285	1.19	0.55	3.12
Brown bullhead	14	1.15	0.97	1.31
Hardhead minnow	11	1.01	0.66	1.22
Channel catfish	7	1.08	0.96	1.21
Largemouth bass	6	1.24	1.08	1.43
White catfish	2	1.23	1.02	1.44
Rainbow trout	1	1.0	1.0	1.0
Smallmouth bass	1	1.27	1.27	1.27

Notes: [1] Includes fish captured by backpack electrofishing and trammel net sampling.
[2] Condition factor analysis excludes fish under 150 mm in length.

Table 3-12. Historical Comparison of Fish Collected During 1999-2008 and 2025 Fish Population Surveys in the Kern River No. 1 Bypass Reach and the 2020 Fish Population Surveys in the Borel Project Bypass Reach[1,2]

Species	Kern No. 1									Borel
	Oct-99	Jan-01	Oct-01	Oct-02	Nov-03	Oct-04	Oct-06	Oct-08	Dec-25	Oct-20
Sacramento sucker	234	40	45	79	33	23	13	58	374	499
Hardhead minnow	27	7	2	0	6	2	20	1	85	3
Sacramento pikeminnow	19	5	1	2	0	1	42	3	0	10
Rainbow trout	0	3	0	0	0	0	0	1	1	1
Smallmouth bass	118	71	33	168	96	92	15	23	9	45
Largemouth bass	6	8	10	17	21	17	16	0	25	2
Black crappie	0	0	0	14	10	0	0	0	0	0
Brown bullhead catfish[3]	0	0	0	14	12	1	0	3	88	4
Common carp	1	1	2	2	0	0	0	0	0	0
Channel catfish	2	3	2	7	0	1	0	0	7	3
Goldfish	0	0	0	51	4	0	0	0	0	0
Green sunfish	0	0	0	0	0	0	0	0	0	2
Mosquitofish	0	0	13	1	1	5	0	0	0	0
White catfish	12	49	6	31	7	6	10	1	2	2
White crappie	0	2	1	18	2	0	0	0	0	3
Total	**419**	**189**	**115**	**404**	**192**	**148**	**116**	**90**	**591**	**574**

Notes: [1] Sources include Entrix 2009 (1999-2008 data) and Cardno 2021 (Borel 2020 data).
[2] Level of effort for 1999-2008 Kern River No. 1 sampling (Entrix 2009) consisted of barge or backpack electrofishing approximately 750 linear feet of stream each year; 2020 Borel sampling (Cardno 2021) consisted of boat and backpack electrofishing approximately 1,129 linear feet of stream; 2025 Kern River No. 1 sampling consisted of backpack electrofishing approximately 1,726 linear feet of stream.
[3] Historical surveys in the bypass reach (1998-2008) did not identify bullhead catfish to species but were generally categorized as 'bullhead catfish species'. For the purposes of this report, they are identified as brown bullhead catfish.

FIGURES

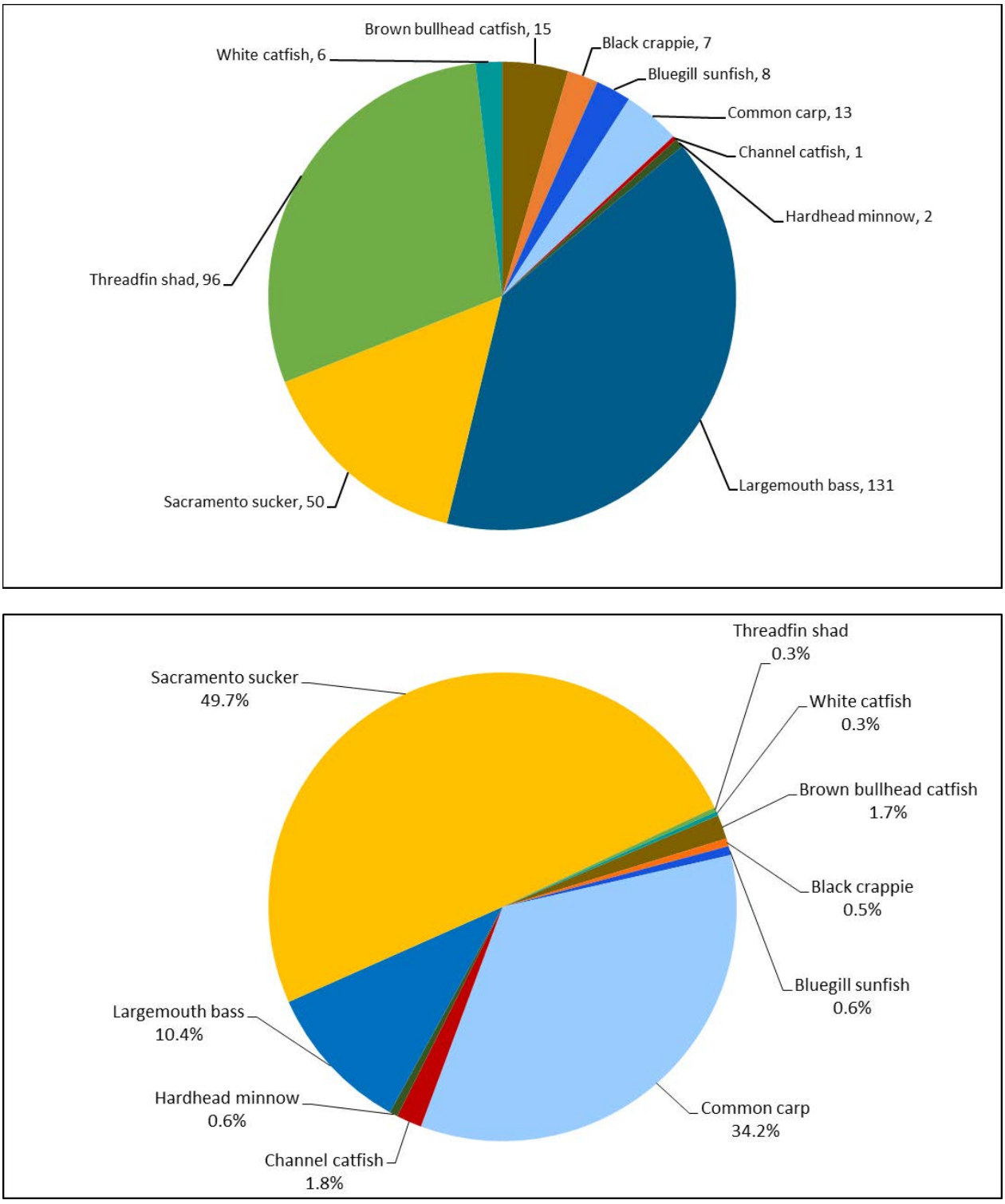


Figure 3-1. Fish Species Composition in the Democrat Dam Impoundment during 2024 E-Cat Sampling by Number Captured (top) and Biomass (bottom).

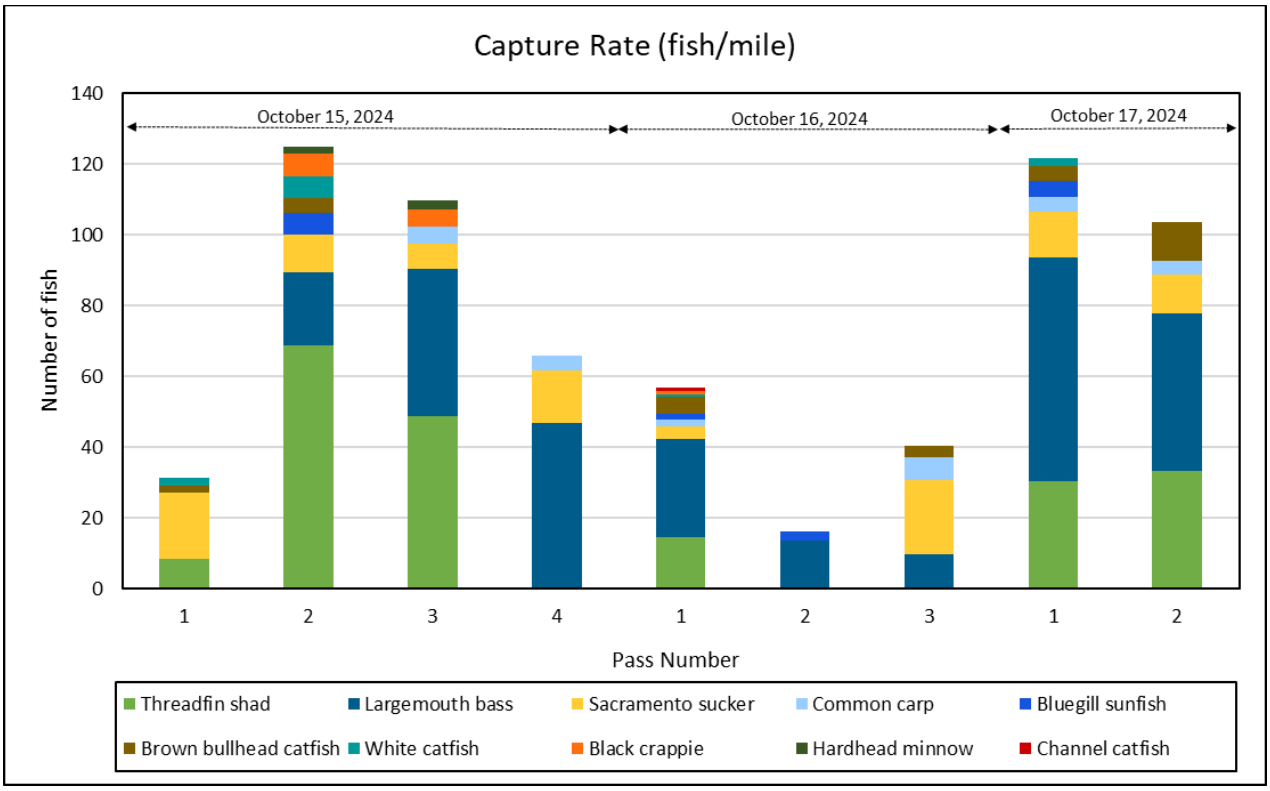
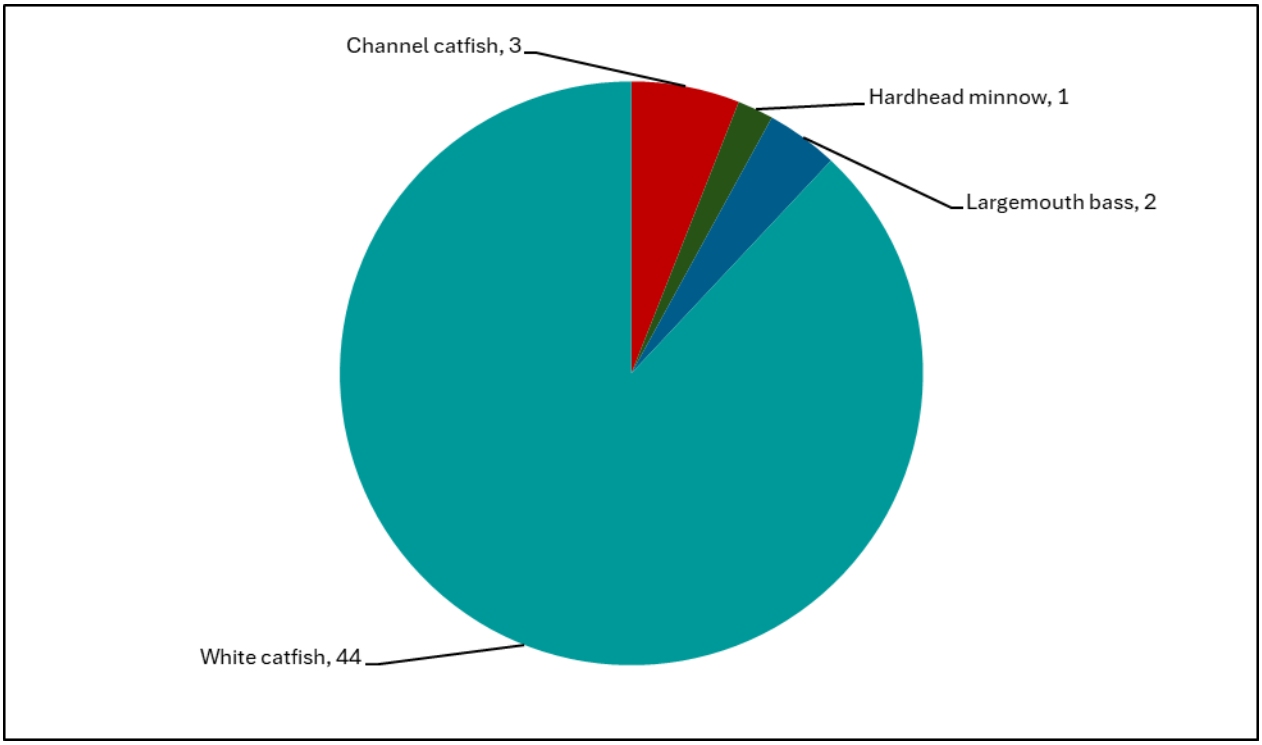


Figure 3-2. Fish Species Capture Rates by Sampling Transect (fish per mile) in Democrat Dam Impoundment in 2024.



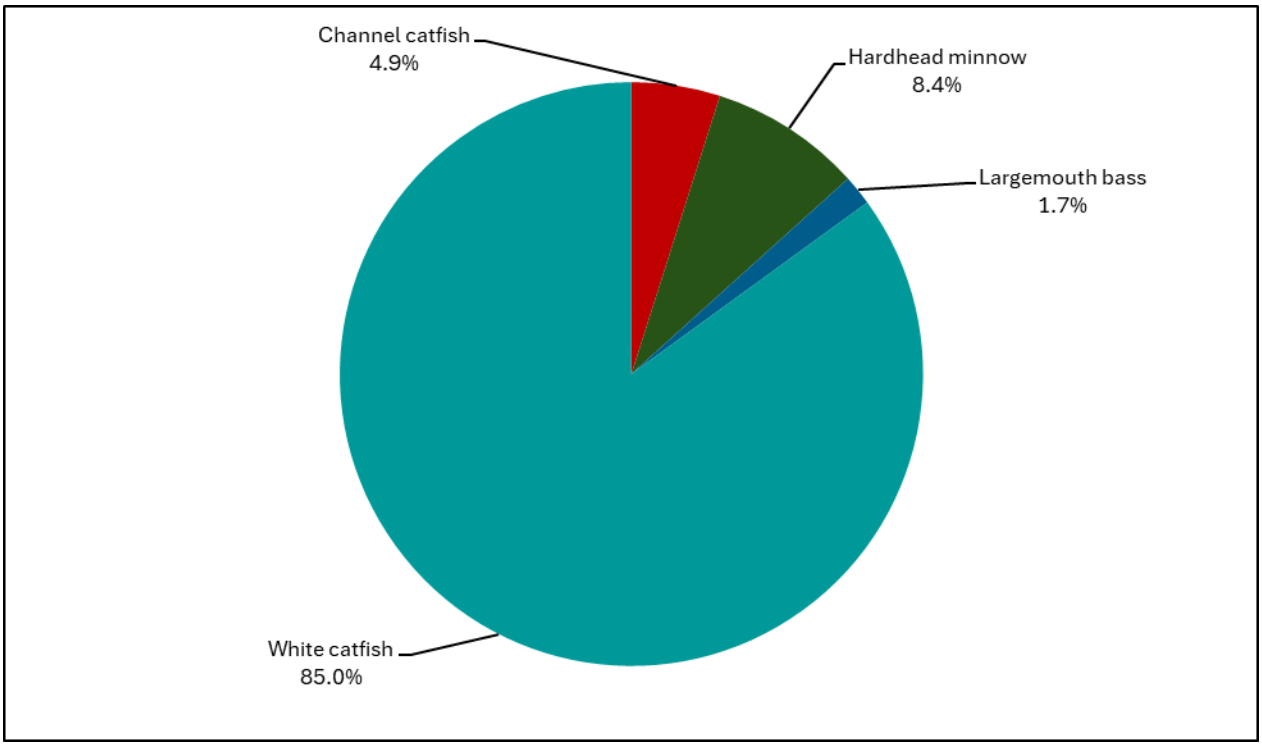


Figure 3-3. Fish Species Composition in Democrat Dam Impoundment during 2025 Trammel Net Sampling by Number Captured (top) and Biomass (bottom).

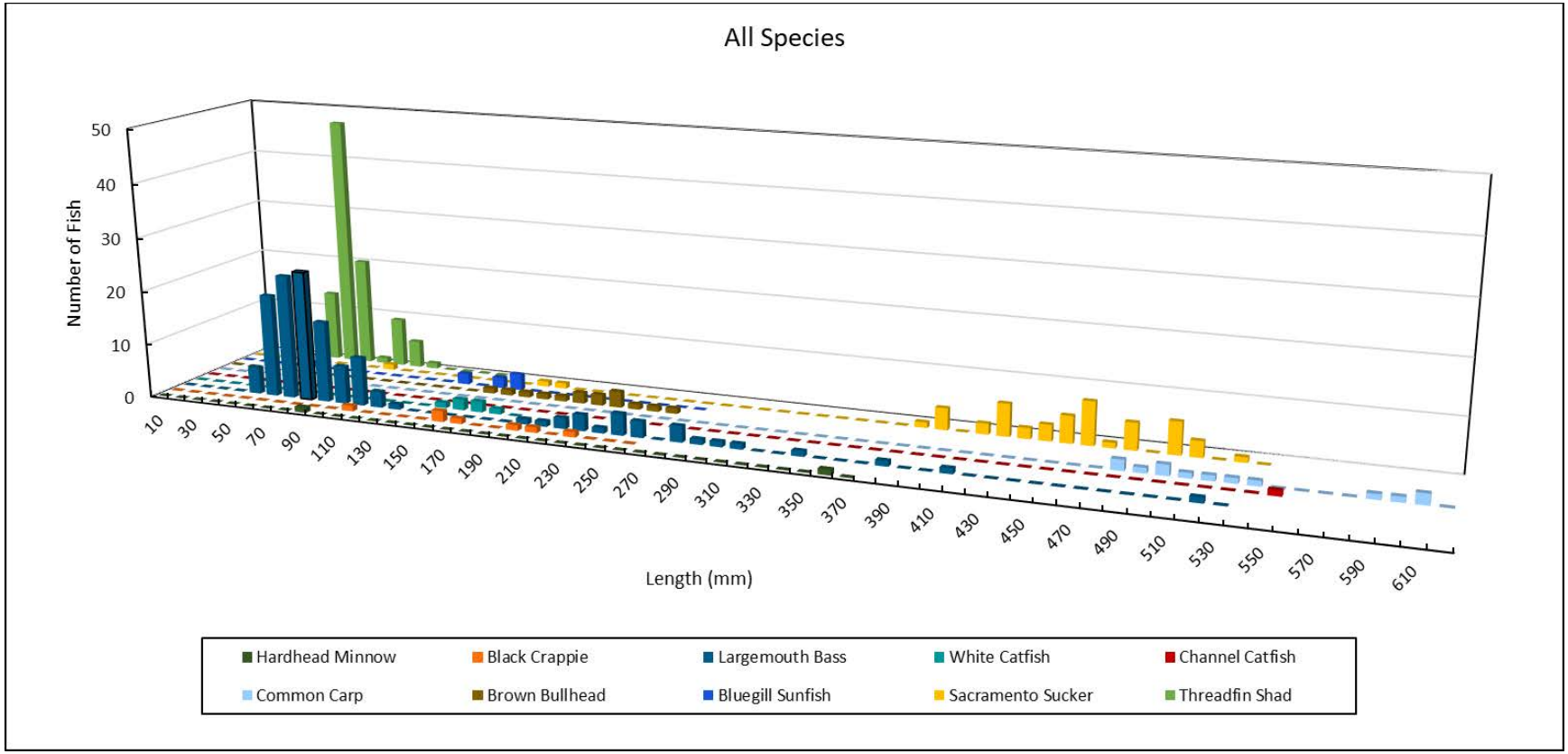
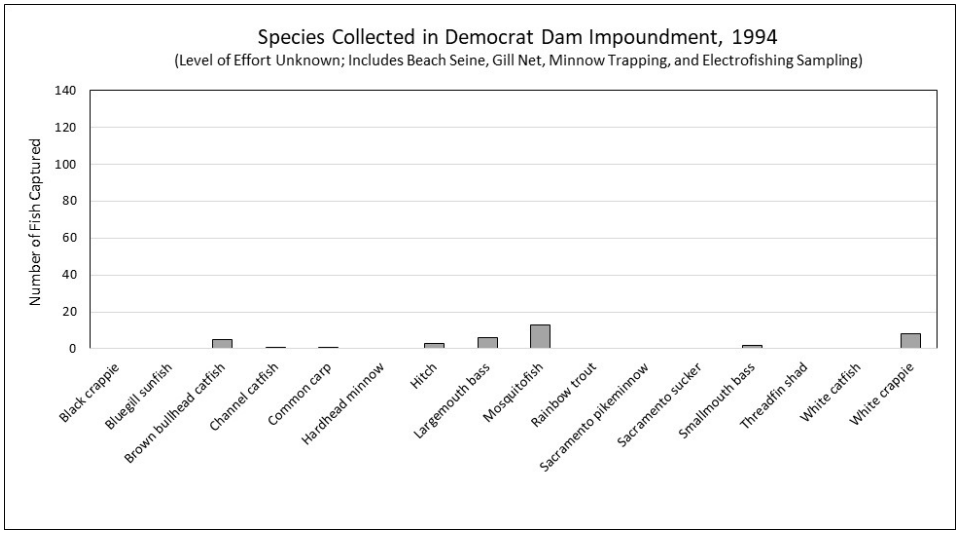
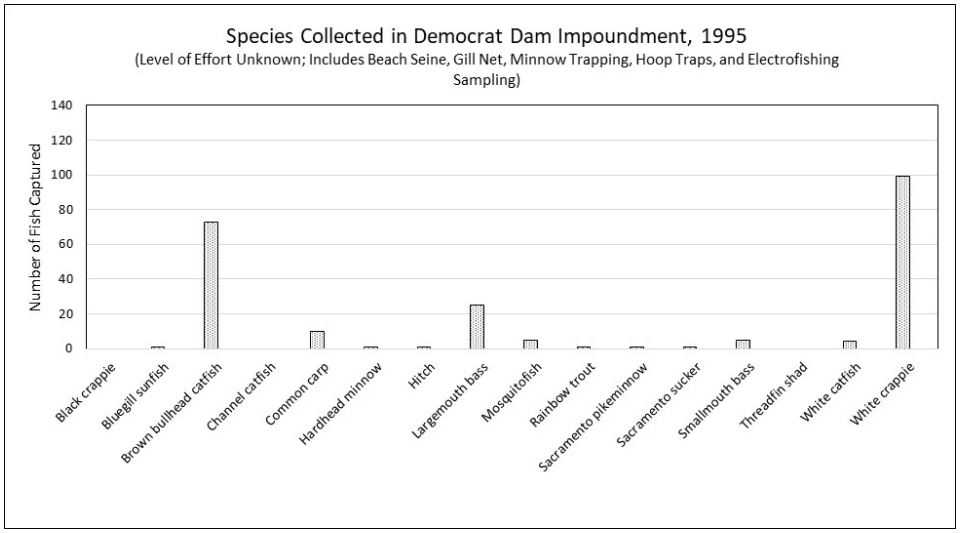


Figure 3-4. Length-Frequency Histogram for all Fish Species Captured during E-Cat Sampling in Democrat Dam Impoundment, 2024.





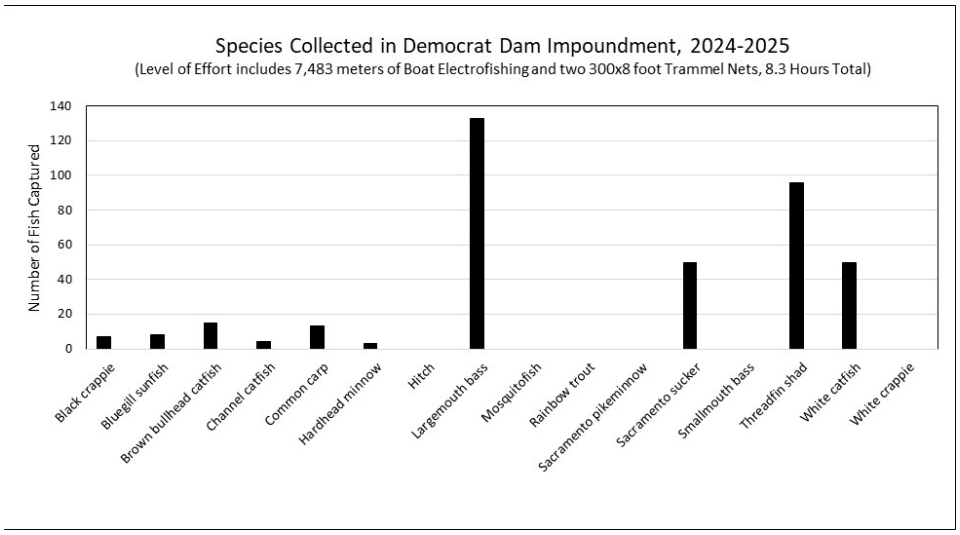


Figure 3-5. Historical Comparison of Fish Species Collected in Democrat Dam Impoundment during 1994, 1995, and 2024-2025 Sampling.

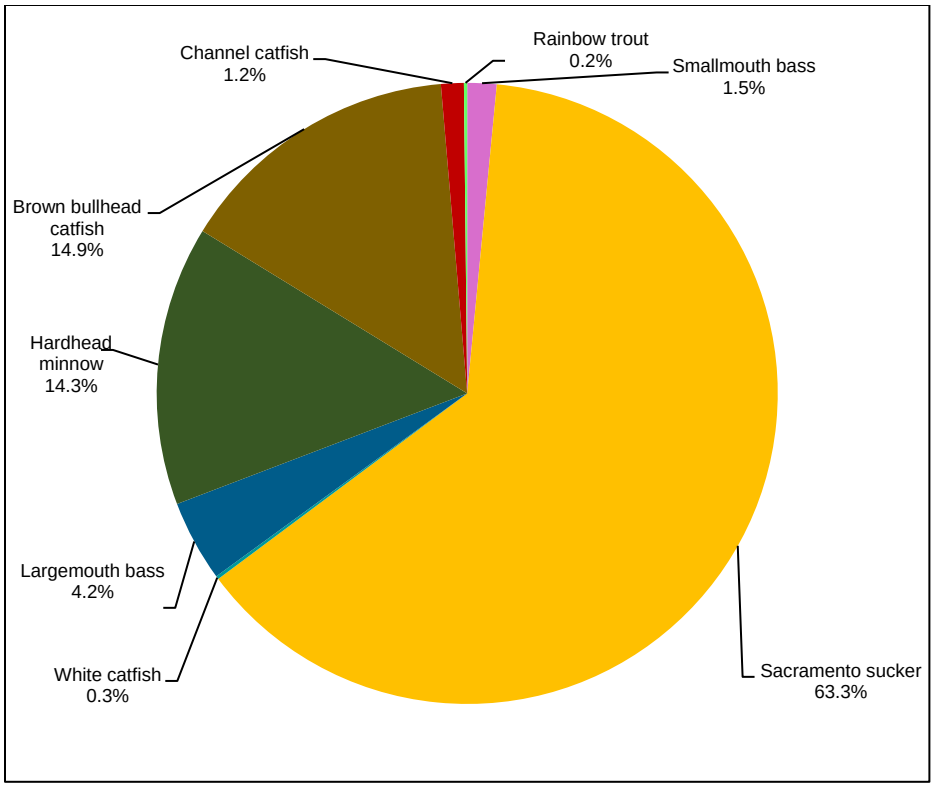


Figure 3-6. Fish Species Composition in the Kern River No. 1 Bypass Reach Backpack Electrofishing and Trammel Netting (total catch, n=591).

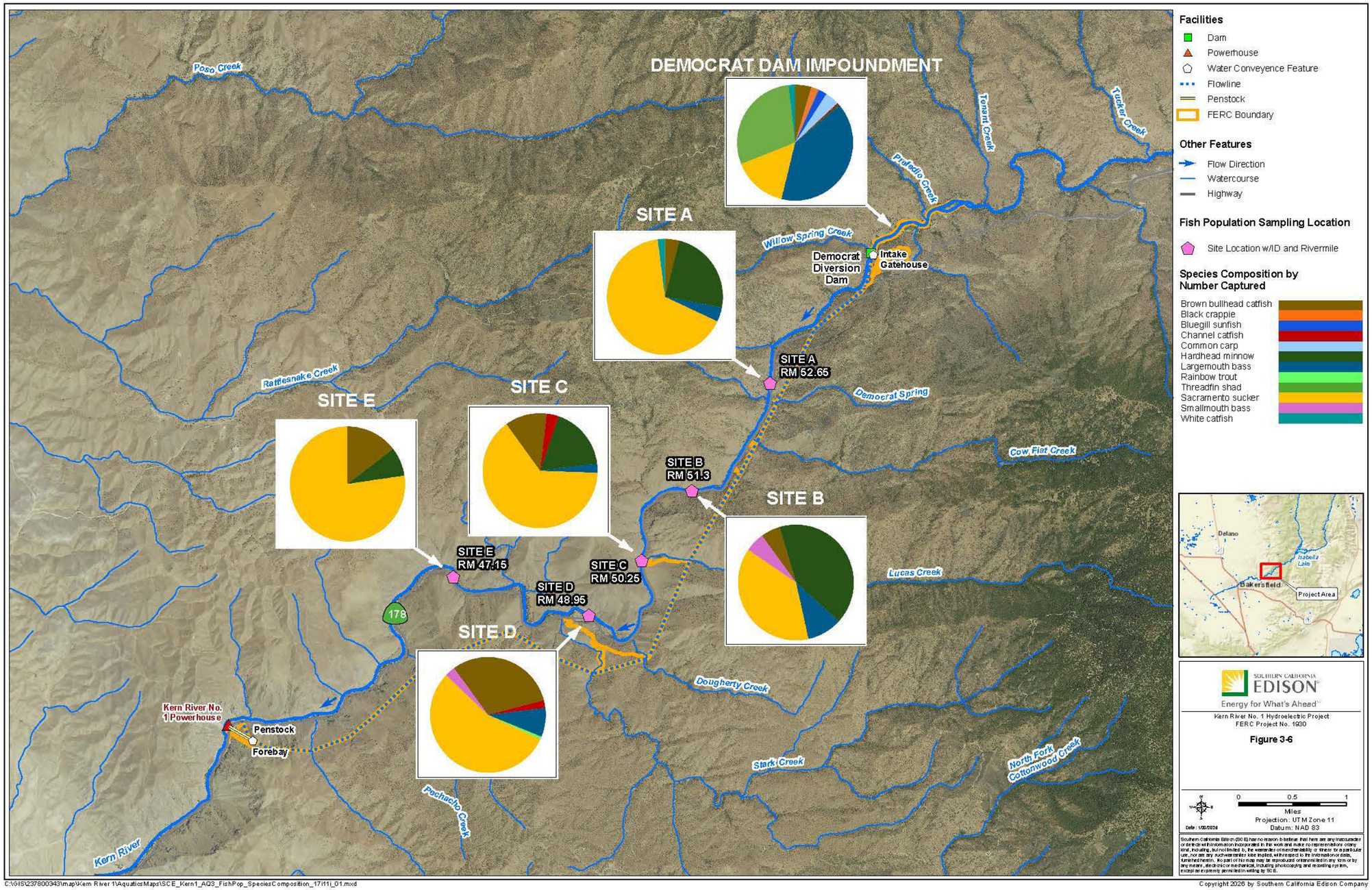


Figure 3-7. Fish Species Composition at Kern River No. 1 Project Sampling Sites by Number Captured during Backpack Electrofishing and E-Cat Sampling, Overlaid on Aerial Imagery.

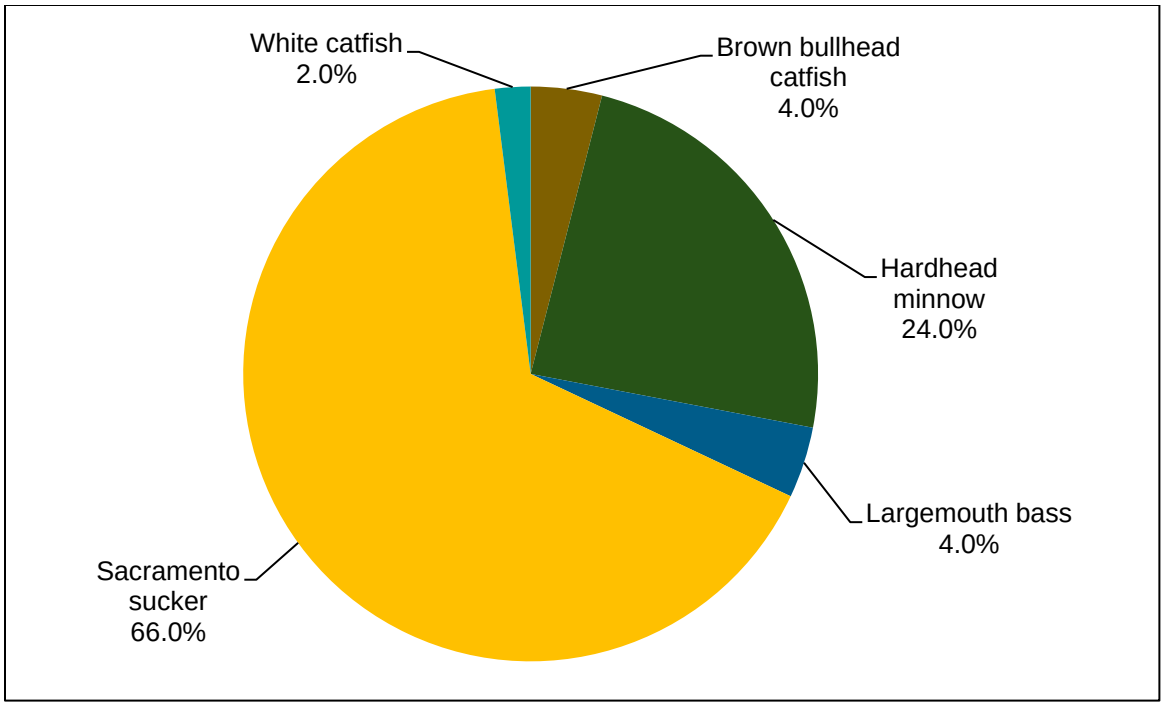


Figure 3-8a. Composition of Fish Species Captured at 2025 Kern River No. 1 Bypass Reach Backpack Electrofishing Site A (n=50).

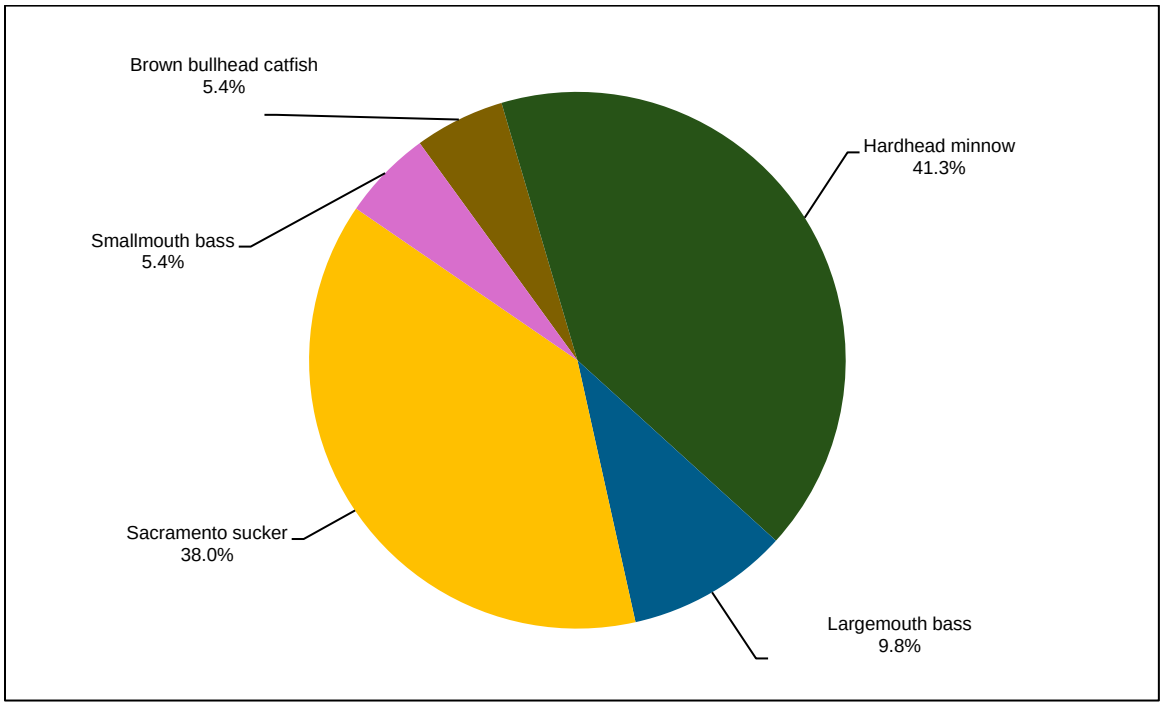


Figure 3-8b. Composition of Fish Species Captured at 2025 Kern River No. 1 Bypass Reach Backpack Electrofishing Site B (n=92).

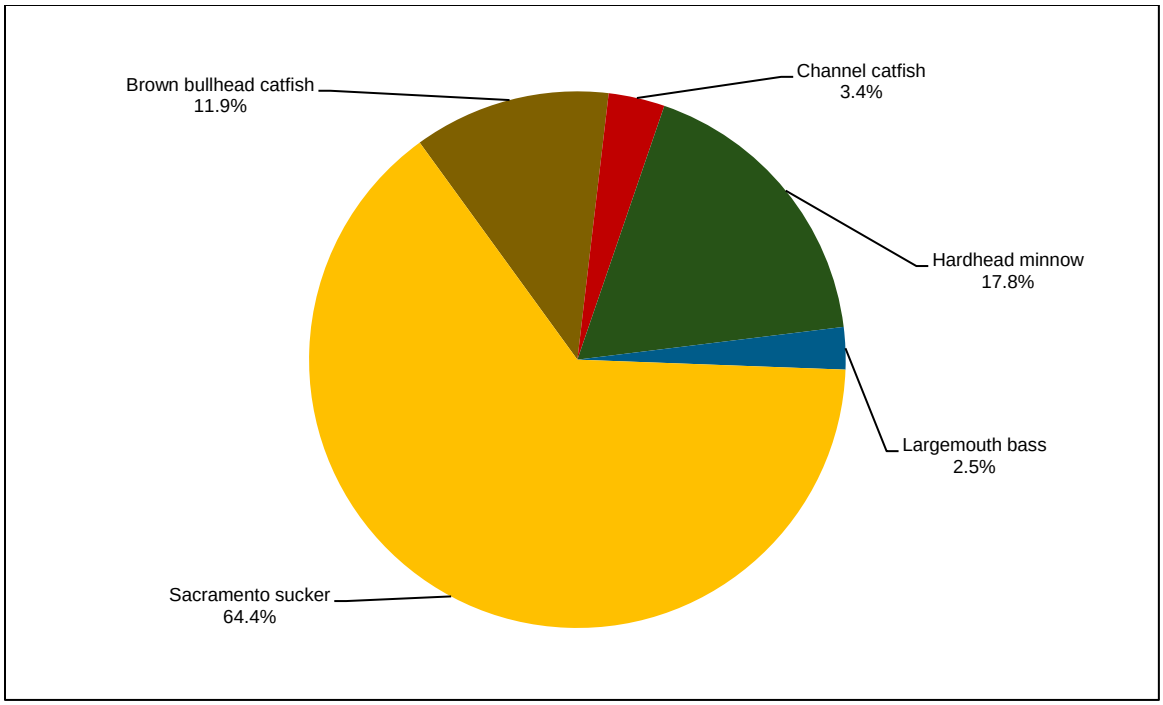


Figure 3-8c. Composition of Fish Species Captured at 2025 Kern River No. 1 Bypass Reach Backpack Electrofishing Site C (n=118).

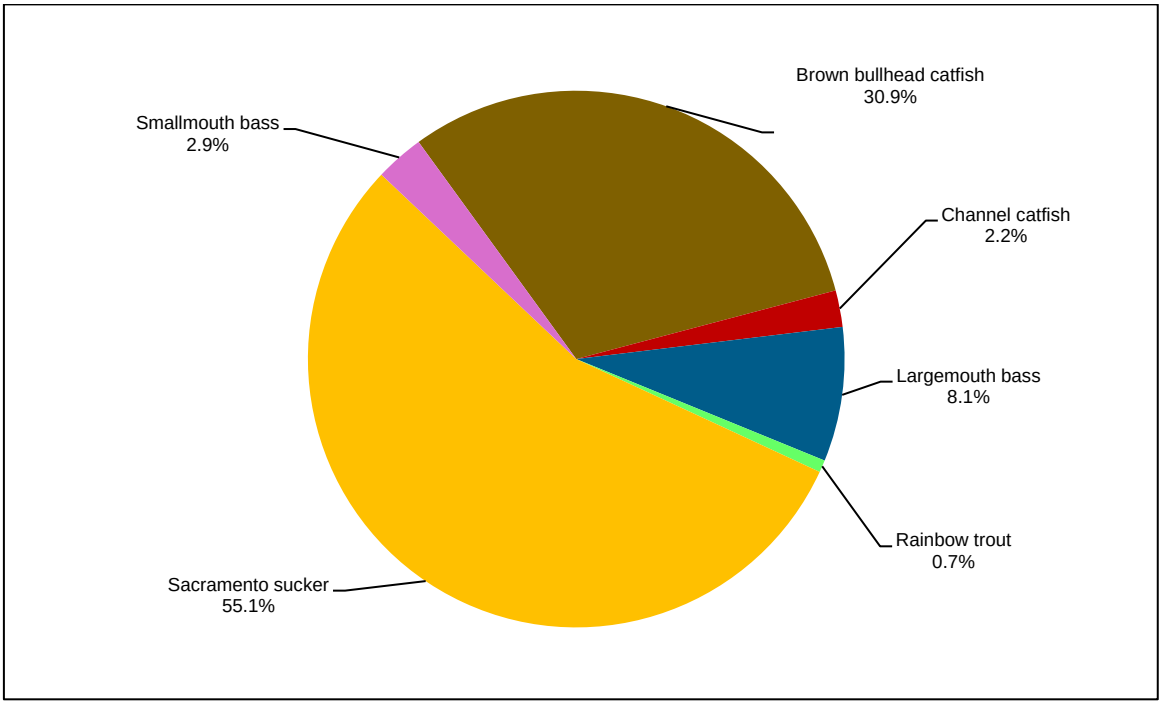


Figure 3-8d. Composition of Fish Species Captured at 2025 Kern River No. 1 Bypass Reach Backpack Electrofishing Site D (n=136).

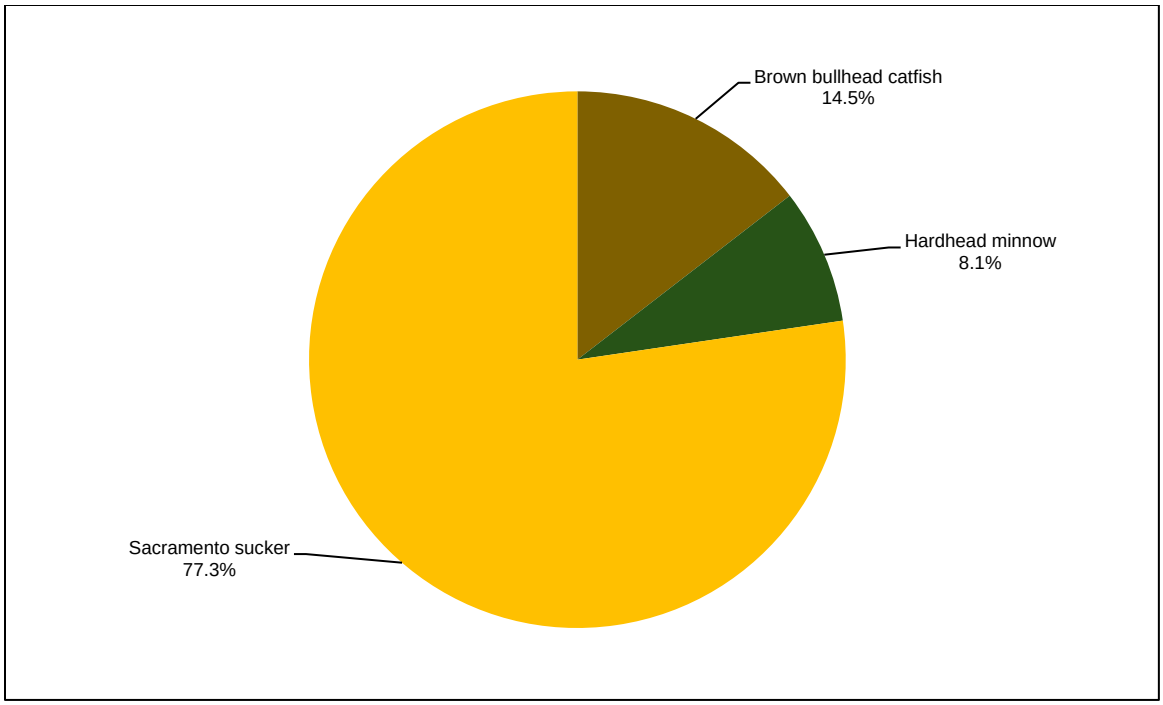
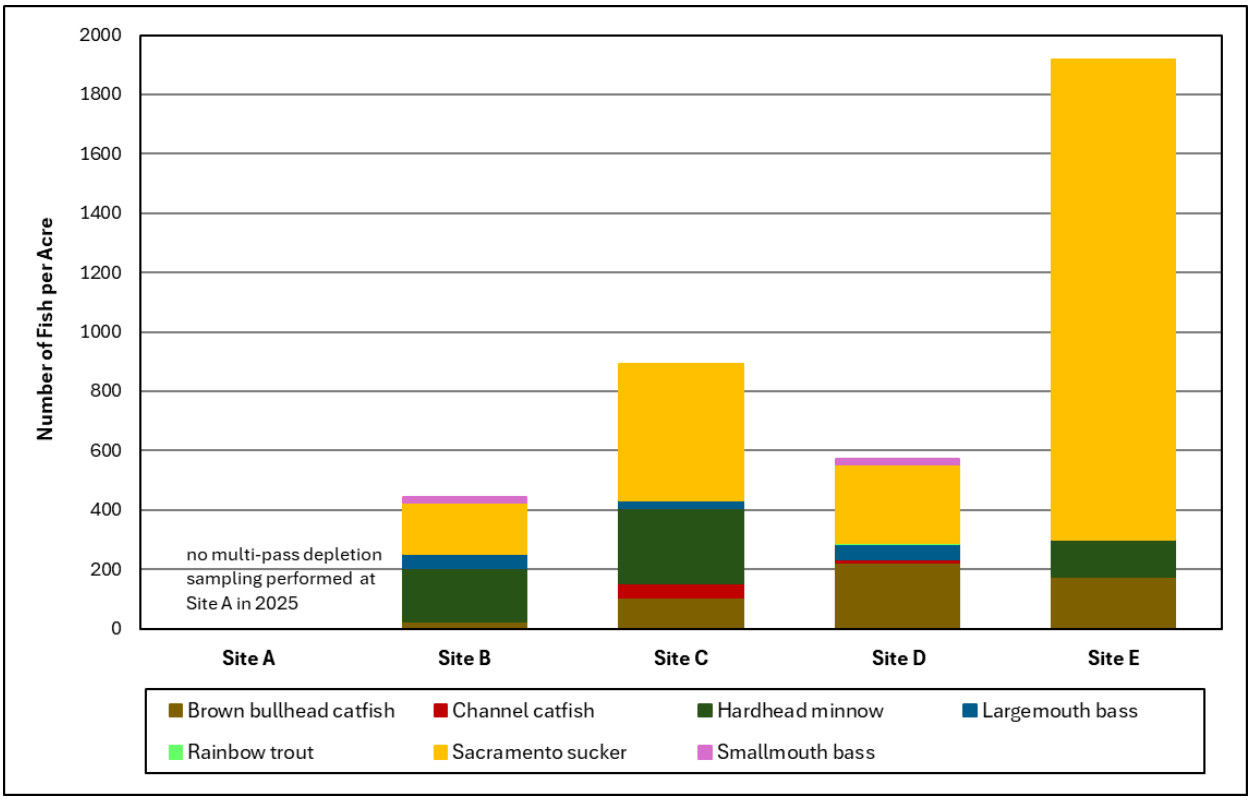


Figure 3-8e. Composition of Fish Species Captured at 2025 Kern River No. 1 Bypass Reach Backpack Electrofishing Site E (n=172).



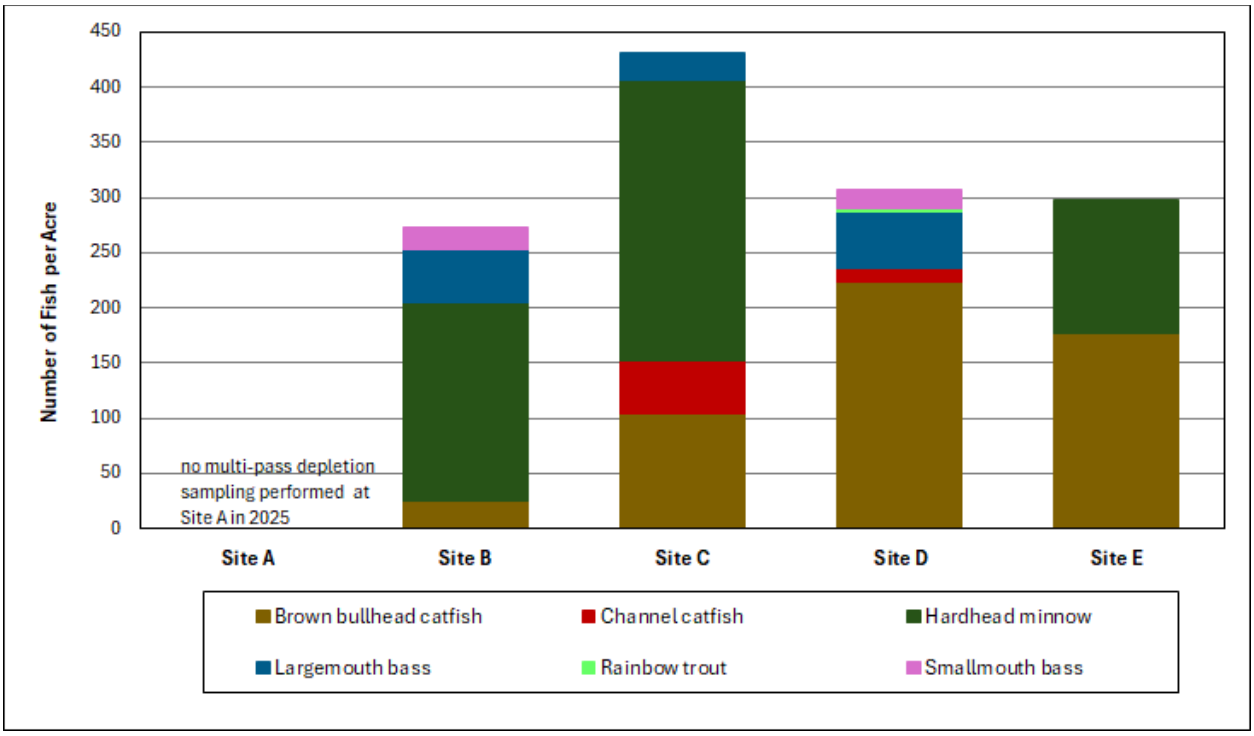


Figure 3-9. Fish Species Density Estimates at 2025 Kern River No. 1 Bypass Reach Sampling Sites, with Sacramento suckers (top) and without Sacramento suckers (bottom).

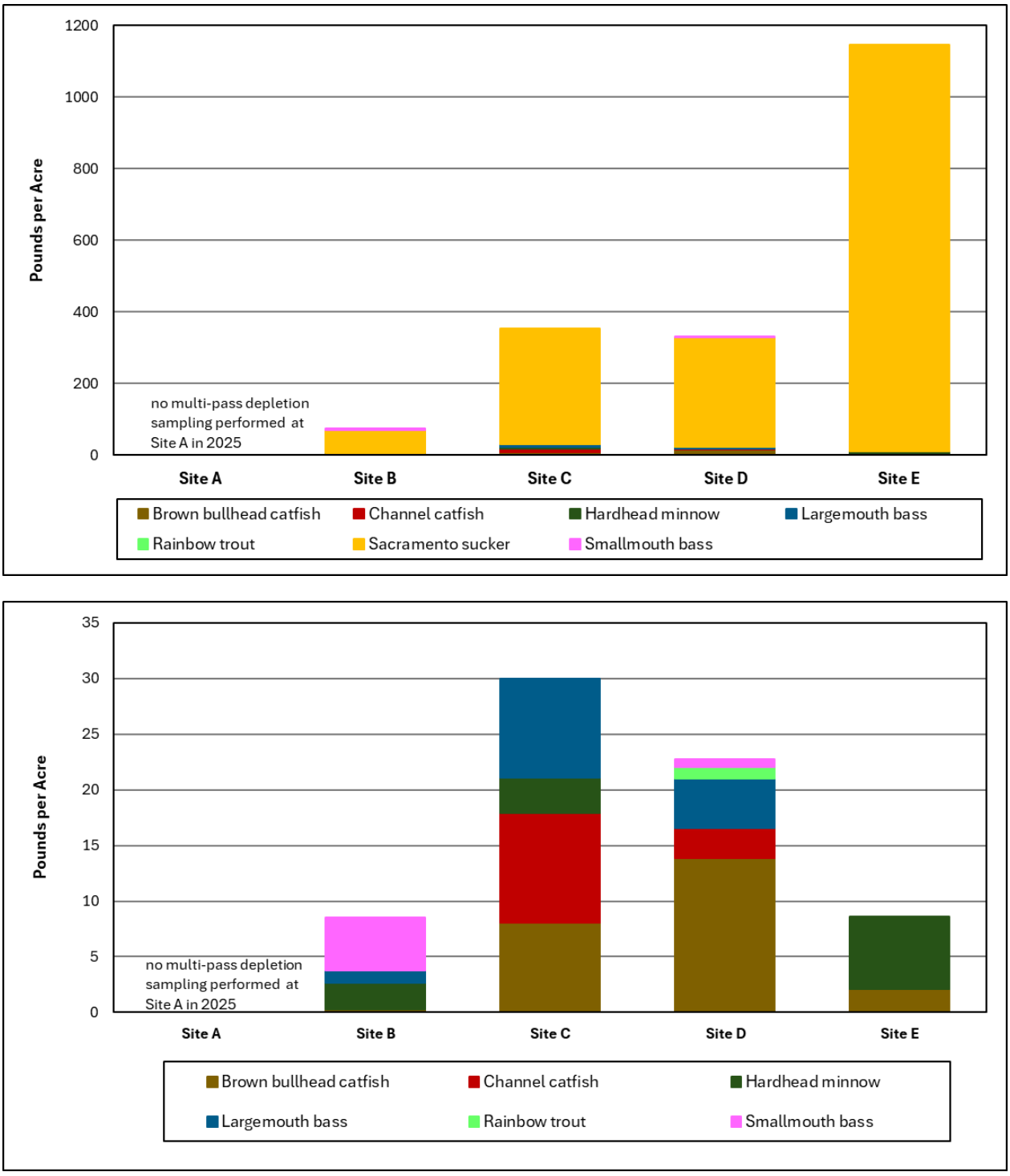


Figure 3-10. Fish Species Biomass Estimates at 2025 Kern River No. 1 Bypass Reach Sampling Sites, with Sacramento suckers (top) and without Sacramento suckers (bottom).

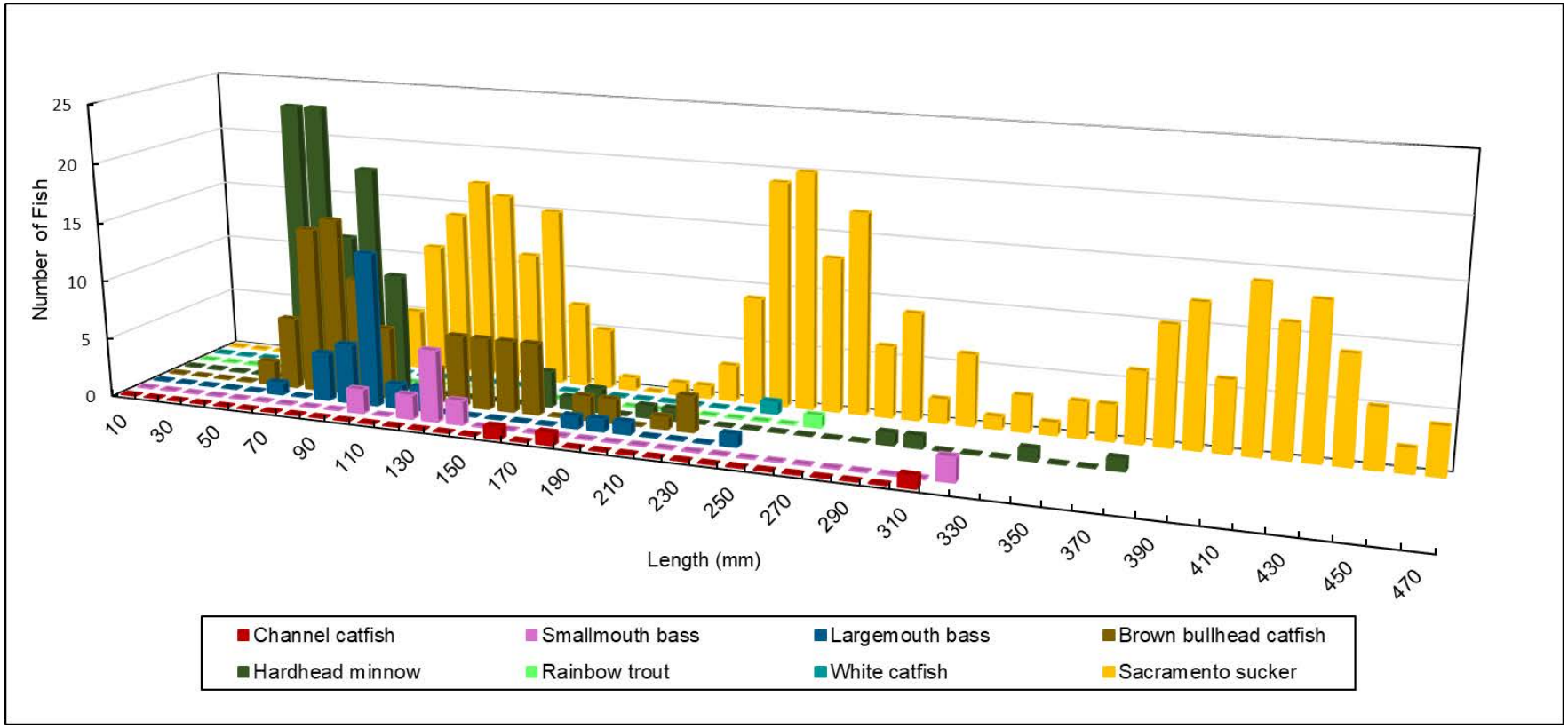
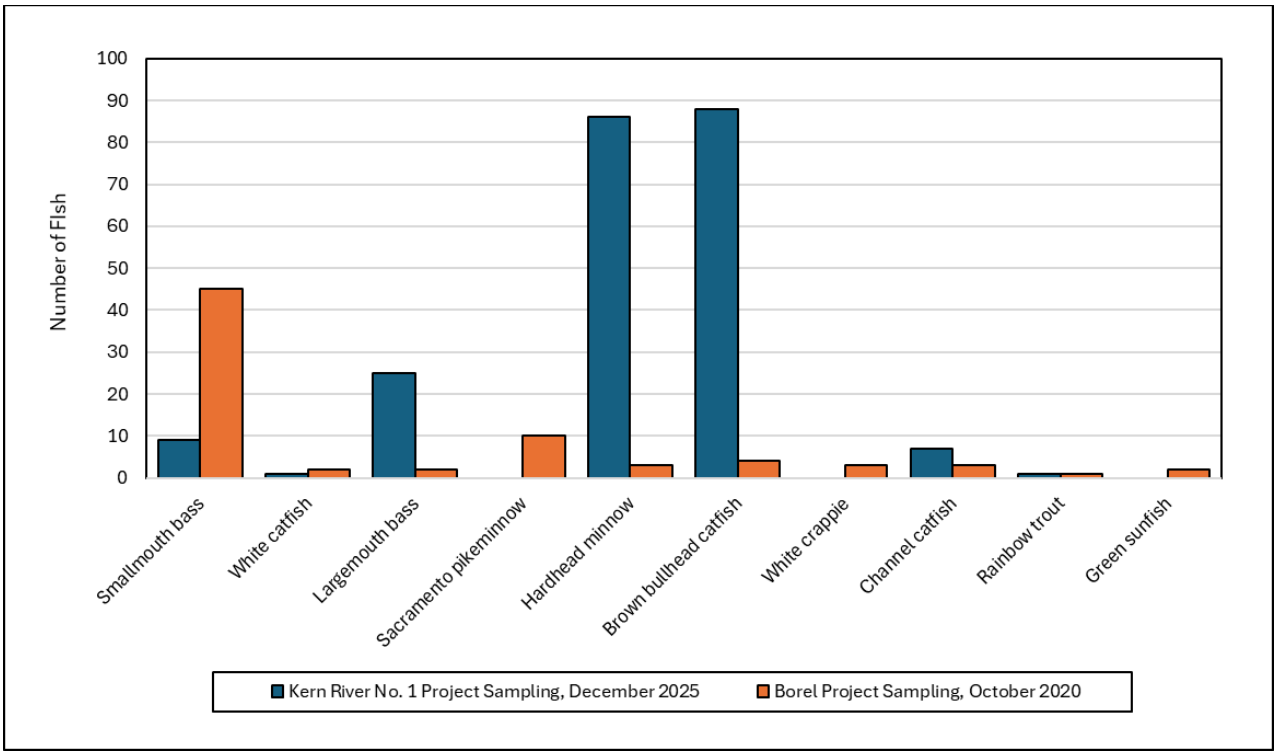


Figure 3-11. Length-Frequency Histogram for all Fish Species Captured during Backpack Electrofishing in the Kern River No. 1 Bypass Reach, 2025.



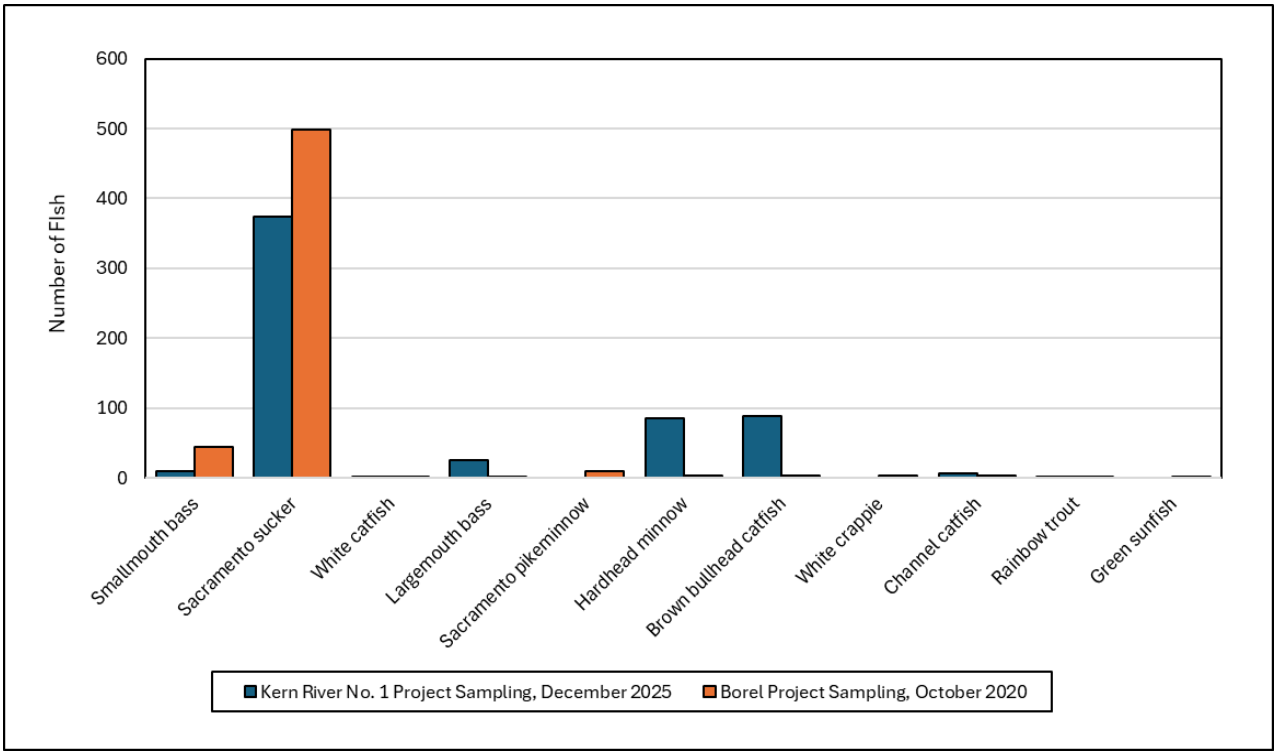


Figure 3-12. Historical Comparison of Fish Species from 2025 Kern River No. 1 Bypass Reach Sampling and 2020 Borel Project Stream Sampling, without Sacramento sucker (top) and with (bottom).

MAPS

Map 3-1. Fish Population Sampling Locations

Map 3-1a. 2025 Bypass Reach Site A

Map 3-1b. 2025 Bypass Reach Site B

Map 3-1c. 2025 Bypass Reach Site C

Map 3-1d. 2025 Bypass Reach Site D

Map 3-1e. 2025 Bypass Reach Site E

Map 4-1. 2024–2025 Democrat Dam Impoundment Sampling

APPENDIX A

Fish Population Bypass Reach Sampling Site Photos

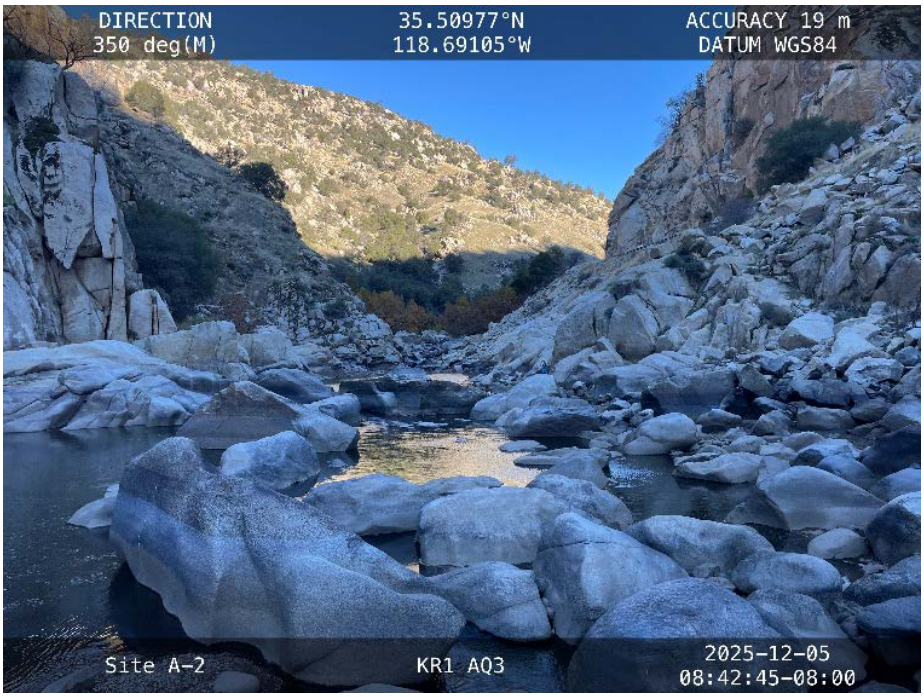
Site A: Unit A-1

Downstream End of Unit

Upstream End of Unit

Site A: Unit A-2

Downstream End of Unit



Upstream End of Unit

Site B: Unit B-1

Downstream Net

Upstream Net

Site B: Unit B-2

Downstream Net

Upstream Net

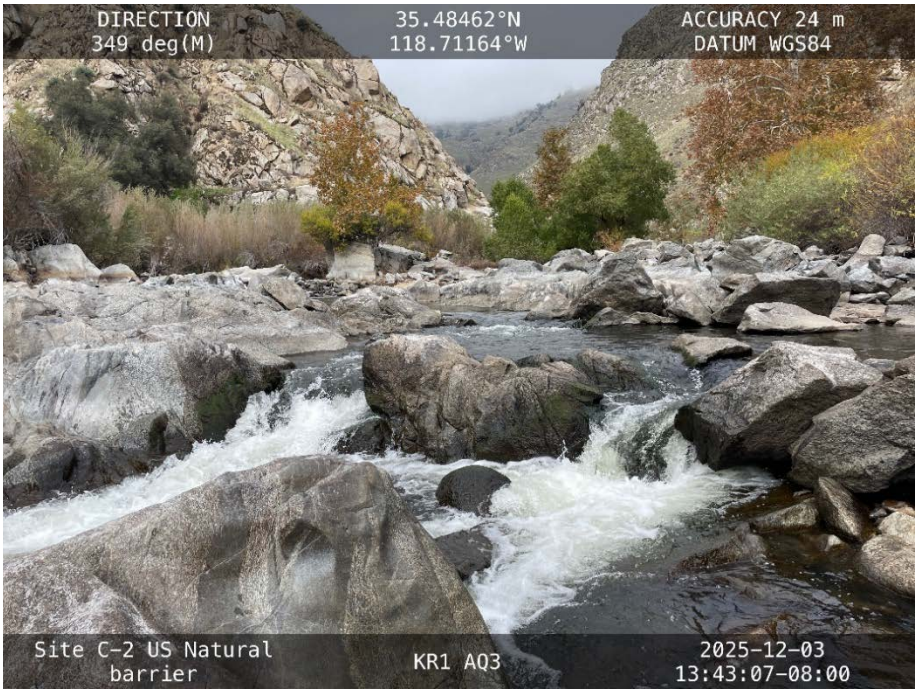
Site C: Unit C-1

Downstream Net

Upstream Net

Site C: Unit C-2

Downstream Net



Upstream Natural Barrier

Site D: Unit D-1

Downstream Net

Upstream Net

Site D: Unit D-2

Downstream Net

Upstream Net

Site E: Unit E-1

Downstream Net

Upstream Net

Site E: Unit E-2

Downstream Net

Upstream Net

Site E: Unit E-3

Downstream Net

Upstream Net

APPENDIX B

Length-Frequency Histograms by Site and Species

Democrat Dam Impoundment

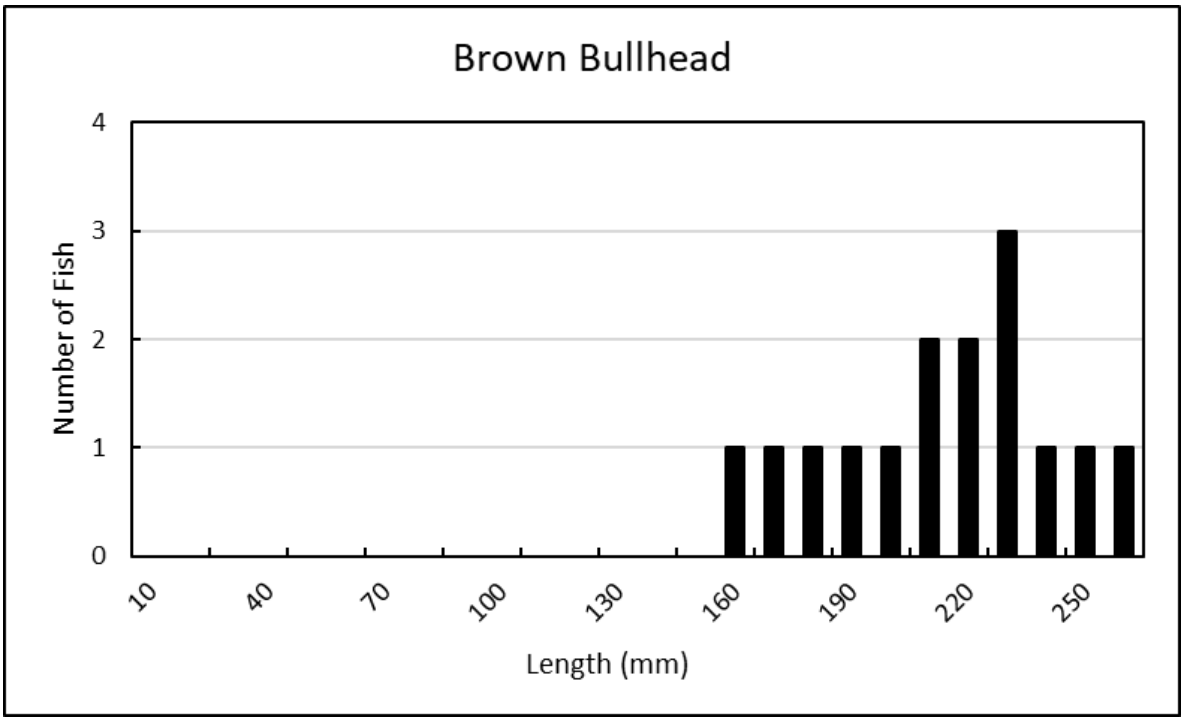


Figure B-1. Length-Frequency Histogram for Brown Bullhead collected in Democrat Dam Impoundment, 2024.

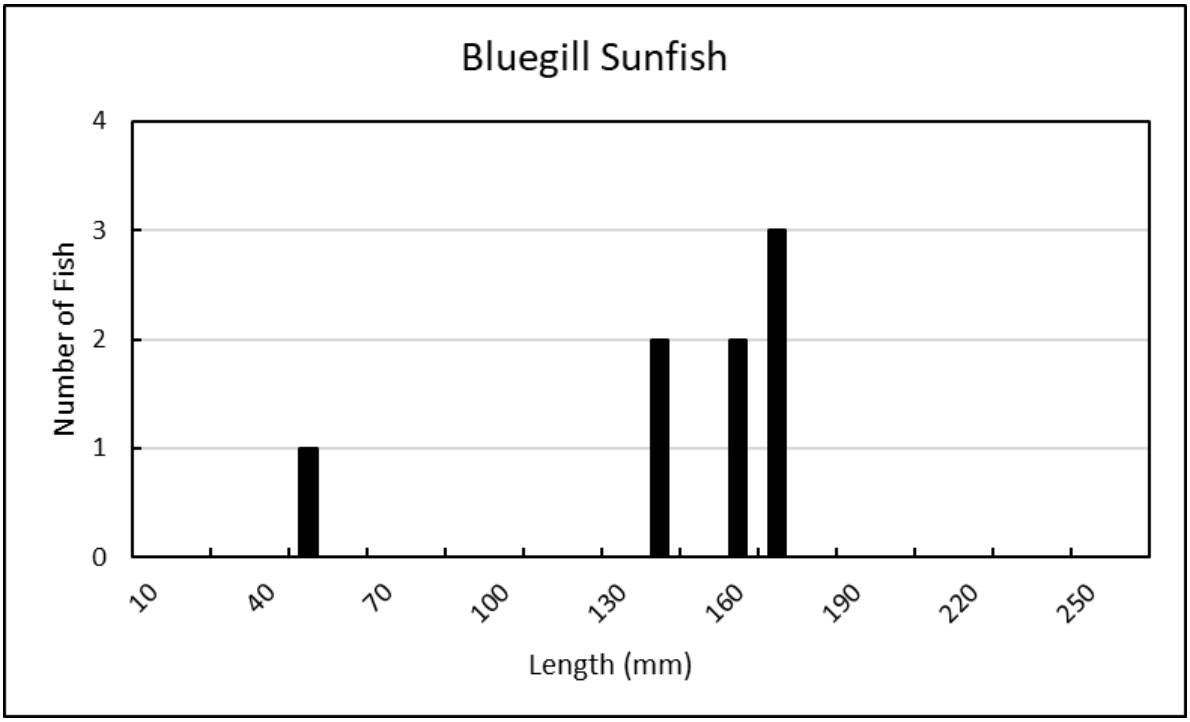


Figure B-2. Length-Frequency Histogram for Bluegill Sunfish collected in Democrat Dam Impoundment, 2024.

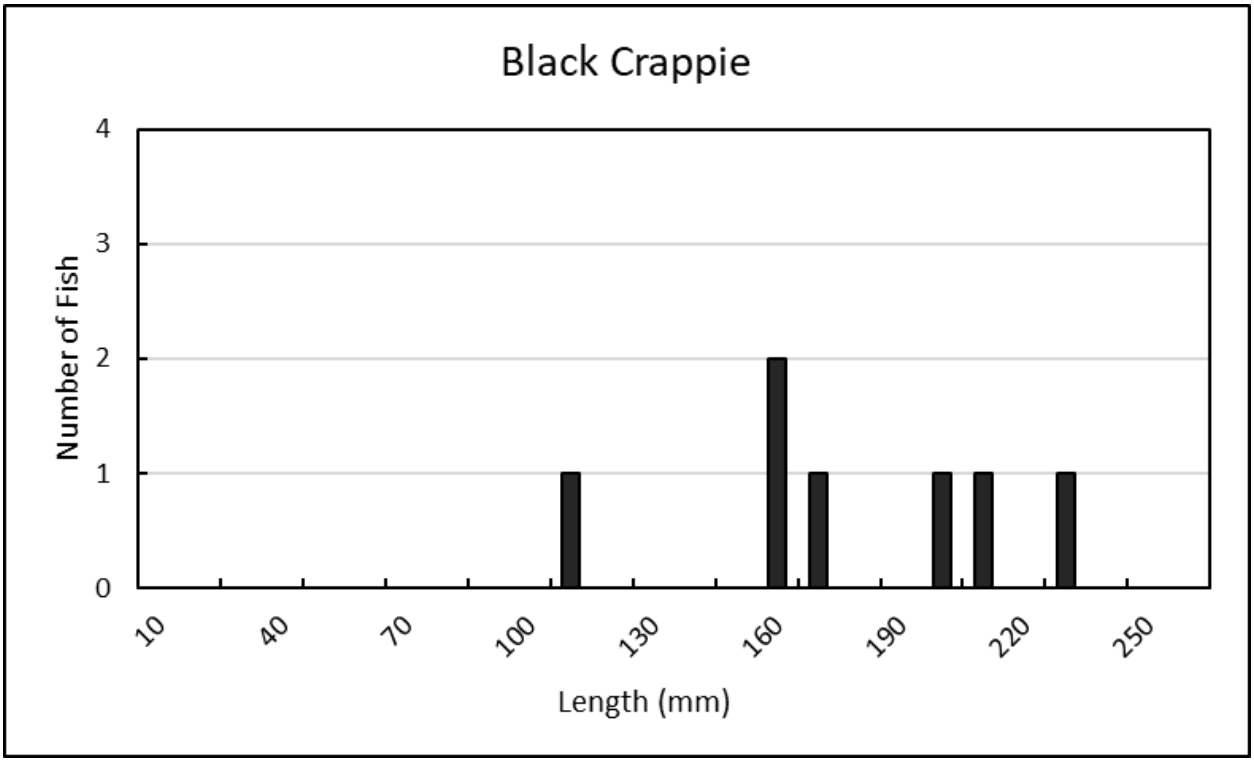


Figure B-3. Length-Frequency Histogram for Black Crappie collected in Democrat Dam Impoundment, 2024.

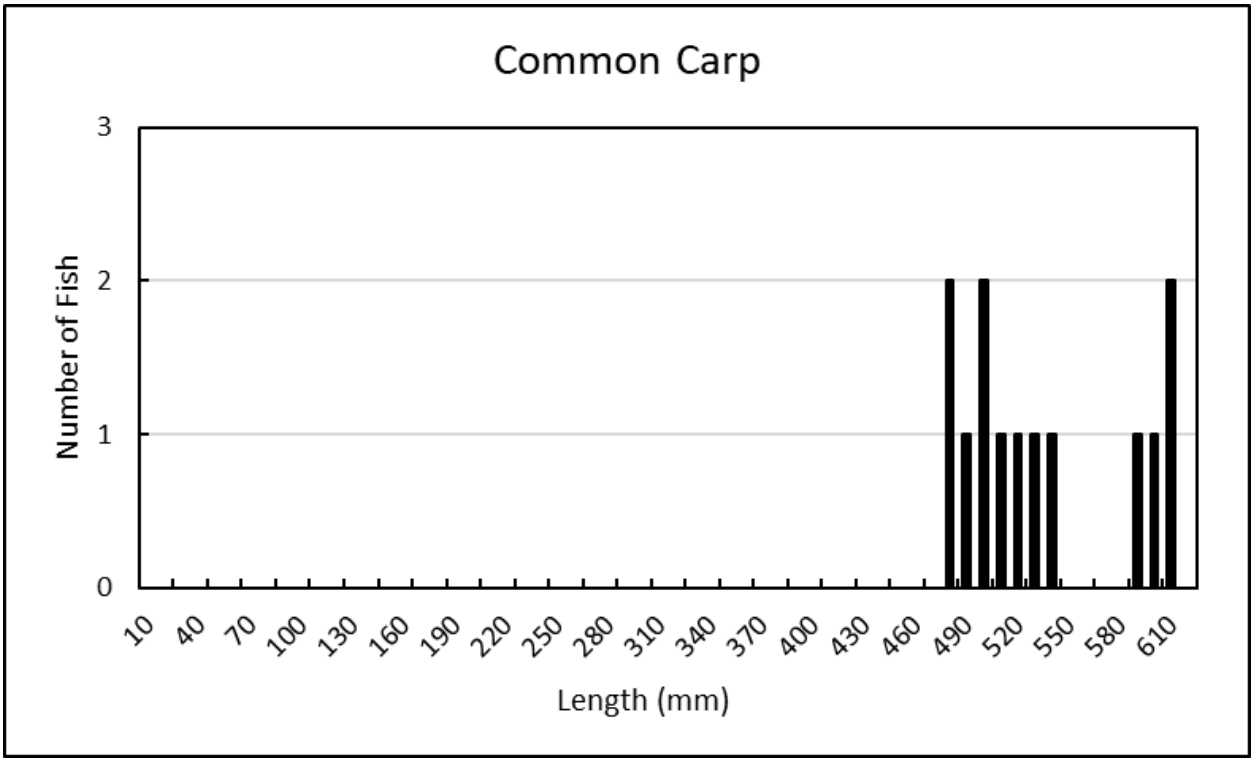


Figure B-4. Length-Frequency Histogram for Common Carp collected in Democrat Dam Impoundment, 2024.

Figure B-5. Length-Frequency Histogram for Hardhead Minnow collected in Democrat Dam Impoundment, 2024.

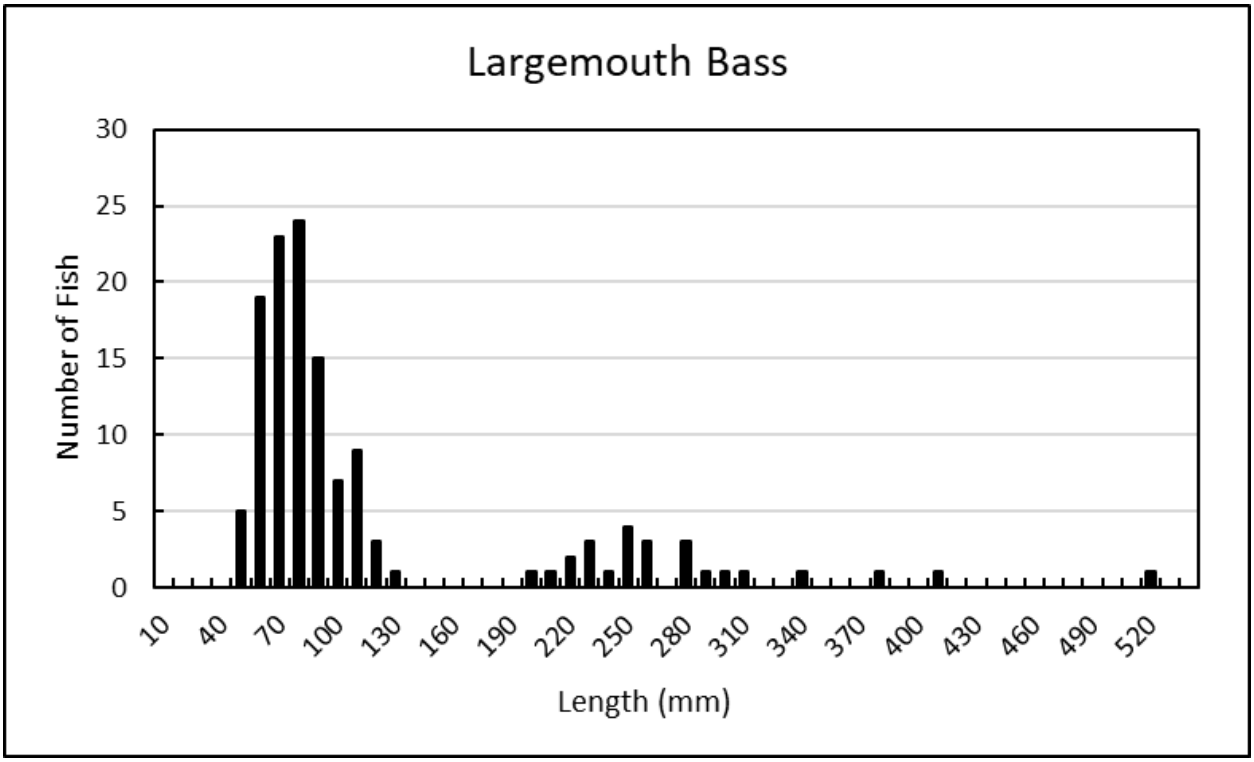


Figure B-6. Length-Frequency Histogram for Largemouth Bass collected in Democrat Dam Impoundment, 2024.

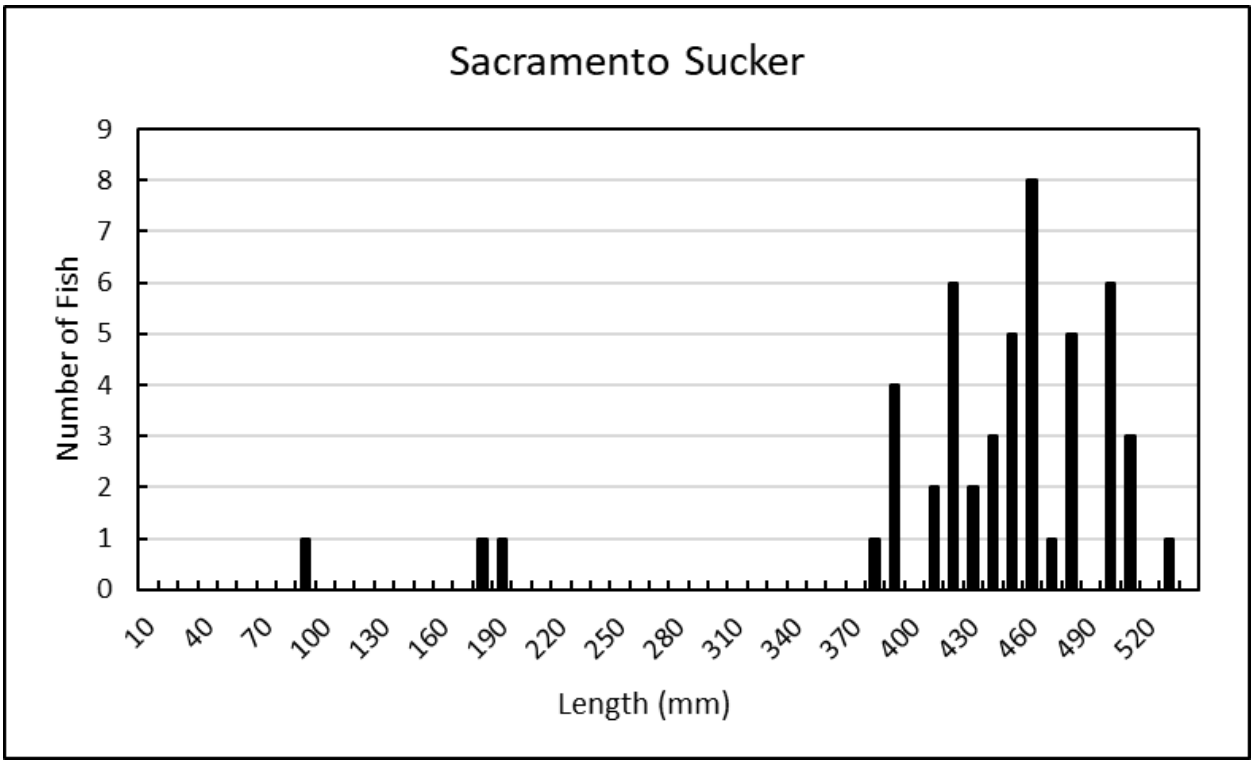


Figure B-7. Length-Frequency Histogram for Sacramento Sucker collected in Democrat Dam Impoundment, 2024.

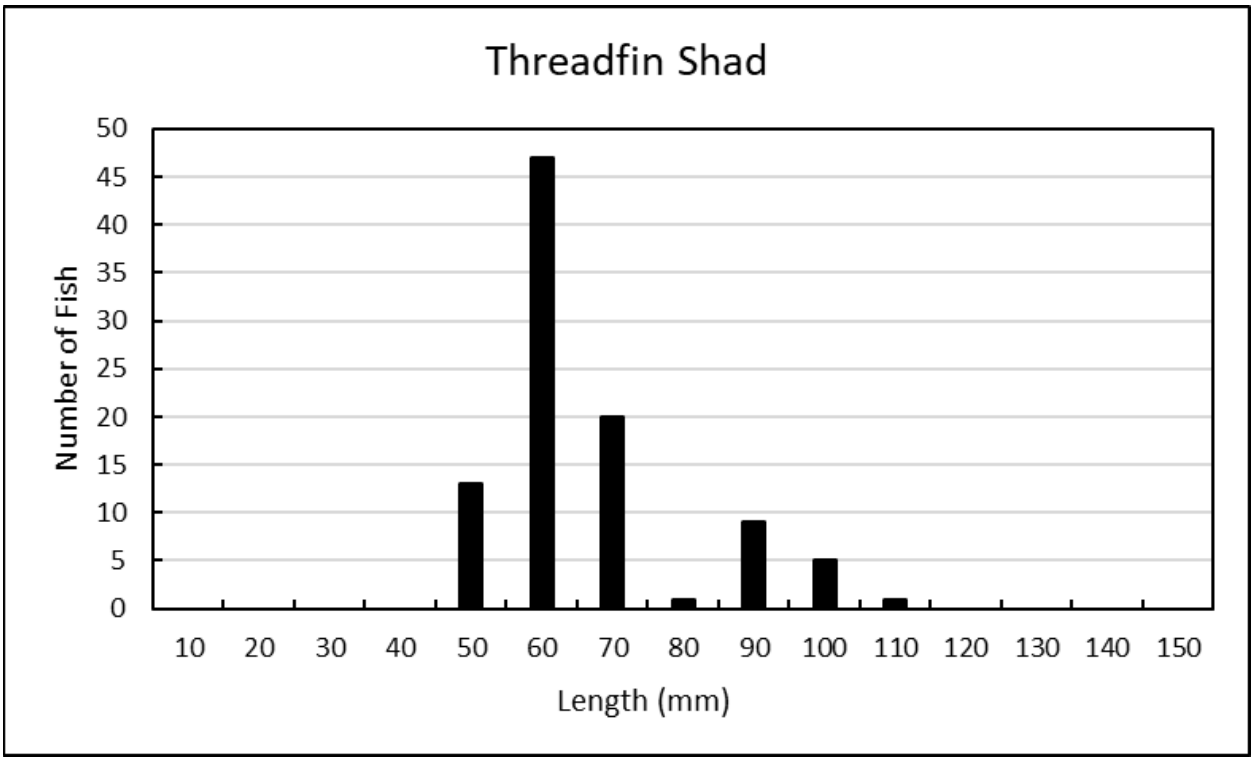


Figure B-8. Length-Frequency Histogram for Threadfin Shad collected in Democrat Dam Impoundment, 2024.

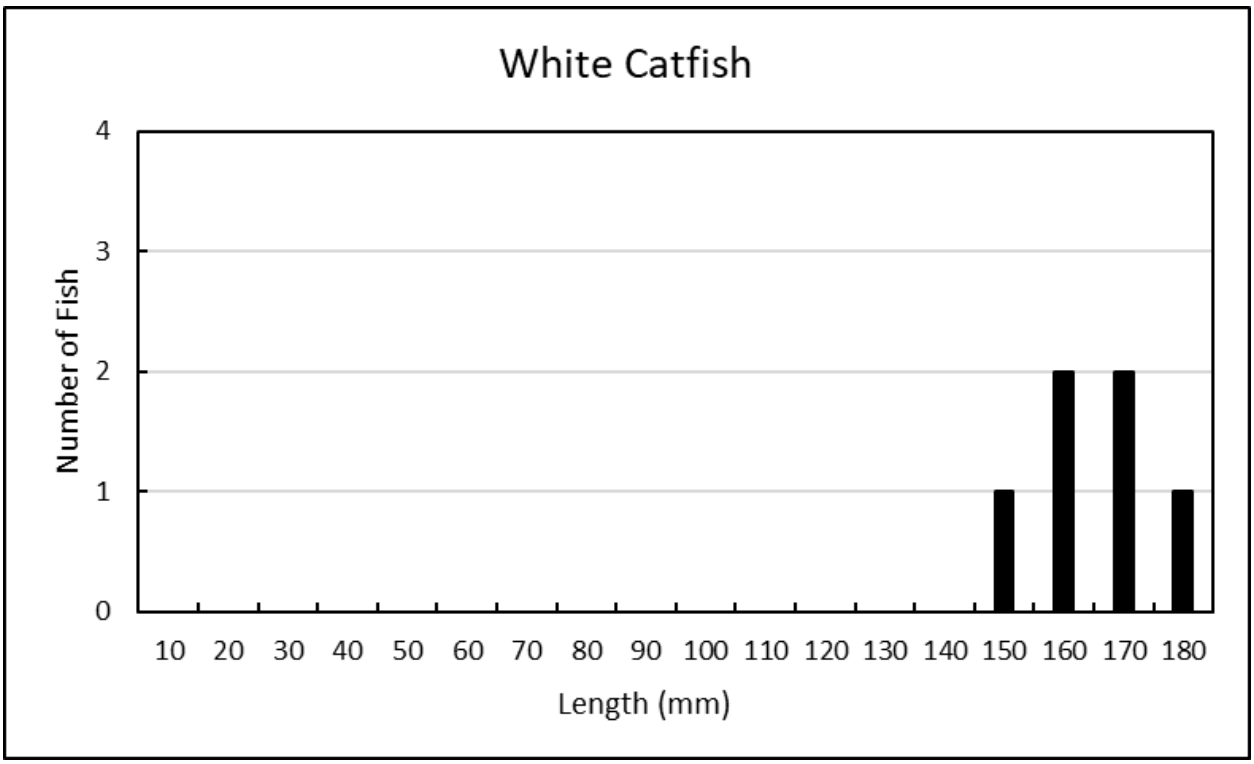
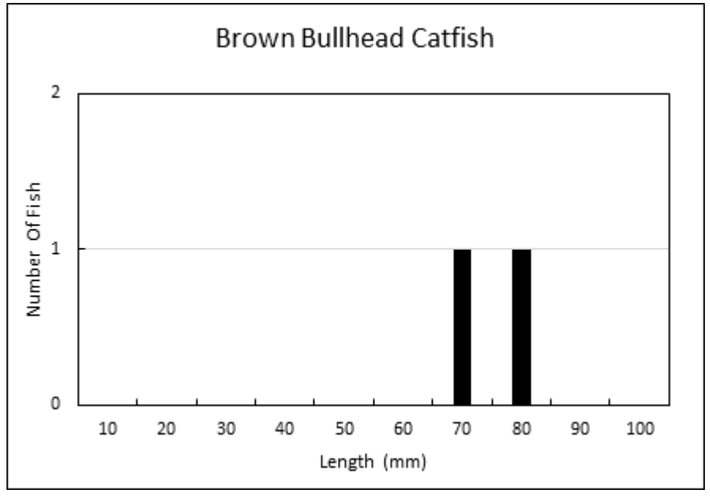
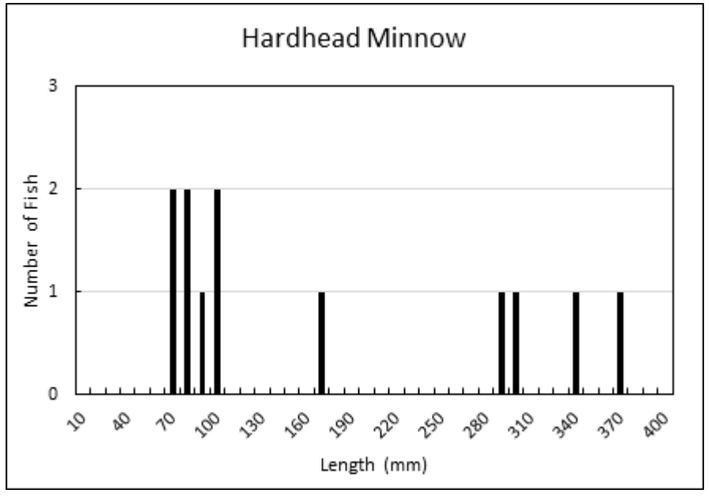
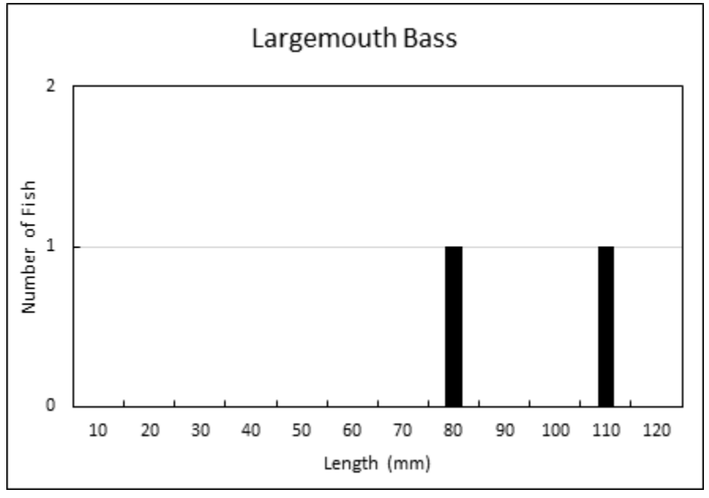


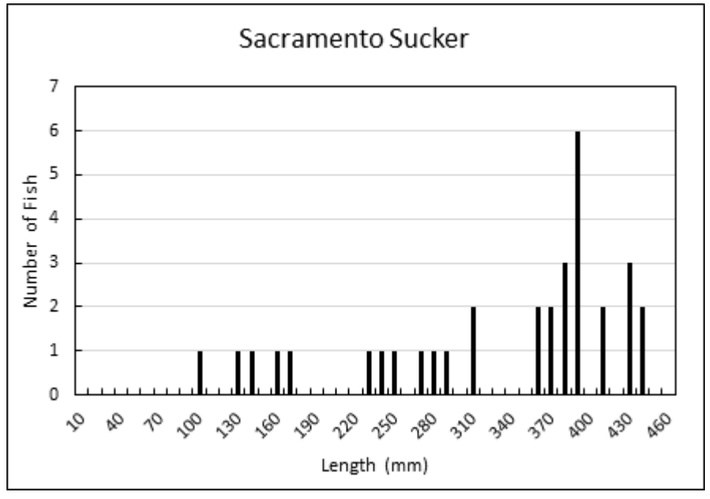
Figure B-9. Length-Frequency Histogram for Threadfin Shad collected in Democrat Dam Impoundment, 2024.

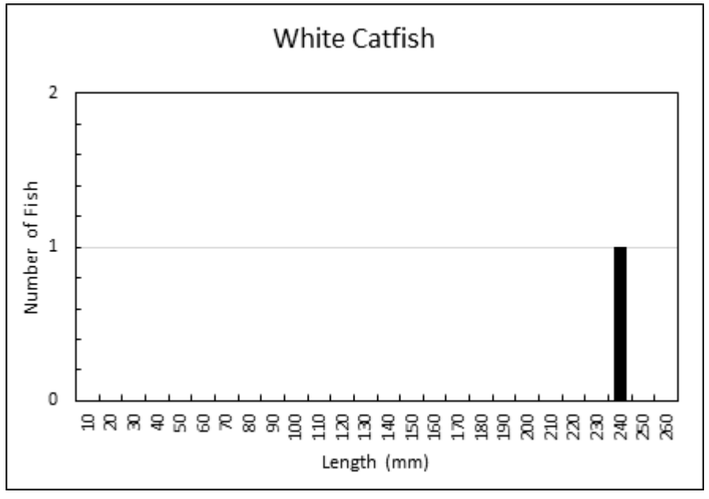
Kern River No. 1 Bypass Reach Site A Length-Frequency Historgrams



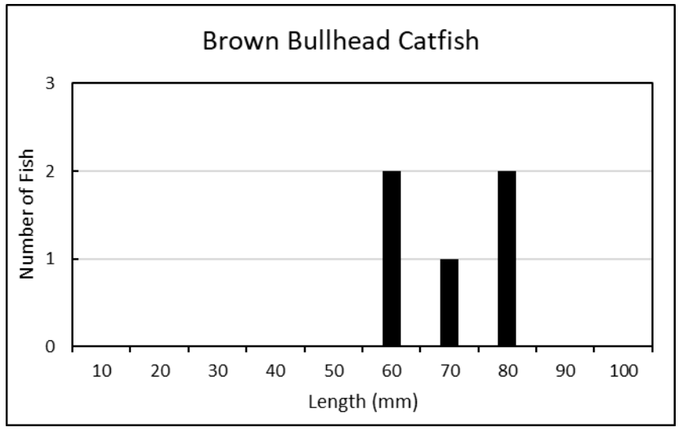


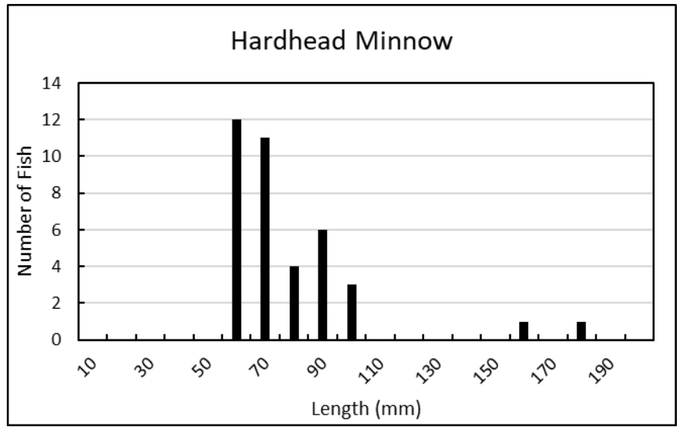


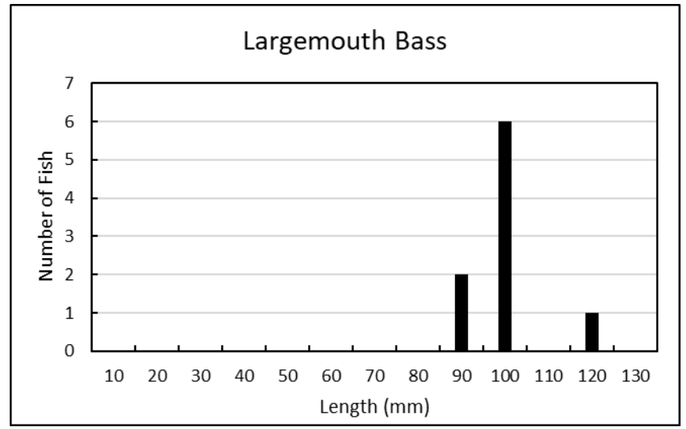


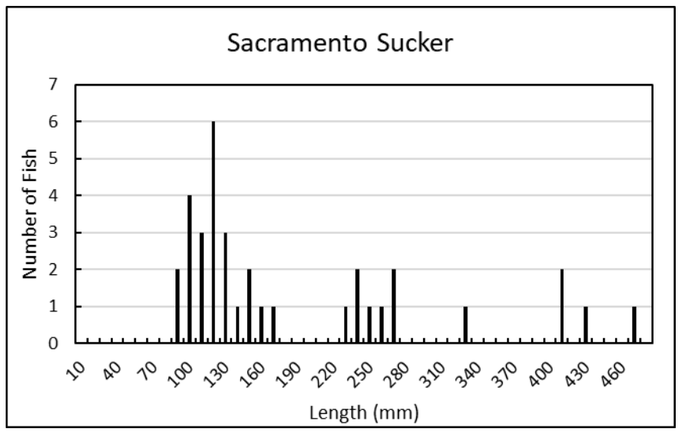


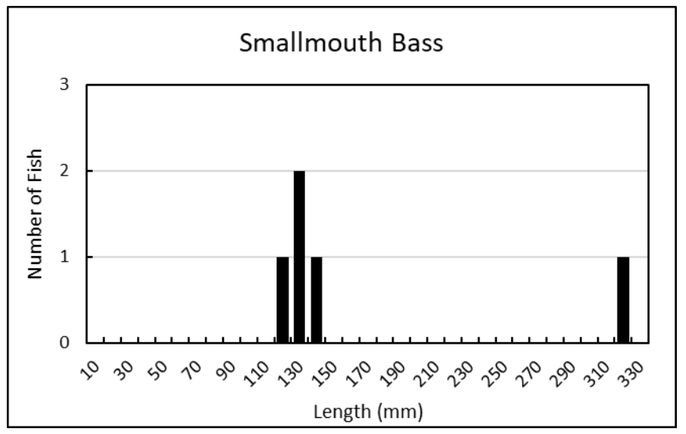
Kern River No. 1 Bypass Reach Site B Length-Frequency Historgrams



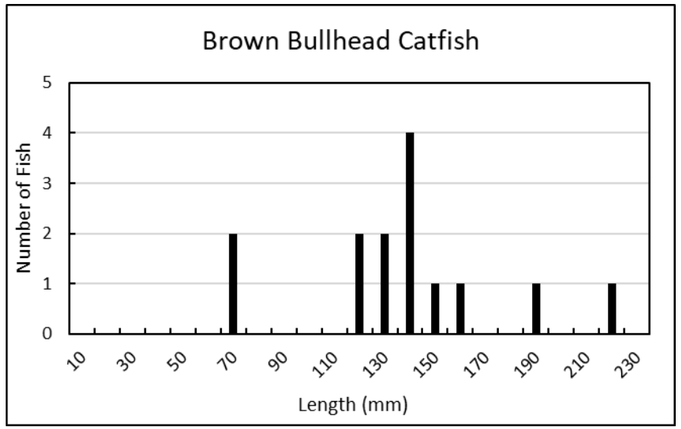


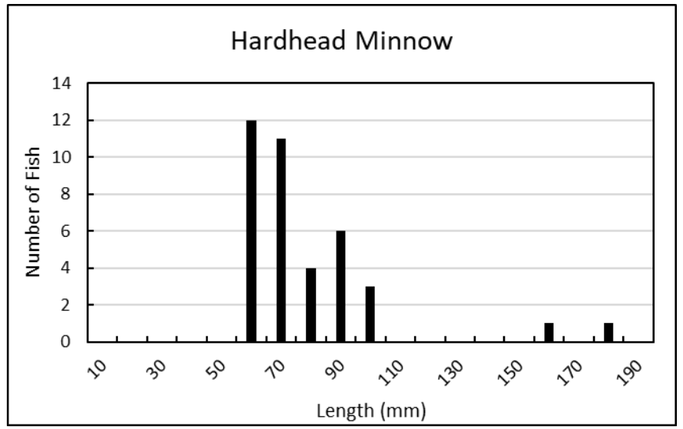


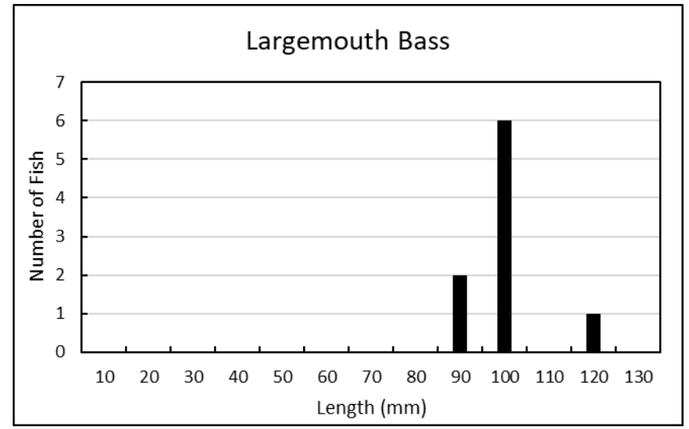


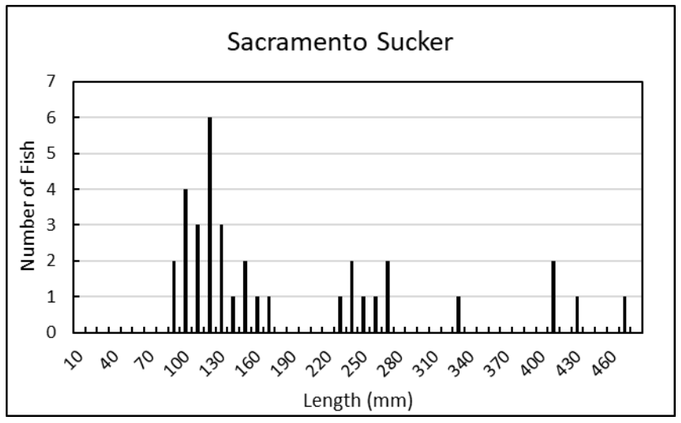


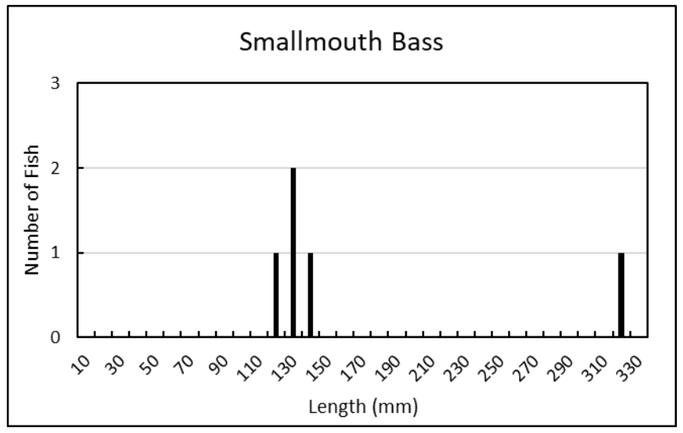
Kern River No. 1 Bypass Reach Site C Length-Frequency Historgrams



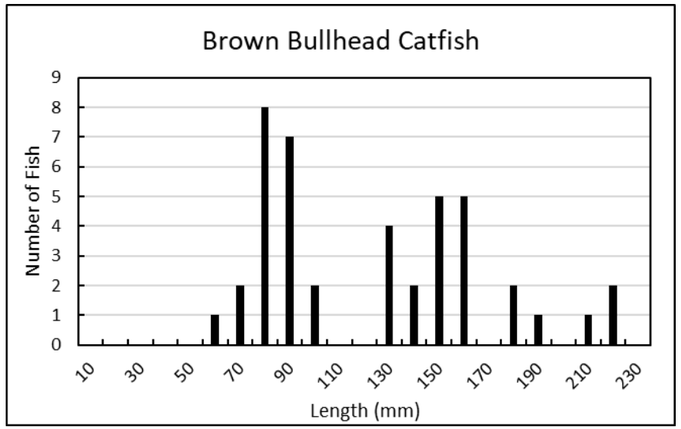


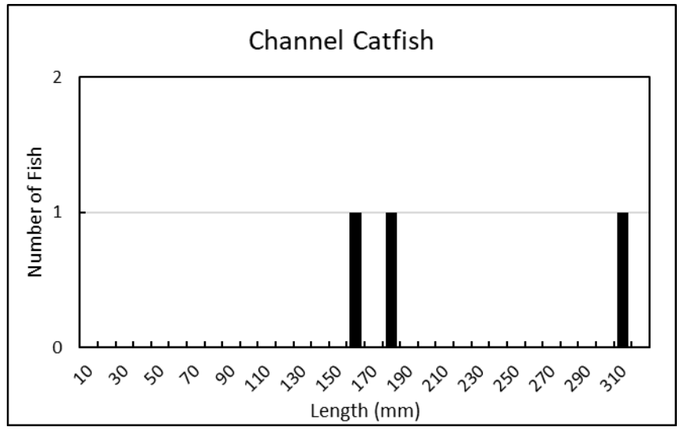


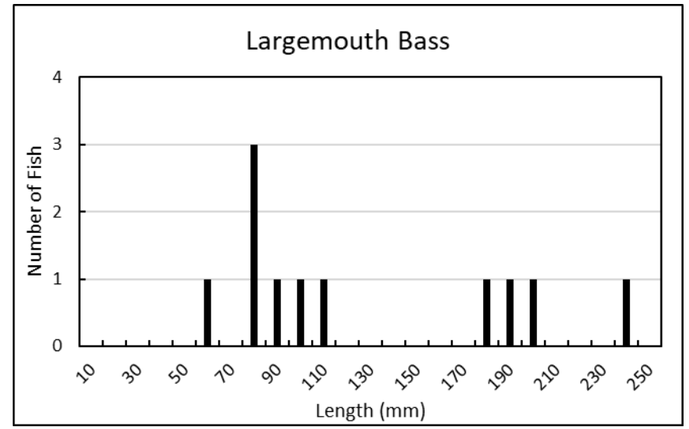


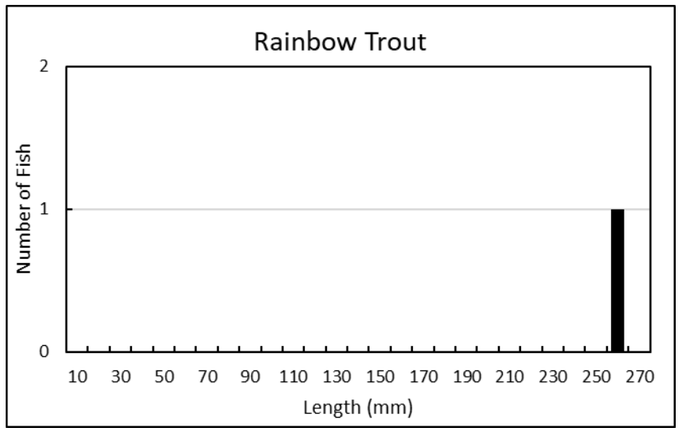


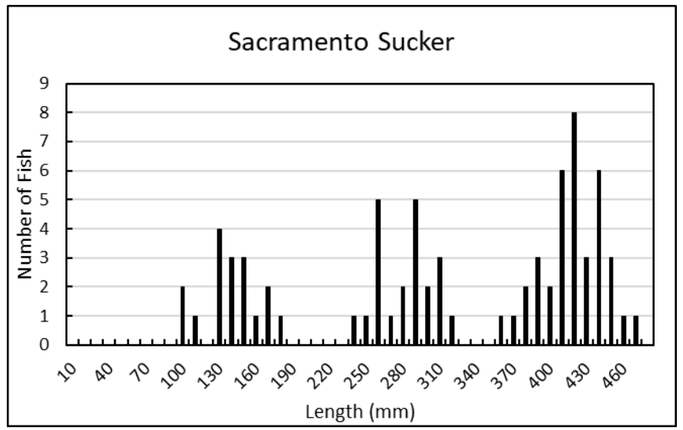
Kern River No. 1 Bypass Reach Site D Length-Frequency Historgrams

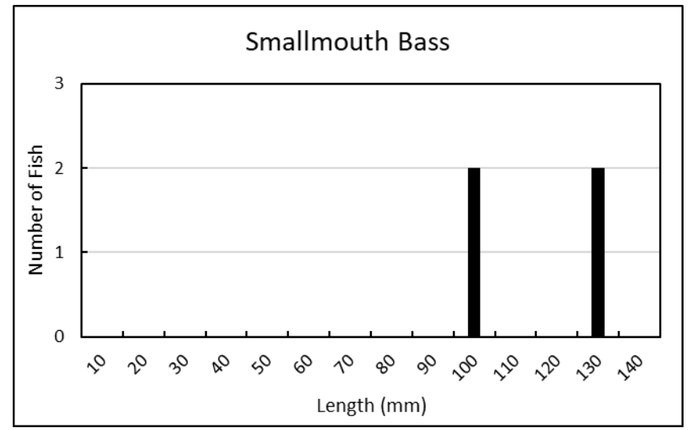




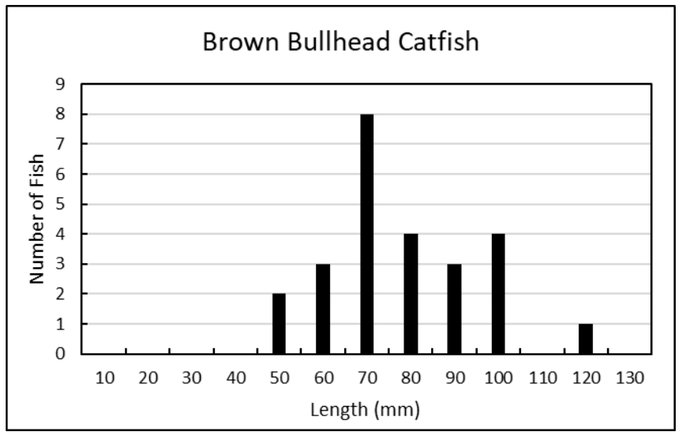


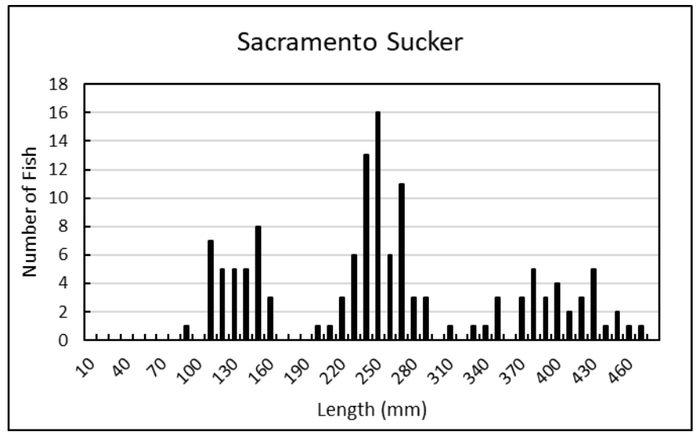






Kern River No. 1 Bypass Reach Site E Length-Frequency Historgrams





APPENDIX C

2024–2025 Fish Population Sampling Photos

Photo C-1. Adult hardhead captured in Democrat Dam Impoundment during 2024 E-Cat sampling with unknown wound or infection.

Photo C-2. Adult white catfish (left), largemouth bass (middle), and black crappie (right) captured in Democrat Dam Impoundment during 2024 E-Cat sampling.

Photo C-3. Adult hardhead minnow captured in the Kern River No. 1 Bypass Reach in 2025.

Photo C-4. Juvenile hardhead minnow captured in the Kern River No. 1 Bypass Reach in 2025.

Photo C-5. Rainbow trout captured in the Kern River No. 1 Bypass Reach in 2025.

Photo C-6. Adult Sacramento sucker captured in the Kern River No. 1 Bypass Reach in 2025.

Photo C-7. Adult smallmouth bass captured in the Kern River No. 1 Bypass Reach in 2025.

Photo C-8. Juvenile largemouth bass (bottom) and smallmouth bass (top) captured in the Kern River No. 1 Bypass Reach in 2025.

Photo C-9. Juvenile channel catfish captured in the Kern River No. 1 Bypass Reach in 2025.

Photo C-10. Juvenile brown bullhead catfish captured in the Kern River No. 1 Bypass Reach in 2025.

Photo C-11. American bullfrog (*Lithobates catesbeianus*) tadpole observed in the Kern River No. 1 Bypass Reach (Site B) in 2025.

Photo C-12. Asian clams (*Corbicula fluminea*) observed in the Democrat Dam Impoundment during 2024 E-Cat sampling (left) and the Kern River No. 1 Bypass Reach during 2025 sampling (right).

Photo C-13. Curly-leaf pondweed (*Potamogeton crispus*) observed in the Kern River No. 1 Bypass Reach in 2025.