

**FERC Project No. 2426**  
**South SWP Hydropower**  
***Quail Lake Fisheries Assessment Study***

**FIELD RESULTS AND DATA SUMMARY**

*March 25, 2019*

Consistent with Section 5.0 of the South SWP Hydropower Revised Study Plan and as approved in the Federal Energy Regulatory Commission (FERC) Study Plan Determinations dated June 14, 2017 and September 7, 2018, the California Department of Water Resources and Los Angeles Department of Water and Power (Licensees) provide the following Field Results and Data Summary for Study 4.1.2, *Quail Lake Fisheries Assessment Study* (Study), which includes work completed to date, key findings, associated data files, variances, and remaining work. The Licensees consider these data to be public.

**Completed Work to Date:**

The Study is complete. As required by the FERC-approved Study Plan, the Licensees completed Step 1 (Data Gathering and Planning) and Step 2 (Fieldwork). Step 2 is comprised of two fieldwork components: boat electrofishing and creel surveys. Boat electrofishing was conducted at Quail Lake on October 9, 2018, using a Smith Root Generator Powered Pulsator 5.0 system. Quail Lake has a total of 3.28 miles of shoreline. For the purpose of this Study, the shoreline was split into six discrete habitat units, each approximately 0.5 miles long (see attached file). The six units were characterized as follows:

1. South Shore: primarily composed of partially submerged, concrete walkway with no visible vegetation
2. East Shore: limited tules present, dam rip-rap, and submerged trees
3. North Shore: tule habitat and inlet rip-rap
4. North Shore: predominately tule and shoal habitat
5. Northwest Shore: predominately shallow tule and shoal habitat
6. Southwest Shore: includes outlet and partially submerged concrete walkway

Each unit was sampled in a “leap frog” manner to minimize herding of fish. Some sections of Units 3 and 6 (approximately 5% of the total shoreline) could not be sampled due to minimal depth and angler presence. Sampling was conducted in accordance with the California Department of Fish and Wildlife (CDFW)-issued Scientific Collecting Permit. Length in millimeters (mm), weight in grams (g), and general condition were collected for up to 50 individuals of each fish species collected; additional fish were examined and enumerated, but not measured or weighed.

Recreational anglers at Quail Lake were surveyed through stratified random sampling that incorporated an active creel design to gather information on fishing pressure and impact on game fish species. A total of 50 surveys were conducted from October 1, 2017 to July 31, 2018, representing 16 high-use days (weekends and major holidays)

and 34 low-use days (weekdays) that were randomly selected. Each survey was also randomly selected as an AM (morning) or PM (evening) survey, with 30 surveys completed in the morning and 20 in the evening. Each survey lasted three hours and occurred from 7:00 am to 10:00 am for the AM period and 3:00 pm to 6:00 pm for the PM period. Surveys were conducted at the parking lot of Quail Lake, as this was the only public access to the lake. Information collected included the following:

- Start and end time of angling outing and the time of the interview
- Number of fish caught by species (including fish harvested and released)
- Targeted fish species
- Angler age by category (younger than 16, 16 to 55, older than 55 years old)
- Angler gender (male, female)
- Angler distance traveled by category (less than 20 miles, 20 to 50 miles, greater than 50 miles)
- Whether angling was the primary reason for their visit to Quail Lake
- Zip code of residences
- Additional information collected for each survey date included the date, day of the week, approximate air temperature, a brief general description of the weather, and harvested fish measured in millimeters using fork length or standard length depending on the type of species

### Key Accomplishments/Summary of Findings to Date:

#### Boat Electrofishing

Species composition was represented by warmwater fishes, including common game fish for California. A total of 13 species were sampled; the most abundant fishes captured were largemouth bass (*Micropterus salmoides*), white catfish (*Ameiurus catus*), and striped bass (*Morone saxatilis*) (n=116, n=50, and n=27, respectively). Other species captured included bluegill (*Lepomis macrochirus*), bigscale logperch (*Percina macrolepida*), prickly sculpin (*Cottus asper*), common carp (*Cyprinus carpio*), goldfish (*Carassius auratus*), Sacramento blackfish (*Orthodon microlepidotus*), channel catfish (*Ictalurus punctatus*), shimofuri goby (*Tridentiger bifasciatus*), threadfin shad (*Dorosoma petenense*), and inland silverside (*Menidia beryllina*). Due to the large numbers of individuals present, threadfin shad and inland silversides were documented for presence/absence in each unit and their numbers were not collected.

Sampling results are presented in Table 1, and overall catch per unit effort (CPUE, fish per minute of electrofisher operation) and species composition are provided in Figure 1. Table 1 lists the 13 fish species collected and observed; Figure 1 lists only the 11 fish species collected (excludes threadfin shad and inland silverside).

**Table 1. Population Summary of Boat Electrofishing at Quail Lake**

Common Name (Scientific Name)	Number Collected	Length (mm)	Weight (g)	Relative Condition <sup>1</sup>	Fulton Condition <sup>1</sup>	Percent of Total Catch by Number	CPUE	PSD <sup>2</sup>	PSD-P <sup>2</sup>
		Min-Max (Mean)	Min-Max (Mean)	Range	Range (Average)				
Largemouth Bass ( <i>Micropterus salmoides</i> )	116	83-458 (199) <sup>3</sup>	7.5- 2,040.0 (294.9) <sup>3</sup>	0.49-1.35 <sup>3</sup>	0.77-2.31 (1.54) <sup>3</sup>	48.7%	0.58	80 <sup>3</sup>	32 <sup>3</sup>
White Catfish ( <i>Ameiurus catus</i> )	50	115-503 (270)	13.8- 3,150.0 (439.4)	0.64-1.32	0.91-2.48 (1.57)	21.0%	0.25	--	--
Striped Bass ( <i>Morone saxatilis</i> )	27	191-718 (283)	80.0- 4,000.0 (613.1)	0.84-1.22	1.04-1.48 (1.28)	11.3%	0.13	80	0
Bluegill ( <i>Lepomis macrochirus</i> )	13	34-174 (81)	4.4-152.0 (34.7)	0.45-1.95	--	5.5%	0.06	20	0
Bigscale Logperch ( <i>Percina macrolepida</i> )	9	80-91 (87)	2.7-5.4 (4.2)	--	--	3.8%	0.04	--	--
Prickly Sculpin ( <i>Cottus asper</i> )	8	39-95 (73)	1.3-14.9 (7.6)	--	--	3.4%	0.04	--	--
Common Carp ( <i>Cyprinus carpio</i> )	7	629-676 (656)	5,110.0- 5,650.0 (5436.7)	--	--	2.9%	0.03	100	100
Goldfish ( <i>Carassius auratus</i> )	3	354-385 (366)	1,530.0- 2,080.0 (1,810.0)	--	--	1.3%	0.01	--	--
Sacramento Blackfish ( <i>Orthodon microlepidotus</i> )	2	475-485 (480)	1,620.0- 1,700.0 (1,660.0)	--	--	0.8%	0.01	--	--
Channel Catfish ( <i>Ictalurus punctatus</i> )	2	350-475 (413)	1,230.0- 1,960.0 (1,595.0)	--	--	0.8%	0.01	50	0
Shimofuri Goby ( <i>Tridentiger bifasciatus</i> )	1	48	2.8	--	--	0.4%	<0.01	--	--
Threadfin Shad <sup>4</sup> ( <i>Dorosoma petenense</i> )	Observed	--	--	--	--	--	--	--	--
Inland Silverside <sup>4</sup> ( <i>Menidia beryllina</i> )	Observed	--	--	--	--	--	--	--	--
Total	238	--	--	--	--	100.0%	1.19 <sup>5</sup>	--	--

Notes:

<sup>1</sup>Relative and Fulton's condition factors could not be calculated for all fish. Non-game fish, species with insufficient sampled individuals, and species without a fusiform body shape (Fulton) were not calculated.

<sup>2</sup>Proportional and relative stock densities were only calculated for species recognized as game fish by the California Department of Fish and Wildlife.

<sup>3</sup>The first 50 individuals captured were used in metric calculations. All individuals captured thereafter were examined and enumerated but not measured or weighed and therefore not used in some calculations.

<sup>4</sup> Threadfin shad and inland silversides were noted for presence/absence in each unit due to the large quantities present throughout the sampling event.

<sup>5</sup>Presented CPUE for individual species are rounded to two decimal places, and therefore may not sum to the presented total CPUE.

Key:

% = percent

CPUE = catch per unit effort, fish per minute

g = grams

Max = maximum

Min = minimum

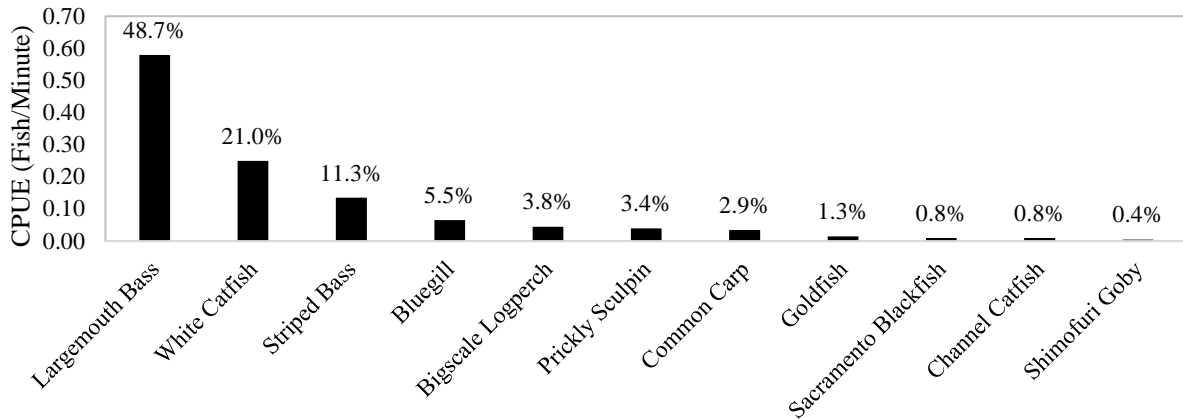
mm = millimeters

PSD = proportional size distribution

PSD-P = relative size distribution – preferred

Game fishes were assessed for their proportional size distribution (PSD) and relative size distribution (PSD-P).<sup>1</sup> Quail Lake can be characterized as a “big bass fishery”<sup>2</sup> with largemouth bass having a high PSD and PSD-P (80 and 32, respectively) and bluegill having low PSD and PSD-P values (20 and 0, respectively). The striped bass fishery was also healthy (relative condition = 0.84-1.22; Fulton's condition = 1.04-1.48, average = 1.28), and had a similar PSD to largemouth bass (PSD = 80).

The fish captured showed a wide range of weight relative to length. Bluegill displayed both the lowest and highest relative condition, a measure of relative expected weight based on length of sampled fish. Fulton's condition, an independent measure of fish condition for fish displaying fusiform body shape, averaged well above 1.0 (considered good). Threadfin shad and inland silversides were documented in large quantities throughout all units, indicating the presence of a large prey base for predatory game fish. The diverse assemblage and broad range of fish conditions may indicate a relatively competitive population within the lake.



**Figure 1. Overall CPUE (Fish Per Minute) with Composition of Species Collected During Boat Electrofishing on Quail Lake**

CPUE varied by unit for the six units sampled. Unit 2 exhibited the highest density of fish with a CPUE of 1.89 fish per minute (fish/minute), and Unit 1 the least with a CPUE of 0.61 fish/minute. CPUE for all units combined was 1.19 fish/minute. Sampling effort (i.e., minutes with electrofisher on) was variable between units dependent on accessible habitat and angler presence. Unit 3 had the least amount of shoreline, but it also had multiple anglers in the area (near the inlet). Table 2 provides CPUE for all species and for all units.

<sup>1</sup> Guy, C. S., Neumann, R. M., Willis, D. W., & Anderson, R. O. (2007). Proportional size distribution (PSD): a further refinement of population size structure index terminology. *Fisheries*, 32(7).

<sup>2</sup> Willis, D. W., B. R. Murphy, and C. S. Guy. 1993. Stock density indices: development, use, and limitations. *Reviews in Fisheries Science*. 1:203-222.

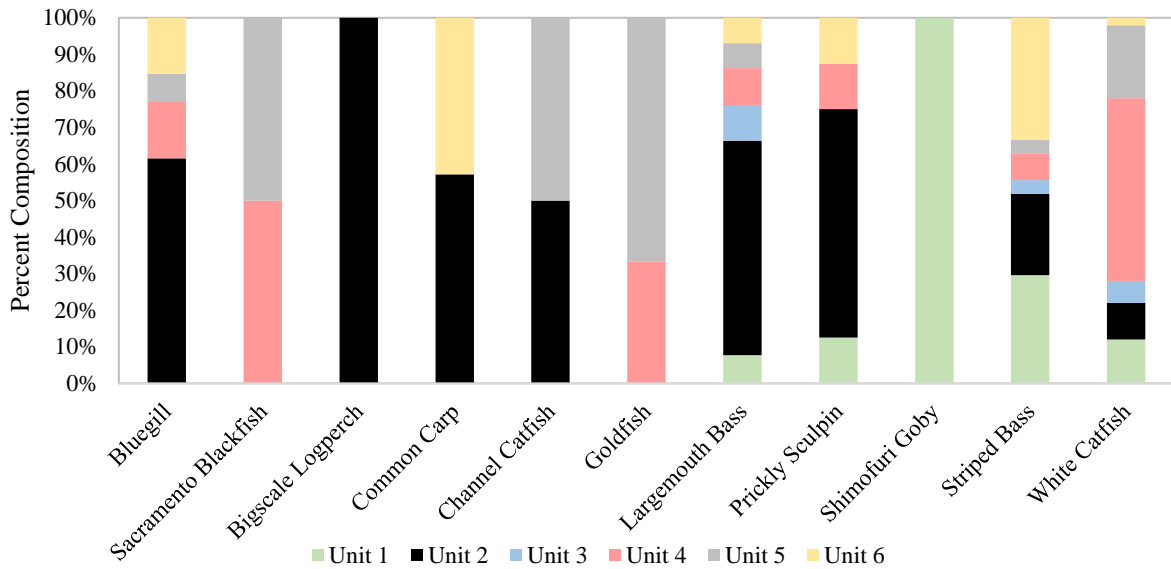
**Table 2. Overall CPUE (Fish/Minute) by Habitat Unit During Boat Electrofishing on Quail Lake**

Species (Scientific Name)	Total Catch	Overall CPUE	Unit 1		Unit 2		Unit 3		Unit 4		Unit 5		Unit 6	
			#	CPUE	#	CPUE	#	CPUE	#	CPUE	#	CPUE	#	CPUE
Largemouth Bass ( <i>Micropterus salmoides</i> )	116	0.58	9	0.22	6 8	1.22	11	0.66	12	0.47	8	0.32	8	0.22
White Catfish ( <i>Ameiurus catus</i> )	50	0.25	6	0.15	5	0.09	3	0.18	25	0.97	10	0.41	1	0.03
Striped Bass ( <i>Morone saxatilis</i> )	27	0.13	8	0.20	6	0.11	1	0.06	2	0.08	1	0.04	9	0.25

Species (Scientific Name)	Total Catch	Overall CPUE	Unit 1		Unit 2		Unit 3		Unit 4		Unit 5		Unit 6	
			#	CPUE	#	CPUE	#	CPUE	#	CPUE	#	CPUE	#	CPUE
Bluegill ( <i>Lepomis macrochirus</i> )	13	0.06	0	0.00	8	0.14	0	0.00	2	0.08	1	0.04	2	0.05
Bigscale Logperch ( <i>Percina macrolepida</i> )	9	0.04	0	0.00	9	0.16	0	0.00	0	0.00	0	0.00	0	0.00
Prickly Sculpin ( <i>Cottus asper</i> )	8	0.04	1	0.02	5	0.09	0	0.00	1	0.04	0	0.00	1	0.03
Common Carp ( <i>Cyprinus carpio</i> )	7	0.03	0	0.00	4	0.07	0	0.00	0	0.00	0	0.00	3	0.08
Goldfish ( <i>Carassius auratus</i> )	3	0.01	0	0.00	0	0.00	0	0.00	1	0.04	2	0.08	0	0.00
Sacramento Blackfish ( <i>Orthodon microlepidotus</i> )	2	0.01	0	0.00	0	0.00	0	0.00	1	0.04	1	0.04	0	0.00
Channel Catfish ( <i>Ictalurus punctatus</i> )	2	0.01	0	0.00	1	0.02	0	0.00	0	0.00	1	0.04	0	0.00
Shimofuri Goby ( <i>Tridentiger bifasciatus</i> )	1	0.00	1	0.02	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Threadfin Shad ( <i>Dorosoma petenense</i> )	OB	--	O B	--	O B	--	OB	--	OB	--	OB	--	OB	--
Inland silverside ( <i>Menidia beryllina</i> )	OB	--	O B	--	O B	--	OB	--	OB	--	OB	--	OB	--
<b>Total Catch</b>	<b>238</b>		<b>25</b>		<b>106</b>		<b>15</b>		<b>44</b>		<b>24</b>		<b>24</b>	
<b>CPUE</b>	<b>1.19</b>		<b>0.61</b>		<b>1.89</b>		<b>0.90</b>		<b>1.71</b>		<b>0.97</b>		<b>0.66</b>	
<b>Effort (minutes)</b>	<b>200.35</b>		<b>40.80</b>		<b>55.97</b>		<b>16.68</b>		<b>25.73</b>		<b>24.65</b>		<b>36.52</b>	

Key:  
CPUE = catch per unit effort, fish per minute  
OB = Observed but not counted or sampled

Species composition varied among the six sampled units. Unit 2 produced the most species and Unit 3 the least (8 and 3, respectively). The three most abundant fish species (largemouth bass, striped bass, and white catfish) were found in all six units. Figure 2 shows the percent composition of fish species by unit.



**Figure 2. Percent Composition by Habitat Unit During Boat Electrofishing on Quail Lake**

**Creel Surveys**

A total of 85 angler parties were interviewed, representing 175 individual anglers. These anglers had a combined 854.6 angling hours, catching a total of 58 fish. Fish caught were represented by 4 categories: striped bass, black bass, catfish, and perch. Based on electrofishing data, black bass were likely largemouth bass, and catfish either were white catfish or channel catfish. Some fish recorded were based on angler responses and may not have been accurately identified. Overall CPUE was low, at less than 0.1 fish per hour. Table 3 presents the overall creel results.

**Table 3. Summary of AM and PM Creel Survey Results for High-Use and Low-Use Periods**

Event	Number of Surveys	Number of Angler Parties	Number of Anglers	Total Angler Hours	Total Fish Caught	Number Released	CPUE
<b>Weekends, High-Use (n=16 surveys)</b>							
Saturday	8	30	65	427.1	26	10	0.06
Sunday	8	17	40	155.5	7	1	0.05
<b>Weekend Subtotal</b>	<b>16</b>	<b>47</b>	<b>105</b>	<b>582.6</b>	<b>33</b>	<b>11</b>	<b>0.06</b>
<b>Weekdays, Low-Use (n=34 surveys)</b>							
Monday	5	6	9	11.8	7	2	0.59
Tuesday	7	7	17	67.7	2	0	0.03
Wednesday	9	9	17	110.9	7	6	0.06
Thursday	5	8	13	42.4	1	0	0.02
Friday	8	8	14	39.2	8	4	0.20
<b>Weekday Subtotal</b>	<b>34</b>	<b>38</b>	<b>70</b>	<b>272.0</b>	<b>25</b>	<b>12</b>	<b>0.09</b>
<b>Overall Total</b>	<b>50</b>	<b>85</b>	<b>175</b>	<b>854.6</b>	<b>58</b>	<b>23</b>	<b>0.07</b>

Key:  
 CPUE = catch per unit effort, fish per hour of angling effort

Thirty-nine of the 58 fish caught by anglers were measured for length and identified to species (Table 4). The most common fish caught (and kept) was striped bass,

representing almost 70 percent of the fish recorded. All striped bass recorded were over 300 mm. Catfish and black bass were caught less frequently and were also targeted less often by anglers. One angler reported catching three perch but did not indicate the species.

**Table 4. Length Frequency of Measured Fish During Creel Surveys**

Species	Length (mm)				Total	Percent of Total
	0-150	150-304	304-533	533-787		
Striped Bass	0	0	11	16	27	69.2%
Catfish sp. <sup>1</sup>	0	1	2	2	5	12.8%
Black Bass <sup>1</sup>	0	3	1	0	4	10.3%
Perch <sup>2</sup>	0	0	3	0	3	7.7%
<b>Total</b>	<b>0</b>	<b>4</b>	<b>17</b>	<b>18</b>	<b>39</b>	<b>100.0%</b>

Notes:

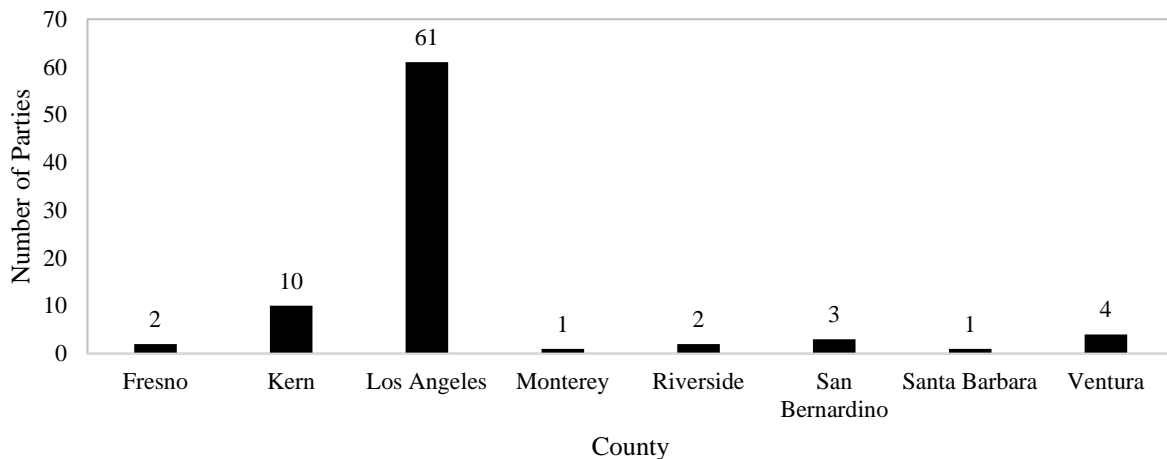
<sup>1</sup>Based on electrofishing data, black bass were likely largemouth bass, and catfish either white catfish or channel catfish.

<sup>2</sup>Three perch were reported during angler interviews, but the exact species was not identified.

Key:

mm = millimeters

Eighty four of the 85 parties interviewed provided information on distance traveled. Most angler parties interviewed traveled from nearby counties, primarily Los Angeles (72 percent). Only a few anglers traveled to Quail Lake from counties outside of the greater Los Angeles area (Figure 5). Anglers were asked to rate their level of satisfaction for overall fishing experience on a scale of 1 to 5. Eighty-three of the 85 parties interviewed answered this question and the average satisfaction was 3.1, meaning more anglers were satisfied with their angling experience than were dissatisfied.



**Figure 5. Angler Parties' Home Location**

During all sampling efforts, there were no incidental observations of aquatic invasive or special-status species.

**Associated Data Files** (All associated data can be found in the folder with this summary form. Note:  
Confidential CEII/privileged information will not be posted publicly):

<b>File Name</b>	<b>Data Description</b>	<b>File Type</b>	<b>File Location</b>
Quail Lake Electrofishing Database	Database containing all raw data collected during boat electrofishing	XLSX	Project Website
Quail Lake Electrofishing Data Sheet	Blank boat electrofishing data sheet	PDF	Project Website
Creel Survey Database	Database containing all raw data collected during creel surveys	XLSX	Project Website
Creel Survey Data Sheet	Blank creel survey data sheet	PDF	Project Website
Map of Quail Lake Electrofishing Habitat Units	Map of habitat units sampled by boat electrofishing	JPEG	Project Website



**Variations from Study Methods, Schedule, or Approach and Abnormalities in Expected Field Conditions:**

Two variances from the FERC-approved Study Plan occurred. The Study Plan states that boat electrofishing would occur in October 2017, and the study would be completed by August 2018. However, the Licensees did not receive the necessary scientific collecting permit from CDFW for this work until March 2018. The Licensees completed the boat electrofishing on October 9, 2018, and the overall study was completed in early November 2018 consistent with FERC's Study Plan Determination issued on September 7, 2018. While this variance is a modification to the June 14, 2017 FERC-approved Study Plan, it did not affect the overall study because the data were collected in the same months specified in the Study Plan and will be included in the Licensees' Updated Study Report and Draft License Application.

The second variance from the FERC-approved Study Plan, was that creel surveyors only asked one out of the three questions regarding angler satisfaction. The two questions not asked during surveys were regarding: 1) angler satisfaction of number of fish caught, and 2) size of fish caught. The two questions not asked during the surveys are generally used for management decisions related to fish stocking. Quail Lake is not stocked with any fish so these questions would not aid in any management decisions regarding angling opportunities. While this is a variance to the Study Plan, it did not affect the outcome or objectives of the Study.

**Remaining Work:**

None; the Study is complete.