State of California
California State Department of Fish and Wildlife
North Central Region

Folsom Lake, El Dorado, Placer and Sacramento Counties

2014 Creel Survey

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Introduction

Folsom Lake is a reservoir located just east of Sacramento between Interstate 80 and U.S. Route 50 in El Dorado, Placer and Sacramento counties. The reservoir's maximum capacity is 977,000 acre feet (AF) and it has 75 miles of shoreline when full (DWR, 2015). From the dam, the main body is formed and then one arm extends about 15 miles up the north fork, and a second arm extends about 10 1/2 miles up the south fork of the American River (California, 2015). Folsom Lake State Recreation Area (SRA) is managed by both US Bureau of Reclamation and California Department of Parks and Recreation. The SRA offers a wide variety of recreational activities including biking, hiking, camping, and horseback riding as well as a number of water sports including fishing.

Folsom Lake fishery is managed by California Department of Fish and Wildlife (CDFW) with Eagle Lake and Shasta strain rainbow trout (*Oncorhynchus mykiss aquilarum*, RT) stocked annually by American River Hatchery. Inland Chinook salmon (*Oncorhynchus tshawytscha,* CHIN) have been historically planted when available and Folsom Lake contains a small self-sustaining population. CDFW has stocked kokanee salmon (*Oncorhynchus nerkus,* KOK) in the past; however the program was discontinued due to low angler returns.

Black bass are the most commonly targeted warm water species which include largemouth bass (*Micropterus salmoides salmoides,* LMB), smallmouth bass (*Micropterus dolomieu,* SMB) and spotted bass (*Micropterus punctulatus,* SPB). Additional warm water species are black crappie (*Promoxis nigromaculatus,* BCR), common carp (*Cyprinus carpio,* CP), channel catfish (*Ictalurus punctatus,* CCF), Sacramento pikeminnow (*Ptychocheilus grandis,* SPK) and Sacramento sucker (*Catostomus occidental,* SKR).

During the 2014 creel census (February-September) Department of Water Resources (DWR) reported Folsom Lake water levels were between 30-36% of the reservoir's total capacity. The historical average ranges from 56-62% from February-September (Figure 1) (DWR, 2015).

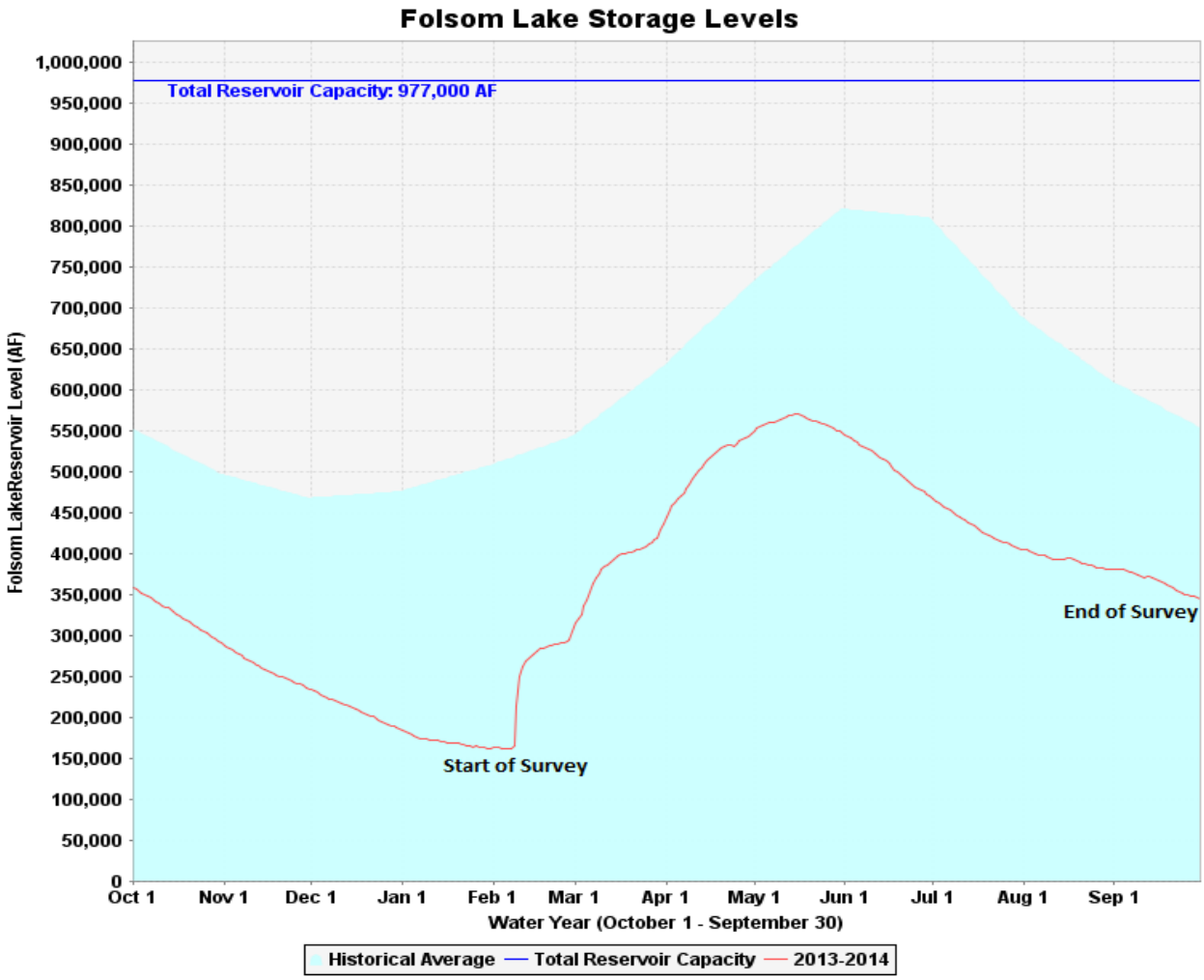

Figure 1. Folsom Lake storage from October 2013 through September 2014 (DWR 2015)

This creel survey was conducted to estimate:

1. Angler effort, catch per hour, and catch per angler
2. Species composition of fish caught
3. Size classes of fish caught
4. Angler satisfaction

Methods

In 2014, a creel survey was conducted on Folsom Lake utilizing a stratified random sampling design. The sampling period was first stratified into high and low use-weekend/weekday, then stratified again by AM/PM (Malvestuto, 1996). The 2014 creel survey was conducted by CDFW staff on 26 days (8 weekends, 18 weekdays) randomly selected from February through September. Although every attempt was made to stick to the randomly generated schedule, equipment failure and available staffing caused some variation from the random design.

The creel survey utilized a roving sampling design where CDFW staff used a boat to access anglers in an attempt to provide a more complete assessment of all angler types on any given day. Prior to the survey, the lake was categorized into three sections: 1 = Main Body, 2 = South Fork, 3 = North Fork (Figure 2). The order of how the survey was conducted in these three sections was randomly determined. Due to boat malfunctions and staff availability 15 surveys (57.7%) were conducted using a boat and 11 (42.3%) were point surveys conducted at one of two randomly selected boat ramps.

Anglers were asked a standard series of survey questions regarding their angling experience, catch rate, size of fish, and species targeted and caught. Angler effort was determined by the amount of time spent actively fishing (total hours fished) and catch per unit of effort (CPUE) was calculated. Gear type (bait, lure, or both) and technique (boat or shore) were used with CPUE to determine the most effective form of fishing.

For fish kept, total length (TL) in millimeters (mm) was measured and species was recorded. In some cases such as with boat contacts, physical measurements were not possible so a visual estimate was taken by CDFW staff to eliminate the risk of losing an anglers fish when transferring fish from boat to boat. For fish released by anglers, the species and total number caught were reported; no size ranges were collected.

Each angler was asked between one and three standard “yes or no” questions to determine angling satisfaction. Every angler interviewed was asked the question: “Were you satisfied with your angling experience today?” If an angler reported catching one or more fish, they were asked two follow-up questions: “Were you satisfied with the number of fish caught?” and “Were you satisfied with the size of fish caught?” Zip codes were also collected at the end of the survey to determine angler origin.

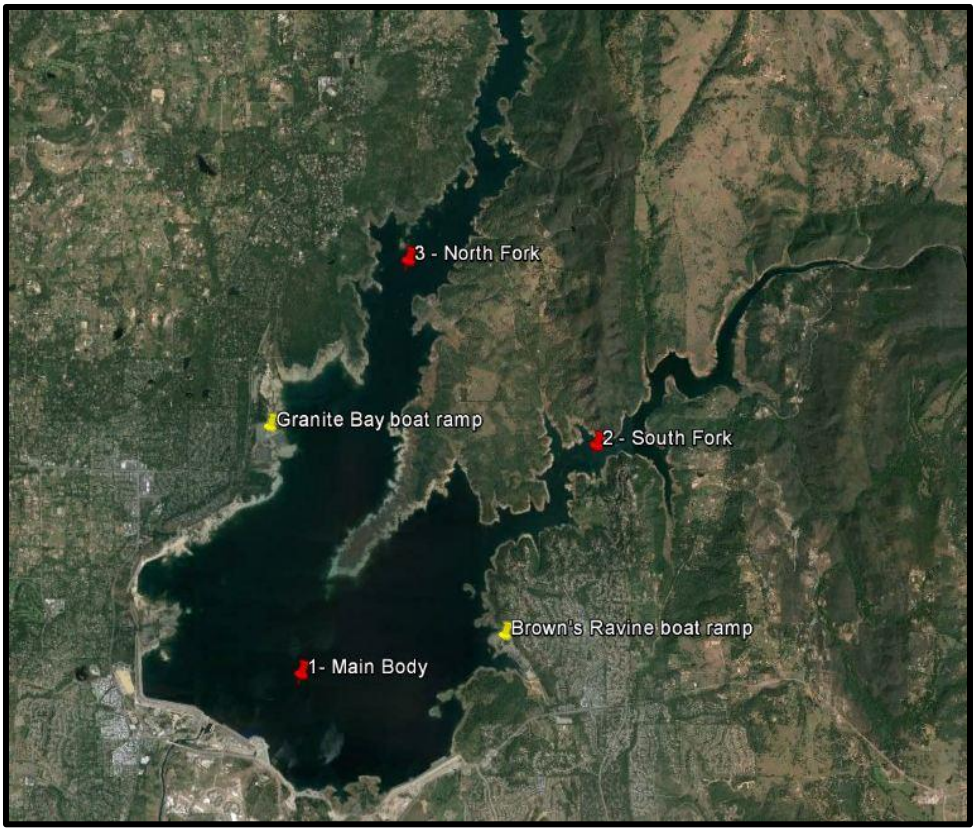

Figure 2. Map of Folsom Lake showing the two boat ramps (yellow) utilized during point surveys and the three categorized sections (red) of the lake randomly selected for roving surveys (Google Earth, 2015)

Results

In total, 549 anglers were surveyed with a total of 2110.95 hours of fishing logged. A total of 1098 fish were caught for a CPUE of 0.52 fish per hour (Table 1) and an average of 2 fish per angler. A breakdown of fishing technique and gear used shows the two predominate categories of anglers were boat anglers using lures and shore anglers using bait. The majority (307, 55.9%) of anglers interviewed fished from a boat using lures which resulted in a CPUE of 0.67 (Table 2). Shore fishing with bait was used by 125 (22.8%) anglers with a CPUE of 0.23.

Table 1. General catch statistics of the Folsom Lake angler survey, 2014

Number Anglers	549
Total Fish	1095
Number of Fish per Angler	2.00
Total Hours	2110.95
Average CPUE	0.52

Table 2. Breakdown of gear and fishing technique used with associated catch statistics of the Folsom Lake angler survey, 2014

Technique	Gear	# of Anglers	Hours fished	# of Fish Caught	CPUE
Shore	Bait	125	367.75	82	0.23
	Bait/Lure	15	49.75	13	0.26
	Lure	42	136.25	43	0.32
Boat	Bait	30	135.5	39	0.29
	Bait/Lure	28	110.55	40	0.36
	Lure	307	1305.15	875	0.67
	Unknown	2	6	3	------

Of the 549 anglers, 392 (71.4%) were targeting black bass with an effort of 1492.45 (70.7%) hours fished. A general summary of the targeted fish species, hours fished and number of anglers is provided in Table 3. Fish disposition of each species caught is summarized in Table 4, showing the number of kept and released. Of the 1095 fish caught, 601 (54.9%) were SPB and 512 (46.8%) were released. Of all species caught, black bass were the most common with a total of 954 (87.1%); this includes the black bass that were not identified to species (Table 4).

Table 3. Breakdown of angling effort for each targeted fish species

Target Species	Hours fished	# of Anglers
Black bass	1492.45	392
Trout	297	80
Any	189	43
Chinook	92	17
Carp	19	10
Catfish	12.5	6
Unknown	9	1

Table 4. Fish disposition of each species caught in the Folsom Lake

Species Caught	Kept	Released	Total
Spotted bass	89	512	601
Smallmouth bass	32	136	168
Largemouth bass	28	66	94
Black bass (spec. unknown)	8	83	91
Rainbow trout	61	25	86
Chinook salmon	22	0	22
Common carp	12	3	15
Channel catfish	3	10	13
Unknown	1	3	4
Black crappie	0	1	1
	256	839	1095

Anglers were asked yes or no questions to determine their satisfaction with the fishery. If they did not respond (DNR) was recorded. When asked their satisfaction with their overall fishing experience, 78.75% of anglers were satisfied (Table 5). Much lower satisfaction was found with numbers of fish caught (50.72%) and the size of the fish caught (66.57%). It should be noted 43.3% of anglers surveyed did not respond to the number and size satisfaction questions, because they had not caught fish.

Table 5. Angler satisfaction with Folsom Lake fishery during 2014 angler survey

Question	Yes	No	DNR	Percent Satisfied
Satisfaction with Overall Fishing Experience	415	112	22	78.75%
Satisfaction with Number of Fish Caught	212	206	138	50.72%
Satisfaction with Fish Size	235	118	196	66.57%

From the total lengths (TL) taken on fish kept, total length-frequency histograms were developed for CHIN, RT, SPB, LMB, and SMB (Figures 3-7). Of the 22 kept CHIN, the average TL was 480.2 mm (Figure 3). The average TL was 368.2 mm of the 58 kept RT (Figure 4). There were 31 LMB measured with an average TL of 353.4 mm (Figure 5), 79 SPB measured with an average TL of 353.5 mm (Figure 6), and 11 measured SMB with an average TL of 308.1 mm (Figure 7).

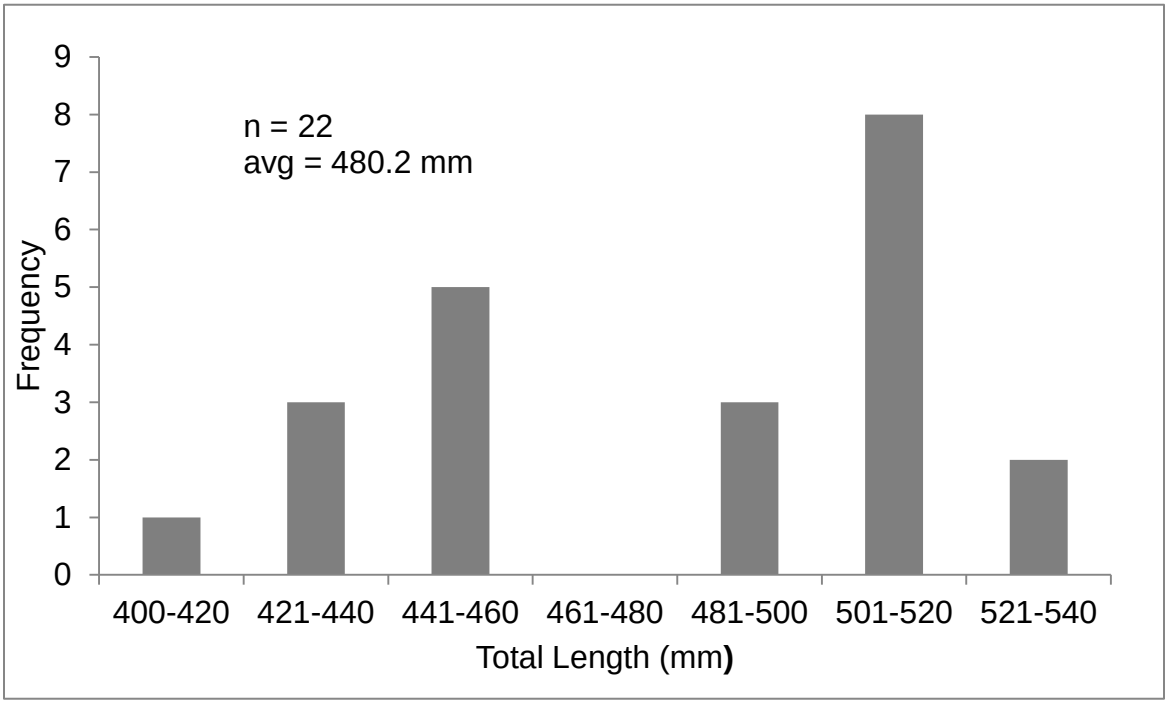

Figure 3. Total length-frequency histogram for Chinook salmon kept during the Folsom Lake angler survey, 2014

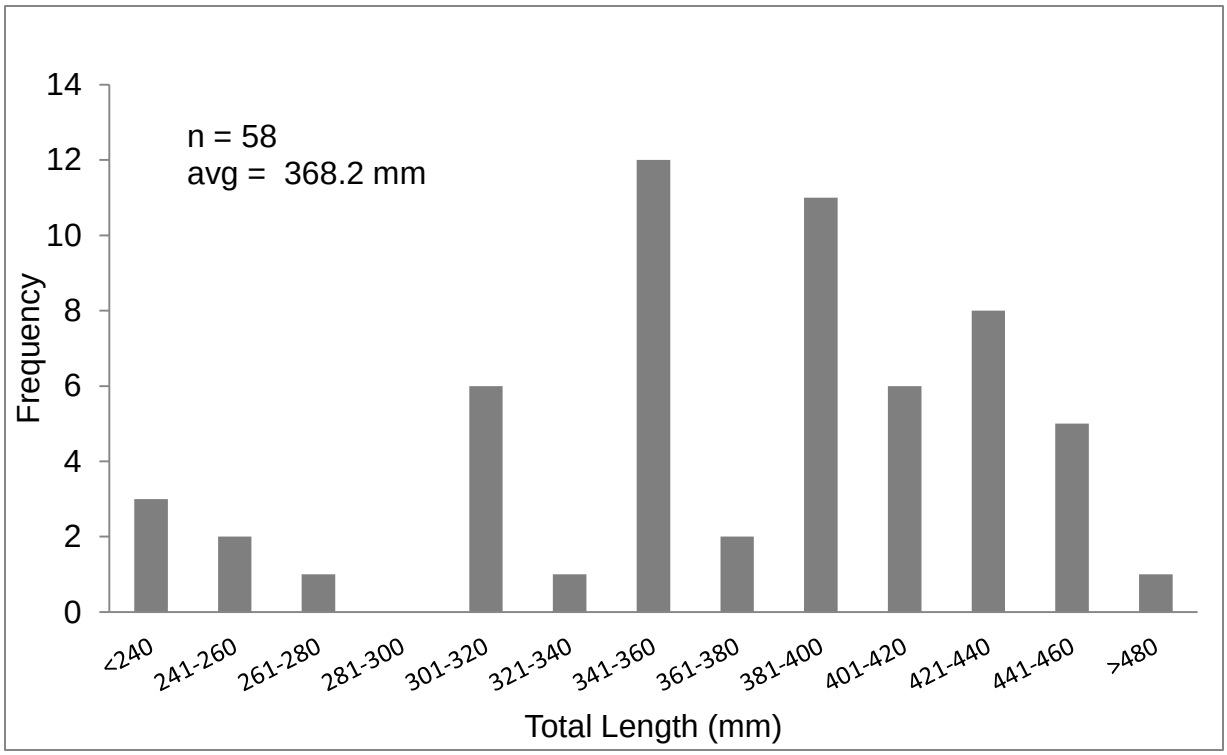

Figure 4. Total length- frequency histogram of kept rainbow trout during the Folsom Lake angler survey, 2014

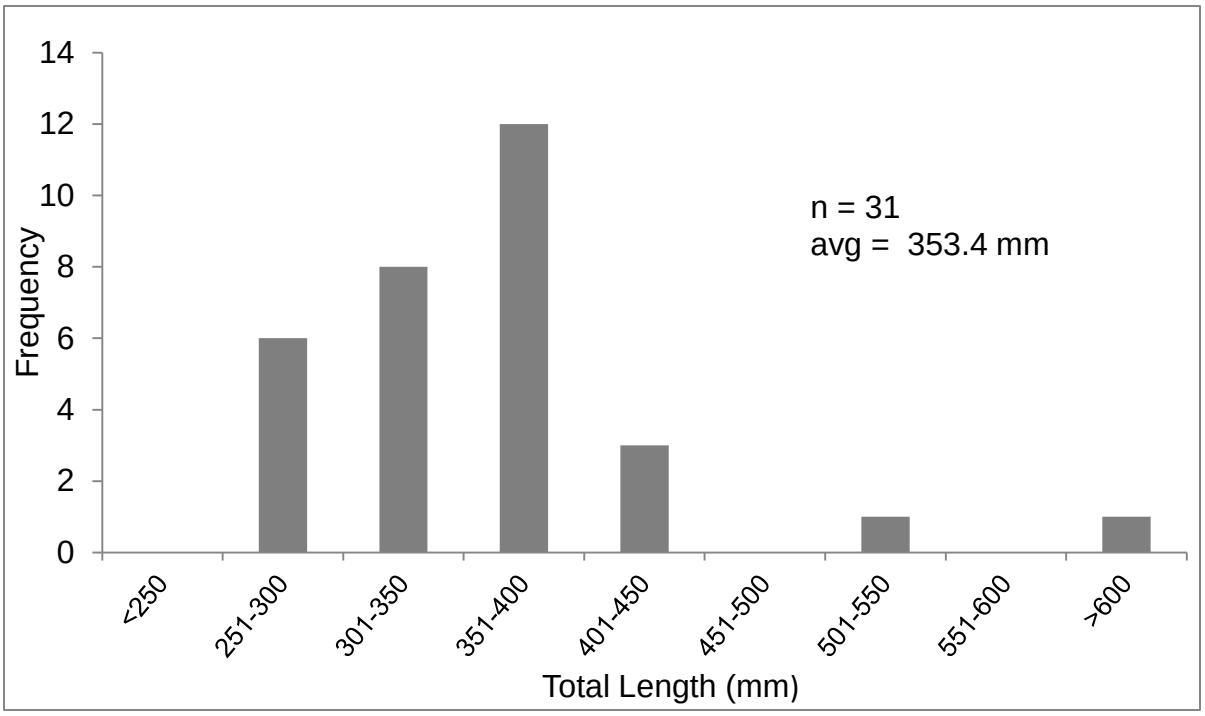

Figure 5. Total length-frequency histogram of kept Largemouth bass during the Folsom Lake angler survey, 2014

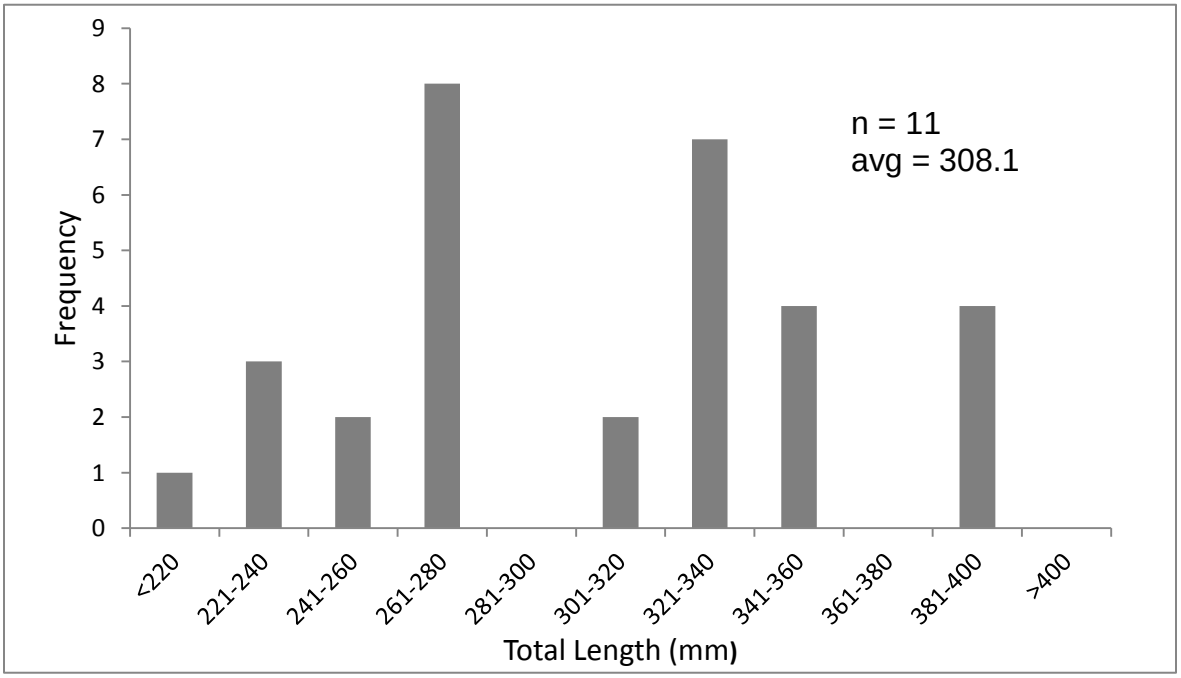

Figure 6. Total length-frequency histogram of kept Spotted bass during the Folsom Lake angler survey, 2014

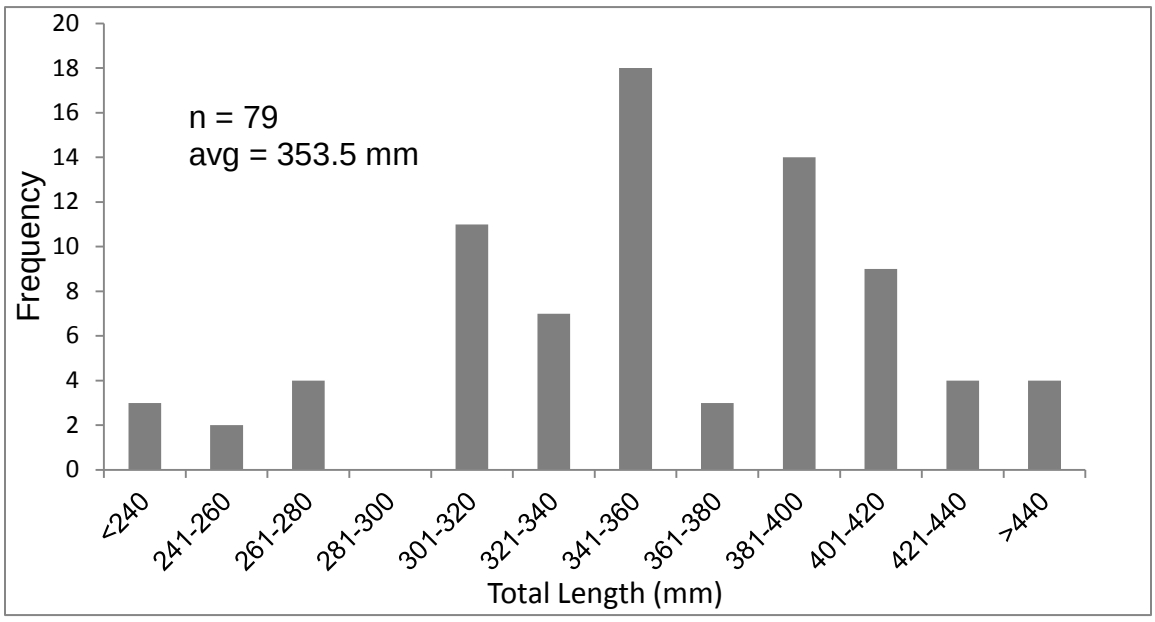

Figure 7. Total length-frequency histogram of kept Smallmouth bass during the Folsom Lake angler survey, 2014

Discussion and Conclusion

Folsom Lake had an overall average CPUE of 0.52 fish per hour during the 26 survey days from February through September. A CPUE of 0.50 fish per hour or greater is considered an acceptable number if fish size is considered satisfactory (Hanson 2013). The anglers were positive regarding their angling experience; however they were barely satisfied with numbers and sizes of fish landed.

The majority of anglers on Folsom Lake were targeting black bass from boats, using lures. The numbers show they were more successful which may be a result of multiple variables. The low water levels and high water temperatures may have created less than ideal fishing for salmonids which could have deterred anglers and potentially decreased the numbers of fish caught.

When comparing the two survey types used, point versus roving, there were pros and cons to both. Point creels allowed for the survey information (hours fished and number of fish caught) to be complete since the anglers were done with their day of fishing

when the survey was conducted. However, it did not capture a complete view of the total angling pressure of that day because it did not allow interaction with shore anglers around the lake as well as anglers launching out of other facilities. The roving creel allowed for the surveyor to capture a complete assessment of how many anglers were on the lake and is likely the best way to get full representation of all angler types on a large waterbody with many shore access points such as Folsom Lake.

References

CA Department of Parks and Recreation (2015). Retrieved December 17, 2015 from: http://www.parks.ca.gov/?page_id=500

Department of Water Resources. (2015). Retrieved December 18, 2015, from Department of Water Resources California Data Exchange Center: http://cdec.water.ca.gov/cdecapp/resapp/resDetailOrig.action?resid=FOL

Hanson, John C. 2013. [Personal communication]. January 14. Rancho Cordova, CA; California Department of Fish and Wildlife, North Central Region, Wild Trout Program.

Malvestuto, S. P. (1996). *Sampling the Recreational Fishery* (Fisheries Techniques, Second Edition. ed.). (M. a. Wills, Ed.)