

Alameda Creek Flood Control Channel
Predator Fish Surveys
2008



Leigh K. Ochikubo Chan
Peter J. Alexander

Fisheries Dept.
East Bay Regional Park District
2950 Peralta Oaks Court
Oakland, CA 94605

February 3, 2009

East Bay Regional Park District (EBRPD) conducted several predator surveys within Alameda County Water District's Rubber Dam backwater pools in 2008. The surveys were conducted as part of the Alameda Creek Study Plan Elements (Element #4: Biological and Physical Evaluation of ACWD Rubber Dam Backwater Pools) described in the Alameda Creek Population Recovery Strategies and Instream Flow Assessment for Steelhead Trout, Final Study Plan prepared by McBain and Trush, Inc. (2007). The surveys conducted specifically addressed Study Plan element 5.4.1.2 Task No. 2. Evaluate predator populations in the backwater pools. In an effort to evaluate which predators currently exist in the backwater pools, as well as enumerate and assess size distribution, EBRPD biologists conducted several boat electrofishing surveys for predator fish (one in May and three in August 2008). Predator fishes encountered included largemouth bass and Sacramento pikeminnow. These two species have been well documented in the literature to be predatory on salmon/steelhead smolts (Tabor et al 2004)(Harvey & Nakamoto 1999). PIT (passive integrated transponder) tags were supplied by Hanson Environmental, Inc. for use in the mark/recapture of predatory fishes in this study.

EBRPD participated in the survey and cleanup of the fish kill that took place due to oxygen depletion in the channel in early October. Hundreds of dead fish were observed and 95 large, (> 150 mm. FL), fish were removed from the channel. Large fish were individually identified to species and scanned for PIT tags.

In addition to the predator study within the Alameda Creek Flood Control Channel impoundments, EBRPD staff also conducted a survey for potential predators at the mouth of the Alameda Creek Flood Control Channel in September using an otter trawl. Results from all three surveys are discussed below.

BOAT ELECTROFISHING

Study Area

The study area included the pools within the Alameda Creek Flood Control Channel. For the surveys conducted on May 13 and August 12, the pools above Rubber Dam 3 (RD3) and Rubber Dam 1 (RD1) were sampled. On the surveys conducted on August 21 and 28, only the pool above RD3 was sampled.

Methods

An 18-foot Smith Root model SR16 electrofishing boat was used for all surveys. The boat electrofishing settings were 504 V. DC; 60 pps; 7 – 8 amps. Surveyors included 3-5 people including the boat driver. Two crewmembers stood at the bow to net fish. All fish encountered were targeted for capture, but adult piscivorous fish were the focus. Fish were caught using 8-foot long fiberglass poles with 17-inch by 17-inch nets attached. Effort was measured using shock seconds, i.e., the number of seconds when electric current was actually applied to the water (Chase et al. 2000). Any adult predatory fishes larger than about 200 mm were tagged using PIT tags to evaluate predator populations within the Alameda Creek Flood Control Channel impoundments. Sampling took place on four different dates. The first survey occurred in May during the day, as did the second survey on August 12. The May survey sampling strategy consisted of sampling the entire shoreline in both the upper pool (above RD3) and the

lower pool (above RD1). The August 12 survey also surveyed both above RD3 and above RD1, but sampling within these areas followed a protocol similar to that utilized by Sonoma County Water Agency (Chase et al. 2000). Under the suggestion of Josh Fuller (NMFS), we split the upper section into 6 sampling stations. Starting at the downstream end of the area, we sampled approximately 200-foot increments of the right bank, mid-channel, or left bank within that pool. We also surveyed the lower section (above RD1) in a similar manner. Due to the lack of fish encountered, the last two surveys took place at night on August 21 and 28. Only the area above RD3 was sampled. Both of these surveys utilized the same sampling strategy as those used on August 12.

Results

The first survey occurred on May 13, 2008 during the day. Fish species captured included Sacramento sucker, Sacramento pikeminnow, common carp, largemouth bass and white catfish. A total of 12 fish were captured in the upper section (above RD3) and a total of 7 were captured in the lower section (above RD1). See Table 1. In terms of abundance, Sacramento sucker were the primary species captured, followed by common carp. One specimen each of largemouth bass, Sacramento pikeminnow, and white catfish were also captured during the May 13 survey. Additional carp and prickly sculpin were observed but not captured during the survey. See Figure 1. Due to scarcity of fish encountered, a summer survey was planned.

The summer survey occurred on August 12, also during daylight hours. During this survey, both pools above RD3 and RD1 were sampled. Forty fish were captured in the upper pool (above RD3). These consisted of hitch, Sacramento pikeminnow, common carp, Sacramento sucker, prickly sculpin, bluegill, green sunfish, and largemouth bass. One lamprey (likely Pacific) ammocoete was observed but not captured. One white catfish was captured in the area above RD1 (See Tables 2 and 3, Figure 2). Other fish encountered but not caught included carp, Sacramento suckers, and one juvenile goldfish.

Due to the low number of fish captured during the day surveys, EBRPD biologists conducted two more surveys in August (21, 28) during the evening hours, when fish were expected to be more susceptible to boat electrofishing methods. On both surveys, only the pool above RD3 was sampled. On August 21, a survey of the upper pool (above RD3) took place from 20:30 to 23:00 hours. During this survey, a total of 125 fish were captured (See Table 4, Figure 2). These included hitch, Sacramento pikeminnow, common carp, Sacramento sucker, prickly sculpin, green sunfish, largemouth bass, and bigscale logperch. Thirteen Sacramento pikeminnow and one largemouth bass were tagged during the survey. Sacramento suckers made up 38% (48 captured) of all fish caught. A total of 29 Sacramento pikeminnow were captured (11 more were observed) which made up 23% of the fish caught. Five largemouth bass (5 more were observed) made up 4% of the fish caught.

On August 28, a follow up survey was conducted to recapture tagged fish caught on August 21. This survey took place between 20:26 and 22:30 hours. A total of 24 fish were captured consisting of Sacramento pikeminnow, Sacramento sucker, one hitch, and one largemouth bass (See Table 5, Figure 2). There were no recaptures among the fish caught.

Of potential predator fishes captured (Sacramento pikeminnow and Largemouth bass), several fish observed were over 200 mm. This is the size at which these species may become predatory on salmonid smolts (Poe et al. 1991)). Sacramento pikeminnow ranged in size from 52 mm to 358 mm forklength. Largemouth bass ranged in size from 65 mm to 355 mm forklength (See Figures 3 and 4).

Discussion

Given the results of our surveys in the Alameda Creek Flood Control Channel impoundments this year, it appears that conducting summer surveys at night is the most effective. However, the second recapture survey on August 28 had far fewer fish observed or caught compared to the survey conducted on August 21. Surface water temperatures ranged from 24.4 °C to 22.9 °C moving downstream to upstream on August 21. On August 28, surface water temperature was measured once at the start of the survey and was 24.6 °C. However, air temperatures were very different between the two nights. On August 21, the air temperature was 19.2 °C (66.5 °F) while on August 28, the air temperature was 29.4 °C (85 °F). The majority of the Sacramento pikeminnow observed and captured on August 21 were found on the far eastern part of the ponded area where Alameda Creek flowed into the ponded area. The lack of fish caught on August 28 compared to August 21 might have been due to slightly higher temperatures. It may be that fish were not present within the range of the boat electrofishing unit. Although there was a change in one member of the survey team, the staff present were well versed in catching fish; there were simply fewer fish present that night. Due to the lack of recaptures, we were unable to accurately estimate predator fish population size. The surveys point to a number of Sacramento pikeminnow present that could potentially prey on out migrating steelhead smolts. This is based on the larger size classes of Sacramento pikeminnow and largemouth bass that were caught. These predators appear to be in greatest concentration at night at the transition of the creek to pool where downstream migrant smolts may be most vulnerable to predation (Harvey & Nakamoto 1999). Conducting future multiple sets of night surveys between late spring and early fall may also help to increase our capture rates and better assess predator populations.

FISH KILL

On October 6, 2008, thousands of fish were reported dead in the Alameda Creek Flood Control Channel between the Mission Boulevard bridge and Alameda County Water District's Rubber Dam 3. Preliminary surveys indicated the fish died as a result of oxygen depletion.

On October 8, 2008, East Bay Regional Park District staff Pete Alexander and Matt Harray conducted a survey to identify, enumerate, and collect remains from the fish kill.

Most of the large fish collected were found floating in the downstream, (deepest), section of the impoundment. A total of 95 fish were collected, although thousands of 50-70 mm prickly sculpin and unidentified small fish, (< 120 mm TL), were observed in the shallows. The fish collected included 81 adult Sacramento suckers, 2 juvenile Sacramento suckers, 2 adult Channel catfish, 7 adult Sacramento pikeminnow, 8 juvenile Sacramento pikeminnow, and 2 adult Common carp. These larger dead fish were removed from the channel and disposed of. The 7 adult S. pikeminnow were scanned for PIT tags. No PIT tags were detected.

Approximately 5000 fish were estimated to have died due to the drop in oxygen in the creek that weekend.

OTTER TRAWL

Study Area

The study area included the mouth of the Alameda Creek Flood Control Channel and slightly upstream.

Methods

A 22' Almar with a jet drive was used to conduct the trawls. The otter trawl net measured 14.5 feet across and 1 foot high. The mesh opening of the trawl did not exceed 1.5 inches. Two trawls were conducted. The first trawl occurred with the trawl being pulled at approximately 0.5 feet/second for 3 minutes. The second trawl was pulled at a velocity of 5 feet/second for a total of 15 minutes. A total of 4 personnel (one boat driver and three people attending the net) were used to conduct the survey.

Results

Two trawls were conducted on September 18, 2008 with EBRPD staff. Three types of organisms were caught in the first trawl. They included 13 unidentified invertebrates, 2 shrimp, and 2 top smelt. The second trawl collected top smelt, bay shrimp, staghorn sculpin, northern anchovy, starry flounder, and unidentified shrimp and invertebrates, and sculpin. No species that might potentially prey on steelhead smolts were caught.

Discussion

Otter trawl surveys may not be suited to capturing predatory fish at the mouth of Alameda Creek due to the net avoidance ability of many predatory fish species and the relatively slow nature of the trawling method. The trawls were initially intended to be conducted in the spring (May) or summer (August) in efforts to assess if any predatory fishes might be present at the mouth of the creek (e.g., striped bass). However, due to equipment failures, the trawls were conducted in mid-September which may not be appropriate based on projected smolt outmigration. In the future, if this survey technique is utilized again, we recommend conducting these surveys during the time period when smolts are likely to be emigrating from the system. At that time, a better assessment of what predators exist, their size, and numbers may result.

Acknowledgments

These surveys were conducted by East Bay Regional Park District staff and outside agency staff. We would like to thank Matt Harray and Wendy Hayes from East Bay Regional Park District for their assistance in the field. We also would like to acknowledge Kristie Karkanen (Hanson Environmental), Thomas Niesar (Alameda County Water District), Joshua Fuller (National Marine Fisheries Service), Wes Stokes (California Department of Fish and Game) and Alameda Creek Alliance volunteer Gary Sargent for their contributions to these surveys.

Literature Cited

Chase, S., R. Benkert, D. Manning, and S. White. 2000. Sonoma County Water Agency's Mirabel Rubber Dam/Wohler Pool Fish Sampling Protocol. Sonoma County Water Agency, Sonoma, CA 95406.

Harvey BC, Nakamoto RJ 1999. Diel and seasonal movements by adult Sacramento pikeminnow (*Psychocheilus grandis*) in the Eel River, northwestern California. *Ecology of Freshwater Fish* 1999 8: 209 - 215

McBain and Trush, Inc. 2007. Alameda Creek Population Recovery Strategies and Instream Flow Assessment for Steelhead Trout, Final Study Plan. Prepared for Alameda Creek Fisheries Restoration Workgroup. December 2007.

Poe, Thomas P., H. C. Hansel, S. Vigg, D. E. Palmer, and L. A. Predergast. 1991. Feeding of Predaceous Fishes on Out-Migrating Juvenile Salmonids in John Day Reservoir, Columbia River. *Transactions of the American Fisheries Society* 120 (4): 405-420.

Tabor Roger A., Mark T. Celedonia, Francine Megia, Rich M. Piaskowski, David L. Low. 2004. Predation of Juvenile Chinook Salmon by Predatory Fishes in Three Areas of the Lake Washington Basin. USF&W Service, Western Washington Fish and Wildlife Office, Lacey, Washington 98513

Species	Upper (Above RD3)	Lower (Above RD1)	TOTAL
Common carp	5	2	7
Largemouth bass	1	0	1
Sacramento pikeminnow	1	0	1
Sacramento sucker	5	4	9
White catfish	0	1	1
TOTALS	12	7	19

Table 1. Total number of fish captured in the Alameda Creek Flood Control Channel during boat electrofishing on May 13, 2008.

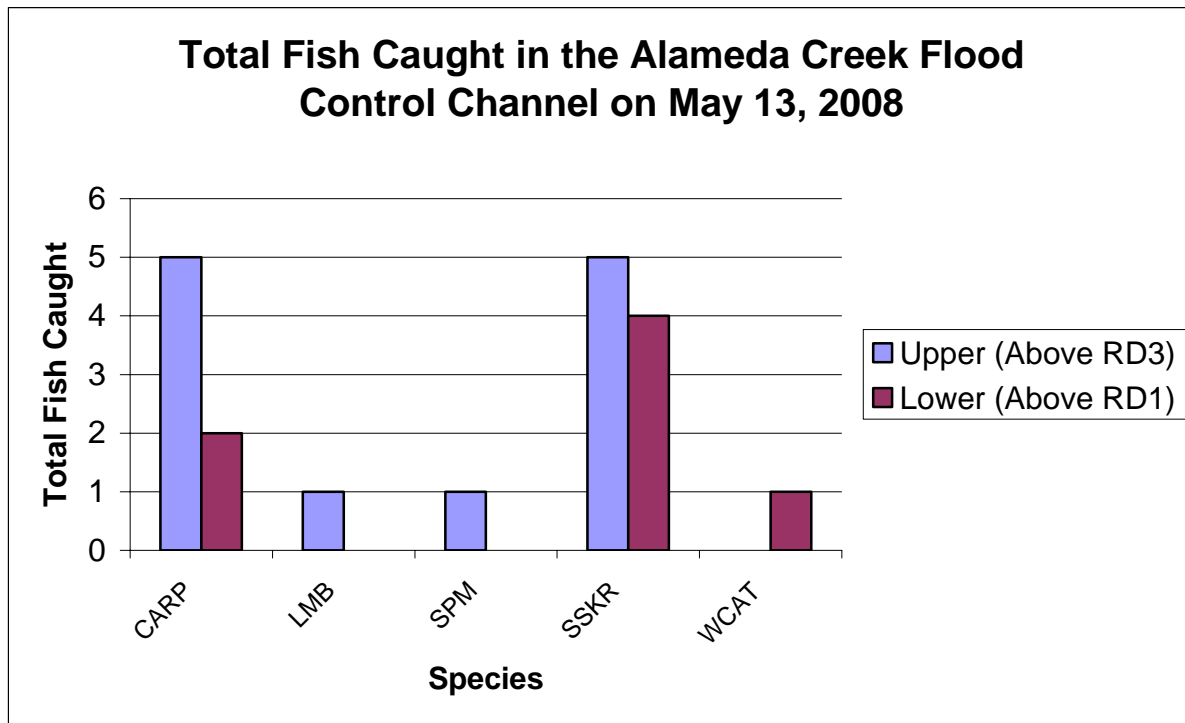


Figure 1. Total fish caught during day boat electrofishing surveys in the Alameda Creek Flood Control Channel above Rubber Dam 3 (RD3) and Rubber Dam 1 (RD1) on May 13, 2008.

Species	Upper (Above RD3)	Lower (Above RD1)	TOTAL
Common carp	2	0	2
Bluegill	1	0	1
Green sunfish	3	0	3
Hitch	2	0	2
Largemouth bass	3	0	3
Prickly sculpin	8	0	8
Sacramento pikeminnow	9	0	9
Sacramento sucker	12	0	12
White catfish	0	1	1
TOTALS	40	1	41

Table 2. Total number of fish captured in the Alameda Creek Flood Control Channel during boat electrofishing on August 12, 2008.

Species	Site 1	Site 2	Site 3	Site 4	Site 5	Site 6	TOTAL
Common carp	0	0	0	0	2	0	2
Bluegill	0	0	1	0	0	0	1
Green sunfish	2	0	1	0	0	0	3
Hitch	0	0	2	0	0	0	2
Largemouth bass	0	0	1	0	0	2	3
Prickly sculpin	5	0	0	3	0	0	8
Sacramento pikeminnow	0	0	7	1	0	1	9
Sacramento sucker	2	0	0	5	5	0	12
White catfish	0	0	0	0	0	0	0
TOTALS	9	0	12	9	7	3	40

- Site 1 = Left (south) bank
- Site 2 = Mid-channel continuing from end of Site 1
- Site 3 = Right (north) bank
- Site 4 = Left (south) bank above Cyn. Heights bridge
- Site 5 = Right (north) bank from top of Cyn. Heights bridge
- Site 6 = Mid-channel downstream of Cyn. Heights bridge

Table 3. Total number of fish captured by site in the Alameda Creek Flood Control Channel during boat electrofishing above RD3 on August 12, 2008.

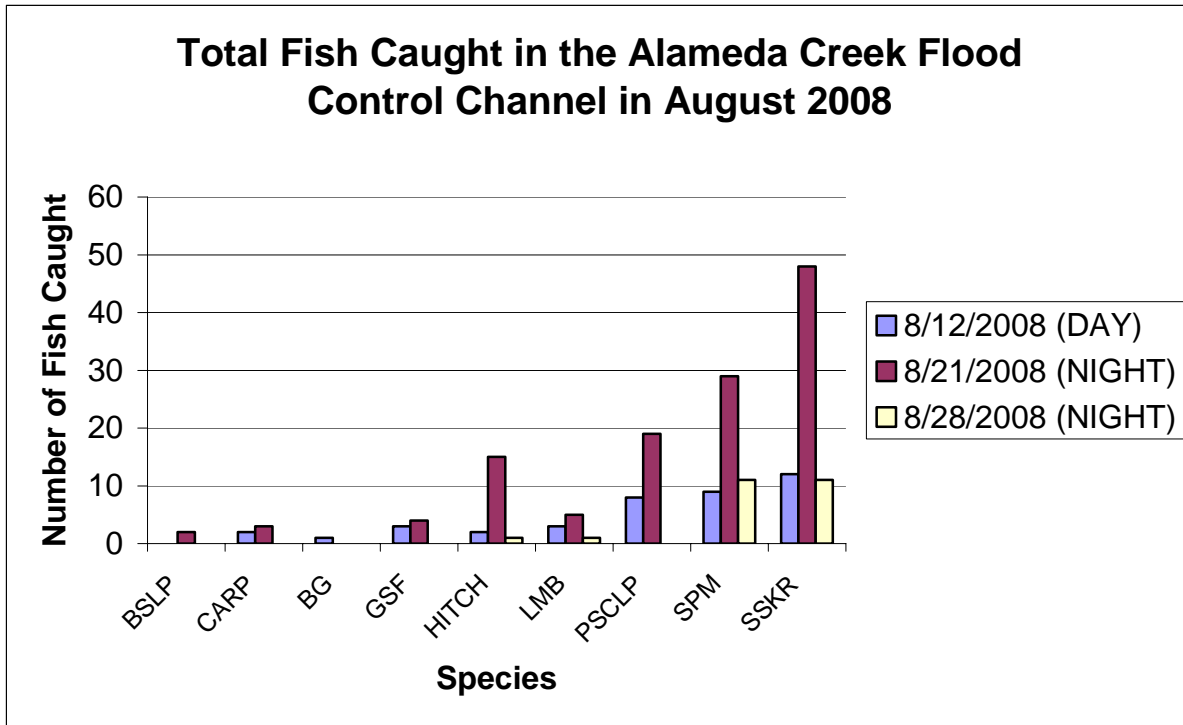


Figure 2. Total fish caught during boat electrofishing surveys in the Alameda Creek Flood Control Channel above Rubber Dam 3 (RD3) in August 2008.

Species	Site 1	Site 2	Site 3	Site 4	Site 5	Site 6	TOTAL
Bigscale logperch	1	0	0	0	1	0	2
Common carp	1	0	0	0	2	0	3
Bluegill	0	0	0	0	0	0	0
Green sunfish	2	0	0	0	2	0	4
Hitch	0	0	0	1	3	11	15
Largemouth bass	3	0	1	0	1	0	5
Prickly sculpin	7	0	0	0	6	6	19
Sacramento pikeminnow	6	1	5	8	6	3	29
Sacramento sucker	2	1	5	17	14	9	48
TOTALS	22	2	11	26	35	29	125

- Site 1 = Left (south) bank
- Site 2 = Mid-channel continuing from end of Site 1
- Site 3 = Right (north) bank
- Site 4 = Left (south) bank above Cyn. Heights bridge
- Site 5 = Right (north) bank from top of Cyn. Heights bridge
- Site 6 = Mid-channel downstream of Cyn. Heights bridge

Table 4. Total number of fish captured by site in the Alameda Creek Flood Control Channel during boat electrofishing above RD3 on August 21, 2008.

Species	Site 1	Site 2	Site 3	Site 4	Site 5	Site 6	TOTAL
Bigscale logperch	0	0	0	0	0	0	0
Common carp	0	0	0	0	0	0	0
Bluegill	0	0	0	0	0	0	0
Green sunfish	0	0	0	0	0	0	0
Hitch	0	0	0	0	1	0	1
Largemouth bass	0	0	0	0	1	0	1
Prickly sculpin	0	0	0	0	0	0	0
Sacramento pikeminnow	1	0	0	10	0	0	11
Sacramento sucker	1	0	2	7	1	0	11
TOTALS	2	0	2	17	3	0	24

Site 1 = Left (south) bank

Site 2 = Mid-channel continuing from end of Site 1

Site 3 = Right (north) bank

Site 4 = Left (south) bank above Cyn. Heights bridge

Site 5 = Right (north) bank from top of Cyn. Heights bridge

Site 6 = Mid-channel downstream of Cyn. Heights bridge

Table 5. Total number of fish captured by site in the Alameda Creek Flood Control Channel during boat electrofishing above RD3 on August 28, 2008.

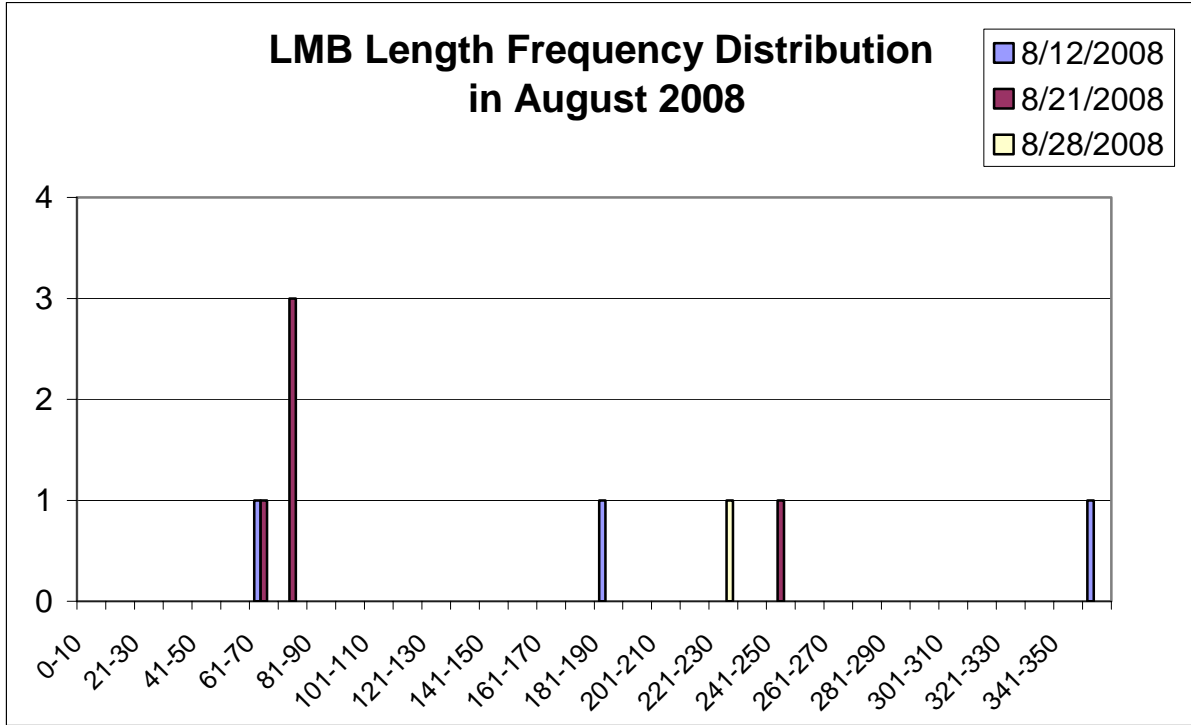


Figure 3. Length frequency of Largemouth bass captured by boat electrofishing in the Alameda Creek Flood Control Channel in August 2008.

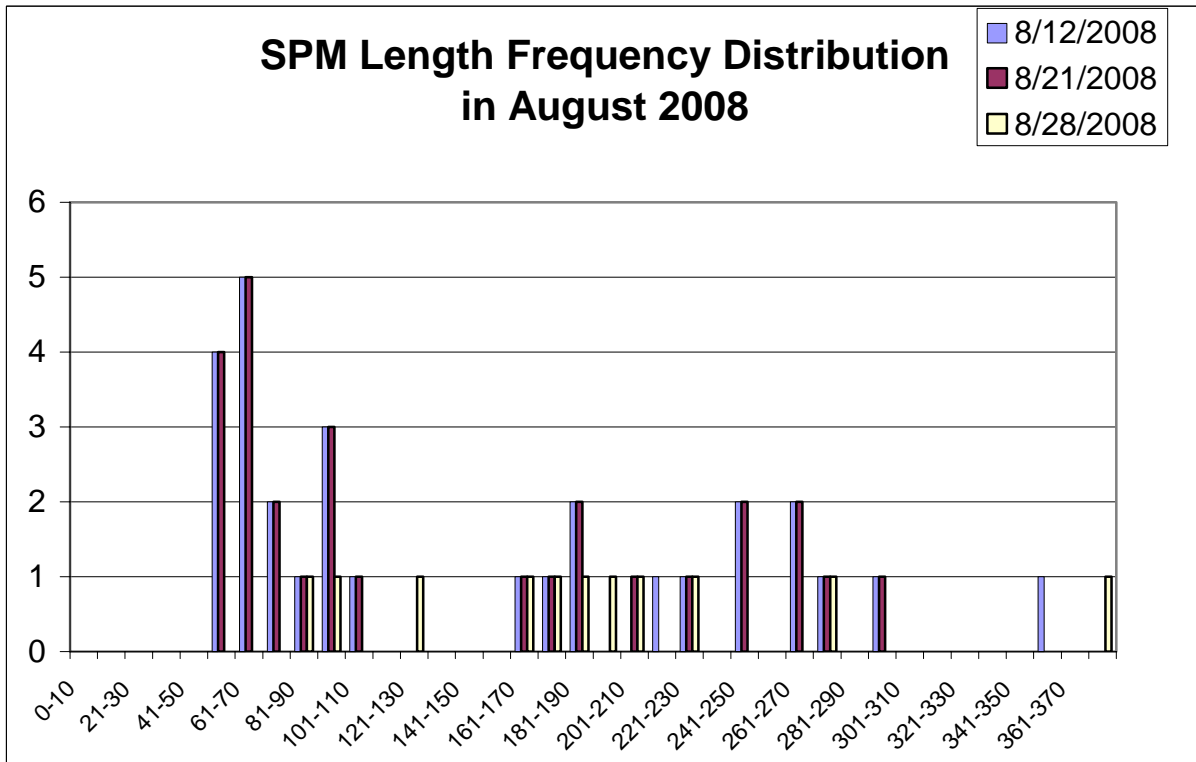


Figure 4. Length frequency of Sacramento pikeminnow captured by boat electrofishing in the Alameda Creek Flood Control Channel in August 2008.

