

California Department of Fish and Wildlife
North Central Region
Sierra District

Summary of the Clear Lake Hitch Survey
on Kelsey and Adobe Creeks
2014

May, 2014



Prepared By:

Ben Ewing
District Fishery Biologist
Alpine, Amador, Calaveras, Lake Counties

Summary

In an effort to evaluate the Clear Lake hitch (*Lavinia exilicauda chi*) (CLH) fishery on Kelsey and Adobe Creeks, a modified Jolly-Seber mark-recapture survey was conducted beginning March 12, 2014 and ending April 29, 2014. For the season, a total of 357 CLH in Adobe Creek and 118 in Kelsey Creek were collected measured, and/or P.I.T. tagged and/or fin clipped using a hoop net for the sampling method. The dry winter and spring combined with the lack of any consistent water flows, especially in Adobe Creek may have contributed to low numbers of CLH collected this season. The data from this survey in conjunction with future efforts will be used to monitor the status of this fishery.

Introduction

The objectives of this survey were to:

- Determine the number of CLH spawning in Kelsey and Adobe creeks
- Determine the average size of CLH spawning in Kelsey and Adobe creeks
- Determine if CLH from prior spawning runs are returning again to spawn in Adobe or Kelsey creeks
- Create baseline indices with which to compare future surveys

In September of 2012, The Center for Biological Diversity submitted a petition to the California Department of Fish and Wildlife (CDFW) to list the CLH as threatened under the California Endangered Species Act (CESA) (Fish and Game Code, 2050). In August, 2014, the California Fish and Game Commission voted to list the CLH as threatened under CESA.

In 2013, CDFW conducted a population estimate of CLH in Cole and Kelsey creeks which are two tributaries to Clear Lake to estimate the abundance and distribution of CLH. This was done at the time to help in the status review process under CESA. This 2014 report hopes to present a more accurate estimate of population size with 95% confidence intervals, for CLH in Kelsey and Adobe creeks. The estimate with accompanying confidence intervals was based on multiple mark and recapture survey efforts.

Kelsey and Adobe creeks are tributaries to Clear Lake which is the largest and oldest lake completely within the California border (Macedo 1988) (Figure 1). These creeks were chosen

due to the fact that they have historically had the largest runs of CLH and/or had a sufficient amount of water during the survey period.



Figure 1. Map of locations on Adobe and Kelsey Creeks CDFW conducted surveys.

CDFW is gathering information on the CLH to allow for informed decisions on future fisheries management at Clear Lake. The report will present mean length, catch per unit effort (CPUE), population estimate, and numbers of CLH seen for the survey period.

Methods and Materials

In estimating the population of CLH in these historic spawning tributaries, we considered the populations to be “open” with the Cormack (1966) version of the Jolly-Seber Method to be used as the statistical analysis. According to Krebs (1999), the following assumptions have to be met for the estimates to be reliable:

- Every individual has the same probability (α_t) of being caught in the t-th sample, regardless whether it is marked or unmarked.
- Every marked individual has the same probability (Φ_t) of surviving from the t-th to the (t+1)th sample.
- Individuals do not lose their marks, and marks are not overlooked at capture.
- Sampling time is negligible in relation to intervals between samples.

A total of five sampling efforts were conducted to mark and recapture CLH on Adobe Creek while there were eight sampling efforts on Kelsey Creek. The first survey effort was on March 12 and the last effort was on April 29. The population estimates will only be for CLH collected in Kelsey and Adobe Creeks.

Each hoop net/beach seine sampling effort took a total of up to two days each using a crew of three to four CDFW staff and sometimes additional help from various Native American tribes. The hoop net dimensions had a 4 ft. wide x 3 ft. tall square opening with two 18ft. long x 3 ft. tall wings, with five 31 in. diameter hoop rings and compartments in which the CLH swim into. The hoop net was made up with 3/8 inch mesh. These wings extended towards the shorelines and faced downstream (Figure 2). The beach seine was made of 3/4 inch mesh, and was 5 ft. tall x 41 ft. long. A start and stop time for installing the hoop net and removing the net were recorded. Water temperatures were also recorded at the same time for each effort. CLH were collected from the hoop net and/or beach seine using a dip net and placed into a primary holding container (Figures 3 and 4). Alka-Seltzer© was placed into the primary holding container to sedate the fish collected from the hoopnet prior to handling. Due to CLH already stressed from beach seining, these fish were not sedated. All CLH were measured in total length (millimeters) regardless of size (Figure 5). All CLH 275 mm (10.8 in.) and greater received a Biomark© HPT12 size, individually coded Passive Integrated Transponder (P.I.T) tag. The P.I.T. tags were implanted into the abdominal cavity of the CLH using a sterilized size 12 GA injector needle and MK10 implanter syringe, entering just above the pelvic fins towards the front of the fish. A Biomark© Model 601 P.I.T tag reader was used to read tags. CLH that were less than 200 mm (7.9 in.) total length were only

measured and not marked or P.I.T tagged. This was done in order to protect these fish during this delicate life stage. CLH that were between 200 mm and 275 mm (10.8 in.) total length were given a single hole punch on the upper caudal fin using a single, handheld paper hole puncher. CLH in this size class were deemed large enough for a hole punch but still at risk to injury or death if injected with a P.I.T tag. After the CLH were measured and/or given a mark/tag, they were placed into a secondary holding tank for recovery prior to release back into the creek. The crew consisted of at least one person recording data, one person measuring and checking for recaptures, and one person implanting the P.I.T tags. The mean total length, catch per unit of effort (CPUE), population estimate for the two creeks, and numbers of CLH collected would be calculated.



Figure 2. Hoopnet being used in Kelsey Creek (S. Newton, 3/13/14).



Figure 3. Collecting CLH from Kelsey Creek
(S. Newton, 3/13/14).



Figure 4. Work station on Adobe Creek (S. Newton, 3/13/14).



Figure 5. Juvenile CLH being measured (S. Newton, 3/13/14).

Results and Discussion

Adobe Creek

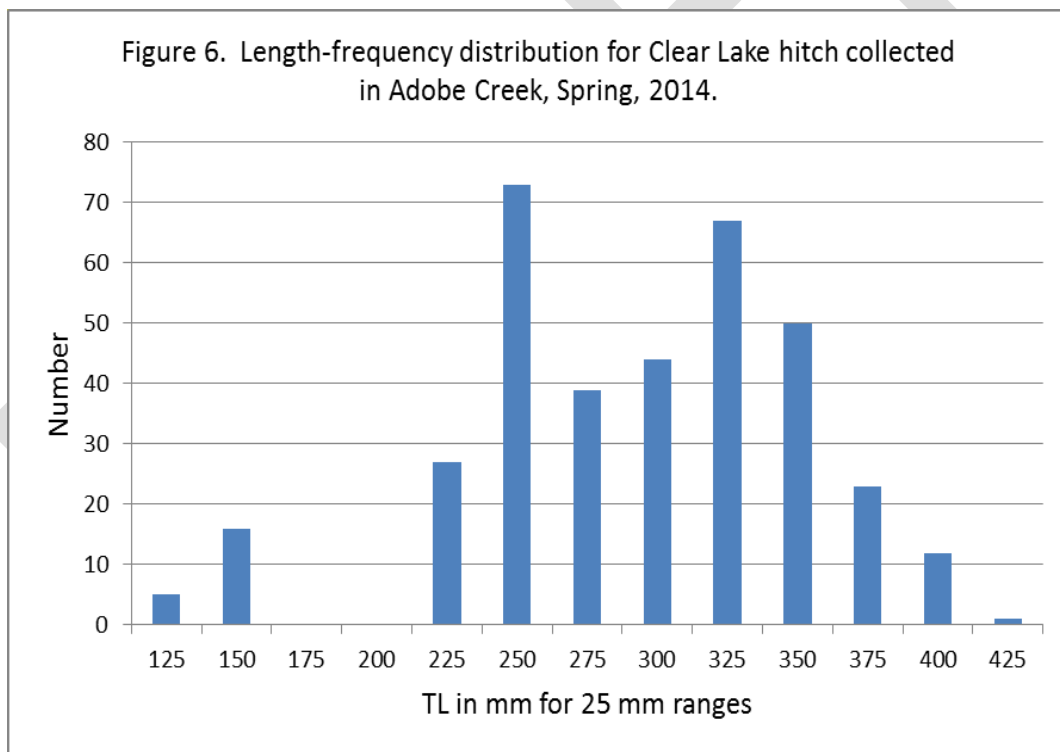
A total of 357 CLH were collected and measured between using a hoopnet or beach seine as the collection method at Adobe Creek. Of the 357 collected, 233 were P.I.T. tagged with only one recapture, which was from a prior Upper Lake Pomo Tribe survey (Table 1). A total of 110 CLH were marked with a single hole punch with one hole punch recapture. Of the five sampling efforts, only two initial mortalities were recorded. These fish were tallied with no data collected. On March 18 and 19, a total of 197 CLH were collected during a fish rescue on Adobe involving CDFW and local tribes. Of the 197 CLH collected, 155 were P.I.T. tagged with one recapture, 24 were hole punched with one hole punch recovery. The fish rescue was made due to the rapidly receding water in Adobe that left the CLH in a couple of pools that were drying up. The CLH were then moved to Kelsey Creek where there was sufficient flow.

Average total length for CLH collected in Adobe Creek was 303.6 mm (12.0 in.) with the greatest number of fish collected in the 250 mm length class (2 – 3 years of age) (Figure 6) with a few collected over 400 mm, which are likely four years or greater of age (Moyle 2002). The lack of fish collected in the 175 mm and 200 mm length classes might indicate a gap between successful spawning efforts during the fluctuating spawning period for CLH. Depending on winter and spring creek flows, the timing of CLH migration upstream can range from one to four months which could explain difference in growth even though they are the same year class.

Table 1. Summary of CLH collected at Adobe Creek, 2014.

Date	Total Measured	PIT Tagged	PIT Recaps	Hole Punched	Hole Punch Recovery	Mortality	CPUE (fish/hr)	Notes
3/12-3/13	153	76	0	83	0	0	6.92	
3/18*	196	155	1	24	1	2		Upper Pomo Tag
3/19*	1	0	0	1	0	0		
3/27 - 3/28	Creek Dry							
4/3-4/4	Creek Dry							
4/10-4/11	6	2	0	2	0	0	0.29	
4/17-4/18	1	0	0	0	0	0	0.06	
4/23-4/24	Creek Dry							
4/28-4/29	Creek Dry							
	357	233	1	110	1	2		

* Indicates beach seine as collection method



Kelsey Creek

A total of 118 CLH were collected and measured using a hoopnet as the collection method. Of the 118 collected, 99 were P.I.T. tagged with 12 recaptures. Of the 12 recaptures, 11

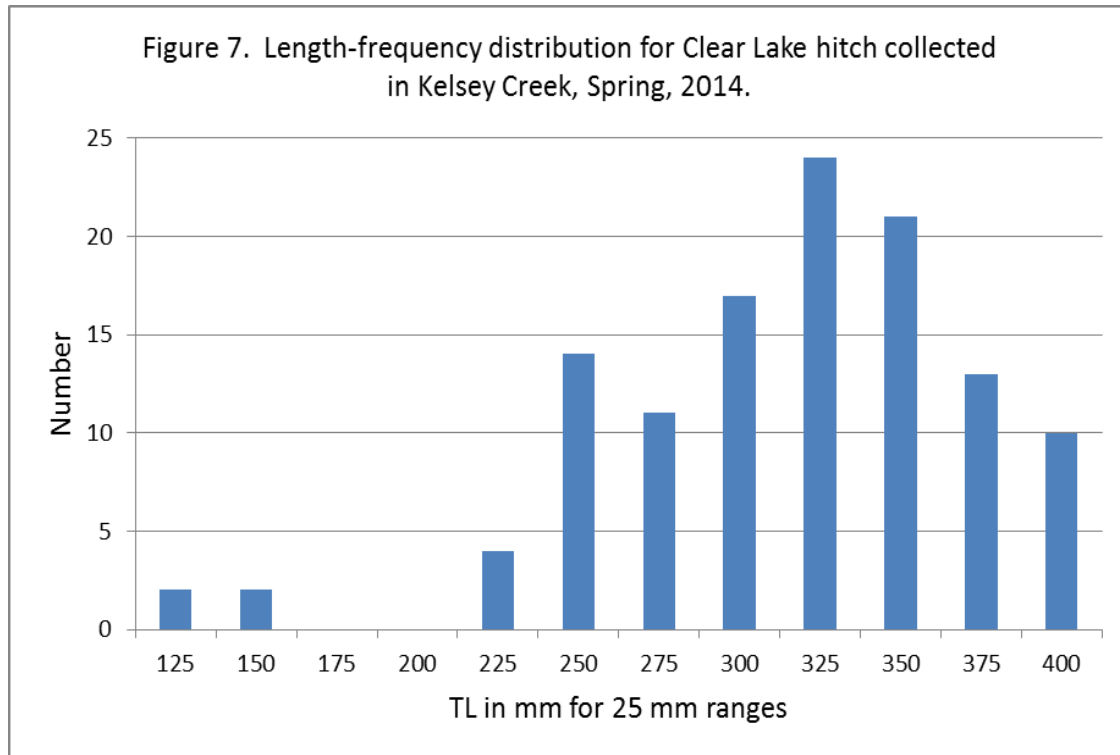
of them were from the Adobe Creek fish rescue transfer. These CLH were put into Kelsey Creek downstream of the net on March 18 and then collected in the net March 19. A total of 70 CLH were marked with a single hole punch with one hole punch recapture. During the eight sampling efforts, one initial mortality was recorded.

Average total length for CLH collected in Kelsey was 326.1 mm (12.8 in.) with the greatest number of fish collected in the 325 mm length class (Figure 7). These fish are likely three year old fish (Moyle 2002). Just like what was found in Adobe, the lack of fish collected in the 175 mm and 200 mm length classes might indicate a gap in the times of the spring when CLH had a successful spawn since there were CLH collected in the 125 mm and 150 mm length classes.

Table 2. Summary of CLH collected at Kelsey Creek, 2014.

	Total Measured	PIT Tagged	PIT Recaps	Hole Punched	Hole Punch Recovery	Mortality	CPUE fish/hr
3/12-3/13	58	56	0	56	0		3.05
3/18-3/19	37	31	11	6	1		2.51
3/27-3/28	0	0	0	0	0		0
4/3/2014*	0	0	0	0	0		0
4/10-4/11	23	12	1	8	0	1	1.2
4/17-4/18	0	0	0	0	0	0	0
4/23-4/24	0	0	0	0	0	0	0
4/28-4/29	0	0	0	0	0	0	0
	118	99	12	70	1	1	

*Indicates hoop net was pulled early in anticipation of higher flows.



Conclusions

CDFW anticipated collecting more CLH than was collected in 2014. The lack of a substantial flow in Adobe and Kelsey throughout the winter/spring season may have had a negative effect on the 2014 CLH spawn. CDFW was not able to estimate the populations of either of the two creeks due to assumptions that could not be met for the statistical analysis. Future efforts will include sampling the same sites and time of year for consistency.

References

Cormack, R. M. 1966. A test for equal catchability. *Biometrics* 22: 330 – 342.

Macedo, R. A. 1988. Creel Survey at Clear Lake, California March – June, 1988. California Fish and Wildlife files. Unpublished.

Moyle, P. 2002. *Inland Fishes of California*. University of California Press, Berkeley and Los Angeles, California. Pg. 138.

DRAFT