California Department of Fish and Wildlife
North Central Region
Sierra District

Summary of the Clear Lake Hitch Survey on Kelsey and Adobe Creeks 2015

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Summary

In an effort to evaluate the Clear Lake hitch (*Lavinia exilicauda chi*) (CLH) fishery on Kelsey and Adobe Creeks, a Cormack-Jolly-Seber mark-recapture survey was conducted beginning March 12, 2015 and ending April 29, 2015. For the season, a total of 160 CLH in Adobe Creek and 27 in Kelsey Creek were collected, measured, and/or P.I.T. tagged and/or fin clipped. A fourth consecutive dry winter and spring may have contributed to low numbers of CLH collected this season. The data from this survey in conjunction with last year's and 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
- Collect population data with which to compare past and future survey efforts

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 two tributaries to Clear Lake, Cole and Kelsey creeks to estimate the abundance and distribution of CLH. This was done to help in the status review process under CESA. In 2014, CDFW conducted a population estimate of CLH in Adobe and Kelsey creeks which are both tributaries to Clear Lake to estimate the abundance and distribution of CLH. The 2015 report aims to present a more accurate estimate of population size with 95% confidence intervals, for CLH in Kelsey and Adobe creeks than previous years. The estimate of population size 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 had a sufficient amount of water during the survey period.

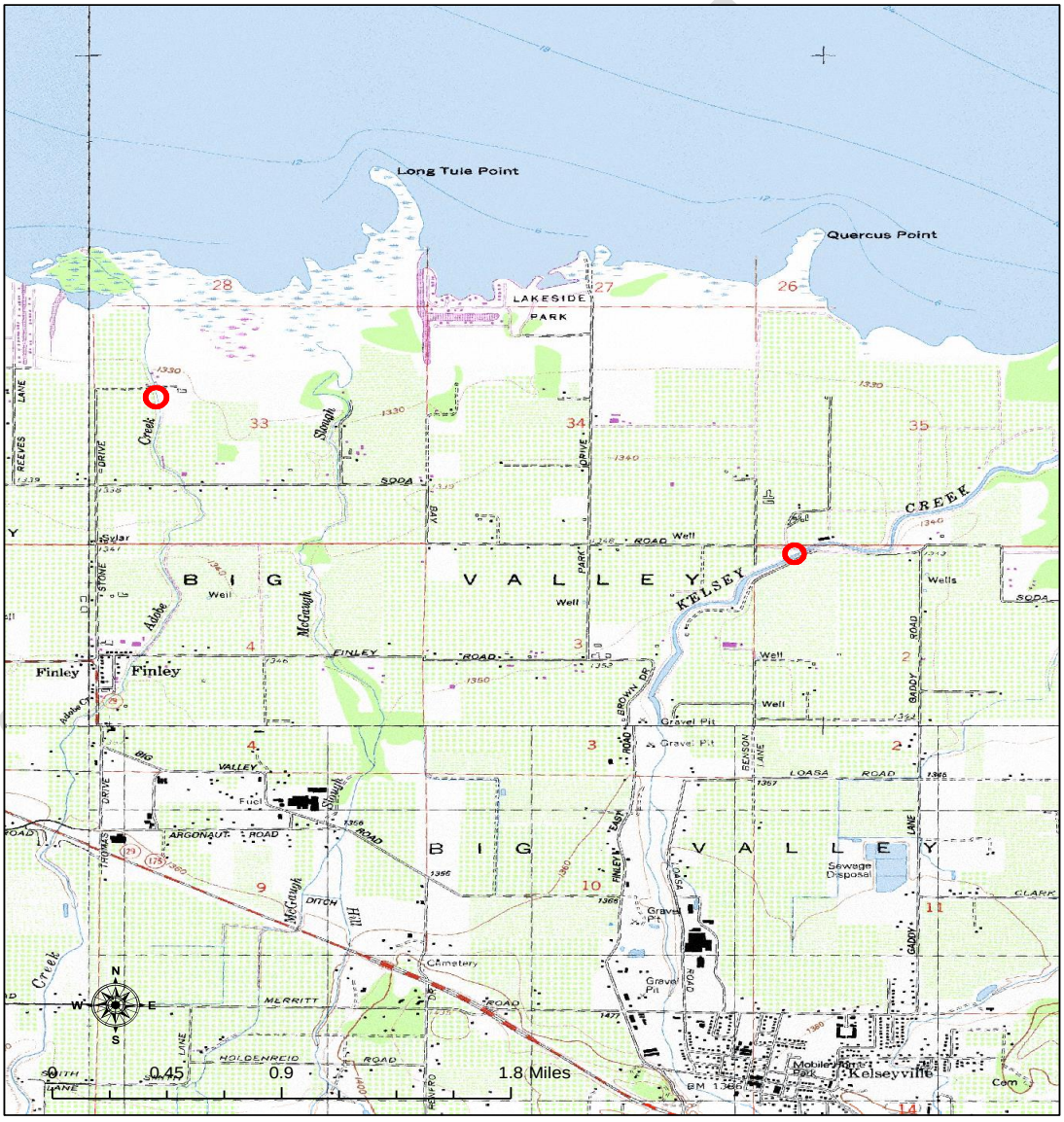


Figure 1. Map of locations on Adobe and Kelsey Creeks CDFW conducted surveys.

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 (Φt) 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 seven sampling efforts were conducted to mark and recapture CLH on Adobe Creek while there were eight sampling efforts on Kelsey Creek. The population estimates will only be for CLH collected in Kelsey and Adobe Creeks.

Each hoop net effort took a total of up to two days each using a crew of at least two CDFW staff. 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). A start and stop time for installing and removing the hoop net were recorded. Water temperatures were also recorded at the same time for each effort. CLH were collected from the hoop net 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. All CLH were measured in total length (millimeters, mm) 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 (7.9 in.) 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 two people in order to record data, measure, check for recaptures, and 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

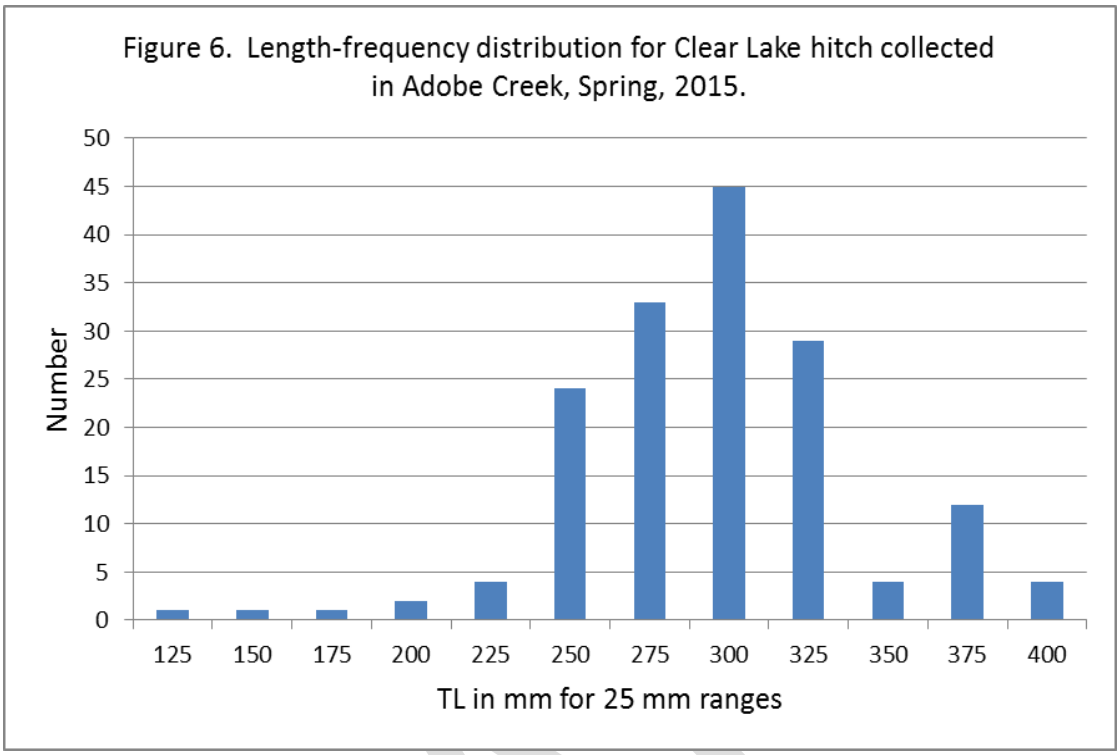
Adobe Creek

A total of 160 CLH were collected and measured at Adobe Creek in 2015, which is significantly down from the 357 collected in 2014. Of the 160 collected, 127 were P.I.T. tagged with no recaptures (Table 1). A total of 29 CLH were marked with a single hole punch with no hole punch recaptures. Of the seven sampling efforts, only one initial mortality was documented. These fish were tallied with no data collected.

Average total length for CLH collected in Adobe Creek was 306.6 mm (12.1 in.) with the greatest number of fish collected in the 300 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).

Table 1. Summary of hitch collected at Adobe Creek, 2015.

Date	Total Measured	PIT Tagged	PIT Recaps	Hole Punched	Hole Punch Recovery	Mortality	CPUE (fish/hr)	Notes
3/12-3/13	126	94	0	28	0	1	5.58	
3/17-3/18	0	0	0	0	0	0	0	
3/25-3/26	1	1	0	0	0	0	0.06	
4/1-4/2	0	0	0	0	0	0	0	
4/15-4/16	33	32	0	1	0	0	1.43	
4/22-4/23	0	0	0	0	0	0	0	
4/28-4/29	0	0	0	0	0	0	0	
	160	127	0	29	0	1		



Kelsey Creek

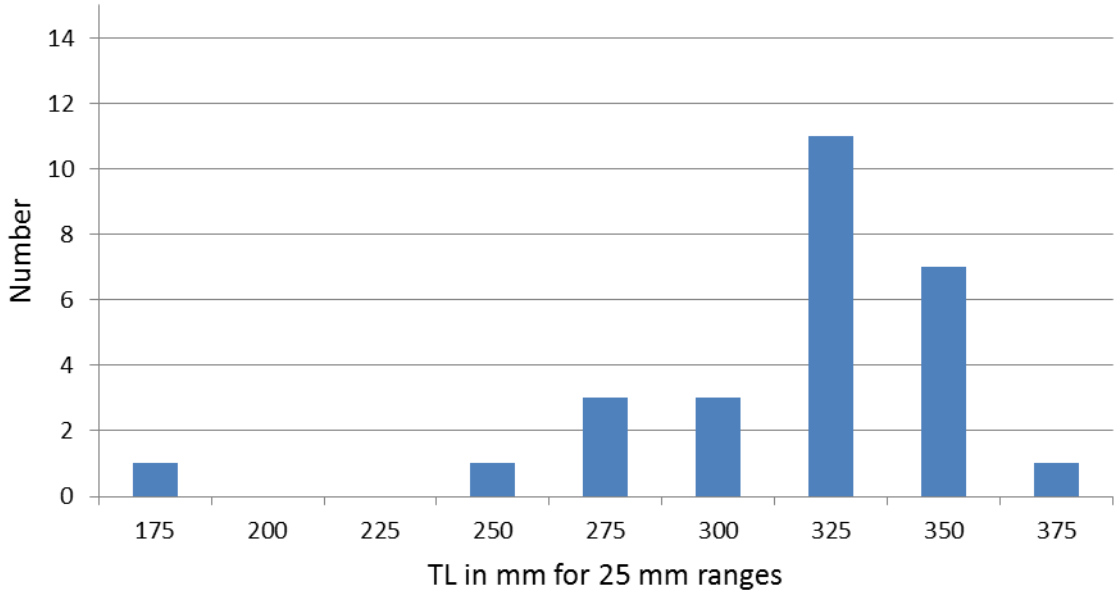
A total of 27 CLH were collected and measured in Kelsey Creek, down significantly from 118 individuals in 2014. Of the 27 collected, 24 were P.I.T. tagged with no recaptures. Only one CLH was marked with a single hole punch with no hole punch recaptures. There were no initial mortalities recorded during the eight sampling efforts.

Average total length for CLH collected in Kelsey was 326.0 mm (12.8 in.) with the greatest number of fish collected in the 325 mm length class for a second consecutive year (Figure 7). These fish are likely three year old fish (Moyle 2002).

Table 2. Summary of hitch collected at Kelsey Creek, 2015.

	Total Measured	PIT Tagged	PIT Recaps	Hole Punched	Hole Punch Recovery	Mortality	CPUE fish/hr	Notes
3/2-3/3	0	0	0	0	0	0	0.00	
3/12-3/13	0	0	0	0	0	0	0.00	
3/17-3/18	20	18	0	1	0	0	1.2	
3/25-3/26	1	1	0	0	0	0	0.06	3 C. roach, 1 S.sucker collected
4/1 - 4/2	0	0	0	0	0	0	0	1 C. roach collected
4/15-4/16	6	5	0	0	0	0	0.27	
4/22-4/23	0	0	0	0	0	0	0	
4/28-4/29	0	0	0	0	0	0	0	
	27	24	0	1	0	0		

Figure 7. Length-frequency distribution for Clear Lake hitch collected in Kelsey Creek, Spring, 2015.



Conclusions

CDFW anticipated collecting more CLH than was collected in 2015. The lack of a substantial flow in Adobe and Kelsey throughout the winter/spring season for a fourth consecutive

year may have had a negative effect on the 2015 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 as well as no recaptures were collected. Unfortunately during this year's survey, the hoop nets on both creeks were tampered with and vandalized. It is uncertain how many CLH were not collected due to these issues.

References

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