California Department of Fish and Wildlife
North Central Region
Sierra District

Summary of the 2017 Clear Lake Hitch Survey on Kelsey and Adobe Creeks

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Summary

In an effort to evaluate the Clear Lake hitch (*Lavinia exilicauda chi*) (HCH-C) fishery on Kelsey and Adobe Creeks, a Cormack-Jolly-Seber mark-recapture survey was conducted, beginning March 15, 2017 and ending May 18, 2017. For this season, a total of 680 HCH-C in Adobe Creek and eight (8) in Kelsey Creek were collected, measured, and/or P.I.T. tagged and/or fin clipped. A record wet winter and spring with much needed rain to the watershed did not allow CDFW staff to be able to set up the necessary equipment due to high flows, especially in Kelsey Creek. It is unknown how many HCH-C may have been missed during these periods where sampling was not conducted. The data from this survey in conjunction with the 2014 - 2016 data will be used to monitor the status of this fishery.

Introduction

The objectives of this survey were to:

- Determine the number of HCH-C spawning in Kelsey and Adobe creeks
- Determine the average size of HCH-C spawning in Kelsey and Adobe creeks
- Determine if HCH-C 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 HCH-C 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 HCH-C as threatened under CESA.

In 2013, CDFW conducted a population estimate of HCH-C in two tributaries to Clear Lake, Cole and Kelsey creeks to estimate the abundance and distribution of HCH-C. This was done to help in the status review process under CESA. From 2014 - 2016, CDFW conducted a population estimate of HCH-C in Adobe and Kelsey creeks to estimate the abundance and distribution of HCH-C. The 2017 report aims to present a more accurate estimate of population size with 95% confidence intervals, for HCH-C 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 HCH-C and had a sufficient amount of water during the survey period.

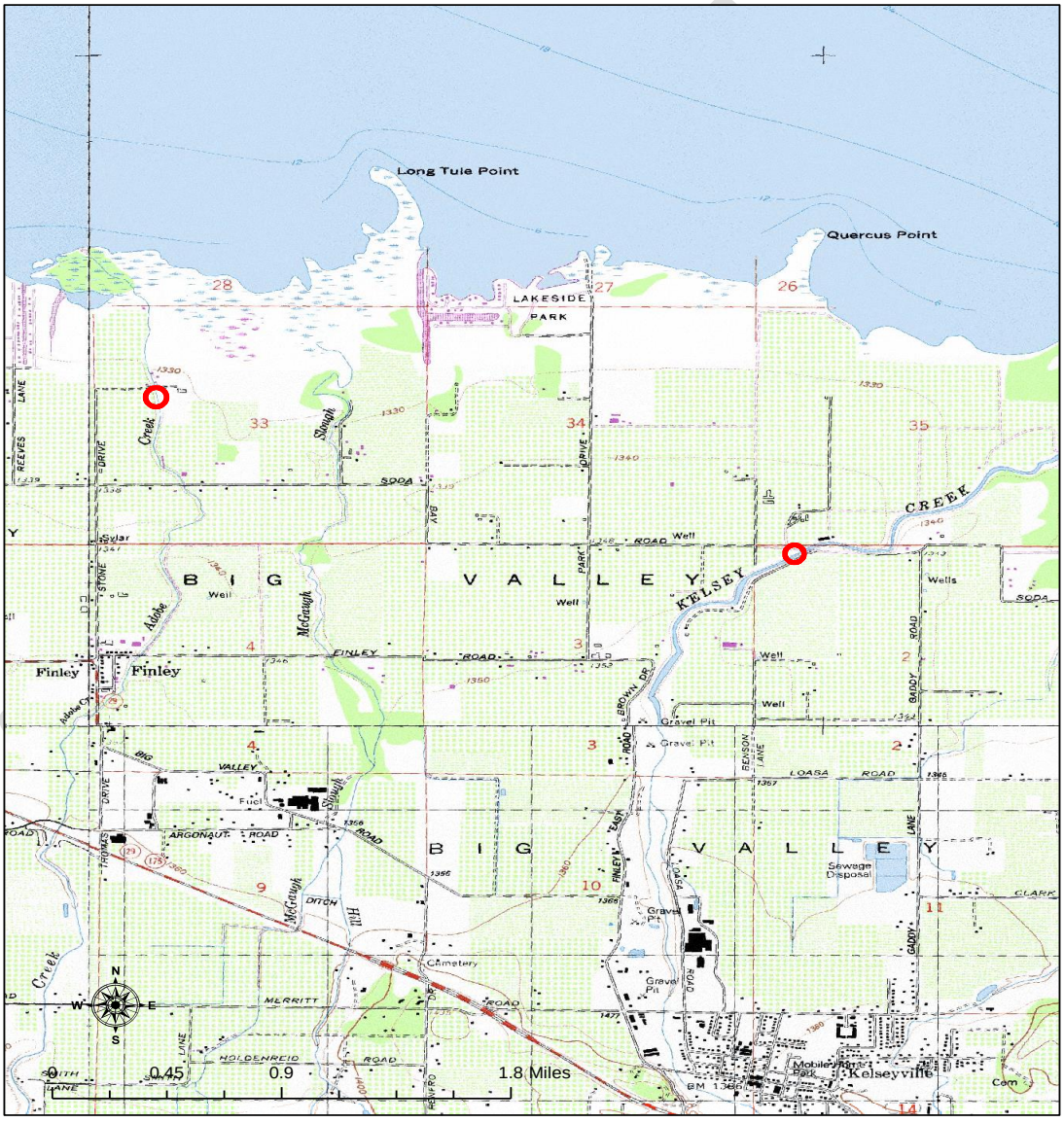

Figure 1. Map of locations on Adobe and Kelsey Creeks CDFW conducted surveys.

CDFW is currently gathering information on the HCH-C 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 HCH-C seen for the survey period.

Methods and Materials

In estimating the population of HCH-C in these historic spawning tributaries, CDFW 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 and four sampling efforts were conducted to mark and recapture HCH-C on Adobe and Kelsey creeks. The population estimates will only be for HCH-C collected in Kelsey and Adobe creeks.

Each fyke net effort took one day each using a crew of at least two CDFW staff. The fyke 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 HCH-C swim into. The fyke net was made up with 3/8 inch size mesh. These wings extended towards the shorelines and faced downstream (Figure 2). The start and stop times for installing and removing the fyke net were recorded. Water temperatures were also recorded at the same time for each effort. HCH-C were collected from the fyke 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 fyke net prior to handling. All HCH-C were measured in total length (millimeters, mm) regardless of size (Figure 5). All HCH-C 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 HCH-C using a sterilized size 12 GA injector needle and MK10 implanter syringe, entering just above the pelvic fins towards the front of the fish (Figure 6). A Biomark© Model 601 P.I.T tag reader was used to read tags. HCH-C 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. HCH-C 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. HCH-C 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. After the HCH-C 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 mean total length, catch per unit of effort (CPUE), population estimate for each creek, and numbers of HCH-C collected would be calculated.

Figure 2. Fyke net being used in Adobe Creek (J. Torres, 3/30/17).

Figure 3. Collecting HCH-C from Kelsey Creek (S. Newton, 3/13/14).

Figure 4. Work station on Adobe Creek (J. Torres, 3/30/17).

Figure 5. Juvenile HCH-C being measured (S. Newton, 3/13/14).

Figure 6. HCH-C being implanted with P.I.T. tag (J. Torres, 3/30/17).

Results

Adobe Creek

A total of 680 HCH-C were collected and measured in Adobe Creek in 2017, which is the greatest number collected in the four years of surveys on Adobe Creek. In 2016, only eight were collected, 160 in 2015, and 357 in 2014 (Ewing 2014, 2015, 2016). Of the 680 collected, 523 were P.I.T. tagged with no recaptures (Table 1). Twenty-four HCH-C were marked with a single hole punch with no hole punch recaptures. Of the seven sampling efforts, seven initial mortalities were documented. Initial mortalities would be deaths immediately associated to processing the HCH-C. Average total length for HCH-C collected in Adobe Creek in 2017 was 301.1 mm (11.9 in.) with the greatest number of fish collected in the 325 mm length class (Figure 7). These fish are likely three-years of age (Moyle 2002).

Table 1. Summary of hitch collected at Adobe Creek, 2017.

Date	Total Measured	PIT Tagged	PIT Recaps	Hole Punched	Hole Punch Recaps	Mortality	CPUE (fish/hr)	Notes
3/15 - 3/16	130	65	0	7	0	0	6.58	2 unmeasured hitch, 2 sucker and 2 bluegill collected
3/29 - 3/30	46	20	0	2	0	1	2.25	1 b.crappie, 1 bluegill, 1 threadfin shad
4/18 - 4/19	51	39	0	0	0	0	2.78	1 dead hitch, 1 sucker, 1 bluegill, 21 threadfin shad
4/26 - 4/27	291	269	0	12	0	4	10.00	
5/3 - 5/4	154	126	0	3	0	0	6.72	5 hitch escaped, 1 riffle sculpin mort., 1 sucker
5/10 - 5/11	7	3	0	0	0	2	0.37	1 dead threadfin shad
5/17 - 5/18	1	1	0	0	0	0	0.05	1 threadfin shad, 1 sucker, 2 mallards
	680	523	0	24	0	7		

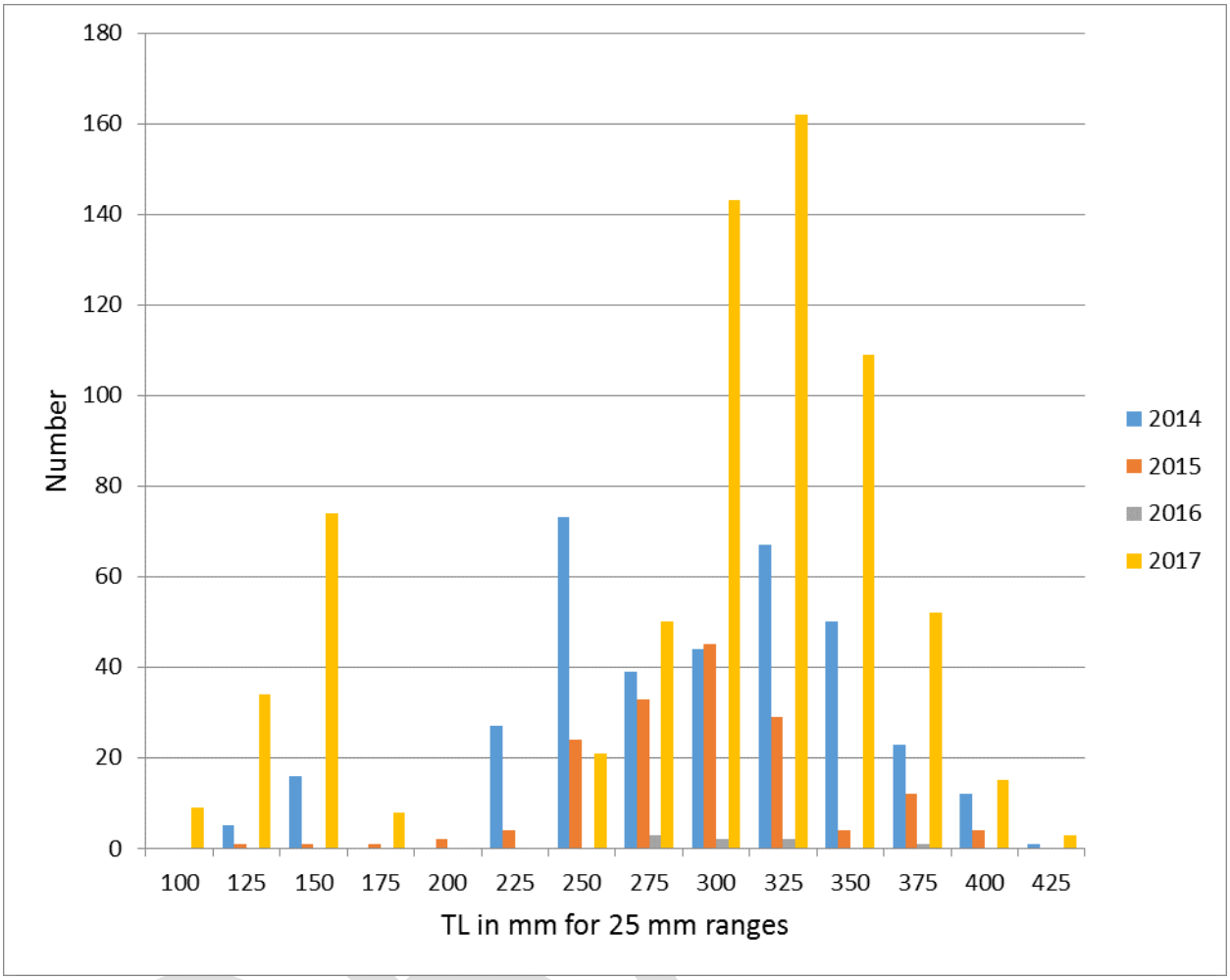

Figure 7. Length-frequency distribution for Clear Lake hitch collected in Adobe Creek, Spring, 2014 -2017.

Kelsey Creek

A total of eight HCH-C were collected and measured in Kelsey Creek, the lowest in the four years of surveys. In 2016 there were 22 collected, 27 in 2015, and 118 in 2014 (Table 2). Of the eight collected, five were P.I.T. tagged with no recaptures. No HCH-C were marked with a single hole punch with no hole punch recaptures. There was one initial mortality recorded during the four sampling efforts.

Average total length for HCH-C collected in Kelsey Creek in 2017 was 288.3 mm (11.4 in.) with the greatest number of fish collected in the 300 mm length class for the first time in four years (Figure 8). These fish are likely two to three year old fish (Moyle 2002).

Table 2. Summary of hitch collected at Kelsey Creek, 2017.

	Total Measured	PIT Tagged	PIT Recaps	Hole Punched	Hole Punch Recaps	Mortality	CPUE fish/hr	Notes
4/26 - 4/27	4	3	0	0	0	1	0.20	1 Ca. roach
5/3 - 5/4	0	0	0	0	0	0	0.00	35 dead t. shad, 1 alive collected
5/10 - 5/11	0	0	0	0	0	0	0	A lot of vegetation, trap collapsed
5/17 - 5/18	4	2	0	0	0	0	0.22	
	8	5	0	0	0	1		

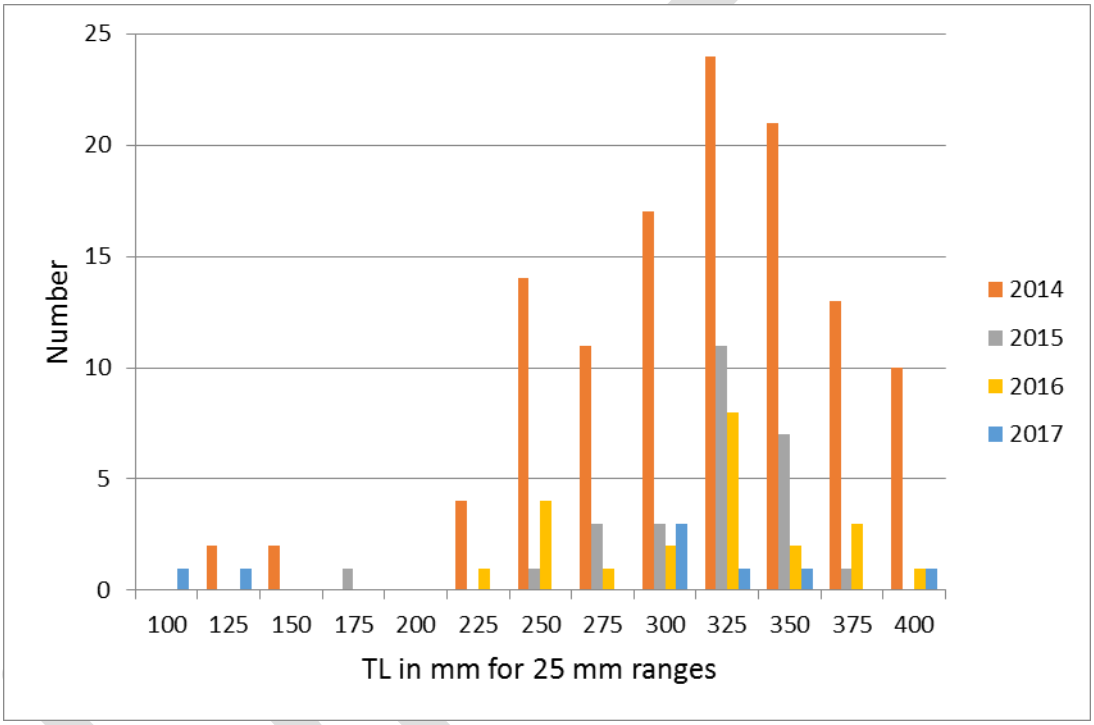

Figure 8. Length-frequency distribution for Clear Lake hitch collected in Kelsey Creek, Spring, 2014 – 2017.

Discussion

CDFW anticipated collecting more HCH-C in 2017, specifically in Kelsey Creek than was collected in previous years due to the increased and consistent flows in the two tributaries. The record wet winter/spring, compared to the previous years in the Clear Lake watershed may have spread out the HCH-C across the many other tributaries to Clear Lake. Generally, Adobe and Kelsey Creeks hold the most and consistent flows into Clear Lake. In 2016 there were many reports of HCH-C in numerous tributaries to Clear Lake after an average to above average winter/spring rain total. In 2017, there were few HCH-C sightings compared to 2016 in which

HCH-C were seen in tributaries that had no prior documented HCH-C sightings for decades. Unfortunately during the 2017 survey, the high flows would not allow the fyke nets on both creeks, especially Kelsey to be set. It is uncertain how many HCH-C migrated up Kelsey and Adobe creeks while the fyke traps weren't fishing. It is possible with the recent drought, that there are fewer adult fish in the lake due to poor previous recruiting seasons, thus less migrating upstream to 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. CDFW may not continue the tagging program due to the fact that CDFW has not been able to gain an accurate population estimate for HCH-C due to the fact that only one true recapture has been collected in four years.

References

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