State of California
Department of Fish and Wildlife

2025 Clear Lake General Fish Survey

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Fish Evaluation Summary

In an effort to assist the California Department of Fish and Wildlife (CDFW) collect more information on the Clear Lake fishery, a boat-based electrofishing survey was conducted on June 10 and 11, 2025. The 18 selected shoreline transects were the same as those sampled in June 2015 and 2023, except for one. The sites were randomly selected in 2015 and will be the basis for comparison with the 2023 and 2025 surveys. In 2025, native fish species made up four of the ten fish species collected at Clear Lake.

Introduction

In September 2012, The Center for Biological Diversity submitted a petition to the United States Fish and Wildlife Service (USFWS) and the California Department of Fish and Wildlife (CDFW) to list the Clear Lake Hitch (*Lavinia exilicauda chi*) (HCH-C) as a threatened or endangered species pursuant to the federal Endangered Species Act (ESA) and the California Endangered Species Act (CESA) (Fish and Game Code, 2050). On August 6, 2014, a decision to list the species as threatened under CESA was made by the California Fish and Game Commission. On December 3, 2020, a decision not to list the species as threatened or endangered under the ESA was made by the USFWS.

The objectives of this survey were to determine:

- Fish species composition
- Fish age class distribution
- Body condition of each species
- Fish species relative abundance

Methods and Materials

In June 2015, eighteen randomly selected transects of the shoreline at Clear Lake were sampled. These same 18 transects were selected in June 2025 for comparison (**Figures 1 and 2**). Each transect was sampled for 500 electrofishing generator seconds in a continuous line parallel to the shore. The 18 transects were sampled over a two-day period using two, 18 ft. Smith-Root electrofishing boats. Pulsed DC current (2-12 amps) was used to “stun” the fish. When an electrical field was applied to the water it was measured on a counter and this time was recorded as generator seconds.

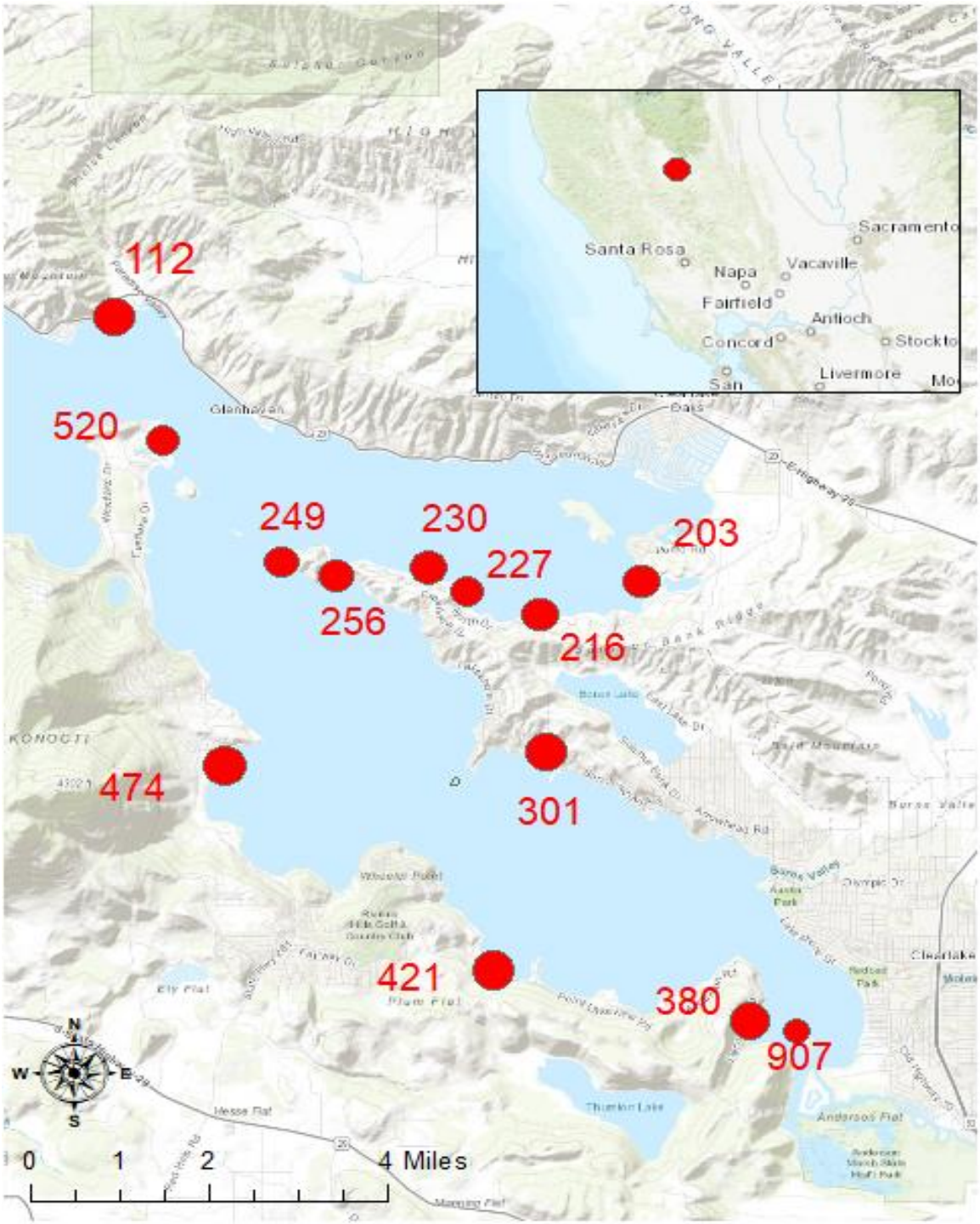

Figure 1. Clear Lake, Lake County with middle and lower arm transect locations for general fish surveys performed in June 2015, 2023, and 2025. Location of Clear Lake in relation to California found in inset map.

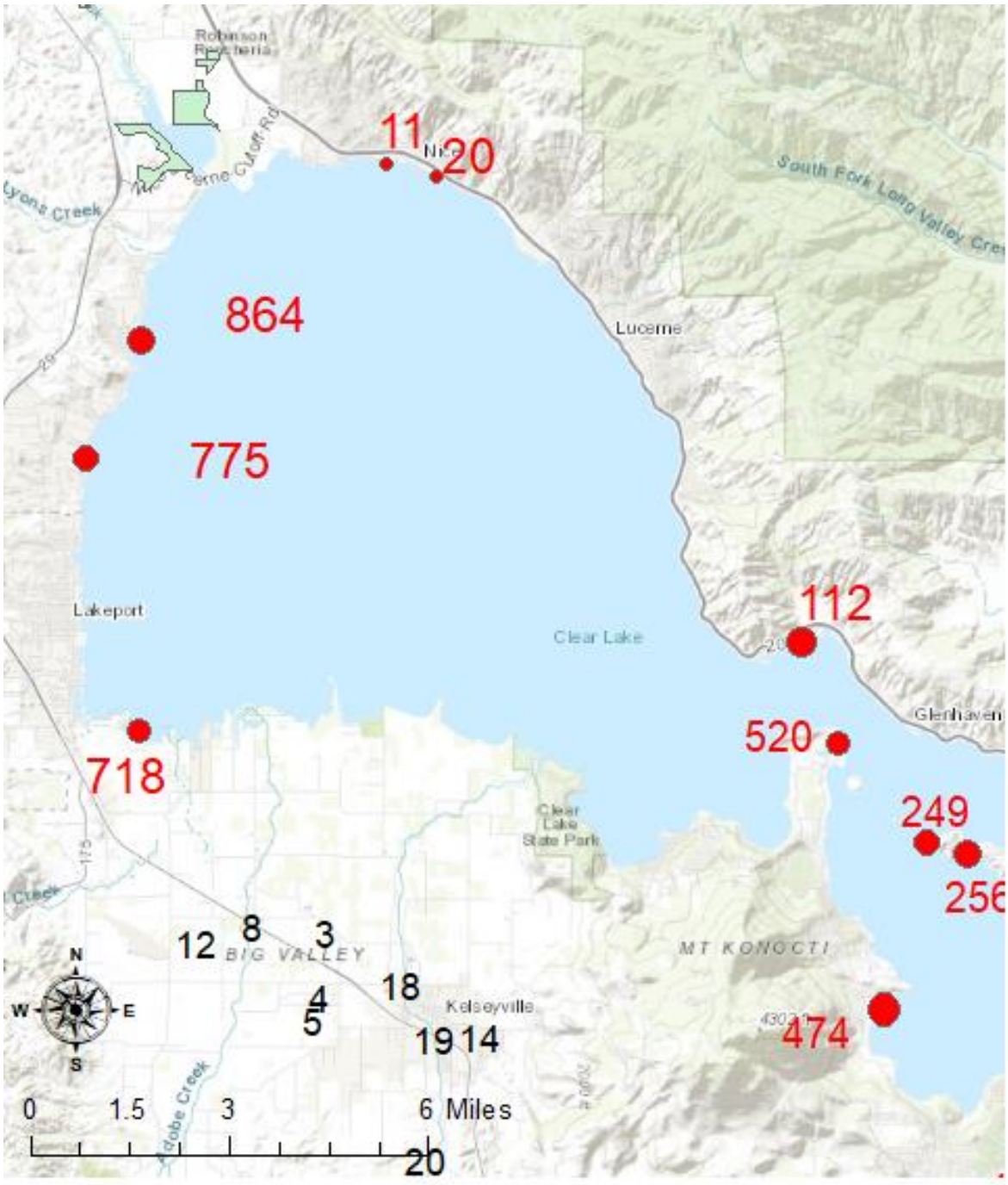

Figure 2. Clear Lake, Lake County with upper arm transect locations (in red font) for general fish surveys performed in June 2015, 2023, and 2025.

All fish (except Common Carp (*Cyprinus Carpio*, CP), Threadfin Shad (*Dorosoma petense*, TFS), Goldfish (*Carassius auratus*, GF), and Inland Silversides (*Menidia beryllina*, INS), were netted and placed in a livewell in the boat. An effort was made to capture all target species; however, very small fish occasionally eluded capture as did

fish on the outer edge of the electrical field. These fish could not be identified; and therefore, are not included with the Catch Per Unit Effort (CPUE).

The crew consisted of two forward netters, one boat operator, and zero to multiple crewmembers working the livewell, which held the collected fish in circulated water.

All fish collected were identified to species and the first 25 of each species at each transect had measurements recorded for total length (TL) in millimeters (mm). If minimum total lengths were attained for that specific species (Table 15.1, Murphy and Willis 1996), weights in grams (g) would be taken for the first 25 of each species. Minimum total length for Channel Catfish (*Ictalurus punctatus*, CCF) was 70 mm. Minimum total length for Bluegill (*Lepomis macrochirus*, BG), Tule Perch (*Hysterocarpus traski*, TP), Redear Sunfish (*Lepomis microlophus*, RSF), and Green Sunfish (*Lepomis cyanellus*, GSF) was 80 mm. Minimum total length for Sacramento Sucker (*Catostomus occidentalis*, SKR-S), HCH-C, and Sacramento Blackfish (*Orthodon microlepidotus*, SBF) was 90 mm. Minimum total length for both White Crappie (*Pomoxis annularis*, WCR) and Black Crappie (Pomoxis nigromaculatus, BCR) was 100 mm and minimum total length for Largemouth Bass (*Micropterus salmoides*, LMB) was 150 mm. Minimum lengths were designated because weight measurements of small fish tend to be quite variable with low precision and accuracy. Weights were determined using a digital scale or a Boga Grip ™ scale if the fish was over seven pounds. All fish collected after the first 25 of a species were tallied from each transect. The mean length and weight for each species was determined and an analysis of population indices were evaluated for selected species when appropriate. These indices include CPUE (fish/shocking minute) weight-length (millimeters/grams) relationships, relative weight (Wr), and proportional/relative stock density (PSD)/(RSD) (Anderson, R.O. and R.M. Neumann 1996). Relative weights were gathered by collecting the lengths and weights on fish and entering them into fixed slope and intercept parameters for that specific species (Table 15.1, Murphy and Willis 1996):

Log10(Ws) – (Fixed intercept found in Table 15.1) + (Fixed slope found in Table 15.1) * log10(L)

where Ws = standard weight

L = total length

The relative weight index ranges for determining the condition of selected species are: 110 and above: excellent, 90-109: good, 70-89: average, and 69 and below: poor (Ewing and Granfors, personal communication).

Proportional and relative stock density values were gathered by collecting the lengths of fish and comparing them to fixed stock, quality, preferred, and memorable sizes for that specific species (Table 15.2 and 15.3, Murphy and Willis 1996).

Results

In 2025, A total of 152 electrofishing minutes were used to sample the 18 transects. **Tables 1** and **2** summarizes the species composition, CPUE, mean total length and weight, and length ranges. Two hundred and forty-nine fish representing 10 species were collected during the 2025 survey, compared to 107 fish and seven species in 2023, and 346 fish and 12 identifiable species in 2015 (**Table 1**). In 2025, LMB comprised 63.1 percent of the total fish sampled. BG followed with 19.3 percent of the total fish sampled. CLH and RSF comprised 9.2 and 2.8 percent of the total catch, respectively. Brown Bullhead (*Ameiurus nebulosus*, BBH) and CCF comprised the fifth (2.0) and sixth (1.2) greatest percent of the catch, respectively. GSF and SKR-S both comprised 0.8 percent of the catch, while SBF and Prickly Sculpin (*Cottus asper*) concluded all the species collected with 0.4% of the catch, respectively. The total CPUE for this survey effort was 1.63 fish/minute.

Table 1. Species composition from Clear Lake, June 11 and 18, 2015, June 12,13, and 27, 2023, and June 10 and 11, 2025. Mean Total Length (TL) was measured in millimeters (mm). Average Weight was in grams (g).

	2015			2023			2025		
Species	#	%	CPUE	#	%	CPUE	#	%	CPUE
Largemouth Bass	171	49.4%	1.13	48	44.9%	0.32	157	63.1%	1.03
Bluegill	53	15.3%	0.35	2	1.9%	0.01	48	19.3%	0.32
Clear Lake Hitch	24	6.9%	0.16	25	23.4%	0.17	23	9.2%	0.15
Sacramento Sucker	24	6.9%	0.16	0	NA	NA	2	0.8%	0.01
Black Crappie	22	6.4%	0.15	0	NA	NA	0	NA	NA
Tule Perch	15	4.3%	0.10	0	NA	NA	0	NA	NA
Goldfish	11	3.2%	0.07	0	NA	NA	0	NA	NA
Redear Sunfish	10	2.9%	0.07	0	NA	NA	7	2.8%	0.05
Sacramento Blackfish	9	2.6%	0.06	4	3.7%	0.03	1	0.4%	0.01
Brown Bullhead	3	0.9%	0.02	9	8.4%	0.06	5	2.0%	0.03
Prickly Sculpin	2	0.6%	0.01	0	NA	NA	1	0.4%	0.01
Channel Catfish	1	0.3%	0.01	5	4.7%	0.03	3	1.2%	0.02
Unident. Sculpin	1	0.3%	0.01	0	NA	NA	0	NA	NA
White Catfish	0	NA	NA	14	13.1%	0.09	0	NA	NA
Green Sunfish	0	NA	NA	0	NA	NA	2	0.8%	0.01
Total	346			107			249		
Generator minutes:	150.8			150			152.3		
CPUE (Fish/ gen. min)	2.29			0.71			1.63		
Water Temperature	76.5° F			72.6° F			77.8° F		

*Weights were only collected when the minimum total length for Bluegill was 80 mm, 90 mm for

Clear Lake Hitch, 150 mm for Largemouth Bass. No lengths and weights for common carp were taken due to the damage they do to Department equipment.

Table 2. Comparison of mean total lengths, weights, and length ranges (LR) from Clear Lake, June 11 and 18, 2015, June 12,13, and 27, 2023, and June 10 and 11, 2025. Mean Total Length (TL) was measured in millimeters (mm). Average Weight (WT) was in grams (g).

	2015			2023			2025		
	TL	WT	LR	TL	WT	LR	TL	WT	LR
Largemouth Bass	275.4	727.9	34 - 603	421.6	1293.1	176 - 526	322.9	1145.5	37 - 589
Bluegill	104.4	52.2	32 - 235	156	83.5	146 - 166	101.4	102.6	33 - 293
Clear Lake Hitch	199.3	83.5	158 - 305	157.2	52.6	44-366	210.2	114.4	37-283
Sacramento Sucker	272.9	223.0	230 - 405	NA	NA	NA	278.5	1253.0	66 - 491
Black Crappie	165.1	70.3	134 - 210	NA	NA	NA	NA	NA	NA
Tule Perch	74.3	64.0	55 - 160	NA	NA	NA	NA	NA	NA
Goldfish	249.9	365.6	192 - 406	NA	NA	NA	NA	NA	NA
Redear Sunfish	167.7	147.9	100 - 276	NA	NA	NA	201.0	233.1	110 - 230
Sacramento Blackfish	221.3	109.8	167 - 248	149.3	38	130 - 184	245.0	154.0	NA
Brown Bullhead	266.7	410.0	153 - 357	392.3	1019.4	360 - 410	354.4	688.4	333 - 374
Prickly Sculpin	41	NA	37 - 45	NA	NA	NA	56.0	NA	NA
Channel Catfish	NA	NA	NA	270.8	528.7	465 - 745	777.67	5834.7	765 - 795
Unident. Sculpin	NA	NA	NA	NA	NA	NA	NA	NA	NA
White Catfish	NA	NA	NA	415.8	1169.8	226 - 540	NA	NA	NA
Green Sunfish	NA	NA	NA	NA	NA	NA	777.7	5834.7	113 - 186

Largemouth Bass

In 2025, LMB total length ranged from 37 – 589 mm (1.5 – 23.2 in.) (**Figure 3)**. The length class with the highest frequency in 2025 was 25 mm (0.98 in.) compared to 425 mm (16.7 in.) in 2023, and 175 mm (6.9 in.) class in 2015 (Ewing et al. 2016). This indicates the 2025 modal length class are likely zero to one-year old fish (Moyle 2002). The length frequency distribution shows a LMB population in which there is a fairly balanced distribution and range of size classes, with a healthy 2025 recruitment (**Figure 3**). In 2025, the mean total length for LMB was 322.9 mm (12.7 in.) compared to 421.6 mm (16.6 in.) in 2023 and 275.4 mm (10.8 in.) in 2015. A comparison of LMB collected in the 2025 survey and the 2023 survey indicate an increase in LMB collected from 25 – 375 mm (0.98 – 14.8 in.) (**Figure 3**).

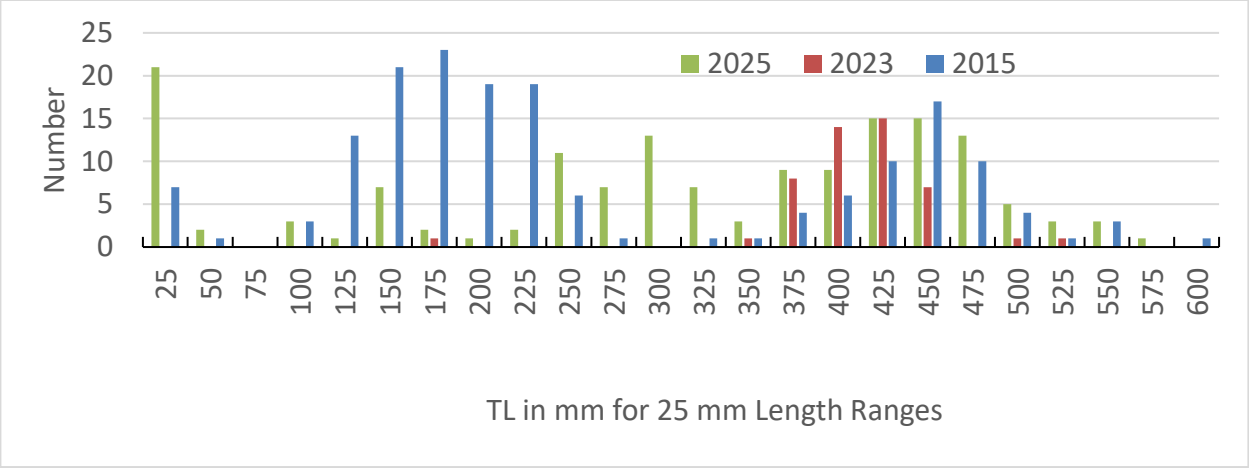

Figure 3. Length-frequency distributions for Largemouth Bass captured by electrofishing at Clear Lake, Summer 2015, 2023, and 2025.

A linear regression equation can be used to determine a reliable estimated weight from the length of LMB for the 2025 and 2015 total lengths and weights for LMB ≥ 150 mm in total length (**Figure 4**). Due to the low R^2 value in 2023, no length−weight scatter plot was made for comparison to 2025 and 2015.

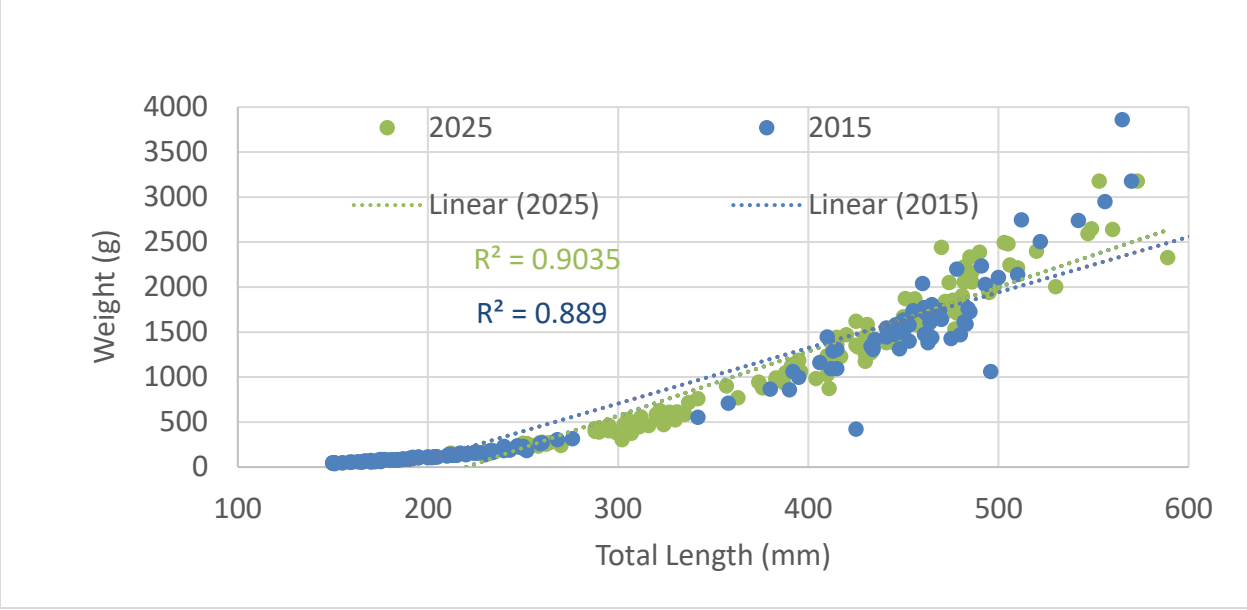

Figure 4. Total length-weight scatter plot with linear regression line for Largemouth Bass captured at Clear Lake, Summer, 2015 and 2025.

In 2025, PSD for LMB was 82, indicating a population that is unbalanced with larger-sized LMB. This unbalance is similar, but not as extreme when compared to the 2023 PSD for LMB of 100, but higher than the 56 value and a balanced population in 2015. The RSD-P in 2025 (62), 2023 (100), and 2015 (54) were unbalanced with preferred-sized LMB. The RSD-M in 2025 (8), 2023 (6), and 2015 (8) were balanced with memorable-sized LMB. These stock density indices also indicate a partial unbalance in the system with larger than stock-size LMB.

In 2025, LMB had a mean relative value of 111, compared to 109 in 2023, and 104 in 2015. This indicates the LMB collected were in excellent condition in 2025 and good condition for 2023 and 2015.

Bluegill

In 2025, BG total length ranged from 33 – 293 mm (1.3 – 11.5 in.) (**Figure 5)**. The length class with the highest frequency in 2025 was 70 mm (2.8 in.) compared to 80 mm (3.1 in.) in 2015 (Ewing et al. 2016). Only two BG were collected in the 2023 survey (Ewing 2024). This indicates the 2025 modal length class are likely one-year old fish (Moyle 2002). The length frequency distribution shows a BG population in which there is a fairly balanced distribution and range of size classes, with a healthy 2025 recruitment (**Figure 5**). In 2025, the mean total length for BG was 101.4 mm (4.0 in.) compared to 156 mm (6.1 in.) in 2023, and 104.4 mm (4.1 in.) in 2015. A comparison of BG collected in the 2025 survey and the 2023 survey indicate an increase in BG collected from 170 – 190 mm (6.7 – 7.5 in.) (**Figure 5**).

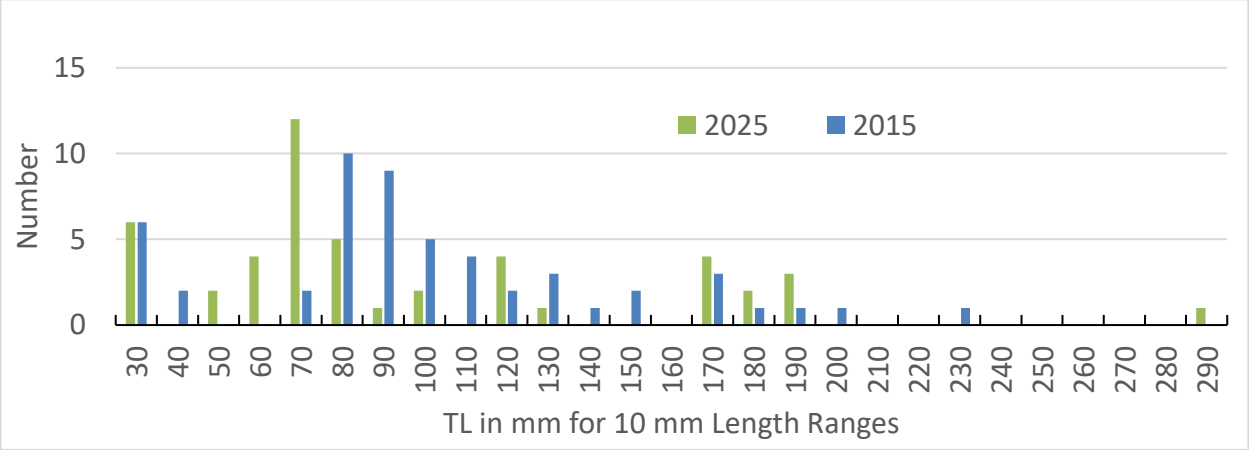

Figure 5. Length-frequency distributions for Bluegill captured by electrofishing at Clear Lake, Summer 2015 and 2025.

Due to the low R^2 value in 2025, no length−weight scatter plot was made for comparison to 2023 and 2015.

In 2025, PSD for BG was 43 and 21 in 2015, indicating populations that were balanced with larger-sized BG. The RSD-P in 2025 (4) was unbalanced, but balanced in 2015 (5) with preferred-sized BG. The RSD-M in 2025 (4) was balanced with memorable-sized BG.

In 2025, BG had a mean relative value of 127, compared to 107 in 2015. This indicates the BG collected were in excellent condition in 2025 and good condition for 2015. No PSD, RSD, or mean relative values were calculated for BG in 2023 due to only two BG collected.

Clear Lake Hitch

In 2025, HCH-C total length ranged from 37 – 283 mm (1.5 – 11.1 in.) (**Figure 6**). The length class with the highest frequency in 2025 was 225 mm (8.9 in.) compared to 150 mm (5.9 in.) in 2023 (Ewing 2024) and 200 mm (7.9 in.) in 2015 (Ewing et al. 2016). This indicates the 2025 modal length class are likely two to three-year old fish (Moyle 2002). The length frequency distribution for 2025 suggests an HCH-C population in which there is an uneven distribution and range of size classes, with few juveniles seen (**Figure 6**). In 2025, the mean total length for HCH-C was 210.2 mm (8.3 in.) compared to 157.2 mm (6.2 in.) in 2023 and 199.3 mm (7.8 in.) in 2015. A comparison of HCH-C collected in the 2025 survey relative to the 2023 and 2015 surveys indicate an increase in HCH-C collected greater than 200 mm (7.9 in.) (**Figure 6**).

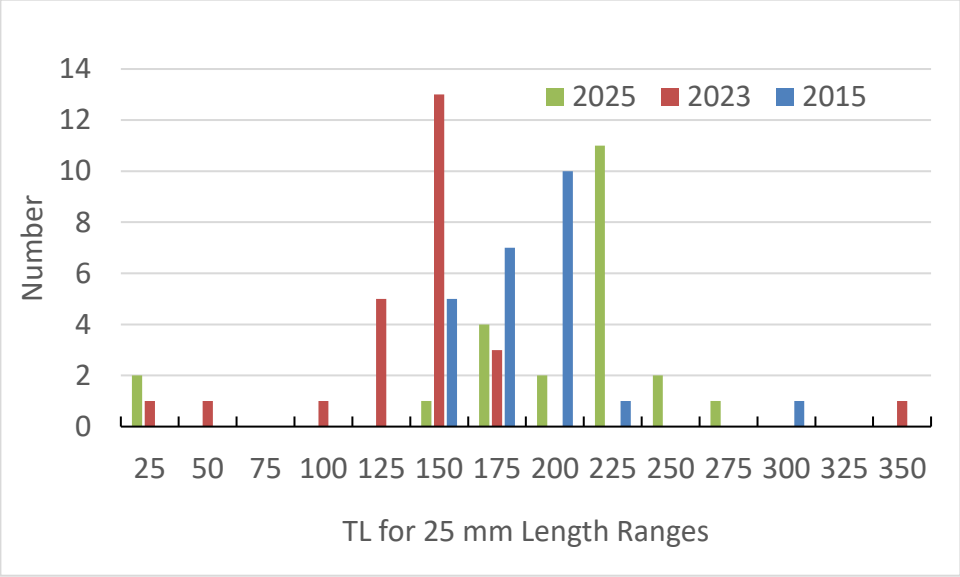

Figure 6. Length-frequency distributions for Clear Lake Hitch captured by electrofishing at Clear Lake, Summer, 2015, 2023, and 2025.

A linear regression equation can be used to determine a reliable estimated weight from the length of HCH-C for all years' total lengths and weights for HCH-C ≥ 90 mm in total length (**Figure 7**).

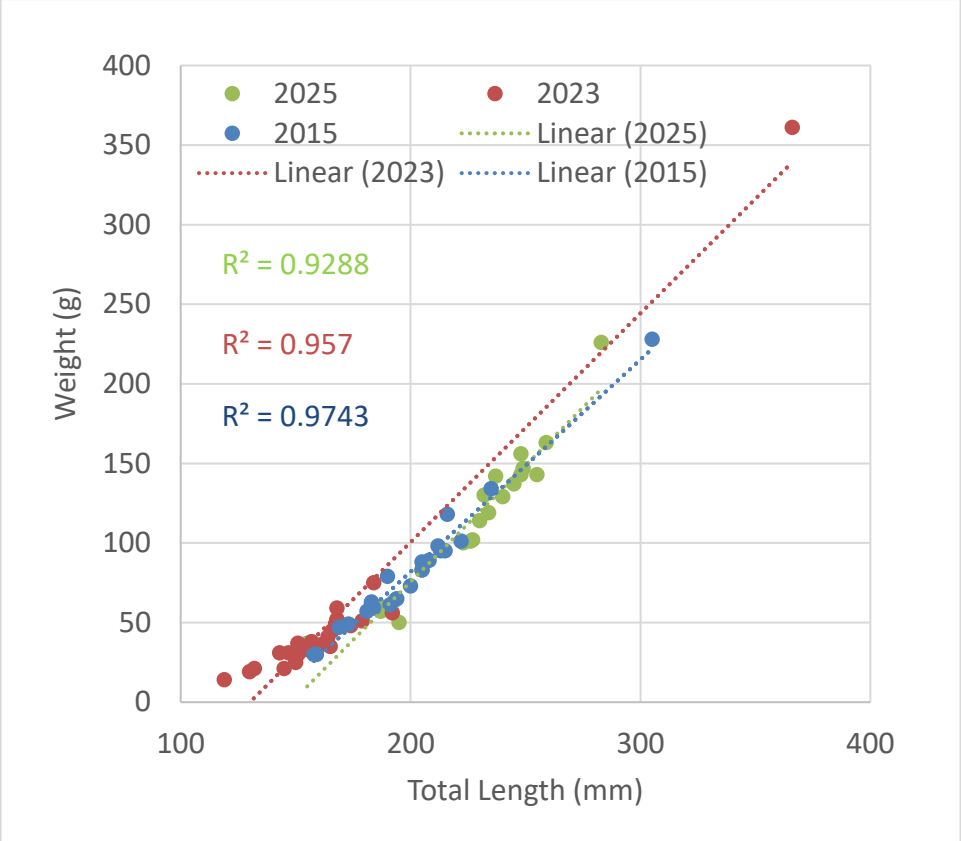

Figure 7. Total length-weight scatter plot with linear regression line for Clear Lake Hitch captured at Clear Lake, Summer, 2015, 2023, and 2025.

Discussion

Due to the small sample sizes collected for the other species, no summaries were made. This was due to the increased possibility the data collected would be an unreliable indicator of how that specific species status was in Clear Lake. In 2025, 10 different species were sampled compared to seven in 2023, and 12 (does not count GF) in 2015. In 2025, 249 fish were collected compared to 107 in 2023, and 335 (not including GF) in 2015. Since 2023, Clear Lake has experienced better water quality and increased capacity, which has likely contributed to the increase of fish seen compared to 2023. In 2022, Clear Lake was very low with a large bathtub-ring around the lake, offering no structure/vegetation refuge for eggs/juvenile fish. It is likely many of the eggs/juvenile fish that need this refuge were predated on by other fish, birds, or

mammals. Additionally, during the 2023 survey, much of the shoreline of Clear Lake had a large and possibly toxic algae bloom (**Figure 8**) which may have forced many fish to seek refuge into deeper water.

Figure 8. Clear Lake on June 27, 2023.

Of the 249 fish that were collected in 2025, LMB were captured in the greatest number (n = 157, 63.1%). This was also true for 2023 and 2015 (**Table 1**). Although, overall numbers of LMB increased from 2023, the 2025 and 2023 PSD and RSD-P for LMB were unbalanced with larger-sized fish. These values likely indicate the lack of recruitment in spring of 2023 and prior. According to Gablehouse (1984), there is an

imbalance, but Clear Lake is also well known throughout the world as a lake that grows a significant amount of large bass, most recently being named number one bass fishery in the country. Factors such as large surface area/volume, long growing season, and abundance of forage fish contribute to LMB productivity. It is possible with the 2023 historical high rainfall and the lake reaching capacity in 2024 and 2025 that more juvenile LMB will survive and bring the PSD and RSD-P into balance.

The 2025 average Wr for LMB was 111 which indicates the population is in “excellent” condition. LMB’s relative weight classifications of “good” in 2023 and 2015, as well as “excellent” in 2025 can likely be attributed to the reasons mentioned above for the larger-sized LMB.

The 2015-2025 length frequency distribution offers further support that the LMB population had prior poor recruiting seasons. With the increase of juvenile fish collected in 2025, it is likely the 2023 LMB recruitment was an improvement from 2018-2022.

HCH-C made up the third greatest number of fish collected in 2025 compared to second in 2023, and fourth in 2015. It was positive to see the continued high number of HCH-C collected relative to the total number of species collected for a third survey in a row. HCH-C may never be the top species of number collected in a general fish survey, but to consistently be in the top four, is and will continue to be a positive sign for the species. However, the decrease of HCH-C collected under 150 mm suggests that 2023, 2024, and early 2025 may be recruitment years that don’t appear to be very productive.

We sampled the same 18 transects that were surveyed in June 2015 and June 2023, other than site 894, which mistakenly CDFW sampled instead of nearby 249. However, we believe we were still able to gather consistent and comparable data that will be used to inform management decisions.

References

Anderson, R. O. and R. M. Newmann. 1996. Length, weight and associated structural indices. Pages 447-482 in B. R. Murphy and D. W. Willis, editors. Fisheries techniques, 2nd edition. American Fisheries Society, Bethesda, Maryland.

Ewing, B. and Granfors, Q. Personal Communication. California Department of Fish and Wildlife. Unpublished.

Ewing, B., Hickey, Kassie and J. Rowan. 2016. 2014 - 2015 Clear Lake Fishery and Habitat Evaluation. California Department of Fish and Wildlife. Available from: https://nrm.dfg.ca.gov/FileHandler.ashx?DocumentID=116729

Ewing, B. 2023 Clear Lake General Fish Survey. 2024. California Department of Fish and Wildlife. Available from: https://nrm.dfg.ca.gov/FileHandler.ashx?DocumentID=220011

Gablehouse, D.W., Jr. 1984a. A length-categorization system to assess fish stocks. North American Journal of Fisheries Management 4:273-285.

Moyle, P. 2002. Inland Fishes of California. University of California Press, Berkeley and Los Angeles, California. Pg. 138, 383, 400.

Murphy, B.R. and D.W. Willis. 1996. Fisheries Techniques, 2nd edition. American Fisheries Society, Bethesda, Maryland. Pages 458 and 462.