



CALIFORNIA WETFISH PRODUCERS ASSOCIATION

PO Box 1951 • Buellton, CA 93427 • Office: (805) 693-5430 • Mobile: (805) 350-3231 • Fax: (805) 686-9312 • www.californiawetfish.org

April 1, 2019

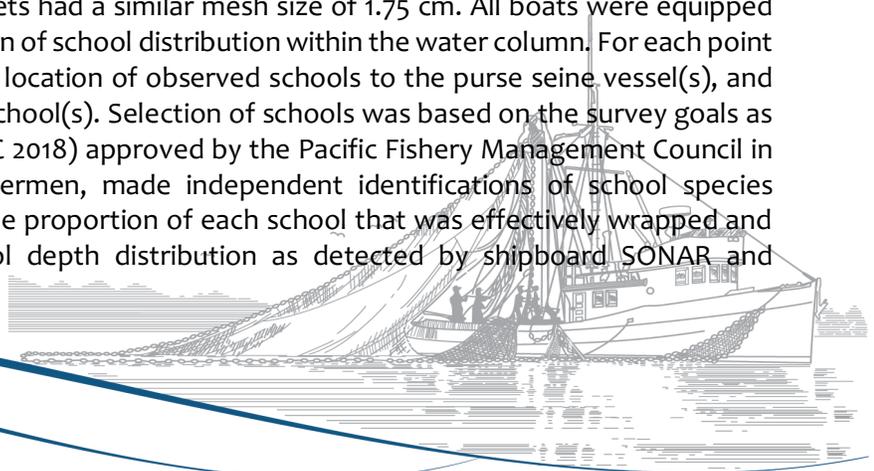
CALIFORNIA WETFISH PRODUCERS ASSOCIATION (CWPA) NEARSHORE COOPERATIVE SURVEY PROGRESS REPORT IN SUPPORT OF THE 2019 EXEMPTED FISHING PERMIT

The California Wetfish Producers Association (CWPA) has submitted an exempted fishing permit application (EFP) for continuing research (Agenda Item E.2). This EFP requests 400 mt to allow for the catch of Pacific Sardine (sardine) during the 2019-2020 fishing season (July-June). This research will collect complementary data to address research recommendations from a methodology review panel for the CDFW-CWPA aerial survey (PFMC 2017). The aerial survey provides information on the nearshore biomass of coastal pelagic species (CPS), including sardine and northern anchovy distributions off the coast of California that are currently unaccounted for in NMFS acoustic-trawl (AT) surveys, now the primary index for sardine stock assessments.

The catch of CPS schools (“point sets”) identified by aerial observers will be landed, weighed and sampled to compare with estimates of tonnage and species composition made by the spotter pilot and observer. These data, combined with previously collected point sets from a prior study in 2010 (Jagiello 2010), will be used to develop a correction factor for adjusting aerial survey biomass estimates, as part of a collaborative research project intended to qualify aerial surveys and the resultant minimum abundance estimates for use in future stock assessments. This report summarizes EFP research methodology and initial analyses from the point sets collected in 2010 and 2018.

Point sets

Point sets were conducted in 2018 from August 17 to 28, using purse seine gear deployed from commercial CPS fishing vessels chartered for the survey. Four vessels, each equipped with 2 to 4 wells (holds), allowed for the separation of catches collected from individual CPS sets (Table 1). Purse seines ranged from 365 to 420 m in length and from 37 to 54 m in depth, but all nets had a similar mesh size of 1.75 cm. All boats were equipped with SONAR and fathometer, allowing detection of school distribution within the water column. For each point set, the pilot and observer communicated the location of observed schools to the purse seine vessel(s), and directed the fishing vessels to wrap selected school(s). Selection of schools was based on the survey goals as defined in the Exempted Fishing Permit (PFMC 2018) approved by the Pacific Fishery Management Council in 2018. Both the pilot and observer, and fishermen, made independent identifications of school species composition and estimates of tonnage, and the proportion of each school that was effectively wrapped and retained. Boat captains also recorded school depth distribution as detected by shipboard SONAR and fathometer.



Catches from each set were landed at the closest port, as determined by the processor, as soon as the boat reached well capacity or at the end of the sampling day. As each school was offloaded at the processing facility, the processor took bucket samples per established protocols for commercial fishing operations to determine species composition data and weights for each species. The weight of the catch by species in each well was recorded separately, according to point set number, facilitating the determination of total weight and species composition of each captured school.

Biological sampling

Each school captured was sub-sampled onboard the fishing boat throughout the pumping aboard of each purse seine set. Fish were sampled four times at equal intervals throughout the pumping of each set, using 5-gallon buckets to collect fish samples. The contents of each bucket were sorted by species and weighed in aggregate by species. All four subsamples were mixed in a basket, and 50 fish per species per set were randomly selected, stored in plastic bags and preserved on ice until landing. All collected fish samples were processed at the CDFW laboratory and measured for biological characteristics (length, weight, sex, maturity, and age), following routine procedure.

Preliminary Results

Point set survey

During the 2018 NCS point set sampling, a total of 21 fish schools was captured by chartered purse seine vessels as directed by the pilot. One point set of mackerel was attempted off Catalina island, but less than 10% of the school was retained by the purse seine as the fish escaped during the wrap. Although many schools of anchovy were spotted during the survey, none of these schools could be caught because they were observed in areas off-limits to purse seine fishing, or contained early juvenile fish too small to be retained in the 1.75 cm mesh size nets. Nineteen sardine schools were captured, but three were released as they did not meet the minimum threshold of 80 percent capture. Sixteen schools of Pacific sardine were successfully captured and retained as valid point sets (>80% capture). These sets were included in the computation of bias. Most schools captured during the surveys were pure sardines. Some of the schools were mixed with a few Pacific and Jack mackerel (1-13 fish). As expected, sardines caught during purse seine sampling were mostly juvenile and young adult fish. Sardine ranged in size from 104 mm to 269 mm, but the size of most fish was lower than 200 mm (Figure 2).

Bias correction factor

Preliminary analyses were conducted to estimate the bias correction factor, using a total of 42 point sets collected in the SCB in 2010 and 2018. School biomass estimated by the same observer in both years was used in these analyses. A weighted least-squares linear model with no intercept was used to compute the ratio of estimated school biomass (ESB, mt) to adjusted landed catch (ALC, mt) for each sardine school captured during point set sampling. Previous analyses showed that the intercept of the linear model was not significantly different than 0 ($p = 0.29$), and thus it was set to 0. Hence, the ratio estimate, computed as the slope of the linear model, was 0.81(CV= 3%) (Figure 3). These results indicate that the spotter tends to underestimate school biomass during aerial surveys. Hence, biomass estimated from aerial surveys is most likely to be negatively biased, and this ratio could be used to adjust aerial biomass with a high level of precision.

Future point set sampling

During the 2019-20 fishing year, conditional on approval of this EFP, additional point sets will be attempted to collect more data so that all school sizes observed during past aerial surveys can be accounted for by the regression model. Based on the 2018 EFP (PFMC 2018) and current data on point set sampling, mean school size, mean number of schools, and species composition estimated from 2016 to 2018 during aerial survey (Table 1) were used to update both the target sample size and associated sardine biomass for the 2019 EFP.

The request for 400 mt of sardine for this EFP is based on the need for additional data to make the regression model more representative of all school sizes observed during past aerial transect surveys, i.e. from 2016 to 2018, and hence minimize the need for extrapolating beyond our data when applying the bias correction factor to adjust future aerial biomass estimates. Therefore, in 2019 we will seek to collect at least another 7 point sets, trying for larger schools in the 20-100 mt range (Table 1, Figure 3), which may include anchovy schools as well as sardine. Having collected 16 viable point sets from August 2018, we seek to collect another 7 point sets at least, which would complete the goal of 23 total point sets from the 2018 EFP. The targeted school sizes in Table 1 are based on preferred sizes that would improve the application of the bias correction factor to future aerial transect surveys, and feasible to accomplish within the time period. The total point set catch will not exceed the 400 mt sardine requested.

Table 1. Targets of CPS schools by size for the 2019 point set sampling. Number and size of 2019 Target point sets are based on goal of 23 total point sets from 2018 EFP.

School Size (mt)	2010 Point Sets	2018 Point Sets	Total Point Sets Collected	2019 Target Schools
0-10	4	12	16	--
10-20	6	4	10	--
20-30	3	0	3	2
30-40	2	0	2	1
40-50	6	0	6	--
50-60	0	0	0	1
60-70	2	0	2	2
70-80	1	0	1	
80-90	2	0	2	
90-100	0	0	0	
100+	0	0	0	1
Total	26	16	42	7

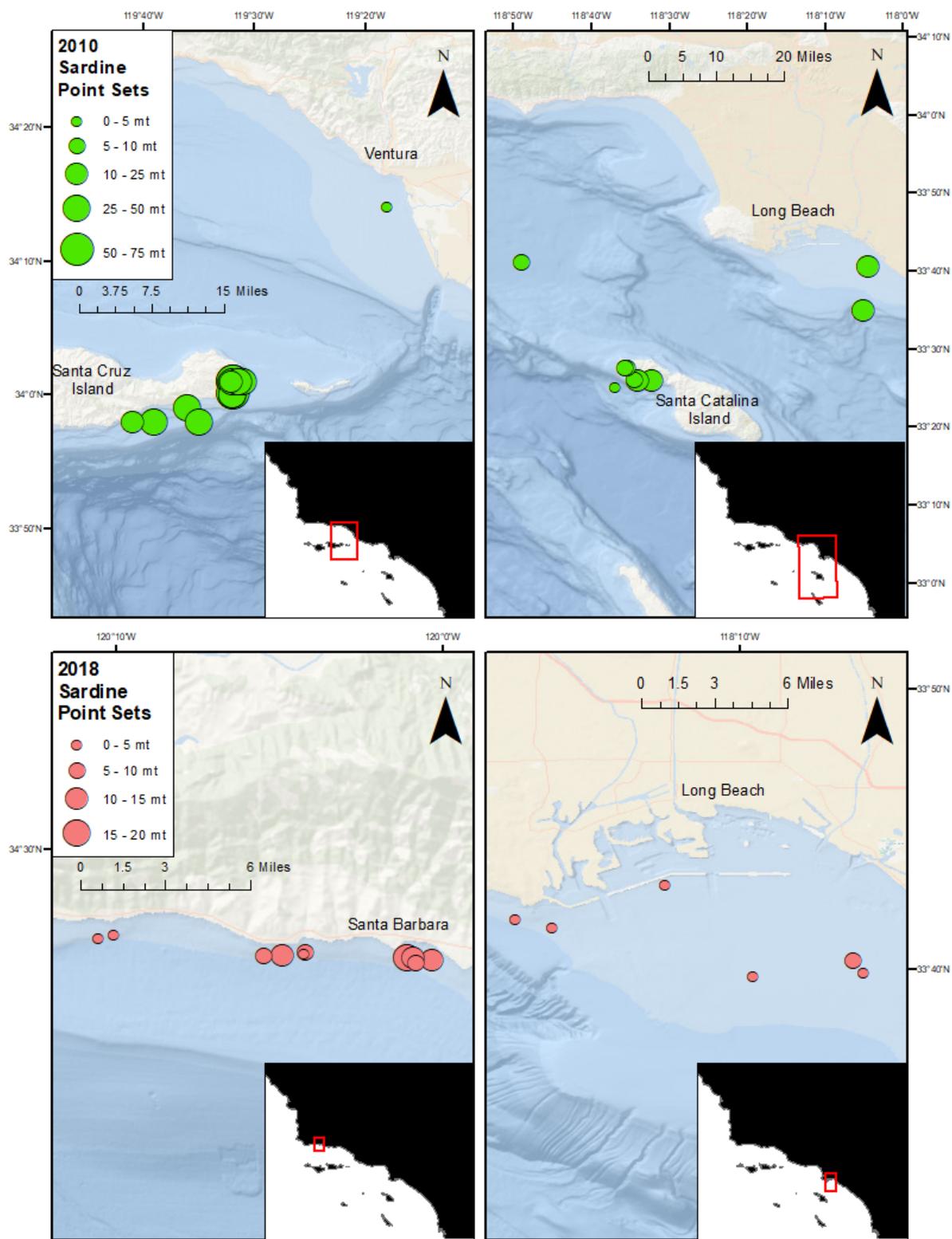


Figure 1. Spatial distribution and school size of Pacific Sardine collected during the 2010 (green circle) and 2018 (red circles) surveys.

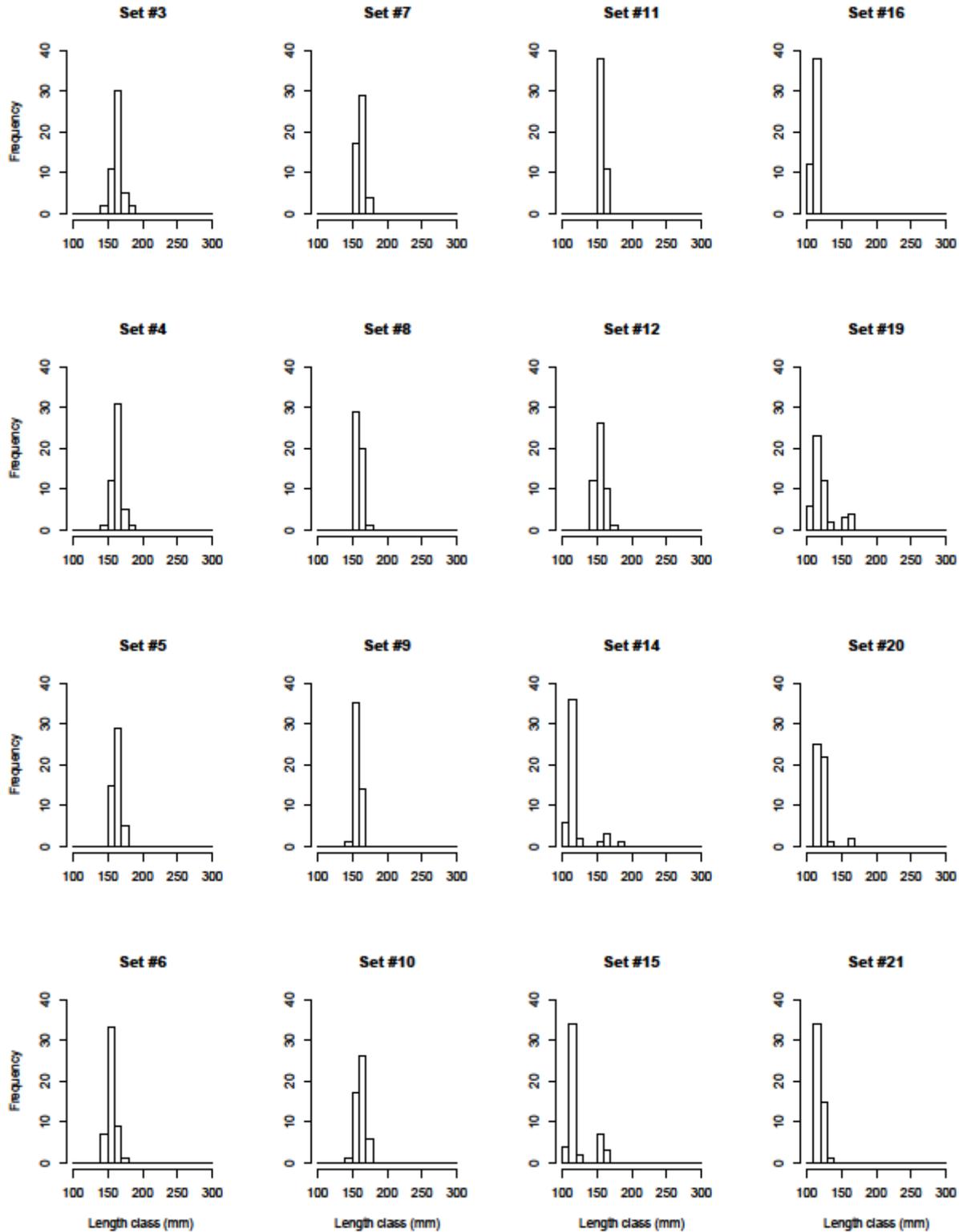


Figure 2. Length distribution of Pacific Sardine collected from each point set during the 2018 nearshore cooperative survey.

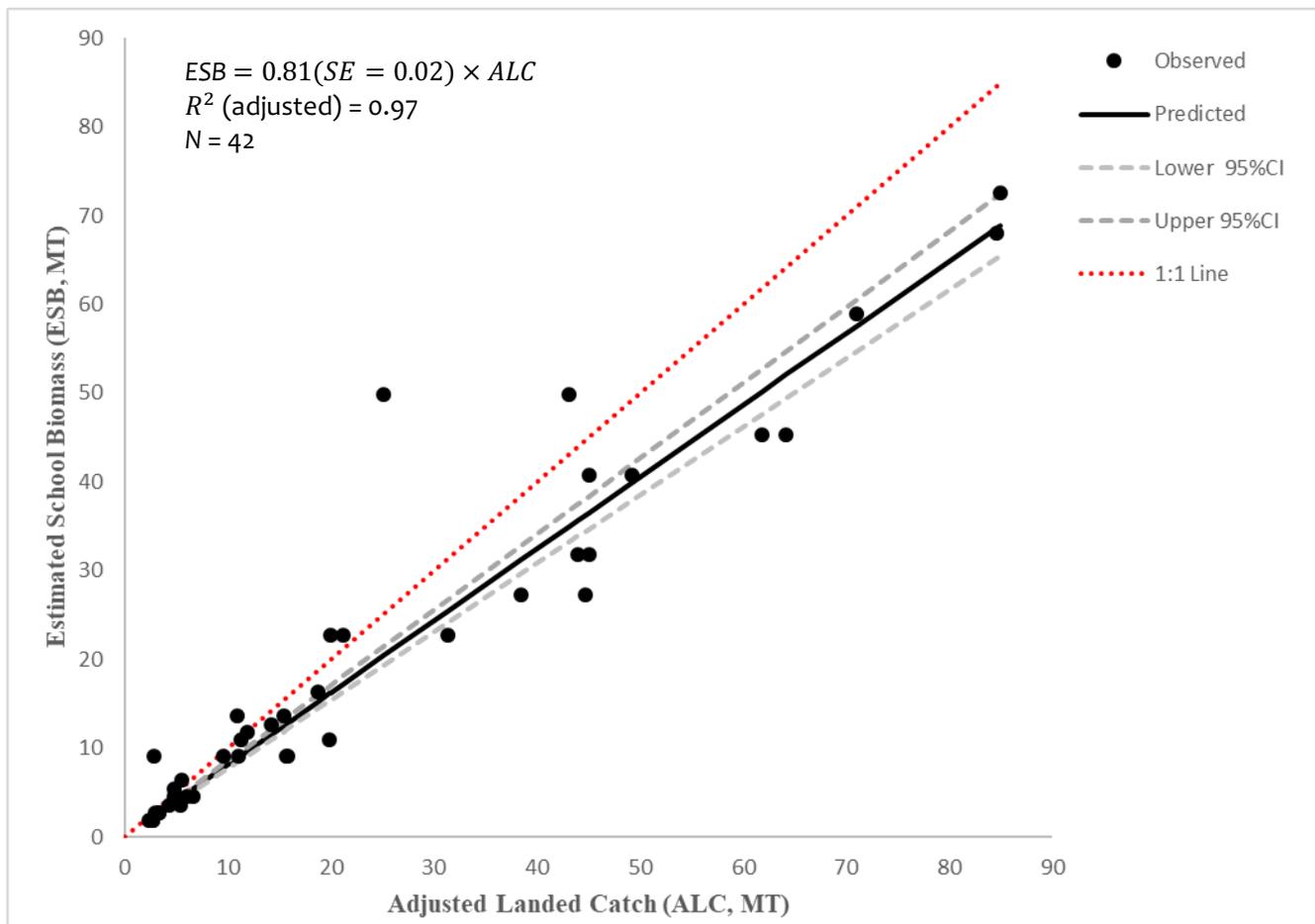


Figure 3. Linear model used to compute the ratio (0.81) of estimated school biomass to adjusted landed catch of captured schools during point set sampling in 2010 and 2018. Percent captured for schools used in the analyses ranged from 90% to 100%. Dotted line represents 1:1 ratio of ESB to ALC.

References

- Jagiello, T.H., Hanan, D., Howe, R., and M. Mikesell. 2010. West Coast Aerial sardine Survey. Sampling Results in 2019. Prepared for Northwest Sardine survey and the California Wetfish Producers Association. Pacific Fishery management Council, Portland, OR, October 15, 2010. 51p.
- PFMC. 2017. Southern California coastal pelagic species aerial survey methodology review. http://www.pcouncil.org/wp-content/uploads/2017/05/D2_Att1_Meth_Review_Panel_Rpt_Jun2017BB.pdf.
- PFMC. 2018. Revised application for experimental fishery permit to allow take of Pacific Sardine in 2018 nearshore research program. https://www.pcouncil.org/wp-content/uploads/2018/03/C2_Att_1_Apr2018BB.pdf.