

SCIENTIFIC AND STATISTICAL COMMITTEE REPORT ON SARDINE HARVEST SPECIFICATIONS AND MANAGEMENT MEASURES FOR 2023-2024

In April 2022, the Scientific and Statistical Committee (SSC) recommended the 2022 Northern Subpopulation (NSP) Pacific sardine Stock Assessment update be adopted for use by management as a category 2 assessment. The category 2 designation was based on a suite of uncertainties, including questions related to the reported large Mexican catch of NSP sardines relative to the estimated total biomass. At that meeting, the stock assessment team (STAT) expressed concerns about their ability to resolve these uncertainties if also tasked with developing a 2023 stock assessment update. The SSC concurred that delaying a full assessment to 2024 and conducting a review based on new work to better understand stock structure and other uncertainties would be a productive course for improving stock assessments over the longer term.

The SSC discussed the 2022 update stock assessment, their previous statements on an appropriate path forward for 2023-2024 Harvest Specifications, and new information related to the summer 2022 acoustic-trawl (AT) biomass estimate of NSP sardine and the outcome of the SSC Coastal Pelagic Species (CPS) subcommittee meeting on March 20-21, 2023 (Agenda Item H.1).

The SSC notes that the summer 2022 AT survey estimated a total NSP Pacific sardine biomass of 69,506 tons, with a CV of 21 percent. This represents an increase relative to the 2021 estimate of 40,983 tons with a CV of 37 percent, although given this uncertainty the difference in estimated biomass between the two years is modest. While the SSC recommends adoption of the 2022 survey results for future sardine stock assessments, it does not recommend using the estimate as a direct basis for arriving at an overfishing limit (OFL). The SSC notes that the information available during the review discussed under Agenda Item H.1 did not include the proportion of the summer 2022 NSP biomass that is age 1+ (as 1+ biomass is the quantity used to compute an OFL from the stock assessment).

Based on the National Marine Fisheries Service (NMFS) report provided under Agenda Item H.1, the SSC recognizes that major improvements to future assessment models are expected. Specifically, the SSC recommended adoption and use of the Southwest Fisheries Science Center's (SWFSC) updated Pacific sardine potential habitat model (Agenda Item H.1.c, Supplemental SSC Report 1), for which the threshold value is based on the assumption that the high catch of sardine during 2020-2021 in Mexican waters was from the southern subpopulation (SSP). This is likely to greatly reduce or remove the apparent conflict between the scale of total estimated NSP biomass and NSP catch in previous assessments, ideally resulting in a more robust assessment.

The SWFSC provided the SSC the latest California Cooperative Oceanic Fisheries Investigations (CalCOFI) sea surface temperature (SST) values, which were used to inform sardine harvest control rules (HCRs). The three-year average SST (2020-2022) was estimated to be 15.985°C, slightly lower than the 2019-2021 average temperature of 16.039°C reported in the 2022 update assessment and used to set the 2022-2023 OFL. This would be associated with an E_{MSY} slightly lower than that reported in the 2022 update assessment. The SSC noted last year that since this HCR was revised in 2013, the temperature has suggested an E_{MSY} close to the upper end of the recommended range, despite evidence for low productivity and abundance since that time. The SSC recommends that a workshop be convened to revisit the analysis and assumptions that have

been used to inform the NSP Pacific sardine HCR, as there continues to be evidence that the adopted relationship between sardine productivity and ocean temperatures is not currently valid.

The SSC recommends rolling over the 2022-2023 OFL of 5,506 tons for the 2023-2024 management cycle given a lack of compelling evidence that NSP biomass has changed substantially between 2021 and 2022, and the lack of complete information needed to apply the full OFL formula to an updated biomass estimate. Rolling over the 2022-2023 OFL was identified by the SSC in a November 2022 SSC statement on stock assessment prioritization as a potential course of action in the absence of an update stock assessment or other substantial information ([Agenda Item I.5.a, Supplemental SSC Report 1, November 2022](#)).

The SSC recommends that the category 2 sigma continue to be used to inform the acceptable biological catch (ABC) (when combined with the Council’s decision for a P*) since the revised catch estimates (based on the new habitat model) have not been evaluated within the assessment, and retrospective issues continued to be a concern in the 2022 update assessment. The sigma value should be multiplied by 1.31 to account for the time that has passed since the update assessment was conducted. Table 1, below, provides the recommended OFL and ABC values for P* alternatives that may be selected by the Council.

Finally, the SSC notes that the information reviewed by the SSC CPS subcommittee indicated that the abundance of NSP in Mexican waters appears to have declined over time, suggesting that the DISTRIBUTION term used to apportion the OFL for the NSP should be reconsidered. Similarly, an increasing proportion of the U.S. sardine catch, particularly in Southern California waters, has been assigned to the SSP based on the new habitat model. The SSP is not currently included in the CPS FMP. Consequently, catches of SSP are counted against the allowable catch for the NSP. The SSC recommends that the Council consider an appropriate means of identifying management approaches for the SSP given its inferred increased presence in U.S. waters.

Table 1: SSC recommended OFL and corresponding ABC values based on a year 2 buffer for a category 2 assessment and the Council choice for P* (DISTRIBUTION [0.87 in US waters] was accounted for in the calculation of the OFL)

| 2023-2024 OFL | | 5,506 t | | | | |
|----------------------|----|---------------------------------------|--------------|--------------|--------------|--------------|
| | | Category 2 (baseline $\sigma = 1.0$) | | | | |
| | P* | 0.45 | 0.40 | 0.35 | 0.30 | 0.25 |
| <i>Year 1 buffer</i> | | <i>11.8%</i> | <i>22.4%</i> | <i>32.0%</i> | <i>40.8%</i> | <i>49.1%</i> |
| Year 2 buffer | | 15.2% | 28.2% | 39.6% | 49.7% | 58.7% |
| 2023-2024 ABC (t) | | 4,669 | 3,953 | 3,326 | 2,770 | 2,274 |