

COASTAL PELAGIC SPECIES MANAGEMENT TEAM REPORT ON NORTHERN ANCHOVY STOCK ASSESSMENT AND MANAGEMENT MEASURES

The National Marine Fisheries Service (NMFS) Southwest Fisheries Science Center (SWFSC) produced a report, Egg and Larval Production of the Central Subpopulation of Northern Anchovy in the Southern California Bight (Agenda Item G.4.a, SWFSC Report), which was reviewed by the Scientific and Statistical Committee (SSC) Coastal Pelagic Species (CPS) Subcommittee on October 11, 2016. The report was produced following recommendations from the May 2016 workshop convened to explore alternative approaches to assessing CPS, with a concentration on the central subpopulation of northern anchovy (CSNA). Some members of the Coastal Pelagic Species Management Team (CPSMT) attended both the May workshop and October review meeting. The CPSMT also attended the SSC November meeting where Dr. Ed Weber summarized the report, including changes requested by the SSC CPS Subcommittee during the October 11, 2016 review. The CPSMT thanks the SWFSC and Dr. Weber for the report.

This CPSMT report provides comments from our consideration of the information presented under this agenda item, and on indicators of anchovy abundance and related ecosystem considerations, and presents steps that the CPSMT would like to take to address some of the current challenges of managing CPS. The CPSMT suggests using northern anchovy as a basis to: 1) explore or identify how to utilize information from ecosystem models, 2) examine other structural management approaches that recognize the limitations with assessing some CPS while still supporting regular or periodic evaluation of stock status, and 3) more clearly delineate a process for updating harvest management specifications.

Egg and Larval Production Report and Anchovy Stock Status

The CPSMT notes that anchovy abundance estimates indicate the stock remains at low levels (at least up to 2015), but there are indications of potential improving status since 2014 and particularly in 2015-2016.

The CPSMT agrees with the SSC that the Egg and Larval Production Index is generally imprecise for estimating total egg production, and that although it is suitable for evaluating trends in spawning biomass of CSNA within the California Cooperative Fisheries Investigations (CalCOFI) survey area, it is not appropriate to expand the data to estimates of absolute spawning biomass. The index at best provides a broad perspective on the status of the CSNA from 1981 to 2015, since it does not fully cover the distributional range of the population, and the timing of winter and spring surveys may miss peak spawning periods (Agenda Item G.4.a, November 2016, SWFSC Report, Figures 3; Table 2).

The CPSMT also reviewed information provided by the SWFSC summarizing results from recent surveys, including the summer 2015 Sardine-Hake (SaKe), the winter 2016 CalCOFI, the 2016 spring CalCOFI-CPS, the 2016 Rockfish Recruitment and Ecosystem Assessment Survey and the 2016 Summer “California Current Ecosystem Survey” (Item G.4.a, Supplemental SWFSC Report 2.) Taken together, the surveys indicate major temporal and spatial shifts in spawning and recruitment distributions. For example, significant anchovy spawning was detected during 2015

in the Juvenile Rockfish survey and the Acoustic Trawl Method (ATM) survey; however, the CalCOFI survey did not detect this. Spawning occurred in 2016 but appears to have shifted northward and outside of the CalCOFI survey area.

The CPSMT notes that the absolute biomass estimate from the ATM survey provided in the SWFSC report is negatively biased because of coverage gaps in the survey. Testing and implementation of side-scan and front-looking sonar scheduled for the upcoming (2017) ATM survey should begin to address the lack of surface and shallow-water coverage that has been recognized in previous reviews. Complementary surveys are also needed, such as the California Department of Fish and Wildlife (CDFW) - California Wetfish Producers Association (CWPA) aerial project proposed for methodology review in 2017 (Agenda Item G.2, Attachment 1), to expand and improve coverage of nearshore waters.

Despite the uncertainties due to gaps in survey coverage and anchovy distribution shifts noted above, the SWFSC report provides multiple lines of evidence of recent enhanced spawning and recruitment into the fishery:

- Spawning:
 - Off California, fish length data from the ATM survey indicate that anchovy caught in 2015 were spawned in 2015 even though the CalCOFI survey lacked evidence of spawning.
 - Generally, anchovy young-of-the year (YOY) abundances from 2014-2016 were higher than during the period from 2008-2013 (Juvenile Rockfish Midwater Survey).
- Recruitment:
 - In 2016 the Juvenile Rockfish Midwater Survey observed adults for the first time since 2008 (SWFSC Report 2, Figure 8).
 - Data show multiple cohorts in different regions as inferred from length data (2016 California Current Ecosystem Survey).

Additionally, aging work from samples CDFW collected from the 2014 fishery (unpublished data) shows multiple year classes in the catch (ages 0-3), providing further evidence of recruitment to the fishery in recent years.

Ecosystem Considerations and Fishery Impacts

For consideration of ecosystem concerns, especially those related to CPS as forage, the CPSMT reviewed the most relevant sections, including Regional Forage Availability, Marine Mammals, and Seabirds in the State of the California Current Report (SOCC), 2016 (Agenda Item D.1.a, NMFS Report 1, March 2016). Based on the information presented, seabird abundance trends reported as density anomalies may be linked to environmental conditions. For example, the 2015 common murre (piscivore) and the 2014 Cassin's auklet (planktivore) die-offs were attributed possibly to warm ocean conditions. In contrast to these mortality events, sooty shearwater density anomalies show an increase over the long term. The SOCC report states that more research is needed to determine the most likely causes of these die-offs. And, for some place-based predators reliant on anchovy (e.g., brown pelicans), reducing allowable CSNA harvest may offer very little benefit. Other management approaches, such as time-area management, could possibly be more

effective on a case-by-case basis. For example, it appears that brown pelicans have also seen increases in productivity during times of potentially low anchovy abundance (Figure 1). For marine mammals, the SWFSC report notes early observations from a summer survey indicate a trend toward a return of normal sea lion pup weights.

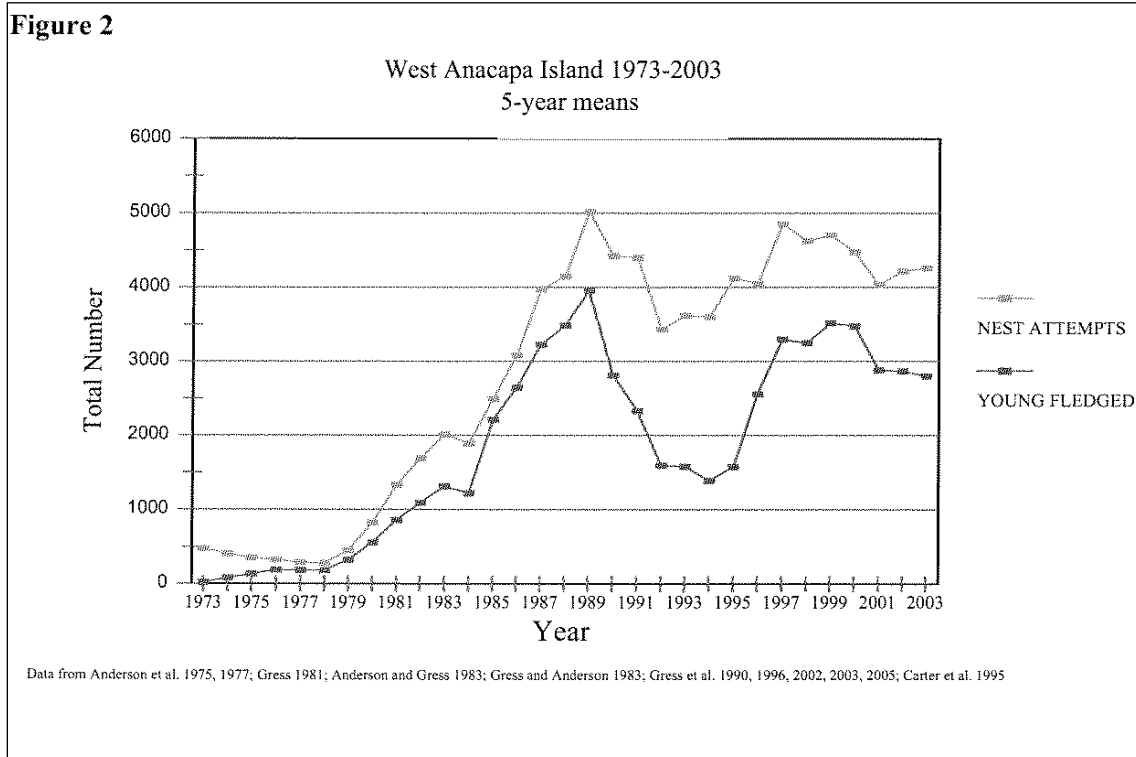


Figure 1. Brown pelican five-year means of nest attempts and young fledged, 1973-2003, United States Fish and Wildlife Service (USFWS).

The CPSMT highlights that anchovy abundance is driven, like other CPS, primarily by environmental conditions, and that additional harvest reduction is unlikely to increase abundance levels. As evidence, trends in anchovy landings over the last 25 years show mostly low levels (e.g. under 10,000 mt) without a significant sustained increase in anchovy abundance. The CPSMT notes 2016 California anchovy landings (through November 10) are about 6,400 mt, compared to approximately 17,000 mt in 2015 (Figure 2).

Given the various lines of evidence of recent spawning and recruitment, and ecosystem considerations, the CPSMT recommends that the Acceptable Biological Catch/Annual Catch Limit (ABC/ACL) for CSNA remain at 25,000 mt.

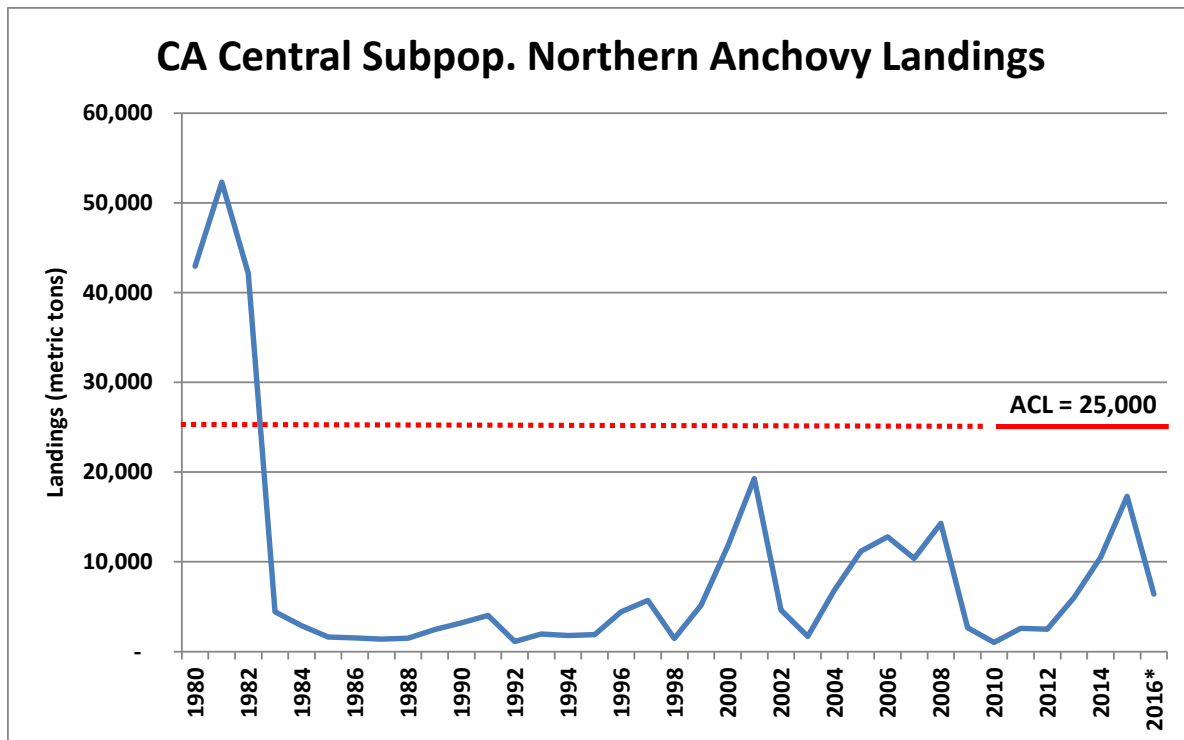


Figure 2. Annual anchovy landings (metric tons) in California, 1980 to November 10, 2016.

Next Steps

The CPSMT does not recommend revising the current management for CSNA at this time, and concurs with the SSC that additional data and steps are necessary to develop a revised overfishing limit (OFL). The CPSMT supports evaluating more recent information for potential reconsideration of the science informing OFL and ABC for northern anchovy and envisions progress on the steps the SSC cited to begin in the forthcoming year. This work is also needed prior to determining if a change to management category assignment (Monitored to Active) is feasible because Active implies annual/biennial assessments and adoption of harvest specifications. The CPSMT emphasizes that moving to the Active management category is not necessary to update harvest specifications.

To that end, the CSPMT would like to work with the SSC CPS subcommittee and SWFSC staff to examine whether current data streams on anchovy may allow refinement of existing harvest specifications, begin scoping a plan to address sampling and survey priorities across all CPS, and develop a timeframe for work to be accomplished. The CPSMT suggests/requests an additional day to the methodology review meeting of the CDFW-CWPA aerial survey to start this process, with a subsequent report to the Council.

As noted by the SSC, there are no set procedures for updating OFL and ABC for monitored species beyond when new scientific information becomes available. To address this lack of a prescribed timing for review, the CPSMT envisions, as part of the review described above, undertaking a process that could lead to future consideration of a new construct for reviewing available data and the OFLs and ABCs for monitored stocks.

The CPSMT also desires to continue to explore modeling efforts that may enhance our understanding of the role of CPS in the ecosystem and improve our ecosystem-based management approaches for these species. To date, potential indirect impacts of fishing for CPS on predators have proven difficult to quantify. In 2013, as part of the workshop (Agenda Item I.1.b, Attachment 1, April 2013) held by the Council and the SWFSC center on the harvest parameters of the sardine control rule, information on existing ecosystem models for the California Current Ecosystem was reviewed and it was determined that none of the ecosystem models presented were sufficiently well developed to directly analyze these linkages.

The CPSMT notes that work has been ongoing on some of those models. The Northwest Fisheries Science Center and the Ocean Modeling Forum (presentation to Council in June 2015) have made significant progress on certain models specifically relating to forage fish. These include the Atlantis (Kaplan et al, in prep), MICE (Punt et al. 2016 Ecological Modelling), and Ecopath (Koehn et al. 2016 Ecological Modelling) models. The Atlantis model was formally reviewed by the Council in 2014 and found to be an appropriate tool for potentially addressing fishery impacts on the food web; however, the SSC noted at that time that the results from this model should be interpreted qualitatively rather than quantitatively for Council applications and that this model should not be used to set OFLs or ABCs. The CPSMT agrees that these types of models may be a way to examine the impacts of harvest and plans to develop closer ties with the groups working on these models to help ensure they can provide the tools the CPSMT is seeking.

Conclusions

At this time, the CPSMT does not recommend a change to the OFL and ABC/ACL based on the following:

- CSNA stock status has been at a low level since 2008, but appears to be improving based on survey indications of enhanced spawning and recruitment to the fishery.
- CSNA harvests have been at low levels for an extended time period; therefore, if a decrease in anchovy abundance has occurred, it has done so in the near absence of a fishery.
- CSNA abundance and distribution are highly influenced by oceanographic conditions; therefore, restricting potential harvest is unlikely to drive improvements in CSNA abundance.

At this time, the CPSMT does not recommend a change from the monitored management category based on the following:

- A change of management category is not necessary in order to review/revise the OFL and/or ABC of monitored stocks if and when new information becomes available to do so.
- The CPSMT intends to explore changes to CPS management categories.

The CPSMT recommends the following initial steps to address ongoing uncertainties:

- Seek/support improvements in survey coverage spatially and temporally for CPS stock status evaluations.
- Seek to optimally incorporate a periodic review of monitored stocks management with our ongoing management needs for actively managed stocks. This would involve CPSMT consultation with NMFS, SWFSC and Northwest Fisheries Science Center experts, and the SSC CPS Subcommittee in matching CPS management needs with survey and analytical capabilities to determine a timeline for the near-term (5 years).

- Seek to better understand and potentially address ecosystem concerns, particularly with regard to CPS as forage. The CPSMT would consult with appropriate experts (including the SSC CPS Subcommittee and the USFWS) to discuss the readiness and utility of ecosystem models and also potential management approaches such as time-area management to address dependent predator concerns.

References

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