NATIONAL MARINE FISHERIES SERVICE REPORT ON COASTAL PELAGIC SPECIES MANAGEMENT

National Marine Fisheries Service (NMFS) Southwest Region will briefly report on recent international and domestic developments relevant to coastal pelagic species (CPS) fisheries and issues of interest to the Council. NMFS Southwest Fisheries Science Center will briefly report on CPS-related science and research activities.

Council Task:

Discussion.

Reference Materials:

None.

Agenda Order:

a. Regulatory Activities — Svein Fougner
b. Science Center Activities — Paul Crone
c. Reports and Comments of Advisory Bodies
d. Public Comment
e. Council Discussion

PFMC
08/23/04

Pacific mackerel proposed rule

The Southwest Region published the proposed rule to implement the annual harvest guideline for Pacific mackerel on July 20, 2004 (69 *FR* 43383). The public comment period for the proposed rule ended on August 4, 2004. One comment was received but did not contribute information that would provide a basis for a change in the final specifications. The final rule will be published as soon as practical. The Pacific mackerel fishing season begins on July 1 of each year and ends on June 30 the following year.

Pacific sardine landings

The Pacific sardine resource off California, Oregon, and Washington has a fishing season that starts January 1 and runs through December 31 each year. The harvest guideline for January 1, 2004, through December 31, 2004, is 122,747 metric tons (mt) (68 *FR* 67638, December 3, 2003). The northern allocation is 40,916 mt (north of Pt. Arena 39 00' 00" N. lat.), and the southern allocation is 81,831 mt. As of July 31, 2004, the northern allocation area has landed 14,632 mt (about 36% of their allocation); and the southern allocation area has landed 19,421 (about 24% of their allocation).

CPS Observer Program

The Southwest Region of the National Marine Fisheries Service initiated a year long pilot observer program on California purse seine fishing vessels landing Coastal Pelagic Species (CPS) in July 2004. NOAA Fisheries is able to place observers on California purse seine fishing vessels as a condition of the Magnuson-Stevens Fishery Conservation and Management Act [50 CFR§ 660.519, Coastal Pelagic Species Fisheries Management Plan] and the vessel's Marine Mammal Authorization Certificate [50 CFR§ 229.7]. The pilot observer program's main focus is to gather data on total catch and bycatch, and on interactions (if any) between their fishing gear and protected species such as marine mammals, sea turtles, and sea birds. Observers were contracted and trained by NOAA Fisheries in the beginning of July 2004. As of August 25th observers completed 10 vessel trips ranging from Moss Landing to San Pedro, California. Out of ten trips, there were two observations of net entanglements of California sea lions (one died and the other was released alive).

NATIONAL MARINE FISHERIES SERVICE - SOUTHWEST FISHERIES SCIENCE CENTER REPORT ON COASTAL PELAGIC SPECIES - SCIENTIFIC RESEARCH UPDATE

The following discussion highlights important areas of research recently completed, currently being addressed, or planned for the future by the Southwest Fisheries Science Center (SWFSC) concerning coastal pelagic species (CPS), e.g., Pacific sardine, Pacific mackerel, and market squid. In many of the following areas of scientific study, the SWFSC works directly or indirectly with state fishery agencies (e.g., California Department of Fish and Game, Oregon Department of Fish and Wildlife, and Washington Department of Fish and Wildlife), academic institutions (e.g., University of California San Diego, Scripps Institution of Oceanography-SIO and University of California Davis), and the fishing industry (e.g., Coastal Pelagic Species Advisory Subpanel and Market Squid Industry-Agency Cooperative Research Program).

- The first, formal Stock Assessment Review (STAR) for Pacific mackerel and sardine took place in June 2004 at the La Jolla Laboratory of the SWFSC.
    - In this context, the alternative statistical population models that were developed over the last year for these species were supported and ultimately, recommended as assessment tools to be used in future stock assessments.
    - Finally, based on recommendations from the Panel, population dynamicists are well underway with critical evaluations of both baseline input data, such as catch-at-age time series from recently available data from Mexico and Canada, as well as important assumptions and model parameterization methods.

- For the first time, three CPS-related research cruises were conducted off the 'Pacific NW' (42° to 48°N latitude / inshore waters out to 127°W longitude, roughly 15-150 mi offshore) over the last year in efforts to better understand stock distribution of particularly sardine; cruise objectives included:
    - Obtaining fishery-independent data to examine: (1) biological parameters of adult sardines and occurrence/distribution of early life stages, such as eggs and larvae; (2) oceanographic parameters; and (3) hydroacoustic sampling gear/design for potential alternative monitoring programs.
    - Each research survey spanned roughly three weeks; a summer 2003, winter 2004, and summer 2004 cruise.
    - A winter 2005 cruise is being planned; however, funds, ship time, and sampling design have not been finalized to date.
    - A one-week spring 2004 cruise was also conducted off central and northern California to examine biological parameters of adult sardines early in the annual migration north that is generally hypothesized for this species.

- The ongoing *CalCOFI Conference* will be held this November at the Scripps Institution of Oceanography, in conjunction with the *Trinational Sardine Forum*.

    - Efforts continue to strengthen collaborative research and data exchange between Canada and in particular, Mexico researchers, given the vast range (say distribution) of this trans-boundary species in any given year, depending on environmental conditions.

- The newly developed assessment method on market squid (i.e., Egg Escapement Method) has received much bolstering over the last six months, including: field collection and laboratory processing of field samples over a broad spatial/temporal design to better understand the variability of reproductive parameters important to the population analysis; simulation modeling research to further examine biological reference points important in the management of this species; and finally, plans are being constructed for a collaborative age/growth study with international researchers in efforts to gain more insight into squid biology on a global scale.

- An economic-based study is underway that generally addresses fisher and processor cost/earnings data by Pacific coast 'regions' (i.e., southern California, northern California, and Pacific NW) in efforts to assess the economic-related impacts of various industry options for allocating the harvest guideline on sardine.

COASTAL PELAGIC SPECIES STAR PANEL REPORT

A coastal pelagic species (CPS) stock assessment review (STAR) was held Monday, June 21, 2004 through Friday, June 25, 2004. The purpose of the CPS STAR Panel was to review new modeling methods for the assessments of Pacific sardine and Pacific mackerel. In their reports, the STAR Panel provides recommendations about use of the new assessment methodologies for developing management recommendations for the 2005 sardine fishery and 2005/2006 Pacific mackerel fishery. Their reports also discuss research and data needs for management of CPS fisheries.

If approved by the Council, the new assessment methodology for Pacific sardine would be used to develop the stock assessment and harvest guideline recommendation for the Council's November 2004 meeting. This harvest guideline would be for the sardine fishery starting January 1, 2005.

If approved by the Council, the new assessment methodology for Pacific mackerel would be used to develop the stock assessment and harvest guideline recommendation for the Council's June 2005 meeting. This harvest guideline would be for the Pacific mackerel fishery starting July 1, 2005.

Mr. Tom Barnes (STAR Panel Chair) will summarize the STAR Panel's findings and recommendations. The Scientific and Statistical Committee, CPS Management Team, and CPS Advisory Subpanel will also provide reports to the Council.

Council Task:

Discussion and guidance.

Reference Materials:

1. Agendum I.2.b, Pacific Mackerel STAR Report
2. Agendum I.2.b, Pacific Sardine STAR Report
3. Agendum I.2.c, CPSMT Report
4. Agendum I.2.c, CPSAS Report
5. Agendum I.2.d, Public Comment
6. Agendum I.2.c, Supplemental SSC Report

Agenda Order:

a. Agendum Overview	Dan Waldeck
b. STAR Panel Report	Tom Barnes
c. Reports and Comments of Advisory Bodies	
d. Public Comment	
e. Council Discussion and Guidance	

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08/23/04

Pacific Mackerel

STAR Panel Meeting Report

NOAA / Southwest Fisheries Science Center
La Jolla, California
June 21 – 24, 2004

STAR Panel
Tom Barnes, California Department of Fish and Game (Chair)
Andre Punt, University of Washington (SSC Representative)
Rodolfo Serra, IFOP, Valparaiso, Chile
John Wheeler, Department of Fisheries and Oceans, Canada (CIE, Rapporteur)

PFMC
Brian Culver, Washington Department of Fish and Wildlife, CPSMT
Diane Pleschner-Steele, CPSAS

STAT
Kevin Hill, NOAA / Southwest Fisheries Science Center
Paul Crone, NOAA / Southwest Fisheries Science Center

1) Overview

On June 21st to 24th, 2004, a STAR Panel (hereafter the Panel) met in La Jolla, CA for the first formal PFMC-sponsored stock assessment review of Pacific mackerel. The STAR Panel terms of reference were adhered to, in that the Panel worked with the STAT to ensure that the assessment was reviewed as needed and that meeting discussions were documented. However, it was noted that a recent SSC report on Pacific mackerel (June 2004, Supplemental SSC Report F.2.b.) recommended a separate future STAR panel to deal with issues of yield and harvest formula for CPS species. Therefore, summaries of stock status and harvest guidelines were not reviewed by this STAR panel as the focus of the meeting was to review assessment methodologies and not results.

The STAR Panel members received copies of all documentation approximately one week prior to the meeting, which provided sufficient time for review. The meeting commenced on June 21st with introductions (see list of attendees) followed by a brief overview by the Chair (Tom Barnes). Kevin Hill, with assistance from Paul Crone, led the presentation on assessment methodology. Nancy Lo gave a presentation on the aerial spotter program, an abundance index in the assessment.

The CPS fishery in California takes market squid, sardine and mackerel. The fishery has progressed from one focused primarily on squid and mackerel in the early 1980's, to one that focuses substantially on sardine and squid, although the fishery still relies on all three species.

The most recent mackerel assessment, intended for PFMC management decisions for the period July 1, 2004 to June 30, 2005, used a modified virtual population analysis model (ADEPT) to estimate Pacific mackerel biomass. During the meeting, the Panel briefly reviewed the method and results from the ADEPT model. However, most discussion focused on a forward-projection age structured assessment program (ASAP) model which the STAT proposed for future assessments of Pacific mackerel. The ASAP model is intended as an alternative statistical model to evaluate more fully the relationship between the species' population dynamics and associated fishery operations than is possible using ADEPT.

For illustrative purposes and to provide a basis for discussion, the STAT presented two ASAP models. The baseline model attempted to mimic the ADEPT formulation for the 2004 assessment. It included the four indices used in ADEPT and fixed selectivity over the entire period (1929-2003). The alternative approach eliminated one index, combined two other indices, and separated selectivity into two time periods.

In examining the results of the illustrative ASAP models, it was noted that results from both the baseline and alternative approach are very similar. Population numbers and biomass increased through the late 1970's and early 1980's similar to the ADEPT model, but peaked at much lower levels.

The Panel and the STAT agreed that ASAP should form the basis for the 2005 assessment. For continuity purposes, future assessments should include an ADEPT analysis as a sensitivity test.

The Panel commended the STAT for their excellent presentations, well-written and complete documentation, and their willingness to respond to the Panel's requests for additional analyses.

2) Discussion and Requests Made to the STAT during the Meeting

a. There were questions regarding the length of the time series to be included in the ASAP model, given uncertainties regarding earlier landings data. **Request:** the Panel requested that a sensitivity analysis be conducted to compare starting the model in the 1920's versus starting it when the stock rebounded in 1978. **Response:** the STAT provided numerous runs during the meeting comparing model outputs based on the entire time series and a truncated time series commencing in 1978.
b. There were concerns regarding biological sample sizes on which the catch at age data for some years is based, in particular during the 1970's when the fishery was closed. There were also concerns regarding the temporal and spatial variability of sampling. **Request:** the Panel requested that sample sizes by year be provided. **Response:** these were provided during the meeting and it was decided that it was not necessary to conduct a sensitivity analysis since there are several sources of uncertainty associated with the catch at age data other than sampling error, such as potential seasonal sampling bias. However, given the small sample sizes during the 1970's, it was suggested that this may be a further reason to begin the ASAP model subsequent to this period.
c. Weight at age data exhibited considerable variability over time, in particular during the mid 1970's when landings were low and sampling was reduced. It was suggested that this is another reason to start the ASAP model subsequent to this period. No requests or recommendations were made.
d. There were questions regarding the comparability of the new aerial spotter index and the historical fishery-based spotter index. No requests or recommendations were made.
e. In examining abundance indices, it was difficult for the Panel to compare one index with another. **Request:** the Panel requested that the abundance indices be plotted against each other (X-Y plots) to examine the degree of agreement between them. **Response:** three plots were provided during the meeting: 1) aerial spotter index vs. CalCOFI index, 2) aerial spotter index vs. CPFV index, and 3) CalCOFI index vs. CPFV index. These plots (see Figure 1) suggest that the relationship between the aerial spotter index and the CalCOFI and CPFV indices is not linear.
f. There were questions regarding the use of the northern CPFV index in ADEPT because its trend is contradictory with that of the southern CPFV index. The Panel and STAT agreed that a single combined index be used in the ASAP model.
g. There was a discussion regarding the use of the triennial and impingement indices. The Panel and STAT agreed that these indices be eliminated from the ASAP model.
h. In discussing the CalCOFI and aerial spotter indices, it was noted that there are zero values in the indices. However, the ASAP model replaces zero values by 0.0001 after the indices are rescaled to 1. **Request:** the Panel requested that a sensitivity analysis be conducted to examine the impact of adding a small value to the zero values in the ASAP input file. **Response:** the STAT provided numerous runs that illustrated that the ASAP model was highly sensitive to the addition of small values to the zeros. It was suggested, that in the long term, a negative binomial error structure be incorporated in the model to

allow for zero values. However, after much discussion, it was concluded that, in the short term, zero values in an index be replaced with the smallest observed value in that index.

i. After an extensive discussion, several other issues were identified that required further evaluation and review. **Request:** the Panel requested that the following ASAP sensitivity analyses be conducted: 1) three indices (CalCOFI, CFPV, and aerial spotter) vs. two indices (CalCOFI and CFPV), and 2) the full time series vs. a truncated time series commencing in 1978. **Response:** the STAT presented each of the above sensitivity analyses. The exclusion of the spotter index did not change the model fit substantially. It was concluded that all three abundance indices be included in the model, that the full time series be used, that zero values in indices be replaced with the minimum estimate from the index, and that the same coefficients of variation be assigned to all data points.

j. The baseline model of ASAP did not mimic the catch in 1998. **Request:** the Panel requested that the STAT conduct analyses in which the weight assigned to the catch data was increased (lambda values of 100, 300, and 1000) and provide a table with predicted 1998 catch, and 1+ biomass in 2003. A bubble plot was also requested to examine residual patterns. **Response:** the STAT provided this information (Table 1 and Figure 2).

3) Technical Merits and/or Deficiencies of the Assessment

The lack of catch at age and weight at age data from the Mexican (Ensenada) fishery is a major source of uncertainty, especially in recent years when Mexican landings have been as large as or larger than Californian landings.

Pacific mackerel range from the Gulf of California to southeastern Alaska and are harvested from Ensenada to British Columbia. However, the abundance indices used in the assessment are all derived from the Southern California Bight, a relatively small area compared to the distributional range. It was also noted that even within this area, there may be a spatial bias as most abundance indices are derived from the northern part of the spawning range, which is thought to range from central Baja California to the Southern California Bight.

The Panel could not fully review the age composition data due to a lack of information on how they were developed. There is considerable inter-annual variation in the proportion of catch in different age classes and this results in systematic patterns in the residuals about the fit to the catch-at-age data. The ASAP model is based on the assumption that all of the discrepancy between the observed and model – predicted age proportions is due to observation error. There are, however, alternative explanations: ageing error (both systematic and random), non-random sampling of the landings, the impact of seasonal variation in the fishery, and random changes in availability. The Panel strongly recommends examination of the basis for the age composition data and the possible benefits of allowing for time dependent selectivity. The Panel noted that variance in age composition data could be partitioned into component parts to estimate observation error and process error. The fishery was not conducted year-round in all years, which may have introduced a source of variability in the annual catch-at-age data. A sensitivity analysis could be conducted by down-weighting years with only a partial year of fishing.

4) Areas of Disagreement

There were no areas of disagreement between the Panel and STAT.

5) Unresolved Problems and Major Uncertainties

Problems unresolved at the end of the meeting form the basis for the research recommendations in Section 6.

6) Research Recommendations

The following recommendations are not given in priority order.

a. There was a discussion regarding the overall lack of fishery independent survey data, in particular outside of the Southern California Bight. **Recommendation:** the Panel recommended a concerted approach to develop a coastwide synoptic survey, ideally on an annual basis, to estimate an index of mackerel biomass.
b. There was a discussion regarding the survey design of the new aerial spotter index. **Recommendation:** the Panel recommended that the survey design incorporate rigorous protocols. Attempts should be made to estimate school surface area. The Panel also recommended that an aerial spotter survey be initiated in the Pacific Northwest in conjunction with industry.
c. The Panel endorsed and encouraged overall greater collaboration with industry in the collection and analysis process for coastal pelagic species, including Pacific mackerel.
d. There is a lack of biological sampling data available from Mexico for inclusion in the assessment. The lack of Mexican catch-at-age data is more critical in recent years when the Mexican catch has been as large as or larger than that of California. **Recommendation:** the Panel recommended that fishery and survey (IMECOCAL) data be acquired from Mexico and incorporated into future assessments.
e. **Recommendation:** the Panel recommended that spawning biomass be defined in terms of the numbers at the end of the year.
f. There were questions regarding the length of the time series to be included in the ASAP model, given uncertainties regarding earlier landings data. Although it was decided to use the entire time series, it was considered that the use of a truncated time series be evaluated further. **Recommendation:** the Panel recommended that consideration be given to using the ASAP model for 1978 to the present.
g. There were questions regarding the use of fishery-based weights at age to estimate population parameters as they are derived from only part of the population. **Recommendation:** the Panel recommended that this be examined and that a Von Bertalanffy curve be used if it includes samples from throughout the stock range.
h. **Recommendation:** the Panel recommended that all indices be plotted with confidence intervals in future assessments.
i. **Recommendation:** the Panel recommended that the STAT evaluate year – area

interactions in the GLM used to standardize the catch – effort data.

j. There was a discussion regarding selectivity patterns for the CPFV index which were estimated outside of the ASAP model. **Recommendation:** the Panel recommended that selectivity within the model be estimated by treating CPFV as a separate fishery using available biological data.

k. There were questions regarding how the catch-at-age (in number) is developed. **Recommendation:** the Panel recommended that this requirement should be included in the STAR terms of reference.

l. There was a question whether the CPFV index includes estimates of discards. It was noted that discard rates were only available in logbooks since 1994. **Recommendation:** the Panel recommended that the magnitude of discards be examined for the next assessment.

m. There was a brief discussion on the catch at age matrix, whether it should be extended beyond age 5+. It was noted that this may be more feasible if a truncated time series is used in the ASAP model. **Recommendation:** the Panel recommended that these issues be examined for the next assessment.

n. The Panel strongly recommends examination of the basis for the age composition data and the possible benefits of allowing for time-dependent selectivity.

o. The spotter index was not fit well. **Recommendation:** the trade-offs for leaving this index in or out of the assessment are complex and not readily apparent, and this decision should be left to the STAT as work progresses on the next assessment.

p. There were questions regarding how an assumed birth date of July 1st is accounted for in a model with a calendar year basis. **Recommendation:** the Panel recommended that, if practicable, the model year commence on July 1st to match the assumed birth date.

q. Noting the lack of a linear relationship between the aerial spotter index and the remaining indices, there was a discussion whether the aerial spotter index should be included in the ASAP model even though it is the only "recruitment index" available. This index assumes full selectivity across all ages. **Recommendation:** the Panel requested that selectivity within the model be estimated by creating a 'fleet' with no catch and no sampling. It was considered that this may not work but would at least provide selectivity estimates that could then be examined.

r. Observed vs. predicted catch proportions were presented, derived from the baseline ASAP model. Problems were identified with data through the 1970's, as residual patterns were not random. **Recommendation:** the Panel requested that this or a similar plot be used as a standard diagnostic in the assessment report.

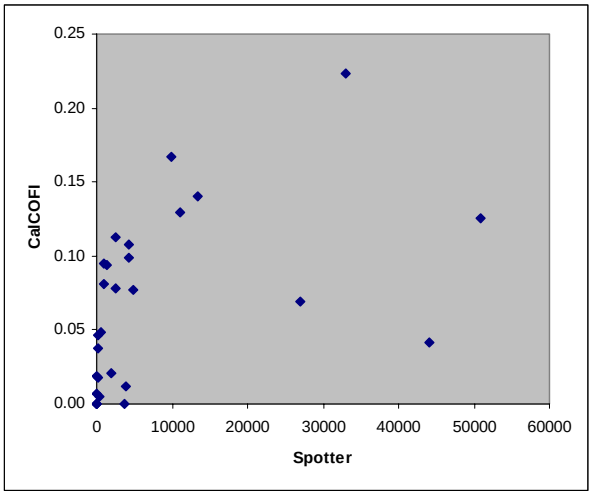
s. The specific details of the method used to develop catch-at-age data were not provided. **Recommendation**: the Panel requested that the STAT document how catch-at-age was estimated.

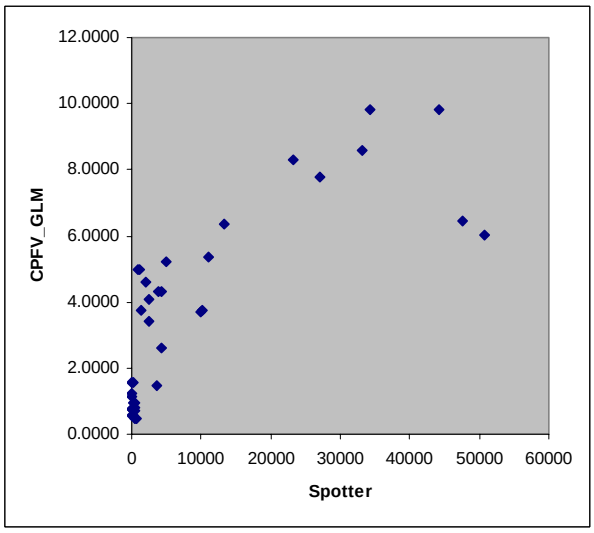
t. An error was made in summing catch-at-age data for annual estimates, due to misapplication of the July 1st birth date that is used in assigning ages. **Recommendation:** a correction needs to be made to account for the July 1 birth date that is used in assigning ages, when aggregating catch-at-age data over calendar year time periods.

u. Certain modifications are required to the ASAP model:
   - make allowance for fleet-specific weights-at-age (specifically the fishery weights-at-age for the fishery in the Pacific northwest);
   - define spawning biomass in terms of the numbers at the end of the year;

- explicitly include a zero age-class;
- include a log-normal bias-correction factor in the component of the objective function related to deviations about the stock-recruitment relationship; and
- quantify parameter uncertainty using the MCMC algorithm.

Figure 1. X-Y Plots of indices used in Mackerel assessment.





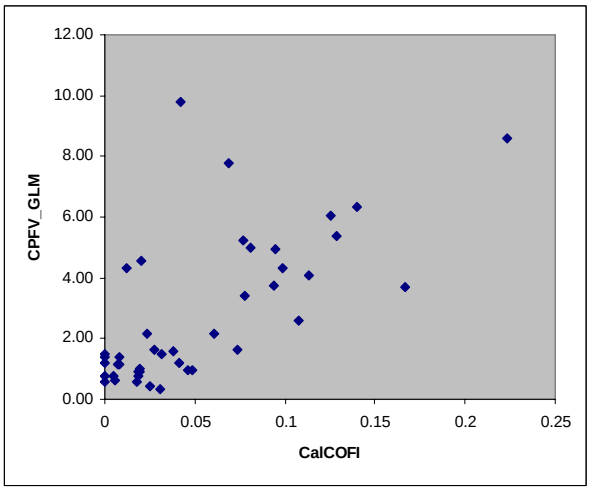


Figure 2. Bubble plots of residuals

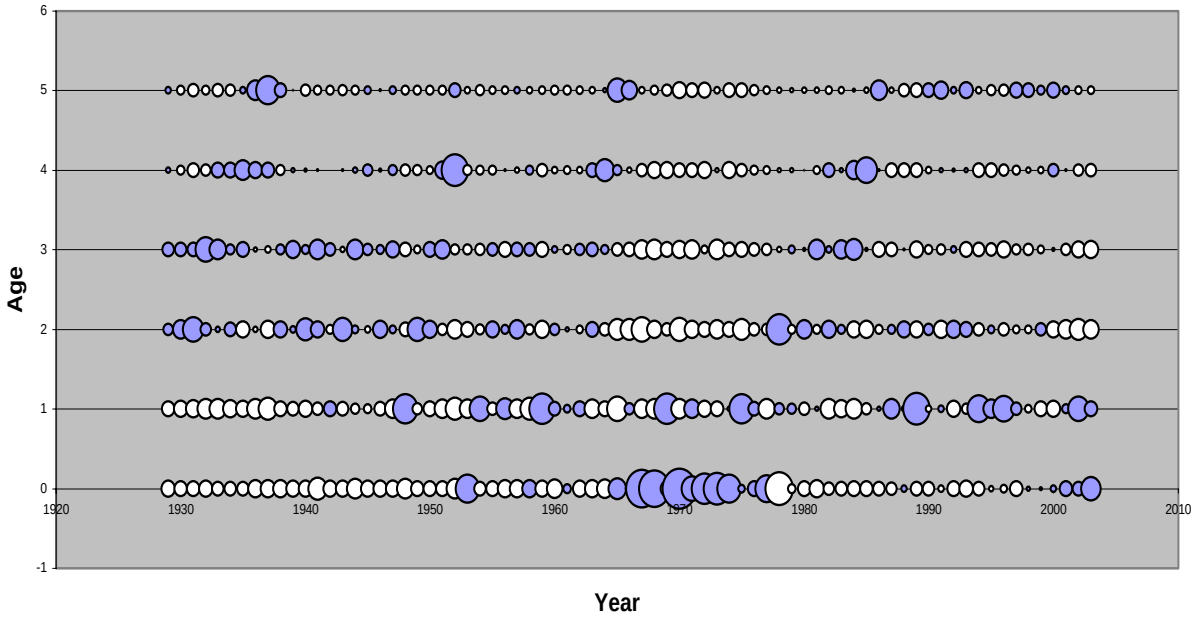


Table 1. New baseline results with increasing lambda catch.

G_2h Summary			
		1998 catch	
Lambda Catch	obj_fun	(obs-pred)	Biomass (Age 1+, Jan 2003)
100	1194.93	-8059.1	85,183
300	1197.07	-2673.2	87,138
1000	1197.84	-798.5	87,912

Pacific Sardine

STAR Panel Meeting Report

NOAA / Southwest Fisheries Science Center
La Jolla, California
June 21-24, 2004

STAR Panel
Tom Barnes, California Department of Fish and Game (Chair)
André Punt, University of Washington (SSC Representative, Rapporteur)
Rodolfo Serra, IFOP, Valparaiso, Chile
John Wheeler, Department of Fisheries and Oceans, Canada (CIE)

PFMC
Brian Culver, Washington Department of Fish and Wildlife, CPSMT
Diane Pleschner-Steele CPSAS

STAT
Ray Conser, NOAA / Southwest Fisheries Science Center
Kevin Hill, NOAA / Southwest Fisheries Science Center
Suzanne Kohin, NOAA / Southwest Fisheries Science Center
Nancy Lo, NOAA / Southwest Fisheries Science Center

1. **Overview**

The STAR Panel (hereafter the Panel) reviewed the assessment documents prepared by the STAT for Pacific sardine. The entire STAT was available to present and discuss aspects of the report.

The Panel focused exclusively on assessment models for Pacific sardine. The Terms of Reference for CPS STAR panels includes consideration of management recommendations. The Harvest Guideline for Pacific sardine is currently based on the catch control rule specified in the CPS Fishery Management Plan. The STAR Panel did not review the basis for this catch control rule but noted that the SSC has identified that a future STAR Panel could evaluate the catch control rule for Pacific sardine (and Pacific mackerel). Public comment on the issue on the control rule (verbal and written) was presented to the Panel. The written public comment will be forwarded to the Council.

The "wetfish" purse-seine fleet in California historically has taken CPS (market squid, Pacific sardine, northern anchovy, Pacific mackerel, jack mackerel, bonito), and tunas on an opportunistic basis. The fishery has progressed from one focused primarily on squid and Pacific mackerel in the early 1980s to one that focuses substantially on squid and sardine, although the fishery still relies to some degree on all target species. A CPS purse-seine fishery focused primarily on sardine has developed in the Pacific northwest in recent years.

The results from the assessment models presented to the Panel were preliminary and based on data through 2003. The Panel did not focus on the consequences of the results, and instead focused on the most appropriate framework for conducting future assessments of Pacific sardine. The first occasion that any new assessment for Pacific sardine could be used to provide management advice will be November 2004.

The STAT provided results for two assessment frameworks: CANSAR-TAM (catch-at-age analysis for sardine – two area model) and ASAP (age structured assessment program). CANSAR-TAM has provided the basis for the assessment of Pacific sardine since 1998. CANSAR-TAM is an extension to the CAGEAN approach to fisheries stock assessment that explicitly allows for migration of the northern component of the Pacific sardine population from southern California to the Pacific northwest. The assessment relies on indices of abundance for southern California to infer the status of the total population size.

The migration model underlying CANSAR-TAM is simple, and the values for the parameters related to migration are largely arbitrary. The treatment of the fisheries in Pacific northwest in CANSAR-TAM is also *ad hoc*. In contrast, ASAP is a multi-fleet model that can deal relatively straightforwardly with the component of the population in the Pacific northwest, both in terms of its contribution to the spawning biomass and to the catches. Both the STAT and Panel agreed that ASAP provides a more defensible basis for conducting assessments of Pacific sardine.

The Panel commended the STAT for their excellent presentations, well-written and complete documentation, and their willingness to respond to the Panel's requests for additional analyses.

2. Requests made and comments to the STAT during the meeting (Table 1 provides a summary of the alternative models considered during the workshop).

a) Assemble a table of the sample sizes on which the catch-at-age matrix is based.
The sample sizes for the USA-California fishery range from 432 (1984) to 3887 (1995). The Panel agreed that, given that the sample sizes are all fairly large, and the fact that there are several sources of uncertainty associated with the catch-at-age data other than sampling error, there is no need to assign year-specific weights to the catch age-composition data when fitting the population dynamics model.

b) Examine the implications of different assumptions about selectivity in the USA-California using "bubble plots" of residuals.
The residual patterns for the baseline case in the assessment document provide no evidence for trends in residuals within cohorts but several "runs" of residuals within age-classes are evident. The Panel highlighted the continuing importance of reviewing the residuals about the fits to the catch age-composition data, particularly once these data have been revised.

c) Examine the trends in q for the CalCOFI percent positive index and the spawning area index.
There are noteworthy trends in q (increasing for the percent positive index / decreasing for the spawning area index). These trends were expected given percent positive indices will saturate at high population size while square miles of spawning area would under-estimate spawning stock size if there is a "basin effect". See Section 3.2 for further discussion in terms of the utility of these indices for tuning purposes.

d) Examine the sensitivity of the results to setting the population weights-at-age from 1990 equal to the weights-at-age in the catch.
The results of this sensitivity test were broadly similar to those for the baseline case. The most notable difference between the results of this sensitivity test and those from the baseline case were that the estimates of recruitment for 1990-99 were greater for baseline case. The Panel and the STAT agreed that this was expected given that the fishery weights-at-age are higher than the population weights-at-age for these years. The value of a sensitivity test along these lines will be enhanced once the assessment software can include separate fishery and population weight-at-age matrices.

e) Plot indices against each other in the form of an X-Y plot.
These plots suggest that the relationships among the DEPM (Daily Egg Production Method), CalCOFI percent positive and spawning area indices are, in general, not linear. There does appear, however, to be a linear relationship between the DEPM and spotter plane indices, even though these indices relate to different components of the population.

f) Conduct a sensitivity test in which the only abundance indices are the DEPM estimates and the spotter plane index.
The results of this sensitivity test were not statistically different to those for the baseline case, although the variances were slightly larger owing to the reduction in

the number of data points. The Panel agreed that this sensitivity analysis should form the baseline case for the November 2004 assessment.

g) Conduct a preliminary evaluation of estimation uncertainty using the Markov chain Monte Carlo (MCMC) module.

The results of a preliminary application of the MCMC algorithm (1,000,000 cycles) indicated evidence for lack of convergence (see Fig. 1). The Panel advised the STAT to examine the .COR matrix from ADMB and to use this to guide how the model should be re-parameterized in future to reduce the correlations among the model parameters. It is likely that modifying the parameterization of selectivity in the first year should lead to reduced correlation among the selectivity parameters.

h). Examine the sensitivity of the results of the assessment to having a single selectivity pattern for entire 1983-2003 period and to there being three periods of selectivity (1983-91, 1992-97, and 1998-2003).

The fit to the data deteriorates markedly if selectivity for the southern California fishery is assumed to be time-invariant, providing support for having at least two periods of fishery selectivity. There is little improvement in fit if three periods of fishery selectivity are assumed for the southern California fishery. The Panel agreed that the baseline case for the November 2004 assessment should include two selectivity periods for the southern California fishery.

3. Technical merits and/or deficiencies of the assessment

The STAT identified three areas of considerable (but largely unquantifiable) uncertainty in its initial presentation to the Panel:

- Stock structure and migration are not well understood
- Fishery-independent data are limited to central and southern California, even though spawning occurs off Mexico and limited spawning has been reported to the north.
- The biological data for the Mexican, Canadian and Pacific northwest fisheries are limited.

3.1 Stock structure

There are several hypotheses regarding the stock structure of Pacific sardine. The current stock assessment is based on the working hypothesis that Pacific sardine off northern Mexico, southern California, northern California and the Pacific northwest constitute a single biological stock with substantial mixing / migration. However, there is considerable uncertainty regarding this hypothesis. Evidence that may support an alternative stock structure hypothesis includes:

- The presence in the Pacific northwest of some spawning and some zero-year-old fish.
- The marked differences in mean weight-at-age among fish in the Pacific northwest and those off southern California (the fish tend to be much larger and have higher weight-at-age off the Pacific northwest).

There is also uncertainty regarding the relationship between the fish found offshore of where the fishery off California is prosecuted and those elsewhere, and between the Mexican fish and those elsewhere. The Panel emphasized the considerable importance of

research to resolve issues related to stock structure, and to develop abundance indices for areas in addition to southern California. The latter aspect is as important as the former because, if data are collected which provide support for an alternative stock structure hypothesis (e.g. separate California and Pacific northwest stocks), abundance data for the Pacific northwest will be required to conduct an assessment for the population in this area. Even if additional data confirm the present working hypothesis, there is still considerable value in obtaining abundance information for regions other than for which the DEPM and spotter plane indices are available.

The importance of resolving stock structure uncertainty was also emphasized during the period of public comment.

The Panel, the STAT and members of the public identified several areas of research which might shed light on the issue of stock structure (see Section 6.1). It was agreed that for the present time, the assessment should be based on a single coastwide assessment.

3.2 Input data

The variant of the assessment presented initially to the Panel included four indices of abundance: a) the CalCOFI percent positive index, b) the DEPM index, c) the spawning area index, and d) the spotter plane index (see Table 1 for the basic data for the first three indices). The STAR panel noted that the three fishery-independent indices are correlated with each other because they are based on the some of the same underlying data and that the DEPM estimates of abundance are correlated among years because of the way the biological information for 1994 is used to construct the DEPM estimates for several years.

The Panel noted that the DEPM estimates used in the assessment are based on biological data (from which the estimates of daily fecundity per gram are computed) from 1994 and 2002[1]. Although the estimates of fecundity per gram are fairly similar for 1994 and 2002, the values for the biological parameters that are used to estimate fecundity per gram differ markedly between 1994 and 2002. For example, percentage spawning was 7% for 1994 and 17% for 2002. The Panel agreed that biological data for use in the DEPM should be collected more routinely in the future than has been the case in the past.

There is an overlap between the data on which the DEPM estimates are based and the data on which the spawning area and CalCOFI percent positive indices are based. Furthermore, unless allowance is made for time-varying catchability, the fit of the model to the latter two indices is very poor. The Panel and STAT considered three ways to resolve this problem:

- Ignore the CalCOFI percent positive and the spawning area indices and base the assessment solely on the DEPM and spotter plane indices.
- Include the CalCOFI percent positive and the spawning area indices in the assessment but restrict them to years for which the assumption that these indices

[1] Data for 2004 are still being processed so were not available to the Panel.

are linearly proportional to abundance appears to be most valid (e.g. prior to 1998 for the CalCOFI index and after 1998 for the spawning area index).
- Use a mixed effects model to fill in years with no DEPM data.

The Panel and STAT agreed that the assessment to be presented to the Council in November 2004 should be based on ignoring the CalCOFI percent positive and the spawning area indices.

The Panel and STAT were concerned about relying substantially on the DEPM estimates when it is known that these can vary markedly from one year to the next. The Panel agreed that an attempt should be made to extend the DEPM method so that constraints are placed on the extent to which the estimate of P_0 (the number of eggs spawned) can vary over time to avoid biologically unrealistic changes in this quantity. One approach that could be investigated is to force a time-series structure on the values for P_0 over time.

3.3 Biological data

The model makes use of the weight-at-age data for the population (in addition to that for the fishery). Weight-at-age in the catches off southern California are lower than weight-at-age in the population because the larger individuals appear to be located outside the areas that are fished primarily. Survey data are used to infer post-1990 population weight-at-age. However, this is a crude approach and efforts should be made to include data on weight-at-age from the fisheries in the Pacific northwest when constructing population weight-at-age. This problem can not, however, be resolved easily without sampling of offshore and northern areas to determine the relative proportion of the population in different areas, such as through the use of a synoptic survey of the entire west coast.

3.4 Other

The catch control rule relies on the estimate of 1+ biomass for the start of the last year of the assessment period. The STAT currently bases this estimate on population weight-at-age. However, the alternative of basing it on the fishery weight-at-age may be more appropriate. This issue should be considered when the catch control rule is reviewed at a future STAR Panel.

The weightings given to the various data sources and penalties (the lambdas) impact the sizes of the variances calculated using asymptotic (Hessian and delta method) and Bayesian approaches. The Panel noted that it would be desirable to develop an overall scaling parameter so that the residuals about the data are not over-dispersed relative to the variances implied by the lambda values.

4. Areas of disagreement

There were no areas of major disagreement between the STAT and the Panel[2].

[3] The Panel was unable to reach agreement on the correct way to pronounce certain letters of the Latin and Greek alphabets. The Panel therefore recommends that future Panels include not only LANs but also translators who can translate from American "English" into English as it is used elsewhere.

5. Unresolved problems and major uncertainties

Problems unresolved at the end of the meeting form the basis for the recommendations in Sections 6.0 - 6.3.

6. Recommendations

The following recommendations are not given in priority order.

6.0 General

The Tri-national Sardine Forum should be utilized to share fishery, survey and biological information among researchers in Mexico, Canada, and the U.S. The long-term benefits of this forum will be greatly enhanced if it can be formalized through international arrangements.

6.1 Stock structure

a) Growth data for Mexico, southern California, northern California, the Pacific northwest and the offshore areas should be collected and analyzed to quantitatively evaluate differences in growth among areas. This evaluation would need to account for differences between Mexico and the U.S. on how birthdates are assigned, and the impact of spawning on growth.
b) The timing and magnitude of spawning off California and the Pacific northwest should be examined.
c) The likelihood of various stock structure hypotheses should be examined using existing tagging data and additional tagging experiments or (preferably) techniques such as analyses of trace element composition.
d) Information which could be used in an assessment of the Pacific northwest component of a single coastwide population or of a separate Pacific northwest stock should be obtained. Synoptic surveys of Pacific sardine on the entire west coast have the potential to provide such information as well as the basic data needed to address research questions 1) and 2) above.

6.2 Data and monitoring needs

a) The Panel endorsed the aerial survey which started during 2004 and emphasized the value and importance of a rigorous survey protocol. It suggested that the surveys be augmented to estimate schooling areas and distinguish schools. It also supported the collection of data (e.g. bearing and distance to schools) which could be used in line transect-type estimation methods. 'Sea-truthing' of the species identification of the aerial surveys will enhance the value of any resulting index of abundance.
b) An aerial survey program should be started in the Pacific northwest. Such a survey program would provide data for a component of the population currently not surveyed. However, it would take several years before any index based on such a survey could be included in the assessments.
c) The current abundance indices provide data which can be used to fit a population dynamics model. However, alternative methods for indexing the population (e.g. acoustics) should continue to be evaluated. Acoustic methods are a qualitatively different approach to indexing relative abundance and are the primary fishery-independent method for obtaining abundance indices for many of the world's major

pelagic fish stocks. Acoustic methods have been applied to northern anchovy off California. Acoustic data have the potential to provide information on the relative abundance of the populations off southern California and the Pacific northwest.

d) The catch-at-age data should be updated so that ages are defined in terms of a calendar year lifecycle (if the model continues to be based on a calendar year). At present the catch-at-age matrix combines animals from different cohorts into the same age-class because no account is taken of the assumed 1 July birthdate.
e) Biological data for use in the DEPM must be collected and analyzed more routinely in the future than has been the case in the past.
f) The DEPM method should be extended so that constraints are placed on the extent to which the estimates of P_0 vary over time.
g) The impact of environmental variability on the CalCOFI percent positive data should be examined.
h) The data on maturity-at-age should be reviewed to assess whether there have been changes over time in maturity-at-age, specifically whether maturity may be density-dependent.
i) The algorithm used to determine the catch proportion-at-age data from the raw data collected from the fishery should be documented and included in the assessment report.

6.3 Modeling and assessment issues

a) The November 2004 assessment for Pacific sardine should be based on an extension of ASAP in which:
    - allowance is made for fleet-specific weights-at-age (specifically the fishery weights-at-age for the fishery in the Pacific northwest);
    - spawning biomass is defined in terms of the numbers at the end of the year;
    - explicitly include a zero age-class;
    - a log-normal bias-correction factor is included in the component of the objective function related to deviations about the stock-recruitment relationship; and
    - parameter uncertainty is quantified using the MCMC algorithm.
b) The data on which the November 2004 assessment will be based will differ from those on which the analyses reviewed during the Panel meeting:
    - only the DEPM and spotter plane indices will be used as abundance indices when fitting the model;
    - the latest fishery and abundance index data will be included in the assessment;
    - substantial additional catch-at-age data for the Mexican fisheries for 1983-2002 will be included in the assessment;
    - additional catch-at-age data for the fisheries in the northwest will be included in the assessment; and
    - the DEPM estimate will be enhanced using new biological data.
c) An attempt should be made move from a model that is based on a calendar year to one based on a biological year. This may improve the fits of the model to catch-at-age data but may lead to the catch-at-age data being overweighted relative to the abundance indices.
d) The extent of ageing error should be quantified and included in future assessments.

e) The sensitivity of the results of the assessment to the assumption that recruitment is related to spawning biomass by a Ricker stock-recruitment relationship should be examined.
f) The sensitivity of the results of the assessment to the weight assigned to each data point / abundance index (e.g. equal weight, weight based on the sampling standard error) should be explored.
g) Environmental covariates should be considered when fitting the stock-recruitment relationship.
h) Confidence intervals for the data should be added to the time-series plots which compare observed *versus* model-predicted values.
i) The values for the lambdas should be chosen so that these are consistent with variances of the residuals.
j) Data that may be included in assessments for years beyond November 2004:
    - additional indices of abundance for Oregon / British Columbia / Mexico.
    - the results of the new spotter plane index (if the new index can be related to the historical index).
    - an index based on the spawning volume for Pacific sardine (if such an index can be developed).
k) Sensitivity should be examined to different southern boundaries for the "stock" (i.e. if there is a separate stock off northern Mexico, how does it mix with the stock(s) exploited in the U.S.).

Table 1. Sardine models considered during the STAR Panel

Run	Description	Number of Parameters	Total Likelihood	SSB Virgin (1000 MT)	SSB 2003 (1000 MT)	Recruits 2003 (Billions)
R06-9	Baseline in paper	131	381	2,038	1,490	9.4
R08-0	Remove 2 indices:	129	281	2,100	1,609	9.9
	CalCOFI and Spawn Area.					
	New Baseline					
R08-1	Use USA-CA fishery WAA	129	268	1,628	1,836	8.2
	as population WAA.					
	R08-0 is still new baseline					
R08-2	No time varying selex	111	359	1,676	1,365	13.7
	R08-0 is still new baseline					
R08-3	3 selex blocks for USA-CA	135	276	2,086	1,510	7.8
	1983-92 / 1993-97 / 1998-2003					
	R08-0 is still new baseline ???					

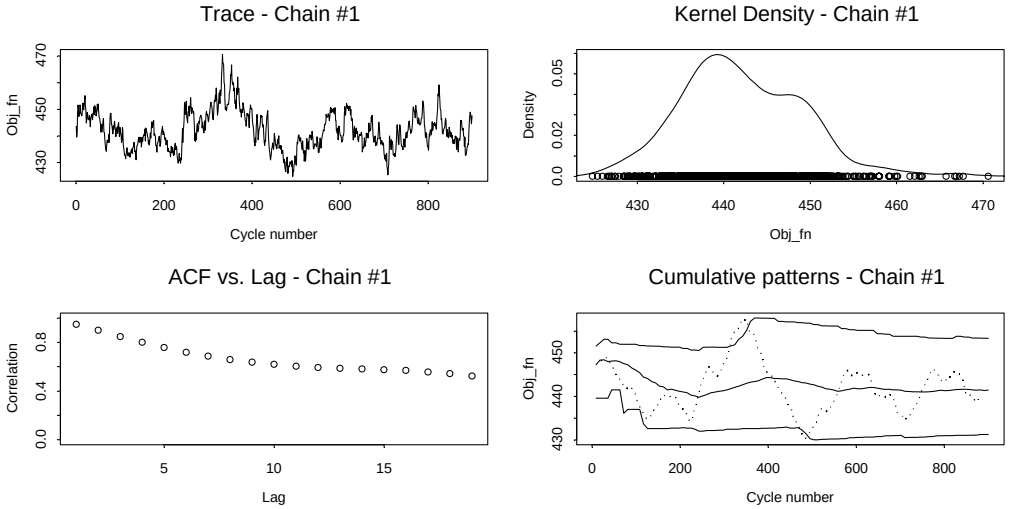
Table 2. Raw data used to construct the DEPM estimates and the indices of abundance based on the positive stations in the CalCOFI surveys and the spawning area.

Year	P_0	Z	Area (km^2)	SSB (CV)	Positive Stations	Spawning Area index	Spotter Plane
1983					-	40	-
1984					4.9	480	-
1985					3.8	760	-
1986				7,659	1.9	1,260	22,049
1987				15,704	4.0	2,120	11,498
1988				13,526	7.9	3,120	55,882
1989					7.2	3,720	32,929
1990					3.7	1,760	21,144
1991					16.7	5,550	40,571
1992					8.8	9,697	49,065
1993					6.1	7,685	84,070
1994	0.193 (0.21)	0.12 (0.91)	380,175	127,102 (0.32)	17.8	24,539	211,293
1995	-	-	-	-	13.4	23,816	188,924
1996	0.415 (0.42)	0.105 (4.15)	235,960	83,176 (0.48)*	28.0	25,890	119,731
1997	2.77 (0.21)	0.35 (0.14)	174,096	409,579 (0.31)*	27.3	40,591	66,943
1998	2.279 (0.34)	0.255 (0.37)	162,253	313,986 (0.41)*	24.3	33,446	118,492
1999	1.092 (0.35)	0.10 (0.6)	304,191	282,248 (0.42)*	16.7	55,171	50,506
2000	4.235 (0.4)	0.42 (0.73)	295,759	1,063,837 (0.67)*	7.8	32,784	48,373
2001	2.898 (0.39)	0.37 (0.21)	321,386	790,925 (0.45)*	12.5	31,663	-
2002	0.728 (0.17)	0.4 (0.15)	325,082	206,333 (0.35)	7.1	61,753	-
2003	1.52 (0.18)	0.48 (0.08)	365,906	485,121 (0.36)	14.2	41,702	-

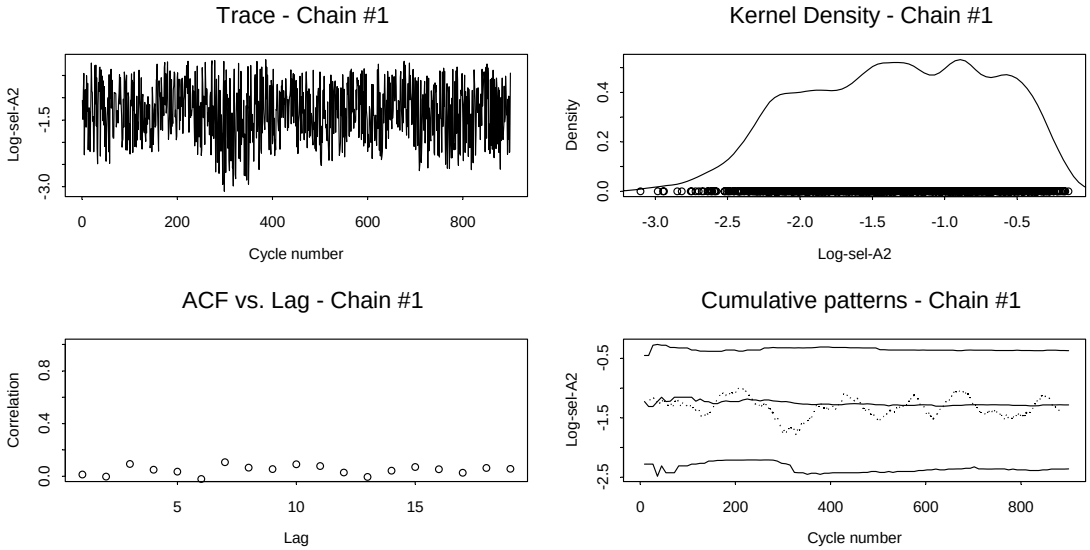
* $CV = (CV^2(P_0) + 0.054CV_{1994}^2)^{1/2}$

Figure 1. Example MCMC diagnostics for two model outputs. The panels for each quantity show the trace, the posterior density function (estimated using a normal kernel density), the correlation at different lags, the 50-point moving average against cycle number (dotted line in the rightmost panels), and the running mean and running 95% probability intervals (solid lines in the rightmost panels).

(a) The objective function



(b) The second selectivity parameter



COASTAL PELAGICS SPECIES STAR PANEL

Agendum I.2

Participants

- STAR Panel:
  - Tom Barnes (Chair)
  - Andre Punt (SSC Representative)
  - Rodolfo Serra (IFOP)
  - John Wheeler (DFO, CIE)
- PFMC
  - Brian Culver (CPSMT)
  - Diane Pleschner-Steele (CPSAS)
- STAT
  - Ray Conser (Sardine)
  - Kevin Hill (Sardine & Mackerel)
  - Suzanne Kohin (Sardine)
  - Nancy Lo (Sardine)
  - Paul Crone (Mackerel)

Overview

- The STAR Panel reviewed the assessments in terms of the most appropriate framework for conducting future assessments.
- It did not:
  - Review assessment results (these will be presented to the Council in November 2004 – sardine, and in July 2005 – mackerel).
  - Evaluate the harvest control rule.

Appropriate Assessment Framework

- The STAR Panel supported the future use of the ASAP (Age Structured Assessment Program) framework for assessment of both sardine and mackerel. This framework would replace the current frameworks:
  - CANSAR-TAM (Sardine)
  - ADEPT (Mackerel)
- Reasons for this support include:
  - The values for the migration parameters in CANSAR-TAM are largely arbitrary, and the treatment of fleets is *ad hoc*. ASAP provides a more straightforward way to model multiple fleets and areas.
  - ADEPT is based on backwards VPA so ignores errors in the catch-at-age data.
  - ASAP can be used to more fully quantify uncertainty.
- Note that ADEPT will continue to be run as a sensitivity test for the mackerel assessment.

Key Uncertainties and Recommendations (Sardine)-I

- Stock structure and mixing is not well understood:
  - The current working hypothesis is of one stock from Mexico to British Columbia. This working hypothesis was supported for the present.
  - Recommendations:
    - Conduct synoptic surveys to provide information to address stock structure issues and for use in a possible assessment of sardine in the Pacific northwest.
    - Growth and spawning data should be collected and analyzed.
    - Various methods for determining stock identity should be applied.

Key Uncertainties and Recommendations (Sardine)-II

- Input data:
  - Fishery independent data are limited to southern California.
  - The Tri-National Sardine Forum should be utilized to share fishery, survey and biological information among researchers (Mexico, Canada, US).
  - Recommendations:
    - Examine ways to extend the DEPM method.
    - Consider different ways to index the population in the Pacific northwest (e.g. acoustics).
    - Update the catch-at-age data for use in the assessment.

Key Uncertainties and Recommendations (Sardine)-III

- Modeling and assessment issues:
  - Data
    - Drop the CalCOFI percent positive and spawning area indices.
    - Include any additional Mexican catch-at-age data.
    - Include any additional catch-at-age data for the Pacific northwest.
  - Modeling
    - Allow for fleet-specific weight-at-age.
    - Define spawning biomass in terms of end-year numbers.
    - Add a zero age-class.
    - Quantify uncertainty using the MCMC algorithm.

Key Uncertainties and Recommendations (Mackerel)-I

- Input Data:
  - The lack of catch-at-age and weight-at-age data for Mexico remains a major source of uncertainty.
  - The abundance indices used in the assessment relate to only a small fraction of the distributional range of Pacific mackerel.

Key Uncertainties and Recommendations (Mackerel)-II

- Recommendations :
  - Develop of coastwide synoptic survey for mackerel.
  - Examine (and revise) the basis for the catch-at-age data (discrepancies between observed and predicted catches-at-age could be the result of several factors).
  - Fishery and survey data should be obtained from Mexico and incorporated into future assessments.

Key Uncertainties and Recommendations (Mackerel)-III

- Modeling and assessment issues:
  - Allow for fleet-specific weights-at-age.
  - Define spawning biomass in terms of end-year numbers.
  - Add a zero age-class.
  - Quantify uncertainty using the MCMC algorithm.

Endorsements

- The Panel endorsed:
  - The aerial survey for sardine that started in 2004 (support was given for a similar survey off the Pacific northwest).
  - Overall greater collaboration with industry in the collection and analysis process for coastal pelagic species.

Concluding Remarks

- The Panel commends the STAT for:
  - excellent presentations;
  - well-written and complete documentation; and
  - rapid responses to the many requests for additional analyses.

COASTAL PELAGIC SPECIES ADVISORY SUBPANEL REPORT ON COASTAL PELAGIC SPECIES STAR PANEL REPORT

The Coastal Pelagic Species Advisory Subpanel (CPSAS) reviewed the draft reports of the coastal pelagic species (CPS) Stock Assessment Review (STAR) Panel. The CPSAS also received a report from Ms. Diane Pleschner-Steele, the CPSAS representative to the STAR Panel. Generally, the CPSAS agrees with the findings of the STAR Panel and recommends the new assessment models be used for the next Pacific sardine and Pacific mackerel assessments.

The CPSAS also agrees with the STAR Panel recommendations for research and data needs. This much needed information includes increased coastwide synoptic research surveys, spotter pilot surveys in southern and northern waters, and access to Mexican and Canadian fishery and research data. Resources should also be dedicated to incorporating samples from the Pacific Northwest fishery into the assessment process. Specific to fishery independent research, the CPSAS strongly agrees with the STAR Panel recommendation for "overall greater collaboration with industry in the collection and analysis process for coastal pelagic species" research.

The CPSAS strongly urges the Council to set as a high priority the need to formally review the harvest guideline formulae for Pacific sardine and Pacific mackerel. For Pacific sardine, moderate decreases in sea surface temperature (SST) could significantly decrease the harvest guideline. The use of SST in the harvest guideline formula should be fully investigated to ensure unwarranted economic impacts on the fishery are prevented.

Finally, the CPSAS once again urges the Council and NMFS to pursue cooperative management arrangements with Mexican fishery management agencies. Reports indicate significant expansion of Mexican fisheries in recent years. Expansion of fisheries on shared CPS stocks needs to be fully accounted for, and where appropriate, Mexico should be encouraged to limit fishery expansion so as to avoid compromising Pacific coast CPS stocks, i.e., overfishing.

The CPSAS is encouraged to hear reports of improved cooperation between Mexican and U.S. fishery scientists and fully supports the continuation and expansion of this relationship through the Tri-National Sardine Forum.

PFMC
08/23/04

COASTAL PELAGIC SPECIES MANAGEMENT TEAM REPORT ON COASTAL PELAGIC SPECIES STAR PANEL REPORT

The Coastal Pelagic Species Management Team (CPSMT) reviewed draft reports from the coastal pelagic species (CPS) Stock Assessment Review (STAR). The STAR Panel provided CPS Stock Assessment Teams (comprised of National Marine Fisheries Service-Southwest Fisheries Science Center staff) useful technical advice and, ultimately, supported new modeling methods for the assessments of Pacific sardine (in November 2004) and Pacific mackerel (in June 2005). The CPSMT agrees with the general findings from the STAR Panel and, further, echos the Panel's recommendations regarding additional data, surveys, and harvest control rule analysis, which collectively, will greatly strengthen the ongoing stock assessments conducted on these species. These recommendations are briefly discussed below.

A primary area of uncertainty applicable to many transboundary fish stocks, including sardine and mackerel populations off the Pacific coast of North America, is better understanding of stock distribution, both spatially and temporally. Information that is needed includes complete fishery-dependent and -independent data from Mexico, coastwide catch-at-age data, and a synoptic Pacific coast research survey. Some of these data are currently available, but remain inaccessible (e.g., Mexico data) or have yet to be incorporated into population analyses, given limited resources to process, summarize, and incorporate relatively newly acquired information (e.g., Pacific Northwest fishery and research survey samples). This is not a trivial recommendation, given current monitoring programs should be considered minimum (at best), and are in critical need of additional research attention, staff, and dedicated funds to meet present objectives regarding the status of exploited fish stocks.

Related to future CPS STAR Panels, the CPSMT discussed the review of fishery management plan harvest guideline formulae for Pacific mackerel and Pacific sardine. The CPSMT considers the current formulae the best available method for determining annual harvest guidelines. However, it would be prudent to plan for a comprehensive review of the formulae at some point in the near future. The CPSMT notes that review of the harvest guideline formulae would be a major undertaking, larger than what could be accomplished during a week long STAR Panel meeting. For example, several elements of the Pacific sardine harvest guideline formula could be reviewed–sea surface temperature, stock distribution (notably percent in U.S. waters), and stock structure. Therefore, the CPSMT does not recommend scheduling a CPS STAR during 2005 to review the harvest guideline formulae, but rather, suggests that the Council coordinate with NMFS to develop a formal research outline (timetable) to address (re-examine) the harvest guidelines currently in place for these species.

PFMC
08/23/04

SCIENTIFIC AND STATISTICAL COMMITTEE REPORT ON STOCK ASSESSMENT REVIEW PANEL REPORT

Dr. André Punt presented the coastal pelagic species (CPS) stock assessment review (STAR) Panel reports for Pacific sardine and Pacific mackerel to the Scientific and Statistical Committee (SSC). The SSC endorses the STAR Panel reports and the Panel's recommendations. The Stock Assessment Teams (STAT) are commended for excellent presentations, reports, and willingness to conduct additional model runs and other work completed during the STAR process.

The STAR Panel reviewed new assessment methodologies and recommended the most appropriate framework for conducting future assessments. The Panel did not focus on results of individual assessments or the harvest control rules currently in place. New assessments will be presented to the Council for sardine in November 2004 and for mackerel in June 2005. The STAR Panel reports provide recommendations about use of the new assessment methodologies for management of the 2005 sardine fishery and 2005-2006 Pacific mackerel fishery. The reports also discuss research and data needs of the CPS fisheries.

The new assessment model for sardine, ASAP (age-structured-assessment-program), offers a more straightforward treatment of multiple fleets and areas than the model used for past assessments, CANSAR-TAM (catch-at-age-analysis-for-sardine-two-area-model). The STAR Panel recommended use of ASAP in the next sardine assessment. The ASAP model was also used for mackerel, and compared to the ADEPT model (a modified virtual-population-analysis model). The STAR Panel also recommended use of the ASAP model for the next mackerel assessment, but also recommended using ADEPT for sensitivity analysis.

In general, stock structure and mixing are not well understood for both species. The STAR Panel recommended, and the SSC supports, continuing with the working hypothesis of a single Pacific sardine stock extending from Mexico to British Columbia.

PFMC
09/15/04

Environmental Component and The Pacific Sardine Harvest Guideline

By

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June 19, 2004

The Coastal Pelagic Species Fisheries Management Plan (CPS FMP) Harvest Guideline is computed through a formula. (#2 Harvest Guideline) The formula uses an environmental component. This component is based on the sea surface temperature (C) recorded at Scripps Pier, La Jolla CA. using a three-year running average. (Figure 6.)

A Fraction is determined for use in the formula. (#3 Fraction) Using this fraction with the formula (#2 Harvest Guideline) determines the sardine harvest. The harvest fraction is capped at a 15% rate and falls to a 5% rate. (Figure 11)

We believe there are four major faults with the environmental component, fraction and harvest guideline.

1. The use of the sea surface temperature at Scripps Pier does not reflect the health of the entire sardine region.
2. The cutoff temperature, which affects the exploitation rate of 15% to 5%, is arbitrary and capricious.
3. The sharp drop from 15% harvest to 5% harvest is careless and severally affects the industry dependent on the sardine.
4. The harvest cap of 15% in the Oregon and Washington fisheries is constrictive. The fishery is not fishing on juveniles. Oregon and Washington fish on an age class of sardine about three years and older, then California. The fraction for Oregon and Washington fish should be 30% as the mackerel fishery is, not 15% going to 5%.

We have modeled the historic harvest using the CPS FMP. The model uses the average yearly temperatures at Scripps Pier, three year running average and a breakdown of what the harvest rate would have been for those years. This model shows the formula would have severally restricted some years we know were expansion years (1916 – 1936, 3.3 Fishing Industry) If the Harvest Guideline formula is allowed to continue, using the environmental component as is, we can expect years of a 5% harvest on a fishery that may be expanding. This is negligent to the industry dependent on sardine.

Historic harvest using CPS formula

Fraction Formula

Fraction	Number	T2	Number	Temp at S	Number
15.13%	0.24864981	296.1841	8.190043975	17.21	67.4558326
15.00%	**0.24864981**	**296.0670836**	**8.190043975**	**17.2066**	**67.4558326**
11.38%	0.24864981	292.41	8.190043975	17.1	67.4558326
10.00%	**0.24864981**	**290.8559703**	**8.190043975**	**17.0545**	67.4558326
6.10%	0.24864981	285.61	8.190043975	16.9	67.4558326
5.09%	0.24864981	283.9225	8.190043975	16.85	67.4558326
5.00%	**0.24864981**	**283.7708703**	**8.190043975**	**16.8455**	**67.4558326**

Historic harvest using CPS formula

Year	Temp at Scripps Pier	3 rear running average	15% harvest Rate	Between	5% harvest rate	Growing stock	Landings
1916			<17.2066		>16.8455	X	CAL
1917	16.68					X	CAL
1918	17.35					X	CAL
1919	16.87	16.967		1		X	CAL
1920	16.55	16.923		1		X	CAL
1921	16.55	16.657			1	X	CAL
1922	16.48	16.527			1	X	CAL
1923	17.36	16.797			1	X	CAL
1924	16.55	16.797			1	X	CAL
1925	17.01	16.973		1		X	CAL
1926	18.07	17.210	1			X	CAL&CN
1927	16.87	17.317	1			X	CAL&CN
1928	16.73	17.223	1			X	CAL&CN
1929	17.18	16.927		1		X	CAL&CN
1930	17.45	17.120		1		X	CAL&CN
1931	18.5	17.710	1			X	CAL&CN
1932	16.31	17.420	1			X	CAL&CN
1933	15.65	16.820			1	X	CAL&CN
1934	17.52	16.493			1	X	CA CN & OR
1935	16.71	16.627			1	X	CA CN & OR
1936	17.61	17.280	1			X	WA CA CN & OR
1937	17.04	17.120		1			WA CA CN & OR
1938	16.68	17.110		1			WA CA CN & OR
1939	17.18	16.967		1			WA CA CN & OR
1940	17.36	17.073		1			WA CA CN & OR
1941	17.66	17.400	1				WA CA CN & OR
1942	17.01	17.343	1				WA CA CN & OR
1943	17	17.223	1				WA CA CN & OR
1944	16.49	16.833			1		WA CA CN & OR
1945	16.61	16.700			1		WA CA CN & OR
1946	16.83	16.643			1		WA CA CN & OR
1947	16.88	16.773			1		WA CA CN & OR
1948	16.08	16.597			1		
1949	16.53	16.497			1		

Historic harvest using CPS formula

Year	Temp at Scripps Pier	3 rear running average	15% harvest Rate	Between	5% harvest rate	Growing stock	Landings
1950	16.4	16.337			1		
1951	16.62	16.517			1		
1952	16.28	16.433			1		
1953	16.25	16.383			1		
1954	16.86	16.463			1		
1955	16.49	16.533			1		
1956	16.37	16.573			1		
1957	17.36	16.740			1		
1958	17.85	17.193		1			
1959	18.37	17.860	1				
1960	16.62	17.613	1				
1961	16.53	17.173		1			
1962	16.24	16.463			1		
1963	16.96	16.577			1		
1964	16.43	16.543			1		
1965	16.52	16.637			1		
1966	17.01	16.653			1		
1967	16.93	16.820			1		
1968	16.94	16.960		1			
1969	16.65	16.840			1		
1970	16.63	16.740			1		
1971	16.19	16.490			1		
1972	16.88	16.567			1		
1973	16.46	16.510			1		
1974	16.47	16.603			1		
1975	15.53	16.153			1		
1976	17.26	16.420			1		
1977	17.26	16.683			1		
1978	17.42	17.313	1				
1979	16.85	17.177		1			
1980	16.62	16.963		1			
1981	17.62	17.030		1			
1982	17.12	17.120		1			
1983	17.97	17.570	1			X	Cal
1984	18.31	17.800	1			X	Cal
1985	17.21	17.830	1			X	Cal

Historic harvest using CPS formula

Year	Temp at Scripps Pier	3 rear running average	15% harvest Rate	Between	5% harvest rate	Growing stock	Landings
1986	17.72	17.747	1			X	Cal
1987	17.56	17.497	1			X	Cal
1988	16.99	17.423	1			X	Cal
1989	17.18	17.243	1			X	Cal
1990	17.88	17.350	1			X	Cal
1991	16.97	17.343	1			X	Cal
1992	18.24	17.697	1			X	Cal
1993	18.27	17.827	1			X	Cal
1994	18	18.170	1			X	Cal
1995						X	Cal
1996						X	Cal
1997						X	Cal CN
1998		18.450	1			X	Cal CN
1999		18.200	1			X	CA CN & OR
2000		17.800	1			X	WA CA CN & OR
2001		17.050	1			X	WA CA CN & OR
2002		17.300	1			X	WA CA CN & OR
2003			1			X	WA CA CN & OR
2004			1			X	WA CA CN & OR

Note: 2002 was threatened with a reduced harvest because of the environmental component.
The cutoff temperature is 17.2066 thus 2002 was close to being restricted from the 15% rate of harvest.

Totals for years	31	16	36	83
	37.35%	19.28%	43.37%	

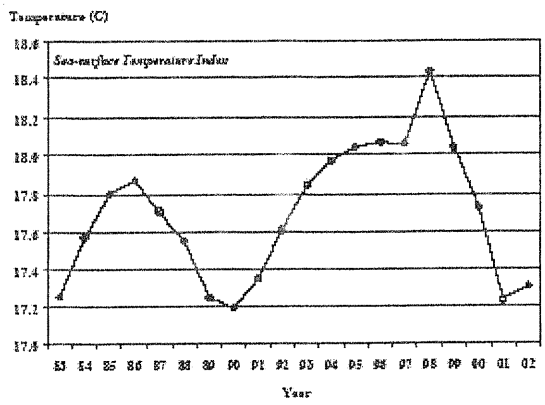


Figure 6. Time series of sea-surface temperature (C) recorded at Scripps Pier, La Jolla, CA (1983-02). Annual estimates reflect 3-year 'running' averages, see Jacobson and MacCall (1995).

#2 Harvest Guideline

$$HG_{2003} = (\text{TOTAL STOCK BIOMASS}_{2002} - \text{CUTOFF}) * \text{FRACTION} * \text{U.S. DISTRIBUTION},$$

where HG_{2003} is the total U.S. (California, Oregon, and Washington) harvest guideline recommended for 2003, TOTAL STOCK $BIOMASS_{2002}$ is the estimated stock biomass (ages 1+) from the current assessment conducted in 2002 (see above), CUTOFF is the lowest level of estimated biomass at which harvest is allowed, FRACTION is an environment-based percentage of biomass above the CUTOFF that can be harvested by the fisheries (see below), and U.S. DISTRIBUTION is the percentage of TOTAL STOCK $BIOMASS_{2002}$ in U.S. waters.

#3 Fraction

The value for FRACTION in the MSY control rule for Pacific sardine is a proxy for F_{msy} (i.e., the fishing mortality rate that achieves equilibrium MSY). Given F_{msy} and the productivity of the sardine stock have been shown to increase when relatively warm-water ocean conditions persist, the following formula has been used to determine an appropriate (sustainable) FRACTION value:

$$\text{FRACTION or } F_{msy} = 0.248649805(T^2) - 8.190043975(T) + 67.4558326,$$

where T is the running average sea-surface temperature at Scripps Pier, La Jolla, California during the three preceding years. Ultimately, under Option J (PFMC 1998), F_{msy} is constrained and ranges between 5% and 15% (Figure 11).

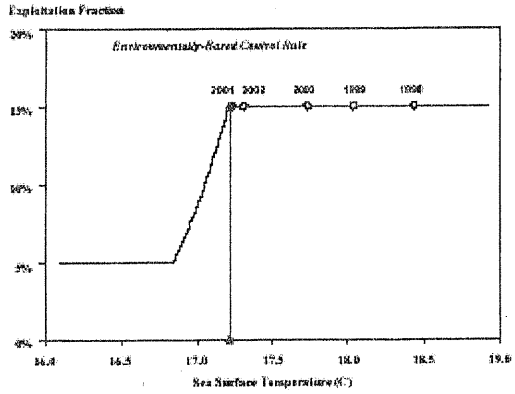


Figure 11. Environmentally-based harvest rate control rule for Pacific sardine as specified in the Coastal Pelagic Species Fishery Management Plan (PFMC 1998). For any given year, sea surface temperature (X-axis) is the running average sea surface temperature at Scripps Pier (La Jolla, CA) during the three preceding years. The exploitation fraction (Y-axis), which can range between 5-15%, is an explicit part of the algorithm used to determine the annual harvest guideline (quota) for the coastwide U.S. fishery – see Table 4. Open circles illustrate the sea surface temperature and exploitation fraction for recent years (1998-2002).

3.3 Fishing Industry

The sardine fishery was first developed in response to demand for food during World War I. Landings increased from 1916 to 1936, and peaked at over 700,000 mt. The Pacific sardine supported the largest fishery in the western hemisphere during the 1930s and 1940s, with landings along the coast in British Columbia, Washington, Oregon, California, and Mexico. The fishery declined, beginning in the late 1940s and with some short-term reversals, to extremely low levels in the 1970s. There was a southward shift in the catch as the fishery decreased, with landings ceasing in the northwest in 1947 through 1948, and in San Francisco in 1951 through 1952. Sardine were primarily used for reduction to fish meal and oil, and as canned food, with small quantities taken for live bait. An extremely lucrative dead bait market developed in central California in the 1960s.

In the early 1980s, sardine began to be taken incidentally with Pacific (chub) mackerel and jack mackerel in the Southern California mackerel fishery and was primarily canned for pet food, although some were canned for human consumption. As sardine continued to increase in abundance, a small directed fishery was reestablished in California in 1986. As biomass continued to increase, the directed fishery was expanded. During the 1990s, landings averaged almost 42,000 short tons per year. By the late 1990s the sardine fishery had expanded coastwide, with active fisheries off Oregon, Washington, and British Columbia.

FISHERY MANAGEMENT PLAN AMENDMENT–SARDINE ALLOCATION

The Pacific Fishery Management Council (Council) will receive an update from the Coastal Pelagic Species Advisory Subpanel (CPSAS) about development of alternative management scenarios for allocation of the annual Pacific sardine harvest guideline. The Council will also receive a report from the Coastal Pelagic Species Management Team (CPSMT) about their review of several coastal pelagic species (CPS) fishery management plan (FMP)-related issues identified by National Marine Fisheries Service.

At the June 2004 meeting, the Council initiated an amendment (Amendment 11) to the CPS FMP. The primary purpose of the FMP amendment is to address allocation of the annual Pacific sardine harvest guideline. The FMP amendment is intended to ensure optimal utilization of the resource and equitably allocate harvest opportunity. The Council tasked the CPSAS with initial development of a range of allocation alternatives.

To enable implementation by January 2006, final Council action would need to occur no later than the June 2005 Council meeting. The tentative schedule is:

June 2004 – initiation of FMP amendment
September 2004 – progress report to Council
November 2004 – review preliminary alternatives
December 2004-January 2005 – public hearings on draft alternatives
March 2005 – preliminary action
June 2005 – final action

The CPSAS met August 3-4, 2004 to begin development of alternative allocation scenarios. Their report (Agendum I.3.b, CPSAS Report) details progress-to-date.

Secondly, in a May 18, 2004 letter to the Council, NMFS identified a suite of CPS-related issues that NMFS suggested could be addressed through amendment of the CPS FMP. These issues include FMP harvest control rules, compatibility between California's proposed market squid FMP and the Council's CPS FMP, market squid overfishing definitions, CPS FMP bycatch provisions and pilot at-sea observer program, essential fish habitat, and five-year review of the CPS FMP Environmental Impact Statement. The Council directed the CPSMT to formally review the CPS FMP issues raised by NMFS to identify issues that could be addressed through amendment of the CPS FMP and if the issues could be addressed in the short-term or would require more extensive time to complete.

The CPSMT met August 5, 2004 to formally review the FMP-related issues identified by NMFS. Their report (Agendum I.3.b, CPSMT Report) details their findings and recommendations.

Council Task:

Council guidance on development of an FMP amendment.

Reference Materials:

1. Agendum I.3.a, Attachment 1: May 18, 2004 NMFS letter.
2. Agendum I.3.b, CPSAS Report.
3. Agendum I.3.b, CPSMT Report.
4. Agendum I.3.c, Public Comment.

Agenda Order:

a. Agendum Overview — Dan Waldeck
b. Reports and Comments of Advisory Bodies
c. Public Comment
d. Council Guidance on Development of an FMP Amendment

PFMC
08/25/04

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
Southwest Region
501 West Ocean Boulevard, Suite 4200
Long Beach, California 90802- 4213

MAY 1 8 2004

F/SWR2:SF
1504–13-CPS-OB-010

Donald K. Hansen
Chairman
Pacific Fishery Management Council
7700 NE Ambassador Place, Suite 200
Portland, Oregon 97220-1384

Dear Mr. Hansen:

In preparation for the meeting of the Pacific Fishery Management Council (Council) in June, my staff and I have been giving some thought to the decisions the Council will need to make in coming months on the scope and timing of actions under the Coastal Pelagics Species Fishery Management Plan (FMP).

The Council has already decided that the sardine allocation process now in place has a fixed term; it is scheduled to end after the 2005 fishing year. I expect that the Council will affirm its intent to have the CPS management team analyze and evaluate the impacts and implications of extending the current system and of alternatives to the current system, considering both recent fishery information and any new information from recent research into the northern component of the sardine stocks. This is clearly the top priority for the team at this time.

However, I would ask that the Council also consider directing the team to look at some additional issues. First, I note that there will be a Stock Assessment Review Panel looking at the sardine and Pacific mackerel stock assessment methodologies and advising as to their scientific soundness and future use. In that context, I understand that an alternate stock assessment method for Pacific mackerel is being or has been developed. It may be that this would provide a basis for considering changes in the harvest guideline formula for Pacific mackerel or possibly even Pacific sardine. This might be considered in the next amendment.

Second, the Southwest Region (SWR) has received calls in recent months from California vessel owners expressing concern about the incompatibility of the State of California market squid limited entry program with the CPS finfish limited entry program under the FMP. I think both the management team and the advisors should take a fresh look at this issue and advise the Council if they believe that a change in the FMP would be a reasonable way to resolve any such issues. In addition, with respect to market squid, it appears that there is a need to address further the prospective use of the egg escapement value as a proxy for maximum sustainable yield and as a value for determining if the stock is overfished or is subject to overfishing (i.e., minimum stock size and maximum fishing mortality threshholds). Based on our most recent review for the annual National Marine Fisheries Service (NOAA Fisheries) Report to Congress on the status of

fish stocks, the current FMP language is ambiguous. I note in this context that NOAA Fisheries is considering amendments to the National Standard Guidelines, and any changes could affect the way in which this issue might be addressed. Nonetheless, it would be prudent to direct the team to consider this issue and to be prepared to advise the Council as to possible "fixes" once any changes to the guidelines have been proposed.

Third, as the SWR indicated in its March 2004 report to the Council, the FMP needs to be revised to address the bycatch provisions of the Magnuson-Stevens Fishery Conservation and Management Act more fully. The States of Oregon and Washington have had observers on vessels indicating there is not a bycatch problem to the north, but we have very little field information to the south. While port sampling suggests there is not a bycatch problem in the south, I believe that port sampling alone is insufficient to demonstrate with assurance that there is not a bycatch problem. Therefore, the SWR is planning to place observers on some CPS vessels operating out of Southern California in a pilot project intended to provide better information on the extent to which there is bycatch in the CPS fishery in that area. We would provide the results to the CPS management team to consider the need for additional field observations and possibly consider alternative ways to address any bycatch issues identified, as required by the Magnuson-Stevens Act.

Fourth, as indicated in a recent letter from Dr. William Hogarth, regional councils are being asked to review and assess the need for changes in essential fish habitat (EFH) designations under their fishery management plans. This would include the CPS FMP. It would seem prudent to have the team at least complete an initial reassessment in this next planning effort to determine if there are any major problems with the current EFH designations.

Having identified these additional issues for consideration, I also note that the last Environmental Impact Statement (EIS) for the CPS fisheries management program was prepared with Amendment 8, which established the CPS FMP. That occurred more than 5 years ago, and as you know, there have been major changes in the fishery since then. Therefore, I believe it is appropriate for the Council to initiate scoping to determine if a full EIS process is warranted for the next amendment to the CPS FMP. If scoping results in a conclusion to keep adjustment of the FMP to a moderate level, then an EIS may not be needed. However, only after scoping would the Council have a solid information base for that decision. If an EIS is warranted, then the SWR would do all we can to help design and carry out the process consistent with the principles and protocols of regulatory streamlining under the new Operational Guidelines.

In summary, I urge the Council to consider the full range of possible adjustments to the FMP and to engage in scoping to determine the scope of review and the manner in which to proceed. I appreciate all the hard work that goes into preparation of FMP amendments and associated documents, and look forward to working with the Council to assist in any way we can.

Sincerely,

for Rodney R. McInnis
Acting Regional Administrator

COASTAL PELAGIC SPECIES ADVISORY SUBPANEL REPORT ON FISHERY MANAGEMENT PLAN (FMP) AMENDMENT–SARDINE ALLOCATION

As directed by the Pacific Fishery Management Council (Council), the Coastal Pelagic Species Advisory Subpanel (CPSAS) met August 3-4, 2004 to begin development of management alternatives for annual allocation of the Pacific sardine harvest guideline (HG).

A set of overall objectives were agreed upon to guide development of the management alternatives. Based on these objectives, a suite of allocation "scenarios" were drafted. Each allocation scenario was then further specified into specific alternatives. Pros and cons of each allocation scenario were also developed to facilitate Council decision making.

Subsequent to the CPSAS meeting, industry representatives continued discussions within their respective sectors to inform them of the CPSAS draft work product, refine the alternatives, and begin narrowing the potential range of alternatives.

The following report lists the draft objectives, allocation scenarios, and specific alternatives. The CPSAS is seeking guidance from the Council to determine if the CPSAS is on the right track in terms of overarching objectives and the specific types of allocation scenarios. Following the September Council meeting, the CPSAS will meet to further refine the alternatives into a draft "reasonable range" of alternatives for Council consideration at the November 2004 Council meeting.

A principal concern over-riding development of a Pacific sardine allocation program is the fishery during the October - December period. California fishery participants would like access to a reasonable amount of fish during this period. However, Pacific Northwest fishery participants are concerned that if fish are "locked up" for the October - December period *and* if the California sector is unable to harvest this amount, then a portion of the harvest guideline could be "left on the table." A second major concern is that during low stock biomass periods a portion of the harvest guideline (HG) will be "locked up" in a Pacific Northwest allocation, and could go unharvested because the fish are no longer in northern waters and available to the Pacific Northwest fishery.

Objectives for Allocation Program

- Strive for simplicity and flexibility in developing an allocation scheme.
- Transfer quota as needed.
- Utilize optimum yield.
- Implement a plan that balances maximizing value and historic dependence on sardine.
- Implement a plan that shares the pain equally at reduced HG levels.

Summary of Alternative Scenarios

The following table summarizes several alternative scenarios, provides a description of how the scenario would operate, and pros and cons.

Scenario	Description	Pros	Cons
Status quo	Extends the interim allocation framework. Subarea line at Pt. Arena; Jan 1 allocation 66:33 S/N; Sept 1 reallocation 80:20 S/N; Dec 1 coastwide.	• Identifies PNW fishery as independent sector and provides specific allocation. • Simple system. • Provides for reallocation of unused fish at right time. • Provides for Dec 1 mop up fishery.	• Leaves fish on table (at high HG). • Too rigid, can't adapt to year-to-year variation nor react to need for inseason changes.
No action	If Council took no action, the interim allocation would expire and the allocation framework would revert back to the original FMP formula. Subarea line at Pt. Piedras Blancas; Jan 1 allocation 66:33 S/N; Oct 1 reallocation 50:50 S/N.	• Best suited to a CA only fishery, performs well at allocating between Nor CA and So CA, but doesn't acct for PNW fishery. • Doesn't provide for expanding PNW fishery (pro for CA).	• In some years, sectors pre-empted. • Leaves fish on table (at high HG). • Too rigid, can't adapt to year-to-year variation nor react to need for inseason changes. • Doesn't provide for expanding PNW fishery (con for PNW).
Coastwide HG, w/ seasonal allocation	Periodic/seasonal allocation of fixed amount of the HG,[1/] rollover of remaining HG to next period. No subarea allocation.	• Provides for potentially equitable distribution, thru-out the year, for each sector. • Simple, easy to administer. • Improves ability to achieve HG. • Aims to provide proper amount for each sector when they need it.	• Fixed dates are inflexible and could prevent transfer of fish to other sectors on as needed basis. • Increased potential for locking fish into one sector, disadvantaging other sectors. • If quota decreases or market demand increases, PNW could be preempted. • No explicit PNW allocation.

1/ Note – monthly allocation (with rollover) could create large administrative burden. Three-period structure appears easier to administer (Jan-Jun, Jul-Sep, Oct-Dec).

Scenario	Description	Pros	Cons
Area-based allocation of HG	HG allocated to specific subareas. Periodic reallocation of unused HG. Mop up fishery at end of year.	• Equally divides HG to CA and PNW. • Provides for timely and flexible transfer of HG between areas. • Allocates the pain of a lower HG equally between sectors.	• No incentive for PNW to limit expansion. • Exacerbates race to fish and inter-sectoral preemption.
"Historical" allocation of HG	Each year sectoral allocation would be based on each sector's harvest the previous year.	• Relies upon most recent history (previous season) for allocating the next year.	• Penalizes sector for having a bad season the previous year and assumes the previous year's conditions will continue in next year. • Administrative burden.
Coastwide HG with Sept 1 Season Start	No sub-area allocation.	• Flexible way of using HG (when HG > 100,000 mt). • Very simple.	• Could preempt PNW (when HG < 100,000 mt).
Coastwide HG with June 1 Season Start	No sub-area allocation.	• Flexible way of using HG (when HG > 100,000 mt). • Very simple.	• Could preempt CA (when HG < 100,000 mt).
Set Aside Plan	A portion of the HG is "set aside" (e.g., held in trust by NMFS) for distribution on as needed basis.	• Protects limited entry fleet. • Prevents premature closure of sector.	• Potentially leaves fish on the table. • Administrative burden. • Unequal allocation between sectors.

Allocation Scenarios and Variations on the Theme

The following narratives describe each allocation scenario developed by the CPSAS and variations on each basic scenario. As noted previously, the overarching scenarios were developed by the CPSAS, specific variations were developed by the CPSAS, and (after the CPSAS meeting) by the fishery sectors. All of the alternatives are presented to demonstrate the full range of potential alternatives. Prior to the November 2004 Council meeting, the CPSAS will meet to work on focusing this broad range into a "reasonable range" of alternatives.

Status quo

- Subarea line at Pt. Arena. Allocation January 1 66% to the South (So CA and Nor CA), 33% to the North (PNW); reallocation on September 1 80% to the South, 20% to the North; remaining HG open coastwide December 1.

No action

- Subarea line at Pt. Piedras Blancas; allocation January 1 66% to the South (So CA), 33% to the North (Nor CA and PNW); reallocation on October 1 50:50.

Coastwide HG, w/ seasonal allocation – Seasonal release of HG coastwide. Unused HG automatically rolls into next seasonal release.

- January-June 40%; July-September 40% + rollover; October-December 20% + rollover.
- If HG < 100,000 mt – January-June 40%; July-September 35% + rollover; October-December 25% + rollover.
- January-June 50%; July-December 50%.
- January-June 45%; July-August 45%; September-December 10%.
- Change season start date to December 1. December-May 50%; June-November 50%.
- January-June 35% coastwide; July-September 50% + prior unused allocated (40% to PNW, 10% to CA); October-December 15% + prior unused allocated coastwide.

Area-based allocation – Subareas at Pt. Arena, South is So CA and Nor CA, North is PNW.

- January 1 season start, 50% to South and 50% to North. If and when the Northern region catches its quota, Southern area uncaught quota (less a hold back equal to 120% of the Southern regions prior year's October, November, and December catch) would be made available on that date as a coastwide quota.

- January 1 season start, 40% to South (January 1), 40% to North (June 1-September 30), 20% of HG (plus remainder from January 1-September, both areas) for use coastwide (October1-December 31). Prior to September 30, the southern fishery could not exceed their 40% allocation.

- January 1 season start, 30% of HG available coastwide January-June, 40% of HG to North, 10% (plus remainder of January-June amount) allocated to South July-September, coastwide October 1.

- October 1 season start, 45% to South (on October 1), 45% to North (on June 1), 10% set aside (for use by whomever uses their sectoral allocation first), August 1 all remaining HG pooled and available coastwide.

- October 1 or December 1 season start (depends on size of HG), 20% of HG available coastwide at start of season through December 31, 40% of HG to South (on January 1), 40% of HG to North (on June 1), August 1 remaining HG available coastwide. Under this scenario the southern fishery would be open year round, as long as their HG allocation was available. The northern fishery would be closed January 1 - May 31.

  If the HG > 90,000 mt – October 1 season start.
  If the HG < 90,000 mt – December 1 season start.

  "Historical" allocation – Subareas at Pt. Arena, South is So CA and Nor CA, North is PNW.

- Each year sectoral allocation would be based on each sector's harvest the previous year.

  Coastwide HG with September 1 Season Start

- Season start changed to September 1, coastwide HG, no seasonal or subarea allocations.

  Coastwide HG with June 1 Season Start

- Season start changed to June 1, coastwide HG, no seasonal or subarea allocations.

  Set Aside Plan – Subareas at Pt. Arena, South is So CA and Nor CA, North is PNW.

- If HG > 100,000 mt – 10,000 mt set aside, remaining HG allocated 60% to South, 40% to North (on January 1); remaining HG available coastwide on September 1. Set aside to be used by sector that will run out of HG (triggered when sector has achieved 90% of its allocation).

- If HG is < 100,000 mt – no set aside, 60% to South, 40% to North (on January 1); remaining HG available coastwide on October 1.

Variations on Status quo – Subareas at Pt. Arena, South is So CA and Nor CA, North is PNW.

- If HG > 100,000 mt – 60% to South, 40% to North (on January 1), reallocation 60 % to South, 40% to North (on September 1), coastwide on November 1.

- If HG > 100,000 mt – 66% to South, 33% to North (on January 1), reallocation 80 % to South, 20% to North (on September 1), coastwide on November 1.

- If HG < 100,000 mt – 66% to South, 33% to North (on January 1), coastwide on October 1.

COASTAL PELAGIC SPECIES MANAGEMENT TEAM REPORT ON FISHERY MANAGEMENT PLAN AMENDMENT ISSUES—SARDINE ALLOCATION

The Coastal Pelagic Species Management Team (CPSMT) reviewed a letter to the Pacific Fishery Management Council (Council) from Mr. Rod McInnis, National Marine Fisheries Service (NMFS)-Southwest Region. The CPSMT reviewed the issues raised in the letter to provide information to the Council for a response to NMFS. The issues were evaluated in terms of their validity, time and resources necessary to complete the task, priority level relative to other coastal pelagic species (CPS) fishery management plan (FMP) workload, and potential schedule for when the issue could be addressed.

The CPSMT considers developing a long-term allocation formula for the Pacific sardine fishery to be the highest priority FMP-related issue. The CPSMT supports the Council's assignment of the development of alternative allocation formulae to the Coastal Pelagic Species Advisory Subpanel (CPSAS). Once a range of alternatives is developed, the CPSMT will analyze the alternatives to provide information for Council decision making; keeping in mind that, as stated previously, the CPSMT strongly advises that at the onset, the CPSAS must develop general consensus regarding the preferred allocation alternative.

In their May 18, 2004 letter, NMFS identified the following issues: harvest guideline formulae for Pacific mackerel and Pacific sardine; consistency of California's proposed market squid FMP, with the federal CPS FMP; reasonable maximum sustainable yield (MSY) proxies based on the egg escapement method for market squid; bycatch accounting; CPS essential fish habitat; and a five-year review of the CPS FMP.

Harvest Guideline Formulae – NMFS states that the recent CPS stock assessment review process could "provide a basis for considering changes in the harvest guideline formula for Pacific mackerel or... Pacific sardine."

CPSMT response:

As discussed under Agenda Item I.2, review of the harvest guideline formulae is a valid issue for both Pacific mackerel and Pacific sardine.

Comprehensive review of the harvest guideline formulae would require approximately one year to complete via a formal research project. Specific information would include: population biomass, biomass/sea surface temperature relationship, stock distribution (U.S. waters versus Mexico and Canada), stock structure, and the cut-off value (a hedge against overfishing, currently 150,000 mt). The project could result in a new or modified stock structure hypothesis.

Relative to the other issues in the May 18 letter, this is a mid-level priority, however, as noted previously it would be a major project.

The earliest this research project could be started is June 2005. It would take at least two years to complete the research, amend the FMP, and implement through the federal rule-making process.

California's Market Squid FMP – NMFS notes industry concern "about the incompatibility of the State of California market squid limited entry program with the CPS finfish limited entry program under the [CPS] FMP."

CPSMT response:

The CPSMT discussed the Market Squid FMP, with California Department of Fish and Game (CDFG) staff. The CPSMT does not consider this a valid concern, CDFG developed the state FMP in accord with the federal FMP.

The California Fish and Game Commission is scheduled to adopt the Market Squid FMP (MSFMP) on August 27, 2004, including a restricted access program. Once the Commission decides on the specifics of the MSFMP, the program will be implemented in the squid fishery season starting April 1, 2005. In developing a restricted access program, the CDFG used the criteria set forth in the federal FMP to support its recommendation of a "moderately productive and specialized" fleet capacity goal of 52 round-haul vessels, 34 light boats, and 18 brail boats. These goals are within the range of the number of vessels actively participating in the fishery in a given year and maintains a ratio of one round haul vessel to one vessel attracting squid (both light boats and brail boats) currently observed in the fleet. The recommendations include establishing limited entry permit criteria based on prior catch or fishing history and provide for full transferability of vessel permits only between vessels of comparable capacity.

Market Squid Egg Escapement MSY Proxy – NMFS notes "that [it appears] there is a need to address further the prospective use of the egg escapement value for determining if the stock is overfished or is subject to overfishing."

CPSMT response:

The CPSMT perceives this issue to be about ensuring the egg escapement MSY proxy provides information for managing the fishery and monitoring stock status. It is a valid issue, but is currently being addressed.

As reported in the June 2004 CPS Stock Assessment and Fishery Evaluation (SAFE) document, there is a coordinated program (CDFG and NMFS) to develop a systematic approach to evaluate stock status and manage the squid fishery. The program includes port sampling of market squid landings, analysis of biological information, development of a systematic (spatially and temporally) assessment schedule, simulation modeling, and incorporation of the results into state and federal management processes. Other components being developed include a range of "*F*" rates, which would provide management targets to prevent overfishing and further understanding of appropriate biological reference points for monitoring status of this species. The full program should be up and running by fall 2005, initial results could be available in spring 2005. It would be prudent to plan for Scientific and Statistical Committee review during 2005.

Information from this coordinated program would be used by CDFG for inseason management, by Council in the SAFE report, and by NMFS in the status of stocks report

The CPSMT also considered market squid relative to NMFS proposed revisions to National Standard 1 guidelines. The CPSMT considers market squid to have unique management needs that do not fit well with the current National Standard 1 guidelines. Moreover, the CPSMT cautions against forcing market squid management to conform to guidelines designed for finfish, i.e., species with very different life history characteristics.

Bycatch – "the FMP needs to be revised to address bycatch provisions of the Magnuson-Stevens Fishery Conservation and Management Act more fully."

CPSMT response:

The CPSMT considers this a valid, but limited, concern.

The CPSMT notes that Amendment 9 to the CPS FMP documented methods being used to monitor and minimize bycatch in CPS fisheries. The June 2004 SAFE document reports the most recent data on bycatch. Both of these sources indicate bycatch in CPS fisheries to be minimal. This finding is based on incidental catch reports from port samples of the California fishery; and port samples, logbooks, and at-sea observer data from Pacific Northwest fisheries. More recently, NMFS has initiated a pilot program for at-sea observers aboard California-based CPS fishing vessels. The CPS FMP authorizes NMFS to require at-sea observers in the CPS fishery. NMFS has indicated their intent is to evaluate the pilot project to determine if at-sea observers are warranted for the California fishery. The CPSMT fully supports the NMFS initiative and will assist and advise as necessary.

If there are specific bycatch concerns that are not being addressed nor reported in the CPS SAFE document, the CPSMT requests information from NMFS to identify these specific areas of concern.

Beyond, but related to, the bycatch issue, the CPSMT is concerned that underreporting of CPS on fishtickets could be occurring. If this is the case, fishery management and stock assessments could be effected. The CPSMT recommends the Council request the Enforcement Consultants to evaluate this issue. For example, a review of enforcement records could be undertaken to evaluate if underreporting has been detected, how frequent it has occurred, what is the violation rate, have citations been issued, etc.

Essential Fish Habitat (EFH) – NMFS requested the Council "complete an initial reassessment... to determine if there are any major problems with the current EFH designations."

CPSMT response:

The CPSMT does not consider this to be a valid concern.

The CPSMT reviewed CPS EFH information in the June 2004 SAFE document and the CPS FMP. The information in these sources is complete and accurate. The CPSMT is not aware of new information that could warrant modification of the current EFH designations. Moreover, there appears to be no evidence to support development of static definitions of CPS EFH as opposed to the current dynamic definition. That is, CPS EFH is linked to ocean temperatures, which shift temporally and spatially, providing a "dynamic" definition of EFH.

If NMFS has other information that would indicate changes to CPS EFH definitions are warranted, the CPSMT will review this information for the Council.

Environmental Impact Statement – NMFS "believe[s] it is appropriate for the Council to initiate scoping to determine if a full EIS process is warranted for the next amendment to the CPS FMP."

CPSMT response:

The CPSMT considers this somewhat valid and notes the FMP amendment to address sardine allocation will entail development of an EIS. NMFS also notes "there have been major changes in the fishery" since the FMP was implemented in 1999. The only "major change" the CPSMT is aware of is the expansion of the Pacific Northwest sardine fishery that has occurred since 2000, which will be the subject of review under the sardine allocation FMP amendment.

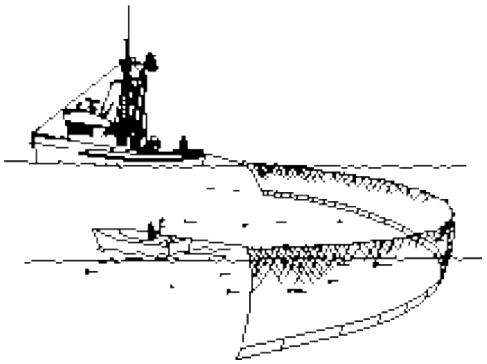
The CPSMT is not aware of evidence that a comprehensive review of the FMP is warranted. If NMFS believes a full programmatic FMP EIS for CPS (analogous to groundfish) is needed, the CPSMT suggests it would take at least two years to develop a programmatic EIS.

In summary, the CPSMT considers sardine allocation to be the top priority. The harvest guideline formulae could be reviewed, but not in the current FMP amendment. It would take at least two years to perform the research and implement changes (if necessary) to the harvest guideline formulae. Concern about compatibility between the California market squid FMP and the federal CPS FMP is unwarranted. A program to fully implement the egg escapement MSY proxy approach is underway and should be ready for use in state and federal management in 2005. From current data, bycatch in the CPS fishery does not appear a serious concern. The CPSMT will work with NMFS as they complete their pilot observer program. The CPS EFH designations appear appropriate. A program-level EIS for the CPS FMP would take at least two years to complete. The current FMP amendment to address sardine allocation will, most likely, be analyzed in an EIS.

Finally, the CPSMT recommends the Council request the Enforcement Consultants to evaluate underreporting of CPS on fishtickets. For example, a review of enforcement records could be undertaken to evaluate if underreporting has been detected, how frequent it has occurred, what is the violation rate, have citations been issued, etc.

PFMC
08/24/04

Agendum I.3.c
Public Comment
September 2004



CALIFORNIA WETFISH PRODUCERS ASSOCIATION

Representing California's Historic Fishery

August 24, 2004

Mr. Don Hansen, Chair &
Dr. Don McIsaac, Executive Director
Pacific Fishery Management Council
7700 NE Ambassador Place #200
Portland OR 97220-1384

RE: Agenda Item I.3.c – CPS FMP Amendment – Sardine Allocation

Dear Chairman Hansen, Dr. McIsaac and Council members,

The California Wetfish Producers Association (CWPA) represents the major sardine processors in both Monterey and southern California, along with fishermen from both regions. We very much appreciate this opportunity to address the Council on the issue of long-term sardine allocation, expanding on the CPSAS report.

As the CPSAS report noted, industry representatives have engaged in extensive discussions to date, including inter-regional communications. CWPA is committed to continue working toward a suite of reasonable alternatives to present to the Council, following the objectives that resulted from initial ad hoc meetings between Pacific Northwest and California industry representatives.

A note on the objectives as stated:
Both northern and southern reps. agreed to strive for a flexible allocation plan that fosters full use of optimum yield, if possible.
Both regions also acknowledged that the plan should protect CA's historic dependence on sardine while providing the OR/WA fishery with increased fishing opportunity when stock(s) are abundant in the north. However, re: "sharing the pain equally" at reduced HG levels, the regions do not agree on the meaning of the word "equal". PNW representatives are now advocating 50:50 allocation, even in low quota years, which would clearly pre-empt the federally permitted limited-entry fishery in CA to foster increased harvest in the "open access" area.

In light of oceanic and resource changes observed in the northern fishery, documented by observers on the grounds as well as the 2004 summer sardine field survey, the possibility exists that sardines will be less abundant or absent from northern waters coinciding with a reduction in the biomass and HG.
It is also likely that no "one size fits all" allocation formula can equitably address both high-quota and low-quota situations. For that reason, we propose that the Council consider the need to adopt a framework that provides for different allocation formulas for HGs above and below a pre-defined level – for example, 100,000 tons. We further suggest that any "long-term" allocation scheme adopted by the Council be reviewed and, if necessary, adjusted after two years.

PO Box 1951 Buellton, CA 93427 Phone: 805-693-5430 Fax: 805-686-9312
Email: dplesch@earthlink.net

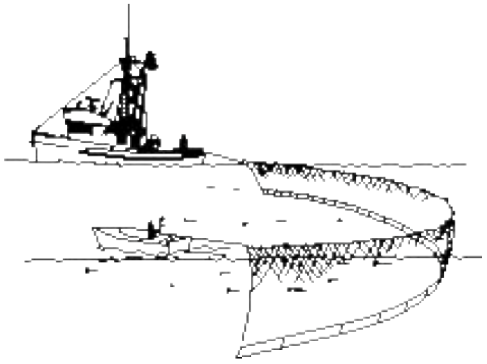
At this time we would like to share with the Council the initial ideas, discussion and analysis that we submitted to Council staff following the recent CPSAS meeting, much of which was included generically in the CPSAS report.

We very much appreciate the Council's consideration of this information.
Thank you very much for your attention.

Sincerely,

Diane Pleschner-Steele
Executive Director

cc: Rod McInnis
Dan Waldeck



CALIFORNIA WETFISH PRODUCERS ASSOCIATION

Representing California's Historic Fishery

SUGGESTED OPTIONS FOR LONG TERM SARDINE ALLOCATION
from CA SARDINE INDUSTRY

In an effort to narrow and refine the number of options for long-term sardine allocation, members of California's sardine / wetfish processing industry met in San Pedro on August 13 to consider recommendations from CA.

The objective of this exercise was to accomplish the following:

[a] design a more flexible framework to achieve optimum yield when the harvest guideline is above 100,000 tons,

[b] protect California's historic, federally permitted limited entry fishery from premature closure during its peak fall-winter season when the harvest guideline falls below @100,000 tons.

[c] provide equitable fishing opportunity for the emerging fishery in OR/WA while fish remain available in the north.

[d] avoid "locking up" quota in the north when sardines disappear from northern waters, ostensibly at lower quota levels.

CA wetfish industry emphasizes the need to review any long-term option selected by the Council within two years and make adjustments as needed to reflect status of resource and fishing trends.

Notes:

[a] A member of the sardine STAT responsible for developing sardine biomass estimates and harvest guidelines makes a compelling argument in favor of retaining the January 1 season start date: to utilize current season field and fishery data to develop biomass estimate and HG. Any alteration to the season start date (e.g. September season opening or June season opening) would necessitate using prior year data. In light of the changes apparent in the resource, CA industry members agree with and prefer the use of current year data to develop biomass and HG, thus all options suggested by CA begin January 1.

[b] However, a January 1 start date potentially penalizes CA's limited entry fishery if quota is "used up" by the emerging sardine fishery in the PNW prior to CA's peak season, which begins in September and continues through December and on into March of the following year. To avoid premature shut-down in November or December, it is critical to provide adequate HG in the period Oct-Dec. CA has demonstrated use of ± 22,000 tons in the period Sep-Dec. over the past seven years.

The options provided below are **not** listed in order of preference at this time:

1. Area allocation

Above 100,000 tons

[a] Status quo (interim allocation):
33% allocated to N, 66% allocated to CA effective January 1.
Reallocation of all unused HG 20% N, 80% S effective September 1.
Reallocate all unused coast-wide effective November 1.

[b] Modified status quo: N = PNW; S = CA. Season begins January 1.
40% allocated to N, 60% allocated to CA effective January 1.
Reallocation of all unused HG 40% N, 60% S effective September 1.
Reallocate all unused coast-wide effective November 1.

Below 100,000 tons

[c] Status quo (interim allocation) with no reallocation Sept. 1
33% allocated to N, 66% allocated to CA effective January 1.
Reallocate coast-wide October 1.

2. Seasonal allocation

Above 100,000 tons

[a] 40% allocated coast-wide January 1 for period Jan – June 30
Unused HG automatically rolls into next seasonal release
40% + prior unused allocated coast-wide July 1 for period Jul – Sep 30
20% + prior unused allocated coast-wide Oct 1 for period Oct-Dec

[b] 35% allocated coast-wide January 1 for period Jan – June 30
Unused HG automatically rolls into next seasonal release
50% + prior unused allocated July 1 40% to PNW, 10% to CA for period Jul – Sep 30
15% + prior unused allocated coast-wide October 1 for period Oct – Dec 31

Below 100,000 tons (at reduced quota, assuming fish are largely unavailable in PNW)

[c] 40% allocated coast-wide January 1 for period Jan – June 30
Unused HG automatically rolls into next seasonal release
35% + prior unused allocated coast-wide July 1 for period Jul – Sep 30
25% + prior unused allocated coast-wide Oct 1 for period Oct – Dec 31

[1b]

MODIFIED STATUS QUO ALLOCATION BY AREA >100,000 TONS

Jan 1 season open - 60% South, 40% North

Reallocate September 1 60 S / 40 N, Coast-wide 11/1

110,000 TONS	PNW	CA	
Month	44,000	66,000	
Jan	0	9,026	
Feb	0	7,496	
Mar	0	6,665	
Apr	0	4,543	
May	0	2,780	
Jun	3,136	1,273	
Jul	12,117	2,652	
Aug	15,617	5,277	
SubT	30,870	39,712	
Bal Unused 9/1	13,130	26,288	39,418
Reallocate	15,767	23,651	
Sep	10,818	4,646	
Oct	1,350	8,146	
SubT	3,599	10,859	
Nov	0	4,892	
Dec	0	4,321	
Total Used	43,038	61,717	
*Net Bal.	3,599	1,646	

* Assume PNW balance harvested

[1a & 1c]

STATUS QUO ALLOCATION BY AREA <100,000 TONS

Jan 1 season open - 66% South, 33% North

Reallocate September 1 80 S / 20 N, Coastwide 11/11

90,000 TONS	PNW	CA	CA w/ **No Sept.**
Month	29,700	59,400	Reallocation
Jan	0	9,026	9,026
Feb	0	7,496	7,496
Mar	0	6,665	6,665
Apr	0	4,543	4,543
May	0	2,780	2,780
Jun	3,136	1,273	1,273
Jul	12,117	2,652	2,652
Aug	15,617	5,277	5,277
SubT	30,870	39,712	39,712
Bal Unused 9/1	*-1,170*	19,688	
Reallocate	3,938	15,750	No reallocation
Sep	10,818	4,646	4,646
Oct	1,350	8,146	8,146
SubT	*-8,230*	2,958	
Nov		*-1,934*	4,892
Dec		*-4,321*	4,321
Total			61,717

[2a]

40/40/20% RELEASE OF HARVEST GUIDELINE (MT) + ROLLOVER					
		CA Average+			
H.GUIDELINE	123,000	110,900	100,000.00	80,000	60,000
Jan Rel. @40%	49,200	44,360	40,000	32,000	24,000
CA Av+ Jan-Jun	-31,783	-31,783	-31,783	-31,783	-31,783
PNW Jun (JT)	-3,136	-3,136	-3,136	-3,136	-3,136
	Rollover	Roll over	Roll over	No rollover	No rollover
Unused	14,281	9,441	5,081	*-2,919*	*-10,919*
Jul @40% + RO	63,481	53,801	45,081	32,000	24,000
CA Av+ Jul-Sep	-12,575	-12,575	-12,575	-12,575	-12,575
Available for Harvest	50,906	41,226	32,506	19,425	11,425
Oct Rel. @20%	24,600	22,180	20,000	16,000	12,000
CA Av+ Oct-Dec	-17,369	-17,369	-17,369	-17,369	-17,369
PNW Oct. Est.	-1,350	-1,350	-1,350	-1,350	-1,350
Remaining OY	5,881	3,461	1,281	*-2,719*	*-6,719*

[2b]

35/50/15 SEASONAL RELEASE OF HARVEST GUIDELINE (MT) + ROLLOVER >100,000 TONS

(40/40/20 RELEASE < 100,000* tons)

H.GUIDELINE	123,000	110,900	100,000.00	H.GUIDELINE	90,000	80,000	70,000	60,000
Jan Rel. @35%	43,050	38,815	35,000	Jan Rel. @40%	36,000	32,000	28,000	24,000
CA Av+ Jan-Jun	-31,783	-31,783	-31,783	CA Av+ Jan-Jun	-31,783	-31,783	-31,783	-31,783
PNW Jun (JT)	-3,136	-3,136	-3,136	PNW Jun (JT)	-3,136	-3,136	-3,136	-3,136
Total Used	-34,919	-34,919	-34,919	Total Used	-34,919	-34,919	-34,919	-34,919
Avail for harvest	8,131	3,896	81	Balance	1,081	*-2,919*	*-6,919*	*-10,919*
Jul @50% + Rollover	69,631	59,346	50,081	Jul @40% + RO	37,081	32,000	28,000	24,000
CA Av+ Jul-Sep	-12,575	-12,575	-12,575	CA Av+ Jul-Sep	-12,575	-12,575	-12,575	-12,575
PNW Jul-Sep	-38,552	-38,552	-38,552	HG Available	24,506	19,425	15,425	11,425
Total Used	-51,127	-51,127	-51,127					
Avail for harvest	18,504	8,219	*-1,046.00*					
Oct Rel. @15%	18,450	16,635	15,000	Oct Rel. @20%	18,000	16,000	14,000	12,000
CA Av+ Oct-Dec	-17,369	-17,369	-17,369	CA Av+ Oct-Dec	-17,369	-17,369	-17,369	-17,369
PNW Oct. Est.	-1,350	-1,350	-1,350	PNW Oct. Est.	-1,350	-1,350	-1,350	-1,350
Remaining OY	*-269*	*-2,084*	*-3,719*	Remaining OY	*-719*	*-2,719*	*-4,719*	*-6,719*

[2c]

35/50/15 SEASONAL RELEASE OF HARVEST GUIDELINE (MT) + ROLLOVER >100,000 TONS

(40/35/25 RELEASE < 100,000* tons)

H.GUIDELINE	123,000	110,900	100,000.00	H.GUIDELINE	90,000	80,000	70,000	60,000
Jan Rel. @35%	43,050	38,815	35,000	Jan Rel. @40%	36,000	32,000	28,000	24,000
CA Av+ Jan-Jun	-31,783	-31,783	-31,783	CA Av+ Jan-Jun	-31,783	-31,783	-31,783	-31,783
PNW Jun (JT)	-3,136	-3,136	-3,136	PNW Jun (JT)	-3,136	-3,136	-3,136	-3,136
Total Used	-34,919	-34,919	-34,919	Total Used	-34,919	-34,919	-34,919	-34,919
Avail for harvest	8,131	3,896	81	Balance	1,081	*-2,919*	*-6,919*	*-10,919*
Jul @50% + Rollover	69,631	59,346	50,081	Jul @35% + RO	32,581	28,000	24,500	21,000
CA Av+ Jul-Sep	-12,575	-12,575	-12,575	CA Av+ Jul-Sep	-12,575	-12,575	-12,575	-12,575
PNW Jul-Sep	-38,552	-38,552	-38,552	HG Available	20,006	15,425	11,925	8,425
Total Used	-51,127	-51,127	-51,127					
Avail for harvest	18,504	8,219	*-1,046.00*					
Oct Rel. @15%	18,450	16,635	15,000	Oct Rel. @25%	22,500	20,000	17,500	15,000
CA Av+ Oct-Dec	-17,369	-17,369	-17,369	CA Av+ Oct-Dec	-17,369	-17,369	-17,369	-17,369
PNW Oct. Est.	-1,350	-1,350	-1,350	PNW Oct. Est.	-1,350	-1,350	-1,350	-1,350
Remaining OY	*-269*	*-2,084*	*-3,719*	Remaining OY	3,781	1,281	*-1,219*	*-3,719*

Basis for analysis of allocation options
Source: DFG - CPS monthly landings tables for CA
Jerry Thon spreadsheet – highest monthly landings in last 3 yrs for WA

JT PNW HIGH 2000-2003	CA SEASONAL USAGE 1997-2003	7 YR.AV.	HIGHEST	LOWEST	7 YR + HIGH AVERAGE ++	JT 3-YR HIGH + AVERAGE / 2 **AVERAGE +**	JT CA 3 YR HIGH
0	Jan	6,974.90	12,101.62	1,921.62	9,538	9,026	11,076
0	Feb	6,202.65	9,398.14	2,466.76	7,800	7,496	8,789
0	Mar	6,569.74	10,908.44	2,597.89	8,739	6,665	6,760
0	Apr	3,877.07	8,195.22	1,432.90	6,036	4,543	5,209
0	May	2,016.50	3,443.28	714.72	2,730	2,780	3,543
3,136	Jun	795.31	1,751.15	102.99	1,273	1,273	1,751
3,136	Jan-Jun ST	26,436.17	45,797.85	9,236.88	36,117	31,783	37,128
12,117	Jul	1,955.46	3,718.94	154.67	2,837	2,652	3,349
15,617	Aug	3,100.05	7,455.61	306.66	5,278	5,277	7,454
10,818	Sep	4,282.66	6,151.42	1,581.42	5,217	4,646	5,008
38,552	Jul-Sep ST	9,338.17	17,325.97	2,042.75	13,332	12,575	15,811
1,350	Oct	6,856.21	12,602.92	4,276.91	9,730	8,146	9,435
0	Nov	4,194.47	7,423.66	1,058.00	5,809	4,902	5,589
0	Dec	4,632.31	7,684.92	2,009.09	6,159	4,321	4,009
1,350	Oct-Dec ST	15,682.99	27,711.50	7,344.00	21,697	17,369	19,033
43,038	Total	51,457	90,835		71,146	61,727	71,972