



Stock Assessment Science Program Review

Southwest Fisheries Science Center Summary and Response – November 2014

1. Introduction

NOAA Fisheries conducts annual peer review science on a six-year cycle of each of its six Science Centers and headquarters' Office of Science and Technology. Each year a specific theme is emphasized. This year's focus was on fishery stock assessments under the Magnuson-Stevens Fishery Conservation and Management Act (MSA). The review of the Southwest Fisheries Science Center (SWFSC or the Center) was held July 28-August 1, 2014, in La Jolla, CA. Fishery stock assessment science is a major endeavor for NOAA Fisheries and the science supporting it is extensive. Therefore, the Center's MSA review was split between 2013's focus on data collection and management¹ and 2014's focus on the modeling approaches, review processes, and responsiveness to MSA's mandates as described below.

We invited experts from both inside and outside the federal government to evaluate our approach in assessments of highly migratory species (HMS), coastal pelagic species (CPS) and groundfish (GF) species. We welcomed this opportunity to receive guidance on improving our stock assessment processes and to offer the greatest utility and transparency possible.

The review² was not of any particular fishery, but rather of the Center's overall stock assessment program, focused on the following seven themes from Terms of Reference (TORs) agreed on by the NOAA Fisheries Science Board:

- 1) Does the SWFSC apply a suitable scientific/technical approach to fishery stock assessment modeling?
- 2) Is the assessment process efficient, effective and clearly described, including terms of reference for assessment reports?
- 3) Does the SWFSC, in conjunction with other entities such as the Pacific Fishery Management Council's (PFMC) Scientific and Statistical Committee (SSC), have an adequate peer review process?
- 4) Is the SWFSC's program organization effective at accomplishing needed assessments according to a set of assessment priorities?
- 5) Does the SWFSC achieve adequate assessment accomplishments relative to mandates particularly with respect to the number of Fishery Management Plan (FMP) species assessed?

¹ <https://swfsc.noaa.gov/2013DataManagementReview/>

² <https://swfsc.noaa.gov/2014StockAssessmentReview/>

- 6) Does the assessment program adequately communicate their results, needs, and research?
- 7) Are there opportunities for improving stock assessments and the stock assessment process?

To conduct the review, we selected experts who were not associated with the SWFSC. SWFSC staff presented the panel with information on the state of SWFSC's stock assessment program. Panelists were also provided with background material for more in-depth information and had time to discuss the state of the SWFSC's stock assessment program with SWFSC management and staff during the review. The panelists also considered comments and questions from members of the public who attended the review.

The results from this year's review, along with those being conducted at each of the other Fishery Science Centers and the Office of Science and Technology³, will be used to prepare a national summary, to highlight best practices and to inform decisions on opportunities for improving stock assessment science programs across NOAA Fisheries.

2. Background

Focus: Within the broad national TORs, the review focused on a wide range of methods including data-poor [catch-based methods such as Depletion-Based Stock Reduction Analysis (DB-SRA), recently applied to a large number of West Coast GF], data-rich [statistical age-structured models such as Stock Synthesis (SS) applied to stocks in all FMPs and to HMS by the ISC)], and "data-moderate" methods (such as Bayesian surplus production models, often applied to many HMS stocks and some GF stocks).

Fishery stock assessments at the SWFSC are conducted both in-house as well as through collaborative international working groups. For example, our international assessments for HMS (e.g., tunas, billfish, sharks, etc.) are conducted through the International Scientific Committee for Tuna and Tuna-like Species in the North Pacific Ocean (ISC), with additional information provided by our colleagues at the Pacific Island Fisheries Science Center (PIFSC) in Honolulu, HI, and at the Inter-American Tropical Tuna Commission (IATTC) in La Jolla, CA.

The PIFSC, Northwest Fisheries Science Center (NWFSC) and SWFSC operate under a series of signed operating agreements (7/2010) that designate lead and supporting roles for Centers in different assessment activities. Within the PFMC there are four fishery management plans⁴ (FMPs), and a Fishery Ecosystem Plan⁵ (adopted in 2013 to guide management decisions). The SWFSC is the lead for PFMC assessments within the CPS FMP and the HMS FMP. The NWFSC is the lead for the GF FMP, with SWFSC staff conducting research, data collection and

³ <http://www.st.nmfs.noaa.gov/science-program-review/>

⁴ <http://www.pcouncil.org/council-operations/council-guide/part-iv-fishery-management-plans/>

⁵ <http://www.pcouncil.org/ecosystem-based-management/fep/>

stock assessments for a number of (typically southern) GF species in coordination with the NWFSC.

3. Acknowledgements

We would like to thank the panelists who devoted a significant amount of time to participate in this review. Their observations and recommendations provide valuable feedback on how our stock assessment program is performing relative to our stated goals and objectives. We also greatly appreciate the thought that participating stakeholders put into this review. Their questions and comments sparked many conversations and their perspective was invaluable.

The panelists for this review were:

- Dan Howard, Sanctuary Superintendent, Cordell Bank National Marine Sanctuary, NOAA, National Ocean Service, Chair
- Anne Hollowed, Senior Scientist, Leader of the Status of Stocks and Multispecies Assessment Program, Alaska Fisheries Science Center, NOAA Fisheries
- Samuel Pooley, Director, Pacific Islands Fisheries Science Center, NOAA Fisheries
- Jake Schweigert, CPS Biologist, Pacific Biological Station, Department of Fisheries and Oceans Canada, retired
- Nathan Taylor, Conservation Biology Section Head, Pacific Biological Station, Department of Fisheries and Oceans Canada

We wish to acknowledge and thank Dr. Steve Murawski's (University of South Florida) participation in preparatory discussions and calls leading up to the review. We also thank the contributions to the presentations by the West Coast Regional Office and the Pacific Fishery Management Council as well as stakeholders from industry who attended and contributed as part of the public. Finally, we thank SWFSC staff who prepared and presented material for this review.

4. Remarks

The summary report noted: *“The SWFSC fishery stock assessment staff appear dedicated and passionate and they appear to have the latitude to express themselves freely, which is a compliment for this type of review. It was clear to the panel that SWFSC has a talented and committed staff, and there is a strong effort to complete timely and rigorous assessments and develop new assessment approaches. The SWFSC appears to be doing a very effective job and operating at a high level meeting the assessment requirements of the PFMC and ISC.”* The Chair's and Panelists' reports validate the SWFSC's commitment to maintaining stock assessments as a core priority, despite challenging budgets. This review will encourage the SWFSC to continue to improve and pursue excellence in all aspects of fish stock assessment.

5. Response to Summary Recommendations

Panelists raised several issues on multiple occasions that related to more than one of the TORs. Below are responses to the Chair's non-consensus summary recommendations related to themes that emerged during the review. In Section 6 we provide responses to the TORs.

5.1 Capacity Building and Staffing

It was noted that finding graduate students, post-docs or young professionals with appropriate quantitative skills to join stock assessment teams is challenging.

Recommendations: To address this, recommendations from the Chair and the Panelists included enhancing university partnerships to expand stock assessment training programs, training programs for stock assessment staff (short sabbaticals or rotational assignments to enhance their skillsets) and adding additional stock assessment staff through filling current vacancies, and adding stock assessment and data staff. Panelists also recommended that the Center contribute to capacity building of ISC-member countries.

Response: The Center recognizes the critical need to proactively prepare for management needs requiring stock assessments and population status advice as well as the shortage of qualified stock assessment scientists⁶. The Center concurs with the reviewers' comments regarding the importance of well-supported ties with academic partners to meet current, and future work responsibilities and directives. In particular, the Center's support of CSTAR⁷ (UC Santa Cruz) and CAPAM⁸ (UC San Diego and the IATTC) are existing examples of efficient research/instructional frameworks that have produced meaningful results and highly qualified scientists that directly support stock assessments used for managing marine resources.

Action Items:

- The Center will continue to seek support for CSTAR and CAPAM and their activities (e.g., training of students and post-docs, visiting scientists, conducting classes, etc.) and explore the possibility of increasing assessment-relevant training at the UC system campuses and via online media. The Center will discuss developing additional online courses with input from faculty at UCSC and UCSD.
- The Center will pursue opportunities for increased exchanges with stock assessment staff, as well as encourage multi-Center and university assessment methods workshops, e.g., as part of the CAPAM good practices workshop series, a workshop addressing modeling growth in stock assessments will be conducted in November 2014.
- The Center will discuss with NMFS leadership the development of a NMFS-wide stock assessment training program for current staff.
- The Center will examine its current data management infrastructure and identify options for increasing data support to assessment analysts through redirection and/or new hires.
- The Center will pursue filling current vacancies in key stock assessment positions, given recent retirements and increased workloads. (Note the recent hire of one additional GF and one additional HMS stock assessment scientist.)

⁶ <http://caribbeanfmc.com/pdfs/ShortageOfDegrees.pdf>

⁷ <http://users.soe.ucsc.edu/~msmangel/CSTAR.html>

⁸ <http://www.capamresearch.org>

- The Center will consider providing contract funds to recently retired assessment scientists to fill the gap in assessment expertise and to mitigate the workload until qualified replacement scientists can be hired and trained.

5.2 International Data Sharing

Comments were made concerning the dependence on other countries for fishery-dependent and fishery-independent data for CPS and HMS species. It was pointed out that the assessment scientists at the SWFSC cannot control the timeliness of data delivery from these nations, and that the analysts spend valuable time collating data series for input into assessments.

Recommendations: Work with international partners to establish a data sharing agreement that includes best practices for data collection, estimation of CPUE or survey biomass, and include timelines for delivery of information to assessment analysts.

Response: The Center has regular communication with partner nations through formal meetings (e.g., the ISC, MexUS) as well as international workshops and symposia. Formal meetings, bilateral or multilateral, would be the most appropriate venue to foster and formulate, or reaffirm data sharing agreements or organize training workshops with other nations.

Action Items:

- The Center will continue to participate in efforts such as the annual Trilateral Sardine Forum and U.S.-Mexico Bilateral meetings to enhance collaboration and encourage active exchange of data between Mexican and Canadian and Center scientists.
- The Center will explore potential data sharing issues and stock assessment capacity building with researchers in Mexico.
- The Center will work with ISC member nations to improve data exchange for specific assessments and propose to ISC to formalize needed improvements to data sharing, as well as note to U.S. delegations to RFMOs the need for improved data sharing.

5.3 Federal/State Shared Responsibilities

The Chair and Panelists remarked that it was unclear how assessment responsibilities are allocated between SWFSC and the State of California for some of the nearshore species, including sampling and analysis for some CPS and GF stocks.

Recommendation: Initiate strategic conversation with the State of California, via the California Department of Fish and Wildlife (CDFW), to talk about stock assessment responsibilities and priorities for some of the nearshore species. The CDFW may be in a position with an improved economy to resume assessments for some of the inshore stocks that they historically assessed.

Response: Responsibilities for assessment of nearshore species are clearly delineated by the Federal and State FMPs. Historically, CDFW personnel have led or participated in assessments of federally managed stocks in Federal FMPs.

Action Item:

- The Center will discuss options with CDFW management regarding greater CDFW involvement in the next round of PFMC GF and CPS assessments.

6. Observations and recommendations specific to the TORs

6.1 Theme I: High-level scientific/technical approach

Panelists' observations: The SWFSC has a highly trained and productive group of stock assessment scientists who have foresight and initiative in developing and applying a suite of techniques to a wide array of species for providing required advice on harvest and rebuilding targets including novel methods for assessing data moderate and data poor stocks. Scientists have published new approaches to deal with difficult parameter estimation issues as well as model specification to address stock structure. Panelists noted challenges associated with time lags in the delivery of recent catch information, the issues with data-poor stock assessments, and in developing methods to deal with time-varying effects including movement, natural mortality and distribution (for all fishery groups) will present major future challenges.

Recommendations:

- Develop data-poor assessments for Pacific mackerel, northern anchovy and jack mackerel.
- Advance the collaborative simulation activities SWFSC has begun. Instead of assessment models, it might be possible to design alternative rules for setting catch levels.
- Complete ageing of archived otolith collections to improve data for stock assessments; consider establishing a dedicated ageing laboratory.
- Consider establishing a regular planning meeting for the sardine-hake (SaKe) survey groups and assessment scientists in order to enhance communication.
- Continue to work with Mexico concerning the need for collaborative survey efforts.

Response: The Center is committed to continue developing data-poor stock assessment methodologies. Improving efficiency for production ageing assignments is a high priority for the Center in efforts to maintain continuity in biological compositions and provide robust growth estimates for ongoing and new GF, CPS, and HMS assessments.

Action Items:

- To meet CPS and GF stock assessment goals, Center assessment scientists will continue developing modeling approaches for assessing data-poor and data-moderate stocks. In this context, staff analysts will evaluate the benefits/drawbacks of detailed data-rich assessments (e.g., SS models) vs. more straightforward data-limited methods (e.g., DB-SRA, DCAC) for determining OFL/ACL estimates for unassessed stocks in the Pacific coast GF and CPS FMPs.
- The Center will focus research on how to assess HMS data-poor stocks. Initial focus will be on using the data-poor methods currently used by the Regional Fishery Management Organizations (RFMOs). Research will be conducted in collaboration with RFMO and Pacific Islands Fishery Science Center scientists when possible.
- The Center will continue to use simulation methods to test data rich and data moderate assessment methods and assumptions.
- The Center will establish regular planning meetings with the NWFSC regarding synoptic west coast surveys in order to provide fishery-independent survey data for use in multiple stock assessments.
- The Center will share CPS survey methods and information with colleagues from Mexico, INAPESCA in particular, with the ultimate goal of conducting joint, synoptic CPS surveys along the west coast using new U.S. and Mexican federal research vessels. International collaboration regarding acoustic-trawl methodologies will be proposed during the 2015 MexUS-Pacifico meeting.
- The Center will focus on restructuring the CPS data bases/archives for conducting ongoing assessments. The Center will contact respective staff and state agencies to review, develop, and implement necessary changes for improving data accessibility and conducting assessments.

6.2 Theme II: Assessment process

Panelists' observations: The Center is commended for its sound assessment methods and well-defined stock assessment process for CPS and GF. The assessment process for HMS is not nearly as well defined.

Recommendations:

- Consider collaborating with universities to conduct Management Strategy Evaluations (MSE) on one or two fisheries as prototypes, and if successful to assess how widely MSEs might be adopted.

- The PFMC process for review and rule making creates a situation where harvest recommendations are based on outdated stock status information.
- Focus effort on aging historic collections of otoliths for long-lived species to help with natural mortality estimates.

Response: The Center recognizes the need to develop MSE tools and conduct MSEs for many of the management unit species under its jurisdiction. MSEs can be used to derive biological reference points, evaluate performance of harvest policies, and explore candidate environmental time series affecting stock productivity.

Action Items:

- The Center will communicate with academic experts and RFMO scientists regarding potential MSE projects and will work to identify funding towards developing MSE tools and analyses.
- The Center will begin a process to use simulation-based methods (including MSE) to evaluate alternative reference points, control rules and harvest strategies within the ISC working groups.
- The Center will discuss with the West Coast Regional Office to review options for streamlining the rule-making process to ensure that harvest specifications are based on the best available science.
- The Center will evaluate the feasibility of establishing a dedicated ageing group, in order to facilitate greater availability of age data to support stock assessments and to improve natural mortality estimates.

6.3 Theme III: Peer review

Panelists' observations: The differences between the CPS/GF assessment approach and the HMS approach are quite stark in terms of the peer review process, although it appears both have adequate review processes in place. GF analysts seem to think the current STAR panel process works but the panel wondered if other options might be explored that would give analysts more time in which to evaluate changes recommended by the STAR panel and to select best model.

Recommendations:

- Work with the NWFSC and the PFMC to modify the current stock assessment review process to ensure that time needed to foster careful and thoughtful completion of the assessment is available. The Centers and PFMC might consider the merits of dropping the need for reaching consensus on base model during the STAR process. This would al-

low the analyst time to address reviewer comments and more carefully consider the issues and concerns raised during the review. The base-model could be selected at a later meeting after the analysts have time to run models and evaluate performance.

- Consider establishing an agreed-to pool of funds to consistently cover the cost of reviews in ISC. This activity will require coordination with the PIFSC.
- Consider developing an in-house rotating review schedule for assessments before they are released to the public in order to educate other stock assessment scientists and reduce errors.

Response: The Center acknowledges the desire on the part of stock assessment analysts to conduct further sensitivity analyses on models developed during the course of a STAR panel review. Likewise, the Center is aware of the need for internal review of stock assessments prior to submission for external review, e.g., by a STAR panel. Again, timeliness and quality of internal reviews will depend on timing of assessment data availability, time for assessment analysis and report generation, and availability of qualified subject matter experts within the Center to conduct such a review in short order. We agree that a consistent funding source is required to establish regular review of international stocks.

Action Items:

- The Center will discuss with the PFMC and NWFSC the comments raised by the Panelists in a discussion of alternative approaches to the assessment process.
- The Center will continue to participate in annual reviews of the Council's TOR for GF and CPS stock assessments and, where possible, adjust reporting requirements in order to provide the time needed to foster careful and thoughtful completion of the assessment and to streamline the process for stock assessment staff.
- The Center will review the current process (or missing elements) for the internal review of stock assessments prior to submission for STAR panel review.
- The SWFSC and PIFSC will discuss with HQ the need for a consistent funding sources for international HMS stock assessment reviews.

6.4 Theme IV: Organization and priorities

Panelists' observations: It appears that scientists in the three stock assessment programs (GF, CPS, HMS) interact sufficiently despite separate locations (La Jolla and Santa Cruz), and GF staff are also in close communication with the NWFSC and PFMC. The national prioritization process seems promising for aligning the appropriate level of assessments with different stocks,

though the panel was uncertain if this process would increase or decrease the need for benchmark assessments.

Recommendations:

- Maintain close communication with fishery management councils as S&T starts to implement the Stock Assessment Prioritization process.
- Continue developing a more rigorous prioritization process and identifying target assessment frequencies and types to balance needs with capacity and clearly relate these priorities and implementation to the SWFSC's strategic plan.

Response: Given the likelihood that the stock assessment workload will not decrease in the near future, the Center will collaborate with other FMCs, S&T and other stakeholders with respect to developing and implementing a more rigorous process for prioritizing assessments. The Center notes that improved predictability in assessment priorities will facilitate more effective planning for focused research and ageing efforts.

Action Item: The Center will follow the status of S&T's assessment prioritization process and guidelines.

6.5 Theme V: Accomplishments relative to mandates

Panelists' observations: The SWFSC is commended for the significant accomplishments relative to mandates given the small number of the assessment staff.

Recommendations: In order to increase the overall number of stocks that the Center is able to assess, the panel had several suggestions, including:

- better utilize stock assessment updates to increase the timeliness of assessments and throughput; reduce reporting requirements for update assessments
- consider other means to improve timeliness of data availability and assessment implementation
- hire additional database support to free up assessment authors to conduct more and better assessments.

Response: The Center recognizes the utility of streamlining the assessment process by utilizing assessment updates more frequently while, at the same time, reducing the reporting requirements for these updates. The need for additional database support was highlighted during both the 2013 and 2014 reviews, and the Center sees this as another opportunity to improve data quality and increase assessment throughput.

Action Items:

- Center will continue working closely with the PFMC to develop a schedule of data-poor assessments for other coastal pelagic species.
- The Center will discuss with the PFMC the comments raised by the panelists and identify those that could be revised and continue to improve on the STAR process.

6.5.1 Incorporating ecosystem effects priorities

Recommendations: Panelists recommended fostering international collaboration (ISC, PICES, ICES) on climate variability effects on pelagic fish/fisheries and associated ecosystems to identify thresholds for defining the risk to marine resources. Once defined, analysts should consider when or if the risk of environmental change can be incorporated into existing uncertainty buffers.

Response: Recognizing that ecosystem effects are important to most fishery resources, but difficult to quantify and incorporate into assessments, the Center will continue research, data and analyses through collaborative efforts among research groups to address such interactions in both stock assessments and process studies. The California Current Integrated Ecosystem Assessment (CCIEA) process works across NMFS, and collaborates with other line offices, to advance our long-term understanding of the factors that drive ecosystem productivity. The next round of the CCIEA will bring the stock assessment and ecosystem scientists together to focus on defining risks to the ecosystem and to important fisheries.

Action Items:

- The Center will facilitate interactions between climate/ecosystem researchers with stock assessment researchers to improve both stock assessments and climate and ecosystem products and research objectives through the CCIEA process. Such efforts have proven to be productive with respect to salmon and CPS assessment models and will be continued, as well as expanded to greater engagement with HMS and GF. This will include ongoing and additional research into temperature, biomass and/or other thresholds that relate to the risk of overfishing.
- The Center will continue its participation in international bodies such as ISC, ICES and PICES with respect to research into the effects of climate variability and change on pelagic and other fisheries resources and their ecosystems.

6.6 Theme VI: Communication of assessment results and data needs

Panelists' observations: The SWFSC is commended for its communication strategies and it is suggested that the Center diversify the means and audiences of communications.

Recommendations: Among the suggestions were the establishment of a series of workshops, such as *Fisheries Stock Assessment 101* and *MSE for Managers*, as well as participating in public in events such as ocean days, boat shows, fishing tournaments, etc., and/or host regular

“open houses” at PFMC meetings for targeted audiences as well as providing a one-stop-shop for stock assessment information on the Center’s website.

Response: The recommendation to diversify our communications strategies is appropriate. Working within our resource constraints we will endeavor to expand how we communicate stock assessment science.

Action Items:

- The Center will develop a new Stock Assessment webpage to provide easy access for the most recent stock assessments.
- We will coordinate with NMFS HQ on establishing workshops or other targeted orientation to stock assessment methods and approaches, as these could be useful across the country; discussions will include the benefits of national vs. regional foci.
- The Center communications team will collaborate with the stock assessment staff to define the best audiences for a diversified communications portfolio.
- The Center communications team is also beginning to develop ocean-to-table workshops for targeted audiences where stock assessment science will be highlighted.
- The Center will work with FishWatch.gov to include additional species that the Center assesses on its website.

6.7 Theme VII: Opportunities

Panelists’ observations and recommendations:

- Continue assessment work that is supporting decisions that are successfully rebuilding overfished rockfish stocks in the NE Pacific.
- There is an opportunity to work with the state and complete assessments for northern anchovy and Pacific mackerel to understand their population dynamics as sardine populations decline.
- Use closed-loop simulations to test the performance of the harvest control rule current being applied using single species assessments when ecosystem-driven parameters are in flux.

Response: The Center continues to invest considerable effort in ensuring the best possible data and science are available for managing rebuilding rockfish. For example, ongoing efforts for cowcod include development of an *in-situ* biomass estimate based on Remotely Operated Vehicle surveys. Data improvements and assessments for the currently rebuilding species (such as cowcod and bocaccio) remain a high priority for the SWFSC. The Center has a long history of working with CA, OR and WA on CPS issues and continues to strive to ensure that fishery-

dependent data collected by the states provides the best available science for inclusion into stock assessments.

The Center also recognizes the need to develop MSE tools and conduct MSEs for many of the management unit species under its jurisdiction. Ecosystem effects are highly important to most fishery resources, but difficult to quantify and incorporate into assessments. Simulation modeling to evaluate the performance harvest control rules will advance our long-term understanding of the factors that drive productivity for managed populations.

Action Items:

- The Center will maintain close communications with the states and appropriate international researchers in order to provide high quality information to the stock assessment process.
- The Center will continue to develop expertise in MSEs by communicating with academic experts regarding potential MSE projects and working to identify funding towards developing MSE tools and conducting MSE analyses.

7. Conclusion

This review was the second in a series of annual external reviews at the SWFSC, with the focus being on the Center's stock assessment program. The Chair and the panel members' observations and recommendations provide valuable feedback on how the Center's stock assessment program is performing relative to its stated goals and objectives, and how it can be improved. Overall, panel members were overwhelmingly positive in their comments. The following key recommendations were made:

1. Increase the number and availability of qualified scientists capable of leading stock assessments for NMFS, recommendations included enhancing partnerships with universities to develop a stock assessment training program, succession planning, and innovative training programs for current stock assessment staff.
2. Work closely with international partners to establish data sharing agreements that includes best practices for data collection, estimation of Catch Per Unit of Effort (CPUE) or survey biomass, and include timelines for delivery of information to assessment analysts.
3. Initiate strategic conversation with the State of California, via the California Department of Fish and Wildlife (CDFW), to talk about stock assessment responsibilities and priorities for some of the nearshore species.
4. Initiate development of data-poor assessments for Pacific mackerel, northern anchovy, jack mackerel
5. Consider conducting MSE on one or two fisheries as prototypes, and if successful to assess how widely MSEs might be adopted.

6. Work with the NWFSC and the PFMC to modify the current stock assessment review process to ensure that time needed to foster careful and thoughtful completion of the assessment is available.
7. Maintain close communication with fishery management councils as S&T starts to implement the Stock Assessment Prioritization process and develop a more rigorous prioritization process and identifying target assessment frequencies and types to balance needs with capacity and clearly relate these priorities and implementation to the SWFSC's Strategic Science Plan.
8. Foster international collaboration (ISC, PICES, ICES) on climate variability effects on pelagic fish/fisheries and associated ecosystems and to include attempts to identify thresholds for defining the risk to marine resources in research on ecosystem indicators.
9. Establish a series of workshops, such as *Fisheries Stock Assessment 101* and *MSE for Managers*, participate in public fisheries events, and/or host regular "open houses" at PFMC meetings for targeted audiences as well as provide a one-stop-shop for stock assessment information on the Center's website.

SWFSC leadership agrees with these recommendations and is committed to implementing the necessary changes in existing protocols at the Center to realize significant benefits and efficiencies.

Table 1: Summary of Action Items and Schedules

Action Item	Schedule
The SWFSC will pursue opportunities for increased exchanges with stock assessment staff, as well as encourage multi-Center and university assessment methods workshops.	A CAPAM workshop addressing modeling growth in stock assessments was conducted in November 2014 with international participation and from multiple NMFS Science Centers.
The SWFSC will pursue filling current vacancies in key stock assessment positions, given recent retirements and increased workloads.	The hire of a GF stock assessment scientist was completed in July 2014. The hire of an HMS stock assessment scientist was completed in October 2014.
The SWFSC will share CPS survey methods and information with colleagues from Mexico, INAPESCA in particular, with the ultimate goal of conducting joint, synoptic CPS surveys along the west coast using new U.S. and Mexican federal research vessels.	Exchanges regarding CPS survey methodologies and data interoperability will be conducted during the November 2014 Trinational Sardine Forum and the April 2015 MexUS-Pacifico meeting.
The SWFSC will discuss options with CDFW management regarding greater CDFW involvement in the next round of PFMC groundfish and CPS assessments.	SWFSC will initiate discussions with CDFW in FY15.
The SWFSC will work closely with the PFMC to develop an assessment schedule of data-poor coastal pelagic species.	A schedule of data-poor CPS stock assessments has been worked out with the PFMC. Northern anchovy will be the next CPS assessment. Initiated in 2015, completion will be dependent on workload schedule.
Explore the development of within-SWFSC capabilities to conduct Management Strategy Evaluations (MSEs)	Summer 2015 (in collaboration with the IATTC; initial target will be Pacific albacore). A funding proposal for this work has been submitted.
Complete ageing of archived collections to improve data for stock assessments; consider establishing a dedicated ageing laboratory.	Ongoing. SWFSC will continue to support ageing activities with internal funds as available, and will continue to seek external funds to complete analysis of collections. We will evaluate the feasibility of establishing a dedicated ageing laboratory in FY15.

Action Item	Schedule
Together with PFMC and NW Center, consider components of the STAR process. Request the West Coast Regional Office to review options for streamlining the rule making process to ensure that harvest specifications are based on the best available science.	Fall 2015/Spring 2016
Develop a more rigorous stock assessment prioritization process and identifying target assessment frequencies and types to balance needs with capacity and relate these to the SWFSC's Strategic Science Plan.	SWFSC will meet the schedule of the current NMFS effort to nationally prioritize stock assessments and will work with NWFSC on shared Fishery Management Plans.
The SWFSC will continue to enable and facilitate opportunities for climate and other ecosystem researchers to interact with stock assessment researchers and teams in order to improve stock assessments and ensure that climate and ecosystem products and research objectives.	SWFSC will continue to find ways to fund climate and stock assessment interactions. As part of the CCIEA SWFSC and NWFSC publish an annual State of CA Current report to PFMC, which includes climate information related to Council species. Four annual CalCOFI surveys contribute to a temperature index used in setting the harvest guideline for sardines.
The SWFSC will continue its participation in international bodies such as ISC, ICES and PICES and develop research into the effects of climate variability and change on pelagic and other fisheries resources and their ecosystems.	In FY15, SWFSC will introduce spatial structure into HMS stock assessments through collaboration with PIFSC, PICES and ISC; FATE proposals that have direct impacts on stock assessments have been submitted for funding.
Establishment of a series of meetings with constituents, such as <i>Fisheries Stock Assessment 101</i> and <i>MSE for Managers</i> , participate in public fisheries events, and/or host regular "open houses" at PFMC meetings for targeted audiences.	A meeting with constituents on Pacific Bluefin to explain the most recent stock assessment was held in October 2014. Together with the NWFSC and PFMC we will plan a <i>Stock Assessment 101</i> to be given at a 2016 PFMC meeting.