



NOAA FISHERIES

Pacific Islands Fisheries Science Center

Background and PIFSC Response: Panel Reports of the Stock Assessment Program Review May 19-23, 2014 Honolulu, Hawaii.

The following provides an overview of the objectives of the PIFSC 2014 external review, summary of reviewer remarks and our brief response to the review panel's reports. The terms of references, background materials, presentations and the panelist's reports are provided on our webpage at:

[http://www.pifsc.noaa.gov/do/peer_reviews/program_review_of_fisheries_stock_assessments_2014.php].

Program Review: In January of 2013, NOAA Fisheries initiated a standardized five-year cycle to peer review science conducted by each of the six science centers and the headquarters Office of Science and Technology. Each year will have a specific thematic focus with this year's focus on the fisheries stock assessment process. We invited experts from both inside and outside the federal government to evaluate our approach to the assessments of highly migratory species, and insular species such as bottomfish and coral reef species. Panelists were asked to review (1), how those assessments were conducted, (2) processes for prioritizing conducting assessments, (3) processes for reviewing assessments, and (4) efforts and efficacy of communicating the assessment results to the Council and other stakeholders. We welcomed this opportunity to discuss our strengths and weaknesses and to continually find ways to meet the needs of our many clients.

Panel: The PIFSC review was held May 19-23, 2014 in Honolulu, Hawaii. The review panelists were respected members of the scientific community from across the country:

- Steve Murawski, Chair, University of South Florida in St. Petersburg Florida
- Yong Chen, University of Maine, Orono in Orono, Maine
- Keith Criddle University of Alaska, Fairbanks at Juneau in Juneau, Alaska
- Steve Martell, International Pacific Halibut Commission in Seattle, Washington
- Cisco Werner, NOAA Southwest Fisheries Science Center in La Jolla, California

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Focus: The national Terms of Reference directed the panel to focus their review on the background materials provided (see webpage) and frame their comments around seven questions that define the stock assessment program:

- 1) Does the Center 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 Center, in conjunction with other entities such as the Council's Scientific and Statistical Committee (SSC), have an adequate peer review process?
- 4) Is the Center's program organization effective at accomplishing needed assessments according to a set of assessment priorities? Include program structure, staffing, and funding; include prioritization of stocks for assessment.
- 5) Does the Center achieve adequate assessment accomplishments relative to mandates particularly with respect to the number of Fishery Management Plan (FMP) species assessed?
- 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?

We focused the early stages of the review week around three types of assessments conducted with differing levels of data quality: blue marlin, representative of highly migratory species and relatively data rich, Main Hawaiian Islands bottomfish, as representative of data poor, and coral reef fish as representative of stocks for which the data are sparse. At the later stages of the review week we discussed the processes by which assessments are prioritized, how they are peer reviewed, and by what means do we communicate the results of our work to our stakeholders.

Fishery stock assessments and corollary analyses (e.g., Annual Catch Limits) in this region include in-house, international, and collaborative work. Our international assessments for highly migratory species (tunas, billfishes, etc.) are primarily conducted through the International Scientific Committee for Tuna and Tuna-like Species in the North Pacific Ocean (ISC), and to a lesser degree through the Western and Central Pacific Fisheries Commission (WCPFC). Highly migratory species stock assessments are often done in collaboration with colleagues at the NOAA Fisheries Southwest Fisheries Science Center in La Jolla, CA. We are solely responsible for Hawaii and territorial bottomfish assessments, and provide all of the scientific input for their management. We collaborate extensively to provide fishery information to staff at the Western Pacific Fishery Management Council who developed the proxy for assessment informing the Annual Catch Limits (ACLs) for coral reef species in this region.

The data sources for each of the assessment were reviewed at the 2013 program review and were only discussed in the context of a brief review for those panelists not involved in that review. [http://www.pifsc.noaa.gov/media/news/peer_review_of_data_management_2013_presentations.php]

Findings/Recommendations/Proposed Actions:

Though the panel had differing

perspectives and foci there were recurrent findings from the week of review. Below are those recurring findings (numbered, with text quoted from the Chair's report in italics and minor clarifying text un-italicized), the panel's recommendations (letters), and PIFSC proposed actions or response (small roman numerals).

(1) All of the panelists felt that the process of establishing assessment priorities and terms of reference (TOR) needed to be more formalized than it is now. Currently, the scope and schedule for individual and collective stock assessments is open-ended, contributing to the feeling among assessment scientists that the workload is increasing with no plateau.

- a. The Science Center, in conjunction with the Regional Office and the Fishery Management Council, should develop and implement a formal stock assessment steering committee to establish the assessment schedule and develop formal terms of reference for stock assessments.

PIFSC will:

- i. Develop TOR for Western Pacific Stock Assessment Review (WPSAR) Steering Committee with PIRO, PIFSC and the Council as members before the end of the Calendar year.
- ii. Make PIFSC Stock Assessment Schedule for the next 5 years available on the fishery stock assessment pages of the PIFSC website before the end of the calendar year.
- iii. Develop formal terms of reference (TOR) for assessments that state what information should be provided in order to make informed management decisions. Each TOR will be unique to each assessment review and will be developed prior to each review and approved by the Steering Committee.
- iv. Develop and sign TOR for the WPSAR framework to be used as an umbrella for developing and implementing the WPSAR framework before the end of the calendar year.

(2) Peer-review processes in which the Center participates include the RFMO working groups and science committees (e.g., ISC plenary and WCPFC Science Committee), and the CIE and WPSAR process of the Council. The WPSAR process is new and relatively untested but in theory should be the proper venue to bring two-stage peer reviewed products to the Council's SSC for supporting management decision making.

- a. The science and management entities involved (PIFSC, PIRO and WPRFMC) should do all they can to ensure that the WPSAR process evolves into an efficient, respected and independent peer review venue for assessing the region's fish stocks.
 - i. The Center scientific review process includes the ISC plenary and WCPFC Science Committee's Science Committee) for highly migratory species and the CIE and WPSAR process of the Council for

all other species. This will be reflected in the WPSAR TOR.

- ii. PIFSC will work with the Council and PIRO to overcome the existing issues and utilize the WPSAR process to establish a positive, fair and transparent track record for the review of PIFSC assessment products.

(3) The PIFSC stock assessment group is comprised of a relatively young staff with few senior staff and supervisors. It has been difficult to recruit and retain talented quantitative population dynamicists due to a variety of circumstances including living in a resort area distant to the continental USA. It is imperative that talented young scientists be recruited and retained.

- a. Greater emphasis on training, and especially hosting training programs (e.g., short courses) at the IRC would be cost effective and is considered a priority for mentoring staff.
 - i. PIFSC sought and received funding to support three instructors to come to PIFSC to conduct a total of 10 weeks of training over the course of FY15. Students will include Federal and JIMAR staff primarily within the Assessment program but staff across the Center are welcome to join. Topics include fisheries statistics, AD Model builder, advanced population dynamics and R. These trainings will both provide professional development but also provide opportunities for mentoring from outside PIFSC and from within.
 - ii. PIFSC will request funding to support fully the Pacific Islands Region –Fisheries Training program’s annual curriculum each year. Next year the focus will broaden to include data management. The long term goal with such training is multifaceted: increase morale, increase expertise, provide a foundation for stable high-quality staff and increase staff retention.

(4) Assessments supporting the three stock assessment arenas (large pelagics, “Deep-7” and coral reef fisheries) are critically dependent on accurate life history data for stocks being assessed, including age and growth, maturity parameters and interspecies predation data. Currently, the life history (population biology) program has insufficient throughput of high quality life history data to support this demand. [some text removed] There is particular concern in this regard for the “Deep-7” bottomfish complex of species since they are managed as a group, and potential variations in life histories could put some of the components at risk of overfishing.

- a. The PIFSC leadership should prioritize resources to increase the throughput of life history data, particularly emphasizing the “Deep-7” bottom fish complex of species.
 - i. In response to recommendations from the 2013 Program Review as well as our own internal assessment of needs, PIFSC has made this a priority. However, by the very nature of the discipline, progress is

- slow. In FY 13 PIFSC reassigned one FTE to the Life History Program. In FY14 we announced a JIMAR Life history position that will be filled by Dr. Brett Taylor starting Mid November FY15.
- ii. In addition to in-house positions, PIFSC LHP has collaborations with University of Hawaii and Hawaii Pacific University and is very active with them in terms of mentoring students to conduct collaborative life history investigations. Though progress is on-going there remains a large gap to be filled.
 - iii. The Stock Assessment Program is also investigating the types and details of life history information that would most benefit assessments.
- b. Additional market sampling for fish lengths and biological data may be possible through access to fish at the auction. It seems logical, then to increase this cost-effective program.
- i. PIFSC has been exploring options to increase the efficiency of the program at the Honolulu fish auction. For example placing cameras over the scales that weigh the fish for sale in order to get length and weight data for all fish that come through the auction. Though this sounds simple there are legal and funding constraints, such as manpower to analyze eight hours of video every day and security concerns regarding the camera and the footage. That said, PIFSC continues to brainstorm and explore new opportunities to maximize the auction's utility.
- c. Improvement in specific stock assessments will come with enhanced information on life history (growth), movement data (tagging) and greater emphasis on fishery-dependent and fishery-independent data. Stock assessments are critically dependent on these inputs and the center and NOAA/NMFS should consider additional strategic investments to obtain such data.
- i. Historically the return on tags in the Pacific has been quite poor, less than 1%, leading PIFSC to invest limited resources elsewhere. We have invested considerable time and effort in the development and field calibration of a fishery independent sampling survey using new technologies mirrored with existing commercial fishing techniques that has the capability to estimate "deep-7" bottomfish biomass by extractive (research fishing) and non-extractive (survey imaging) techniques. This survey technique should be operational in FY15 but the process is expensive and slow. As discretionary funds continue to diminish we will struggle to accomplish these tasks.
 - ii. We have increased the number of our life history staff and are working to increase the number of our assessment staff. Dependent upon FY15 funding availability we will announce a new Stock Assessment FTE.

(5) *Assessment staff produce from 2 to 5 fully reviewed stock assessments per year and have moderate production of published papers. This is a modest level of productivity for the number of staff numbers involved. It was explained that because the staff is on average relatively new to the business, that all members of the team participate in each assessment.*

- a. As demands increase, the current model of assignments is unsustainable. In order to increase throughput of assessments, the Center will have to either add stock assessment staff or re-organize into smaller teams of analysts responsible for each assessment.
 - i. PIFSC is planning to approach this issue from both perspectives. The Stock Assessment Program (SAP) has a position in consultation with NOAA Work Force Management Office to replace a recent transfer. Additionally, the SAP is working on a plan to reorganize into focus teams, HMS (internationally managed stocks) and Insular species (bottomfish and coral reef species). The details of this reorganization are not yet completed.
 - ii. PIFSC will also seek to differentiate more clearly *benchmark* from *update* assessments, with the goal of streamlining assessments through a simpler throughput of current year fishery and survey information within the same model structure.

(6) *In [removed text] the case of the Main Hawaiian Islands bottom fish fishery (the “Deep-7”) this is a clear federal mandate with little split jurisdiction domestically or internationally. Because of this clear mandate, it seems that assessment priorities should emphasize this fishery. While the cumulative dockside value is modest, the fishery has strong cultural importance in Hawaii. There is an important and unmet need to understand the implications of exploiting and managing the Deep-7 species as a complex as opposed to as individual species. Even if the complex management scheme is retained, it would be important to know which species may be most vulnerable due to life history concerns. [Removed text]*

- a. The “Deep-7” stocks should be assessed well and often both as a complex and as individual species.
 - i. PIFSC is mandated under MSA to assess the Deep 7 species as a complex rather than as individual species under the Bottomfish FEP. Though the SAP will continue to meet this need, and we have recently completed the 2014 update to the MHI Deep 7 bottomfish assessment, the SAP will be examining individual species with an assessment of Opakapaka (*Pristipomoides filamentosus*), the species with the richest data set within the Deep 7 complex. The schedule of assessments for the next 5 years will be posted on the PIFSC website before the end of the calendar year.

(7) *Virtually none of the stock assessments are supported by fishery-independent surveys (the exception is shallow water coral reef fishes). Given the inherent biases from using only commercial data, it seems prudent for the Center to fully implement a fishery-independent sampling program emphasizing the Deep-7 species. Candidate gears and methods are being explored by the center, but the sampling has not been densified sufficiently to use this in a management context.*

- a. The Center should decide on a modern approach using modern tools (for both the assessment side and the data collection side of the equation) and focus limited resources there. Fishery-independent sampling (especially for the Deep-7 complex) is a priority.
 - i. PIFSC has been exploring and calibrating with a recently developed a video system (BOTCAM and MOUSS systems) to do visual benthic surveys of the MHI bottomfish complex. The system has been calibrated among several gear types including research fishing, and once the final per sample costs are evaluated and found feasible, the system is ready to be operationalized. We anticipate that cost per sample estimate to be available in Summer FY15. Though the focus of this survey is the locally important bottomfish complex and the component species, in the future this system may expand PIFSC capabilities in the rarely surveyed depths beyond diver reach but shallower than bottomfish surveys in order to assess the coral reef fish complexes and species.

(8) *The panel discussed the merits of conducting fishery-related survey work in the Northwestern Hawaiian Islands Monument. Since this area has been closed to fishing for at least 5 years, there may be important contrasts in the density and population dynamics that can be inferred from demographic and ecosystem sampling as a comparative study to the main Hawaiian Islands. Since the temperature and productivity conditions are different with distance from the main Islands, the comparisons would need to take this into account. Such comparisons to the “unfished” conditions are potentially useful and these studies could have great scientific value, including understanding the efficacy of fully-protected MPAs.*

- a. The Center should develop a plan and justification for such activities, should scientists deem them to be important to stock assessment.
 - i. Though we agree that much could be learned towards understanding the usefulness of MPAs, with limited resources, many competing priorities related to Magnuson Act mandates, and great difficulties in obtaining necessary permits for extractive research, work in the Monument is not a high priority for the SAP. However PIFSC is open to collaborations with NOS in developing a greater understanding of the efficacy of MPAs, either within SAP or other Divisions within PIFSC. We commit to reaching out to the PIRO Sanctuary Program as

they develop their budgets in the first quarter of FY15 to gauge their interest and priorities within their own diminishing resources.

(9) Because of the large spatial sweep of large pelagic fisheries across the Pacific, and differing trends in apparent fish density in local areas, greater emphasis on spatial dynamics in modeling and assessment is justified.

a. There may be great utility in mounting internationally-supported scientific tagging studies to generate transfer rates for spatially-explicit metapopulation models.

i. PIFSC has encouraged, and often participated in, large scale tagging projects conducted by the tuna regional fishery organizations such as the Secretariat of the Pacific Community (SPC). The SPC conducted two huge, multimillion-dollar tuna tagging programs in recent decades, releasing hundreds of thousands, and recovering tens of thousands of tagged tuna, including skipjack, yellowfin, and bigeye tuna. Past research has provided very important data on mortality used in the tuna stock assessments, including the bigeye tuna assessment that is the basis for current catch limits on the US longline fishery based in Hawaii. Through our international research collaborations PIFSC continues to evaluate and promote HMS tagging, however, programs such as these require major institutional investment and, without high level prioritization of such an effort from NMFS, PIFSC does not currently have the resources to invest in tagging studies.

(10) Ecosystem modeling activities, although not technically part of the stock assessment activities of the center, can provide important insights into the trophic implications of management reference points and may help explain the high levels of productivity in the face of overfishing for some species (e.g., bigeye tuna). Greater interactions between ecosystem modelers and stock assessment scientists seems prudent

a. To the extent that comparative ecosystem research would foster improved understanding of managed resources, collaborations with the NWHI Monument allowing access to obtain such data would foster the missions of all concerned and such collaborations are encouraged.

i. PIFSC is supportive of this recommendation. The Ecosystem and Oceanography Division (EOD) continues to develop ecosystem models and to test hypotheses regarding ecosystem impacts on resource abundance and distribution. It is one of PIFSC's objectives to incorporate such factors in stock assessments as those parameters are proven to have additional explanatory power. However the process is slow in realizing an increase in explanatory power of a model with the inclusion of such data. This is a long term effort by the SAP and EOD staff.

(11) With respect to international fisheries stock assessment activities supported by the Center, the establishment of the Western and Central Pacific Fisheries Commissions did not result (necessarily) in specific new resources to fund travel and stock assessment work for this new responsibility.

- a. PIFSC should seek funding to support its international work.
 - i. PIFSC, along with the SWFSC, does not have separate funding for international science even though the demands of such assessments are extensive, expensive and generally outside the scope of Magnuson Act requirements. However NMFS does have international requirements under treaties signed by Congress and international agreements reached by the Department of State. Funding requests for travel to work in international fora are rarely successful; however, PIFSC has put several proposals in RFPs and will continue to do so. Until NMFS creates a fiscal priority around its international commitments, the PIFSC SAP work on HMS, including, assessment work and travel will continue to be done with existing EASA funding.

(12) The PIFSC has traditionally relied on a much higher proportion of foreign-national scientists and students as part of the research program. The heightened security issues and the recent move to the Ford Island military base have exacerbated the difficulties in working with foreign scientists. As this issue is particularly acute in the Pacific Islands, NOAA and DOC should revisit their policies regarding access and streamline them to the extent practicable.

- i. PIFSC is working with NOAA Inouye Regional Center and Department of Commerce security officials to revisit these policies in the light of meeting our mission while maintaining a secure workplace.

Conclusion:

The review panel members prepared individual reports based on their observations. The panelists were not paid for participating in this review, so we very much appreciate their willingness to dedicate a week of their time to improving the execution of PIFSC mission. We also appreciate the involvement of our partners and stakeholders, as well as, of course, all of our staff who have prepared and presented material for this review. We specifically appreciate their honesty and openness about the challenges faced in conducting fisheries stock assessments in the Pacific Islands Region. PIFSC will seek to implement actions to meet many of the recommendations by the Panel, including those listed here, in their individual reports and those discussed during public and private sessions.

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Recommendation	Action	Anticipated completion
Develop and implement a formal stock assessment steering committee to establish the assessment schedule and develop formal terms of reference for stock assessments.	Develop TOR for Stock Assessment Steering Committee with PIRO, PIFSC and the Council as members	Dec 2014
	Make PIFSC Stock Assessment Schedule for the next 5 years	Dec 2014
	Develop formal terms of reference (TOR) for assessments that states what information should be provided in order to make informed management decisions. Each TOR will be unique to each assessment review and will be developed prior to each review and approved by the Steering Committee.	Variable
	Develop and sign TOR for the WPSAR framework as umbrella for Steering Committee	Dec 2014
The science and management entities involved (PIFSC, PIRO and WPRFMC) should ensure that the WPSAR process evolves into an efficient, respected and independent peer review venue for assessing the region’s fish stocks.	PIFSC will work with the Council and PIRO to overcome the existing issues and utilize the WPSAR process to establish a positive, fair and transparent track record for review of PIFSC assessment products.	Dec 2014
Greater emphasis on training, and especially hosting training programs (e.g., short courses) at the IRC would be cost effective and is considered a priority for mentoring staff.	PIFSC sought and received funding to support three instructors to come to PIFSC to conduct a total of 10 weeks of training over the course of FY15.	Sept 2014
	PIFSC will request funding to support fully the Pacific Islands Region –Fisheries Training program’s annual curriculum each year.	Sept 2015
The PIFSC leadership should prioritize resources to increase the throughput of life history data, particularly emphasizing the “Deep-7” bottom fish complex of species.	Augment Life History staff	One FTE Jan 2014, One JIMAR Nov 2014
	Increase Life History pool of candidates	Ongoing

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Recommendation	Action	Anticipated completion
	Maximize use of Life History information in assessment products.	Ongoing
Additional market sampling for fish lengths and biological data gathering through fish auction.	PIFSC has been exploring options to increase the efficiency of the program at the Honolulu fish auction and opportunities to maximize the auction's utility.	Ongoing
Increase investments in enhanced information on life history (growth), movement data (tagging) and fishery-independent data.	Fishery independent sampling survey to estimate "deep-7" bottomfish biomass by extractive (research fishing) and non-extractive (survey imaging) techniques.	Sept 2015
	Increased the number of life history staff and increase the number of assessment staff.	Dependent upon FY15 funding availability we will announce a new Stock Assessment FTE.
To increase throughput of assessments, the Center will have to either add stock assessment staff or re-organize into smaller teams of analysts responsible for each assessment	The SAP has developed a plan to reorganize into focus teams, HMS (internationally managed stocks) and Insular species (bottomfish and coral reef species).	Sept 2014
	PIFSC will also seek to differentiate more clearly <i>benchmark</i> from <i>update</i> assessments, with the goal of streamlining assessments through a simpler throughput of current year fishery and survey information within the same model structure.	Dec 2014
The "Deep-7" stocks should be assessed well and often both as a complex and as individual species.	PIFSC is mandated to assess the Deep 7 species as a complex. However, in addition to the existing workload the SAP will be examining individual species with an assessment of Opakapaka (<i>Pristipomoides filamentosus</i>).	Oct 2017

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Recommendation	Action	Anticipated completion
The Center should focus limited resources on the development of a fishery independent survey.	PIFSC has been exploring and calibrating with a recently developed a video system (BOTCAM and MOUSS systems) to do visual benthic surveys of the MHI bottomfish complex.	Operational Summer 2015 dependent upon the FY15 budget
The Center should develop a plan and justification to work in the Papahānaumokuākea Marine National Monument should scientists deem them to be important to stock assessment	Working in the Monument has proven difficult however, PIFSC is open to collaborations with NOS in developing a greater understanding of the efficacy of MPAs. We will open a dialog with NOS and the PIRO Sanctuary Program to gauge their interest and priorities within their own diminishing resources.	Dec 2014
Engage in the mounting of an internationally-supported scientific tagging studies to generate transfer rates for spatially-explicit metapopulation models.	Through our international research collaborations PIFSC evaluates and promotes HMS tagging, however, programs such as these require major institutional investment and, without high level prioritization of such an effort from NMFS, PIFSC does not currently have the resources to invest in tagging studies.	No plans to execute
	The Ecosystem and Oceanography Division (EOD) continues to develop ecosystem models and to test hypotheses regarding ecosystem impacts on resource abundance and distribution. The SAP and EOD staff collaborate to test the incorporation of such factors in stock assessments as those parameters are proven to have additional explanatory power.	Ongoing
To the extent that comparative ecosystem research would foster improved understanding of managed resources, collaborations with the	Specific funding for international science is not currently in PIFSC assessment budget. Until NMFS creates a fiscal priority around its	On-going

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Recommendation	Action	Anticipated completion
NWHI Monument allowing access to obtain such data would foster the missions of all concerned and such collaborations are encouraged.	international commitments, the PIFSC SAP work on HMS, including, assessment work and travel will continue to be done with additional funds from successful proposal and existing EASA funding.	
PIFSC should seek funding to support its international work.	PIFSC is working with NOAA Inouye Regional Center and Department of Commerce security officials to revisit these policies in the light of meeting our mission while maintaining a secure workplace. However successful completion of this action at the NOAA and DOC level is out of PIFSC capabilities	Ongoing locally. Will assist as needed at the HQ level.