

## **Appendix J: Technical Panel Key Outcomes Memos**

# **Summary Key Outcomes**

## **Expert Panel Kick-Off Teleconference**

### **April 4, 2007**

#### **Participants:**

Expert panel members: John Butler (AAG, NMFS), Paul Crone (NMFS), Laura Rogers-Bennett (DFG) Ian Taniguchi (DFG, AAG), Daniel Geiger (AAG),  
Facilitators: Scott McCreary and Eric Poncelet (CONCUR)

#### **Key Outcomes:**

1. Reviewed Terms of Reference with Expert Panel (EP) members.
2. Expert Panel (EP) membership:
  - a. The EP's members from NMFS requested that DFG staff coordinate with NMFS senior staff to more formally request their involvement in the Expert Panel.
  - b. The EP members recognized that recruiting a modeler to the EP is an essential need; this person must play a pivotal role in the technical modeling work.
3. TAC Framework: The EP outlined a basic 3-step "framework" for developing a TAC. [Note: This "framework" describes the general method for determining a TAC. The "framework" does not include all of the steps outlined in the TOR for Review Committee and AAG review.] The three steps include:
  - a. Coalesce the data
  - b. Brainstorm and build models to determine a TAC
  - c. Address uncertainty by running simulations; this will lead to the determination of a TAC
4. Data sources identified include:
  - a. SMI 2006 survey
  - b. Historical density surveys (DFG and CINP)
  - c. Historical landings
  - d. Tag and capture data
  - e. Mortality, growth rate from neighboring islands
  - f. Kelp coverage data set
  - g. Sea surface temperatures
  - h. 2007 survey (especially abundance data to establish a time series)
5. Estimated timeline for TAC development-by task:
  - a. Coalesce Data: to be completed in next 2 months (by June)
  - b. Consider model options, select and build a model:
    - i. Brainstorming: EP to reconvene on 4/18 to discuss pros and cons of potential models. Members believed this step could be accomplished take place concurrent with the step of collecting and coalescing data.
    - ii. Select and build model(s): this was estimated to take approximately 3 months of full time modeling contractor or about 12 months for a part time DFG modeler.
  - c. Run model simulations: depending on the models explored, this may take additional time (perhaps a couple of months)
6. The EP recognized that the AAG and TAC timelines will need to be integrated.

**Next Steps:**

1. Ian to work with DFG senior staff to formally request participation of NMFS staff in the EP
2. Ian to begin coordinating in-house to find a modeler to join the EP
3. Ian to revise framework document to incorporate the following information: 3-step framework, expanded data sources, timeline.
4. AAG to discuss implications of probable TAC timeline for the completion of the AAG's charge at April 6 meeting
5. DFG staff to continue collecting and coalescing all identified data (by early June)
6. Expert Panel to reconvene 4/18 to brainstorm potential models to apply

## **Summary of Key Outcomes Technical Panel Teleconference April 18, 2007 (12 -2 PM)**

### **Participants:**

Expert panel members: John Butler (AAG, NMFS), Paul Crone (NMFS), Laura Rogers-Bennett (DFG) Ian Taniguchi (DFG)

Facilitators: Scott McCreary and Eric Poncelet (CONCUR)

### **Key Outcomes:**

#### Panel nomenclature

Panel members requested that the panel be renamed as the “Technical Panel,” as this more appropriately reflects the panel’s role.

#### Coordination between DFG and NOAA Fisheries

Ian Taniguchi reported that he had initiated steps from the Department's end to generate a letter formally inviting and requesting the participation of John Butler and Paul Crone on the Panel. Panel members reiterated the importance of completing this communication as soon as possible.

#### Panel Membership, roles, and need for an additional modeler

Ian reported that DFG had begun internal discussions toward bringing another modeler on to the Technical Panel. This modeler would be responsible for doing much of the legwork in building the TAC model(s). The other Panel members would work closely with this modeler, providing guidance, advice, and review. Panel members stressed that this individual must have significant analytical skills along with relevant experience in population modeling and (ideally) abalone or related invertebrates.

Panel members agreed that bringing an additional modeler on board to do the modeling legwork is essential before the Panel can be considered complete. They also emphasized that bringing this individual on board is squarely on the critical path for both TAC development and achieving the overall charge of the AAG. Members concluded that the Panel is now limited in the work it can accomplish until this individual joins the Panel, and until the members of the Panel from NOAA Fisheries receive formal approval to participate.

Panel members supported the idea of DFG funding a qualified post-doc to do this modeling legwork. Panel members suggested a few possible candidates. Members also suggested asking Loo Botsford at UC Davis for recommendations.

Ian reported that DFG had recently hired a new biologist with some experience in ecosystem modeling. Panel members noted differences between ecosystem and population modeling but expressed a willingness to help determine whether this new biologist would be qualified to serve on the Panel.

### Timeline for TAC development

The Panel reviewed the updated project timeline as outlined in the revised Terms of Reference document. Panel members acknowledged that DFG contracting procedures can be time consuming and found it unlikely that an outside contractor could be brought on board before September 1, 2007. Assuming that this individual could work on the project nearly full time, they recommended that the Terms of Reference (TOR) be revised to show a preliminary draft model being prepared by the end of the year.

Panel members acknowledged the value of bounding the TAC development process in time, but they also warned that unrealistically short time lines could well undermine the overall objective of producing a rigorous and strongly supported TAC.

### Exploring the potential for a “quick scan” approach to TAC

The Facilitation Team reported the AAG’s interest in asking the Technical Panel to explore a short-term, “quick scan” approach to TAC development. That is, several diverse members of the AAG requested that the Technical Panel consider the possibility of determining a rough cut TAC in the relative near term by applying existing data to a readily-available and largely appropriate model. This information would help inform the AAG’s ongoing discussions of possible allocations, regulatory approaches, and management measures. Technical Panel members cautioned against such an approach because of the risks involved in not using the model appropriately. Panel members stressed the importance of pursuing a deliberate and rigorous TAC development process.

### Brainstorming potential models

Panel members discussed potential models that might serve as the basis for developing a TAC for red abalone at San Miguel Island. There was general agreement that the “per recruit model” developed by Hobday and Tegner (2002) would provide a strong foundation for this effort.

Panel members discussed the applicability of using a standard “production model” to determine a TAC. They concluded that a “production model” is not very applicable, because it is based on the removal of animals, and there has not been an abalone fishery at SMI for 10 years. They noted, however, that a “production model” could be used as a rough means of checking the results of the “per recruit model.”

Panel members expressed the desire to brainstorm further on other possible ways of determining a TAC. They acknowledged that this next step would require significant background analysis, including a literature review. Panel members prefer to launch this work once formal coordination between DFG and NOAA Fisheries is established and once an additional modeler is brought on board.

Panel members identified a possible short-term task for the Panel: updating the “life table” information used for the Hobday and Tegner (2002) model.

### AAG Interests in Observing and Tracking the Work of the Technical Panel

The Facilitation Team reported on the AAG’s specific request to participate in and otherwise track Technical Panel meetings as observers. This request was supported by DFG staff working on the project. It was also reflected in the revised version of the project Terms of Reference.

Panel members discuss perceived benefits (e.g., transparency of the process) and drawbacks (e.g., the potential for Panel members to self-censure) of this proposal. The Facilitation Team and Technical Panel members both recounted experience with past processes in which specific opportunities for joint meetings had been built into the flow of a Panel process.

Following this discussion, a majority of panel members expressed the preference that the Technical Panel process include intervals for the Panel to deliberate privately as a Panel and formats where deliberations are observed. Accordingly, AAG members would not be present as observers at all Panel meeting. Panel members proposed the following approach to coordinating with the AAG:

- Develop Key Outcomes Summaries for Technical Panel meetings and distribute these to the AAG following internal Technical Panel review.
- Lay out a schedule of future meetings and commit to convene periodic joint Technical Panel/AAG meetings. Use these joint meetings to present specific information to and solicit specific input/feedback from AAG members. Panel members anticipated that these joint meetings would take place after the Panel had made significant progress on TAC development.

**Near-Term Next Steps:**

1. Ian to confirm and track progress toward preparation and transmittal of a coordination letter from DFG senior staff to appropriate NOAA Fisheries staff.
2. Ian to take steps to recruit an additional modeler to the Technical Panel to do the legwork in developing the model. This includes exploring the possibility of DFG funding a qualified post-doc. Costs and management approval of this step will need to be explored.
3. Facilitation Team to work with the AAG and Technical Panel to establish a broadly accepted process for involving the AAG in Technical Panel meetings. This process should strive to meet the interests of both AAG and Technical Panel members.
4. Ian and Facilitation Team to revise the TOR as appropriate to reflect Panel discussions. In particular, the TAC framework timeline should be revised to take into account the time necessary to bring an additional modeler on board. Additionally, a new section should be added to the TOR to guide the recruitment of a modeler to the Technical Panel.

## **Summary of Key Outcomes Technical Panel/AAG Teleconference February 7, 2008 (1:00 – 3:00 PM)**

### **KEY MEETING MATERIALS (distributed before the teleconference)**

Prior to the teleconference, the facilitation team distributed the following key materials to support Technical Panel and AAG deliberations:

- Data Matrix v7 containing a listing of all identified data sets and other supporting materials
- PowerPoint presentation developed by Dr. Yan Jiao
- Key Outcomes Memorandum from the AAG/Technical Panel's 11/29/07 meeting

### **PARTICIPANTS**

- Technical Panel members: Yan Jiao (Virginia Tech), Paul Crone (NMFS), Laura Rogers-Bennett (DFG). Technical analyst: Rob Leaf
- Abalone Advisory Group (AAG) members: Jessie Altstatt, Terry Maas, Jim Marshall, Chris Mobley, Greg Sanders, Chris Voss
- California Department of Fish and Game (DFG) Staff: Ian Taniguchi
- Facilitators: Scott McCreary and Eric Poncelet (CONCUR), Rob Williams (RESOLVE)
- Additional support staff: Alicia Bonnette

### **KEY OUTCOMES**

#### **A. Technical panel confirmed that mobilization of relevant data sets is on schedule and near completion**

During the teleconference, Yan Jiao (lead Technical Panel modeler) reported that of the 16 data sets identified by Technical Panel and AAG members since the November 29, 2007 joint AAG-Technical Panel meeting, 13 had been received and, of these, 10 had been reviewed and analyzed. As a matter of transparency, data sets were transmitted to all AAG members.

Note: for ease of cross-referencing, please refer to Data Matrix v7 to identify the individual data sets discussed below.

The following data sets have been received but still need to be analyzed:

- 2007 San Miguel Island (SMI) red abalone survey (data set #10)
  - Data 10 – AB\_SMI\_2007 survey data TAC.xls
  - Data 10b - SMI\_Ab\_Pop\_Est\_2007sum.xls (mean and variance data)
- Channel Islands National Park kelp forest monitoring (data set #12) (6 files, 12a – 12f)
- Red abalone larval settlement and recruitment (data set #18)

The following data sets have been requested but not yet received

- DFG pathology report for red abalone (data set #3)
- PISCO subtidal monitoring data (data set #11)

AAG members confirmed that no useful data exist for one of the potential data sets identified:

- Aquaculture facility growth rates (data set #14)

Participants also confirmed that the following data set will not be used in the modeling work but may be useful to ground truth the modeling results:

- Aerial flight census kelp data (data set #17)

## **B. Technical Panel addressed issues associated with the utilization of the data in the modeling**

The Technical Panel addressed key data analysis issues for the following data categories:

### **1. Survey data (2006-2007) on abundance**

Status of data mobilization: Technical Panel members confirmed that data sets #1 (2006 SMI red abalone survey) and #10 (2007 SMI red abalone survey) are ready for use in the modeling effort.

### **2. Fecundity survey**

Status of data mobilization: Technical Panel members confirmed that data set #13 (female red abalone fecundity data) is ready for use in the modeling.

Other data analysis issues addressed: Technical Panel members recommended that either the 2007 or the combined 2006/2007 data be used for modeling. Yan Jiao indicated that she would use the 2007 data.

### **3. Growth (individual)**

Status of data mobilization: Technical Panel members confirmed that data set #5 (red abalone growth data) is ready for use in the modeling effort.

Other data analysis issues addressed:

- Yan Jiao indicated that, for purposes of simplicity, she intends to delete the “negative growth data” on individual growth (i.e., data showing decreased length over time). Technical Panel members agreed that the negative values were likely due to inaccurate measurements in the field rather than observed negative growth rates. They further agreed that it was reasonable to delete the negative values but suggested running the models with and without the negative values to see if there was a noticeable difference.
- Technical panel members recommended that Yan use “total weight” rather than “animal weight” in the analyses of length-weight relationships. This would be consistent with the use of “total weight” measurements in landing or catch.

#### 4. Mortality (natural)

Status of data mobilization:

- Yan Jiao reported that larval recruitment data (data set #18) are still to be analyzed.
- Technical Panel members noted that Jim Moore (DFG) may have potentially useful data on temperature and the presence of RLP (Rickettsia-like Prokaryote) bacteria (data set #3). These are the data that informed the abalone health survey findings in DFG's final report for the 2006 SMI survey. Yan Jiao, Rob Leaf, Ian Taniguchi, and Laura Rogers-Bennett will follow up with Jim Moore to explore the utility of these data for the modeling effort.
- Technical Panel members noted that estimates for instantaneous size-specific mortality could be derived from Leaf et al. (2007) (Supporting Information H) and Rogers-Bennett (2007) (Supporting Information F), although both studies are focused on northern red abalone. It should also be noted that the range of natural mortality estimates from the different studies is large, and sensitivity analyses would be needed to determine the influence on the modeling analysis.

Other data analysis issues addressed:

- Technical Panel members suggested that “constant natural mortality” be used at the start of the model analysis or at least in some sensitivity runs. Technical Panel members noted that it would be helpful to use a sensitivity analysis to analyze the 2007 pathology data by incorporating additive natural mortality.

#### 5. Length frequency data

Status of data mobilization:

- Technical Panel members confirmed that data sets #1 (2006 SMI red abalone survey), #2 (DFG red abalone cruise data 1993-2001), and #10 (2007 SMI red abalone survey) are ready for use in the modeling effort. This includes the 2007 cruise data on length frequency.
- Technical Panel and AAG members discussed the quality of the commercial data provided by Jim Marshall (small sample size of about 200 shells). Jim Marshall noted that the number of fishers who caught the 200 abalone was unknown and that it was not possible to confirm that the sample was representative of commercial fishery catch, although he believed this to be the case. The Technical Panel agreed to use this data and to perform a sensitivity analysis to help address issues presented by the small sample size.
- Ian Taniguchi reported that other cruise report data may exist on length frequency (e.g., 99-M5, 99-M1). These 1999 surveys were based on a swim-based methodology rather than a transect-based methodology. Ian will track down the survey reports to see if the data are useful, and pass these on to the Technical Panel and the AAG.

## 6. Stock recruitment sketch

Status of data mobilization:

- Technical Panel members noted that the Channel Islands National Park kelp forest monitoring data (data set #12) are not useful for stock recruitment. This is because of the living characteristics of the small-sized abalone, which tend to hide under rocks.

## 7. Historical catch

Status of data mobilization:

- Technical Panel members confirmed that the DFG historical commercial red abalone landings data (data set #8) and the DFG historical sport commercial passenger fishing vessel dive boat log data (data set #9) are ready for use in the modeling effort.
- Technical Panel members identified a potential new data source: 1991-1997 commercial passenger fishing vessel (CPFV) recreational logbook catch data of red abalone. Ian Taniguchi will examine the data for completeness. Technical Panel members believed that, if good, these data would add helpful information to the data on “total removals.”
- Participants discussed other possibilities of obtaining additional catch per unit effort (CPUE) data. Ian noted that additional CPUE data may be available from the CPFV boat landings. The group confirmed that no other logbook data on CPUE is known to be available. Technical Panel members agreed that additional CPUE data would help improve the quality of the catch data.

Other data analysis issues addressed:

- The Technical Panel identified the need for further discussion regarding how to develop a measure for CPUE (e.g., time/swim abundance)
- Participants briefly discussed the issue of “catch all block” data and flagged this as a subject for follow-up Technical Panel discussion.

## 8. Relative abundance

Status of data mobilization:

- The Technical Panel confirmed that data sets #1 (2006 SMI red abalone survey), #2 (DFG red abalone cruise data 1993-2001), and #10 (2007 SMI red abalone survey) are ready for use in the modeling effort. Data set #11 (PISCO subtidal monitoring data) is pending and #12 (Channel Islands National Park kelp forest monitoring) needs to be scrubbed and analyzed.
- The Technical Panel noted that data set #16 (1966-67 commercial logbook data) was only one point, and they recommended against combining this data set with the other data sets because of differences in the survey methods used.
- Ian Taniguchi again reported that other cruise report data may exist (swim data rather than transect data) that might be relevant for analyses of relative abundance (e.g., 99-M5, 99-M1). Ian will track down these survey reports and transmit any applicable data to the Technical Panel and the AAG.

Other data analysis issues addressed:

- Yan Jiao indicated her intent to combine all of the survey data (data sets #1, #2, and #10). The Technical Panel indicated their support for this approach, given that the methodologies used for the surveys were the same. Yan suggested that she could perform a sensitivity analysis at a later date to determine the influence of combining the data. The Technical Panel flagged this topic for further discussion.
- Yan Jiao noted that in the 1993-2001 survey data (as listed in the summary document entitled “DFG SMI surveys summary.doc”), there are both relative abundance (catch/minutes) and density (catch/square meter) data. She indicated her intent to use both of these data types as indicators of population abundance.
- Technical Panel members indicated that the Channel Islands National Park kelp forest monitoring data (data set #12) would not be useful for stock recruitment determination. Technical Panel members did believe, however, that since the Channel Islands National Park was subject to similar fishing pressure, these data could be used as a set of relative abundance data.
- Yan Jiao noted that the 1974 historical relative abundance data listed in the 1993-2001 survey summary document (“DFG SMI surveys summary.doc”), abalone/minute and/or abalone/square meter from 1974, 1993, 1994, 1997, 1999, 2000, 2001 were reported as nominal numbers. These are the values shown in slide 20 of her PowerPoint presentation. Yan Jiao requested that Technical Panel members and DFG staff review these data and determine whether the 1974 data point should be used or eliminated as an outlier.

### **C. Technical Panel reviewed the anticipated timeline for developing the models to determine a total allowable catch (TAC)**

Technical Panel members discussed the anticipated timeline for completing the modeling. They confirmed that the modeling was still on track to be completed in the spring 2008 timeframe. They also confirmed that enough data were in hand for Yan Jiao to begin populating the models.

The facilitation team outlined the following process next steps in the modeling process.

1. Yan Jiao to begin populating the models and to follow up with Technical Panel members, as needed, to address any remaining data or data analysis questions.
2. Once initial results from one (or a small number of) modeling runs are available, Technical Panel members to discuss the results and any issues that arose.
3. The Technical Panel and AAG to participate in another joint meeting in Spring 2008 to discuss initial findings from all of the models before revision and submittal to a Review Committee.

Technical Panel members commented that it was still too early to determine what inferences the models might have for determining a TAC. [Note: As a reminder, the Technical Panel’s charge is to develop a methodology for determining a TAC; the AAG’s charge is to provide a recommendation on a TAC to the DFG.]

**D. Facilitation team will work with Yan Jiao and the Technical Panel to prepare a list of relevant terms and acronyms/initializations used in the modeling for the AAG**

The facilitation team noted that it would be helpful to provide AAG members with a list of commonly used technical terms and acronyms/initializations. The facilitation team will work with Technical Panel members to prepare a concise list for distribution to the AAG.

**E. Facilitation team will take steps to convene a Review Committee**

The facilitation team reminded participants that a key next step in the TAC development process involves recruiting members of a Review Committee. The facilitation team will initiate this work in the coming weeks in accordance with the August 30, 2007 memo on the Review Committee process discussed at the November 29, 2007 AAG/Technical Panel meeting.

**NEXT STEPS**

Key next steps stemming from the teleconference include the following:

DFG Data Mobilization

1. Ian Taniguchi to track down the following potential new data sets and transmit these to the facilitation team for forwarding to the Technical Panel and the AAG:
  - a. Cruise report data from 1999 (e.g., 99-M5, 99-M1), especially data pertaining to length frequency and relative abundance.
  - b. 1991-1997 CPFV recreational logbook catch data for red abalone, especially data pertaining to CPUE.
2. Ian Taniguchi to track down remaining data sets and transmit these to the facilitation team for forwarding to the Technical Panel and AAG. Yan Jiao to analyze the data and incorporate them into the models as appropriate.
  - a. PISCO subtidal monitoring data (data set #11)
  - b. Aerial flight census kelp data (data set #17)

Technical Panel Data Mobilization and Analysis

3. Ian Taniguchi to convene a teleconference with Yan Jiao, Rob Leaf, Laura Rogers-Bennett, and Jim Moore (DFG) to discuss the possible utility of RLP/temperature data from the 2006 survey (data set #3).
4. Technical Panel members and DFG staff to review data set #2 and the summary document (“DFG SMI Surveys Summary.doc”) to determine whether the 1974 data point should be used or eliminated as an outlier. [This summary document is attached for convenience. It will also be added to the Data Matrix.]

5. Technical Panel members to address how “catch all blocks” data should be analyzed.

Modeling next steps

6. Yan Jiao to analyze remaining data sets (#10 2007 SMI red abalone survey, #12 Channel Islands National Park Kelp Forest Monitoring data, #18 larval settlement and recruitment data) and begin populating the models with the data confirmed above. When one or more models are far enough along, the Technical Panel to meet by teleconference to discuss preliminary results and any data, analysis, or modeling issues that arose.

Facilitation team next steps

7. Facilitation team to work with the Technical Panel to schedule a follow-up teleconference(s) to address the next steps identified above (next steps 3-5).
8. Facilitation team to initiate steps to recruit members of a Review Committee.
9. Facilitation team to work with Technical Panel and AAG members to schedule and plan a spring AAG/Technical panel joint meeting.

**Summary of Key Outcomes**  
**Technical Panel Teleconference**  
**March 13, 2008, 3:00 – 4:30 PM (PDT)**

**I. KEY MEETING MATERIALS (distributed before the teleconference)**

On March 11 and 12, 2008, the facilitation team distributed the following key materials to support Technical Panel (TP) deliberations on their March 13, 2008 teleconference:

- Agenda containing list of data analysis questions to be addressed on the call.
- Updated Data Matrix v8
- Data mobilization status report (prepared by Ian Taniguchi, March 11, 2008)
- CPFV Dive Boat Logbook Catch Data for Abalone (1991-1997).
- March 2008 progress report on the investigation of the potential impact of El Nino events on SMI red abalone health and survival (prepared by Jim Moore, DFG).

**II. PARTICIPANTS**

- Technical Panel members: Yan Jiao (Virginia Tech), John Butler and Paul Crone (NMFS), Laura Rogers-Bennett (DFG).
- Abalone Advisory Group (AAG) members (participating as observers): Jim Marshall
- California Department of Fish and Game (DFG) Staff: Tom Barnes, John Ugoretz, Ian Taniguchi
- Facilitators: Scott McCreary and Eric Poncelet (CONCUR)

**III. KEY OUTCOMES**

**A. Technical panel received update on status of data mobilization**

Ian Taniguchi (DFG) reported that the following data sets have been received or are expected to be received by the end of the month. Once they are available, the facilitation team will forward them to the Technical Panel and the AAG:

- Size frequency and abalone abundance data from 1999 DFG cruises 99M1 and 99M5. This data set should be available by March 17, 2008.
- Size frequency and abalone abundance data from 1993 cruise 93M6. This data set should be available by March 17, 2008.
- 1991-1997 CPFV dive boat logbook catch data for red abalone. This data set was sent to the TP/AAG in advance of this conference call. The data will be assigned a number and added to the data matrix.
- PISCO data set. Ian has requested the data and is awaiting a response from PISCO.
- Aerial kelp flight census data (data set #17) is expected by 3/21/08.
- SMI pathology data from an ongoing study of the potential impact of El Nino events on SMI red abalone health and survival. A progress report prepared by Jim Moore (DFG) was sent to the TP/AAG in advance of the TP's conference call.
- DFG 1974 cruise 74KB11 data (cruise report 74-K-29). Ian confirmed that abalone abundance data are available from the cruise report but that no size frequency or raw data exist.
- Data from a 1979 cruise (report 79-H-6) may also exist and need to be mobilized, if useful.

**B. Technical Panel addressed data analysis issues**

The Technical Panel considered and offered guidance on the following data analysis issues:

**1. Utility of 1991-1997 CPFV dive boat logbook data**

Yan Jiao noted that there appears to be a discrepancy in this data set between the 1991-1992 data and the 1993-1997 data with regard to the total hours of diving.

The technical Panel agreed that the data require further analysis to determine the utility. Possible ways to address the data discrepancy include:

- Leave out the 1991-1992 data
- Compare the 1991-1997 data with the 1978-1990 CPFV data set to determine utility

**2. Utility of preliminary pathology data from the SMI mortality study**

Laura Rogers-Bennett reported that mortality results from Jim Moore's study of the potential impact of El Niño events on SMI red abalone health and survival are not expected until the end of Summer 2008. Only very preliminary data are available now.

Laura also reported that results of the SMI 2007 survey pathology analysis should be available in about one month's time. This study is based on a larger sample size (n=150) than the SMI 2006 survey (n=50).

**3. How to integrate swim survey data (abalone per time search) from past DFG cruises with more recent SMI 2006 and 2007 survey data**

Ian Taniguchi clarified that raw data on "abundance" (abalone/hour) exist for the 1993-2001 surveys but were not included in data set #2. [Data set #2 ("Historical SMI red ab density data" file) currently contains density counts and size frequency data collected via a transect methodology.] Ian will compile all of the survey swim data on abundance from the 1993-2001 cruises into a new data set and forward this to the facilitation team for distribution to the TP and AAG.

The Technical Panel recommended that Yan work with Ian to create separate indices for abundance (ab/hr) and density (ab/m<sup>2</sup>) data from the 1993-2001 and 2006-2007 surveys. Then, they should assess whether these data can reasonably be combined. Ian suggested that it may be possible to combine these data at specific geographic regions. Ian and Yan will follow up by phone within the week to review these data.

Ian clarified that the 1974 and 1979 cruise reports contain only swim survey abundance data. No raw data exist for these two cruises. The Technical Panel recommended that Yan examine the 1974 and 1979 cruise reports to assess the utility of the data included.

**4. How to analyze "catch all block" data regarding historical commercial catch**

John Butler agreed to review a time series of historical commercial catch and recommend a percentage of the catch from the "catch all block" to be attributed to SMI based on historical commercial catch trends.

**5. How to address small size classes from SMI surveys to avoid biases in length-frequency data**

Technical Panel members supported Yan's proposed approach for omitting size classes below a certain threshold and recommended a threshold of 100 mm. This is consistent with

past DFG methodology defining emergent abalone as being > 100 mm used in the ARMP and other published papers.

**6. How to address geographic differences in Channel Islands National Park (CINP) fishery independent survey data (1983-2006)**

The Technical Panel supported Yan's recommendation to separate the CINP kelp forest monitoring data (1983-2006, data set #12) into three separate indices. Ian clarified that the surveys were conducted in three separate geographic areas and for particular monitoring purposes, and he recommended against extrapolating from these three areas to the whole island.

Technical Panel members recommended that Ian work with Yan to look at the overlap between the CINP data and the most recent SMI 2006 and 2007 survey data. This may allow for extrapolation of the CINP data.

**7. Aggregating data from multiple surveys within one year**

Technical Panel members agreed that it is reasonable to combine data from different monthly cruises in the same year. This is due, in part, to the fact that abalone are a relatively long-lived animal. This will allow the modeling to focus on yearly, rather than monthly, analyses.

**C. Technical Panel requested increased use of graphs to illustrate future data analysis issues**

The facilitation team will work with Yan Jiao to include relevant data analysis graphs and plots as meeting materials to tee up future Technical Panel discussion of data analysis issues.

**D. Anticipate more informal Technical Panel communications in the model development process**

The Technical Panel emphasized the value of more informal communications within the Technical Panel and between Technical Panel members and Ian Taniguchi.

The facilitation team recommended a two-pronged approach to Technical Panel communications over the coming weeks:

1. In general, Technical Panel members are encouraged to contact each other (and Ian) directly to address routine data clarification questions or minor analytical questions. This will be an efficient way to move the analytical work along. Key questions and working assumptions should be documented.
2. In cases where major analytical questions arise, Technical Panel members are encouraged to forward these to the facilitation team. The facilitation team will help frame the issues and convene a conference call to discuss the issues and help document the key conclusions and working assumptions to help brief the full AAG.

The Technical Panel expressed an interest in seeing some of Yan's preliminary modeling results. The facilitation team will agendaize this discussion for the next Technical Panel conference call.

## **IV. NEXT STEPS**

Key next steps stemming from the teleconference include the following:

### **A. DFG Data Mobilization Tasks**

1. Ian Taniguchi to track down the following data sets and transmit these to the facilitation team, for forwarding to the Technical Panel and the AAG:
  - a. Abundance data and, where possible, size frequency data from the 1993-2001 cruises (swim survey data). This includes the 1993 and 1999 surveys described above (augmentation to data set #2)
  - b. PISCO data set (data set #11)
  - c. Aerial kelp flight census data (data set #17)
  - d. DFG 1974 cruise 74KB11 data (report 74-K-29) and DFG 1979 cruise data (report 79-H-6) (augmentation to data set #2)
  - e. Pathology analysis from the 2007 SMI survey (augmentation to data set #3)
2. The facilitation team to forward the data sets identified above to the Technical Panel and the AAG. The facilitation team will also update the AAG TAC Data Set Matrix document accordingly.

### **B. Technical Panel Follow-up Data Analysis Tasks**

3. Ian Taniguchi to address the discrepancy in the 1991-1997 CPFV dive boat logbook data and determine the utility of the data.
4. Ian Taniguchi and Yan Jiao to work together to create separate indices for abundance (ab/hr) and density (ab/m<sup>2</sup>) data from the 1993-2001 and 2006-2007 surveys and then assess whether these data can be combined.
5. Yan Jiao to examine the 1974 and 1979 cruise reports to assess the utility of the data included.
6. John Butler to review a time series of historical commercial catch for the Channel Islands and recommend a reasonable percentage of the catch from the "catch all block" to be attributed to SMI based on historical commercial catch trends for analytical purposes.
7. Yan Jiao to work with Ian to examine the overlap between the CINP data (data set #12) and the most recent SMI 2006 and 2007 survey data (data sets #1 and 10) to see if it is possible to extrapolate the CINP data.

### **C. Next Steps in Technical Panel Model Development**

8. Yan Jiao to begin analysis of the new data sets and to coordinate with other Technical Panel members or the facilitation team to address additional data analysis issues.
9. Once the new data sets have been received and analyzed, the facilitation team will convene a follow-up Technical Panel teleconference to address any remaining data analysis issues and to begin review and discussion of preliminary modeling results.

## **Draft - Summary of Key Outcomes**

### **Technical Panel Teleconference**

**July 7, 2008 (3:30 -5:00 PM)**  
**(For review by Technical Panel Members)**

#### **Participants:**

Technical panel members: John Butler (AAG, NMFS), Paul Crone (NMFS), Laura Rogers-Bennett (DFG), Yan Jiao (Lead modeler, VT)  
DFG Staff: Tom Barnes (DFG), Ian Taniguchi (DFG)

#### **Key Outcomes:**

##### Data Mobilization Issues

Panel members discussed the status of pending data sets for use in the modeling. The only information pending is results of the San Miguel Island (SMI) “El Niño” simulation pathology study. Laura and Ian provided an update on the study which began last September.

The study design consists of holding and tracking red abalone collected last year from SMI in three different water temperature treatments. The treatments are: Ambient seawater (AMB) at Bodega Marine Laboratory and two temperature profiles that simulate the 1997-98 El Niño (ELN) plus 1° C and the 1998-99 La Niña (LAN) events. The temperature profiles used were based on actual profiles recorded on a daily basis at a site on the south side of SMI during those time frames. All abalone are fed kelp on a regular basis, thus the only variable that differs is the water temperature. Abalone were checked daily and any dead abalone were removed and processed to obtain health, reproductive, and genetic data. Preliminary results from the time the temperature profiles began diverging from each other to now, show that the ELN treatment abalone experienced 50% mortality. The AMB treatment abalone has experienced a few mortalities and the LAN treatment has had very little to no mortalities to date.

**Preliminary reproductive information shows that shrunken moribund abalone had no reproductive capacity which suggests that reproduction during El Niño events is severely curtailed or nonexistent.** The study continues until deaths in the ELN treatment begin to level out at which point the study will end.

Panel members discussed the possible implications of this information on the modeling effort. It was suggested that a scenario be added to the yield-per-recruit model (M 4) to reflect this enhanced natural mortality and reduced reproductive capacity during El Niño events.

A discussion of the overall natural mortality rates (M) to use in the models ensued. Yan specifically asked what M values for non-El Niño years should be used. Panel members suggested that existing M values reported in the literature for abalone or similar species should be used. Laura offered using the M values that she and other colleagues have published for red abalone in Northern California. Panel members all agreed to use values published in the literature for red abalone in Northern California as the M value in the modeling effort for non-reproductive years.

### Latest modeling update

Yan gave a brief update on her current work on the catch-at-age/size model. She developed length frequency indices for the four areas of SMI (NW, NE, SW, SE) based on the fishery independent survey data sets. She did not include the NE information in the modeling due to limited abundance and harvesting information for that area. Yan also developed the recreational catch-per-unit of effort (CPUE) for use in the modeling.

### Discussion of further model development steps

The panel discussed the various “Next Steps” points in the modeling that were listed in Yan’s May and June 2008 modeling update report.

The TP discussed detail on the catch-at-age/size (M2) and the yield-per-recruit (M4) models. Some TP members felt that these two models seem to be more important and appropriate for this species and situation. For M4, Paul suggested that Yan really look at the yield-per-recruit model that is published in Hobday and Tegner (2002) and at yield-per-recruit model work on market squid (which he can supply).

The discussion of the natural mortality estimations occurred earlier in the meeting so the panel moved on to the discussion of the abundance indices and their inconsistencies. The twelve abundance indices that were developed from fishery dependent and independent survey data are highly variable that show no consistent trend through time. The abundance indices need to be scrutinized closely and the number of indices paired down to the core few that show some correlation and are thought to be accurate that will be used in the models. Ian and Laura will take a first crack at pairing down the data sets as well as developing criteria for determining which indices are used in the model.

### Planning for face-to-face meeting

The Panel settled on August 14 and 15 in La Jolla, CA. for the face-to-face meeting. John will look into reserving the conference room at the NOAA Southwest Fishery Science Center (SWFSC) for the two day meeting. John mentioned that the entire SWFSC will be moving into their new building between now and those dates. It is possible that we may be able to hold the meeting in the new conference room in the new facility. There is also a possibility that neither building will be available for the meeting. John will check into this and get back to the rest of the group.

Looking forward to the possible content of the meeting, Paul asked that the actual Excel spreadsheets for the synthesized data and calculation of the abundance estimates for SMI survey be available at the meeting. Ian will supply this information.

### **Near-Term Next Steps:**

1. Yan will incorporate the use of existing natural mortality values from Laura’s published papers on northern California red abalone. Laura will work with Yan on this.
2. Paul will supply the squid yield-per-recruit work to Yan in further refining the SMI red abalone yield-per-recruit model. Yan already has access to the Hobday and Tegner (2002) paper as part of the supporting material sent during data mobilization.

3. Ian and Laura will work together to narrow the number of abundance indices to be used in the modeling.
4. Ian will work on further planning of the face-to-face meeting in La Jolla.
5. John will reserve meeting room for the face-to-face meeting

## Summary of Key Outcomes Technical Panel Meeting August 14, 2008 (9:00 -5:00 PM) (For review by Technical Panel Members)

### Participants:

Technical panel members: John Butler (AAG, NMFS), Paul Crone (NMFS), Laura Rogers-Bennett (DFG), Yan Jiao (Lead modeler, VT)

DFG Staff: Ian Taniguchi (DFG)

Other TP staff: Rob Leaf (VT graduate student)

### Key Outcomes:

#### Briefing on preliminary results of models

Yan gave a presentation on the current status of the models and the preliminary results. Panel members discussed the preliminary results and the nuances of each model.

#### Geostatistical Survey Abundance:

TP members would like to see the abundance estimates for 2006 and 2007 surveys. The 2006 survey abundance estimates are in the 2006 SMI survey final report. The 2007 SMI survey report is still in draft form but it can be distributed to the TP for showing the abundance estimates. The abundance estimates and survey results are important for comparing with the model results to ensure that results track with what is observed in reality. Ian will send draft 2007 SMI survey draft report out to the TP members.

#### Per-recruit Model:

Yan presented results from per-recruit analysis (e.g., yield-per-recruit, YPR, and eggs-per-recruit, EPR) that was profiled across a suite of generally relied upon fishing mortality ( $F$ ) levels, i.e., spawning potential ratios (SPR). That is, a range of  $F$ -based SPRs that spans both 'target' and 'overfishing' thresholds, depending on the dynamics of both the fish stock and fishery in question:  $F_{0.1}$ ;  $F_{20\%}$ ;  $F_{50\%}$ ;  $F_{80\%}$ , and  $F_{\max}$ . Sensitivity analysis incorporated development of alternative model scenarios based on different (plausible) assumptions for this species' rate of natural mortality ( $M$ ), e.g.,  $M = 0.11-0.23$ . In this context, TP members spent some time going over key parameters in this model. As of the last teleconference call, the natural mortality parameter was set at a range of 0.11 to 0.23 based on published northern California red abalone life history data (Rogers-Bennett et. al. 2007). Panel members thought this approach was appropriate.

#### State Space Surplus Production Model:

Most of the discussion on this model was directed at the abundance indices and how best to utilize the data (see next section: Final data issues).

#### Catch at Age/Size Model:

Panel members discussed the preliminary results of this model. Estimates of annual recruitment of abalone to the fishery over a time frame spanning from 1950 to the present show very high

recruitment occurring prior to 1970 (Figure 4 of the July modeling report). This same sort of trend is also seen in the overall population abundance estimates (Figure 5). Panel members identified the need to double check the sharp spike in recruitment to the fishery in the late 1950's seen for scenario three on the recruitment output graph (Figure 4 of the July modeling report). The recruitment spike seems highly unusual. A check of the commercial landings data showed an error in tallying landings for San Miguel Island for the year 1959. Ian will double check commercial landings data for that year and the rest of the 1950s. Any corrections to the landings data will be provided in a revised spreadsheet of the original data to the TP and the AAG. Yan will provide updated model output results based on corrected landing data.

#### Final data issues

The TP discussed the abundance indices being used for the surplus production model and the Catch at age/size model.

One of the key outcomes from the last TP teleconference call dated July 7, 2008 was to critically review and pare down the 12 original abundance indices that reflect more realistic or accurate natural trends in the population. The intent was to focus on the most useful indices.

Five of the 12 candidate indices were eliminated due to inconsistencies in correlated trends, and temporal or spatial differences and the remaining indices were used for the current model results. The seven remaining indices were scrutinized further by the TP and considered for their continued utility in modeling development.

The Technical Panel specifically recommended that three indices should be eliminated.

- Recreational CPUE abundance index was eliminated because the fishery was regulated on a small daily bag limit (2 or 4 abalone per day) and thus CPUE does not truly reflect directly with abundance. Also during the time frame of the data collection the bag limit was reduced by half from four abalone per day to two, so the observed drop in CPUE was induced by regulation.
- Channel Island National Park (CINP) Kelp Forest Monitoring site Hare Rock was eliminated for purposes of developing indices because abalone abundance dropped to zero around 1990. Also the Hare Rock site is located in the NE zone of the island where there have always traditionally been low densities of abalone and the site is now in a reserve.
- Channel Island National Park Kelp Forest Monitoring site Miracle Mile was eliminated for purposes of developing indices because densities were 100 times larger than other abundance indices. This is due to the site being placed specifically in a high density abalone area and is therefore not reflective of overall population abundance.
- The four remaining abundance indices are the DFG historical survey abundances for the SW, SE, NW, and the CINP Kelp Forest Monitoring site Wyckoff Ledge (WL). The TP discussed running several scenarios with the existing indices; 1) all indices separate 2) combining SW, SE and NW and assume that there are no spatial heterogeneity since the model is not spatially structured; 3) Delete CINP WL since WL occurs within the SW zone.

The Technical Panel discussed the length frequency (LFQ) indices used in the Catch at Age/Size model. It was pointed out that there are some spatial discrepancies in the LFQ through time.

Some of the combined LFQ sampling by year represents a limited number of sites visited compared to other years (i.e. 2006 and 07 surveys). Panel members thought that the LFQ indices were fine and that these discrepancies should be explained in the final report.

A small discrepancy in the commercial catch data was discovered during the discussion of the recruitment output graph of the Catch at Age/Size model (See last section). Commercial catch data for the 1950's will be double checked for accuracy by Ian.

#### Model Advantages/Disadvantages Review

The TP discussed the strengths and weaknesses of the four models. Three models, geostatistical abundance, per-recruit, and catch-at-size/age appeared to be the most useful to proceed with in terms of providing meaningful management advice in the future.

*Surplus Production Model:* The surplus production model provided some generally useful baseline information regarding the dynamics of this resource/fishery. However, inherent difficulties arose, given the catch time series that is included in the model (i.e., a moratorium on fishing began in 1997).

One problem is that the model assumes constant growth rate. This in turn forces the population to grow after the fishery closure which may not accurately reflect the actual status of the population. In the context of a surplus production model, it was generally discussed that some of the problems above could be evaluated through further sensitivity analysis with influential 'growth' parameters (such as  $r$  and  $k$ ) and other parameterization adjustments. The TP agreed that additional work necessarily needs to be prioritized at this time and thus, it was decided to place the highest priority on furthering the development of the geostatistical abundance, per-recruit, and catch-at-size/age models.

#### Further Results/Outputs Needed to Fulfill TP Work Product

Other considerations that could affect a determination of a TAC were discussed, and the prospects for incorporating these considerations into models. Considerations such as Minimum Viable Population (MVP), WS, and poaching were addressed.

The TP discussed the merits of incorporating these considerations directly into the models for determining a TAC. However the TP could not identify a clear way to directly incorporate them into the models. Panel members suggested an approach of providing a suite of inputs to consider in addition to a TAC. These inputs would be other biological factors (i.e. similar to harvest control rules) that would significantly affect the model outputs and that management would have to consider in determining a TAC for a given time frame.

These biological factors will be listed in a specific section in the report along with the reasons why they are significant to consider and as well as some brief guidance on how to deal with them.

#### Final Work Product Discussion

The TP agreed that the work product will be outlined in a later meeting, but some discussion on the structure and content of the final report was touched on in preceding agenda items (i.e. biological factors section). The TP agreed current report structure that Yan has outlined in her

July monthly report is appropriate. Additionally Ian and Yan will work together to fine tune the description of data used in the models.

**Next Steps:**

1. Ian will send draft 2007 SMI survey draft report out to the TP members in early Sept.
2. Now that the TP has had two meetings to themselves to thoroughly discuss the technical aspects of the data and models, the question was asked on how to re-engage back into the AAG. The TP felt that they should meet with the AAG at their next meeting whenever that may occur to explain their progress on the data usage and models. Yan backed by the rest of the TP would give a presentation on their progress. It was thought that the next AAG meeting would not occur until sometime in early October at the earliest. Thus the TP used this rough date for scheduling further work.
3. Yan will continue working on narrowing the models based on the outcomes of this meeting. The TP felt that further discussion and work on the models could happen via email and telephone. They tentatively scheduled September 30 for a teleconference meeting if it is needed.
4. The TP felt that a final draft report for review by the review committee could be done by mid November.

**Additional next steps to consider that were not discussed at the meeting:**

1. Prepare an outline of the draft report
2. Outline preliminary findings for advice on the creation of a TAC prior to joint meeting with AAG
3. Begin considering how the Review Committee function would work and its time frame for completion