

Webinar Kickoff Meeting Summary

Scientific Review of Red Abalone Survey and Density Estimation Methods



Monday, September 16th, 2:00 PM - 4:00 PM

Overview

At the request of the California Department of Fish and Wildlife (DFW), the California Ocean Science Trust has convened a Science Advisory Committee (SAC) to conduct a scientific and technical review of the survey design and methods currently used to estimate densities of red abalone (*Haliotis rufescens*) in northern California. This is a summary of the first meeting of the scientific review; the purpose of this meeting was to provide the SAC with an opportunity to clarify or gather the information they need to conduct a robust review. The SAC and Ocean Science Trust will use questions and comments raised during this first meeting to help frame the next steps of the scientific review process. This meeting summary captures the questions and comments raised by the SAC and members of the public. You can access the review documents, meeting agenda, and view the webinar [here](#).

Meeting Attendance

Science Advisory Committee (SAC): M. Carr, K. Nielsen, J. Prince, P. Raimondi, S. Schroeter, B. Tissot

California Department of Fish and Wildlife (DFW): T. Barnes, C. Button, L. Rogers-Bennett, I. Taniguchi

California Ocean Science Trust: M. O'Donnell (moderator), E. Knight, H. Carter, A. Pribyl, S. Rahimi

Members of the Public: 24

2:00 pm Welcome and Introduction - California Ocean Science Trust

OST Senior Scientist M. O'Donnell welcomed everyone to the meeting and introduced the OST staff. He discussed OST's role in the scientific review of survey and density estimation methods for red abalone, the meeting agenda, guidelines for public participation, the [scope of the review](#), a description of the overall [review process](#), and the selection process for the SAC. He provided these descriptions to ensure that going forward, the SAC, DFW, and the public are well informed of the approach and process for this review. To familiarize all meeting participants with the SAC, each SAC member provided their name, affiliation, and a couple sentences about their area of expertise. Two page CVs of all SAC members can be found [here](#). DFW staff members working on the abalone review were introduced next. Two page CVs of DFW staff members working on the review can be found [here](#).

2:30 pm California Department of Fish and Wildlife (DFW) Presentation

In order to provide the SAC with the background information necessary for them to frame their review, DFW Senior Environmental Scientist L. Rogers-Bennett presented information about the design, application and interpretation of their methods. Specifically, L. Rogers-Bennett addressed the following topics:

- The historical background of the California abalone recreational fishery, including the different species and its cultural and economic importance for the region.

- Background of the red abalone fishery in Northern California including its physical range, relative size and yearly catch estimates in total and by county.
- Background on the Abalone Recovery and Management Plan (ARMP), which consists of traditional fishery management measures paired with adaptive management in the form of closure triggers informed by density measurements.
- The purpose and goal of density monitoring, namely to inform management and to detect changes in density relative to earlier time periods.
- Information on the 8 index sites surveyed, including reasons for choosing the sites, locations, and surface area.
- The sample design (random stratified transects), including why it was used, and why transects are equally distributed according to depth strata.
- The number of transects, the survey cycle, and the layout of the data sheet used by divers.
- A description of how the data is collected, verified, processed and analyzed.
- A description of the statistical power of the sampling program.
- The results of the sampling program; namely a 35% decrease in average density across index sites, a 60% decrease in average density in Sonoma County alone, and a non-significant change in density for Mendocino County between the 2003-2007 and 2009-2012 time periods.
- The Harmful Algal Bloom (HAB) event of August 2011 in Sonoma County and its subsequent effects on the north coast fishery.

3:00 pm Science Advisory Committee Asks Questions of DFW

Following the DFW presentation, the SAC was given the opportunity to ask DFW biologists clarifying questions about their methods, and provide comments about further information they would like to see to help frame the next steps of the review, including a technical workshop that will be held in late October (to be announced on OST's website).

Mark Carr

M. Carr, the SAC chair, started this session by asking questions of and offering suggestions to DFW biologists. M. Carr highlighted that the density review document was particularly enlightening and a useful reference material but could be bolstered with additional information, including:

- Information about the software and procedures used for identifying transects within a site and how the divers actually locate the sites in the field using handheld GPS.
- Maps showing the distribution of transects at each site, as well as maps on how the distribution of transects may vary over time at each site.
- More detail on dimensions of abalone and urchins measured and methods used to measure abalone and urchins (calipers).

M. Carr also asked several additional questions of DFW biologists:

- To clarify, does DFW measure the first 25 individuals per transect when there are more than 25 individuals on a transect? *[L. Rogers-Bennett answered: Yes, they measure the first 25, and sometimes up to 30 per transect. If there are more, they don't get measured, but all get counted along the transect.]*
- How are size data used (the ARMP criteria #1 takes size distributions and bins them into “intermediate” and “large” size categories)? *[L. Rogers-Bennett responded that this was not in the background document because the document was focused on density estimation methods, however having a detailed discussion at the technical workshop about how the size frequency data is used would be appropriate.]*
- How are habitat attributes (topography and algal cover) used (could be used as co-variates in the analysis)? *[L. Rogers-Bennett responded that DFW also collects data on habitat, algal composition, and other species in the community and they do use some of the data as co-variates in the analysis. This would be a relevant topic to discuss during the workshop.]*
- What are the visibility criteria for the surveys? *[L. Rogers-Bennett stated DFW does not have visibility criteria for their surveys - each diver is only looking at a 1 m swath on either side of the transect tape, and they generally have enough visibility to conduct surveys.]*
- Would be good to know the statistical packages used for the analyses—particularly the power analyses. *[L. Rogers-Bennett said this will be added to the background document.]*
- The power analysis indicated that DFW can detect a 15% change in effect size – is that an effect size you were targeting given that the management thresholds were on the order of 25%, or was there some other rationale for focusing on a 15% effect size? *[L. Rogers-Bennett responded that DFW needed a tool that would be more sensitive than 25% so their goal was to get to 15%.]*

Later in the meeting, M. Carr added the following questions:

- By reducing the number of transects per site, DFW may be able to get a higher temporal resolution and a wider spatial resolution. Has DFW done an exercise where they've sub-sampled transects to reduce the number of replicates at a given site, and then changed the corresponding variance to see how that affected your power? *[L. Rogers-Bennett said DFW has randomly picked sub-samples from their 36, and done half or 9 or 12. The other thing they've done is that during the HAB event in August 2011, they surveyed all sites in Sonoma County right away so they could phone the numbers into the Fish and Game Commission meeting. Similarly, in 2012 DFW surveyed all four Sonoma County sites because they thought it was very important to finish the sites after the impact. L. Rogers-Bennett said they could show what those numbers look like if they were to do smaller numbers of transects at the workshop. Also, now that the densities are lower in Sonoma County, so is the variance.]*
- Is DFW thinking of incorporating MPA sites as index sites as well? This bears onto the issue of finding the balance between the number of transects per site and the payoff in temporal and spatial resolution.

Karina Nielsen

- Has DFW considered using an analysis that incorporates the hierarchical nesting inherent in the data (index site level, county level, region level)? *[L. Rogers-Bennett stated this will be considered in the technical workshop.]*
- Was the power analysis done for the fishery as a whole? *[L. Rogers Bennett responded this would*

also be a good topic for discussion at the technical workshop.]

- To what extent do divers conducting surveys cross-count to see whether they are counting the same way and coming up with the same numbers? *[L. Rogers-Bennett stated that DFW has a large number of divers and most have been with the program for many years. They are trained and paired up with experienced divers on the boat for the first year. DFW also uses yellow crayons underwater if an abalone is near the middle of the tape to indicate that the abalone was counted.]*
- Have you compared your density estimates with others who are doing density surveys in the same area? *[L. Rogers-Bennett said this is a topic we can delve into at the workshop.]*

Pete Raimondi

- P. Raimondi asked whether the purpose of the review concerns only the density estimates of abalone, or if it covers the density estimates of abalone as a tool for management? P. Raimondi indicated that DFW's current method is phenomenal for figuring out the density of abalone, but may not be the best method for figuring out density as a tool for management.

M. Carr clarified that the review to some extent must be viewed in the context of management decisions (especially with respect to the statistical power of the analysis). M. Carr indicated one question might be: do the estimates provide sufficient power to detect the changes that are necessary and relevant to management? In that case, the SAC must be more cognizant of the management context.

P. Raimondi stated that with respect to management, using size attributes for statistical analyses instead of an overall density estimate would be better.

M. O'Donnell then responded by directing the SAC to the three points in the review scope, including the goal of the review to determine whether the density estimations are useful for the management as specified in the ARMP. He further stated that when we talk about the review not covering management, we mean the review does not cover whether the ARMP is the correct management strategy for abalone. The review does ask: given the structure of the ARMP, are these density estimate methods designed correctly?

- P. Raimondi asked several additional questions of the DFW biologists, including:
 - ◇ Why did you decide to not use flashlights? *[L. Rogers-Bennett stated that DFW has two different types of surveys: one is called "emergent," where they look at animals that are in crevices, or seen without flashlights. So emergent non-flashlight transect surveys in the earlier time period are compared to emergent non-flashlight surveys in the most recent time period. DFW also has invasive surveys where flashlights are used, but those aren't the data being fed into the adaptive management plan. We also do recruitment surveys, but again those data aren't fed into the management plan.]*
 - ◇ When recruitment is mentioned, are we talking about ecological recruitment or recruitment to the fishery? *[L. Rogers-Bennett responded they are doing all of the above. However, recruitment in the ARMP is recruitment to the fishery which are abalone >100mm.]*
 - ◇ Pete then asked a clarifying question about the 25% density triggers and how they work.
 - ◇ Later P. Raimondi added the following: If you have the capability of doing more rapid sampling, it might be worth thinking about expanding the spatial extent.

Steve Schroeter

- Would like to see the time series data for the different sites since sites are sampled at different times, for the purpose of data snooping. *[L. Rogers-Bennett indicated that it would be a good long-term goal to have the data to do a time series.]*
- Was the power analysis you conducted post-hoc or was there another procedure you used to determine effect size? *[L. Rogers-Bennett stated that DFW conducted the power analysis early on when designing the sampling program so they could nail down how many transects they needed to do. They wanted to do the fewest with the power that they needed.]*

Jeremy Prince

- It would be constructive to see time series spanning all the surveys with each site in its own time period, to better understand the structure of the data.
- Is the randomness in the transect surveys every year, or when DFW initially selected the points? *[L. Rogers-Bennett indicated that the randomness in the survey is done every year.]*
- He would like to see more of the transect points used so they can see how the data ended up being distributed. He is interested to know more about what the structure of the actual populations are in the selected sites. He asked if DFW had any mapping of the abalone population? *[L. Rogers-Bennett stated that DFW does not have maps generated at the moment because their goal for density estimation is to see if there are large changes between time periods indicating some big impact that management might want to respond to.]*
- Are abalone only distributed through your survey areas or are there hot spots within those survey areas? *[L. Rogers-Bennett said that DFW does see that there are differences in density with respect to depth, and that is why DFW has depth stratified the transects. She stated that the pattern seems to hold for the majority of their work and others' work. She said it would be good to look at patterns of abalone density throughout the sites in the workshop.]*
- Would be interested in seeing the spatial distribution data of abalone at the workshop.

Brian Tissot

- How are size data used in the analysis, especially when looking at sub-fishery sizes?
- How does DFW place transects relative to habitat? When using randomized methods, how do transects end up being placed, and how does that sampling play out relative to habitat variability?
- Why did DFW define 0.05 abalone/m² as a management trigger?
- Would like to discuss the methodology of doing emergent surveys without light vs. more invasive surveys. He read a study at Santa Rosa Island that showed only 35% of red abalone were emergent, so if DFW is missing a large proportion of abalone, how does that play into their density estimations, particularly if size distributions are quite different? *[L. Rogers-Bennett replied there are more small abalone in invasive surveys, as well as in some of DFW's sampling techniques that are designed to target smaller individuals. With the emergent surveys, they are looking at >100mm size classes, which encompass both sub legal and legal individuals.]*
- It would be useful to have a discussion about what DFW is trying to measure and manage. The life history dynamics of the population as a whole are important.

- Would like more information about DFW abalone recruitment modules.

3:30 pm Public Question/Comment Period

Following the SAC's questions, the public was invited to provide questions and comments for the SAC to consider in the framing of the review.

Chris Voss

- C. Voss was concerned about the SAC having difficulty only discussing the survey methodology and not thinking in terms of management and how they connect. He encouraged the SAC to think about this further and hoped that any recommendations for refining the survey methodology be made in light of the need for providing good decision-making information to the policymakers.
- He would like the SAC to consider sea otter populations, which have impacted abalone populations in other regions of California. Densities of abalone on the north coast are unnatural since the otters have been absent.
- He would like the SAC to consider other methods, besides density, to inform their decision-making. Worldwide it is recognized that density is not the best way to inform management because it is so expensive.

Bill Bernard

- He hopes the SAC can focus on designing what is the best way to estimate abalone densities.
- Besides the current random transect survey protocols, what other types of survey methods will the SAC consider?
- Have the placement of transects been within a defined hectare? If not, why not? And shouldn't they be?
- Delta temperature variance and the corresponding BRP coefficients across California's bioregions are important to abalone populations; the SAC should consider these factors in determining the best density methods. For example, density surveys between 50 – 100ft might be appropriate in southern California, but in northern California it is not appropriate to conduct surveys at greater than 49ft depths.
- Wonders if we are approaching the transect surveys from a single-plane dimensional type of thinking when we should be looking at transects three-dimensionally. For example, most of the transects run parallel to the coast. In the north central coast and north coast areas, the reef structures are monolithic rock with channels perpendicular (not parallel) to the coast – these are where we should be looking for abalone. We should think about a holistic approach (entire reef structure) vs. pure random approach (what is done now); he's not sure a flat plane approach is the best way to detect abalone.

Jack Shaw

- Is there a visibility criterion or other considerations of survey technique that account for heavy kelp cover? Are there areas that are not surveyed because of heavy kelp cover?
- To date density estimates have been generated based on data collected well after Europeans

influenced abalone populations; has there been or will there be an effort to establish a baseline natural density index, so managers might determine the density of the ecosystem as opposed to the density of the fishery?

- Will there be any determination of what might constitute an overpopulated stock?

Brandi Easter

- Would like the SAC to consider alternative survey methods and is concerned that the 8 index sites do not reflect all the abalone populations along the entire north coast (some areas are less populated). With new MPAs and more divers venturing further, there might be more impacts in lower density areas. The SAC should discuss how to address population changes throughout northern California.
- Acknowledging the state is financially challenged, would like DFW to consider broadening their diver base to include citizen science.

Richard Alvarez

- Are the surveys conducted at the same time each year?
- What type of variance does that cause (if not conducted at same time each year)? From diving you know that in late spring, early summer, there's not much kelp, so the abalone are out and about because they're hungry. At other times there are lots of kelp, so abalone are harder to find.

Jim Marshall

- DFW indicated the index sites are within fishing block areas that make up 48% of the fishery. He would like DFW to elucidate the actual areas of these fishing blocks and their relationship to the areas that are actually surveyed.

Josh Russo

- Concerned that since the transects are scheduled so far in advance, bad weather may affect the number of surveys actually conducted. The DFW data does not show 9 transects in each depth bin as described in the DFW methods. He suggested using a larger number of index sites in the two counties. He is concerned that while the index sites were chosen because they would be the first indicators of heavy pressure, those are the 8 sites everyone goes to so they receive an extraordinary amount of pressure compared to the rest of the coast. The sites are not representative of what is going on with the rest of the coast.

4:00 pm Wrap Up and Next Steps (Ocean Science Trust)

At the conclusion of the meeting, M. O'Donnell went over the next steps in the review process including when future meetings and opportunities for public comment will take place, when materials will be posted, and when review results will be released. This information is also available in the [review process document](#). If you would like to be added to a list serve to receive regular updates on the abalone review, submit your email address to abalone@calost.org.