

Minutes for the Pacific Scientific Review Group Meeting
NOAA Western Regional Center, Seattle WA
25 - 26 Feb 2016

The 26th meeting of the Pacific Scientific Review Group (SRG) was held at the NOAA Western Regional Center, Seattle from 25-26 Feb 2016. All SRG members except Mark Fraker attended the meeting (Katherine Ralls participated by phone). Karin Forney served as rapporteur. Michael Scott served as chairman of the SRG. The attending SRG members and other participants are listed in Appendix 1, review documents are listed in Appendix 2, and the agenda of the meeting is in Appendix 3.

Pacific Islands Fishery/Management Updates

Ann Garrett indicated that there have been staffing changes, with Nancy Young moving to NMFS Office of Protected Resources. The Pacific Islands Regional Office plans to hire a replacement.

The False Killer Whale Take Reduction Team (TRT) met 29 April–1 May 2015 and made several consensus recommendations, including a voluntary change to stronger branchlines so the hooks can straighten (without lines breaking) and allow animals to pull free, the documentation of branchline characteristics of lines currently used in the fleet, of the sharing of observer video recordings of interactions with TRT members to assist in learning more about interactions and improve handling/release techniques, and development of a unified and simplified outreach message and strategy for NMFS and the Hawaii Longline Association to reach captains and crew. The TRT considered a number of other recommendations related to non-longline fisheries, research recommendations, and branchlines, but was unable to reach full consensus. The observer program achieved about 20% coverage for the deep-set longline fishery (DSL), 100% for the shallow-set longline fishery (SSL), and about 20% for the American Samoa (AS) longline fishery. In the DSL, there were 11 observed false killer whale interactions during 2014 and five during 2015, as well as a few other species. SSL interactions included a greater diversity of species. In American Samoa, observed interactions included one short-finned pilot whale during 2014 and two false killer whales during 2015.

Young noted that the observers have obtained some video of marine mammal interactions, but there are confidentiality issues about showing the videos in a public meeting, and many of the videos are very dark because DSL gear is hauled at night.

Garrett noted that deliberations are underway about a proposed rule concerning swimming with spinner dolphins; the proposed rule is expected by late spring/early summer. The SRG expressed concern that a rule focused only on spinner dolphins could potentially shift the problem to other species.

False killer whale bycatch estimates and SAR (*PSRG-2016-03*)

Erin Oleson reviewed the current management situation for false killer whales. There have been no changes in stock structure since the last SAR. The three stocks have small overlap areas, and bycatch is prorated to the overlap areas based on the proportion of fishing in each area, and then prorated to stock based on relative stock densities, as described at the last SRG meeting. The proportion of serious vs. non-serious injuries is used to prorate any interactions for which injury severity cannot be determined. For the 2015 TRT meeting, Forney presented an analysis to determine whether the rate of mortality or serious injury (MSI) or the proportion of non-serious

injuries have changed since implementation of the False Killer Whale Take Reduction Plan (TRP) in 2013. Simulations showed that the point estimate for MSI is slightly greater post-TRP (1.57 per 1000 sets) than pre-TRP (1.32 per 1000 sets), but the difference is not statistically significant. Similarly, the proportion of non-serious injuries was 21% post-TRP, compared to 8% pre-TRP, but the difference is not statistically significant because of the variation caused by small post-TRP sample sizes. Based on these results, the SAR continues to compare the 5-year average bycatch to PBR.

The SRG asked about the certainty of the abundance estimates, whether the past 9% declining trend was factored into N_{\min} calculations, and when new estimates would be available. Oleson explained that the pelagic stock estimates are based on a 2010 ship survey and are robust, albeit imprecise because of the small number of false killer whale sightings. Population size for the Main Hawaiian Islands (MHI) insular stock was previously estimated using mark-recapture analyses by Robin Baird based on 2006-2009 data, but more recently N_{\min} is the number of distinctive individuals identified during 2011-2014. Amanda Bradford is working on an updated mark-recapture abundance analysis. The historical trend is not used for N_{\min} because more recent information is available. The SRG inquired whether there were any areas that could be avoided to reduce interactions with the pelagic stock. Young indicated that no specific areas had been identified, and Forney explained that false killer whales and the fishery are targeting the same fish species, so are likely to overlap. Svein Fougner stated that fisherman do leave an area if they experience depredation, and Forney confirmed that moving after depredation was shown to be a factor that could potentially decrease interactions. Ryan Steen noted that this is challenging, given the diversity of the fleet, but the fishery is making efforts to ensure that the entire fleet understands how to improve outcomes.

There was further discussion about the stocks that interact with the fishery, and whether it is more appropriate to average MSI across 5 years or only post-TRP. At this time, there is no statistical indication that the performance of the weak hooks and other measures are making a difference, although the recent point estimate for MSI is lower than pre-TRP. The SRG asked whether the straightening of weak hooks is evidence that the TRP is working. Forney clarified that hooks had on occasion straightened pre-TRP, and it is not clear whether the rate has changed. Young added that some of the weak hooks are not straightening, and the problem may be that branchlines are breaking before the hooks can straighten. Jeff Moore noted that the analysis suggests an effect that could be illustrated with more data.

The SRG requested clarification of other risk factors that might be affecting the MHI insular stock, given that the fishery now has very little overlap. Oleson noted that the Status Review identified fishery interactions, small population concerns (*e.g.*, Allee effects, demographics, and contaminants), and intentional harm by fishermen as the primary concerns. The longline fishery interactions are being addressed by the TRP, but the other factors have not been investigated in detail. Young added that the current scope of the TRT and TRP is limited to longline fisheries, although the TRT has considered other “non-longline” fisheries in a research context, and there are efforts to increase information on the other fisheries. Robin Baird has also looked at Hawaii State fisheries, and the State will use part of a recent 3-year Endangered Species Act Section 6 grant to increase satellite tracking of false killer whales and evaluate their overlap with fisheries. Baird also has a student who has been evaluating mouth-line injuries for MHI insular false killer whales. The most recent results indicate that 22% of the animals for which the mouth-line was visible (about 58%) had injuries consistent with fisheries interactions. Garrett added that the Recovery plan being developed for MHI insular false killer whales will include a comprehensive

assessment of all factors. The SRG requested an update on TRP effectiveness at their next meeting. Oleson noted that the PIRO observer program currently has a major backlog of observer data that impedes bycatch estimation and creates additional uncertainty. A shorter data review and approval process would likely compromise data quality. The SRG stressed that the backlog has an adverse impact on fishery management and requested further details on the staffing shortages that are preventing the data from being quality-checked and approved.

The SRG requested that the SAR include a note that capture heterogeneity contributes to negative bias in mark-recapture estimates. The SRG also asked whether the line-transect abundance estimates of pelagic and Northwestern Hawaiian Island (NWHI) false killer whales would be updated to include the new Barlow $g(0)$ estimates. Bradford explained that Barlow could not estimate a $g(0)$ for false killer whales because of small sample sizes, but that the new $g(0)$ for pilot whales (a species with similar detection characteristics to false killer whales) did not change very much. Oleson added that a visual/acoustic comparison resulted in a similar estimate of $g(0)$ as that applied in the available pelagic and NWHI false killer whale abundance estimates.

Other Pacific Islands cetacean research

Oleson provided an overview of additional Pacific Islands research. During 2015, there was a large effort to conduct surveys and acoustic monitoring in CNMI (Commonwealth of the Northern Mariana Islands) and Guam. Humpback whale surveys were conducted Feb-Mar 2015, and one match to the Ogasawara Islands was found during preliminary comparisons to photo-identification catalogs from other areas of the North Pacific. The local community has developed great interest in the project, and an iNaturalist project was created to allow the public to contribute photos and information. Ship survey results included systematic and non-standard effort. Spinner dolphins were found around all islands, although poor weather hampered sampling. The habitats appear to be quite different from spinner habitats in other areas. Sighting rates were very low and, with one exception, the species observed were those that were expected to be in the area. The only exception was pilot whales, which are usually common in the southern area but were not encountered. Over 6600 photos were taken, and 51 biopsies from 6 species were obtained. One false killer whale was satellite tagged, and roamed widely during the 30 days of tag transmission; this contrasts with 8 previously tagged animals that remained closer to the islands. An acoustic recorder was placed off Pagan and will monitor for 2 years. A series of small-boat surveys were conducted during summer 2015 at Guam and CNMI, and Bryde's whales were encountered, photographed and biopsy sampled. Acoustic recordings have been mostly ongoing since 2010 at Saipan and Tinian, and propagation models have been developed for the detection of humpback whales and fin whales to estimate the detection range. Baleen whale detections are currently being analyzed and include humpback, blue, and fin whales, as well as an unidentified call that was probably a Bryde's whale, and rare detections of minke and sei whales. Another humpback survey effort will begin next week off Saipan.

Acoustic monitoring of the deep-set longline fishery has continued, with a total of about 20 recorder deployments to date, particularly with the Vietnamese sector of the fishery. All recorded whistles and clicks were run through a species classifier and scored by two experienced analysts, resulting in classification confidence scores. A manuscript is in preparation and shows that most detections are during the haul, especially at the beginning, and during the soak. During sets with false killer whale detection on multiple recorders, animals were initially detected at recorders closer to the vessel and subsequently at recorders further away, moving along the line with depredation on multiple hooks. Animals probably use acoustic cues to find and approach

the vessels. Bait depredation was documented by video, but most of the sets (18/21) with false killer whale detections had no observed depredation. Plans for a 2016 ship survey include a) testing new gear that could be used during the next survey of the EEZ around Hawaii, which is planned for 2017, and b) conducting research on beaked whales over Cross Seamount and false killer whales on the windward side of the islands. The 2017 ship time has been allocated, but funding is still lacking at this point.

Robin Baird provided an overview of research on spotted dolphin fishery interactions, which was primarily funded by PIFSC. Past research showed that spotted dolphins were often found with clusters of fishing vessels, and that there are four demographically independent stocks within the MHI (one pelagic stock and three insular stocks). Abundance estimates are not available for the insular stocks, but if density is similar to that of the pelagic stock, the Hawaii Island stock would number about 900 animals. NOAA's National Center for Coastal Ocean Science recently developed fine-scale models of cetacean density around the Main Hawaiian Islands, and their results suggest that the highest density of spotted dolphins is on the leeward side of Hawaii. Tagging has yielded movement data for one individual off the west side of Hawaii Island over an 11-day period. Spotted dolphins and tuna often associate with one another. There are about 3000 commercial marine license holders in Hawaii for non-longline fishing, including mostly trolling, rod and reel, and also bottomfish handline, tuna handline including ika-shiba and palu-ahi, and charter vessels. Survey protocols have evolved over time, and in recent years information on fishing vessels has been collected and efforts have been made to reduce bias (*e.g.*, by not intentionally heading towards clusters of fishing vessels). Collected information includes which vessels, how many, what type, the nature of interaction with dolphins, and factors influencing deliberate targeting of spotted dolphins. Vessels are also photographed and individually identified.

During 2002-2015, 404 spotted dolphin encounters were documented during 75,000 km of survey effort. Encounter durations were relatively short (median of 9 minutes). In the most recent years (2010-2015), when biases were reduced, 34% of spotted dolphin groups had fishing vessels with them. The vessel discovery curve shows that vessels are regularly re-sighted, but the rate of new vessel identification is not leveling off so the total population is larger than the number of sampled vessels. The frequency of association varies among the 141 vessels identified. A mark-recapture analysis yielded estimates of about 162 vessels during 2011-2012, and 336 for 2012-2013. In most cases heterogeneity in sighting probabilities and other biases will result in a downward bias, so this is probably an underestimate and the estimate is the number of vessels associated with spotted dolphins in the study area during the study period, not of the total number of vessels engaging in this fishing behavior throughout Hawaii. Fishing vessels are relatively 'long-lived,' and do not have frequent turnover. The number of fishing licenses has not shown a trend in that area, although there is some seasonal variability in fishing effort. Vessels that are associated with spotted dolphins are geographically more limited and closer to shore than other vessels, and more closely linked to intermediate water depths. North of Kona airport, 6.7% of dolphin groups were with vessels *vs.* 39% south of there (probably wind-related). Baird described the different ways that vessels operate relative to the dolphins. Fishing effort maps show that the area off Kona has the highest catches for pelagic fisheries, so fishing vessel/spotted dolphin co-occurrence is probably greatest there, although it has also been documented off Maui and Oahu. There does not appear to be a seasonal trend in fishing on spotted dolphins. Although no hookings have been observed during the ~40 hours Baird has spent with spotted dolphins that have fishing vessels with them, the probability of detecting a hooked dolphin would be very low unless the rate of hooking was high. Baird presented one

photograph of a hooked spotted dolphin to show that hookings do happen. Abundance estimates are likely in the hundreds or low thousands of animals, so it would not take many interactions to exceed PBR.

Hawaiian Monk Seal Research and SARs (PSRG-2016-04)

Jason Baker provided an overview of Hawaiian monk seals, including new methods used to obtain the first range-wide estimate of monk seal abundance. The correction factor for non-pup abundance now uses a distributions (with uncertainty), rather than a single point estimate. The proportion of time hauled out at Necker and Nihoa Islands was estimated using daily census counts relative to known population sizes at other Northwestern Hawaiian Islands. For the main Hawaiian Islands, a correction factor distribution was estimated from telemetry data. Simulations were performed to draw estimates of the parameters applied to counts for each island group, and a distribution of total resulting abundance estimates is provided. The preliminary estimates are 1,253 in 2013, 1,272 in 2014, and 1,321 in 2015, showing an increase for the first time. Caveats include a negative bias and poor effort in some years. An evaluation of the use of UAS to obtain photos and video revealed that monk seals did not react to their presence. Social media is being explored as a source of data for monk seal monitoring as well as providing information on public interactions with seals. An Instagram search yielded over 2,000 posts with monk seal images, including identifiable animals. Next steps include potential automation, expanding searches and social media platforms, and examining whether this information adds value to ongoing studies.

In aggregate, translocation efforts through 2014 increased survival of pups. In 2014, this was also true for the 7 seals moved from French Frigate Shoals to Laysan. However, 4 pups moved from Kure and Midway to Lisianski did not appear to fare as well as those left at the source populations. This underscores that recent site-specific survival rates do not always accurately indicate future survival rates. No translocations were conducted in 2015 because there was insufficient difference in survival among subpopulations to warrant translocation. The captive care and release facility has allowed the rehabilitation and release of pre-weaned pups (which previously nearly all died) and a few undersized juveniles. Most have survived, and there currently are 6 pups and a juvenile at the facility. Another recent research activity addresses diseases, with a publication on disease transmission and a new prophylactic vaccination plan for monk seals to achieve herd immunity levels against morbillivirus. The study also indicates that rapid quarantine is capable of containing outbreaks. Captive animals have been vaccinated and are being monitored, and vaccinations of wild seals have been initiated on Oahu. Lastly, toxoplasmosis has been linked to eight seal deaths since 2001. It is transmitted through cat feces, so large feral cat populations on the main Hawaiian Islands are a significant disease vector. Michele Barbieri is working on developing effective mitigation measures to deal with this.

The monk seal SAR has been revised to include the new information, and a PBR has been calculated in accordance with the guidelines, but with a caveat because the recent trend remains uncertain. There was a brief discussion on the validity of using R_{max} to calculate PBR for a declining population. Gillnet fishing seems to be less of a problem in recent years. The SRG noted that the issue of changing carrying capacity continues to be important. The SRG provided comments on the SAR. Baker noted the importance of the marine debris removal effort, but there is no evidence yet of reduced entanglement rates because debris is replenished regularly from the sea.

Sea Otters

Lilian Carswell (by phone) presented updates and a draft SAR for southern sea otters (*PSRG-2016-05*). Range-wide counts are increasing and the most recent 3-year average (3,054 otters) is approaching the delisting threshold of 3,090. Recent studies have examined trophic linkages in Elkhorn slough and with abalone, and modeled population dispersal and growth as a function of coastline topography. Observations of shark bites have increased in recent years. An outreach program (Sea Otter Savvy) was developed because of the large increase in disturbance, especially in Morro Bay and Monterey Bay.

The draft SAR includes updates but no major changes. The SRG wondered about the concept of a reduced growth rate as a function of its natural history and the environment, as this raises an interesting question whether this population could ever grow as fast as others. Carswell confirmed that the growth rate is tightly constrained by habitat, and this is why R_{\max} in the SAR is the maximum growth rate estimated for the mainland population (6%), not the higher rate observed at San Nicolas Island.

Deanna Lynch reported that there is no new SAR for Washington sea otters, but she provided an update. A few sea otters have been seen in Puget Sound and as far south as California. Aerial surveys and ground counts show the population growing to about 1,400 animals in 2015. The population has increased to a greater extent in the southern part of the range than in the northern portion. Stranding mortalities have been around 25-35 per year, but detection rates on the WA coast are quite low and heterogeneous. During 2015, however, strandings were up greatly. Carcasses were very decomposed so limited information could be obtained through examination. Identified sources of mortality include 33% protozoal encephalitis (*Sarcocystis neurona*-like organisms), 18% trauma, 13% cardiac disease, 11% bacterial septicemia, 4% drowning, two gunshot cases and 21% other. Sea otters do not appear to be as susceptible to harmful algal blooms as other species. The next SAR should include a revised N_{\min} and a potential change in R_{\max} based on the long-term trends. Lynch solicited SRG feedback on the Recovery Factor, given that the small population size, limited range, and the Washington State Endangered status (this population is not federally listed under ESA) have been used to justify a Recovery Factor of 0.1. After a discussion, the SRG deferred a decision until a draft SAR with recent data is prepared. The SRG suggested that a correction factor for the detection of human-caused mortalities be considered for the next SAR as well. Steve Jeffries noted that there is some unknown level of interchange with the British Columbia population, and Barlow cautioned that a federal ESA designation would require the designation of a DPS, which would require resolving the relationship between the British Columbia and Washington State populations.

West Coast Management Updates

Monica DeAngelis and Lynn Barre provided updates on a variety of West Coast management-related projects. The NASA-funded 'Whalewatch' project has just been completed, providing monthly model forecasts of blue whale distributions, and a paper describing the model (lead-authored by Elliott Hazen) has been submitted for publication. A program called WhaleCITE seeks to standardize citizen information and place it in a quality-controlled data repository. At the IWC meeting in June 2015 a workshop was held to address ensemble modeling for blue whales. The next steps are to look at SWFSC and other data, habitat-based models, and come up with a way to provide context for other blue whale information.

The Guadalupe fur seal status review received two comments and is consistent with the SAR. There was an Unusual Mortality Event for Guadalupe fur seals with 38 strandings documented in

2015. NOAA's Species in the Spotlight action plans were published for multiple species including the southern resident killer whale (SRKW). The action plans are a good resource for key actions and partners, and include actions such as enforcement of vessel regulations, prey recovery, protecting coastal habitats, improving knowledge of health, and education and outreach. SRKW habitat is being identified via satellite tags and sampling of the physical environment. NOAA and the Navy have successfully coordinated an effort to estimate abundance of harbor porpoises in inland waters.

Whale entanglements off the West Coast have been very high the last few years, with 62 reports during 2015; this is a minimum estimate because many entanglements are not observed. The Region has examined fishery distributions, developed a gear guide, identified hotspots of overlap, and done outreach with State managers and fishing industries. Humpback and gray whales are the most frequently entangled species. The most common confirmed fishery was the CA/OR Dungeness crab fishery (30 cases), but gillnets, spot prawns traps, and other fixed gear have also been involved. The float line on fishing gear is most likely to entangle whales. During 2014, a single fisherman set his gear repeatedly in the same area, resulting in the entanglement of four whales. Additional uncertainties include gear origin, entanglement outcome, and year-round information on the distribution of whales and fisheries. The Region is now coordinating with the States and with fishermen to look at voluntary and mandatory options for reducing entanglements. A working group was convened twice in 2015 by the State of California to review the problem, discuss possible solutions, and develop best practices. Some fishermen are being trained as disentanglement network participants. Next steps include outreach to improve entanglement response and reporting, improve understanding of and ability to predict co-occurrence, evaluate methods to minimize entanglements, and actively engage other stakeholders.

California sea lion OSP (Optimum Sustainable Population) analysis

Jeff Laake has been working on an OSP analysis and is seeking SRG feedback on the proposed methods for evaluating the status of California sea lions. Since the mid-70s there have been complete or partial counts of pups for most years (with missing data estimated), but there is no constant multiplier to convert sea lion pup counts to population size and status and the large El Niño fluctuations complicate things. In 2008, it looked like the population might be leveling off, but after that the population continued to increase. For these reasons, pup counts alone are not sufficient for evaluation of status. An alternate approach was to derive sex- and age-specific estimates of survival for California sea lions based on 1987-2015 data at San Miguel, and predict survival for the earlier years using a model. This would allow a reconstruction of total population size from the survival estimates and pup counts. Laake was initially going to compute the net change between years, and after smoothing used this to estimate R_{max} . Survival for females and males was modeled from branding data (hundreds of pups since 1987), with lower confidence as animals get older because fewer animals remain in the sample. Female survival is greater and stays high longer than for males, and younger animals have more variable survival, consistent with their sensitivity to El Niño, etc. Laake also noted that the population size of animals > 8 years old has reached a historic maximum (compared to other age classes), which lends further support to the idea that CA sea lions may be nearing carrying capacity.

Using the modeled data and pup counts, Laake proposed reconstructing the population from 1975 onward, propagating numbers of pups through their respective ages in the population using survival data. However, there were no non-pups in 1975 so he is filling in these numbers based on an assumed stable age distribution and allowing for the rate of increase of 4% for that period.

He will do some testing of this assumption during the analysis. The analysis examines trends for 1-3 year olds, 4-7 year olds, and ages 8+. The youngest group strongly responds to El Niños, the middle group response is more muted, and the oldest animals do not appear to respond (numerically) to El Niños and are currently at their peak population size. To look at year-over-year growth rates, one can either a) look at pairs of 2-year net changes in non-pups, or b) smooth the abundances and then examine the differences from the smoothed trend. The latter gives a result that does not fit the logistic model of population growth well, but it shows a decline in net growth, followed by an increase again in the late 2000s and a subsequent severe decline. The discrepancy could reflect real world stochasticity, particularly with the unusual ocean conditions in recent years. Possible alternatives are to fit a generalized logistic model to reconstruct population size with a carrying capacity K that varies as a function of environmental variables. Another alternative is to fit a model to net changes in population size as a function of environmental variables. Laake was interested in any other ideas, particularly because a varying K makes it unclear how to interpret results under the MMPA.

The SRG and other participants engaged in a substantial discussion about the different options, and suggested that the smoothing approach be used. The SRG noted that this is an important case study because it will increasingly be important to consider changing K as climate changes. It was suggested that K could be averaged over time, and Paul Wade agreed that this would be consistent with the way deterministic models have been done in the past. Jay Barlow added that there had been substantial gillnet mortality near the islands of around 5%, so this would have affected the survival estimates in the early years and they should be adjusted accordingly.

U.S. West Coast Cetacean Abundance Estimates (PSRG-2016-06)

Barlow reviewed recent abundance estimates that are based on a new 2014 survey and $g(0)$ estimates. An administrative report was just finalized, and a manuscript will soon be submitted for publication. Although the new $g(0)$ estimates largely increased the abundance estimates, the greater variances meant that N_{\min} did not show as great an increase as N . These increased estimates were also confounded by the greater abundance of warm-water species indicative of distributional shifts during 2014.

West Coast Serious Injury Determinations (PSRG-2016-07)

Sources and numbers of serious injury and mortality in 2014 were reviewed by Jim Carretta, including fisheries, marine debris, shootings, and entrainment in power-plant intakes. Shootings topped the list for pinnipeds. There were also a number of research-related accidental takes, mostly of Pacific white-sided dolphins. One severed humpback whale fluke was documented around San Clemente Island in May, attached to California Dungeness crab gear and floats that had been set two months earlier.

CA swordfish drift gillnet bycatch estimates (PSRG-2016-08)

The drift gillnet fishery has changed since the observer program started in the 1990s, including a southward shift because of leatherback turtle regulations, the TRT implementation in 1997, and a continued reduction in effort. As presented at the Joint SRG by Jeff Moore and Jim Carretta, bycatch estimation is moving away from annual estimates based only on single-year data, to model-based annual estimates that apply a modeled take rate to fishing effort data. The random forest approach used by Carretta sequentially splits the data set to maximize differences at each node, and by doing this with different random subsets (*e.g.*, 2/3) of the data, he can estimate uncertainty across multiple trees. Bycatch is estimated as the sum of annual observed takes and the modeled takes for unobserved sets. Carretta and Moore tested model performance and

validation using a simulated data set. Variable selection procedures applied to simulated rare event bycatch data indicated that identification of explanatory variables was robust to sample sizes as low as 5-6 events out of a simulated ~8,600 fishing sets.

In response to questions Carretta explained that the CVs are so variable because of the variability inherent in the fishery and that, while trees may be of different length, they are not weighted differently. Carretta provided the 1990-2014 estimates for sperm whales, beaked whales, CA sea lions and short-beaked dolphins, and indicated that the tree-based approach provides more robust 5-year average bycatch estimates than simple 5-year averages. Although CA sea lion bycatch per unit effort has gone up, total bycatch has gone down because fishing effort has declined. Carretta plans to publish these results as a Technical Memorandum, and is working on a peer-reviewed manuscript with Moore.

Washington Inland Waters harbor porpoise SAR (PSRG-2016-02)

New survey results and a draft SAR for Washington Inland Waters harbor porpoise were presented by Harriet Huber. The SAR includes three main updates, including the first new abundance estimate in 12 years, a change in distribution of harbor porpoise, and text indicating that mortality in 2005-2006 was not an unusual mortality event as initially suspected. The increase in porpoise strandings was linked to an increase in porpoise abundance in Puget Sound, not an increased stranding rate. Abundance is estimated to be about 11,000 porpoises, which is similar to the 2002-2003 estimate. PBR and mortality and serious injury are also similar. John Calambokidis commented on the seasonal patterns observed in the Andersen *et al.* seabird surveys (PSRG-2016-B01), and noted the Puget Sound increase appears to be a result of population recovery in the core area to the north, with animals expanding southward into Puget Sound. Tim Ragen noted that the concept of including a greater number of years to increase robustness should be encouraged. For WA harbor porpoise, there are old bycatch data from the 1990s, but the only recent data to estimate fishery mortality are stranding data that are likely underestimates. Jim Carretta noted that a correction factor estimated for Sarasota dolphins could be applied as a minimum correction factor for missed strandings in Puget Sound, given similarities in the physiographic environment. Following some discussion about the recovery correction factor, the SRG suggested adding some text that describes the correction factor for fishery-related strandings and the issue of underestimation. The SRG also requested some additional details and rationale in the PBR section of the SAR. The SRG suggested that a closer look be taken at the fishery mortality next year, given the history of this stock disappearing from Puget Sound and returning decades later.

Southern resident killer whale SAR (PSRG-2016-02)

On behalf of Brad Hanson, Lynn Barre provided an overview of SRKW SAR changes, including a new population size and recent observations of new calves. . One SRKW was observed hooked by a salmon lure, but the animal was able to lose the lure, and subsequent monitoring indicated there were no adverse health effects. Following a discussion about the population trend and calculation of PBR, the SRG noted that the age and sex structure of the population is very important to know, and suggested that a sentence be added in the status section to indicate that the age/sex structure is a potential concern. This added statement could cite the 2008 Recovery Plan, or possibly the 5-year status review (to be finalized during 2016) if a graphic showing the age and sex structure is added to the status review document.

Other US West Coast SARs (*PSRG-2016-01*)

The SRG provided minor comments on the other West Coast SARs, which Carretta and Forney will revise accordingly. The issue of distributional shift vs. actual changes in abundance is an important one, perhaps warranting some additional text to state that inter-annual changes in abundance could be a reflection of changing environment (ENSO, climate) or true population size changes. Making this more consistent across stocks would assist managers in interpreting the changes.

Topics, timing, and location of next meeting

The SRG agreed to target Feb 2017 for the next meeting, to be held in Hawaii.

Previous Research and Management Recommendations Pacific Scientific Review Group Meeting

The SRG recommends that the NMFS collaborate with the State of Hawaii to produce two reviews that can aid in future management:

- 1) Expand upon the information presented at the SRG meeting and the subsequent preliminary studies on the fisheries that operate in Hawaiian nearshore waters (such as the troll, handline, shortline, and other fisheries). In addition to the information that is currently collected from fishermen through self-reports, data should be collected on catch amounts, season, location, and types of gear used, including regional variations in gear used. The SRG supports the collaborative research proposed by the Hawaii Department of Land and Natural Resources, with its emphasis on scientific research and outreach to the fishing community and public.

A database has been obtained and a preliminary analysis completed. There are plans for additional analyses and a report.

- 2) Depredation of fish catches by cetaceans is recognized as a serious problem for both fishermen and cetaceans in Hawai'i. To better understand the dimensions and dynamics of this cetacean-fishery interaction, a review and problem analysis for each of the applicable fisheries could provide both a historical perspective and a current assessment of the problem.

A 3-year Section 6 grant proposal by the State has been obtained to do this work. NMFS has plans to continue investigations.

The SRG recommends that NMFS procure and maintain sufficient resources to continue to operate the NWHI monk seal field camps and maintain rescue, rehabilitation, and survivorship-enhancement programs throughout the Hawaiian Archipelago. A recent publication (Harting et al. 2014) shows that about a third of the Hawaiian monk seal population is alive only because of the survival-enhancement efforts of NMFS and its collaborators. The field camps in the NWHI not only allow monitoring status of these rookeries and research, but play a critical part in survivorship-enhancement efforts, from rescuing sick or malnourished pups, removing potentially entangling net debris from the islands, translocating pups to areas where survivorship probabilities are greater, and mitigating mortality from male seal aggression, Galapagos shark predation and entrapment.

The SRG recommends that NMFS develop a multi-year allocation of ship time for marine mammal surveys and increase the priority and funding for these surveys necessary to obtain the abundance estimates required to calculate PBR and thus enable fisheries to meet the standards required by the MMPA. A West Coast Survey was completed that provided new abundance estimates but a national survey plan is needed to allocate enough shiptime to obtain new abundance estimates for marine mammal populations.

A Hawaii survey is planned, but operational funds are lacking. A shiptime rotation schedule has not yet been accepted or funded nationally, although discussions continue. Monk seal shiptime also became available.

There is currently marine mammal bycatch during trawls by NOAA research vessels, but samples and carcasses cannot be collected because there is no NOAA permit issued to do so. The SRG recommends that NMFS rapidly cut through the bureaucratic obstacles that hinder the collection of biological samples from the marine mammals incidentally killed during NOAA research activities.

The SWFSC received a permit in 2015; other Centers will follow.

The SRG recommends continued funding for studies of movements and genetics of false killer whales and other cetaceans around Hawaii and in the Central Pacific to better understand stock structure. Much has been learned from these studies, but more information is required; for example, movement data from all the social clusters of false killer whales around the Hawaiian Islands are needed to understand stock structure, ecology, distribution, and fishery interactions.

Studies are ongoing, and Hawaii State will engage in these studies using Section 6 funds.

The SRG recommends that full funding be reinstated for nationwide mammal stranding networks administered by NOAA (the John H. Prescott Marine Mammal Rescue Assistance Grant Program). Nationwide, marine mammal stranding response networks are run primarily through non-profits and other non-government entities and coordinated through NOAA's National Marine Fisheries Service. These networks perform an array of important functions as they respond to an average of more than 5,000 marine mammal strandings each year. Indeed, the fundamental work of the nation's stranding networks plays a vital role in enabling NMFS to meet its Congressional mandate by supporting the "*stewardship of living marine resources through science-based conservation and management and the promotion of healthy ecosystems*". Stranding network investigations are necessary for a timely and accurate understanding of ocean health and to document mortality of marine mammals, which is a vital component of the Stock Assessment Reports. Without sufficient federal support, much of this vital work will cease.

Partial funding was restored to the program.

Research and Management Recommendations
Pacific Scientific Review Group Meeting, 25-26 February 2016

There has been no update to the Washington sea otter SAR since 2008. The SRG recommends that the USFWS fulfill its MMPA responsibility by updating the SAR for the 2017 meeting of the Pacific SRG.

The SRG recommends that the NMFS continue funding for studies of movements and genetics of false killer whales and other cetaceans around Hawaii and U.S. waters in the Central Pacific to better understand stock structure, ecology, distribution, and fishery interactions.

The SRG recommends that the NMFS collaborate with the State of Hawaii to conduct two reviews that can aid in future management:

- 1) Expand upon the information presented at previous SRG meetings and the subsequent preliminary studies on the fisheries that operate in Hawaiian nearshore waters (such as the troll, handline, shortline, and other fisheries). In addition to the information that is currently collected from fishermen through self-reports, data should be collected on catch and bycatch amounts, season, location, and types of gear used, including regional gear variations. The SRG supports the collaborative NMFS-funded research planned by the Hawaii Department of Land and Natural Resources, with its emphasis on scientific research and outreach to the fishing community and public.
- 2) Depredation of bait and fish catches by cetaceans is recognized as a serious problem for both fishermen and cetaceans in Hawaii. To better understand the dimensions and dynamics of this cetacean-fishery interaction, a review and problem analysis for each of the applicable fisheries could provide both a historical perspective and a current assessment of the problem.

These reviews would be particularly valuable given the endangered status of the Hawaii insular stock of false killer whales and our current inability to identify causes for its decline.

A recent publication (Harting et al. 2014) shows that about one-third of the current Hawaiian monk seal population is alive only because of the survival-enhancement efforts of NMFS and its collaborators. Those efforts include rescuing sick or malnourished pups, translocating pups to areas where survivorship probabilities are greater, and mitigating mortality from male seal aggression, Galapagos shark predation, and entrapment. Not included in this total were the additional seals would have become entangled in debris were it not for net-debris removal efforts. To continue these vital conservation and recovery efforts, the SRG recommends that the NMFS:

- 1) Maintain sufficient resources to continue to operate the NWHI monk seal field camps and maintain rescue, rehabilitation, and survivorship-enhancement programs throughout the Hawaiian Archipelago. The field camps in the NWHI not only allow monitoring status of these subpopulations and research, but have been shown to play a critical part in survivorship-enhancement efforts
- 2) Continue the current NMFS net-debris removal program near monk seal haulout areas where entanglement occurs.

The SRG has recommended that NMFS develop a multi-year allocation of ship time for marine mammal surveys and increase the priority and funding for these surveys, which are necessary to obtain the abundance estimates used to calculate PBR and thereby enable fisheries to meet the required MMPA standards. A multi-year survey plan for all U.S. waters was developed but has not been implemented. In the Pacific, a West Coast survey was completed that provided new abundance estimates and a Hawaii survey is planned for 2017. The lack of operational funds threatens to delay the Hawaii survey. The SRG again recommends development and implementation of a national survey plan to allocate both ship time and operational funding to obtain new abundance estimates for marine mammal populations in a timely and systematic manner.

The False Killer Whale Take Reduction Plan instituted for the Hawaii-based deep-set longline fishery included operational changes to such things as branchline strength, hook shapes and strengths, and set procedures. The effectiveness of these changes has bearing on the comparison of mortality and PBR and, at its 2017 meeting, the SRG plans to review the effectiveness of these changes in reducing the mortality and serious injury of false killer whales. To facilitate that review, the SRG recommends that the NMFS provide, along with current mortality and effort data, an analysis on the effectiveness of the Take Reduction Plan measures, particularly with regard to 1) the interaction between the branchline strength and weak hook effectiveness, and 2) potential differences in fishing practices and location for trips with and without observers.

The Pacific Islands Regional Office's Observer Program has served the Region well by providing a long-term dataset for bycatch and effort estimation for observed fisheries. However, recent staffing shortages have limited the Program's ability to process those data, which compromises the timeliness and quality of analyses, jeopardizes bycatch estimation for 2015 and beyond, and undermines efforts to monitor the effectiveness of the False Killer Whale Take Reduction Plan. The SRG recommends that the Region quickly clear up this backlog of unprocessed data.

Appendix 1

Attendees - Pacific SRG Meeting, 25-26 February 2016 (Seattle, WA)

(*Indicates participation by phone/webinar)

Scientific Review Group - Pacific Region:

Hannah Bernard	Hawai'i Wildlife Fund
Robin Brown	Oregon Department of Fish and Wildlife
John Calambokidis	Cascadia Research
Doyle Hanan	Hanan and Associates
Jim Harvey	Moss Landing Marine Laboratories
Steve Jeffries	Washington Department of Fish and Wildlife
Tim Ragen	Marine Mammal Commission (retired)
Katherine Ralls*	Smithsonian Institution
Michael Scott	Inter-American Tropical Tuna Commission
Terry Wright	Northwest Indian Fisheries Commission

Invited Participants and Observers:

U.S. Fish and Wildlife Service

Deanna Lynch
Lilian Carswell*

NMFS Office of Science and Technology
Mridula Srinivasan

NMFS Southwest Fisheries Science Center

Jay Barlow
Jim Carretta
Karin Forney
Karen Martien
Jeff Moore

NMFS Office of Protected Resources
Shannon Bettridge
Kristy Long
Richard Merrick
Lisa White
Nancy Young

NMFS Alaska Fisheries Science Center, NMML

Harriet Huber
Jeff Laake
Sharon Melin
Marcia Muto
Paul Wade
James Powell

Marine Mammal Commission
Dennis Heinemann
Dee Allen

Makah tribe
Jonathon Scordino*

NMFS West Coast Regional Office

Lynne Barre
Monica DeAngelis
Tina Fahy*
Theresa Mangillo
Elizabeth Petras*
Kristin Wilkinson

Western Pacific Fisheries Management Council
Asuka Ishizaki*

Hawaii Longline Association
Svein Fougner*
Ryan Steen*

Cascadia Research
Robin Baird
David Anderson*

NMFS Pacific Islands Fisheries Science Center

Jason Baker
Amanda Bradford
Erin Oleson

Smultea Environmental Services
Sarah Courbis*

NMFS Pacific Islands Region

Ann Garrett
Susan Pultz

Other
Paula Moreno* (IAT)
John Brandon* (IAT)
Phil Fernandez* (Hawaii fisherman)

Appendix 2

Document List			
Pacific SRG Meeting 25-26 February 2016 (Seattle, WA)			
Last revised: 02/23/2016			
Document No.	Title/Topic	Contributor(s)	Distribution Date
Documents for Pacific SRG review			
PSRG-2016-01	U.S. West Coast SARs	Carretta/Forney	2/1/2016
PSRG-2016-02	WA Inland Waters Harbor Porpoise and Southern Resident Killer Whale SARs	Huber/Hanson	2/1/2016
PSRG-2016-03	Pacific Islands False Killer Whale SAR	Oleson/Bradford	2/1/2016
PSRG-2016-04	Hawaiian Monk Seal SAR	Baker	2/1/2016
PSRG-2016-05	Southern Sea Otter SAR	Carswell	2/1/2016
PSRG-2016-06	Cetacean Abundance in the California Current Estimated from Ship-based Line-transect Surveys in 1991-2014	Barlow	2/1/2016
PSRG-2016-07	U.S. west coast serious injury determinations	Carretta	2/1/2016
PSRG-2016-08	CA swordfish drift gillnet bycatch estimates	Carretta	2/1/2016
PSRG-2016-09	Harbor porpoise (<i>Phocoena phocoena</i>) recovery in the inland waters of Washington: Estimates of density and abundance from aerial surveys, 2013-2015	Jefferson	2/1/2016
PSRG-2016-10	PIRO Management updates	Garrett	2/23/2016
Background Papers - FYI only		Submitted by	
PSRG-2016-B01	Disappearance and return of harbor porpoise to Puget Sound: 20 year pattern revealed from winter aerial surveys	Calambokidis	2/18/2016
PSRG-2016-B02	Key Outcomes Memo of the False Killer Whale Take Reduction Team Meeting #7, April 29-May 1, 2015; available at: http://www.nmfs.noaa.gov/pr/interactions/trt/falsekillerwhale.htm	Garrett	2/23/2016
(Draft documents -- provided to SRG members only)			

Appendix 3

**Pacific Scientific Review Group Meeting
25-26 Feb 2016, NOAA Western Regional Center,
7600 Sand Point Way NE, Seattle, WA 98115**

Final Agenda

THURSDAY, 25 FEBRUARY 2016

Welcome & Introductions - *M. Scott, Pacific SRG Chair*

Pacific Islands Fishery/Management Updates (*PSRG-2016-10, PSRG-2016-B02*)

- Pacific Islands Management and Observer Program – *Garrett*
- False Killer Whale TRT Updates – *Garrett*

Pacific Islands Research and SARs

- False killer whale bycatch estimates and SAR – *Oleson (PSRG-2016-03)*
- Other Pacific Islands cetacean research – *Oleson*
- Spotted dolphin fishery interactions – *Baird*

Hawaiian Monk Seal Research and SARs (*PSRG-2016-04*)

Sea Otters

- Southern sea otter updates and SAR (*PSRG-2016-05*) – *Carswell*
- Washington sea otter update – *Lynch*

West Coast Management Updates

- Regional Office Management Updates – *Barre/DeAngelis*

CA/OR/WA Research

- 2014 Cetacean Abundance Estimates (*PSRG-2016-06*) – *Barlow*
- US West Coast Serious Injury Determinations – *Carretta (PSRG-2016-07)*
- CA swordfish drift gillnet bycatch estimates – *Carretta (PSRG-2016-08)*
- California sea lion OSP analysis – *Laake/Melin*

Review recommendations

Adjourn

FRIDAY, 26 FEBRUARY 2016

CA/OR/WA SARs

- Washington Inland Waters harbor porpoise SAR *Huber (PSRG-2016-02)*
- Southern resident killer whale SAR – *Hanson/Barre (PSRG-2016-02)*
- Other US West Coast SARs – *Carretta/Forney (PSRG-2016-01)*

Review Recommendations

Topics, timing, and location of next meeting

Adjourn meeting