

**Minutes for the Pacific Scientific Review Group Meeting
NOAA Pier 38 and Inouye Regional Center, Honolulu
13-15 Feb 2017**

The 27th meeting of the Pacific Scientific Review Group (SRG) was held at the NOAA Pier 38 facility and the Inouye Regional Center, Honolulu from 13-15 Feb 2017. All SRG members except Scott Baker and Robin Brown attended the meeting. 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.

General Topics

The Pacific SRG Chair, Michael Scott, welcomed attendees and new SRG members. Shannon Bettridge reviewed staffing changes within NMFS, and updated the SRG on the implementation of new Guidelines for Assessing Marine Mammal Stocks (GAMMS) for this year's draft SARs. All the Workshop recommendations were adopted except for those related to calculating PBR with outdated abundance estimates and strategic stock designation. These recommendations will be considered in the future. Bettridge also provided details of new vetting requirements for government advisory committees, including SRG members, and let the SRG know that a 'new member information packet' has been put together.

List of Fisheries

Kristy Long informed the SRG that there was only one classification change in the List of Fisheries. The California spiny lobster fishery changed from Category III to II because a bottlenose dolphin interaction changed to a serious injury under the new serious injury policy. This will be finalized in March 2017.

Protected Species Assessment Workshop

Erin Oleson provided an overview of the Protected Species Assessment Workshop that was held in Seattle in January. The goal was to have a focused national conversation on technical issues surrounding stock assessment needs, particularly the use of novel methods to assess abundance and trends and how to deal with data-poor species for abundance and bycatch. Topics presented at the workshop included: the use of habitat relationships to assess density and abundance, other habitat modeling approaches, novel data combinations for population trends, Population Viability Analysis, the use of environmental DNA (eDNA); novel methods to deal with poor data quality in protected species bycatch estimation including methods for rare events; cryptic mortality and serious injury; consideration of spatio-temporal factors, and electronic monitoring. The workshop generated a lot of interest, and it was very helpful to meet and have discussions across Centers and Regions. A workshop report will be prepared and published as a Technical Memorandum. The SRG requested that a link be sent out to the SRG when the report is finalized. Steve Jeffries noted that Washington State would like to participate in such events, as they could affect how the State manages marine mammals.

Using Management Strategy Evaluation for Marine Mammal Conservation

André Punt gave an update on this Science Center for Marine Fisheries (SCeMFis) project to examine how processes and procedures of the MMPA interact with fisheries and marine mammal conservation using a Management Strategy Evaluation (MSE) framework. The new framework builds on that of Wade (1998). Progress so far includes an individual-based model, replicating Wade's production model, and working with Wade to ensure assumptions are clear and consistent. The analyses looked at multiple fishing fleets with different levels of takes, and preliminary results indicate that the Potential Biological Removal (PBR) process works correctly if stocks are infinitely large, but demographic considerations become increasingly important as population size decreases. The probability of classifying fisheries correctly is high, but decreases as the stock tends towards the maximum net productivity level (MNPL). Next steps include the addition of environmental variability and catastrophic events, identifying a range of output statistics, further testing of the code, and the development of a set of simulation experiments and a user-interface. He specifically requested input from the SRG on a variety of questions, *e.g.*, the delays between data collection and use, any species of interest for parameterization of the model, other sources of uncertainty that should be captured, and sampling bias and error.

Responding to the request for additional details, the SRG noted that SARs are revised annually for strategic stocks and every 3 years for non-strategic stocks, and there is a 2-3-year delay from data to SAR. Steve Jeffries noted that cost of monitoring fisheries is also important to consider, because current funding is barely sufficient to monitor Category I fisheries. There is also a trade-off between spending money on abundance surveys *vs.* fishery monitoring. Punt noted that the International Whaling Commission reduces catch and strike limits to account for additional risk if surveys are not conducted on the target schedule. David Itano noted that splitting populations into smaller units also impacts management outcomes. Karin Forney added that the simulations assumed stocks are defined correctly; if not, this can have a large impact on management outcome. Terry Wright noted that interactions include not only effects of fisheries on marine mammals, but also the effect of abundant marine mammals on fisheries. Environmental conditions, food webs, and carrying capacities are changing faster than we can collect and analyze data. While fishery impacts can be monitored, other environmental impacts are difficult to deal with and can also affect the fishery. Punt said that habitat degradation – although it cannot be measured - is considered, *e.g.* for salmon quotas.

Southern Sea Otters

Lilian Carswell (by phone) provided Southern sea otter updates. The abundance still is increasing and the 3-yr average of 3,272 has exceeded the delisting threshold for the first time. If it exceeds this threshold for 3 consecutive years, delisting can be considered. The geographic range has stayed consistent over the last several years between Pigeon Point (San Mateo County) and Gaviota (Santa Barbara County), plus San Nicolas Island (SNI). The center of the range has the highest densities and the population there is thought to be at or near carrying capacity. In the northern and southern areas, densities are lower with high shark bite mortality. Otter numbers in the center of the range have increased for the last 2 years, apparently because of increased juvenile and subadult survival as sea urchins have become more available. Sea otter numbers at SNI have been increasing at an

average of 13% annually. The Navy has received exemptions for Southern sea otters in ‘military readiness areas,’ with monitoring and reporting requirements. The FWS is working with the Navy to implement the plan during 2017. Katherine Ralls asked for clarification of the monitoring plan, and Carswell clarified that it involves habitat and foraging surveys. If the Navy changes activities, there will be more directed monitoring. The plan also increases opportunities to collaborate on projects (*e.g.*, the use of drones to estimate correction factors for sea otter censusing). Two law suits are currently working their way through the courts, regarding FWS’s termination of the SNI translocation. The sea otter stock assessment report is currently out for public comment until March 6th; because of solicitor review, there were two changes: R_{max} was changed to reflect a higher rate at SNI than on the mainland, and information was added about a sea otter mortality in a lobster trap. The final SAR will be updated to include the 2016 census results.

Terry Wright inquired about kelp monitoring at SNI. Carswell indicated this is being looked at and there was a die-off. Ralls inquired whether the effective population size would be re-visited, since it has not increased despite population increase. Carswell agreed this was an important point to consider. Steve Jeffries asked about the home ranges: in WA there are females that undergo longer-distance migrations along the entire WA range and he wondered whether that was a subspecies difference. Ralls suggested it might depend on population density, with home ranges larger when population is smaller. Jeffries responded that the movement data came from a period when the population was only about 1,200. Tim Ragen wondered about the rationale for combining SNI and mainland population and asked for a reminder as to what ESA said about transplanted populations. Carswell responded that terminating the SNI translocation removed the experimental designation for that population, so it made sense to combine them, as movement is possible, and genetically they are not distinct. But they have calculated separate N_{min} and PBR values to consider them as separate management units (as was done for gray whale Pacific Coast Feeding Group). Doyle Hanan wondered whether there was any evidence of mortality at San Clemente Island; Carswell replied that there aren’t any regular otters there (only an occasional male), but there is no reliable way to get information on mortality there.

Washington Sea Otters

Deanna Lynch (by phone) provided Washington sea otter updates and reviewed the current draft SAR. Lynch reminded the PSRG that WA sea otters are a translocated stock. Although there is some evidence of genetic exchange with British Columbia, they are considered separate for now. The minimum population estimate is 1,806 otters, and the population is growing at about 9% per year. The rate of growth is greater in the south (22% *vs.* 6% north of La Push), where almost 80% of the population is found, with an overall annual rate of 9.4%. Maximum net productivity rates for the full range through 1989 is 20%, and this is what the SAR uses. Genetics studies show little immigration and the increase appears to be population growth. The recovery factor for Washington sea otters is 0.1 following Taylor *et al* (2003; population size between 1,500 and 7,500 with increasing trend and considered vulnerable due to restricted range and susceptibility to single catastrophe), with a PBR of 18. Although not ESA-listed (because it is an introduced population), it is listed by Washington State. Jon Scordino (by phone) noted that the population was near the carrying capacity estimate of 1,830 (study by Laidre *et al.*). Jeffries clarified that Laidre considered

the southern area to be marginal habitat, but razor clams appear to be a good food source that was not previously considered in the carrying capacity estimate.

Lynch reported that the only fishery with documented takes is the Makah set gillnet fishery, which has not had observer coverage during the last 5 years, but the mandated self-reports indicate two sea otters were taken in 2011. There is also a crab fishery with potential to trap small otters. A few human-related strandings have been documented (with incomplete stranding coverage), and no total estimate of mortality and serious injury (M&SI) is available, but the documented 5-yr M&SI is ≥ 1.0 . The status relative to OSP is unknown and it is unknown whether takes are approaching ZMRG. Terry Wright disagreed and suggested that the absence documented fishery takes indicates the ZMRG goal has been met. However, the Dungeness crab fishery cannot be monitored for rare events, although Steve Jeffries noted that humpback whale entanglements are also a problem in the crab fishery, and there might be some information on sea otters. Lynch was supportive of this suggestion. Katherine Ralls noted that there two more recent papers relevant for the ‘range and seasonality of breeding.’ Steve Jeffries requested some edits to the SAR’s fishery section to clarify that the gillnet fisheries are only tribal fisheries and not open-ocean fisheries, and that the only pot fishery within the sea otter’s range is the Dungeness crab fishery, because the black cod fishery operates in deeper waters. Tim Ragen was concerned about the inability to obtain reliable information regarding M&SI. Lynch responded there have been attempts to obtain better fishery information, but this is currently not possible. Jeffries asked Carswell about modifications to crab pots to reduce likelihood of trapping otters, and Carswell clarified that there was now a 5” ring for nearshore live fish traps, but not for the crab fishery.

The SRG discussed the available information relative to ZMRG (which would be 1.8/yr). Calambokidis and Ragen commented that the rate of population growth would indicate that unobserved mortality is not a serious problem. Wright argued that since the known mortality is clearly less than PBR and also less than 10% of PBR, that the SAR could indicate that it is insignificant and that the zero mortality rate goal has been achieved. Ragen argued against using known mortality as a standard for management because observer coverage is limited or absent for nearshore fisheries in Washington and similar fisheries in other areas are known to take small numbers of otters. While it is clear that any potential take in those nearshore fisheries is not precluding recovery, the SRG could not come to a consensus about a SAR statement regarding known mortality, potential mortality, and the zero mortality rate goal.

Hawaiian Monk Seal Research and SAR

Jason Baker reported that a new paper on range-wide abundance estimation has been published (*PSRG-2017-B01*). This approach applies a variety of methods depending on the site and aspects of the data available, including correction factor methods for Niihau/Lehua in the MHI and Necker and Nihoa in the NWHI. The MHI abundance, other than Niihau and Lehua is the tally of all individuals identified during a calendar year. This minimum abundance value is likely not highly negatively biased because most seals from Kauai to Hawaii Island are probably identified. Three methods are used in the NWHI from French Frigate Shoals to Kure Atoll: total enumeration, capture-recapture, or analysis of discovery curves relating the proportion of the non-pup population

identified to the amount of field effort expended. Andre Punt wondered whether there are any covariates that might explain the sampling variability; Baker responded that such covariates likely exist but they have not been identified and in many cases data on such covariates would not be available. The 2016 population estimate is greater than for 2013-2015 and will be included in next years' SAR. Populations at most islands are stable or increasing, and 97% of simulations show a median growth rate of 3%. However, in the context of the long-term decline since the 1950s, the population is still low.

A second paper was published on Nihoa translocations (in collaboration with The Marine Mammal Center), showing that rehabilitated weanlings did well once released. A vaccination program against morbillivirus has been initiated, based on a recent paper indicating that prophylactic vaccination or quarantine are more effective than responding to outbreaks. The initial goal is to achieve herd immunity within the MHI. Toxoplasmosis (from cats) is also an increasing concern, with at least 8 known monk seal fatalities since 2001. Michelle Barbieri also just published a paper on protozoal case definition. Genetic studies show there is no evidence of genetic structure in the monk seal population. Studies to improve estimates of reproductive rate and to fully sequence the genome are also underway. The SRG discussed the significance of interventions (rehabilitation, translocation, disentanglement, de-hooking, etc.) to improve survival of individual monk seals (up to 30% of population is composed of individuals that have benefited from these interventions, and their descendants). Hannah Bernard inquired about Ka'ula Rock and possible military training operations, and Baker indicated that counts are rarely obtained from this island, but this area does not appear to be used for pupping. There was some discussion about the PBR section of the SAR (*PSRG-2017-03*), which now includes a PBR calculation because the population is no longer decreasing. The SRG suggested some edits to include caveats because the population is still endangered.

False Killer Whale Take Reduction Team (TRT) Updates

Kevin Brindock was hired in late November to replace Nancy Young as TRT Coordinator. There were no TRT meetings during 2016, and NMFS is currently considering a 2017 meeting or webinar. During 2016 there were 7 false killer whale interactions in the Deep Set Longline (DSL) fishery; 5 were serious injuries, 1 was non-serious and 1 could not be determined. One serious injury in October was inside the HI EEZ and counted towards the Southern Exclusion Zone (SEZ) closure trigger of two animals, but no further takes were documented resulting in no closure of the SEZ. Summary of interactions following implementation of the False Killer Whale Take Reduction Plan (FKWTRP) in 2013 show hooking locations were predominantly on the head or in the mouth, resulting in serious injuries; the non-serious interactions occurred when the animal was hooked but all gear came off prior to release. The durations of observed interactions (first observation of animal to end of interaction) are mostly 1-5 minutes. New outcomes include one case where the animal freed itself without the hook straightening, and one case where a crew member separated the branchline from the mainline and then lost control of the line, releasing the animal with the trailing gear attached. Since implementation of the FKWTRP in 2013, the hook did not straighten in 86% of cases but there was one case where the hook broke. The line broke in 36% of cases, and the animal was released without gear in 25% of cases.

Jamie Marchetti added that most hooks from interactions are not collected as this is voluntary. The interaction data are currently being reviewed and evaluated to provide information to the TRT for their next meeting. Terry Wright asked about the trade-off between lengthening interaction duration to try to remove hook but causing additional stress to animal. Brindock said that the interactions seem to be relatively short, except for two interactions that exceeded 10 minutes. Hannah Bernard added that there were a number of items discussed at the last TRT meeting to explore additional research questions. Unfortunately, the recommendations were not finalized because some members were not empowered to speak for their constituents. This caused frustration that two years have gone by without addressing the identified questions. To increase TRT effectiveness, Bernard recommends that people are able to speak for their constituent base when they are at the table. Kristy Long acknowledged this issue and indicated that NMFS will review the established operating protocols relating to this with the TRT. Tim Ragen noted that the hooks are not working as intended; Bernard added that there are other components of gear that should be stronger but are breaking.

The SRG reviewed its last year's recommendations, which requested an analysis of the TRP measures, especially on the interaction of branchline strength and weak hooks. Given the TRT has been in a monitoring status throughout the last year, this has not happened, but hopefully there will be some additional information next year. Karin Forney reminded the SRG that a 2015 analysis showed it would take at least 4-5 years of data to be able to determine whether the TRP is effective. Erin Oleson confirmed that there should be some updates for next years' meeting, following updated analyses and the 2017 TRT processes that are currently being planned. It was recommended that the issue of branchline aging, weakening, and breakage be examined. Katherine Ralls inquired whether the fishermen keep track of line maintenance and have a sense of how long the line maintains strength. David Itano noted that there have been discussions with the Council's Science and Statistical Committee to test different hooks and line types, because measures based on line and wire diameter are not sufficient, and there are more hooks on the market now. NMFS needs a way to measure actual strength. Chris Boggs wondered whether it was possible to sample the gear, but Bernard confirmed that the fleet would not provide samples of their hooks to the TRT. Long explained that the TRP was based on hook trials, and some additional testing might be useful, but this was an issue for the TRT rather than SRG. The SRG suggested that fishermen be given replacement line if a sample line was needed, as has been done in the past.

Pacific Islands Observer Program Updates

Jamie Marchetti reported that PIRO was able to hire four additional staff and is now caught up with the observer data entry, which was backlogged last year. They also completed data stream-lining with PIFSC to eliminate old data and duplication. PIRO is currently developing tablet-based data collection to transmit observer reports at sea. During 2015 and 2016 the DSLL was monitored with just over 20% observer coverage, with 20 interactions, including 7 false killer whales and a few other species. In the SSLL (100% coverage), there were 5 interactions, including Risso's dolphin, bottlenose dolphin, and a Guadalupe fur seal during 2016, and a striped dolphin during 2017. Itano wondered about the image quality of electronic monitoring of the fishery. Marchetti clarified that

the new electronic process is for data transmission, and there is a separate initiative to look into electronic monitoring of hauls. The SRG commended PIRO for clearing up the data backlog.

False Killer Whale Abundance Estimates and SAR

Erin Oleson presented an overview of a recent abundance analysis conducted by Amanda Bradford (PSRG-2017-06) to estimate MHI false killer whale abundance. Several mark-recapture models were explored to estimate the abundance of animals within the study area, and a sensitivity analysis was conducted. The analysis included an evaluation of the proportion of distinctive animals. Individual year estimates are consistent, although they are underestimates and cannot be used to evaluate trends because the sampled areas varied. There was a discussion of models and capture heterogeneity. John Calambokidis wondered whether an analysis looking primarily at the trend, rather than absolute abundance estimate, would make different choices and perhaps provide a more robust analysis of trends. Andre Punt noted that individual covariates have potential to resolve some of the heterogeneity. Robin Baird provided some additional information on area and depth ranges used by false killer whale clusters.

The new false killer whale SAR (PSRG-2017-02) includes the new MHI estimate. The bycatch estimation analysis is the same previously presented by Marti McCracken, except that the proportion of serious/non-serious interactions post-TRP uses only data from 2013 and later. In the SAR, average take is presented as both the 5-year average and the post-TRP average. All three stocks are now below PBR, and only the MHI stock is strategic because of its ESA listing. Looking ahead to 2018, the Papahānaumokuākea Marine National Monument was expanded and is now closed to fishing so this encompasses almost the entire stock range of the NWHI stock. The expansion reduces spatial overlap with the Pelagic stock but does not affect the MHI stock. Fishing effort could intensify elsewhere, but it is unknown whether that would be mostly inside or outside the EEZ. The Barlow (2015) $g(0)$ correction factor could not be used because there was not a sufficient sample size, but an alternate $g(0)$ consistent with acoustic detection-derived estimate is being used. Tim Ragen requested some wording changes in the false killer whale SAR and expressed support for Bradford's analysis and the interaction work, as well as Calambokidis' suggestion to consider trends.

False Killer Whale Injury and Fishery Interaction Rates

Robin Baird presented information and a draft manuscript (PSRG-2017-16) on lethal and non-lethal interactions between false killer whales and fisheries. Historical records going back to 1960s and 1970s indicated depredation by false killer whales near the MHI. Baird analyzed his telemetry data by HI State statistical fishery areas. Baird combined the data sets to look at combined probability of catching fish and likelihood of depredation. Baird also reviewed the evidence of injuries from fishery interactions, including the 2016 documentation of a Cluster-1 animal with a new leading-edge dorsal fin cut halfway through the fin, which has not yet resolved. This animal is seen regularly so there will hopefully be opportunity for follow-up. There were two additional line injuries for animals from an unknown population, with no social links to other animals. An updated analysis by social cluster indicates that Cluster 3 has a slightly higher rate than the other two. There is a substantial and statistically significant sex bias, with 11 out of 12 known-sex animals

being female. A student is examining photos for mouth-line injuries consistent with being hooked and tearing free. Of 75 individuals with photos of $\geq 50\%$ of the mouth-line visible, 23% have injuries consistent with fisheries interactions. This is probably an underestimate because not all of the mouth-line was visible for most of the 75 individuals. All four individuals with dorsal fin injuries also had mouth-line injuries. Two of four stranded false killer whales had hooks from a variety of fisheries in stomach, providing multiple lines of evidence that MHI false killer whales are interacting with fisheries.

Terry Wright wondered whether information could be obtained from fishermen. Baird suggested that there are social scientists who could include this in other questionnaires, but cautioned about high species-misidentification rate. Species identification pages, distributed with the help of David Itano and Phil Fernandez, have been circulated but misidentification is a problem. Jim Carretta inquired whether the Cluster with the lowest mark-recapture estimate of survivorship had the highest injury rate. Baird responded that Cluster 2 has an intermediate injury rate. Itano noted that the false killer whale recovery planning workshop participants had suggested trying to see what type of line and gear could cause the types of observed injuries, to resolve whether inshore fisheries are involved. Tim Ragen suggested that any populations that do not interact with fisheries could be examined to see if they have similar injuries.

Other Pacific Islands Cetacean Research

Erin Oleson provided an overview of other Pacific Islands research projects. During 2016, PIFSC did a systematic survey of the windward MHI aboard the NOAA ship *Sette*, focusing on telemetry, photo ID, and biopsy sampling. The project also included 19 hexacopter test flights, which demonstrated some difficulties associated with vessel pitch and a changing frame of reference for the pilot while underway. The images obtained from the hexacopter were evaluated for weather effects and the potential to track groups and calibrate group size estimates. Results indicate that calibration of group size is not feasible, and flights are restricted to morning/afternoon when winds are lighter (<15kts) because glare and sea state significantly limited image quality. Wind also makes it difficult to stay with groups. The hexacopter's range of about 400m is no greater than the distance where vessel-based visual observations are effective. During calm sea conditions, health assessment and estimation of the proportion of calves seemed possible. Other efforts included application of 10 satellite tags, 49 biopsy samples, and visual survey that resulted in 3 killer whale sightings. An effort to try to identify the beaked whale at Cross Seamount was hampered by nocturnal-only vocalizations of beaked whales. They are now looking at whether eDNA collected in area of vocalizations could allow genetic identification.

A second survey focused on humpback whales is currently underway in the Marianas surveys. This is part of a 3-year old project to determine timing, distribution and identity of whales in the archipelago using surveys, photo-ID, genetic analysis and year-round acoustic monitoring. Robert Brownell has been instrumental in connecting NMFS with collaborators. The project identified 9 cow/calf pairs during 2015-2016, and has obtained body and fluke photos. So far one photo and one genetic match have been identified between Marianas and Ogasawara (SPLASH 2004). Several PIFSC acoustic analyses are ongoing, including a study of sperm whale acoustics in the

central/western Pacific, description of an echolocating *Kogia*, characterizing fin whale songs across the Pacific to look at population structure, acoustic monitoring of longline fishing, and classification of delphinid species based on echolocation clicks.

Survey plans for 2017 include a HICEAS survey that is part of a new PacMAPPS (Pacific Marine Assessment Program for Protected Species) partnership between NOAA, BOEM, and the Navy. The NMFS national framework for conducting cetacean surveys, which has undergone extensive discussion, will be published soon as a Tech Memo. Required resources are much greater than the available funds, so partnerships are essential. The first such partnership was developed for the Atlantic (AMAPPS), and more recently PacMAPPS was developed. Lisa Ballance, Erin Oleson, and Jeff Moore have been involved and there is now a web site, with a proposed survey rotation schedule. Several EEZ areas are not of interest to BOEM or Navy, so they remain unfunded, but the EEZ's of Hawaii, Gulf of Alaska, Guam and the Marianas, and the US West Coast are included in the plan, with funding arrangements for the first surveys underway. The first survey will be in Hawaii, followed by the US West Coast during 2018, and a winter survey in the MHI, then the Marianas and Gulf of Alaska. The ultimate goal is to produce spatial density layers that other agencies can use. The 2017 HICEAS survey will run for 180 sea days from July – December on 7 aboard the NOAA ships *Sette* and *Lasker*, using standard visual and passive acoustic survey methods. Terry Wright inquired whether there would be special nearshore surveys around Islands, and Oleson said that there would probably be finer-scale effort in a MHI stratum, as during 2002 HICEAS (during 2010, there was more effort in NWHI). Of special interest are false killer whales, insular MHI species, and acoustic line-transect surveys for some species. Additional goals include telemetry, biopsy, new technologies, seabird and ecosystem observations.

Hawaiian Spinner Dolphin Life History

Collaborating with Kristy West, Robert Brownell presented a life history summary of spinner dolphin subspecies throughout Pacific (*PSRG-2017-10*). Currently there are 5 stocks in Hawaii. The study examined 85 captive animals plus 52 stranded dolphins during the last 30 years. Findings included a very different sex ratio of captive dolphins *vs.* stranded animals (females are often preferred for captive display). Total lengths were found to be greater than in coastal Central American spinners, and longevity was greater than in ETP spinners. Hawaiian spinners are likely a different subspecies, requiring some further evaluation. Photo-ID based abundance estimates (Hill *et al.* 2011) are highly variable, so trends and primary threats are unclear. Hexacopter studies could potentially provide health assessments and yield body lengths to differentiate coastal *vs.* offshore spinners. Brownell also showed a photo of a spinner dolphin in Hawaii that was caught in a section of net in 2014. The animal was fresh, but no fishing mortality was indicated in SAR. Chris Boggs noted that the gear shown is not used in any Hawaiian fishery and David Itano said it looks like trawl gear from Pacific NW; however, there was no biofouling on the net fragment so its origin is unclear.

Historic Spotted Dolphin Hunt in Hawaii

Robert Brownell also presented information on Japanese hunting of spotted dolphins in Hawaii during the early 1900s. The first fishery biologists (David Starr Jordan) to come to Hawaii in 1901

obtained the first spotted dolphin specimens in a Honolulu fish market. There were a large number of Japanese fishermen at the time, and Brownell believes that the Japanese fisherman were probably hunting dolphins and David Starr Jordan purchased them in the fish market. This raises a question of how many were hunted (probably from west end of Oahu), and how many were removed. At least 50 animals were removed during 1960s and 70s for captive display, and now there is some bycatch. Cumulative impacts are uncertain, and current threats are same as for spinner dolphins except spotted dolphins probably have greater bycatch.

Pacific Islands Management Updates

Ann Garrett presented Pacific Islands management updates. Recovery planning efforts are ongoing for false killer whales. This year is the 'Year of Monk Seal' and NMFS will use the updated abundance estimate as part of regular outreach focusing on monk seals. A recovery team meeting is planned but not yet scheduled. David Schofield provided stranding updates, with a larger number of dead humpback strandings during 2016-2017. Calf productivity has been a bit lower the last two years, so Schofield is looking into this issue with collaborators in Hawaii, Alaska, and Mexico, and he will provide heads-up package to UME working group regarding the slight increase in strandings. Four false killer whales from the MHI stock have come ashore at South Point, with 3 of 4 individuals confirmed by Robin Baird as known insular false killer whales from Cluster 3. South Point is not a favored area for false killer whales, so the multiple strandings are unusual.

Short-finned Pilot Whale Stock Structure

Karen Martien reviewed pilot whale stock structure in the Pacific, including southern and northern forms off Japan. There is differentiation between the eastern tropical Pacific (ETP) and a Western Pacific type described in Hawaii and Japan, which was originally described based on morphological differences. The genetic differences are strong enough that this might indicate separate subspecies. The SWFSC will do full mitogenome sequences and expects to complete this project by Fall 2017. Morphological information is also being reviewed, including melon shape and size (the northern form is much larger, its skull is different, and has more teeth). Population-level structure between MHI, NWHI and pelagic regions around Hawaii shows no shared haplotypes with other areas, and the MHI population has almost exclusively one haplotype. There is a statistically significant differentiation between MHI and Pelagic, and between MHI and NWHI. Within the MHI, there are different communities near Oahu/Kauai and Hawaii, which are differentiated by their genomes and have very low mixing rates based on photo-ID evidence. Katherine Ralls wondered whether genetic clusters correspond to photographically identified stable social clusters, which could be family units that could create a false indication of structure. Martien clarified that pair-wise relatedness was evaluated, and animals that were first-order kin to another animal were excluded. Within social units, relatedness is higher than expected if social units were random set of individuals (*PSRG-2017-13*). Terry Wright wondered what proportion of population has been biopsy-sampled and whether foraging behavior differs between groups. Robin Baird said about 10% had been sampled and that he has a student who will examine foraging behavior. Robert Brownell questioned whether the pilot whales should be considered different species instead of subspecies. Baird further noted that there is evidence of a third Hawaiian community, but sample sizes are small. Itano inquired whether the social clustering represents a breeding unit, and Martien and Ralls explained that

parentage has not been looked at in this population, but in other populations, pilot whales breed outside their social unit, often with male dispersal. Erin Oleson noted that two pilot whale forms are known in the Marianas, although we do not yet have SARs for those populations. Martien indicated that the manuscript, which will be submitted for publication, explains management importance for a broader audience. Ralls noted it was nicely done.

Rough-toothed Dolphin Stock Structure

Karen Martien presented an update on rough-toothed dolphin population structure (*PSRG-2017-14*). Photo-ID evidence shows variation in group size, vessel avoidance, re-sightings of individuals between islands, and a dispersal rate estimated to be less than 2% per year. Since 2008 there have been 1,278 individual photo-identifications, with a very limited interchange between islands. A genetics study has been published (*PSRG-2017-B02*), and mtDNA analysis shows that the most common haplotypes differ between Hawaii and Kauai, suggesting that at least females are not moving between these islands frequently. Nuclear and mtDNA both show significant difference between Hawaii and other islands. Using other clustering analyses also indicates Hawaii is different from Oahu, Kauai and NWHI. Remaining uncertainties include whether NWHI is a demographically independent population (DIP) or part of the pelagic population. Oahu and the 4-Islands region may also have structure, but the data are very limited.

Other Pacific Islands SARs

Erin Oleson summarized other Pacific Islands SAR changes (*PSRG-2017-02 & 15*), including updated mortality and serious injury information, and updated abundance estimates using the new Barlow $g(0)$ correction. Potential stock structure for *Steno* is mentioned as something to be evaluated in the future. For bottlenose dolphins, all island stocks have outdated abundance estimates, so Baird reviewed the photo-identification catalogs to provide the number of known individuals as N_{\min} for some stocks. For others stocks, the PBR is undetermined because abundance is outdated.

The SRG reviewed the individual SARs and made comments and requests for clarification. For all SARs, the section about new serious injury guidelines can be removed, because it is not new anymore. The disease sections are also too detailed and can be shortened. The SRG suggested that repeated sections be moved to a single introductory section rather than repeated in every SAR. The individual SARs could briefly reference that other section, perhaps with a hyperlink. SRG members and NMFS staff agreed that this was an option and could be implemented. Bettridge said the Atlantic SRG had also struggled with the new GAMMS additions to the SAR.

The SRG discussed whether ZMRG could be achieved when information is incomplete but there is no evidence of a fishery problem (*e.g.*, Kauai/Niihau bottlenose dolphins). Most members agreed with keeping the statement as is, given the uncertainty. The SRG requested that when fisheries/gear are indicated in the table, details of whether this involved Hawaiian or unknown gear be provided (*e.g.*, the two bottlenose dolphin gillnet takes off Maui).

The SRG discussed elements of the false killer whale status section, and NMFS staff clarified the

legal definitions and requirements of SARs. The SRG requested additional information about population decline, small population size, and stranding information. Oleson explained that due to multiple field and analysis differences, the 2002 and 2010 estimates are not comparable and no trends can be inferred.

The SRG asked whether there is any new information on blue whale call types that should be included. Oleson said that she and Ana Širović have been working on this and two call types are heard in Hawaii. Similarly, examination of fin whale call types is ongoing to identify call types in Hawaii and in the Western Pacific.

Pacific Humpback Whales

Shannon Bettridge provided an update on humpback whale ESA-listing and stock structure processes. The ESA listing rule was finalized last year, and NMFS is now evaluating how to deal with MMPA stock structure, because the ESA's distinct population segments (DPS) do not align with MMPA stocks. The analyses are ongoing and NMFS will present options to the SRG between meetings so that any stock structure changes can be incorporated in next year's SARs. NMFS is also working on defining a clearer process for defining stocks to provide clarification and transparency and will develop guidance for 2018 SARs. The SRG will be engaged in this process. The SRG noted that humpback whales will become more complex with different listing levels for different DPSs, and asked SRG members to think about research questions related to humpback whale stock structure. Terry Wright noted that language similar to that for gray whales regarding tribal ability to hunt the whales should be added to humpbacks as the Makah are interested in harvesting. Robert Brownell noted that this would be inconsistent with IWC management.

Humpback Whale Spatial Use Patterns by DPS

John Calambokidis presented an overview of DPS-specific humpback whale movements and regional habitat use. SPLASH data showed clear genetic (haplotype) differences by breeding area, and the differences between foraging areas are even more striking. The SPLASH data and geographically stratified models suggest that one possible approach to address population structure is the concept of 'herds' that are pairs of breeding and feeding destinations. Mark-recapture analyses show evidence that the CA/OR/WA population has stopped growing and seems to have leveled off. Within the CA/OR/WA stock range, whales from the different DPSs use different areas along the US West Coast differently, with the endangered Central American DPS using southern areas more (and being almost absent from WA), while the Revillagigedos population is mostly found from OR/WA northward and is not common off CA. The boundary line between Mexico and Central America DPS's appears to be in southern Mexico, because animals from southern Mexico have resighting patterns similar to animals from Central America. There has also been an increase in humpback whale sightings off southern California, and in the Salish Sea to an area where they used to be common before whaling impacts. As the population increases, its range seems to be expanding. Steve Jeffries noted that anchovies have increased in Salish Sea (as in coastal California and San Francisco Bay). The expansion into new areas and a recent tendency to stay in the feeding areas longer create greater overlap with some fisheries (*e.g.*, CA Dungeness crab fishery, which operates in nearshore waters from Nov-June). Andre Punt noted that IWC is trying to pull together

all data to reconstruct population dynamics as far back as possible and shed light on population rebuilding; so far they are getting a better fit with density dependence on feeding grounds. Robert Brownell added that this will be a long process. Punt also wondered whether the migration movements can be resolved more finely than presented by Calambokidis. Calambokidis said that some areas have a larger data set spanning many years and there is better information, but this is not the case for all areas.

West Coast Whale Entanglements

Penny Ruvelas (by phone) presented information on US West Coast whale entanglements through 2016. There has been a large increase in entanglements for 2014-2016, primarily in pot/trap gear, but some in nets and many 'undetermined.' There were 71 reports of individual entangled whales in 2016, of which 42 were in unknown gear. Forty-eight of these 71 reports were confirmed as entangled whales based on follow-up reporting or other documentation submitted for the case. For cases where fisheries could be identified, the Dungeness crab fishery has the greatest number (22), with a few records from gillnets, sablefish gear, and spot prawn gear. Humpback whales are the primary species reported as entangled (n=54), but there were also 4 blue whales, 3 gray whales, and one killer whale. Report locations concentrated in central California, where the active whale-watch community is more likely to encounter entangled whales than in other areas, but entanglements were documented throughout the range. The gear that could be identified to a specific region was mostly from central California. There is a CA Working Group (initiated by the State) to address entanglements in the Dungeness crab fishery, resulting in a best practices guide and ongoing efforts to find solutions. Oregon is also starting a Working Group, and research efforts are underway to examine gear configurations. Additional planned research projects were developed with SWFSC and include whale/fishery co-occurrence research, developing tools to predict conditions more likely to lead to entanglement, and research to assess population level impacts of increased entanglements. John Calambokidis noted that the map of entanglement locations shows a concentration of entanglements in Monterey Bay, but it is not clear whether this indicates a greater entanglement rate or is an artifact of more people on the water. Michael Scott noted that whales are increasingly in new areas around the same time that entanglements increased and wondered whether there is a connection. Forney said that whale distribution, fishing effort changes, and prey variability are all factors, plus domoic acid closures and seasonal timing of fishing and whale presence. Scott asked whether the working group is essentially doing the same as a TRT. Penny said that NOAA anticipated an increase in entanglements based on increasing whale populations and overlaps with fishing areas and has been working proactively to try to develop options collaboratively with the fishery before a formal TRT becomes necessary.

Humpback Whale ESA Approach

Penny Ruvelas provided an overview of the approach that the West Coast Region plans to use for ESA analyses for humpback whales (*PSRG-2017-B03*), which is similar to the approach in Alaska. When looking at an action that will have an adverse effect on ESA-listed humpback whales along the US West Coast, impacts will be prorated according to the proportional presence of the two listed DPSs that are found off the US West Coast (Central America and Mexico). California/Oregon will be assumed to have 20% Central American whales, and 90% Mexican whales. The total is >100%

because an upper confidence limit was used for the Central American estimate, to account for uncertainty in the estimate and the low abundance and endangered status of this DPS. Washington and southern British Columbia will be assumed to have 15% of whales from Central America, 42% from Mexico, and the remainder from the non-listed Hawaii DPS. This process applies only to ESA actions, not MMPA evaluations because all of the humpbacks off the coast are considered part of the CA/OR/WA stock under the MMPA. The background document identifies some questions that could be addressed to refine the approach, including the gradient in north/south habitat use of animals from different DPSs and whether the percentage of animals from Central America should increase as one goes south. John Calambokidis added that the 20% is based on SPLASH abundance estimates, and the Wade estimates have resulted in a much larger overall CA/OR/WA population estimate so the proportion is lower. However, Calambokidis has photo-ID match rates that exceed 20% for Central America whales in CA/OR, so the 20% may not be conservative. Ruvelas confirmed that new information to refine this approach would be helpful. Ruvelas confirmed that information on origin (such as individual identification) of any entangled whales would supersede this approach, and that the proportions would be applied only to takes under the ESA.

Southern Resident Killer Whale

Lynne Barre presented updates on southern resident killer whales (SRKW), including the death of one satellite tagged whale (L95) that appeared to have acquired a fungal infection at the tag location. There was a stranding with evidence of blunt force trauma, and one whale was observed with evidence of fishery interaction with a recreational salmon fishery, but this animal shed the gear on its own and appeared to have no adverse consequences. NOAA has designated SRKW as one of eight “species in the spotlight” to highlight steps being taken to recover endangered species, including coastal habitat protection, improving knowledge of health (especially in comparison to the growing northern resident population), assessing vessel impacts, targeting recovery of critical prey and developing a food web model, and education/outreach. John Calambokidis noted that the satellite tag used on the killer whale that died is used on many other species, and the death may have been caused by an intersection of a number of things (*e.g.*, harbor porpoises have also shown up with fungal infections recently). He wondered what the impact on tagging for other species/researchers might be in regard to permitting. Barre indicated that it is being reviewed to try to assess risk from fungal infection, and she expects some guidance in the future. Brad Hanson noted that the necropsy report and the incidence report have information on this event. Hanson also said a small group of taggers have reviewed information and will share with the WCR and permit office. The SRG commented on the SRKW SAR (*PSRG-2017-05*). Tim Ragen noted how important demographic effects are for small populations and was pleased that a model was used but asked for some additional details on that model. Barre did not have model specifics but said it incorporated all available demographic information and was described in more detail in the 5-year Status Review. Ragen added that the declining number of juvenile females is likely important, and he encouraged NMFS to use as much of the demographic details as possible.

Other West Coast Region Management Updates

Penny Ruvelas provided some details for the 2015 Guadalupe fur seal Unusual Mortality Event (UME), which is still considered ongoing. Most of the 98 animals that stranded in 2015, and 76 in

2016, were yearlings, and all were malnourished. Many also had infections or detectable domoic acid. Hypotheses for the causes of this UME include a change in prey availability, as with an ongoing California sea lion UME since 2013 that also involved mostly malnourished juvenile animals. The most recent San Miguel Island survey showed CA sea lion pups returning to long-term average weights, although there are fewer pups.

California Sea Lion Optimum Sustainable Population (OSP) Analysis

Jeff Laake (by phone) thanked the SRG for their input last year on his preliminary OSP analysis as the feedback helped him settle on an approach. His revised analysis (*PSRG-2017-09*) derived age and sex-specific estimates of survival for 1975-2013 from resighting and tagging data collected at San Miguel (DeLong *et al.* in press). Laake then constructed a time series of pup counts for 1975-2014 using existing data and imputing missing values. Using these data sets, he reconstructed population size (total and by sex/age class) and then fitted a generalized logistic model. Survival analysis was based on capture-recapture models including covariates (age, sex and their interaction, pup weights). Survival of pups is lower and much more variable than for juveniles and adults, with El Niño events evident. In recent years, the UME has corresponded to low survival. Pup counts have increased longterm, with highly variable recruitment corresponding to environmental conditions, and the growth rate was very sensitive to SST (sea surface temperature, a proxy for El Niño events). The reconstructed time series has much less variation than the pup counts, but with El Niño impacts still visible. For example, a SST increase of 2 degrees yields a 7% decline in growth rate. The carrying capacity (K) was estimated to be 250,000-280,000 animals, with a Maximum Net Productivity level (MNPL) of 156,000-182,000, so the population is above OSP and should remain so despite the recent decline population decline. The model adjusts for the fact that pups are born in July and branding takes place in the fall, although survival might be lower than he estimated. The SRG inquired whether there would be any management changes if the population is at OSP. Shannon Bettridge indicated that it would not change anything because they were not designated as depleted so there is no change in allowable management actions. For depleted stocks, there are a number of things that cannot be authorized (*e.g.*, take waivers, captive display), but these would not apply. Terry Wright inquired whether the OSP determination could open the door for States to take over management of the species. Bettridge confirmed that it would, but said this had only happened once for a limited time in Alaska.

Preliminary Population Structure Project Updates

Karen Martien presented information on three ongoing projects by collaborators at SWFSC. Eric Archer is leading an effort to examine fin whale population structure based on acoustic data (call types) and characterize the calls geographically. There is uncertainty when calls are scored by individuals, so they developed an algorithm that uses inter-pulse interval. There appears to be seasonality of some call types in some areas, *e.g.* call type C is absent from Hawaii during part of the year. A second project has reexamined harbor porpoise population structure with increased sample sizes, and some very preliminary results are available. Martien reviewed the previous Chivers *et al.* analyses, which had significant sampling gaps, (*e.g.*, nothing south of Monterey and large gaps along the West Coast). Preliminary results are similar to Chivers' findings, showing breaks between Morro and Monterey Bay, and between northern WA and southern WA (near La

Push) where a stock boundary was previously considered. However, the Pt. Arena boundary that had a sampling gap just to its north now is less clear for mtDNA. There is evidence of limited dispersal. Analyses are ongoing and will include complete SNP genotyping as well as regional and range-wide analyses. The third project was on Channel Islands bottlenose dolphins, to examine whether population structure exists for the offshore stock of bottlenose dolphins. Preliminary results revealed no evidence of population structure among dolphins sampled at the various islands, but there was some evidence for two clusters that do not correspond to geographic locations. There may be other habitat factors involved, such as bathymetry or water temperature. Additional samples that would help clarify this result were obtained from offshore bottlenose dolphins during the 2014 survey, but funds are needed to process these samples.

US West Coast Serious Injury Determinations

Jim Carretta reviewed 2011-2015 human-related injuries to marine mammals along the US West Coast (*PSRG-2017-07*). Entrainment deaths are down because the San Onofre Power plant has closed. Dolphin deaths include fishing gear and research-related deaths. For large whales, there were mostly entanglements and ship strikes. During a 5-year period, 71 humpbacks were recorded entangled, most with trap/pot gear and a few with gillnets. Gray whales had 61 cases but with a greater proportion of gillnets. This might be caused by seasonal differences or the more nearshore distribution of nets. There were 19 unidentified whales, and Carretta is working on a pro-rating method based on location and other factors. Fin whales had 9 vessel strikes and four fishery entanglements. One blue whale was observed entangled (compared to 4 during 2016). Brownell noted that information on age/size class would be helpful. The SRG noted that injury outcomes by fishery are important and commended Jim for indicating which types of events are more likely to be serious injuries and asked that this be continued. The SRG asked about the expectation of survival following rehabilitation for pinnipeds. Carretta clarified that information is incomplete but that rehabilitated animals are generally only released if they are judged likely to survive. The SRG asked that this be made explicit.

CA swordfish drift gillnet bycatch estimates

Jim Carretta explained that the rare-event bycatch estimation method presented at last year's meeting has now been implemented for the 1990-2015 CA driftnet fishery, re-estimating mortality and serious injury for all years (*PSRG-2017-08*). The zero-inflated data initially created a problem for the tree-based analysis approach, but Carretta was able to balance sample sizes to increase the signal-to-noise ratio using the R package *rfPermute* (Archer 2016), which also provides p-values for each included covariate. Cross-validation error rates for positive bycatch events showed that the included variables provided relevant information. Regression trees were developed using the significant variables to separate sets with bycatch from those without bycatch. Building many trees using bootstrapped data provides a robust estimate of mean bycatch and uncertainty. It also allows spatial validation by comparing predicted bycatch risk with actual bycatch events. Estimates are much more stable using this approach than the previous ratio-estimation analysis, and they provide more stability for management of fisheries. The results are comparable to the Bayesian approach Jeff Moore presented last year, but the Bayesian method gives some additional probabilistic inferences that can be related to management goals more directly. However, the random-forest

approach is straightforward and works well, so this is the approach used by Carretta.

Updated West Coast Cetacean Trends

Jeff Moore has updated the abundance and trends for several species to include the new 2014 cruise data (*PSRG-2017-12*), using the methods previously presented to the SRG and described in published papers. He briefly reviewed the methods and new survey data. The model produces a longterm growth rate (with high uncertainty), and an empirical growth rate that is estimated from the time series and has better precision. For sperm whales, there is no inference about population change because sample sizes are small and variances are large. The new abundance estimate (2,000) is similar to the previous one. Looking at small groups (presumed males) only, there seems to be an increase, but it is not clear whether this is due to a sampling artifact or a true indication of an increase. For beaked whales, the methods were adjusted slightly to include an explicit probability of positive ID. Baird's beaked whales seem stable or slightly increasing; Cuvier's beaked whales previously had a decline that appears to have flattened out in the more recent survey years, with an estimate of about 3,300 animals and an N_{\min} of about 2,000. For *Mesoplodon*, the recent estimate is the largest of the time series, so the previous declining pattern seems to have changed. The current 2014 estimate is about 3,000, with an N_{\min} of 1,967. Sightings were primarily in the southern part of the study area, contrasting with the more northerly previous distribution of sightings. One hypothesis to explain this increase is that it might be an influx of warm-water *Mesoplodon* species during the unusual warm-water event of 2014. Stranding records also show an increase in warm-water *Mesoplodon* species in recent years.

PASCAL Cruise 2016

Jeff Moore also provided an overview of the recent PASCAL cruise, which used drifting acoustic spar buoy recorders to collect acoustic data that can be used to estimate the abundance of beaked whales. Beaked whales are very difficult to survey visually because of their long dive times and cryptic surfacing behavior. But they regularly echolocate at depth, have species-specific clicks, and forage about 25% of the time, so acoustic methods can locate beaked whales more effectively than visual surveys. The acoustic data can provide range (distance to animal) information using the sound path and the reflected sound path off the water surface). During 40 sea-days, 20 buoys were deployed for 15-20 days each, providing >400 days of acoustic surveys. Analysis are ongoing, but so far the recordings contain over 600 beaked whale detections averaging 30 detections per buoy. Multiple known species were detected, as well as some clicks that have not been linked to species. Some of these might be Hubbs' beaked whale and/or Perrin's beaked whale, but others are different. A point-transect analysis framework will be used to analyze the data. It is not known whether males and females have different acoustic signals.

US West Coast SARs

The PSRG provided comments on the draft SARs (*PSRG-2017-01*). Based on the Moore population trend for sperm whales, the SRG suggested saying that the population appears stable. For *Mesoplodon*, the SRG noted that this stock is stated to be strategic based on the previous decline, but preliminary data suggests that the population may have recently increased. Whether this increase is due to population growth amongst one or more species in this multi-species complex

or immigration of southern *Mesoplodon* species into U.S. waters is still uncertain. For *Ziphius*, the SRG asked that the status of stock section clarify that the ‘known mortality’ is an estimate. The SRG noted that under all considered stock structure options the Central American stock of humpback whales will have takes exceeding PBR, particularly so when the 2016 entanglements are included in next year’s SAR. Regardless of the humpback whale stock structure that is decided upon, more research will be required to effectively manage the new stocks. Karen Martien noted that discussions are underway to include genetics when determining stock abundance and assign mortalities. The SRG noted that the MMPA and ESA issues are complex and resolving them takes time, so there is a need to recognize that things are currently in a state of transition and NMFS needs time to do this well. The SRG expressed support for the ‘herd’ concept, explained in the background document (*PSRG-2017-B03*) as the basis for MMPA stocks.

Topics, Timing, and Location of Next Meeting

The SRG agreed to hold the next meeting in La Jolla, targeting a late February or early March timeframe. Potential topics for the next meeting include:

- New False killer whale analyses and TRT updates
- False killer whale Take Reduction Plan update and assessment
- Pilot whale and harbor porpoise genetics
- Updates on NMFS/HI State coordination on fisheries and depredation information
- NMFS permit office updates and tagging guidance.
- Humpback whale stock structure and SARs

**Previous 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.

A draft SAR has been prepared and is in the process of being approved.

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.

These studies are ongoing.

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.

This study is underway.

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.

NMFS is collaborating with the State on these issues.

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

NMFS redirected funds to maintain camps during 2016 and is trying to maintain funds into the future.

2) Continue the current NMFS net-debris removal program near monk seal haulout areas where entanglement occurs.

NMFS and is working with its partners (MDP, PMNMP, DARRP, and CREP) to develop, fund, and implement a marine debris removal plan that will ensure that risk to monk seals and other wildlife is reduced to minimal levels.

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.

NMFS has developed a schedule and PacMAPPS partnership. SRG recommends that NMFS continue to fund and collaborate with other agencies to implement this national survey plan.

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 SRG reviewed the effectiveness of these changes in reducing the mortality and serious injury of false killer whales. Preliminary information suggests that lines were breaking or being cut and hooks were not straightening as anticipated, and that the approach to reduce serious injuries is not working as hoped.

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.

Four new people were hired, and data entry has caught up through 2016.

Research and Management Recommendations
Pacific Scientific Review Group Meeting, 13-15 February 2017

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, abundance and trends, ecology, distribution, and fishery interactions and survey bias.

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.

The SRG would like to receive an update on these ongoing studies and reviews at its 2018 meeting. 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 study (Harting *et al.* 2014) showed 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) Restore the 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 recommends implementation of the national survey plan to allocate both ship time and operational funding and collaboration with other agencies 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 reviewed the effectiveness of these changes in reducing the mortality and serious injury of false killer whales. Preliminary information suggests that lines were breaking or being cut and hooks were not straightening as anticipated, and that the approach to reduce serious injuries is not working as hoped. NMFS should continue efforts to work with the TRT to improve the approach to reduce serious injury of false killer whales.

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, 2) potential differences in fishing practices and location for trips with and without observers, and update its testing of hook breakage and straightening for new hooks that have come onto the market since the original NMFS hook study.

The SRG recommends that NMFS implement a multi-year plan and provide funding for conducting US West Coast pinniped surveys on a 3-5-year schedule. These surveys are necessary to obtain abundance estimates required to calculate PBR and thus enable fisheries to meet the standards required by the MMPA and place an undue burden on those fisheries. Abundance estimates are required to meet assessment needs and conduct multi-species ecosystem modeling.

With the ESA relistings of many humpback whale breeding populations, the WA/OR/CA stock will need to be restructured. Regardless of the stock structure adopted, more research will be required to implement the management of these new stocks. The SRG recommends that photo-identification, surveys, telemetry, and genetics studies be reviewed and expanded as necessary to a) identify the proportion of different breeding populations that comprise the CA/OR and WA/BC feeding populations, b) estimate the abundance of these feeding populations, and c) assign breeding population of origin for whales taken in fisheries or stranded. Because certain newly recognized populations are listed as endangered or threatened, the SRG supports NMFS' efforts to move forward expeditiously with the designation of MMPA stocks.

The SRG recommends that the 2002 and 2010 HICEAS data be reanalyzed after the completion of the 2017 HICEAS survey to apply consistent abundance analysis methods to all three survey years.

APPENDIX 1

Attendees - Pacific SRG Meeting, 25-26 February 2016 (Honolulu, HI)

(*Indicates participation by phone/webinar)

Scientific Review Group - Pacific Region:

Hannah Bernard	Hawai'i Wildlife Fund
John Calambokidis	Cascadia Research
Doyle Hanan	Hanan and Associates
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	Retired
David Itano	Hawaii Fisheries Consultant

Invited Participants and Observers:

NMFS Southwest Fisheries Science Center

Lisa Ballance
Robert Brownell Jr.
Jim Carretta
Karin Forney
Karen Martien
Jeff Moore
Barbara Taylor*

NMFS Alaska Fisheries Science Center, NMML

Jeff Laake*

NMFS Northwest Fisheries Science Center

Brad Hanson*

NMFS Pacific Islands Fisheries Science Center

Erin Oleson
Jason Baker
Kym Yano
Charles Littnan
Chris Boggs
Ali Bayless
Stacie Robinson*

NMFS Pacific Islands Region

Ann Garrett
Kevin Brindock
Jamie Marchetti
Dawn Golden
Jean Higgins
Krista Graham
David Schofield
Susan Pultz*
Nancy Munn*
Adam Kurtz*

NMFS West Coast Regional Office

Lynne Barre
Penny Ruvelas*
Tina Fahy*
Lauren Saez*

NMFS Office of Science and Technology

Mridula Srinivasan

NMFS Office of Protected Resources

Shannon Bettridge
Kristy Long
Lisa Lierheimer*
Lisa White*
Nancy Young*
Sasha Doss*

U.S. Fish and Wildlife Service

Deanna Lynch*
Lilian Carswell*

Marine Mammal Commission

Dennis Heinemann

Other

Robin Baird (Cascadia Research Collective)
Asuka Ishizaki (WPFMC)
Andre Punt (University of Washington)
Ann Smith (NOAA)
Phil Fernandez (Hawaii fisherman)
Sarah Courbis (Ecology & Environment, Inc)
Kristy West (Hawaii Pacific University)
Svein Fougner (Hawaii Longline Association)
Ryan Steen* (Hawaii Longline Association)
Jonathon Scordino* (Makah Tribe)
Brian Gruber* (Makah Tribe)

Paula Moreno* (IAT/ScMFIS)
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APPENDIX 2
Pacific SRG Document List
Pacific SRG Meeting, 13-15 February 2017 (Honolulu, HI)
Last revised: 02/03/2017

Document No.	Title/Topic	Contributor(s)	Distribution Date
Draft documents for Pacific SRG review (Not to be distributed outside NMFS/FWS and SRG)			
PSRG-2017-01	U.S. West Coast SARs	Carretta/Forney	2/3/2017
PSRG-2017-02	Pacific Islands Cetacean SARs	Oleson	2/1/2017
PSRG-2017-03	Monk Seal SAR	Baker	2/1/2017
PSRG-2017-04	WA Sea Otter SAR	Lynch	2/1/2017
PSRG-2017-05	Southern Resident Killer Whale SAR	Hanson	2/1/2017
PSRG-2017-06	Abundance estimates for management of endangered false killer whales in the main Hawaiian Islands	Bradford	2/1/2017
PSRG-2017-07	U.S. West Coast - serious injury determinations for 2015	Carretta	2/1/2017
PSRG-2017-08	U.S. West Coast drift gillnet bycatch estimates, 1990-2015	Carretta	2/1/2017
PSRG-2017-09	Population Status of CA sea lions in the U.S.	Laake	2/1/2017
PSRG-2017-10	Life history of Hawaiian spinner dolphins	Brownell / West	2/1/2017
PSRG-2017-11	First Hawaiian records of spotted dolphin from Hawaii: History and Origin	Brownell	2/1/2017
PSRG-2017-12	Trends in abundance for beaked whales and sperm whales	Moore	2/1/2017
PSRG-2017-13	Short-finned pilot whale population and social structure	Van Cise/Martien	2/1/2017
PSRG-2017-14	Evidence of multiple demographically independent populations of rough-toothed dolphins within the Hawaiian Archipelago	Martien	2/1/2017
PSRG-2017-15	Minimum population size of bottlenose dolphins in Hawai'i based on photo-identification	Baird	2/1/2017
PSRG-2017-16	Updated evidence of interactions between false killer whales and fisheries around the main Hawaiian Islands: assessment of mouthline and dorsal fin injuries	Baird	2/3/2017
Background Papers - FYI only		Submitted by	
PSRG-2017-B01	Range-wide abundance estimation methods for monk seals	Baker	2/1/2017
PSRG-2017-B02	Rough-toothed dolphin population structure	Martien/Albertson	2/1/2017
PSRG-2017-B03	WCR Humpback Whale ESA Considerations and Implications	Ruvelas	2/1/2017
PSRG-2017-B04	Monk seal interactions with nearshore fisheries	Baker	2/1/2017
PSRG-2017-B05	Abundance of cetaceans in HI EEZ waters from a line transect survey	Oleson	2/1/2017

APPENDIX 3
Pacific Scientific Review Group Meeting,
13-15 Feb 2017, Honolulu, HI
Locations: NOAA Pier 38 (Mon-Tue) &
NOAA Inouye Regional Center, Ford Island (Wed)

Final Agenda (02/09/2017)

MONDAY, 13 FEBRUARY 2017

NOAA Pier 38 Conference Room

Welcome, Introductions, New SRG Members - M. Scott, Pacific SRG Chair

General / National Topics

- National updates (e.g. GAMMS, staffing changes, SAR schedule) – *Bettridge*
- List of Fisheries – *Long*
- Protected Species Assessment Workshop – *Oleson/Moore/Carretta*
- Using management strategy evaluation to understand the performance of fishery management for marine mammal conservation in the US – *Punt*

Sea Otters

- Southern sea otter updates – *Carswell, by phone*
- Washington sea otter update and SAR – *Lynch, by phone* *PSRG-2017-04*

Hawaiian Monk Seals - Baker

- Monk seal research updates *PSRG-2017-B01*
- Monk Seal SAR *PSRG-2017-03*

Pacific Islands Fishery/Management Updates

- False Killer Whale TRT Updates – *Brindock*
- Pacific Islands Observer Program Updates – *Marchetti*

Pacific Islands Research and SARs

- False killer whale abundance estimates – *Oleson* *PSRG-2017-06*
- False killer whale SAR – *Oleson* *PSRG-2017-02*
- Other Pacific Islands cetacean research – *Oleson/Baird* *PSRG-2017-16*
- Hawaiian spinner dolphin life history – *Brownell/West* *PSRG-2017-10*
- Japanese hunting of spotted dolphins in Hawaii – *Brownell* *PSRG-2017-11*

Review recommendations

Adjourn

Pacific Islands Topics (continued)

- Pacific Islands Management Updates – *Garrett*
- Short-finned pilot whale stock structure – *Martien* *PSRG-2017-13*
- Rough-toothed dolphin stock structure – *Martien* *PSRG-2017-14 & B02*
- Other Pacific Islands SARs – *Oleson* *PSRG-2017-02 & 15*

Pacific humpback whales

- Humpback whale ESA-listing and stock structure – *Bettridge*
- Humpback whale spatial use patterns by DPS – *Calambokidis*

West Coast Management Updates

- West Coast Whale Entanglements – *Barre/Lawson/Ruvelas*
- Humpback Whale ESA Approach – *Ruvelas, by phone* *PSRG-2017-B03*
- Southern resident killer whale updates and SAR – *Barre/Hanson* *PSRG-2017-05*
- Other West Coast Region Management Updates – *Barre/Ruvelas*

CA/OR/WA Research

- California sea lion OSP analysis – *Laake, by phone* *PSRG-2017-09*
- Preliminary genetics project updates (fin whale, harbor porpoise Channel Islands bottlenose dolphin) – *Martien*
- US West Coast Serious Injury Determinations – *Carretta* *PSRG-2017-07*
- CA swordfish drift gillnet bycatch estimates – *Carretta* *PSRG-2017-08*
- Updated West Coast cetacean trends – *Moore* *PSRG-2017-12*
- PASCAL Cruise 2016 – *Moore/Barlow*

U.S. West Coast SARs – *Carretta/Forney* *PSRG-2017-01*

Review Recommendations

Adjourn

Review Recommendations

Topics, timing, and location of next meeting

Adjourn PSRG meeting