Minutes for the
Pacific Scientific Review Group Meeting
06-10 March 2023

The 33rd meeting of the Pacific Scientific Review Group (SRG) was held at the Ala Moana Hotel in Honolulu, Hawaii. All Pacific SRG members participated in the meeting except Rebecca Lewsion: Scott Baker, Simone Baumann-Pickering, Lars Bejder, John Brandon, John Calambokidis, Doug DeMaster, Leslie New, Tim Tinker, and Matt Leslie. John Calambokidis served as Chair of the SRG, Doug DeMaster served as vice chair, Laura McCue facilitated the meeting, and Shelbie Ishimaru, Tracy Mercer, and Kym Yano served as rapporteurs. The attending SRG members and other participants are listed in Appendix A, the agenda of the meeting is in Appendix B, and the documents are listed in Appendix C.

National Topics

PSRG Membership Review Summary and Ethics Reminder

Zac Schakner from NMFS OST provided a summary of the Pacific SRG membership review, including the membership terms, current membership participation, and term status. The Pacific SRG membership review resulted in a new member, Dr. Matt Leslie. He then reminded the SRG of the ethics and potential conflicts of interest with SRG members.

The PSRG was interested in the membership renewal and the status of each member and their contributions to NMFS. There were also questions regarding the turnover and coordination with other SRGs. The PSRG noted they would discuss membership issues in a closed session.

GAMMS

Schakner provided an update on the 4th revision of the GAMMS, which is now final. He reviewed the background and process of the 4th revision of the GAMMS, as well as a summary of the revisions, and the implementation strategy for incorporation into the SARs.

The Pacific SRG was interested in the reasoning behind removing the 8 year rule for calculating the Nmin and the original reasoning for including this. NMFS responded that the intent of the rule was not working, especially with decreasing funds and for declining stocks.

Serious Injury Determination Policy Revisions

Kristy Long from NMFS OPR provided background on the serious injury procedure revisions, the process for revisions, and an overview of the revisions, which are now final.

The PSRG asked what fraction of marine mammal mortality comes from the observer programs, to which NMFS responded for the U.S. west coast (15%) and Pacific islands region (approximately 75%).

Humpback Whale Recovery Efforts

Meghan Gahm from NMFS OPR provided an update on the humpback whale recovery efforts, including a background on recovery planning, the recovery plan framework, the timeline for publishing the new

recovery plan, and the process once the plan is published, including implementation and maintenance of the plan.

The PSRG asked about the genetics related to the DPS designations, which Gahm noted was covered in more detail in the recovery plan. The PSRG also asked about the recovery team. Gahm responded that the team is currently a small, internal team made up of NMFS staff, but they are planning on hosting informal webinars to engage interested partners and stakeholders. The PSRG followed up by asking if this included any international outreach, to which Gahm responded that they plan on it; however, the details have not been determined and they are open to suggestions.

West Coast ITP Status

Long provided a brief update on the status of the Section 10 incidental take permits from CA, OR, and WA states for the Dungeness crab fishery. Generally, all 3 states are in the process of applying for an ITP, with CA the furthest along with multiple iterations of their permit application and conservation plan. There is also coordination between the states on regular working group calls.

The PSRG noted that this was motivated by a lawsuit against CA for unauthorized take of marine mammals in the Dungeness crab fishery. They also asked more about the coordination between the states and their authority to manage outside of state waters (past 3 miles). Lawson responded that the states were granted authority to manage out past 3 miles, and outlined the ongoing management efforts to mitigate take, including the dynamic management program in CA, measures to clean up derelict gear, etc. Long added that they are connecting the Pacific and Atlantic folks on things like gear marking and other strategies that have been utilized in the Atlantic. The PSRG then asked about ropeless gear, to which Long responded that there is a bycatch funded program within NMFS that would like to test ropeless gear, however there are challenges to getting the industry to participate. She also noted that they are using the terminology “on demand gear” vs ropeless gear. Finally, Lawson added that all 3 states are also committed to electronic monitoring of the fisheries as part of their Conservation Planning, which could help facilitate management of data for on demand systems down the road.

Alaska Fisheries Science Center Updates

California Current Ecosystem Program (CCEP) Updates

Sharon Melin from AFSC MML CCEP provided an update on her program, including the 2022-2023 accomplishments, planned products, 2023 research priorities mostly focusing on pinnipeds and gray whales, and future targeted studies on high profile species (i.e. PCFG gray whales and Pacific harbor seals). She also provided a planned survey schedule as it relates to the SARs (Pacific and Alaska). Melin then focused on 3 harbor seal stocks of Washington inland waters (Northern Inland Waters, Southern Puget Sound, Hood Canal) and provided information about significant stock boundary updates, a summary of each stock’s status, a comparison of the abundance estimates compared to other recent estimates, and a summary of CCEP’s response to the PSRG’s 2022 recommendations.

The PSRG asked what the harbor seal budget was ($40K) and then asked how much lower the Jeffries et al paper’s estimates were compared to NMFS’s recent estimate. Casey Clark, from WA Department of Fish and Wildlife responded that in some cases it was approximately 1,000 fewer individuals, but the methodology needed refinement. The PSRG then asked what the methods moving forward were to improve it (more complex models), to which Clark responded that the priority is to get the backlog out

now and then make improvements, but they do not have specific analysis and timeline plans yet. The PSRG then brought up concerns in the model regarding carrying capacity and suggested using a different model. The conversation would be continued outside of the PSRG meeting. Finally, the PSRG asked about scat analysis plans, to which Melin responded that they are looking at some data, including individual prey identification and repeat sampling of individuals.

U.S. Fish and Wildlife Service Updates

Northern Sea Otters

Teal Waterstrat from U.S. Fish and Wildlife Service (USFWS) – Seattle provided an update on the status of the Washington northern sea otter stock abundance trend and distribution. He reviewed the primary range of the stock and the current abundance estimate. The current minimum population estimate is 2916 otters, and trend was increasing by approximately 10% per year from 1989-2022. Waterstrat then reviewed the 2022 surveys and distributions, and noteworthy observations including large rafts (e.g. ~700 otters), incidental observations and concentrations. He then reviewed the stranding and mortality of sea otters, presenting graphs on annual strandings, average monthly strandings, and the 2022 stranding reports in Oregon and Washington. Finally, he presented maps of carcass recoveries over the past 2 years and summarized the 2022 mortalities.

The PSRG asked for sources of mortality, to which Waterstrat responded that when the cause of death (COD) is determined, most seem to be from disease, and a few have been from shark bites; however, in most cases, the COD cannot be determined. The PSRG then discussed the survey design and the plans for future surveys. Waterstrat noted that they would like to conduct larger offshore flight legs, and that he is interested in exploring new methods with partners. Clark then added that they need to move to some sort of sampling approach and come up with better population estimates.

Southern Sea Otters

Lillian Carswell from USFWS – California provided an update on the status of the southern sea otter. She noted that the final SAR published June 2021, with a flat population growth trend from 2015–2019. There is continuing high mortality due to shark bites, especially at range peripheries, and there has been no sustained range expansion for approximately 20 years. The population estimate is approximately 3,000 animals, which is well below the OSP value (CA only) of 10, 236 (Tinker et al. 2021). They plan to complete the stock review in 2023 and have a draft SAR for 2024 PSRG review. Carswell then reviewed the stranding information, and noted that where the cause of stranding (COS) could be concluded, shark bites were the primary COS. She also noted several uncommon strandings involving a crayfish trap and a monofilament entanglement. Carswell then transition to the congressional directive the USFWS received to study the feasibility and cost of reestablishing sea otters on the Pacific Coast of the contiguous United States, and to report to the Committees on the results of such a study within one year of enactment of the Act. To address this directive, USFWS published a Feasibility Assessment in 2022, which considered N. CA and OR and concluded that reintroduction is feasible. The assessment also outlines next steps in the process, and the response to a petition from the Center for Biological Diversity regarding reintroductions. In addition, the USFWS received a petition to delist the southern sea otter DPS. The USFWS published a 90-day finding in 2022 that the action may be warranted, but a 12-month finding is the next step and is expected to be published in September 2023.

The PSRG asked if any consideration has been given to a source population of the translocations, to which Carswell responded that all potential options have been outlined, but no decisions have been made. She would advocate that southern sea otters be the source for northern CA and Oregon.

Southwest Fisheries Science Center Updates

Science Overview

Dave Weller, Division Director of the SWFSC Marine Mammal and Turtle Division (MMTD), provided a background document outlining the 2022 accomplishments and the 2023 priorities for his division (PSRG_2023_B27). He presented on the ongoing operational updates for FY 2023 including an overview on budget and hiring and the need for strategic planning focused on prioritizing and deprioritizing elements of the MMTD science portfolio. Weller also presented future considerations related to: (a) shifting baselines in light of climate change, (b) the onset of offshore wind energy development off the West Coast and its influence on research priorities, (c) difficulties with securing NOAA ship time, on a regular basis, for marine mammal assessment surveys, (d) the need for required upkeep and modernization of the SWFSC/MMTD marine mammal and turtle tissue archive that contains nearly 200,000 samples and (e) the evolving use and operationalization of new technologies by scientists in MMTD.

The PSRG asked about the apparent decrease in the number of MMTD staff over time, to which Weller responded that increasing labor costs combined with a targeted base budget allocation to labor ratio do not allow 1:1 backfills of vacant positions. Therefore, MMTD has shrunk in the number of staff over the past 5-7 year period. He noted that the decreasing number of staff has resulted in the emergence of reported 'burnout' for some employees, but despite this concern, MMTD has remained highly productive in terms of conducting research in the field and laboratory and producing peer-reviewed publications.

Upcoming Pacific Marine Mammal Survey Cruises and Priorities

Jeff Moore from NMFS SWFSC provided a brief overview of the schedule of survey cruises including the California Current Ecosystem Survey in 2024, which will largely be funded by BOEM. The Navy has indicated that they are likely to contribute some funding as well. The Lasker will be contributing to a survey in the Pacific Islands this later this year.

The PSRG asked how the Science Centers work together in terms of ship time for marine mammal surveys and who decides on the ship times. Moore responded coordination with the Navy occurs to schedule 5 year rotations and that recently Moore and Erin Oleson from PIFSC work together at the program-level to inform their respective Centers and headquarters of their ship needs and plans. The hardest thing to coordinate is the lack of ships and ship time. The PSRG then asked about BOEM's interest and whether it is tied to wind energy, to which Moore responded that it is. There is a lot of wind energy development and BOEM is working with NOAA to help understand impacts of their development on protected species; potential species impacts are driving BOEM's interest.

SPLASH-2 and Central America/ West Coast Humpback Research Updates

Jeff Moore provided an update of the SPLASH-2 project. He provided a brief background of SPLASH (original) and the goals of SPLASH 2, as well as a description of the steering committee and objectives. Moore provided a perspective from the NOAA's U.S. West Coast and the questions and data gaps that

are driving the project goals. He also provided a list of accomplishments and activities including workshops, grants, collaboration for photo sharing, field work, analyses, and abundance estimates. The Central American DPS abundance estimates are being updated, which will be discussed in Alex Curtis's presentation. Moore finished his presentation with a short description of a non-related but relevant humpback whale study that presents a modeling approach for studying predator-prey relationships (Szesciorka et al 2022).

The PSRG requested clarification on the Hawaii animals, since the results seem to convey that they are mainly from Southeast Alaska. Moore clarified that while a lot of the SE AK animals go to Hawaii, not all animals in HI are from SE AK. Additional questions regarding humpback whales were paused until after Curtis's presentation.

Update for Abundance of Humpback Whales Wintering in Central America and Southern Mexico

Alex Curtis from NMFS SWFSC provided an update on the abundance and trend of humpback whales wintering in Central American and southern Mexico using mark-recapture analysis of fluke IDs in the wintering area. A previous assessment (PSRG_2023_B08) included data from 2019 to 2021 (the first year of the SPLASH 2 effort in Central America), while the update includes data from the second year of the SPLASH 2 effort, 2022. She noted two complications driving the choice of spatial capture-recapture methods: variable effort in time and space, and individuals not homogeneously mixing over the study area. Additionally, there is uncertainty in the northern limit of the wintering area of this population. New data from SPLASH 2 substantially augmented recaptures. Curtis explained how she used these data to estimate abundance, and reported that the draft updated population growth rates remain low or flat, in contrast to the overall growth rate of the U.S. West Coast abundance. She noted that two further data streams will be incorporated before finalizing the update: (1) effort data, to improve inference on population size and differentiate variation in effort from variation in spatial density of humpback whales, and (2) data from the vicinity of the uncertain northern boundary, to see if that provides additional insight into that boundary and to evaluate the effect on the population estimate.

The PSRG asked what the estimate was being compared to for trend estimation. Curtis explained that trend estimates are based on comparison to estimates from the original SPLASH data from 2004-6.

The PSRG then asked about the sex heterogeneity in recapture probability and if that has to do with different spatial mobilities of males versus females and whether that could be evaluated. Curtis explained that sex heterogeneity was estimated from relative capture frequencies in the wintering area of animals whose sex is known from biopsy samples off the US west coast. She stated that recapture numbers of known-sex animals were small within the three-year dataset used in the model for supporting direct incorporation of sex heterogeneity, so she was using information from a longer period of times to inform the heterogeneity through a post-hoc correction factor.

The PSRG then asked about the sensitivity of the model to the prior for the space use parameter, sigma, which skews the effective prior for capture probability. Curtis clarified that she explored variation in the bounds of the prior and did not find sensitivity. She explained that a large upper bound to the prior for sigma was chosen to make sure that the burden of proof was on existence of spatial association to support using a spatial model. The PSRG suggested to Curtis that she evaluate the impact of using a different distribution for the prior.

The PSRG then asked what data collection is needed for these stocks. Curtis responded that it would be helpful if there were two years (not just one year) of concerted effort at a time, and that if only one area was to be focused on, it should be southern Mexico.

Updates on SAR-Related Genetics Projects at SWFSC

Karen Martien from NMFS SWFSC presented on several genetic projects including, updates to the epigenetic aging of Main Hawaiian Island (MHI) false killer whales (FKW) project she presented on last year. She is developing a model using non-genetic influences on gene expression by 1) selecting animals of known age, 2) estimating methylation levels of those individuals at many CpG sites, and 3) estimating parameters of a linear model that predicts age from methylation profile. The results are from 94 samples from 78 individuals. The Bayesian model allows you to take into account the full distribution of estimated age probability distribution and can be compared to the LASSO regression results. The full model and results will be presented at the NOAA 'omics journal club on March 21st and any PSRG members are welcome to join.

Martien then moved onto humpback whale migratory herd genetic characterization, which she presented on last year and hoped to have results to share at this meeting, but unfortunately does not. She gave an overview of the background and provided an update that they are now working on using a nuclear marker, which has expanded the geographic scope. They have outsourced this project and gotten some results, but there have some been some challenges and the results haven't been a huge success.

Martien then described gray whale microbiome and epigenetics projects, which are both being led by Aimee Lang. The microbiome project is a pilot project, so they are starting out trying to explore the spatial and temporal variability in skin microbiomes for gray whales to see if this might be a useful marker for looking at things like population structure and migratory movements. The data will be analyzed this summer and an update can be given at next years' meeting. The epigenetics project will be used to estimate gray whale age, which will be helpful in understanding internal vs external recruitment into the Pacific coast feeding group (PCFG), and can help in genetic assignments of parent – offspring relationships.

Martien mentioned that the SWFSC lab is leading a citation genomes project, which is a big collaborative project to try and generate reference genomes for 93 cetacean species. The initial effort is to try to get representatives from all of the different families. They currently have good taxonomic coverage, with many species being complete, and the false killer whale currently in progress.

Finally, Martien provided an update on the new subspecies of bottlenose dolphins in the eastern tropical Pacific (ETP) based on morphology, a paper in review redescribing long-beaked common dolphins as *Delphinus bairdii,* and a taxonomic revision of killer whales showing that resident and Biggs killer whales are different morphologically, acoustically, and genetically from each other and from the rest of the global population.

The PSRG asked about the number of CPG sites and if an array was used. Martien stated that they had eight loci across the 207 CPG sites although some were not included in the model for quality reasons so we did not use an array. We can also tell what CPG sites are contributing most to age, also 4 of the 8 are contributing most of the information.

The PSRG asked how portable the methods are, to which Martien responded that they are very portable and they plan to develop a new method that will be applicable for a variety of species, including Lang's gray whale epigenetic project and age estimation in FKW.

Update on Gray Whales

Aimee Lang from NMFS SWFSC provided an overview of the gray whale UME, which has been ongoing since 2019. The number of strandings reported for 2023 are still quite low, but are expected to increase along the US west coast during the northbound migration. We plan to reassess the UME's status later this year once we have data from the calving season in Mexico, and the results of the 2022/2023 abundance and the 2023 calf production surveys. She then described the upcoming planned gray whale surveys, which include a spring 2023 calf production survey that follows the 2022 survey, which showed calf production to be the lowest since monitoring began in 1994 and an abundance survey that will be conducted during the 2023/24 southbound migration. Typically we do two abundance surveys every five years, and the planned 2023/2024 abundance survey will be our fourth in five years. The increased survey frequency is a response to the need for continued monitoring given the recent decline in abundance of the eastern North Pacific gray whale population (16,650 whales in 2021/22) that has occurred during the UME. Finally, Lang provided an update on the Russian gray whale project and the recent reports of gray whales using the Sakhalin feeding grounds.

Trevor Joyce from NMFS SWFSC introduced a collaborative project that has been in development since 2019 as part of a longer term vision of incrementally building the operational and analytical tools necessary to safely and cost effectively conduct UAS transect and mapping surveys as a way to potentially increase the future quantity and quality of information on marine wildlife density and distribution patterns. We used fixed wing UAS to estimate the detection rate and density of migrating gray whales, and compared the aerial survey detections with visual survey detections and with the number of blows recorded on a fixed thermal infrared camera system, which may provide information on gray whale group sizes. He then transitioned to discussing a study of the role that sea ice potentially plays in gray whale reproductive variability, habitat use, and phenology, which may help to better understand the drivers of high inter-annual variability in the Piedras Blancas Calf Production time series. One hypothesis is that extensive sea ice in some years may physically delay gray whale access to foraging hotspots. The results of the current study showed an important role of sea ice in gray whale distribution, habitat use, and phenology; however the acoustic data also revealed a relatively consistent 10- to 15-day lag between ice breakup dates and the timing of acoustic onset.

Josh Stewart from NMFS SWFSC provided an overview on the integrated population model updates from the last PSRG meeting. Results are still showing significant population fluctuations, with busts that align with UMEs followed by remarkable booms or recoveries. By separating out anthropogenic mortality, we have evidence that human interactions do not increase during UMEs; they are driven by natural mortalities. The model matches data showing that stranding detection has significantly increased since the 1990s, which is used in estimating an annual carrying capacity (K). Since last year's update, which used a proxy for prey abundance, now we have data from benthic crustacean time series, which shows a remarkable correlation between crustacean biomass and fluctuations in gray whale population dynamics. We can now estimate both annual K and a long-term average K, to be able to compare time periods.

Peter Mahoney from NMFS AKFSC presented on the recent trends in abundance of PCFG gray whales since 1998-2020. There are plans to update this through 2022 or 2023 pending data availability. The updates include tracking survey efforts and expanding body condition estimates through UAS to implement into abundance estimates in the future.

Joyce ended the presentation with an overview of a project working with WildMe to develop several algorithmic approaches to match gray whale lateral photo ID images using the Flukebook platform. The main objective of this project is the development of a web-based AI matching capability that will help in rapidly identifying gray whale individuals, particularly from the PCFG, and in the future, for the WNP population.

The PSRG asked about gray whales that might be missed in the annual counts during the southbound migration because some whales do not migrate. Lang responded that the abundance estimate only includes animals that migrate south, but in the future they can consider ways to increase our understanding of whether some of the fluctuations in abundance could relate to not all animals migrating every year. The PSRG mentioned that sounders or acoustic recorders could be used to detect the whales that stay north, to which Lang agreed but noted they had not looked at that yet.

The PSRG then asked about the photo ID effort and if there is a correlation between the number of Western gray whales vs the abundance estimate for the southbound survey. Lang responded that they have not seen an apparent correlation, but it has not been looked at quantitatively. The PSRG then asked a related question about the disconnect between PCFG abundance trends and the overall Eastern North Pacific and how it is not surprising given the abundance of PCFG whales is low.

The PSRG then expressed their appreciation of incorporating PSRG recommendations about this work in the past, and this is really nice work and good collaboration with others. Stewart commended Tinker of the PSRG for his insight and help in the carrying capacity issue.

The PSRG asked about the lack of a shift in distribution of feeding in the Arctic due to sea ice cover, and if long term datasets from the Northern Bering Sea had been incorporated, and what was the feeding distribution in the Arctic. Stewart noted that long-term datasets are limited to historical hotspots, and the newer data from the N. Bering Sea was not incorporated because that was historically a lower quality feeding habitat, with only recent evidence of increasing importance. Joyce added that from the aerial data there is not a long term record to look at shifts in feeding; however, a noticeable shift around 2015 in the Barrow Canyon area (from the N. Bering Sea area) occurred and they could look into that further.

The PSRG then asked if NMFS was getting information about condition from Russian hunters to which Lang responded that they had not.

The PSRG asked why the deviance explained was constant across the models in the table. Joyce responded that it was not mainly the RAC term but instead it was the spatio-temporal tensor product spline term that was absorbing all the variation that was being accounted for by the sea ice terms in the other models. This “null” model with only spatio-temporal and RAC terms has the same deviance but requires many additional parameters to explain that variability. The PSRG followed up with a question about whether ice-free days convey a weaker relationship (compared to sea ice metrics focused specifically on the spring/early-summer period of sea ice retreat). Joyce concurred and explained that

the whales appear to be tracking the opening of the ice, but at a 10-15 day lag. The PSRG followed up asking if the quality of the prey decreases over the season; why is there a tight relationship at the beginning but not the end of the season. Joyce explained that the data is only from 2 mooring locations, so it could be locations specific. He continued that the whales are also in a different energetic state at the beginning of the season due to returning from a long distance migration, so they are more likely to respond more closely to prey access during the opening of the ice vs during fall/winter advance of sea ice.

The PSRG asked how the carrying capacity estimates compared to the classical stock assessment model. Stewart responded that from the model structure, it allows the covariance to have an impact on vital rates, and the abundance trends and abundance rates are much less constrained from some other classic stock assessment models. It was commented that a comparison with stochasticity could be very interesting.

The PSRG asked if there was any idea on what would cause the drop in abundance in the PCFG that occurred right before the UME. Because calf production within the PCFG is variable and clumped and has been low in recent years, it may be a prey-related link that's causing it. Mahoney stated that he did not have any additional insights but it may be a reason to take a more nuanced look at the way we model the PCFG abundance in the future by updating the model and taking more of an integrated modeling approach. He also mentioned that he is anxious to see the data from the last 2 years and what information that may provide.

The PSRG asked about recruitment into the PCFG and if it is due to successful calving and maturation, and if they are recruiting into the same cohort as their mother or is it external recruitment? Calambokidis responded first saying that that is the key question and that genetics is going to be helpful for looking into this, but there may also be come external recruitment. There are efforts to identify animals as offspring of PCFG whales, and matching the PCFG catalog to the Mexican wintering ground catalog.

The PSRG asked about climate adaptation, noting that the benthic fauna data seems valuable, so what is the plan going forward and the status of the data collection to develop predictive models. Stewart noted that the Distributed Biological Observatory (DBO) collects that data every year and will continue to be collected; however, there is a lag in the data processing. He would like it if someone could do predictive modeling and tell us what it would look like in the future and then he could plug the future predictions into the population dynamics model, but that is the hang up.

Update on Status of the Northern CA - Southern OR, Central OR, and Northern Oregon-Washington Stocks of Harbor Porpoise

Karin Forney from NMFS SWFSC presented updated abundance estimates for harbor porpoises off Oregon and Washington, based on marine wildlife aerial surveys conducted during summer 2021 and 2022. The surveys primarily targeted leatherback turtles, but also systematically record pinnipeds, cetaceans and other species. The survey coverage was fine-scale but heterogeneous, preventing the use of a design-based line-transect analysis to estimate abundance. The large number of sightings, however, allowed Forney to develop a habitat-based density model to estimate abundance within shelf waters of Oregon and Washington. A new Central Oregon harbor porpoise stock has been proposed based on genetic, in the northern region of the Northern California - Southern Oregon stock. The habitat-based

density model allowed Forney to estimate abundance for all three stocks found of Oregon and Washington, with variances are similar to past estimates. Forney explained the BOEM is planning to fund additional aerial survey work in this region to assess leatherback habitat use, and with additional data an updated model can be run to include full variance propagation throughout the stock ranges.

The PSRG asked about some of the covariates. They specifically asked if Forney had evaluated any other bathymetric covariates that might be driving abundance or related to prey. Forney responded that she ran rugosity (i.e., the standard deviation of depth), but it was over-specified and caused problems in the model. The PSRG also asked if anthropogenic noise was a concern as a covariate, to which Forney stated that it is not known to be a concern in this location. The PSRG asked about the effects of water quality and turbidity on detecting harbor porpoise, to which Forney explained that the porpoise have to be right at or just below the surface to be detected. Drone work might provide an opportunity to re-assess the estimate of trackline detection probability, which was last estimated by Laake during the 1990s. Finally, the PSRG asked if leatherback sightings might be confounding harbor porpoise sightings, to which Forney explained that leatherback turtles are quite rare. In some locations, large numbers of ocean sunfish could potentially interfere, but in that case the survey protocols are simplified to record abbreviated sunfish information more quickly (note: ocean sunfish are jelly predators that often co-occur with leatherbacks).

Sources of Human Related Injury and Mortality for U.S. Pacific West Coast

Jim Carretta from NMFS SWFSC provided several review documents regarding sources of human related injury and mortality to marine mammals. These were reviewed with the PSRG, including new sources: harbor seal death in a river otter trap and a humpback whale entanglement and release from an experimental CA box crab pot trap fishery.

The PSRG asked if there is any methodological explanation for the large increase in detected humpback whale mortality and serious injury due to pot/trap entanglements starting in 2014. Forney noted that the increase was related to the marine heat wave, which moved humpback prey and distribution inshore. Calambokidis, from the PSRG, added that the heat wave is only part of it, and that CA restrictions to pot-trap fishery is reducing the risk since injuries have decreased.

The PSRG asked what factors led to the increase in injury by unidentified fisheries. Carretta stated that it reflects multiple factors, but that in order to be identified to the fishery, good photos or gear recovery is needed. He also noted that there are more reports of interactions, some of which cannot be identified, because there is more awareness. Lawson also mentioned that his team at the WCRO is looking into how to address unidentified gear through improving gear marking throughout the West Coast.

The PSRG asked about observed vs unobserved entanglements and how this can be changed over time, and could this actually be an observation of trends in reporting vs trends in mortality. Carretta stated that he has thought about this a lot and we currently do not have the answer.

The PSRG asked when the take reductions teams formed, and if there was one for pot fisheries. Lawson added that in 2015 a CA stakeholder working group became a management program in 2018 (OR and WA have similar working groups). All states have contributed to a section 10 plan for Dungeness crab fisheries, but have not convened a take reduction plan yet. Long added that a TRT is redundant once a state has a section 10 permit.

The PSRG asked if there was a change in the number of boats in the water during covid that can be seen in the plot, to which Carretta state there is not.

The PSRG asked if these are just state managed, or state and federally managed. Lawson responded that most pot fisheries are state managed (although 1 is federally managed), gillnet is managed by both, and some are unknown.

R-Package SeriousInjury

Carretta provided an update on using serious injury narratives to generate probabilistic assignments of the health status and whether or not an animal was seriously, injured or not seriously injured. This has evolved into an R package, and we have much more data than last year. Carretta explained the definition of known outcomes, some of the reasoning behind the algorithmic approach, and the need to train others on this R package. He encouraged everyone to test the R package available on GitHub and suggest ways to improve it.

The PSRG asked if there is evolution of the algorithm over time due to changes in language or types of injury - being based in the English language could be a weakness; can it be tested every year. Carretta responded that updating the narratives is easy to do but not many changes in injury narratives are apparent over time, since the types of interactions that result in whale injuries is fairly limited.

The PSRG expressed concern about automatic classifications and asked if there is an effort to bifurcate the methods into different levels by priorities. Carretta noted that they are cognizant of how people use language and the algorithm is compared to a human assessor where currently there is about 7% of the time when they do not agree.

The PSRG expressed concern about people gaming the system (via manipulation of injury narratives) and the idea of taking something that has 3 outcomes and combining to 2 and how that impacts sensitivities. Carretta responded that the decision points are published in the federal register, and evidence of manipulation attempts has not been seen. Forney clarified that serious is based on the NMFS definition of serious injury, or “any injury that is more likely than not to result in mortality, or any injury that presents a greater than 50 percent chance of death to a marine mammal.” Patterson noted that there are discussions about how to implement this tool more broadly in NMFS.

The PSRG asked if there are only 2 known outcomes (alive or dead). Carretta clarified that yes, those are the only 2 categories for known outcomes; however there are covariates to consider. He also noted that the probability of being documented in the positive (survival) may be different from the probability of documenting the known outcome to be negative (dead). The PSRG noted that there could be a higher rate of false positives, especially as resighting rates increase.

West Coast Region Management Updates

West Coast Region updates

Dan Lawson from NMFS West Coast Regional Office (WCRO) – Long Beach, CA provided an update on current management issues along the West Coast, including whale entanglements, fisheries, vessel strikes, aquaculture and offshore wind, MMPA Section 120, Guadalupe fur seals, gray whales, Makah waiver, and SRKW updates.

- Reports of whale entanglements have increased from prior years, including the instances of unconfirmed reports, but they are still less than the peaks observed in 2015 and 2016. A large number of the entanglement reports involve humpback whale stocks, and when the gear can be identified it is most commonly associated with the commercial Dungeness crab (Dcrab) fishery that occurs in all three West Coast States.
- Efforts to reduce entanglements in Dungeness crab fisheries include depth and gear limit restrictions, and delays in the opening and early closure of the CA Dcrab fishery. There was also a Pacific Fishery Management Council gear-marking workshop to help advance the conversation about improved gear marking to reduce the number of entanglement that are not attributed to a specific origin. Tristate coordination on the development of Conservation Plans for the State Dungeness crab fisheries is occurring, and updated drafts are expected from most/all States in 2023. Progress is being made towards meeting short-term and long-term goals under the Pacific Ocean Cetacean Take Reduction for the CA drift gillnet fishery, with only sperm whale takes exceeding PBR. Related to CA drift gillnet activities, it was noted that observer coverage effort is at 21%. The fishery council recommended a hard cap rule for closing the CA drift gillnet fishery, which is still in process, although the driftnet modernization and bycatch reduction act signed by President Biden in December 202, which institutes a 5-year phase-out of large mesh drift gillnet in federal waters off CA and adoption of alternative fishing practices that minimize incidental catch of living marine resources, may negate the need for the hard cap rule. In addition, within the DGN 2021-22 fishing season, 2 short beaked common dolphins, 1 northern right whale, and 1 CA sea lion were observed taken, with pingers were functioning adjacent to observed interactions.
- Reported vessel strikes are at similar levels to the past several years, and gray whales are the species of cetacean most often struck. It was noted that the lawsuit regarding ESA consultation on the traffic separation schemes in San Francisco and LA/Long Beach was vacated by a federal judge, but next steps are not clear. NMFS recently denied a petition for mandatory vessel speed regulations along the U.S. West Coast. IMO adopted amendments to the TSS for Santa Barbara Channel and areas to be avoided.
- Offshore wind updates include designation of 2 wind energy area sites in CA; site characterization surveys and site assessment activities are upcoming after completion of informal ESA section 7 consultation with BOEM that includes mitigation and best management practices to avoid adverse impacts to marine mammals, and areas for exclusion.
- Aquaculture updates included several SoCal projects entering the consultation and permitting stages, with 1 large project expected to advance through these stages in 2023. It was noted that there is a NEPA process ongoing for an Aquaculture Opportunity Area in Southern California, with drafting of an EIS expected to continue through 2023.
- MMPA Section 120 activities include removal of 42 CSL at Willamette Falls since 2018, and 99 sea lions (53 SSL and 46 CSL) from the Columbia River Basin.
- The Guadalupe fur seal Research and Conservation Planning Workshop is planned for March 2023 and will involve over 20 participants from Mexico and the U.S. The goal is to discuss research, conservation, and management activities; review current GFS population status and other data; and evaluate the need for a recovery plan.
- A gray whale UME was declared in May 2019, and as of February 8, 2023, 613 strandings have been reported in the U.S., Canada, and Mexico; for which the cause for most is unknown.

- The Makah waiver update included the publication of the supplemental draft EIS and solicitation for public comments in July 2022. NMFS is currently working on publishing the Final EIS and Record of Decision sometime in 2023.If the AA denies the request, the process stops, and if the AA decides to move forward with the waiver, it then moves into the MMPA permit process, where again the request could be denied. It was recognized that the waiver process still has a ways to go before any sort of subsistence hunt for gray whales could be authorized.
- The SRKW management update included an overview of the stock's recent decline in abundance and risks relative to recovery; the priorities for the Species in the Spotlight, which are related to the 3 main threats to SRKW (vessel impacts, prey availability, and health-related considerations) as well as raising awareness and inspiring stewardship.

The PSRG asked if the Makah waiver was likely to be approved, to which Lynne Barre, WCR's Seattle Branch Chief, responded that she did not know because the decision makers are at the headquarters level, not the regional level. As for timeline, it's hard to know when the ESA and MMPA process will be completed, so she expressed her appreciation for their patience.

The PSRG asked about the salmon fisheries and whether the hatchery program would likely be shut down and what the bycatch was at (e.g. 30 individuals). Barre responded that there is small bycatch of ESA-listed salmon, and that they are still waiting on the decision from the judge as to whether the hatchery will be shut down. Calambokidis noted that that would have implications for both NOAA and killer whales.

The PSRG asked about entanglements and if the proportions of confirmed vs unconfirmed reports has changed over time. Lawson responded that unconfirmed reports have been around 10% of all reports over the past 10 years, although it has increased slightly over time.

The PSRG asked about the mandatory vs voluntary ship speed restrictions, and how with rising fuel cost, ships are slowing down to save money and there is concern that these slowdowns may be erroneously attributed to compliance with the voluntary slow-downs. They then asked if there was any insight into the reluctance of moving to mandatory slowdowns (since voluntary slowdowns are not as effective). Lawson responded that implementation is a major consideration and they need to weigh how much/many resources they will need vs what the current situation is. He also mentioned that there is still some uncertainty with the current state of collisions. Patterson added that with this and the efforts on the East coast related to North Atlantic right whales, the goal is to develop tools and apply them nationally to understand what the real vessel strike mortality is.

The PSRG then asked about the SRKW 1,000-yard approach rule and what the logistics consist of. Barre responded that this is a state bill under consideration in WA (not a NMFS initiative) and was a recommendation to create a commercial whale watch licensing system. It is still under review and revisions and the final form is still unclear. It has passed the WA State Senate and is currently with the House, so it's unclear whether it will be passed.

The PSRG asked if the crab fishery loss values (e.g. $10 million) are annual because at some point there might be a trade-off for investing in newer technologies to allow fisheries to continue to avoid that loss. Lawson responded that he thinks folks have considered and are still considering that, but there needs to be more investment and support from the fisheries, which we currently do not have enough of. But

NMFS and the State of CA, for example, are working hard on solutions, and will be keen to work with fishermen on these topics in the future.

Southern Resident Killer Whale Inbreeding Depression

Marty Kardos from NMFS NWFSC provided an overview of the effects of inbreeding on Southern resident killer whale (SRKW) fitness, components, survival and reproduction, and population growth, which is discussed in a paper that is currently in review. Killer whales were subject to anthropogenic activities that caused a severe decline in their populations. In the 1970s protections went into place and most populations in the North Pacific increased substantially; however, SRKW were an outlier and has had a flat population growth over the last 50 years. There are currently 73 animals in the population today, which is very similar to the population size in the early 1970s. The main threats are prey limitations, contaminants, acoustic disturbance from vessels, intra-specific competition with other killer whales and other marine mammals. In the past there was low statistical power to detect effects of inbreeding. Populations that are small tend to have really high inbreeding; this is sort of the fundamental genetic effect of small population size. Results show very low heterozygosity across their whole genomes, and such individuals are more likely to be homozygous for partially recessive deleterious alleles. This creates this phenomenon that we call inbreeding depression, where we have lower fitness among individuals that are more highly inbred. As a population becomes more highly inbred through time, we expect some cumulative fitness impacts that can sometimes, but not under all circumstances, reduce the population growth rate, and if the population growth rate declines to such an extent that the population declines it enters an extinction vortex – it enters a sort of infinite loop that can result in extinction in some circumstances. In order to alleviate a source of low power (few loci sampled (small sample size) because the population is small), we sequenced the entire genomes of 202 SRKW, and for comparison, we sequenced the genomes from smaller numbers of individuals from four other populations of killer whales, including Alaska residents, transients, Northern residents, and offshore individuals. We use the genomic data to evaluate recent demographic history and asked whether individual inbreeding reduces vital fitness components of SRKW using the long-term demographic data from the population. The take home messages are that both of the resident populations have had relatively small effective population sizes (less than 50) for a long time, over the last 150 generations ago or so, and that the transients have a much larger effective population size (approximately 75) of a recent evolutionary history. The SRKW have substantially higher average in breeding than any of the other populations in the sample. Kardos also shared results of the probability of survival to age 40 for both males and females: for males the least inbred individuals have a probability of 0.8 of reaching age 40, whereas the highest inbred individuals in the population, have a probability of 0.2 of reaching age 40. He then explained that they used an individual based simulation model to evaluate the effects of this observed inbreeding depression on future population growth, and the inbreeding depression scenario results in the population declining through time over the next 100 years. Anthropogenic effects were added on top of what was already a small population size, resulting in the population becoming a lot smaller and exacerbating the effects of inbreeding.

The PSRG asked if Kardos has looked into vessel strikes and how it is related to the inbreeding metric, to which Kardos noted that this is an unusual data set, but they do not fully understand the interaction between death by disease and vessel strikes to inbreeding.

The PSRG asked if there is any potential to do post hoc analysis of necropsy records to find commonalities in these cases. Kardos responded that he could potentially do that, but it boils down to what the molecular mechanisms of inbreeding depression are (like recessive lethal alleles). In this study system we do not know the effect of inbreeding on early life stages, so we could be underestimating the effect of inbreeding on survival. A lot of pregnancies are failing and it could be due to inbreeding depression.

The PSRG asked if he could look into an individual's level of inbreeding and compare the cause of death of the inbred individuals. Kardos noted that they could, but then the sample size would be very small and the statistical power would decline. The PSRG commented that statistically you would not detect it, but you could pull out some mechanisms and find a direction to look into.

The PSRG noted that inbreeding is a cultural cost of the social organization, and that 2 evolutionary ways to reduce inbreeding depression is by 1) purging alleles and 2) actually inbreeding avoidance. Did you see evidence of either? Kardos confirmed that they had looked at purging, and for any population (including this one) that has been small, there is genomic signatures of purging. Purging is inefficient and it will not eliminate the fixed deleterious alleles. With inbreeding avoidance we know a few instances of kin mating producing offspring. We do not have genetic isolation stopping gene flow, and they just do not interact with other populations. Outbreeding is the thing to support the population. We have not looked to see if inbreeding is occurring less than expected. But currently there are only 2 males doing the breeding.

Southern Resident Killer Whale SAR

Candice Emmons from NMFS NWFSC provided an overview of the SRKW current population trend and details of the births and deaths within the population, which led to a net change of -1 animals this past year. The current population size is 73, with the recovery factor set at 0.1 and a PBR of 0.13 animals. Emmons also discussed a recent paper that published looking at Dtag data to look at foraging differences between Southern and Northern resident killer whales. Future research, which will focus on vessel disturbance and impacts, monitoring the soundscape of inland waters, contaminant levels, and prey availability. Emmons mentioned that no new research will be conducted in 2023, instead they will focus on analyzing a backlog of samples.

The PSRG asked about the reasoning behind the decision to not collect new samples or conduct new research in 2023, to which Emmons responded that it is due to a lack of funding and staffing availability, as well as wanting to get through the backlog of samples they already have.

The PSRG also asked if the SRKW was still a Species in the Spotlight, which Emmons confirmed.

U.S. West Coast SARs

Jim Carretta and Karin Forney from NMFS SWFSC provided a summary of the Draft SARs for U.S. West Coast marine mammals. Each species that had an updated SAR this year was reviewed individually.

- SRKW
    - The PSRG asked if the recent entanglement of a killer whale was a transient, to which Carretta confirmed that it was a transient, confirmed by genetics.
- Harbor seal

    - The PSRG asked if Carretta was the lead on this species. Carretta responded that it is mostly led by Melin and he adds in fishery interaction information and formats it to fit within the SAR.
- Harbor porpoise
    - Northern CA / Southern OR stock
        - The PSRG asked about the use of stock-specific vs species-specific Rmax and being consistent with other species (e.g. humpback whales). Forney responded that the GAMMS advises to use stock specific information but agreed that this was worth more discussion.
        - The PSRG asked about the apparent decline since 2011 from Figure 2. Forney responded that there is no evidence of a change in population over time; it is basically flat with wide credible intervals.
    - (Proposed) Central OR stock
        - The PSRG asked if the introduction included information about this being a new proposed stock. Forney responded that the introduction references the genetic study on which the proposed stock is based, and there is also a NMFS memorandum (PSRG_2023_B25) that summarizes the rational for designating a new stock.
    - Northern OR / WA stock
        - The PSRG asked about the designation of some gillnets being identified as tribal, and some not. Forney responded that there are very few non-tribal fisheries in the area, and the designation is based on the reports reviewed by Jim Carretta.
- Sperm whales
    - The PSRG asked if acoustic detections were incorporated, to which Carretta responded that they were not; this was based only on visual detections.
    - The PSRG asked why the latest assessment is missing the Bayesian trend analysis and if there were plans to keep that going. Carretta responded that Moore and Barlow have not updated the analysis and he would need to check with them on the status of it. Carretta clarified his response to this question via email, indicating that the reason a new Bayesian analysis had not been completed for sperm whales is that we have not completed a survey of U.S. West Coast sperm whale habitat since 2014, thus, there is no new estimate for the 2018 survey, which only included nearshore waters.
    - The PSRG asked why 2 estimates were calculated (Bayesian and SDM), and which approach will be continued to be used. Carretta explained that with the Bayesian approach they did not have trend estimates and other parameters, and they want to be transparent about the methods, and this was the approach used for fin whales. The PSRG stated that the Bayesian would fit the data better since the CV is low and there are environmental variables at play, but Carretta noted that they only have Bayesian through 2014, and Forney mentioned that the Bayesian estimate does not capture some of the spatial trends, which is why both are shown in the SAR.
    - The PSRG noted that the trend line is pretty flat, and asked if the population was severely depleted in the 1950/60s. The SAR itself notes that whaling removed at least 436,000 sperm whales from the North Pacific between 1800 and the end of legal commercial whaling for this species in 1987. Of this total, an estimated 33,842 were

taken by Soviet and Japanese pelagic whaling operations in the eastern North Pacific from the longitude of Hawaii to the U.S. West coast, between 1961 and 1976 (Allen 1980), and approximately 1,000 were reported taken in land-based U.S. West coast whaling operations between 1919 and 1971. Carretta explained that the trend analysis reflected an increase of males in the CA current, and noted uncertainties about whether males are using the area more or if there is actual population growth. There is a lot of uncertainty with regard to the trend in this population, which is reflected in confidence intervals.

- Gray whales
    - Western North Pacific
        - The PSRG asked about the stock structure hypotheses getting renumbered in the IWC document, to which Carretta responded that yes they will.
        - There was discussion on stock migrations to different areas.
        - The PSRG gave a general recommendation to be consistent in using stock-specific or species-specific Rmax, and commended the use of species-specific Rmax here.
        - The PSRG asked if the UME was affecting this stock, to which Carretta responded that there is limited stranding data in this area, which is a blind spot. The zooplankton biomass paper citation will be inserted into the SAR once the paper publishes.
    - Eastern North Pacific
        - The PSRG asked about external recruitment into the PCFG. Carretta noted that he would need input from gray whale experts and could not answer the question.
        - The PSRG asked if there was any language about cryptic mortality in this update. Carretta responded no, but that the key message was that there were fewer carcasses/stranding events during a longer UME than the shorter UME in the past that had a higher abundance.
        - The PSRG noted an editorial comment about fixing the x-axis to be more uniform for the population trend figure, or note that there are gaps not shown on the axis.
        - The PSRG commented on the 2 PBRs in one SAR, with history on why a PBR was calculated for PCFG, since it was looking like it was going to be designated as its own stock, but that did not happen. It also helps inform the Makah waiver process. This brought up the question of what would happen if PBR was exceeded for the PCFG. The general consensus was that more debate would happen about the next steps.
- Blue whales
    - There was discussion on the divergence between mark-recapture and line-transect abundance estimates and how that seems troubling. A PhD student is looking at open population models to see whether whales are more widely distributed. There were issues with surveys; very little offshore surveys, the change in direction of the surveys that might have been moving away from blue whale migrations (affects mark recapture data and abundance estimates).

- Fin whales
    - The PSRG made a note about the population trend, that fin whales are more predominantly offshore, and the 2018 estimate shows upward trend despite lower effort of surveys.
- Sei whales
    - The PSRG noted that having no PBR signals no abundance estimate, but if you have PBR with old data, people tend to assume it's using recent data, which is misleading.
    - The PSRG discussed the uncertainty in the last trend estimate and how it is not a formal trend analysis since there are huge CVs, and that if you exceed 8 years it would require a new analysis. Also, the farther away you get, the more uncertainty there is, so you cannot assume a population is stable.
    - The PSRG asked if sei whales were sighted in the 2018 survey. Carretta explained that there were 4 sei whale sightings, but there is no estimate because of the survey had heterogeneous spatial coverage so no design-based estimate was possible. The PSRG requested that information get incorporated into the SAR.
    - The PSRG made 2 additional points: there might not be value in having PBR for this species, and that stocks may overlap between Japanese and American waters.
- Minke whales
    - No comments

Pacific Islands Fisheries Science Center Updates

Science Overview

Charles Littnan, Division Director for the Protected Species Division at PIFSC, provided an update on PSD budgets and the current ship survey situation. The budget updates included monk seal funds, species in the spotlight funding, and discretionary funds, and the types of projects that the money goes towards. PSD also received charter funding for research cruises through OST, and cetacean surveys through congressional appropriation bill, focusing on FKW fisheries interactions as the highest priority. Funds from the Inflation Reduction Act ($440 million towards fisheries) will be available for 5 years. Littnan also described some of the costs – some unexpected – like inflation, salaries, COLA, facilities expenses, etc. Littnan then gave an overview of the challenges with marine mammal surveys and the limited vessels and vessel capabilities, including the probable end of life of the R/V *Oscar Elton Sette* in about 5 years. We are moving away from reliance on white ships and moving more towards the use of charter ships. Littnan then transitioned to the topic of habitat loss and degradation at Lalo (French Frigate Shoals) in the NWHI, and provided an update from the workshop that occurred this week. He went over the main issue at Lalo with climate change, rising sea levels, and storm surges, and how the habitat will likely disappear in the next 40 years. So the focus for recovery is now on cohabitating with monk seals in the main Hawaiian Islands. A workshop report will be disseminated when available.

The PSRG asked about the ships available currently. Littnan responded that the *Sette* is PIFSC's primary vessel, but it is shared with other programs and line offices (e.g. NOS).

The PSRG asked how big of a problem entrapment on Lalo is for seals. Littnan responded that it's unpredictable and not trivial. Seals are more mobile/flexible/adaptable than sea turtles. There are approximately 2 or 3 lifesaving interventions each year for monk seals. The bigger issue is PCBs,

mercury, lead, and other toxins underneath the soil with erosion happening. Entrapments are a moderate risk to seals, but really detrimental to the turtle population especially as other habitat disappears and individuals come to Lalo and have to deal with these hazards.

Hawaiian Monk Seal Research Updates

Research Update

Stacie Robinson from NMFS PIFSC provided an update on toxoplasma research. She reviewed the modeling framework that she presented on last year, and then presented the results, which included a risk map for Hawaiian monk seals based on oocyst export into the watershed. These model results were then turned into an app where users can tweak the inputs to see what the risk is in a certain area. Robinson explained that she plans to hold a workshop with stakeholders and partners on how to use the app and apply it to management and other needs; use it as a scenario evaluation tool. She then mentioned the partnership with Hawaii Humane Society on a Pono Cat Campaign or Pet Parent Campaign, which encourages responsible cat ownership, minimize abandonment, etc. Robinson also noted that samples of seals with confirmed toxoplasmosis infection were sent for genotyping in order to put together the molecular epidemiology of toxoplasmosis in monk seals.

Robinson then provided an update on the 2023 field season, which will look different from past years because it will be an abbreviated season, called ARC (Assessment and Recovery Camps) light. The goal was to find innovative and more efficient methods to refine the survey design to optimize resources for conservation value and ensure long term data quality for monk seal monitoring and recovery. She explained that they have looked at the impact this would have on their long term data set and tried to maximize effort with a compressed timeline. French Frigate Shoals will have a normal, long season, while Laysan, Lisianski, and Pearl and Hermes Reef will be surveys for a few weeks throughout a 28 day cruise. We will rely on partners for Kure (DLNR), Midway (USFWS), and Niihau (Navy). The top priorities are going to be conducting life-saving interventions (e.g. entanglements, treat abscesses), documenting threats to survival, monitoring births and getting reproductive data, and tagging the weaned pups to continue having marked animals to be able to maintain a really high quality data set, while any mark- re-sight surveys will be conducted incidentally.

The PSRG asked if there were any instances of toxoplasmosis occurring in the serum, but the seal being asymptomatic, to which Robinson responded that in the entirety of the monk seal research, there were only 2 instances (approximately) where a seal had positive titers and was not dead. She noted that they are wondering about errors, but typically toxoplasmosis does not show up in the serum of healthy animals. Of note, females are more heavily impacted than males, which they are still researching, including potential differences in foraging areas. They hope to put instruments on adult females to study this this year.

The PSRG then asked for clarification on the epidemiology and whether NOAA was working on a vaccine for toxoplasmosis in seals. Robinson responded that they are not actively working on a vaccine, but there is more work on vaccines in general worldwide that they are staying looped in on. For the molecular epidemiology, Robinson said they are working with partners to look at genotypes and characterize toxo strains found in monk seals, look for patterns in the population based on what we find, and work backwards from there to identify any patterns in cat pathogen populations.

Finally, the PSRG asked if toxoplasmosis is a problem for Mediterranean monk seals. Robinson replied that they had not heard reports of it, but because the population is so sparse, and the opportunities for necropsies assessments, which makes it hard to identify the cause of death of seals.

Pacific Islands Cetacean Research Updates

Pacific Islands Assessment Efforts

Marie Hill from NMFS PIFSC provided an update on the bottlenose dolphin research in the Marianas Islands that occurred between 2010 and 2019. Across all of the effort, they had 47 sightings of bottlenose dolphins with more than 8,000 photos. The median group size was 7, ranging from 1 to 24 individuals. Hill's team collected 43 biopsy samples – from 40 individuals – and deployed six satellite tags during the small boat effort. From genetic analyses, using 15 females, 24 males, and 1 unknown, there is evidence of hybridization of bottlenose and Fraser's dolphins that occurred more than once. From photo ID data, they identified a total of 86 individuals, but based on the discovery curve, not all individuals in the population have been encountered yet.

The PSRG noted that some of the measurements do not seem to agree; it's considered a closed, small, isolated population, but the numbers seem to suggest immigration. For clarification, the study found that there is a small, island-associated population of bottlenose dolphins (throughout most or all of the island chain) that is at least partially separate from an existing offshore population evidenced by the genetic data. Because the surveys were primarily focused on the southern islands (Guam-Saipan), only those data were used for the photo-id mark-recapture analysis. That analysis supported the evidence that the population is small but also suggested that the population bounds extended beyond the southern islands study area, which is also supported by the satellite tag data from animals tagged in the southern islands.

The PSRG asked about distinctiveness of individuals and whether it's a constant change (i.e., if there is a change in one direction (e.g. less distinctive becoming more distinctive) or the other) and suggested using a theta that varies from year to year in case that is affecting abundance estimates. Bradford responded that data for this population are limited, but that this topic will be relevant for insular main Hawaiian Islands false whales to be discussed later in the day.

Amanda Bradford from NMFS PIFSC provided three assessment-related updates, starting with incorporating AI into the dolphin photo ID workflow, a project called Artificial FINtelligence. Automating photo ID is of high value, since PIFSC is responsible for assessing over 120 stocks of 25 cetacean species. The goal is to incorporate AI and machine learning to reduce or eliminate manual photo ID processing, including cropping, distinctiveness and photo quality grading, and matching and cataloging, and to establish online catalogs that will facilitate collaboration and data sharing with partners and the public. This effort currently focuses on short-finned pilot whales, spinner dolphins, and bottlenose dolphins. The 3 current activities include modifying the 'finFindR' dorsal fin ID algorithm, using Flukebook for automated photo ID and collaboration, and evaluating multi-species recognition algorithm. Bradford then reported on the progress and status of 'LTabundR', an R package for analyzing design-based line-transect surveys, which was developed with support from the National Protected Species Toolbox Initiative. Finally, Bradford provided an update on the status of the Hawaiian Islands Cetacean and Ecosystem Assessment Survey (HICEAS) that will occur this summer (2023), following similar surveys in 2002, 2010, and 2017. The goals are to collect visual and acoustic line transect data to estimate the

density and abundance of cetaceans throughout the Hawaiian Islands EEZ, and then to use those data streams along with opportunistic, photo ID, biopsy sampling and satellite tagging, to evaluate cetacean population structure and range. Ecosystem observations and seabird strip-transect data will also be collected. HICEAS 2023 is largely funded by BOEM.

The PSRG asked for thoughts on experiences using Flukebook or Happywhale for automated photo ID. Bradford noted that NOAA Fisheries users are currently largely using Flukebook outside of humpback whale studies and have been connecting with each other to assess shared needs and collaborate on seeking improvements. Bejder noted that it's challenging to upload data to Flukebook, and Bradford added that this should improve with upcoming updates.

The PSRG asked about the use of sail drones and noted that it would be beneficial to use those to collect oceanographic data. Oleson responded that sail drones are too noisy and interfere with the acoustic data collection, but they are using Seagliders, a profiling glider that is much quieter and can also collect oceanographic data.

The PSRG asked Phil Patton, a NOAA QUEST Fellow at UH who led the evaluation of the multi-species recognition algorithm, for his thoughts on the why there was so much variation in performance between catalogs of the same species, to which Patton responded that some catalogs are had stricter photo quality controls and that algorithm performance was higher for catalogs that did not include lower quality photos (e.g., with off angles or bad contrast). The PSRG followed up by asking if it would be possible to evaluate performance using different levels of quality filtering, to which Patton noted that it was possible and would be worthwhile to look into.

Passive Acoustic Assessment Efforts

Erin Oleson from NMFS PIFSC provided an overview on the updates and advances of PIFSC's passive acoustic research. These topics included:

- Acoustic monitoring of the longline fishery to identify and mitigate cues leading to depredation and bycatch of FKWs,
- Advances toward passive acoustic abundance estimation from towed array data,
    - New tools for multi-target (i.e. subgroup) tracking
        - modeling approach to localization using TDOA data
    - Assessing cue rate for sperm whales
    - Testing new FKW classifiers to discriminate between stocks
- Evaluating use of passive acoustic gliders for remote cetacean surveys,
- Examining species/stock distribution and vocal behavior using diverse PAM datasets,
    - Bryde's whale in the western and central Pacific
    - Distribution and calling behavior of unidentified beaked whale BWC
- Using DASBR data to assess abundance of Mariana beaked whales.

The PSRG asked where PIFSC would focus their efforts to try to detect the BWC. Jennifer McCullough responded that she would want to sit on the Navy range overnight and in the early morning given the capability to alert observers at sea of detections on Navy hydrophones. The whales have also been commonly at heard at Cross Seamount (hence its name) and the windward side of Hawaii Island, though

sea conditions in both areas make it difficult to survey there. All observations of BWC are south of latitude 29 N.

Spinner Dolphin Abundance & Age-Structure for Oahu & Hawaii Islands

Claire Lacey from UH Manoa Marine Mammal Research Program (MMRP) provided an update on the spinner dolphin research, including 1) abundance and demographics of spinner dolphins off of the west coast of Oahu (Liah McPherson's Master's thesis work), 2) abundance and distribution of spinners around Oahu and Hawaii Island (Claire Lacey's postdoctoral work), and 3) age structure of free-ranging dolphin using UAS photogrammetry (Fabien Vivier's PhD dissertation work).

1) The photo ID study by McPherson is being conducted off the west side of Oahu. The goals of this study include collecting photos of unique individuals for the photo ID catalog, to estimate abundance, and to estimate the age structure of the Waianae coast population. Results to date show 133 groups, 165 distinct individuals, survival rate of 0.94, low immigration and emigration rates, no seasonal patterns, seasonal estimates are 140 for winter 2022 and 367 for summer 2022.
2) The line-transect surveys include an inshore (out to 1.5km from shore) and offshore strata (1.5-5km offshore). Vessel surveys around the entire island of Oahu are complete. Results include 30 on-effort dolphin sightings, group sizes ranged from 3-82 individuals). While spinner dolphins were the target species, and observed most often, sightings of humpback whales, FKW, bottlenose dolphins, and spotted dolphins also occurred. The leeward side of Hawaii Island was surveyed with the same protocols, with the windward and north and south extremes surveyed by airplane. Results included 34 on-effort sightings, group sizes up to 200 individuals with the majority being under 50 individuals. Aerial surveys have not been analyzed yet, so all data presented is from vessels. The data from both islands was pooled to calculate the detection function for the line-transect analysis. Abundance estimate for Oahu is 507, and for Hawaii Island is 545 individuals.
3) Using UAS photogrammetry, Vivier is assessing the age structure of dolphins. The three main questions are: a) can accurate size measures be obtained from a drone, which preliminary results show are promising, b) are drone measurements sensitive enough to infer age class, which preliminary results show that they are, and c) does this method have sufficient power to detect if age structure within a population changes, which results are promising, but are still in progress, and more power analyses are being conducted.

Lacey then provided the next steps for each of the three projects. McPherson will be processing final Oahu field season data and UAS measurements to get age structures for Oahu west coast population, and then defending her thesis this summer. Lacey will be analyzing Hawaii Island aerial data and creating density surface models for both islands, completing photo ID analysis for both islands to study movement patterns, and will continue with data collection for other islands within the Oahu stock by collaborating with Pacific Whale Foundation. Vivier will be applying his UAS methods to other species (e.g. endangered population of bottlenose dolphins in Greece), and testing the feasibility of using UAS with species that are much different (e.g. blackfish, large whales).

The PSRG asked how flexible are the growth age curves for size-age classification to different populations. Vivier responded that the length is specific to the population, so we need more data to test

the accuracy of the system. The PSRG commented that this will be very powerful for future analyses to track within-population curves, which is exciting to see. Bejder noted that this has been documented for large whales, but not for small odontocetes. Baird noted that there is a paper about this by Durban and Fernbach.

The PSRG asked what is known about foraging habitat and movement patterns and are there any plans in terms of threat assessments for spinners. Lacey responded that the dolphins have cookie cutter bites so they are clearly going somewhere deep, so it is not a feeding concern; the main issue is probably tourism and human disturbance. Lacey added they do not have any plans to study that in the future.

The PSRG asked whether the research vessel has impacted the spinner behavior data given that spinners are impacted so heavily by vessel presence. Lacey responded that are not boat-shy and actually swim towards the vessels.

The PSRG asked how stable the group structures are using over time between sampling. Lacey responded that she is excited to look into this further because anecdotally some individuals are seen together a lot but they do not have the same social structure as killer whales, for example. Bejder added that Tyne's data showed 2-3 animals that were always seen together, but they would then join others to form larger groups, and those associations would vary. Lacey added that Lammers' paper also documented that.

The PSRG asked if the movement inshore/offshore and vessel presence is incorporated when producing the density distribution layer. Lacey responded that surveys are only during the day, but they look at other environmental variables like distance to feeding grounds, but she noted she would look into adding anthropogenic pressures.

The PSRG noted that there are uncertainty measurements from the UAS length measurements and that some individuals have been measures multiple times. They asked if there are levels of uncertainty based on the altitude of the UAS, and are the flights being varied in terms of group size in order to maximize the number of groups in each image. Vivier responded that they are confident they get full representation if they capture 60% of the group. If it is a smaller group, they fly to 25m to capture the entire group.

False Killer Whale Updates

Robin Baird from Cascadia Research Collective provided an update on false killer whale survey effort over the last 3 years. There were 33 FKW encounters, 30 of which were with the insular population. In 2022 there were 93 individuals identified. Since biopsy sampling started, 215 biopsy samples have been collected from 149 individuals. New analyses through 2021 showed 4 social clusters (compared to 3 clusters identified in the past). The social clusters off O'ahu are mainly Cluster 1 and 3, off Maui and Lāna'i it is Clusters 1 and 4, and Hawai'i Island is Cluster 1, 2, and 3. Based on satellite tag data, there is variation in spatial use for each of the clusters, in terms of depth and distance from shore used, and all four clusters are spending a fair amount of time on both sides of the islands (windward/leeward) rather than just one or the other. Future work includes a protocol for photo ID catalog-based age estimation for FKW, and assessing fishery interactions using dorsal fin and mouthline injuries and body condition.

The PSRG asked Baird to speculate on whether the differences in diet by the whales is due to resource use or ecological use. Baird responded that based on stable isotope and POPs there are differences, but

the next steps would be compound specific fatty acids to assess differences in diet, because there could be age-related and sex-related and social cluster-related differences due to habitat variability.

The PSRG asked why the conclusion is that there are no new individuals coming into the population. Baird responded that because of low birth rates, no discovery of new social clusters, new individuals are only 1-2 new individuals per year and they are usually a non-distinct individual that became distinct, he is confident the data reflects low recruitment into the population.

MHI Insular FKW Abundance Estimates

Janelle Badger from NMFS PIFSC provided an overview of the analysis she is conducting to produce updated abundance estimates for MHI insular FKWs. This ongoing effort will improve the stock assessment, including developing an approach that allows for trend estimation, and provide robust and updated inputs to the population recovery plan. This presentation included updates from last year's presentation.

The presented model – a pseudo-spatial mark-recapture model - improves upon the previous mark-recapture approach by incorporating animal availability into the abundance estimation. The process, called a pseudo spatial capture recapture model, involves:

- summarizing yearly survey effort,
- modeling animal space use from telemetry,
- determining overlap between the 2 processes, and
- use the overlap as a covariate for detection

The updated model informs availability to alleviate sampling bias, provided more precise and accurate estimates of abundance, and revealed a decline in MHI FKW abundance. The next steps include working out details to obtain cluster abundances, publish method and abundance results, continue updating with new data, and develop a continuous time, spatially-explicit model.

The PSRG asked if the distinctiveness trend was over 10 or 20 years. Badger clarified that it was over the whole time series. The PSRG asked if this was due to camera quality over time and if Badger was able to exclude other hypotheses like reduction in fisheries interactions causing a decline in the marking. Badger responded that photo quality and ability to capture clean fins has changed over time, resulting in more photos of non-distinctive individuals being taken and processed, but we are not able to piece out the fishery-related aspects. She deferred to Baird. Baird added that a reduction of distinctive individuals, or older animals, are resulting in that decline over time. The PSRG noted that it's not clear how the proportion of distinctive individuals declining is due to better quality. Baird noted that in the past, photos of clean individuals were not of high quality included due to camera limitations, and therefore were not included in the datasets.

The PSRG asked about the simulations: was tag duration included and was there a tagging bias (e.g. we tag animals we can see and there might be a bias in that only animals that come close to the boat are being tagged). So what would happen if we had information on individuals not closer to the boats? Badger liked the idea of including that in the future, and noted there are a myriad of factors to simulate. The PSRG noted that if this would be a method used to assess trend, then they recommend looking at all of the assumptions.

The PSRG expressed their approval of this approach and asked if Badger is straight averaging across individuals. Badger clarified that they get an effective sample size and they are accounting for that with the kernel density, not in the averaging step. The PSRG asked if each individual is contributing equally to the final average value. Badger responded in the affirmative. There were many clarifying questions about the methodology and discussion on approaches to take in the future.

The PSRG asked if Badger presumed animals are observed up to a kilometer and a half. Badger responded that the kernel density estimate is based off of that bandwidth. The PSRG noted their concern for the ability to see animals that far away. Baird noted that FKW often leap out of the water, and can be detected 2-3 km away, but that the entirety of the group could be spread over a large area.

The PSRG noted that the trend is troubling and asked if the PSRG should be looking at the trend as a real thing, or an artifact of something else. Badger confirmed they see a declining trend and it is real since it is based on analyses of different subsets of data. The PSRG responded that testing whether basic things are in agreement with the trend – in addition to all the covariates – would be beneficial. The PSRG also noted that it is important to include the age structure piece.

Proposed New Assessment Approach for Pelagic FKWs

Oleson presented on an urgent request for a recent need for assessing pelagic FKWs in order to inform the TRT on mitigation measures in the fishery. She provided background information: the most and best data on the Hawaii pelagic stock comes from within the EEZ; the pelagic stock boundary extends beyond the EEZ, but the SAR acknowledges that the assessment boundaries are the EEZ because that is where we have abundance and mortality data; we do not have enough data to really understand the population structure and we do not have the telemetry, genetic, distribution, and habitat data to delineate demographically independent populations (DIPs). We need to evaluate a new way to approach Hawaii pelagic FKW because the proportion of fishery effort (deep set longline) outside of the EEZ has been increasing. This spatial mismatch complicates how the stock is managed under the TRT. We say the PBR is based on the EEZ, abundance is 'x' and the mortality and serious injury is 'y' but that mortality and serious injury is an increasingly smaller fraction of the total impact on Hawaii pelagic false killer whales. A species distribution model can provide abundance information outside of the EEZ, and we propose to use the model to inform an assessment approach that incorporates what we know outside of the EEZ, enabling better management of the stock under the TRP. Oleson then provided a map that showed that fishing effort has shifted East and North over time. Serious injury and mortality estimates have been increasing over time. Oleson then provided insight into their current thinking by using information from the GAMMS which states that in the absence of robust data to inform DIPs the best available science should be used to divide a species' geographic range into areas that represent defensible stocks to serve as management units. She then described the information they currently have to use (genetics, telemetry tags, bycatch information, SDMs). Oleson then provided a summary of 2 possible approaches that demonstrate different ways of creating a management area: 1) use the region where the deep-set fishery most commonly operates (using a 95% kernel density estimate) to assess abundance, compute PBR, and manage this bycatch given it reflects a region with concentrated M&SI, or 2) incorporate what else we know about stock identity and the distribution of the pelagic stock to define a larger management area that also includes the deep-set fishery area. She posed the question: What area is the most appropriate (these proposed areas or something different) given the management concern and the data available?

The PSRG then had a lengthy discussion about how to move forward, with many clarifying questions and suggestions (e.g. fishing effort data, foreign bycatch information, not incorporating foreign data, potential for 2 PBRs, potential for a third option, etc). Ultimately, the PSRG decided they needed to discuss in a closed session but agreed that an area outside of the EEZ should be considered.

Update on Congressionally-Funded FKW projects

Oleson provided an update on the status of congressionally-funded FKW projects in a document.

A summary of the FY21 projects are:

Project	**Entity**	**Status**
Examine rates of empty hooks on each set as a proxy for depredation rate using the electronic monitoring system.	PIFSC- FRMD	Complete & Implemented
Examine hook corrosion rate and breaking strength from controlled studies.	PIFSC- FRMD	Complete
Assess and develop tools for safer handling of entangled whales.	PIFSC- FRMD & UH Department of Engineering	Ongoing
Develop and test a miniature camera system for use by fishery observers to document how a whale is hooked.	Cascadia Research Collective	Ongoing
Deploy telemetry tags on pelagic FKWs to examine interaction rates and response to longline vessels.	Cascadia Research Collective & PIFSC	Ongoing
Acoustic monitoring of the longline fleet to identify and mitigate acoustic cues leading to depredation and bycatch.	PIFSC- CRP	Ongoing

A summary of the FY22 projects are:

Project	**Entity**	**Status**
Assessing health & survival of FKWs with evidence of fisheries interactions		

Part 1: Examination of MHI insular FKWs with evidence of mouth hooking to evaluate long-term survival	Cascadia Research Collective	Underway
Part 2: Aerial photogrammetry for assessment of body condition to examine health impacts of prior fisheries interactions	Pacific Whale Foundation & UH Marine Mammal Research Program	Underway
Augmenting FKW abundance with towed array datasets		
Part 1: Complete multi-target tracking tools to enable use of acoustic encounters in abundance analyses	PIFSC- CRP & UH Ocean Resources Engineering	Complete
Part 2: Validate new classification algorithms for use with survey encounters without visual sighting	PIFSC- CRP	Underway
Examine foraging behavior of MHI insular FKWs to inform depredation mitigation strategies	Pacific Whale Foundation & UH Marine Mammal Research Program	Underway
Deploy telemetry tags on pelagic FKWs to examine interaction rates and response to longline vessels	Cascadia Research Collective	Ongoing
Acoustic monitoring of the longline fleet to identify and mitigate acoustic cures leading to depredation and bycatch.	PIFSC- CRP	Ongoing

There were no questions from the PSRG.

Mariana Beaked Whale Density Estimation

Badger provided a summary of ongoing efforts to estimate density of beaked whales in the Mariana Archipelago using DASBR datasets collected in 2018 and 2021. The analysis builds on those methods developed by Barlow and Moore and presented by Moore in 2021. She reviewed the methods used for past density estimates from Barlow et al 2021, which needs data on dive depth and echolocation depth generally obtained from time-depth recorder tags. There are no such data form the Marianas, so the approach is to estimate the required parameters using data from locations where tagging has been conducted. Badger explained they created a depth distribution from Hawaii data from CRC and from published data from other locations (e.g. southern CA, Cape Hatteras, and the Bahamas), and a developed a new approach for estimating dive cycle duration. These data have been used to develop distributions for likely echolocation depths and dive cycles for Mariana whales. Badger is currently

working through the other elements of the analysis and plans to have the final manuscript completed by August 2023.

The PSRG asked if any other species were detected besides Blainville's and Cuvier's beaked whales (identified or unidentified). Badger confirmed they did and Oleson noted there were 3 other species including Longmans' and the BWC whale.

The PSRG asked about the distribution of the DASBR deployments and their apparent skew to the west side of the Marianas Islands. Oleson explained that the map demonstrated data from 2 surveys, one in 2018 that was focused entirely on the west side, and one from 2021 that took place throughout the entire archipelago. Those differences in survey effort would be accounted for within the density estimation framework.

Serious Injury and Mortality for Pacific Islands Marine Mammals

Bradford went through the serious injury/mortality cases of Pacific Islands cetaceans from 2021 with the PSRG, noting the 3 review documents (spreadsheets), one that included Hawaii longline fishery interactions and 2 with from data from the response networks.

The PSRG asked for clarification on the location of the FKW takes currently being reviewed. Bradford clarified that they are all outside of the EEZ (since takes within the EEZ are reviewed by the PSRG as part of an expedited process) and that one of interactions was captured in one of the FKW videos that was previously reviewed in the closed session. Bradford mentioned that routine review of injury determinations by the PSRG can occur over email instead of at the annual meeting if preferred in future years.

The PSRG wanted to know how many of the 4 longline mortalities in 2021 were false killer whales; in follow-up, Bradford reported that there 2.

The PSRG asked if there was more information on humpback injuries from the Hawaiian Islands Entanglement Response Network that what was reviewed. Bradford noted that all of this information came directly from Ed Lyman, the Entanglement Response Coordinator, as they work closely on injury determination each year. Bradford speculated that the lower number of reports was likely a result of the pandemic.

Pacific Islands Region Management Updates

Dawn Golden, the new PIRO Protected Resources Division (PRD) Assistant Regional Administrator (ARA) introduced herself to the PSRG.

Elena Duke from NMFS PIRO provided an overview of the PIRO protected resources division management updates, which included:

- FKW interactions in the Hawaii longline fishery
    - A map of observed FKW interactions from 2013-present
    - A graph of FKW interactions by year, both inside and outside the EEZ
    - A table of the 7 observed interactions in the HI LL fishery in 2022 and the determination
    - A table of the outcomes of the interactions. The majority of interactions (~72%) resulted in the line breaking or the line being cut

- FKW TRT updates
    - The current M/SI (17) exceeds PBR (16)
    - The last FKW TRT was held in November 2022
        - Topics discussed: gear, deterrents, dynamic closures/management area, eMonitoring, O&E. Working groups were established to discuss each topic
    - Next meeting is March 28-31, 2023
- Other marine mammal updates
    - Protective regulations for spinner dolphins
        - Proposed rule for time area closures published in September 2021 and PIRO is still working on going through all public comments to be incorporated in the final rule

The PSRG asked if the takes of FKW occurred prior to the Southern Exclusion Zone (SEZ). Duke responded clarified that the SEZ only closes after a certain number of FKW takes occur; so yes, all takes were prior to the SEZ closure.

The PSRG reiterated their recommendation from the past 4 years of a need for the time area closures. They noted they would include that in this year's recommendations as well. They asked if there was a timeline for the final rule; this was not much of an update from last year since they are still doing the same thing they were doing then. Duke did not have a timeline and repeated the updates on the status that were presented in her talk.

The PSRG asked about the fractional effort between the short line and longline fisheries. They noted that the magnitude of the short line seems significantly lower, and with challenges in the way the state reports takes in the short line, they may not be recording all takes or they may get confounded (e.g. with mixed gear). Duke responded that a lot less hooks are being set in the short line fishery so there are less takes. On online comment from Jeannette Rossa from HI DLNR Department of Aquatic Resources (DAR) stated that there are only 4-5 short line fishers, so the amount of fish caught in this fishery is miniscule compared to the longline fishery, and the number of hook hours is orders of magnitude less. DAR will be presenting these info at the FKW TRT meeting. The PSRG requested the FKW TRT meeting notes once they are complete.

Monk Seal and Cetacean SARs

Littnan provided an impromptu overview of the updates in the Hawaiian monk seal SAR since that was not discussed yesterday during the agenda item. He went over all of the edited text in the document PSRG_2023_06.

The PSRG asked if the monk seal shootings were related. Littnan responded that that was unclear because they are all on the same coastline of Molokai but the shootings occur where the monk seals occur so it is hard to tell. There was one monk seal that washed ashore and it was unknown where the shooting occurred. The PSRG asked to confirm that it was not a reporting issue, to which Littnan confirmed it was not; it is the community self-policing. An online comment from Rosa stated that one of the killings was in a completely different areas than the others and that the majority of the community are against the killings.

The PSRG asked what happens in a case of comorbidity with toxoplasmosis. Littnan deferred to the veterinarian and noted it would depend on what the comorbidity was. The PSRG noted their surprise that it has not already happened/been documented. Littnan noted that if toxoplasmosis occurs in an animal, because we know it's so deadly, we would have toxoplasmosis as the sole cause of death.

Baird asked that since toxoplasmosis is included in the human caused mortality, does PIFSC think they are capturing 100% of the cases or doing anything to extrapolate to get to 100% of cases. Baird also asked about toxo in spinner dolphins. Littnan responded that they are not capturing all of them because the disease kills the animal so quickly and we lose animals at sea/not recovered, but we do document many of them. He noted that unknown cases of mortality are prorated, but in the SARs, the exact values are used. Oleson responded that toxoplasmosis in Hawaiian cetaceans has only been documented spinner dolphins and that a discussion of toxoplamosis will be included I the next spinner dolphin SAR.

The PSRG asked what would happen if we exceed PBR. Littnan stated that it would push them into action, whether that's a TRT or not, but ways to take actions to reduce the threat. He noted that he would ask Golden (PIRO) or Long (OPR) their thoughts. Long added that this is unique because the human-related injuries are not from a fishery like most TRTs, but there are current mechanisms to try to reduce the threat like the recovery plan that will be revised soon. Littnan added that creating a TRT at that point would be duplicative.

The PSRG asked about the population trends in the MHI vs the NWHI. Littnan responded that there is stabilization across both, which can be seen in the age-sex structure. In the MHI there is rapid growth, and would grow even faster if we could remove the threats (toxo, intentional killings, and fisheries mortalities).

Oleson provided an overview of the SAR updates for the 8 cetacean species that were updated in 2023. She scrolled through document PSRG_2023_08 for each species.

- *Bottlenose dolphins* – no questions from the PSRG.
- *Bryde's whale* – no questions from the PSRG.
- *False killer whales* – no questions from the PSRG other than a few clarifying questions about edits.
- *Pantropical spotted dolphins* – no questions from the PSRG.
- *Risso's dolphins* – no questions from the PSRG.
- *Rough-toothed dolphins*
    - The PSRG asked if there is evidence of depredation documented for this species. Oleson responded that they do not have evidence of the dolphin actually taking the catch, so they cannot be certain that it was from a rough-toothed dolphins, but could investigate this acoustically in the future.
- *Short-finned pilot whales*
    - The PSRG asked if dynamic variables were causing the decline in abundance for this species. Oleson clarified that there are no temporal terms in the model; they have tested whether the year term is significant for other species and it is not.
    - The PSRG asked if there are any models outside the EEZ, to which Olesons responded they do not have any models outside the EEZ for any species other than FKW. The PSRG asked to clarify that there could be a model based abundance estimate, but there isn't

one because it is a lot to produce one. Oleson clarified that there likely is adequate data available to produce model-based abundance estimates for outside of the EEZ for some species. Bradford asked if there were models where the spatial resolution was coarser, to which Oleson responded that they did not include the estimates because the modeling approach has evolved, but they can do that in the evolved models in the future.
    - The PSRG asked about island-associated populations. Oleson responded that they have not done a DIP delineation process for rough-toothed dolphins or short-finned pilot whales, both of which have evidence of separate island-associated populations.
- *Striped dolphins* – no questions from the PSRG.

The PSRG expressed their appreciation for all of the great work being conducted by all Science Centers and their presentations at this meeting. Calambokidis then opened the meeting up for public comments and questions.

Baird asked, in regards to longline fishery data that can be used to test the effectiveness of the measures being used, is there any information about violation of rules and is that information available for spinner dolphins. Kevin Brindock from NMFS PIRO stated that there are spots being monitored in order to evaluate the rules. Baird asked if there was concern about operators shifting their focus to other species. Brindock stated that they have looked at that and are continuing to assess that. Baird asked if information of the number of enforcement actions for spinner dolphins that happened in the last year is available. Brindock responded that he does not have those values and does not want to speak to anything further than what was in the media.

In reference to the earlier conversation about the pelagic FKW assessment approach, Brindock noted that due to the movements of FKW individuals and the fishermen themselves, it would be difficult for management to have 2 PBRs for 1 stock and to look at 1 stressor for the 2 areas. DeMaster responded by asking if they would be able to use the foreign fishery landing information in a ratio estimator calculation to estimate its impact. Brindock responded that he would be hesitant to use that information to get a take estimate for the foreign take. Oleson added that she would need to talk to the NMFS fisheries colleagues about the best approach given the available data. She also clarified that foreign fleets are not subject to measures implemented under the FKW TRT.

Calambokidis expressed his thanks again and closed the 2023 PSRG meeting.

Appendix A

Participant List

Pacific Scientific Review Group Members
C. Scott Baker
Simone Baumann-Pickering
John Brandon
Lars Bejder
John Calambokidis
Doug DeMaster
Matt Leslie
Rebecca Lewison (limited online participation)
Leslie New
Tim Tinker

NMFS Office of Science and Technology
Zac Schakner

NOAA Office of General Council
Jason Forman

NMFS Office of Protected Resources
Shannon Bettridge, Meghan Gahm, Ellen Keane, Kristy Long, Eric Patterson, Jaclyn Taylor

NMFS Pacific Islands Fisheries Science Center
Ann Allen, Janelle Badger, Yvonne Barkley, Jessica Bohlander, Amanda Bradford, Tia Brown, Brenda Becker, Selene Fregosi, Pina Gruden, Marie Hill, Shelbie Ishimaru, Thea Johanos-Kam, Charles Littnan, Laura McCue, Jennifer McCullough, Tracy Mercer, Erin Oleson, Stacie Robinson, Jenny Trickey, Rebecca Walker, Kym Yano

NMFS Southwest Fisheries Science Center
Eric Archer, Robert Brownell, Jim Carretta, Alex Curtis, Karin Forney, Brittany Hancock-Hanser, Trevor Joyce, Kristen Koch, Aimee Lang, Karen Martien, Jeff Moore, Josh Stewart, Dave Weller

NMFS Northwest Fisheries Science Center
Candice Emmons, Martin Kardos

NMFS Alaska Fisheries Science Center
Amelia Brower, James Freed, Nancy Friday, Peter Mahoney, Sharon Melin, Tony Orr, Nancy Young

NMFS West Coast Region
Lynne Barre, Laura Casali, Christina Fahy, Dan Lawson, Hanna Miller, Chiharu Mori, Lauren Saez

NMFS Pacific Islands Regional Office
Kevin Brindock, Kristina Dauterman, Nicole Davis, Elena Duke, Dawn Golden, Krista Graham, Joshua Rudolph, Chuck Wheeler, Zachary Yamada

Marine Mammal Commission

Dee Allan, Dennis Heinemann, Laurie Leach, Lori Schwacke, Peter Thomas

Western Pacific Fishery Management Council
Asuka Ishizaki

U.S. Fish and Wildlife Service
Lilian Carswell, Teal Waterstrat

California Department of Fish and Wildlife
Morgan Ivens-Duran

Washington Department of Fish and Wildlife
Casey Clark

Hawaii Department of Land and Natural Resources
Jeannette Rossa

Cascadia Research Collective
Robin Baird, Daniel Barrios, Elana Dobson, Annie Douglas, Kiirsten Flynn, Andi Gero, Annette Harnish, Michaela Kratofil, Jordan Lerma, Sabre Mahaffy, Jacquelyn Shaff, Alexandre Vanderzee

University of Hawaii - Manoa
Augusta Hollers, Claire Lacey, Brijonnay Madrigal, Kirby Parnell, Philip Patton, Jana Phipps, Fabien Vivier,

Mahak Tribe
Brian Gruber, Jonathan Scordino

Other
Jens Currie (Pacific Whale Foundation); Jane Davenport (Defenders of Wildlife); Shannon DeMaster; Ava Ibanez (Oceans Program); Michael Jasney (National Resources Defense Council); Eric Kingma (Hawaii Longline Association); Sean Martin (Hawaii Longline Association); Whitney Raffipiy (University of Hawaii-Hilo), Ryan Steen (Stoel Rives); DJ Schubert (Animal Welfare Institute)

Appendix B

Pacific Scientific Review Group (PSRG)
Honolulu, HI Meeting, 07-10 March 2023
Ala Moana Hotel

Final Agenda (2/28/2023)

-- All times are Hawaii Standard Time—

Google Meet joining info:
Video call link: https://meet.google.com/adm-kapn-ppc (**video and audio**)
Or dial: +1 319-449-0078 PIN: 834 417 006# (**audio only**)

*If you do not have a google account, you will need to be accepted into the meeting, which Laura will monitor. If you have any issues, contact her at laura.mccue@noaa.gov.

A transcript of the audio will be recorded for notetaking purposes.

Pacific SRG Members:
John Calambokidis – Chair – Cascadia Research Collective
Doug DeMaster – Vice Chair – Consultant
C. Scott Baker – Oregon State University Marine Mammal Institute
Simone Baumann-Pickering – Scripps Institution of Oceanography, UC San Diego
Lars Bejder – University of Hawaii Marine Mammal Research Program
John Brandon – ICF International, Inc.
Matt Leslie – USGS National Climate Adaptation Science Center
Rebecca Lewison – San Diego State University
Leslie New – Ursinus College
M. Tim Tinker – University of California Santa Cruz

NMFS Liaison to the Pacific SRG:
Laura McCue – (laura.mccue@noaa.gov), PIFSC

National SRG and SAR Coordinator:
Zac Schackner – (zachary.schakner@noaa.gov), NMFS OST

DAY 1: Tuesday, March 7, 2023		
9:00 HST	Welcome, housekeeping, Introductions. Introduce new member, Dr. Matt Leslie	McCue, Calambokidis
	Headquarters National Updates	
9:30	SRG updates Membership and ethics reminder	Schakner
9:50	Finalized GAMMS and SI *(PSRG_2023_B01 and B02)*	Schakner/ Long
10:00	humpback whale DPS recovery planning process *(PSRG_2023_B03)*	Gahm
10:10	WC ITP application status	Long
10:20	---Break--- (20 minutes)	
	Alaska Fisheries Science Center Updates	
10:40	AFSC California Current Ecosystems Program Update Status of West Coast Pinniped Assessments, incl. elephant seal surveys Washington Inland Waters harbor seal SAR	Melin
	USFWS Updates	
11:05	Washington northern sea otters update WA N sea otter population and causes of mortalities summary 2021-2022	Waterstrat/ Heron
11:20	Southern sea otter update	Carswell
	Southwest Fisheries Science Center Updates	
11:35	Science overview SWFSC/MMTD FY22 Science Accomplishments and FY23 Science Objectives	Weller
11:50	Upcoming Pacific marine mammal survey cruises and priorities	Moore
12:05	---Lunch--- (70 minutes)	
13:15	SPLASH 2 (*PSRG_2023_B04*)	Moore / Calambokidis
13:30	Update for abundance of humpback whales wintering in Central America and southern Mexico *(PSRG_2023_B08)*	Curtis
13:45	SWFSC genetics updates (PSRG_2023_10; PSRG_2023_B13, B14, B15) Updates on are the humpback whale GTseq project (to genetically characterize herds), false killer whale epigenetics, eDNA pilot projects, gray whale microbiomes and epigenetics projects, and the cetacean genomes project. Mention manuscripts that are in prep or in review proposing taxonomic revisions of killer whales, common dolphins, and bottlenose dolphins.	Martien
14:00	Questions and wrap up	Calambokidis
14:15	Adjourn public meeting	
14:30	--- Break --- (15 minutes)	
14:45	**Closed session -** PSRG members (FKW video review and internal discussions)	Bradford (FKW videos)
16:00	Adjourn closed session	

DAY 2: Wednesday, March 8, 2023		
9:00	Welcome and questions from previous day material	Calambokidis
9:15	Updates on gray whale research *(PSRG_2023_B09, B10, B11, B12)* Updates on ENP gray whale abundance, calf production, UME, and new research population modeling, and PCFG abundance. Update on WNP gray whales based on a report that was submitted by the Russian Gray Whale Project to the IWC Scientific Committee	Lang, Joyce, Stewart, Mahoney
9:35	OR/WA Harbor Porpoise Abundance estimates *(PSRG_2023_09; PSRG_2023_B25)*	Forney
9:50	Sources Of Human-Related Injury and Mortality for U.S. Pacific West Coast Marine Mammal Stock Assessments, 2017-2021 *(PSRG_2023_01, 02; PSRG_2023_B05, B06)*	Carretta
10:05	---Break--- (15 minutes)	
10:20	R-Package SeriousInjury *(PSRG_2023_B07)* Discuss how the R-Package SeriousInjury would be implemented NMFS-wide for large whale injuries; discuss broad planning.	Carretta, Long
West Coast Regional Office Updates		
11:00	West Coast Region Management update Topics include updates on POCTRT, fishery interactions, emerging projects, SRKW management, Makah waiver	Lawson
11:45	SRKW inbreeding depression *(PSRG_2023_B16)*	Kardos
12:00	SRKW SAR *(PSRG_2023_07)*	Hanson
12:15	---Lunch--- (60 minutes)	
13:15	U.S. West Coast Draft 2023 SARs" *(PSRG_2023_07)* large whales: ENP gray + WNP gray, CA Current blue, fin, sei, minke, sperm 3 West Coast harbor porpoise Draft SARs	Carretta Forney
Pacific Islands Fisheries Science Center Updates - Hawaiian Monk Seals		
14:15	Science Overview	Littnan
14:30	Hawaiian monk seal research updates Updates on scientific efforts related to climate change impacts in PMNM and Updates on research and risk assessment tools for toxoplasmosis	Robinson
14:45	Questions, wrap up	Calambokidis
15:00	Adjourn	

DAY 3: Thursday, March 9, 2023		
9:00 HST	Welcome, questions from previous day material	Calambokidis
	Pacific Islands Fisheries Science Center Updates - Cetaceans	
9:15	Pacific Islands assessment efforts (PSRG_2023_10) Marianas bottlenose dolphin structure & abundance, LTabundR open-source package for design-based density estimates, Artificial Fintelligence, and HICEAS	Hill, Bradford, Oleson
9:45	Passive acoustic assessment efforts (PSRG_2023_B17) Overview of ongoing and new passive acoustic assessment initiatives, including acoustic Seaglider surveys, new towed array tracking tools, examination of sperm whale cue rates, and Bryde's whale distribution based on long-term monitoring	Oleson
10:15	Spinner dolphin abundance & age-structure for Oahu & Hawaii Islands *(PSRG_2023_10; PSRG_2023_B26)* *Line-transect abundance estimates for Oahu & Hawaii Islands areas and summary of other research on spinner dolphin demographics*	Lacey
10:55	--- Break --- (15 minutes)	
11:10	Hawai'i false killer whale *(PSRG_2023_B20, B21, B22, B23, B24)* Updates on photo-identification, tagging, and sampling in 2022, with ongoing and planned future analyses	Baird
11:25	MHI insular FKW abundance estimates *(PSRG_2023_11, 12)* *Review of new Bayesian approach to estimating abundance and assessing trends of MHI insular FKWs.*	Badger
12:05	--- Lunch --- (55 minutes)	
13:00	Proposed new assessment approach for pelagic FKWs *(PSRG_2023_14)* Review of proposed use of longline fishery area for assessment of pelagic FKWs	Oleson
13:45	Update on Congressionally-funded FKW projects Summary and status of FY21 and FY22 funded projects	Oleson
14:05	Mariana beaked whale density estimation Update on effort to expand upon methods of Barlow et al 2022 to estimate density and abundance for beaked whales in the Marianas using data from drifting recorders	Badger
14:25	Serious Injury and Mortality for Pacific Islands Marine Mammals *(PSRG_2023_03, 04, 05)*	Bradford
	--- Break --- (15 minutes)	
	Pacific Islands Regional Office Updates	
14:55	PIR Management updates Introduction to new ARA, Dawn Golden; Summary of the November 2022 False Killer Whale Take Reduction Team meeting, including measures being considered to amend the Plan to reduce M&SI, and update of false killer whale interactions in the Hawaii longline fishery; other marine mammal management updates.	Duke
15:25	Cetacean SAR *(PSRG_2023_08, B18, B19)* FKWs, Bryde's whales, spotted dolphins, striped dolphins, rough-toothed dolphins, bottlenose dolphins, short-finned pilot whales, Risso's dolphins	Oleson

15:55	Questions and wrap up	Calambokidis
16:10	Adjourn public meeting	

DAY 4: Friday, March 10, 2023 - Closed session; PSRG only	
9:00 HST	Draft 2023 recommendations

Appendix C

DOCUMENT LIST

REVIEW DOCUMENTS		
DOCUMENT NAME	**AUTHOR/ POC**	**DOCUMENT NUMBER**
Sources Of Human-Related Injury and Mortality for U.S. Pacific West Coast Marine Mammal Stock Assessments, 2017-2021 + 2021 cases only	Carretta	PSRG_2023_01
2021 cases only: sources Of Human-Related Injury and Mortality for U.S. Pacific West Coast Marine Mammal Stock Assessments	Carretta	PSRG_2023_02
HI Longline and response network injury determinations	Bradford	PSRG_2023_03
SI/M for HI Humpback whales	Bradford	PSRG_2023_04
SI/M for HI cetaceans (non-humpback whales)	Bradford	PSRG_2023_05
Summary of Documented Human-Caused Mortality, Serious Injury and Non-Serious Injury in Hawaiian Monk Seals	Mercer	PSRG_2023_06
U.S. West Coast (incl. Hawaiian monk seal + SRKW) Draft 2023 SARs	Carretta	PSRG_2023_07
Pacific Islands Draft 2023 SARs	Oleson	PSRG_2023_08
Harbor porpoise abundance on the outer coast of Oregon and Washington based on 2021-2022 aerial surveys	Forney	PSRG_2023_09
Evidence of a small, island-associated population of bottlenose dolphins in the Mariana Islands	Martien	PSRG_2023_10
Badger et al. Long term abundance and trends of the endangered stock main Hawaiian Islands insular false killer whales + appendix	Badger	PSRG_2023_11
Badger et al. Incorporating telemetry information into capture-recapture analyses improves precision and accuracy of abundance estimates for spatiotemporally-biased data	Badger	PSRG_2023_12
Lacey et al. Line transect abundance estimates of spinner dolphins around Oahu and Hawaii Island, 2020-2022	Oleson	PSRG_2023_13
A Potential New Assessment Approach for Hawaii Pelagic False Killer Whales	Oleson	PSRG_2023_14
BACKGROUND DOCUMENTS		
DOCUMENT NAME	**AUTHOR/ POC**	**DOCUMENT NUMBER**
Guidelines for Distinguishing Serious from Non-Serious Injury of Marine Mammals Pursuant to the Marine Mammal Protection Act	Patterson	PSRG_2023_B01
Final GAMMS IV revisions	Patterson	PSRG_2023_B02
Recovery outline for humpback whales	Patterson	PSRG_2023_B03
Szesciorka, et al. 2022. “Multiscale Relationships between Humpback Whales and Forage Species Hotspots Within a Large Marine Ecosystem.” Ecological Applications e2794.	Moore	PSRG_2023_B04
Carretta, J.V. 2022. Estimates of marine mammal, sea turtle, and seabird bycatch in the California large-mesh drift gillnet fishery: 1990-2021. U.S. Department of Commerce, NOAA Technical Memorandum NMFS-SWFSC-671.	Carretta	PSRG_2023_B05

Carretta, J.V. and A. Henry. 2022. Risk assessment of large whale entanglements and vessel strikes from case narratives and random forest classification trees. Frontiers in Marine Science	Carretta	PSRG_2023_B06
R-Package SeriousInjury Tutorial (interactive html file)	Carretta	PSRG_2023_B07
Curtis, et al. 2022. Abundance of humpback whales (*Megaptera novaeangliae)* wintering in Central America and southern Mexico from a one-dimensional spatial capture-recapture model. U.S. Department of Commerce, NOAA Technical Memorandum NMFS-SWFSC-661.	Curtis	PSRG_2023_B08
Eguchi, et al. 2022a. Abundance and migratory phenology of eastern North Pacific gray whales 2021/2022. U.S. Department of Commerce, NOAA Technical Memorandum NMFS-SWFSC-668	Lang	PSRG_2023_B09
Eguchi, et al. 2022b. Eastern North Pacific gray whale calf production 1994-2022. U.S. Department of Commerce, NOAA Technical Memorandum NMFS-SWFSC-667	Lang	PSRG_2023_B10
Harris, et al. 2022. Recent trends in the abundance of seasonal gray whales (*Eschrichtius robustus*) in the Pacific Northwest, 1996-2020. AFSC Processed Rep. 2022-05, 22 p.	Lang	PSRG_2023_B11
Joyce, et al. Accepted. The role of sea ice in the distribution, habitat use, and phenology of eastern North Pacific gray whales. Marine Ecology Progress Series.	Lang	PSRG_2023_B12
Onoufriou, et al. 2022. Biogeography in the deep: Hierarchical population genomic structure of two beaked whale species. Global Ecology and Conservation	Martien	PSRG_2023_B13
Keener et al. 2023. Northern range expansion of California coastal bottlenose dolphins (*Tursiops truncatus*). Aquatic Mammals, 49(1), 29-42	Weller	PSRG_2023_B14
Costa, et al. *Tursiops truncatus nuuanu*, a new subspecies of the common bottlenose dolphin from the eastern tropical Pacific. J Mammal Evol (2022)	Martien	PSRG_2023_B15
Inbreeding depression explains killer whale population dynamics	Hanson	PSRG_2023_B16
Barkley, et al. 2022. Examining distribution patterns of foraging and non-foraging sperm whales in Hawaiian waters using visual and passive acoustic data. Frontiers in Remote Sensing 3:940186.	Oleson	PSRG_2023_B17
Bradford, et al. 2022. Estimating the winter abundance of cetaceans around the main Hawaiian Islands. NOAA Technical Memorandum NMFS-PIFSC-135.	Oleson	PSRG_2023_B18
Becker, et al. 2022. Abundance, distribution, and seasonality of cetaceans within the U.S. Exclusive Economic Zone around the Hawaiian Archipelago based on species distribution models. NOAA Technical Memorandum NMFS-PIFSC-131.	Oleson	PSRG_2023_B19
Baird et al. Field studies and analyses from 2020 through 2022 to support the cooperative conservation and long-term management of main Hawaiian Islands insular false killer whales.	Baird	PSRG_2023_B20
Harnish et al. In review. Long-term associations of common bottlenose dolphins with a fish farm in Hawai'i and impacts on other protected species.	Baird	PSRG_2023_B21

Kratofil et al. 2023. Biologically important areas II for cetaceans within U.S. and adjacent waters- Hawai'i Region. In press in Frontiers in Marine Science	Baird	PSRG_2023_B22
Kratofil et al. In review. A protocol for photo-identification catalog-based age estimation: an application to endangered Hawaiian false killer whales.	Baird	PSRG_2023_B23
Mahaffy et al. In review. Identifying social clusters of endangered main Hawaiian Islands insular false killer whales. Submitted to Endangered Species Research	Baird	PSRG_2023_B24
West Coast Harbor Porpoise Stock Designation Memorandum	Forney	PSRG_2023_B25
Abundance and demographics of spinner dolphins (*Stenella longirostris*) off the Waiʻanae Coast of Oʻahu: February 2023 Field Report	McPherson	PSRG_2023_B26