Minutes of the Joint Scientific Review Group Meeting
February 23-24, 2016
Alaska Fisheries Science Center, Seattle, WA

Welcome and introductions

Richard Merrick made brief opening remarks. As the first protected resources (PR) person in the role of National Marine Fisheries Service (NMFS) Chief Scientist, he has advanced issues and projects relevant to the Scientific Review Groups (SRGs), including the PR toolbox, PR climate vulnerability analyses, review of Science Center PR programs, and identifying the relationship between the Office of Protected Resources (OPR) and the Office of Science and Technology (OST). Merrick emphasized that the SRGs are important to NMFS and perform a similar role to the Marine Fisheries Advisory Committee. The SRGs do more than review stock assessment reports (SARs), and NMFS can expand upon that role and use the SRGs' expertise more than in the past. Merrick welcomed new SRG members and recognized those who are leaving. He referenced the SRG Terms of Reference in establishing a process for ensuring SRGs have appropriate expertise, particularly for keeping up with advances in science. Finally, Merrick thanked Van Helker, Robyn Angliss, and Marcia Muto for their work in setting up and hosting the meeting (see appendices for full attendance, background documents, and agenda).

All participants introduced themselves, including those participating or observing remotely by phone and webinar. Angliss provided logistical information and Shannon Bettridge, meeting chair, reviewed the meeting agenda.

Individual SRG successes and challenges

Each SRG chair presented an overview of the SRG's challenges and successes.

Alaska (AKSRG)

Lloyd Lowry gave an overview of past and current membership, and noted that under the new SRG Terms of Reference it may be difficult to replace marine mammal expertise in the Alaska (AK) region outside of NMFS or U.S. Fish and Wildlife Service (FWS) personnel. Lowry described the history of stocks, successes, challenges, high cost of obtaining even limited data, and an overview of proposed new approaches to obtain information and reduce bycatch.

The successes included: drafting of SARs for remote regions, now up to 51 stocks; providing advice on assessment needs, methods, analysis; and evolving harbor seal stock structure, from three stocks in 1994 to 12 stocks today. The challenges included: old or lacking data on state fisheries; subsistence take estimates that are based on old and incomplete data; and harbor porpoise stock structure is largely unknown and all assessments are based on three geographic regions. Lowry described the differences between federal and state fisheries data in Alaska. Federally managed fisheries have regular observer programs that show low marine mammal mortality and serious injury (M/SI) in all cases. State-managed fisheries have low observer coverage (1% to 7%) and imprecise estimates of bycatch. Lowry estimated that the Alaska Marine Mammal Observer Program cost $690K per observed M/SI in state fisheries, based on a total cost of $8.3M to implement the program. He noted there is no funding for observer programs for AK salmon drift gillnet fishery, which makes harbor porpoise assessment difficult,

as they are known to be taken in large numbers. Resources are also lacking for determining abundance for walrus and sea otters, trend data, and subsistence harvest data.

The AKSRG recommended at the 2011 Guidelines for Assessing Marine Mammal Stocks (GAMMS) III workshop and in a letter to the NMFS Alaska Regional Office and Alaska Fisheries Science Center in 2012: (1) alternative methods be allowed in the assessment process when PBR cannot be calculated; (2) alternatives to observer programs to document M/SI; (3) where interactions are known, mitigation should be implemented, whether or not strategic stocks are being taken (even in the absence of a Take Reduction Team (TRT)).

Michael Scott asked about how ice seals were being assessed and details on digital photography and infrared imagery were shared. Angliss indicated there is a lot of research and development being done in this area, including estimating how many animals are in the water at any one moment.

Atlantic (ASRG)
Randy Wells, acting Chair, outlined five recommendations from the ASRG. He described challenges in prioritizing limited resources to use methods other than traditional large vessel surveys. The ASRG recommended adopting a more formal process (perhaps NMFS to review past 1-3 years at each meeting) to provide updates on past recommendations and how they have been addressed.

The ASRG first recommended changes in how abundance surveys are planned, implemented, and analyzed to improve trend estimation and avoid data becoming outdated. Wells noted there is too much variability in the spatial coverage of surveys year to year and that budget shortfalls are acknowledged to be a part of these problems. He commented that NMFS should determine what can be done with existing, limited resources to fill these gaps, with a focus on how to get things done in the absence of large ship resources. The second recommendation was for modeling of passive acoustic data to be used in conjunction with visual data. The ASRG's third recommendation requested a more formalized process of addressing and responding to ASRG's recommendations be implemented. The fourth recommendation was to resolve the continued challenge to get FWS to produce manatee SARs. Finally, the ASRG recommended new methodology be peer reviewed prior to incorporation into the SARs. Wells noted significant changes to the methodology used to estimate mortality, abundance, and stock structure should be reviewed by SRGs before they are used in a SAR.

Pacific (PSRG)
Scott highlighted the large geographical region of the Pacific Ocean, and the numerous groups the PSRG works with. Scott then described past issues dealing with the PBR process, such as SAR format and content, defining recovery factors, dealing with old estimates of abundance and M/SI, PBRs for recovery ESA-listed species, non-fishery mortality, and a TRT for the California drift gillnet fishery. The PSRG then dealt with difficult-to-estimate PBR elements, such as abundance correction factors for deep-diving whales; West coast and Hawaii surveys, stock definitions and management units, and haulout corrections for pinniped abundance indices; and management and research issues such as pinniped-salmon interactions and lethal removal, a TRT for pelagic longline fisheries, pinger experiments, and observer programs. The most recent issues

include gray whales (Pacific Coast Feeding Group challenges our definition of a stock) and false killer whales (overlapping stocks and bycatch prorations, inshore fisheries not observed). The biggest problem is funding: the PBR scheme requires continual updating of abundance and mortality estimates, but this requirement has been jeopardized by a prolonged drought in government resources. Scott then described what works well, highlighting the PSRG's dedicated membership with low turnover, high participation at meetings, inter-sessional work, and consensus-seeking. Scott ended by thanking present and past NMFS liaisons and other staff, and noting that most of the issues have been solved through critical review and iterative discussions between the SRG and agency colleagues.

Discussion

Beth Mathews inquired about the impact of the Terms of Reference on SRGs and membership longevity; Bettridge indicated NMFS will conduct annual reviews of membership and there will be turnover; members will be removed after their terms or, if their expertise cannot be replaced, they will be reappointed for up to three consecutive terms. Angliss inquired whether the PSRG had a strategic plan to tackle the issues in a strategic order. Scott responded that there was no formal plan, but at the beginning the process involved working with NMFS Southwest Fisheries Science Center staff who had been involved in the development of the PBR process and had a long history of working on tuna-dolphin issues, so it was relatively easy to implement Marine Mammal Protection Act (MMPA) mandates as a result. Terry Wright added that part of the success was that the PSRG includes managers as members. He also noted that the focus started out being fisheries that cause problems for marine mammals, but it has evolved into bigger scientific questions. Sharon Young noted that she was part of the negotiating group to reauthorize MMPA section 118 and that the SARs are much more than a focus on fishery interaction issues, they are holistic in the sense that they deal with stock recognition, trends, etc. Scott noted that for some time, fisheries were the only things that could be "changed," while threats that come from a myriad of sources (climate change, shipping, etc.) often cannot be addressed directly. Tim Ragen reinforced S. Young's perspective that the SRGs and SARs have a structure that should tell us what we need to know under ideal circumstances to understand human effects on species. SARs are incredibly helpful, and they need to be able to keep up with the issues. We need to step back and look hard, and take a risk assessment approach. Interactions between the SRGs, regions, and centers should be improved, as some issues, such as climate change, could be done better in concert. We need to keep our minds open to bigger picture and cumulative issues.

Bettridge noted that there were some common themes among the SRGs, mostly regarding a lack of resources. She stated it was good for the different SRGs to hear about the commonalities (e.g., lack of M/SI or abundance data) and differences (e.g., Alaska subsistence issues).

The participants discussed the use of unpublished data or methods in SARs. Karin Forney inquired about Wells' request to have peer-reviewed publications before information goes into the SAR, as this can cause further delay in the publication of new information in SARs. In the Pacific, SRG members review new information along with the draft SARs and the reports are then published by the time the SARs are finalized. Wells and S. Young indicated that having an opportunity to review new methods and information before they go in the SARs is important, and SRGs would be open to reviewing these materials. Merrick noted that under the Information

Quality Act, any scientific literature used to make management decisions must go through peer review; the SRG review of new information can fit into the Center's peer review process. Bettridge and Forney suggested greater use of inter-sessional webinars, conference calls, and reviews. Trent McDonald, as a new member, noted that he was struck that the SARs seem to include much information that is not adequately referenced, or only in gray literature. Lowry clarified that this has been discussed regularly in the past. Jay Barlow cautioned that journal editors often will not publish updates on data if no new methods are involved (e.g. new line-transect estimates using existing methods). So there is a role for technical memoranda (Tech Memos), and the SRGs provide peer-review for these reports. Paul Wade also noted that not all fish stock assessments are published for the same reason. Merrick agreed that updates of an existing method with new data are fine in Tech Memo, but new methods need to be peer-reviewed. McDonald clarified that the SARs should then indicate "We used the methods of REF with new data." Mathews suggested that such updates could be archived as documents within the Centers and made publicly available; Bettridge clarified that many such studies are published as Tech Memos or Center Reports, but Mathews noted that the SARs also incorporate data and analyses from outside the federal government. Jim Gilbert added that SARs are cited by many other entities, making it very important to have citations. Angliss noted that suggested changes are easier to implement when they affect only one Center vs. multiple centers and regions. Having a 1-3 year review would be useful, especially with SRG input. Merrick further clarified that the SRGs are the final point of review of the SARs, so the SRG needs to speak up if they do not agree with the science. Charlie Hamilton added that draft SARs go out for public comment and are then revised. Grey Pendleton noted that initial support for designating 12 harbor seal stocks (from 3) was lacking and that a portion of the SAR was reworked prior to publication. Carretta noted a similar rejection of proposed SAR boundaries for harbor porpoise along the U.S. west coast some years ago, based on a desire of the PSRG to see more convincing data. The Pacific SRG has also rejected some new methods if they needed more work, and asked NMFS staff to reanalyze and/or provide an updated SAR that addresses the concern for their re-review before Draft SARs go public.

Discussion of NMFS and FWS stock assessment reports

Marine Mammal Commission (MMC) Report

Dennis Heinemann presented an overview of the MMC's review of NMFS' SARs. The review document is not yet available for distribution (completion target April 2016), but Heinemann included a summary of the nationwide review and summary statistics (e.g., what percentage of SARs had non-default Rmax estimates, trend estimates, Nmin estimates, and PBR). Heinemann also presented recommendations to: improve understanding of stock structure, improve surveys for better abundance and trends, implement national stock assessment strategy, identify and prioritize nationals for stocks without PBRs, and identify and secure resources to implement Section 117 comprehensively. He outlined MMC's plans for using the report in targeted lobbying efforts.

Gilbert asked whether the MMC considered breaking down the stocks by pelagic versus coastal (to reflect differences in accessibility for collecting data), or correlate the findings to the amount of funding that have gone to each Center for marine mammal research. Heinemann responded that the analysis did not break down the findings by habitat. MMC also did not consider cost-effectiveness, but has the potential to do so using data from MMC's survey of NMFS'

expenditures on stock assessment and background research supporting the SARs. Wade suggested some of MMC's findings of regional differences might be explained by the regions' differences in pinnipeds versus cetaceans; Wade referred Heinemann to his 2000 Conservation Biology paper (with Andy Read), which found much better data on pinnipeds than odontocetes. Kate Wynne asked whether the MMC plans to discuss M/SI when speaking with Congress; Heinemann said yes, though the MMC still needs to determine what metric to use to describe how accurately and completely agencies are estimating M/SI, and expects to produce a second report to address this. Erin Oleson noted that the Pacific SAR summary was overly optimistic given that there are many known stocks without corresponding SARs (i.e., Western Pacific EEZs where animals are known to occur, but surveys have never been conducted); Heinemann responded that the MMC paper mentions this issue but does not provide an in-depth discussion. Deborah Palka suggested the analysis consider how "important" a species is, such as one with known fisheries interactions. Jim Valade and Diane Bowen asked whether the report included FWS; Heinemann responded that it evaluates only NMFS species, but MMC intends to follow-up with FWS. Wright noted that the SRGs should review the MMC report to help focus the contents on real needs, especially for resource allocation. Ragen emphasized that we need a metric to show the Office of Management and Budget (OMB) how effective NMFS and FWS are, what we accomplished, what gaps need to be filled, what the priorities are, and how much money would be needed to accomplish that. Heinemann said that the MMC plans to produce an annual report of the SAR statistics to demonstrate to Congress the importance of the work, and noted that indices for fish stocks have been successful for obtaining more funding. Merrick noted the best way to market the report is to present it to the OMB Examiner, since OMB is the "gate-keeper." Angliss reviewed previous efforts of the Protected Species Stock Assessment Improvement Program (PRSIP), suggesting the MMC look at the 2003 workshop report to see if the PRSIP criteria could be useful in talking with Congress and OMB. Lowry noted that the PBR-centric approach to success metrics is misguided, simply because of the inability to acquire the data needed to calculate PBR for many stocks. He noted that incorporation of trend data for remote, difficult-to-survey stocks is the critical missing piece. Lowry also emphasized that the zero mortality rate goal (ZMRG) is a metric to manage towards, even in the absence of PBR. S. Young emphasized the requirement to calculate PBR, and LeBoeuf noted that PBR was included in the MMPA as a temporary measure until optimum sustainable population (OSP) could be calculated, so while we cannot dismiss PBR, we need to look at its original intent.

Discussion of inter-regional consistency in SARs

Bettridge provided an overview of steps that have been or are being taken to improve SARs, including >75 SRG meetings, many SARs, GAMMS reviews and revisions, and serious injury determination policy, procedural directive, and implementation. She then examined ways that we can improve what we are doing, given what we have. There is a need to make SARs more consistent across regions and between NMFS and FWS. The summary tables for each region have different information that may be more broadly useful for the other regions. Content differences include the map of stock range, partial survey information, placement of information in subsections, formatting and arrangement of information, habitat concerns, timing of SAR completion, and associated challenges. Accomplishments include serious injury determination policy, trying to remove "stale" information, removing personal communications and unpublished citations, improving maps, applying new methodologies, stock delineation

guidelines initiative (SDGI), GAMMS, trying to get back on schedule. Bettridge solicited feedback on other sources of SAR variability or other things we can do to improve the SARs.

Gilbert said that the Atlantic SRG has discussed having another appendix with historic information. Karen Martien also noted that the changes in stock boundaries or names would also be good to track. Bettridge noted that through the SDGI effort, in tandem with internal processes, we may require a Tech Memo or manuscript to accompany proposed stock changes so there will be a record (and increased transparency). Wright suggested that short 1-2 page SARs with hyperlinks to the older information (particularly historical fisheries interaction information) would be good, because a SAR should be a snapshot of a stock's current status and it is inefficient for the SRG to review old or irrelevant information. Ragen noted that some of the historical information is important, and expressed that it is important to have information readily available (somewhere) and need to know what SRG and Agency think of current data and priority of gaps identified. Gaps could be better identified and would help with prioritization. Carretta emphasized the importance of retaining data on fisheries that have zero M/SI in the SARs, especially in the context of low observer coverage, because a lack of observed interactions does not necessarily mean that no interactions occurred.

Guidelines for Assessing Marine Mammal Stocks

Bettridge gave an overview of the GAMMS history and the 2016 revisions to the GAMMS. The revised GAMMS have an effective date of 22 February 2016 but will be first applied in the development of the 2017 draft SARs. The final revisions are based on recommendations from the 2011 GAMMS III workshop, as modified by public comment and further internal review. The two proposed revisions that received the most public opposition are not currently being finalized: 1) a framework to calculate PBR for stocks with outdated abundance information (workshop topic 1), and 2) a quantitative method to determine when stocks should be designated as "strategic" if declining and likely to be listed as threatened under the ESA in the foreseeable future (portion of workshop topic 6). NMFS is further analyzing those topics, and may propose additional guideline revisions in the future.

Revisions to the GAMMS include: Topic 2: improving stock identification (topic 2, including whether it is plausible the stock contains multiple demographically independent populations, and a clarification to change demographic and reproductive isolation to demographic and reproductive independence, respectively). Topic 3: assessment of very small stocks, including small endangered stocks that should have PBRs calculated instead of listing the PBR as undetermined, but stating that this is problematic. Topic 4: allocating M/SI for mixed stocks (assign, partition, assign to both with discussion of potential to overestimate), and apportioning PBR for transboundary stocks: caution against extrapolating abundance estimates from one surveyed area to another unsurveyed area, but informed interpolation (e.g., based on habitat associations) is ok. If abundance and M/SI outside EEZ cannot be calculated, then only compare within EEZ. Topic 5 involves clarifying M/SI incidental to commercial fishery; SARs should include all human-caused M/SI, with a summary table of U.S. commercial fishery mortality. Also include a subsection summarizing the most prevalent unquantified potential human-caused M/SI section. Topic 6 - stocks that have experience a >50% decline should have this noted. Topic 7 addresses assessing stocks without abundance estimates or PBR – include a statement that trend monitoring can inform status assessment. Topic 8: characterizing key uncertainty in

SARs for Stock Definition in range, elements of PBR formula, population trend Annual M/SI, and include a statement in the stock status section to evaluate consequences of uncertainties on the assessment of the stock's status. Topic 9: includes consideration of non-lethal factors.

McDonald asked whether PBR is set to zero when it cannot be calculated. Bettridge responded that PBR is considered "undetermined," not zero, if abundance estimates (and Nmin) are outdated. She acknowledged that this is a difficult situation, particularly for managers. Scott noted that PBR is a result of an equation, and none of the inputs can be zero (unless the animals are extinct, so Nmin=zero), so PBR cannot be zero. He noted that in cases where PBR "philosophically should be zero," such as for Hawaiian monk seals, the PSRG has concurred with an "undetermined" PBR.

Scott expressed the desire for SARs to be short, and indicated that repeating boilerplate language regarding the potential for multiple demographically independent populations would clutter the SARs. Bettridge acknowledged that the revised GAMMS would add text to the SARs, but authors strive to keep the SARs concise. Kenney also highlighted that if certain text (such as the boilerplate language regarding DIPs) is placed only in a SAR introduction, rather than repeated in each SAR, then readers focusing on individual SARs would never see it.

MMPA imports rule, Take Reduction Teams, and List of Fisheries

On behalf of Nina Young (NMFS Office of International Affairs and Seafood Inspection), Kristy Long gave an overview of the proposed rule to implement Section 101(a)(2) of the MMPA, whereby NMFS will ban imports of fish or fish products from fisheries with incidental M/SI of marine mammals in excess of U.S. standards. The proposed rule was published 1 August 2015, and the comment period closed 9 November 2015. The rule is expected to affect 122 nations that export fish and fish products into the U.S. During an initial 5-year exemption period, NMFS would classify fisheries as "export" or "exempt" on a List of Foreign Fisheries, exporting nations would develop regulatory programs and provide progress reports, and NMFS would issue a comparability finding.[1]

In response to questions, Long clarified that aquaculture is subject to the rule, and NMFS would consider when making comparability findings whether a fishery is subject to regional fishery management organization requirements and how well a fishery complies with those requirements. McDonald inquired what would happen if their bycatch limit is undetermined, and Long indicated that there are many details and there would be comparison with U.S. fisheries. John Calambokidis commented that he supports the rule even though implementation would likely be problematic. Peter Corkeron asked about fisheries that had marine mammal culls, and Long responded that they would not meet standards. Jason Forman clarified that if a country had a cull program, but culling was prohibited from a specific export fishery, the country could still export fish and fish products from that fishery.

Long reviewed the status of the seven active TRTs, including the status of the stocks relative to the MMPA's short- and long-term take reduction goals, the date of the most recent meeting, the

[1] http://www.fisheries.noaa.gov/ia/slider_stories/2015/08/mmpa_import_rule.html

current phase (e.g., implementing, monitoring, rulemaking), and next steps. M/SI is below PBR for the managed stocks for about half of teams/plans, but above ZMRG for most.

Finally, Long outlined the status of the final 2016 List of Fisheries (LOF), which is targeted for publication in early March and includes three Alaska fishery reclassifications, and the proposed 2017 LOF, which is under development in the regions. Long also identified recent LOF improvements, including development of fishery fact sheets and coordination with FWS during LOF development. Online fact sheets may be able to be linked to the SARs, rather than including fishery descriptions in a SAR appendix. Palka inquired about the update schedule for the online fact sheets. Lisa White responded the number of vessels would be updated annually, other information more variable.

Update from the OPR permitting division

Ben Laws presented (by phone) an overview of the incidental take permitting program, including relevant MMPA definitions, the types of authorizations (Letters of Authorization (LOA) and Incidental Harassment Authorizations), a framework for evaluating significance, and a flowchart of the agency decision-making process related to incidental take authorizations. Laws noted that a vast majority of the takes involve impacts from activities related to underwater noise. He then provided information on OPR's permitting activities in various regions. In the Arctic, projects include anchor removal (following Shell's pullout), sub-sea cable installation, and one seismic operation; OPR expects the level of activity in this area will remain low. In Cook Inlet, activities include the Port of Anchorage's preparation for expansion, the initial phase of an LNG pipeline (route characterization using multi-beam sonar), and ongoing seismic activities. Laws indicated that NMFS has announced its intent to prepare an environmental impact statement (EIS) to analyze impacts of issuing MMPA incidental take authorizations in Cook Inlet. West Coast activities include ongoing coastal construction and Navy activity (SOCAL). In the Gulf of Mexico, activities include training and explosive detonation by the Air Force, and oil and gas activities, the majority of which is not in compliance with federal statutes, including the MMPA. Law indicated that it is working with BOEM and industry groups and, under a settlement timeline, a Biological Opinion and EIS will be issued by the end of 2017. In the Atlantic, there are five proposed seismic surveys from Delaware to Cape Canaveral, out to the extended continental shelf. NMFS put number of applications out for public review, and is quickly moving toward proposing some authorizations for some subset of surveys. Law indicated that OPR will email contacts in the Regional Offices and Science Centers when the authorizations are available for public review, likely later this spring. Laws also indicated that there is some wind activity (Martha's Vineyard, Block Island) and Navy activities.

Update on incidental take permitting for fisheries research

Mridula Srinivasan presented an update on NMFS' efforts to comprehensively comply with the MMPA, ESA, and NEPA for fisheries research funded or directed by NMFS. Issuance of an MMPA LOA, ESA Incidental Take Statement (ITS), and permits are complete for the Southwest Fisheries Science Center, and is in various stages for the remaining Centers. Moving forward, the focus will be on training, including data collection and reporting, animal handling procedures, and implementing the monitoring program. NMFS will also work to evaluate mitigation measures during annual cruises, and a national workshop is being planned for late fall 2016 to share cross-center best practices and lessons learned. As new fishery research projects

are added, scope and coverage of the LOAs, ITSs, and permits will need to be verified at the regional level.

During discussion, Srinivasan clarified that Center research is continuing while the permit process is underway, and the process applies only to fisheries research. However, if a marine mammal is incidentally taken during fisheries research, the animal cannot be sampled without a permit. In that case, stranding response networks would be notified, and NMFS could retain the carcass for the stranding network to sample. Merrick indicated that all of the activities in the Centers will be environmentally compliant, where previously they were not.

Public comments
Paula Moreno requested that some of the content of the SARs (e.g., tables, maps) be made available in electronic formats other than PDF.

Status of humpback whale listing rule, and implications of ESA listing status change for humpback whale management under the MMPA
Bettridge began her presentation by outlining numerous issues related to the intersection of the ESA and MMPA (e.g., MMPA management once an ESA-listed species has recovered; ESA distinct population segment (DPS) boundaries versus MMPA stocks; cases of multiple DPSs within one MMPA stock). Bettridge then presented a summary of the proposed humpback whale listing rule which, if finalized as proposed, would split the globally-listed humpback whale species into 14 distinct population segments (DPSs). Two of the DPSs as proposed would be listed as endangered, two as threatened, and ten not listed. Bettridge identified the implications of the listing status change for humpback whale management under the MMPA. DPSs in the proposed rule do not align with current MMPA stocks, so this will need to be addressed in future SARs. Stock statuses may change, new PBRs will be calculated, MMPA 101(a)(5)(E) authorization requirements will change, and approach regulations will change. Questions remain regarding how to authorize takes on feeding grounds, how to assign takes to feeding grounds in the case of mixing if stock is unknown, etc.

Lowry questioned the decision to keep a stock designation as strategic and depleted if delisted, such as was done for the Eastern steller sea lion DPS, since the only way for a non-listed stock to be considered depleted is if there was a depleted analysis. Bettridge responded that NMFS solicited comments on the depleted status for humpback stocks that would no longer be ESA-listed. If the stock is not considered depleted from an ESA listing, the other path is list it as depleted via an analysis under MMPA section 115. This is something NMFS is analyzing now and hopes to have resolved when the ESA final rule is published. Scott asked whether NMFS could go through the MMPA section 115 process as part of the ESA delisting process, and if NMFS finds the stock is still depleted, would NMFS hold off on delisting it until the stock reaches OSP? Bettridge responded that NMFS will follow the ESA process; if NMFS moves forward on MMPA section 115 listing and the species does not end up being delisted under the ESA, it would still be considered depleted because of the ESA listing, and the MMPA depleted analysis would have been a waste of resources. Corkeron asked what would happen if the single identified Caribbean population turns out to be two populations. Bettridge responded that we would then reinitiate the ESA listing process.

NMFS marine mammal budget discussion

In response to the SRGs' request for more information on the NMFS budget, LeBoeuf presented an overview of the federal budget process, with a detailed focus on Prescott funding. LeBoeuf emphasized the importance of constituent input when budgets are reduced in lean budget times. She indicated that earmarks are technically gone, but money in those accounts is still coming because no one has taken it for other uses, or the stakeholders who got it in there to begin with are fighting for it. As budget structures change, funds for one marine mammal species or project may be used for a different species or project or be held back by Congress entirely. Where an external constituency voices its concerns loudly, or if the money is a small enough amount, it may survive for years without risk of reductions. LeBoeuf described earmarks as "echoes" propagating and degrading over time, where the echo is fainter each year. If there are old legacy earmarks you care about, she suggested keeping eyes on those; they are not as protected as they were when they were actual earmarks. LeBeouf explained that there are different accounts called PPAs (program, project, or activity). In tough times, agencies roll up PPAs into bigger pots of money, which allow more flexibility to pay for required or higher priority activities. In the next budget, some marine mammal-related PPAs will be rolled up. LeBoeuf also emphasized that SRG members are experts and chosen by NMFS to serve in this expert capacity. NMFS is not allowed to talk to Congress about our funding needs, but SRG members can. Talk to your representatives; you could have real influence there. [Later in the meeting, LeBoeuf clarified that when SRG members serve, they are in capacity that is quasi-governmental, so they cannot speak to Congress as SRG members. However, she noted that SRG members do have the power to go to Congress in an individual expert capacity or as group to educate legislators about marine mammal science needs rather than lobby as SRG members or an SRG as a whole.]

Scott asked whether the SRGs' letters to NMFS were considered during the budget cycle. LeBoeuf responded that OPR responds to the letters, but that similar letters to Congress and, appropriators, in particular, and external audiences could be more influential. Doyle Hanan questioned whether the SRG(s) could write to Congress as a body. Merrick noted that although the request for more monk seal ship time, for example, does not leave NMFS, the agency listens, and that is why the R/V Sette is fully booked. S. Young asked how the Species in the Spotlight lines up with budget plans. LeBoeuf responded that the Species in the Spotlight program components are focused on partnerships and making the most of the money we spend on the species, rather than diverting money from other species; it is focused on raising awareness and working with partners, and is not a budget initiative in and of itself. Merrick highlighted that protected resources will be level-funded for the foreseeable future (even though we request increases every year), so the only way to do anything new will be to work with partners to do it (e.g., NFWF, PEW), or use existing money for something different. Finally, Scott noted that the whole PBR structure rests on a certain amount of funding for monitoring of abundance and M/SI, and without PBR, some fisheries cannot be permitted. Will the PBR structure collapse with this level funding, and do we need a Plan B? LeBoeuf responded that NMFS is considering this, and noted that we need to come up with a way to calculate and apply PBR now, while continuing to message that we need better data collection too.

New methodologies being applied to SARs

Moore

Jeff Moore discussed new analytical methods applicable to the SARs, with a focus on improving the accuracy and stability of our abundance and bycatch estimates. Trend models can improve assessments by stabilizing abundance estimates, because they allow past information to inform

the present information, thereby reducing volatility due to sampling error. For example, trend-based estimates of abundance for sperm whales were shown to be much more stable than inter-annual estimates based on within-year data alone.

Moore also reviewed his work on improving default estimates of R_{max}, which is a key parameter for estimating PBR but is unknown for most populations. By combining allometric and life-table approaches, he was able to estimate R_{max} for a wide range of cetacean taxa. For most delphinids, the estimates are close to the conventional default of 0.04, but R_{max} for many baleen whales and porpoises are likely higher, while R_{max} for some species (e.g., bowhead whales, sperm whales) are likely lower. This is still a work in progress, but might offer an opportunity to improve upon the default R_{max} values for some taxa. Lance Garrison noted that age at first reproduction (one of the data inputs) seems easy to measure, but adult survival (another data input) is much more difficult, and asked how sensitive the model is to this. Moore acknowledged that the estimates can be sensitive, particularly when based solely on life-table data, but that inclusion of the allometric model adds considerable robustness to the estimates, particularly if realistically narrow uncertainty in the vital rates can be specified (e.g, in the form of a prior distribution).

Bycatch estimates are highly imprecise when events are rare. Various methods have been used to address this. Moore and Carretta are exploring Bayesian GLM and Random Forest (RF) approaches to this, and will conduct a comprehensive review and evaluation of different model-based approaches. Moore provided the example of sperm whales in the California drift gillnet fishery using the Bayesian approach, and several examples using RF approach. Both gave similar results for the species analyzed by both approaches.

Barlow

Barlow discussed a new analysis estimating the trackline detection probability, g(0), based on apparent differences in species density for different sea state conditions. The results show that detection probabilities drop off rapidly with sea state and are lower than previously estimated for most species. For small whales, such as beaked whales, trackline detection probabilities decline severely from Beaufort 0 to 2 (less than a 10% chance of detection in Beaufort 2). This effect is much less pronounced for large whales. The decline in detectability is considerable for delphinids as well, except for Pacific white-sided dolphins. Biases are greatest for hardest-to-detect species. Estimates of group size also decrease with Beaufort, leading to further underestimation of abundance; it is unclear whether this is a result of perception bias or if the animals really are fragmenting into smaller groups. The take-home message is that cetacean abundance from previous surveys is under-estimated in all but the best survey conditions, but this can be fixed. New abundance estimates from a 2014 survey using these methods have now been vetted by the PSRG, including bias corrections. Participants had a few clarifying questions and were intrigued by the results, expressing support for the approach.

Carretta

Carretta reviewed a recent study on carcass deposition rates that can provide a correction factor for estimating total human-caused mortality from observed strandings. The study focused on California coastal bottlenose dolphins as a best-case scenario for cetacean carcass recovery that can be used as a threshold for more pelagic species in the region. The study found that 25% (95% CI 20%-33%) of available carcasses were documented. The West Coast SARs now multiply human-related strandings by a factor of four for outer coast delphinids. It was noted that carcass recovery rates for other, more pelagic delphinids along the U.S. West Coast are likely to be considerably less than 25%, and that the coastal bottlenose dolphin threshold will be

used until species-specific carcass recovery factors are developed for other species. Other studies on different marine mammal species have found different recovery rates, the highest of which was 33% for Sarasota Bay bottlenose dolphins (Wells et al. 2016).

In response to a question from Palka, Carretta noted that the annual rate of recovery ranged from 10-46%; it was important to look at the time period where there was stable abundance so we could get at that variance. We are using a very broad brush, but it is better than not having a brush. There are some subtleties, for example, animals that strand inside Puget Sound may have different probability of being detected versus on the open coast. Therefore, Puget Sound will not apply the outer coast correction factor until this can be examined in more detail.

McDonald asked whether ocean circulation models could be used in the model. Carretta responded that they could be, and a few of the papers cited (such as common dolphins in France) had some ocean circulation covariates; however, you do not need to know why the carcasses are not coming ashore, just how many should be coming ashore (versus how many you recover).

Mathews asked whether the model needed to account for mortality type (i.e., anthropogenic vs. natural). Carretta noted that this study only accounts for natural mortality, given their inputs, and for this nearshore population they are making an assumption that the probability of stranding is equal for natural and anthropogenic mortality, but this would have to be accounted for.

Pendleton and Bettridge asked whether the methods could be used in any other stocks/regions. Carretta responded that they are currently applying the methods to U.S. west coast delphinids, and they would next be focusing on large whales. With respect to g(0) corrections, Barlow noted that there are no large ship surveys in AK right now, but there are in NEFSC and SEFSC, and the methods could be applied there; even if they do not have as much data, even a worst-case pooling various delphinid species is better than assuming g(0)=1.

Cryptic mortality

Heinemann provided a comprehensive review of carcass recovery estimates for a wide variety of marine mammals. There is a concern about bias in mortality detection for unobserved events (e.g. unobserved fisheries). Carcasses may sink, get scavenged, or decompose before being detected, or they may be detected but not identified. The number of observed human-caused deaths from strandings is also biased low because not all (human-related) carcasses show signs of human interaction. Detection rates have been examined for species in inshore (22%), coastal (8%), and offshore (1.2%) environments, but the ranges overlapped across species, so there are clearly other factors involved (e.g., population distribution, habitat [distance from shore, currents, wind temperature, salinity], buoyancy, type of trauma, scavenging and deposition rates, shore type, and search effort). The goal for assessments is to know the total number of human-caused deaths, while we only know what was actually detected and identified.

Scott noted that Heinemann did not look at observed fisheries, and just because there is an observer on board does not mean there is not cryptic mortality. For example, even with 100% observer coverage, the observer may miss something, or could be coerced or bribed. Heinemann replied that this is probably not as big a problem as unobserved fisheries. Corkeron noted that mid-water trawl drop-out is also a problem - Australian sea lions caught in trawls represent only ¼ of all sea lions that are actually caught, based on video documentation. Calambokidis asked whether is it better to report uncorrected numbers and state that they are not corrected, versus

providing partial corrections that may give a false impression of accuracy or completeness. Heinemann replied that it is better to use a broad brush than no brush. Except for the two sea otter examples, the highest is 33% detection. There could be inaccuracies in an individual number, but they are all clustered on low values, indicating three times to two orders of magnitude underestimation. Bias is severe, so actual M/SI is considerably larger than other biases that we already correct for in stock assessments. Merrick asked whether Heinemann had analyzed how many might be strategic if correction factors are used, since that would be an effective way to get at the impact and get decision-makers' attention. Carretta noted that the correction factor used in coastal bottlenose dolphins did not make them strategic but brought them closer, and suspects that for large whales it might push them over PBR. Corkeron noted that photo-ID databases could be used to estimate survivorship of large whales based on entanglement and scarring rates.

Protected Resources Toolbox

Srinivasan gave an overview of national efforts to develop a Protected Species Toolbox and highlights of marine mammal toolbox projects. The effort, led by OST, had been sea turtle focused but has expanded to include applications to marine mammals. The goal of the toolbox effort is to address shortcomings in population assessments and making them more user-friendly. The original allocation was $600K ($100K per center), with cross-center collaborations. There was a mini-symposium on the nine projects. Typical outputs have been models, R packages (e.g. crawl – correlated random walk library), and spatial bycatch predictions, placed into a repository. For example agTrend is used for analyses for Steller sea lion trends. Marine mammal focused projects included a few tools developed for AK pinnipeds.

For 2015-2018, there will be $600K/yr for 3 years, but funding is project-specific (not necessarily for all Centers). Science-management discussions led to identification of broad themes: Coral demographics, population assessment, and spatial analysis. There are two team leads per theme (Science and Management Teams). Themes are still being developed, but preliminarily include: Population Assessments – goal to address shortcomings in population assessments such as variable survey methods, limited detectability of individuals, inadequate observer coverage, etc. The idea is to do a webinar series to find out what tools are available and being used, and what are the deficiencies, to get an overview of management needs.

Reflection on Day 1

The planned discussion of calculating Nmin when only a portion of a stock's range is sampled was removed from the agenda. Instead, Bettridge reviewed topics and key points from the previous day's presentations to solicit input from SRG members.

Wells wondered how applicable the methods on g(0) and trend analyses would be to the Atlantic. Garrison explained that trend analysis is a challenge because there are not a sufficient number of cruises. The Gulf of Mexico data from the early 1990s were obtained as a "piggyback" to a survey that was not designed for marine mammals, and there are only two other surveys, but Garrison expect there will an increase in the frequency of Gulf surveys. In the Atlantic, there have been three surveys conducted (1998, 2004, and 2011), with another planned for 2016. Garrison expects trend analyses will be possible in the future. The NEFSC and SEFSC have addressed g(0) through the two-observer team approach, which can quantify effects of sea state and other factors on detection probability. This has been implemented in the Atlantic since

2004. In the Gulf of Mexico, there are limited surveys and small sample sizes, and limited data in certain sea states, so the data lack the necessary contrast. Garrison noted that there could be ways to apply the Atlantic g(0) corrections to the Gulf. For the Northeast, there may be additional time series options for harbor porpoise, for which there are multiple surveys. Scott wondered whether the Atlantic surveys would allow a comparison of the two-observer approach and Barlow's method. Barlow clarified that the two-team method only corrects for perception bias, not availability bias, and thus g(0) estimates are much greater. Garrison confirmed that this is a particular issue for aerial surveys, and additional information is needed to account for availability bias. Barlow also noted that g(0) is not as pooling robust as ESW is, so if all matches are in Beaufort 0 conditions, this would bias estimates of overall g(0) unless Beaufort-specific estimates are derived. Calambokidis wondered about individual heterogeneity, e.g. breaching humpbacks, and Garrison agreed this could be an issue, so detection should be estimated by species or include cue information.

Small commended Barlow for the study, but wondered about applicability for Alaska stocks, given the different data availability. Angliss explained that AFSC staff is currently looking into ways to apply various correction factors, but this may require more resources (staff and money). Pendleton noted it would be especially important to develop expansion factors for estimating takes. Mathews also was pleased with the new methodology, and noted that there have been more advances in estimating abundance and fewer for estimating human-caused impacts. Ragen agreed and indicated that NMFS has talented analysts that have helped advance the stock assessments. However, there is increasing concern over shifts in species distribution, and our static perspective (a single place and time) may become inadequate. Ragen questioned what tools are available to address this issue. Hannah Bernard agreed with the previous points, and wondered whether NMFS was interested in a recommendation on how to deal with cryptic mortality and the potential development of a tool that can be used.

Pendleton inquired whether there should be some standardization of what a "current trend" is, given that some trends are based on 20-30 years and some on shorter time period. McDonald also shares this concern, and indicated that methods should be standardized, since different models will give different results, and SARs using different trend models cannot be compared. Ragen cautioned that the trend history can be very important and different data sets may require different methodology, and suggested that it is most helpful to include all data. Carretta agreed and added that time periods have different relevance to different species (e.g. bowhead whale vs. harbor porpoise), and supported showing all the data so that the reader can evaluate patterns. Laist suggested SARs should include a graph with discussion in the text. Steve Jeffries suggested the SAR section be retitled to simply "Population Trend" (rather than "Current Population Trend"). Jason Baker questioned whether any management decisions were made based only on trend; Bettridge responded that trend can be used to inform stock status, and Barlow stated that trend information can be used when setting the recovery factor, though there is no quantitative definition of the period of increase. Heinemann noted that current criteria for negligible impact determinations include trends as well. McDonald was concerned about different trend results that are obtained from a linear trend vs. a different model, and thought that some standardized ways would be helpful while presenting all the data. For example, if there are > 15 data points, use a consistent smoother across species. Ragen indicated one would need to be careful about the use of a single model for all trends, because there may be specific factors in

a given data set that need to be accounted for the models, and preferred the use of multiple methods but being cautious about interpreting trends in the context of the data and model fit. Calambokidis added that fitting the best model to the stock trumps the ability to compare across stocks. Moore commented that their data sets are different and we do not have formal objectives for how trend metrics are used. For cetacean data, it is not practical to discuss what happened during last 5 years vs. 20 years, because surveys are only done periodically and the data are not available at shorter time-scales. He supported using the most appropriate method and process should be used and reviewed by the SRG on a case-by-case basis. If the objective is to compare across stocks, then standardization may be useful, but this should be looked at as a separate process (perhaps at the next GAMMS workshop). Scott wondered whether a review paper reviewing methods, data sets, and time periods for trend analyses across SARs would be useful, perhaps as a GAMMS document.

Scott requested clarification of the decisions made between the proposed and final revisions to the GAMMS, particularly regarding workshop topics 1 and 6. Bettridge noted that the Federal Register notice will includes responses to comments. She then explained that the concern with topic 6 was that the criteria developed at the workshop (and included in the proposed GAMMS) to evaluate whether a stock was declining and likely to be listed would pre-suppose the agency's action under the ESA. NMFS felt that this was not sufficiently fleshed out to move forward at this time, but is open to revisiting this. Scott responded that a case where a stock is known to have declined by >50% indicates it is below OSP. Bettridge indicated that this portion of the proposed GAMMS was retained in the final revisions. Stocks for which such a decline was found should state in the SAR that the stock may be below OSP (but a separate process is needed for a depleted designation). Ragen questioned why a 50% decline was selected, rather than 60%. Bettridge indicated that the 50% threshold was the GAMMS workshop recommendation; NMFS has historically interpreted the maximum net productivity level (MNPL) as between 50-70% of carrying capacity and recent analyses used the mid-point 60%, but the revised GAMMS were based on the workshop recommendation.

For topic 1 (outdated abundance estimates), the proposal to discount abundance estimates after year 8 received strenuous objections from the public and NMFS had some concerns. OPR is working on an alternate approach, which will be vetted through Science Centers and SRGs.

Dealing with outdated bycatch estimates

Wynne and Bettridge led a discussion of outdated bycatch estimates. Wynne provided an overview of the problems using old bycatch estimates (e.g. from the 1990s) when current estimates are not available, because environments and other factors change. Carretta clarified that the model-based approach Moore presented can capture such changes while using the older information. Angliss and Wynne questioned whether Moore's methods could be applied in Alaska when there may be few or no estimates of bycatch. Wade questioned whether this is really a problem given that no management actions are being taken. Wynne clarified that if the science does not support the use of old abundance estimates, it is inconsistent to rely on old bycatch estimates. Barlow suggested that a meta-analysis of studies worldwide that evaluated porpoise bycatch rates as a function of km of net in the water and porpoise abundance can and should be done and would provide information. Wynne cautioned that fishing methods and gears do not all have the same bycatch, and many porpoise in AK are released alive. Carretta

provided an example from the Pacific that dealt with this. Mathews noted that the default of considering bycatch to be zero is a problem. Palka added that a multiple approaches can be used with partial fishery information to get a basic evaluation of whether a problem may exist. Small pilot studies can be conducted by students in specific areas to provide some data, and abundance can inform the process. Lowry clarified that there are no other abundance estimates. Bristol Bay has 2400 gillnet fishers, and they have never been observed, so if there were harbor porpoise they may no longer be there. Moore noted that a common theme of risk assessment is the question "we do not know anything, so what can you tell us?" but the real conversation that needs to happen is with managers and resource allocation. And there are ways to assess whether there is the potential for a problem. Wynne suggested it may be more parsimonious to just apply available bycatch-reduction methods that are known to work if there is a reason to believe by analogy that there is a problem. Scott noted that AKSRG has suggested this for years, the PSRG has been supportive, and wondered why this is not being considered. Wynne indicated that there has been push-back. S. Young noted that the history of voluntary bycatch reduction measures in fisheries has not been good; fishermen will not use pingers unless mandated by regulation and enforcement. Forney noted that the case described by Wynne is encouraging, as the fishermen seem interested, and there are past cases in California where fishermen were so happy with results that they pushed others to get the pingers too.

Pendleton wondered whether the SRG can add a note to a SAR that they disagree or do not believe the data support the conclusions. Angliss and Mathews expressed that this should be done collaboratively to come up with acceptable wording. Corkeron noted that this is a different process from usual peer-review, as there is no independent arbiter of disagreements. Ragen suggested that as a manager, it is important to note this uncertainty and identify potential approaches to resolving this. Wright reminded the group that the nexus between science and management to focus the issues is the List of Fisheries.

Habitat modeling for density

Forney reviewed habitat-based models and their potential use in SARs. These models may be useful in places such as Palmyra Atoll, where there is observed longline fishery bycatch, but despite a couple of surveys in the region, there are an insufficient number of sightings to estimate abundance. She provided direct comparisons of line-transect and model-based estimates of abundance; the estimates are similar, but model-based estimates provide better spatial resolution. She cautioned to not make predictions for other regions based on a geographic-specific model. Models can help fill gaps where current abundance estimates (and PBRs) are outdated or missing. The main drawback is that a large proportion of the data used to develop the models are "old" (1997, 2002, 2005, etc.). So the models indicate how many animals are expected to be in a given region based on the collective historical data, not the number of animals that are estimated to be there presently. This can be lead to inaccurate abundance estimates if populations are declining or increasing. Moore noted there is a distinction between using "old data" versus "old estimates." In the case of trend-based models, using "old data" is valid, given careful consideration of assumptions. Palka noted that IWC will have a meeting next year to address these same questions.

Update on Stock Delineation Guidelines Initiative

Martien presented an update on the SDGI. A national workshop, recommended by the GAMMS III workshop, was held 19-21 August 2014, with the goals of facilitating the integration of multiple lines of evidence in stock delineation and promoting consistency and transparency in stock delineation across NMFS. Products of the initiative will be combined into a Stock Delineation Handbook to guide future demographically independent population (DIP) delineation efforts. The Handbook, currently still draft, includes the following components: 1) a review of lines of evidence (LoEs) and factors that should be considered when collecting, analyzing, and interpreting data; 2) assessment of the strength of each LoE when positive results are found and sampling is adequate; 3) assessment of data availability for each LoE in order to describe "best available science" attainable for different stocks.

In general, morphology, genetics, and movements are the strongest lines of evidence. Other LoEs, such as differences in pollutant levels, are considered weak and should not be used on their own stock delineation. The workshop participants concluded that there was no quantitative way to combine multiple lines of evidence, and decisions must be case-by-case.

Martien also noted that NMFS is planning a beaked whale stock delineation workshop. These are data-poor species; for example, we are not managing Mesoplodon species at the species level in our SARs because they cannot usually be identified to species in the field.

McDonald asked whether movement data includes photo-identification and telemetry. Martien responded yes; while they are very different and have different caveats, they were grouped together into a broad category. McDonald then asked what the gold standard was for stock delineation. Martien responded that it would depend on the situation. For example, for an insular population around Hawaii, the gold standard would be genetics, but for spinner and spotted dolphins in the eastern tropical Pacific, there are differences in morphology that separate sub-species, but they are so abundant you cannot tell them apart genetically. Mathews stated she was surprised that stable isotope differences was considered a weak line of evidence, and asked whether Randy Wells found differences within the bottlenose dolphin population he studies. Wells responded that there were gross distinctions that separated inshore/offshore populations, but stable isotopes were not useful for fine-scale differentiation. Rosel and Martien explained that there is a turnover rate issue, and stable isotopes are a short-term signal. Even if you had a robust dataset showing that the two groups you are comparing are different in their stable isotope signatures, it does not give much faith that they are indeed separate populations. There are so many things that could cause different stable isotope signatures that it was not considered to be strong evidence of population differentiation. For example, the animals may be moving through different habitats, or staying in the same location but the environmental conditions change.

Data Sources in SARs

Merrick provided an update on the process for including peer-reviewed sources for information in the SARs, and emphasized that non peer-reviewed information should not be included. McDonald questioned why authors are not named on individual SARs. Merrick responded that the policy within GAMMS is that SARs should not be cited as primary references (although people do it all the time). McDonald suggested that this may not encourage ownership of the particular SARs. Corkeron asked whether, as first author of the Atlantic SARs, he needs to determine whether every SAR is acceptable quality. Merrick responded yes, but that hopefully it does not come down to him in the end, post-SRG review.

Climate discussion

Merrick

Merrick introduced the session on climate change issues.

Tortorici (by phone)

Cathy Tortorici, Chief of the OPR ESA Section 7 Consultation Division, reviewed Section 7 consultation issues related to climate change. Tortorici said NMFS is developing a framework on how to include climate considerations when issuing permits, because cumulative/aggregate effects need to be part of the NEPA and other documents.

Ragen noted that there is a lot of expertise on the SRG to help focus the needs and concerns. McDonald wondered whether climate change effects are part of human-caused mortality, and suggested that climate impacts could be included in the human-caused mortality section. Bettridge noted that this is also in the habitat concerns section, but Ragen noted that these sections should include more information to assist managers. LeBoeuf explained the management context for this issue. Scott wondered whether the SRG can make recommendations with respect for the need to reduce CO2 emissions. Merrick responded that the SRG can recommend anything, and while NMFS does not regulate greenhouse gases, it does regulate activities and fishing in the face of climate change. Guidance from SRGs on helping NMFS better manage the species would be more effective than recommending actions NMFS cannot engage with. Scott asked Wade whether the simulations for recovery factors included consideration of climate change. Wade explained that the 0.5 recovery factor was intended to account for uncertainty that has not been included elsewhere, e.g., underestimating bycatch by a factor of 2. Climate change is more complex, because if it changes the carrying capacity, then the abundance and PBR decline, but the question of what that means (e.g., with polar bears and human-caused climate change in the Arctic) is difficult. Is the current carrying capacity really appropriate if the reduction was caused by human activities, or should PBR use a more conservative recovery factor that would allow the population to be closer to the new, lower carrying capacity? LeBoeuf noted that there are other parts of the MMPA that are underutilized, including Sec 117(d)(1)(E) which asks the SRG to advise on "*the actual, expected, or potential impacts of habitat destruction, including marine pollution and natural environmental change, on specific marine mammal species or stocks, and for strategic stocks, appropriate conservation or management measures to alleviate any such impacts.*"

Lettrich (by phone)

Matt Lettrich, OST, provided an overview of rapid vulnerability assessments for marine mammals and sea turtles. Part of this included the vulnerability assessment, and part included looking at whether we can assess potential changes in marine mammal distribution (January workshop). Abundance, Distribution and Phenology are all important and mechanistic models would be great but coarser information is also lacking. Vulnerability assessment evaluates exposure, sensitivity, and ability to adapt for species, and was performed via literature review. Existing frameworks include NOAA fish-stock climate vulnerability assessment for sensitivity and exposure effects on abundance; the second is Pecl et al. (2014) sensitivity effects on all three. The plan is to combine the two for a broader framework, but had to adjust attributes for marine mammals vs. fish stocks. The products will include a species ranking of most to least vulnerability including breakdown of different expert scores (Morrison et al. 2015). Currently

reviewing attributes for taxon-specific groups, identifying data sources, and drafting methodology. Will do case studies with 6 species, spanning a range of expected vulnerability, and following refinement expect to implement for regions. The testing is targeted to start by March 2016. There will be opportunities for SRG members to be involved in review and implementation, and also whether these steps match up with needs identified in SARs.

Merrick highlighted that the SRG can help on expert panels and in peer reviews. Scott noted that Alaska is an obvious starting point, but understanding effects on fish stocks (which has already been done) is an important starting point because these are also marine mammal prey species. Other prey items may be another good starting point (squid, krill). He also suggested that one potential Joint SRG recommendation may involve how best to provide SRG input on this topic. Corkeron inquired about the role of assessing and increasing population resilience, using North Atlantic right whales as a case study. Merrick responded that the vulnerability assessment will reflect this. However, Corkeron rebutted that the discussions are not currently focused on important information relevant to resilience, because this is not part of the information required by the SARs (e.g., other than abundance, human-caused mortality). For example, the coral reef field has increased protection levels as a buffer against climate change, and a similar buffer may be needed for right whales and fishery entanglements. Ragen expressed support for clarifying the information that might be helpful for assessment, and indicated that metrics other than mortality (e.g., reproduction) are important for assessing impacts. It is also critically important to keep up with abundance estimates, to provide measures of what is happening even if we do not understand the mechanisms (yet). Clark noted projected changes in ambient noise could contribute to the vulnerability assessment.

Scott inquired whether FWS has a comparable approach to climate change. Bowen indicated that Lettrich has been in touch with FWS, but they do not currently have anything for marine mammals. Laist asked whether impacts of harmful algal blooms are included, as they appear to be increasing in frequency, and whether species that may benefit from climate change were also going to be considered. Lettrich responded affirmatively, and Merrick clarified that this is just a first step. Heinemann expressed support for the concept raised by Corkeron, that increasing resilience is a management tool to address effects of climate change (since we cannot manage human-caused effects on climate directly). Merrick said that specific recommendations on what can and should be done would be very helpful. He also noted that the concept of shifting baselines is complex, and it is not clear how best to deal with this.

Public comments

Jonathan Brandon described analyses conducted by the IAT. He explained that the IAT conducted a management strategy evaluation (MSE) of a tiered PBR approach, delineated based on different levels of data. The group has developed code (available on GitHub; Google "PBR Tier system") that can be adapted for situations where multiple stocks are taken in a fishery, or where Nmin is based on an incomplete survey. Looking forward, Brandon asked the SRG whether there was interest in pursuing additional evaluations, such as extending the trials to include information available since the original MSE for PBR, new methods to integrate multiple years of data to improve estimation of parameters of interest, incorporating trends into the recovery factor, and uncertainties that have come to light in last 20 years, including climate change and stock structure complexity. Pendleton indicated that it is always a good idea to

evaluate new methods. Ragen added that it is not necessary to do this for every situation, but it would probably be helpful to look at the stocks where information is poor vs. good to see if there is a basis for doing an evaluation.

Moreno, also with IAT, expressed thanks for being included in the meeting, and asked whether documents could be provided. Merrick indicated that the draft documents have not been internally reviewed and are pre-decisional; Bettridge also noted that some published documents may have copyright issues that prevent us from posting or distributing them beyond the SRGs. Moreno requested that the full citation be provided so it is clear which documents are draft vs. published. Merrick confirmed that this was a good suggestion that can be addressed.

Moreno also asked Heinemann for more details on MMC's consideration of a metric for evaluating estimates of M/SI, since the IAT is considering doing an analysis of the estimates. Heinemann responded that there could be various reasons for zero-values of M/SI in various fisheries or stocks, including that not all fisheries that take marine mammals have observers, and observer coverage varies widely. For other causes of M/SI, such as ship strikes, the ability to detect M/SI varies by region. Heinemann suggested that basic statistics could be reported, but comparing averages across regions would be problematic because of uneven detection and reporting. Heinemann suggested Moreno contact Sam Simmons, the author of the MMC report, to follow up.

Recommendations of the Joint SRG

1. The Alaska, Atlantic, and Pacific SRGs commend the efforts by the NMFS Climate Vulnerability Project to estimate the effects of climate change on marine mammals and offer their individual and collective expertise to assist in this effort. The SRGs stress the critical value of establishing baselines from which to measure the effects of climate change and climate variability. The SRGs recommend that NMFS and USFWS: a) collaborate on the Climate Vulnerability Project; b) establish and maintain baselines for abundance, status, vital rates (particularly reproductive rates), prey abundance, habitat-use patterns, and distributional range; and c) identify those species that may be less resilient to climate change (and therefore in need of greater protection) and those that may benefit by climate change.
2. When observer programs are too costly or logistically difficult to reliably monitor marine mammal mortality by a fishery, alternative methods should be used for determining where, when, and approximately how many marine mammals are being seriously injured or killed.
3. If there are known interactions between marine mammals and fisheries resulting in serious injury or mortality, then safe and appropriate mitigation measures should be implemented, even in the absence of abundance and mortality data, a strategic stock determination, and take reduction team formation.
4. The USFWS should produce updated Stock Assessment Reports annually for strategic stocks and triennially for other stocks under its jurisdiction. These SARs should incorporate the most recent peer-reviewed information and best science available on abundance, mortality, trends, management actions taken and other information as required by the Marine Mammal Protection Act.
5. The SRGs recommend that NMFS implement a multi-year allocation of ship time for marine mammal surveys and increase the priority and operational funding for those surveys. The surveys are necessary to obtain the abundance estimates required to calculate PBR and thus enable fisheries to meet the standards required by the MMP A. The failure to meet those requirements may place an undue burden on those fisheries and the lack of data can place marine mammal populations at risk.
6. Estimated levels of human-caused mortality and serious injury suffer from negative biases due to incomplete detection and recovery of carcasses. A correction factor for this mortality has been derived for some coastal delphinids and is being applied to address this negative bias. We recommend research on cryptic mortality be done on a regional basis to establish such correction factors and incorporate them into stock assessment reports as appropriate.
7. The 2016 stock assessment guidelines state that PBRs must be calculated and reported in the SARs where possible, even for species that are declining and listed as endangered. Statements should be included in the summary table and text cautioning that no take can be sustainable for an endangered population that is declining.

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Appendix 1 – List of Participants

Alaska SRG
Lloyd Lowry, Chair
Beth Mathews
Grey Pendleton
Robert Small
Kate Wynne

Atlantic SRG
Randy Wells, Acting Chair
Chris Clark (by phone)
Jim Gilbert
Bob Kenney
Trent McDonald
Buddy Powell
Sharon Young

Pacific SRG
Michael Scott, Chair
Hannah Bernard
Robin Brown
John Calambokidis
Doyle Hanan
Jim Harvey
Steve Jeffries
Tim Ragen
Kathy Ralls (by phone)
Terry Wright

NMFS
Richard Merrick (NMFS Chief Scientist)
Mridula Srinivasan (OST)
Jason Forman (GCF)
Shannon Bettridge (OPR)
Nicole LeBoeuf (OPR)
Kristy Long (OPR)
James Powell (OPR)
Lisa White (OPR)
Nancy Young (OPR)
Ann Garrett (PIR)
Susan Pultz (PIR, by phone)
Jason Baker (PIC)
Amanda Bradford (PIC)
Erin Oleson (PIC)
Bridget Mansfield (AKR)
Robyn Angliss (AKC)
Van Helker (AKC)
Marcia Muto (AKC)
Kim Shelden (AKC)
Paul Wade (AKC)
Alex Zerbini (AKC)
Mike Ford (NWC, by phone)
Lynne Barre (WCR)
Monica DeAngelis (WCR)
Tina Fahy (WCR, by phone)
Elizabeth Petras (WCR)
Penny Ruvelas (WCR, by phone)
Jay Barlow (SWC)
Jim Carretta (SWC)
Karin Forney (SWC)
Karen Martien (SWC)
Jeff Moore (SWC)
Mike Asaro (GAR)
Dave Gouveia (GAR, by phone)
Allison Rosner (GAR, by phone)
Peter Corkeron (NEC)
Beth Josephson (NEC)
Debra Palka (NEC)
Laura Engleby (SER)
Stacey Horstman (SER, by phone)
Jessica Powell (SER, by phone)
Kathy Foley (SEC, by phone)
Lance Garrison (SEC)
Keith Mullin (SEC)
Patty Rosel (SEC)

FWS
Diane Bowen
Lillian Carswell (by phone)
Charlie Hamilton
Deanna Lynch
Jim Valade

MMC
Dee Allen
Dennis Heinemann
David Laist

Invited presenters (via phone/webinar)
Ben Laws (OPR)
Matt Lettrich (OST)
Cathy Tortorici (OPR)

Observers (via phone/webinar)
Robin Baird (Cascadia Research Collective)
Jonathan Brandon (IAT)
Brian Gruber (Makah tribe)
Asuka Ishizaki (Western Pacific Regional Fishery Management Council)
Paula Moreno (IAT)
Jon Scordino (Makah tribe)

Appendix 2 – List of Background Documents

The following documents were provided to the Joint SRG members to support meeting presentations and discussions. Documents in strikethrough text were included in the original list of documents and are referenced in the draft agenda, but for various reasons were not distributed before or during the meeting.

Document No.	Title/Topic
~~JSRG-2016-B01~~	~~MMC Review of NMFS' Marine Mammal Stock Assessment Reports~~
~~JSRG-2016-B02~~	~~Sample SARs for inter-regional consistency discussion~~
~~JSRG-2016-B03~~	~~2016 Revision to the Guidelines for Assessing Marine Mammal Stocks (GAMMS III)~~
JSRG-2016-B04	Proposed Rule on MMPA Fish and Fish Product Import Provisions
JSRG-2016-B05	Recovery rates of bottlenose dolphin (*Tursiops truncatus*) carcasses estimated from stranding and survival rate data
JSRG-2016-B06	Inferring trackline detection probabilities, g(0), for cetaceans from apparent densities in different survey conditions
JSRG-2016-B07	Cryptic mortality estimation papers
JSRG-2016-B08	Published mortality detection rate estimates
~~JSRG-2016-B09~~	~~Placeholder for PR Toolbox topic~~
~~JSRG-2016-B10~~	~~Placeholder for PR Toolbox topic~~
JSRG-2016-B11	Habitat-based models of cetacean density and distribution in the central North Pacific
JSRG-2016-B12	SDGI workshop report

Appendix 3 – Agenda

DRAFT AGENDA
JOINT SRG MEETING
February 23-24, 2016
Alaska Fisheries Science Center, Seattle, WA

Day 1: Tuesday, February 23, 2016

8:00 Welcome and introductions
- Opening remarks (Merrick)
- Logistics (Bettridge)
- Finalize agenda (Bettridge)

8:30 Individual SRG challenges and successes
- Alaska (Lowry)
- Atlantic, Gulf of Mexico, Caribbean (Wells)
- Pacific (Scott)
- Discussion

9:30 Discussion of NMFS and FWS stock assessment reports (Bettridge, Heinemann and FWS)
- Overview of MMC review of NMFS' stock assessment reports (summary of nationwide review of SARs and summary statistics) *(JSRG-2016-B01)*
- Recommendations and plans for MMC report
- Discuss ways to improve reports
- How can SARs be made more consistent across regions? *(JSRG-2016-B02)*
- Efforts by NMFS and FWS with regards to SAR production are very different. How can these be brought into closer alignment with greater consistency in process?

10:30 Break

10:45 Guidelines for Assessing Marine Mammal Stocks (Bettridge)
- Overview of GAMMS III *(JSRG-2016-B03)*
- Overview of plans for addressing topics not finalized in GAMMS III

11:15 Update on incidental take permitting for fisheries research (Srinivasan)

11:30 MMPA imports rule and take reduction team/List of Fisheries discussion (Long) *(JSRG-2016-B04)*

11:45 Update from the Office of Protected Resources permitting division (Laws call in)

12:15 Remote public comments

12:30 Lunch

2:00 Status of humpback whale listing rule, and implications of ESA listing status change for humpback whale management under the MMPA (Bettridge)

2:30 NMFS Marine mammal budget discussion (LeBoeuf)

3:00 New methodologies being applied to SARs (Moore, Carretta, and Barlow) *(JSRG-2016-B05; JSRG-2016-B06)*

- Examples: g(0), Rmax, model-based bycatch estimation, estimating abundance using trend models, correction factors for stranding data.

4:15 Break

4:30 Cryptic mortality (Heinemann) *(JSRG-2016-B7; JSRG-2016-B8)*

5:00 Protected Resources Toolbox (Srinivasan) *(JSRG-2016-B9 and JSRG-2016-B10)*

- Overview of PR Toolbox effort
- Highlights of marine mammal toolbox projects

5:15 Remote public comments

5:30 Adjourn

Day 2: Wednesday, February 24, 2016

8:30 Calculating Nmin when only a portion of a stock's range is sampled (Oleson)

- Examples
- Discuss challenges and potential approaches

9:00 Dealing with outdated bycatch estimates (Wynne, Bettridge)

- Recall MMPA requirements (PBR, etc.)
- Discuss outdated bycatch data and resulting estimates
  - Examples
- Need for and options to address
- What happens in the future when we have no reason to believe more data will be gathered?

10:00 Habitat modeling for density (Forney, Oleson, Garrison) *(JSRG-2016-B11)*

- Examples from Pacific Islands, U.S. West Coast, U.S. East Coast
- Applicability to SARs
- What to do about outdated data used in models?

10:30 Break

10:45 Update on Stock Delineation Guidelines Initiative (Martien) *(JSRG-2016-B12)*

11:15 Climate discussion (Lead TBD)

- Quick review of the ESA and Climate study, and the OPR guidelines on climate (PR5, by phone)
- Climate vulnerability assessment tool (Lettrich, by phone)
- Discussion of changing baselines

12:15 Remote public comments

12:30 Lunch

1:30 Discussion of Joint SRG recommendations to NMFS and FWS

2:15 Drafting of Joint SRG recommendations to NMFS and FWS

3:15 Adjourn Joint SRG meeting

3:30 Individual SRGs convene

5:00 {poster session and social gathering}