NMFS Responses to 2024 AKSRG Recommendations

1. **Integrated Modeling Approaches**

At the 2024 meeting, the AKSRG noted that some stock assessments may benefit from the use of integrated population models (IPM) and similar approaches to estimate minimum abundance (Nmin) and other demographic parameters. The Bristol Bay beluga SAR was an example where a new abundance estimate of 1,669 individuals in 2022 was lower than the previous estimate of 2,040 in 2016, however, it was not clear if this represented a real decline in abundance or was the result of sampling variability. Most of the whales in Bristol Bay are counted in 2-3 large groups, which make them more difficult to count accurately, a common issue for surveys of small cetaceans that form large aggregations. Moreover, fewer surveys were flown in 2022 due to weather. In such situations, an IPM could impose realistic underlying population dynamics that would allow the distinction between process variation (i.e., real changes in abundance) and observation error, and would prevent abundance estimates from varying from year-to-year in demographically implausible ways. An IPM could also potentially allow the inclusion of additional information, such as mark-recapture data, that would allow variables to be informed by multiple observation processes. This can reduce potential bias and allow estimation of additional demographic parameters such as the superpopulation size (i.e., the larger group of animals that use an area over a multiyear period, rather than the "snapshot" of abundance provided by aerial surveys) and rates of immigration and emigration. **The AKSRG therefore recommends that stock assessment authors explore IPMs where multiple data sources exist. Resulting abundance estimates used to inform Nmin and Potential Biological Removal (PBR) may exhibit less sampling variation and bias, allowing for more consistent management advice.**

NMFS Response: Integrated models, even if not explicitly labeled as such, are already being used to estimate abundance and Nmin in several stock assessment reports (SARs). For example:

- Four stocks in CA/OR/WA (sperm whales, Mesoplodont beaked whales, Baird's beaked whales, and Cuvier's beaked whales), a Bayesian trend model is used to estimate abundance and Nmin, where the model abundance in the last year is conditioned on the entire time-series of abundance estimates.
- For both Alaska harbor seals and Steller sea lions, a model is fit to count data to estimate modeled counts that are used for abundance and Nmin; this is essentially the same approach, though tailored to the use of count data for pinnipeds.
- A weighted average of the last three abundance estimates is used for Cook Inlet beluga abundance and Nmin, which is analogous to an integrated model.

- Line-transect data over many years is being used to provide spatial abundance estimates using environmental data; this can also be thought of as a form of integrated model. Two examples include calculation of CA/OR/WA fin whale abundance and Nmin using line-transect and environmental data from 1991-2018, and use of sighting data from 2002 to 2017 within the U.S. Exclusive Economic Zone around Hawaii to derive habitat-based models of animal density for the overall period for short-finned pilot whales, which were used to estimate abundance in 2017.

NMFS agrees that it is reasonable to explore the use of IPMs for stocks such as Bristol Bay beluga whales and agrees that the use of such models may exhibit less sampling variation and bias and allow for more consistent management advice. NMFS plans to pursue this type of approach as staff resources are available.

2. Critical Nmin

The AKSRG noted that the SARs for Gulf of Alaska (GOA) and Bering Sea (BS) harbor porpoises made use of new guidance from the revised GAMMS to calculate a Critical Nmin when abundance information is outdated (and therefore cannot be used unless there is evidence that the population has been stable or increasing). Essentially, this approach calculates the minimum abundance that would result in PBR being exceeded given observed mortality and serious injury (M/SI). For instance, the GOA harbor porpoise abundance estimate for 1998 is 3.6 times greater than the Critical Nmin, and therefore NMFS concluded that strategic status is not warranted.

The AKSRG endorsed the Critical Nmin approach when it was introduced because prior guidance required that a stock be classified as strategic when abundance estimates were more than 8 years old; in many cases, it is clear that stocks are not strategic even when abundance data are out-of-date. However, the AKSRG was not comfortable with the application of Critical Nmin to GOA harbor porpoises, for which there are too many uncertainties. Specifically, the estimate of M/SI is based on incomplete mortality data, the population estimate is 25 years old, and the stock structure of the population is poorly understood. Section IV of the GAMMS item 3.4.2.1 applies to cases where one should “judge whether the stock range-wide minimum abundance is likely greater or less than this Critical Nmin value based on the best scientific information available.” The group argued that there is no clear guidance or a set threshold to decide what “likely greater” means and felt that this standard was not met for GOA harbor porpoises given the available scientific information.

In contrast, the AKSRG felt more comfortable with the application of Critical Nmin to BS stock harbor porpoises. For BS harbor porpoises, the abundance estimate is more

recent and 23 times greater than the Critical Nmin despite being based on a survey that covered only a small part of the stock's range, which makes the NMFS' recommendations much more defensible.

Therefore, the AKSRG recommends that the Critical Nmin approach be applied on a case-by-case basis, and that its rationale should be subjected to the same scrutiny as other components of the PBR calculations that are changed from their default values (e.g., Rmax, F_R). The AKSRG further recommends GOA harbor porpoise remain a strategic stock, within the context of the Critical Nmin process, due to the data limitations, fishery interactions, and stock structure concerns noted above.

NMFS response: We appreciate the AKSRG's careful consideration of NMFS' application of the new Critical Nmin guidance in the draft GOA and BS harbor porpoise SARs. We agree that the Critical Nmin approach should be used in specific circumstances, and we understand the AKSRG's concerns regarding the uncertainties in the GOA harbor porpoise's assessment that suggest the "likely greater" standard in GAMMS section 3.4.2.1.V has not been met. In this case, the GAMMS advise that the stock may or may not warrant strategic status based on MMPA section 3(19)(A) and discretion should be used to judge the likely upper bounds of both the true range-wide Nmin and the true total human-caused M/SI to determine whether the stock warrants strategic status. We were not able to judge the likely upper bounds of the true values given the age of the abundance estimate and the high degree of uncertainty in the extent to which human-caused M/SI is underestimated. There is additional uncertainty given the likelihood that the stock structure is too broadly defined based on what is known about harbor porpoise population structure elsewhere. Based on these considerations and consistent with GAMMS section 3.4.2.1.V, NMFS will continue to consider this stock to be strategic. Also in response to the AKSRG's recommendation, we retained the use of the Critical Nmin approach to justify the non-strategic status for BS harbor porpoise stock.

3. Effects of Anthropogenic Noise during Harbor Porpoise Surveys

Recent studies suggest that elevated ambient noise (associated with survey efforts or other nearby anthropogenic sources) has the potential to impact harbor porpoise sightability and distribution, and thus can introduce a bias in abundance estimates based on distance sampling (Frankish et al. 2023). Therefore, surveys conducted from different platforms or in different acoustic conditions may not always be directly comparable within a time series. The AKSRG noted that data collection methods used to generate population estimates for GOA or BS harbor porpoise include both aerial and vessel-based surveys, yet there has been no consideration to date of the effect of the

survey platform on and the comparability of abundance estimates. **The AKSRG recommends that platform type (vessel type and size, aircraft size) and, when possible, a description of the acoustic environment (e.g., a count of the number of vessels underway), should be considered and discussed when comparing population estimates for harbor porpoises.**

NMFS response: Consistent with Section 3.2.1 of the GAMMs, NMFS considered whether the Nmins for the GOA and BS stocks of harbor porpoise could be adjusted to account for potential abundance changes that may have occurred since the last survey but found that there was no reliable basis for doing so. Thus, the Nmins for both stocks are considered unknown. When new abundance estimates become available, NMFS will consider whether a discussion on platform type and acoustic environment are applicable in the SARs.

The paper referenced by the AKSRG focused on harbor porpoise avoidance of very large vessels. Responsive movement from harbor porpoise would be an issue for abundance estimation if porpoise detected and responded to the research vessel before they were seen by the observers. Vessel surveys in the BS were conducted on NOAA ships during echo-integrated trawl surveys for pollock. Those vessel surveys were conducted using big-eye binoculars, which minimizes the effect of responsive movement to a great extent because there is a high likelihood animals will be detected well before they respond to the presence of the vessel. Examination of the detection function showed no evidence of negative responsive movement. Only aerial surveys have been conducted for the GOA harbor porpoise stock, and at the time, responsive movement was not expected in response to the plane so it was not considered in the abundance analysis. In our 2019 vessel-based survey in Southeast Alaska, observers searched for porpoise well ahead of the vessel to minimize this issue, and similarly, there was no evidence of avoidance behavior in our histograms of perpendicular distance used for estimation of detection probability. It is possible that a small number of individuals may have responded to the presence of the survey vessel or other vessels in the area, but this is unlikely to significantly affect the resulting abundance estimate. We will ensure that the ADFG, who is likely to be the next agency that conducts a comprehensive survey for Southeast Alaska harbor porpoise, is aware of the paper that the AKSRG has provided.

4. Killer Whale Bycatch

The AKSRG received a presentation on the bycatch of 11 killer whales in 2023 Bering Sea trawl and longline fisheries. The AKSRG appreciated the opportunity to discuss the issue prior to the relevant SAR update (planned for 2025) and notes that the recent bycatch represents a significant increase in M/SI for the Eastern North Pacific Alaska

Resident stock. All whales, for which sex could be determined, taken in this fishery were females. If this sex ratio is indicative of the general skew for bycatch in this fishery, takes could have a disproportionate impact on the reproductive potential of the population, and this issue could raise concerns for the calculation of the PBR (which is robust to some types of uncertainty but does not take into consideration the sex and age structure of the removals). The GAMMS mention that the recovery factor can be adjusted to accommodate additional information, for example "if human-caused M/SI includes more than 50% females, the recovery factor should be decreased to compensate for the greater effect of this mortality on the population." The GAMMS, however, do not provide a specific method to adjust the recovery factor based on the observed sex ratio, but other studies have examined this issue and could provide additional insights (e.g., Brandon et al. 2017).

The AKSRG recommends that sex ratio of killer whale bycatch be given due consideration when updating the killer whale SAR and calculating the PBR and encourages authors to discuss the biological consequences of a skewed sex ratio (an example of this can be found in the Northern fur seal SAR) and to provide rationale for the choice of a recovery factor.

In light of ongoing concerns with killer whale bycatch in Alaskan commercial fisheries, interaction risks associated with depredation on commercial fishing gear (including new reports of slinky pot interactions) and changing prey resource availability associated with warming marine conditions, **the AKSRG reiterates its recommendations from 2013 and 2022 for NMFS to prioritize efforts to update Eastern North Pacific killer whale stock structure. This update should include an analysis of existing genetic samples from southeast Alaska, the Gulf of Alaska, and False Pass/Unimak Island region and analyses of historic and current photo-identification catalogs.**

NMFS response: NMFS reviewed the final 2022 Eastern North Pacific Alaska Resident killer whale SAR and determined the status of the stock can be more accurately determined. NMFS is in the process of revising the SAR and expects to include a brief discussion of the possible biological consequences of a skewed sex ratio in the draft 2025 SAR for the Eastern North Pacific Alaska Resident stock of killer whales and will consider adjusting the recovery factor per Section 3.2.4 of the GAMMS. Consistent with NMFS' policy on reviewing and designating stocks and issuing SARs under the MMPA, NMFS intends to initiate a review of Eastern North Pacific Alaska resident killer whale stock structure in January 2025.

5. **Model-based Bycatch Estimators**

The AKSRG continues to support the development of a model-based approach to estimate marine mammal bycatch. In addition to the advantages of reduced interannual volatility in marine mammal bycatch estimation, there may be other advantages as this method is further developed to explore longer-term time series for certain fishery/marine mammal combinations, probabilities of exceeding PBR for vulnerable marine mammal species, and to incorporate interaction (presence/absence or distribution) data in the models to improve performance. The AKSRG also urges NMFS to evaluate ways to address rare events (such as years with high bycatch numbers) via simulations or other methods to best account for these interactions. We look forward to hearing updates on this work at the 2025 joint meeting.

NMFS response: We appreciate the AKSRG''s continued support for updating the marine mammal bycatch estimation procedures. Development of a model-based approach is an ongoing priority at AFSC, and we agree these methods improve upon the current procedure by reducing the volatility of annual bycatch estimates, allowing the assessment of temporal and/or spatial trends, and providing inference that has relevant, probabilistic interpretations. An update on recent progress will be provided at the 2025 AKSRG meeting.

6. Bristol Bay Beluga Whales

NMFS requested that the AKSRG: 1) review the SAR for the Bristol Bay beluga stock, 2) comment on next steps for assessing correction factors for aerial surveys, and 3) comment on existing survey methods for belugas in Bristol Bay. The Bristol Bay population is relatively small with approximately 1,500 to 2,000 belugas. Past surveys have focused on visually counting belugas during coastline aerial surveys in July, when belugas aggregate near shore to feed on migrating sockeye salmon. Observers fly nearly the entire range of Bristol Bay belugas multiple times during the survey period, often twice per day and during two sequential years. The survey yields raw counts of belugas, which have been adjusted by a fixed correction factor for availability bias of 2.62, which comes from a small sample of belugas radio-tagged in Bristol Bay (Frost and Lowry 1995). These surveys have been conducted approximately every five years since 1993 (Fig. 1) by the Alaska Beluga Whale Committee (ABWC) and the Alaska Department of Fish and Game (ADFG). The question posed by NMFS was specifically whether a better correction factor was necessary and more generally if better survey methods should be considered.

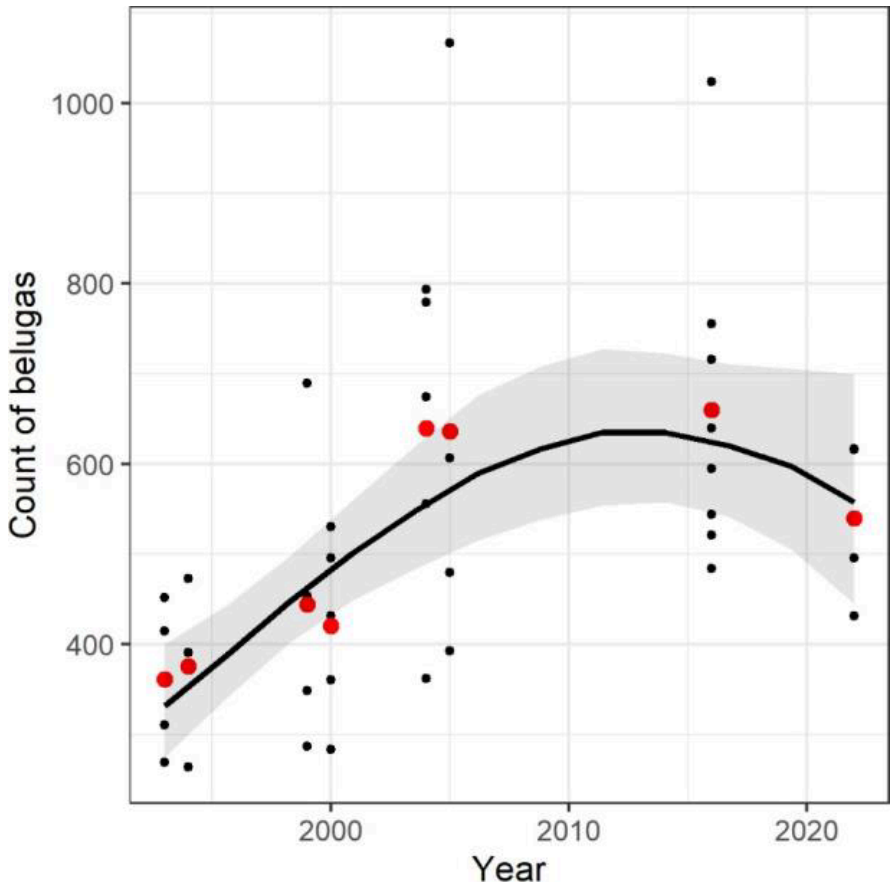

Figure 1. Trend in beluga counts from 1993 to 2022. Black points are actual counts, red points are the mean count for each year, and the black line is the fitted trend (± 95% C.I. gray shading). This graphic is taken from Quakenbush et al. (2022).

The AKSRG concluded that although more informative surveys should be considered, there is nothing inherently wrong with the current method of counting. Consistency in the timing of surveys (during the sockeye run), conducting multiple counts per year, and covering most of the entire summer range of belugas during each survey has yielded valuable information on trend (Lowry et al. 2008; Citta et al. 2019; Quakenbush et al. 2022). The AKSRG thinks that those estimates of trend are potentially more reliable than applying the fixed availability correction factor to obtain estimates of absolute abundance. However, we note that a genetic mark-recapture study (Citta et al. 2018) yielded 1,928 belugas and was consistent with the 2016 aerial surveys which yielded 2,040 belugas after the fixed correction factor was applied (Citta et al. 2019). As such, surveys completed in Bristol Bay to date have been appropriate and informative. However, the AKSRG also notes that the methods used rely on maintaining survey consistency. Flying the survey during a different time of year or with new observers may alter the apparent trend and resulting estimate of abundance. Likewise, changes in beluga behavior or the behavior of their prey may also alter results and affect

inferences. The ability of observers to accurately count large groups visually is potentially one large source of error, which may be difficult to control across multiple observers.

More complex methods that can likely control for sources of uncertainty in a statistically defensible fashion are available. For example, the video method used in Cook Inlet will likely enumerate groups more consistently (Hobbs et al., 2022). The development of habitat-specific availability correction factors for belugas in the Saint Lawrence Estuary has dampened the variability in counts and led to more consistent and biologically realistic estimates of abundance over time (Lesage et al. 2024). These approaches should be considered for Bristol Bay. We note that all these approaches will require significantly more resources in the form of funding, staff, and time investment.

One potential way forward would be to leverage the existing genetic work that has been done in Bristol Bay. Approximately 1,000 belugas were genetically marked during the genetic mark-recapture study that was completed in 2011 (funded by ABWC). Most of these marked belugas should still be alive and could contribute information on survival if another genetic mark-recapture study were to be conducted. We can foresee analyzing these data within a robust design framework, estimating abundance within sampling periods and survival between periods. This work could be expanded to consider relatives in a close-kin mark-recapture framework and could also be combined with the aerial survey data in an integrated population model. The Bristol Bay population is small, and existing data suggest it may be declining. **Therefore, the AKSRG recommends that updated surveys of belugas in Bristol Bay be given priority. Determining the best approach for future surveys will take time, so the AKSRG suggests holding a dedicated workshop, similar to what was held for Cook Inlet belugas in 2023. Until then, the AKSRG suggests continuing the existing aerial survey program with another survey within the next year or two to acquire trend data.**

NMFS response: We appreciate the AKSRG's consideration of our request and advice about how to proceed with respect to future field assessments of the Bristol Bay beluga stock. We agree that there is merit in reconsidering the methods for assessing the Bristol Bay beluga stock and are open to discussing with our co-management partners and other interested parties about when to schedule such a workshop.

7. **Agency Communications and Science**

Effective marine mammal science and management necessitates collaboration and transparency across agencies, including NMFS, the North Pacific Fishery Management Council (NPFMC), ADFG, USFWS and Alaska Native Organizations and Tribes. At the

2024 meeting, the AKSRG received a presentation on a proposed ADFG survey to reassess Southeast Alaska harbor porpoise abundance and genetic stock structure given concerns with recent NMFS-led surveys. While the AKSRG appreciates some of the concerns ADFG communicated at the 2024 annual meeting, **we strongly urge NMFS and ADFG to collaborate on future surveys to ensure research effort is complementary and not duplicative, especially when funding and survey resources are limited and many marine mammal species in the Alaska region do not have current estimates of Nmin or PBR.**

Additionally, it has come to the AKSRG's attention that the NPFMC no longer receives a detailed annual update from NMFS/MML on marine mammal stock status relative to fishery interactions/bycatch (with the exception of northern fur seals). Understanding marine mammal interactions with commercial fisheries and potential impacts to marine mammal stock status is a major component of the SAR process. **Therefore, the AKSRG recommends that NMFS/MML reinstitute a detailed annual update to the NPFMC to ensure that marine mammal bycatch and stock status is communicated to fishery managers and fishers to best inform Ecosystem-Based Fishery Management.**

NMFS response: We agree that collaboration with the ADFG is highly desirable to ensure that the outcomes of research add to the collective body of knowledge on harbor porpoise abundance and stock structure. The Cetacean Assessment and Ecology Program (CAEP) within MML has engaged with the ADFG to provide advice about their harbor porpoise survey plans. In addition, we hosted one of the ADFG biologists on a brief cruise in Southeast Alaska in late summer 2024 to familiarize her with our field protocols.

NMFS agrees that understanding marine mammal interactions with commercial fisheries and determining stock status is part of the SAR process (see 16 U.S.C. § 1386(a)(4)-(5)). Fishery interaction data through 2022 were incorporated into the draft 2024 SARs, as appropriate.

NPFMC has access to the SARs, and marine mammal bycatch and other information is incorporated throughout the year into NPFMC reports and analyses, such as environmental assessments and Endangered Species Act section 7 consultations supporting Fishery Management Plan amendments. Additionally, actions under the MMPA, such as fishery reclassifications on the MMPA List of Fisheries, are communicated to the NPFMC by the NMFS Alaska Regional Office in their Management Reports (sometimes referred to as "B2 reports").

8. **Alaska Native Organizations and Indigenous/Traditional Knowledge**

Alaska Native Peoples and organizations should be involved in key decisions regarding species integral to the ecological and sociocultural aspects of their regions. The AKSRG commends NMFS for formalizing the review of SARs by Alaska Native co-management groups and recognizes their increased efforts to collaborate on SARs with Alaska Native Organizations (ANOs). **The AKSRG recommends that NMFS and USFWS continue building frameworks that support equity for ANOs and Tribes in marine mammal management.**

The AKSRG appreciated the presentation by Aleut Community of St Paul Island (ACSPI) that provided some historical and cultural context to understanding Unangan relationships with northern fur seals (NFS), which was particularly relevant to our review of the NFS SAR. Furthermore, we feel that ACSPI's participation in the conversation about the NFS SAR contributed to more inclusive Tribal collaboration and representation during the SAR review process. Recent White House guidance[1,2] confirms Indigenous Knowledge (IK) must be equitably considered among "the best available science" for federal agencies to confront climate change in consultation with Tribes. **As part of NMFS' commitment to Tribal Consultation and co-management agreements, the AKSRG supports continued efforts to include IK and Tribal Consultation through ANOs and Tribes in SAR development, review processes and other management actions.**

NMFS response: NMFS appreciates the AKSRG's recognition of NMFS' recent and continuing efforts. Consistent with the NOAA Guidance and Best Practices for Engaging and Including Indigenous Knowledge in Decision-Making, NMFS will endeavor to review and, where appropriate, include Indigenous Knowledge in the SAR review and revision process. Including Indigenous Knowledge and Tribal engagement in marine mammal management increases our understanding of marine mammals in Alaska and the complex issues associated with Alaska ecosystems, climate change, and subsistence use.

9. **Research Priorities**

The AKSRG suggests the following priorities, based on conservation need and the ability for management actions to alter population status and trajectory (list is NOT in order of priority):

- Southeast Alaska harbor porpoise stock structure and fishery interactions (see 2022 AKSRG letter).

[1] https://www.whitehouse.gov/briefing-room/presidential-actions/2021/01/26/memorandum-on-tribal-consultation-and-strengthening-nation-to-nation-relationships/

[2] https://www.whitehouse.gov/wp-content/uploads/2022/12/OSTP-CEQ-IK-Guidance.pdf

- Eastern North Pacific resident killer whale stock structure and fishery interactions (see recommendation above).
- North Pacific right whale research that could provide important data on this endangered species in a cost-effective manner. Research could include processing of existing acoustic data, maintenance of acoustic monitoring stations, and the development of research platforms of opportunity.
- Bristol Bay belugas stock survey and workshop (see recommendation above).
- Improving methods to estimate marine mammal bycatch (see recommendation above).

NMFS response: NMFS appreciates the AKSRG identifying research priorities that complement and go beyond priority work currently being conducted by NMFS. NMFS will consider these additional priorities as additional funding and resources allow.

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