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DEPARTMENT OF COMMERCE

National Oceanic and Atmospheric Administration

[RTID 0648-XC506]

Final 2022 Marine Mammal Stock Assessment Reports

AGENCY: National Marine Fisheries Service (NMFS), National Oceanic and Atmospheric Administration (NOAA), Commerce.

ACTION: Notice; response to comments.

SUMMARY: As required by the Marine Mammal Protection Act (MMPA), NMFS has considered public comments for revisions of the 2022 marine mammal stock assessment reports (SARs). This notice announces the availability of 25 final 2022 SARs that were updated and finalized.

ADDRESSES: The 2022 Final SARs are available in electronic form via *https://www.fisheries.noaa.gov/national/marine-mammal-protection/marine-mammal-stock-assessment-reports-region*.

Copies of the Alaska Regional SARs may be requested from Nancy Young, Alaska Fisheries Science Center; copies of the Atlantic, Gulf of Mexico, and Caribbean Regional SARs may be requested from Sean Hayes, Northeast Fisheries Science Center; and copies of the Pacific Regional SARs may be requested from Jim Carretta, Southwest Fisheries Science Center (see "**FOR FURTHER INFORMATION CONTACT**" below).

FOR FURTHER INFORMATION CONTACT: Zachary Schakner, Office of Science and Technology, 301-427-8106, *Zachary.Schakner@noaa.gov*; Nancy Young, 206-526-4297, *Nancy.Young@noaa.gov*, regarding Alaska regional stock assessments; Sean Hayes, 508-495-2362, *Sean.Hayes@noaa.gov*, regarding Atlantic, Gulf of Mexico, and

Caribbean regional stock assessments; or Jim Carretta, 858-546-7171, *Jim.Carretta@noaa.gov*, regarding Pacific regional stock assessments.

SUPPLEMENTARY INFORMATION:

Background

Section 117 of the MMPA (16 U.S.C. 1361 *et seq*.) requires NMFS and the U.S. Fish and Wildlife Service (FWS) to prepare stock assessments for each stock of marine mammals occurring in waters under the jurisdiction of the United States, including the U.S. Exclusive Economic Zone (EEZ). These SARs must contain information regarding the distribution and abundance of the stock, population growth rates and trends, estimates of annual human-caused mortality and serious injury (M/SI) from all sources, descriptions of the fisheries with which the stock interacts, and the status of the stock. Initial SARs were completed in 1995.

The MMPA requires NMFS and FWS to review the SARs at least annually for strategic stocks and stocks for which significant new information is available, and at least once every 3 years for non-strategic stocks. The term "strategic stock" means a marine mammal stock: (A) for which the level of direct human-caused mortality exceeds the potential biological removal level or PBR (defined by the MMPA as the maximum number of animals, not including natural mortalities, that may be removed from a marine mammal stock while allowing that stock to reach or maintain its optimum sustainable population); (B) which, based on the best available scientific information, is declining and is likely to be listed as a threatened species under the Endangered Species Act (ESA) within the foreseeable future; or (C) which is listed as a threatened species or endangered species under the ESA or is designated as depleted under the MMPA. NMFS and FWS are required to revise a SAR if the status of the stock has changed or can be more accurately determined.

In order to ensure that marine mammal SARs are based on the best scientific information available, the updated SARs under NMFS' jurisdiction are peer-reviewed within NOAA Fisheries Science Centers and by members of three regional independent Scientific Review Groups (SRGs) established under the MMPA to independently advise NMFS and FWS on marine mammal issues. Because of the time it takes to review, revise, and assess available data, the period covered by the 2022 Final SARs is 2016 through 2020. While this results in a time lag, the extensive peer review process ensures that the SARs are based on the best scientific information available.

NMFS reviewed the status of all marine mammal strategic stocks and considered whether significant new information was available for all non-strategic stocks under NMFS' jurisdiction. As a result of this review, NMFS revised reports for 25 stocks in the Alaska, Atlantic, and Pacific regions to incorporate new information. The 2022 revisions to the SARs include revisions to stock structures, updated or revised human-caused mortality/serious injury (M/SI) estimates, and updated abundance estimates. With the publication of these SARs, the revised stock structure for all North Pacific humpback whale stocks and Southeast Alaska harbor porpoises is finalized. The revisions to stock structure and the addition of new reports resulted in five newly designated strategic stocks and three newly designated non-strategic stocks. No stocks changed in status from "non-strategic" to "strategic." One Western North Atlantic common bottlenose dolphin stock, the Northern South Carolina Estuarine System Stock, changed from "strategic" status to "non-strategic." A technical update was made to the Northern Gulf of Mexico Bay, Sound, and Estuary stocks of common bottlenose dolphin SAR that covers 23 Northern Gulf of Mexico stocks to move Florida Bay from the Western North Atlantic to the Gulf of Mexico. Florida Bay is now included within Table 1 and Figure 1 of the SAR, and the number of stocks in the Gulf of Mexico has been updated accordingly. No other changes or updates were made to that SAR.

NMFS received comments on the draft 2022 SARs from the Marine Mammal

Commission (Commission); the Department of Fisheries and Oceans Canada (DFO); the Washington Department of Fish and Wildlife (WDFW); the Alaska Department of Fish and Game (ADFG); seven fishing industry associations (California Coast Crab Association (CCCA), West Coast Pelagic (WCP), Maine Lobstermen's Association (MLA), Washington Dungeness Crab Fishermen's Association (WDCFA, United Fishermen of Alaska (UFA), Southeast Alaska Fishermen's Alliance (SEAFA), and United Southeast Alaska Gillnetters (USAG)); a non-governmental organization (Natural Resources Defense Council (NRDC)); and two letters from the public. Responses to substantive comments are below. Responses to comments not related to the SARs are not included. Comments suggesting editorial or minor clarifying changes were incorporated in the reports, but they are not included in the summary of comments and responses. We did not reply to comments outside the scope of the SARs (*e.g.*, regulating impacts of offshore wind). In some cases, NMFS' responses state that comments would be considered or incorporated in future revisions of the SARs rather than being incorporated into the final 2022 SARs.

Comments on National Issues

Comment 1: The Commission recommends that NMFS secures the resources necessary to conduct the surveys required to produce complete and up-to-date SARs and work with other agencies to collect the information needed. Additionally, the Commission recommends NMFS provide sufficient personnel and resources to maximize the value of surveys by allowing for photo-identification, biopsy sampling, satellite tagging, acoustic monitoring, and other efforts, which provide valuable information for understanding marine mammal distribution, habitat use, health, and behavior.

Response: NMFS acknowledges the Commission's comment and will continue to prioritize our efforts to collect needed data, as resources allow.

Comment 2: The Commission recommends that NMFS set a deadline to make draft SARs available for public review no later than the end of September each year and allow for more thoughtful review by interested parties.

Response: NMFS thanks the Commission for the recommendation; we strive to keep the SARs on schedule and released to the public as quickly as possible.

Comment 3: A member of the public comments that the SARs fail to provide information on whether dolphin populations are increasing, decreasing, or staying the same. They state that the lack of information on population trends in these reports makes them of little use to scientists trying to protect dolphins.

Response: NMFS agrees that long-term time series trend analyses are useful while also acknowledging that it is difficult to achieve the appropriate precision and accuracy needed to detect trends (Authier *et al.* 2020). When sufficient information is available to evaluate trends, the information is included within the SAR. We will continue to prioritize our efforts to collect data to address abundance estimates and trends as resources allow.

Comments on Atlantic Issues

Comment 4: The Commission comments that the change to the status of four bottlenose dolphin stocks from "strategic" to "non-strategic" lacks adequate justification. The Commission notes estimates of human-caused M/SI are based on minimum counts and are likely to be higher in reality and is concerned about the proposed changes. Also, the Commission notes that Wells *et al.* (2015) estimated the proportion of carcasses recovered to be 0.33 for common bottlenose dolphins near Sarasota, Florida, but less populated areas and those with intricate networks of marsh habitat likely have substantially lower carcass detections. The Commissions recommends the following: reevaluate the strategic status of these four stocks, considering all available scientific information regarding plausible human-caused M/SI beyond the minimum count of detected strandings and at-sea observations; substantially increase efforts to investigate alternative strategies for collecting information on human-caused M/SI for bays, sounds, and estuaries (BSE) common bottlenose dolphin stocks for which entanglements are difficult to detect or quantify, and for which observer programs are lacking.

Response: NMFS had proposed to change the status of four stocks of bottlenose dolphin (the Northern South Carolina Estuarine System, the Central Georgia Estuarine System, the Southern Georgia Estuarine System, and the Biscayne Bay -- 88 FR 4162 01-24-34). Based on the Commission's comment, NMFS reevaluated the strategic status of the four stocks. We revisited Wells *et al.* (2015) and implemented a lower stranded carcass recovery rate for some stocks as recommended by the Commission. We estimated M/SI (NMFS 2023) based on two carcass recovery rate estimates: 0.33 for Sarasota Bay (Wells *et al.* 2015) and 0.16 for Barataria Bay (DWH MMIQT 2015). Using the best available scientific information on the minimum abundance for each of these stocks, we concluded that annual human-caused M/SI for three stocks (Central Georgia Estuarine System, Southern Georgia Estuarine System, and Biscayne Bay) exceed PBR. Hence, these stocks' strategic status will remain unchanged. Regardless of the stranded carcass recovery rate, the Northern South Carolina Estuarine System Stock is non-strategic. An additional explanation for the rationale of each stock's status was provided within the Status of Stock sections.

Comment 5: The DFO strongly disagrees with the gear origin country assignment given to North Atlantic right whale (NARW) #3920. The gear removed from #3920 was reviewed by the DFO and country/fishery of origin was found to be inconclusive. The cases which DFO disagrees with the country of origin assignment are as follows: Mortalities - right whale #3893, #3694, #3920 and Serious Injury - right whale #4094 and #3125.

Response: NMFS responds to the specific cases below and looks forward to continuing work with Canada on transboundary gear analyses to further our understanding of incident origins. Right whale cases #3893, #3694, and #3125 would benefit from bilateral gear analysis; but without new incident documentation, under longstanding NMFS protocols (*https://www.greateratlantic.fisheries.noaa.gov/policyseries/index.php/GARPS/article/view/30/26*), NMFS would not change the current attribution. Regarding #3920 and the potential uncertainties described in the DFO report "Recovered Gear Analysis of North Atlantic Right Whale Eg #3920 'Cottontail'" - references multiple isolated gear elements. The collective evidence (see report here *https://media.fisheries.noaa.gov/2022-10/E22-20Cottontail-gear-analysis-updated-draft-GARFO.pdf*) supports the conclusion that the recovered gear is consistent with the 2018/2019 Canadian Snow Crab Fishery. Regarding #4094, NMFS would consider changing the status to XC if Canada revises the published incident report (of which DFO are contributing authors) that identified this as Canadian snow crab gear.

Comment 6: MLA comments that the Pace model's initial estimated population decline from 2011-2015 occurred during a time when NARW geographic distribution shifted to areas lacking survey effort and may be an underestimate of the population. MLA requests NMFS discuss the model's limitations and ensure they are taken into account as new data from the realigned survey effort are incorporated into the model. The draft SAR underweights the existence of natural predation as demonstrated by Taylor (2013), Curtis (2014), and Sharp (2019). MLA comments that the SAR must cite relevant literature on natural mortality in both NARW and closely related species, and discuss how the treatment of this significant factor affects population models. Finally, MLA believes Pace (2021) incorrectly assumes an equal sex ratio and probability of mortality.

Males are known to make up a larger portion of the population and are statistically more likely to encounter and become entangled in a vertical line.

Response: The Pace *et al*. (2017) and slightly updated Pace (2021) Mark-Recapture-Resight (MRR) model have been reviewed by both a journal peer review process for publication as well as more than 6 years of Atlantic SRG meetings across 20 expert members. Its contents are publicly available to review as the documents are cited within the SAR.

The MRR model published by Pace *et al.* (2017) uses the sighting histories of individuals (adults and subadults) to estimate interval (in this case, annual) capture probabilities, which are allowed to vary at each interval. Indeed, the estimated capture probabilities since 2011 of NARW have shown considerable variation compared with the previous decade. The statistical methodology employed simultaneously estimates rates of survival and capture and estimates the number of whales still alive. Additionally, the MRR model allows individual animals to have unique catchability parameters, thus reducing biases in capture rates found in simpler MRR models. The model does not assume an equal sex ratio and allows survival and capture rates to differ between the sexes. Although there is no accommodation for permanent emigration, there is no evidence that even modest numbers of NARW have permanently left all the areas surveyed in the United States and Canada, and all individuals identified in extralimital sightings have been seen in U.S. waters again following their oceanic sojourns. Hence, NMFS concludes that the estimated survival rates presented in the SAR and reflected in the abundance estimates represent actual survival rates of the stock and not merely apparent survival rates. Finally, it is important to note that the Pace *et al.* (2017) model relies on individual animals being photographically identifiable from their callosity patterns in order for them to be recruited into the population. Since these patterns do not typically stabilize until animals are at least 1 year old, the resulting abundance estimates, as well as the associated estimated total mortality estimated *sensu* Pace *et al.* (2021), only represent adult and subadult animals.

Regarding natural mortality, NMFS and the SAR acknowledge that some natural mortality of calves exists, which is not inconsistent with the documented shark predation on calves, as noted by the commenter (Taylor 2013; Curtis 2014). However, we cannot speak to the comments related to a Sharp *et al.* (2019) reference. Our reading of Sharp *et al.* (2019) included a review of only 70 NARW incidents, and the paper does not support the cited incident designations. There are no observations that attribute adult or subadult mortality to natural causes and only these age classes are included in the Pace *et al.* (2021) model estimates of total mortality. NMFS reviewed relevant data, existing models, and the literature with the Atlantic SRG on September 2, 2021, and requested their expert guidance on how to attribute estimated total mortality (adults and sub adults) to cause. The Atlantic SRG recommended NMFS continue to assign 100 percent of the total estimated mortalities of non-calf NARW (i.e., adult and subadult) to anthropogenic origins (Atlantic SRG letter to NMFS September 16, 2021).

Comment 7: MLA asserts that NMFS' determination that 87 percent of undetected, assumed carcasses represent whales killed by fishing entanglements is unsupported and arbitrary. The draft 2022 SAR includes new text that entanglement is more likely to be detected than vessel strikes, which raises concern with NMFS' method of apportioning unknown sources of human-caused mortality. MLA questions NMFS' conclusion that because 87 percent of the observed, seriously injured right whales are caused by an entanglement, then 87 percent of assumed, undetected carcasses are similarly killed by entanglements. MLA believes it is more likely that the observed data with respect to carcass status as discussed in Pace (2021) are correct—that entanglements and vessel strikes kill whales in roughly equal proportions as reported in Sharp (2019). MLA thinks it is also plausible that when a whale is struck by a vessel, it is more likely to be killed than it is to be seriously injured. In contrast, MLA notes a majority of entanglements are of minor severity, when an incident occurs it is less likely to result in death, and mortality as a result of entanglement would probably be detected due to the amount of time that elapses between when an animal is entangled and when the animal ultimately dies.

Response: NMFS continues to agree that no empirical study supports that whale carcasses are more likely to be detected when caused by vessel strikes, as opposed to entanglement. However, SARs provide published information on our current understanding of the right whale population, including trends in strandings and sightings data and a published hypothesis suggesting a disparity between detected entanglement/vessel strike serious injuries. Moore *et al.*'s (2020) hypothesis is founded in the physics of buoyancy on marine mammal bodies under varying conditions. There may be factors that increase the likelihood of detection of entanglements due to serious injuries. Lacking sufficient evidence regarding the likelihood of detecting vessel strikes or entanglements to inform an understanding of the cause of unseen, estimated mortalities of adults and sub adults, NMFS proposed many alternative scenarios to the Atlantic SRG on how best to apportion cryptic mortality (NMFS intersessional September 21, 2021). The Atlantic SRG recommended that the ratio between entangled and vessel-struck NARW, 70 percent (Table 2, NARW SAR), calculated from documented observations of Serious Injuries and Mortalities over the last 5 years, be used to apportion cause. NMFS scientists will continue to review published literature and work on improving methods of apportioning causes of estimated but unseen mortalities of adults and subadults. The Atlantic SRG will continue to consider the evidence presented as part of their responsibility in peer reviewing the SARs.

Comment 8: MLA requests the draft SAR present the annual mortality and serious injury estimates by each fishery and describe area differences in such injuries. By lumping Canadian and U.S. fisheries together in the annual summaries presented in Table 2, MLA feels NMFS misleads the public with the implication that all of these injuries are attributable to U.S. fisheries. MLA requests that NMFS describe the observed M/SI by fishery for each year of the relevant 5-year reporting period. Specifically, MLA requests Table 2 to include summarized data concerning the country of origin of NARW entanglements during the relevant time period, taking into account scientific observations of entangling gear, the differentiating attributes of that gear, such as rope diameter and strength which influence comparative lethality, and describe the differences between the conservation programs and relative effectiveness of measures to protect NARW in each country.

Response: NMFS continues to provide all available details on locations where right whale serious injury and mortality incidents are first observed and, when available, where the incidents originated (see Table 3, NARW SAR). Additionally, NMFS attempts to provide the maximum precision and resolution in apportioning all M/SI to fishery, vessel, or other causes following practices that have been peer-reviewed and recommended by the Atlantic SRG. However, sufficient evidence to assign entanglements to a specific country or fishery is usually lacking, given the rare instances of recovered gear with sufficient markings to distinguish initial entanglement location, gear type, or fishery. Because right whales are able to travel thousands of miles in short periods of time, even when trailing gear, it is very difficult to attribute entanglement based on the region of the initial sighting. Upon conferring with the Atlantic SRG, NMFS determined that there was insufficient information to provide guidance on the apportionment of estimated entanglements to a country of origin. We believe the expansion of gear marking and reporting requirements will assist us in this area moving forward.

NMFS has invested considerable effort in developing better methods for apportioning M/SI to appropriate sources in light of increased mortality overall, including increasing observations determined to have occurred in Canadian fisheries. We are also working to improve our ability to quantify unseen (estimated) mortality of adults and subadults and to evaluate if and how to apportion natural versus anthropogenic mortality. As mentioned above, as part of this effort, the agency convened a special session of the Atlantic SRG in September 2021 for scientific and technical input. The Atlantic SRG supported its prior position that 100 percent of the mortalities of non-calf NARW should be considered to be of anthropogenic origin. The Atlantic SRG also considered the various approaches provided by NMFS for apportioning M/SI between the United States and Canada but did not have enough information to provide a robust scientific alternative. Therefore, NMFS continues to use the best available information available to assign documented (and unobserved, estimated) mortalities and serious injuries (those identified as likely to result in mortality) to country and type of fishery. We continue to work with Canada on transboundary retrieved gear analyses and risk modeling. As science advances and more data become available, NMFS will consider assigning M/SI with greater resolution if scientifically appropriate, and if resources allow.

Comment 9: MLA believes the NARW SAR should describe interactions between NARW and commercial fisheries, and this must include the information called for in section 117(a)(4) of the MMPA. MLA comments the SAR should also include data on the severity of entanglements, and MLA believes the SAR does not provide understanding of scarring data for the relevant time period.

Response: The fisheries are summarized in “Appendix 3 - Fishery Descriptions” because there are multiple species interactions with multiple fisheries. They are also available online at *https://www.fisheries.noaa.gov/national/marine-mammal-protection/list-fisheries-summary-tables* with table II category I and II fisheries referenced. NMFS cites our annual report that documents the details of our determination process for all reported injuries during the SAR time frame. Analyses of gear retrieved from large whales are also available online at *https://www.fisheries.noaa.gov/new-england-mid-atlantic/marine-mammal-protection/atlantic-large-whale-take-reduction-plan*. However, because only a small fraction of entanglements have gear recovered and a smaller fraction of that is traceable to the fishery, we have not been able to estimate the annual M/SI to the resolution of fishery and region of origin. Given new recommendations for the Atlantic SRG at the 2021 meeting and additional analysis from Pace *et al.* (2021), we are working to improve our understanding of this issue toward the resolution requested above for future SARs. We address this to the extent that data can support in Table 3. We discuss non-serious injuries in the third paragraph of the section titled "Fishery-Related Mortality and Serious Injury." The report cites Knowlton *et al.* (2016) and, more recently, Hamilton *et al.* (2019), which indicate that the percentage of the population experiencing non-serious injuries is increasing (26 and 30 percent, respectively). Despite roughly 100 injuries per annum in recent years, the incidents causing injuries are rarely observed. Wounds can persist for years, while animals may travel thousands of miles. Therefore, NMFS takes a conservative approach to not apportion injury by fishery or areas where data are unavailable. Additional language to address this concern has been added to the first paragraph of the "Fishery-Related Mortality and Serious Injury" section of the SAR.

Comment 10: MLA asserts that the draft NARW SAR should include additional available scientific information about NARW behavior and associated risk of harm from fishing gear. MLA believes there are areas where NARW are rarely, if ever, observed and so NMFS' characterization of NARW year-round presence in the Gulf of Maine is misleading. These findings were most recently summarized and reported in Meyer-Gutbrod (2021); MLA requests this paper be referenced and discussed in the draft SAR.

Additionally, Crowe (2021) determined that the Gulf of St. Lawrence is currently an important habitat for 40 percent of the right whale population.

Response: The distribution changes and observations in the comment are correct. However, they are based on the assumption that NARW are only subject to mortality when they occur in dense aggregations and that those areas are the only regions that should be managed for NARWs. In reality, dense aggregations in limited, small regions only occur during a portion of the year, and at no time of year are all right whales detected within known aggregations. NMFS recognizes that management measures must also reflect the documented acoustic presence of NARW during much of the year across their entire range, including areas of overlap with the Maine lobster fishery. There has been more recent acoustic monitoring, but these surveys cannot detect mortality/injury, determine the number of animals, or detect the presence of animals if they are not calling. Thus, gaps in visual survey data contribute to gaps in our understanding of NARW distribution and the locations of M/SI events. Recent congressional appropriations to increase surveillance in the Gulf of Maine may result in refining the identification of risk areas.

Comment 11: MLA comments that the NARW SAR's reference to "New England" waters must specify that these important areas are located in southern New England. Also, MLA notes that the draft SAR under-reports recent calving data, stating that "despite high survey effort, only 5 and 0 calves were detected in 2017 and 2018, respectively," and adding that 7 were born in 2019 and 10 in 2020. The draft SAR omits the most recent calf detections from 2021, 2022, and 2023 (to date) with 20, 15 and 12 calves detected, respectively. The section summarizing M/SI should be renamed "Vessel Strike-Related Mortality and Serious Injury" as is done for the section on M/SI from fishery-related M/SI. In the 2020 SAR, NMFS removed language stating that the majority of right whale sightings occur within 90 kilometers (km) of the shoreline of the southeastern United States. NMFS correspondingly added a sentence stating that "telemetry data have shown rather lengthy excursions, including into deep water off the continental shelf (Mate *et al*. 1997; Baumgartner and Mate 2005)." Both statements should be included and NMFS can simply add a sentence explaining the effort discrepancy. Finally, the SAR should report recent findings from the Canadian government that determined: "[T]he movement behaviour of individual NARW [in the Gulf of St. Lawrence] was highly variable. Some individuals did not move far between successive days while others moved considerable distances. Some whales in the southwestern Gulf of St. Lawrence were estimated to move as much as 50 km in a single day."

Response: The description of NARW feeding grounds reflects NMFS' current understanding. Acoustic monitoring in the central Gulf of Maine indicates right whales are present in areas besides southern New England. The calves born during 2021–2023 fall outside of the reporting period for this report. The "Other Mortality" heading has been a standard heading for stock assessment reports for all species. The "vessel strike" classification is accounted for in Table 3. NMFS believes our description of right whale sightings, distribution, and movement is as comprehensive and accurate as the data and available analyses currently allow.

Comment 12: MLA states that the draft NARW SAR continues to cite Kenney (2018) and asserts that this reference is fundamentally flawed. Specifically, MLA believes the methods used in the study fail to account for basic biological processes—namely, natural death. Further, calves have natural mortality rates that are ignored during scenarios when they are included in this model.

Response: As stated in previous responses to public comments, the Kenney (2018) reference is a relevant, peer-reviewed study that helps provide context to the impacts of fishery-related mortality on the NARW population. The study does account for non-fisheries mortality (*e.g*. vessel strikes, calving declines, resource limitation, etc.), removing only confirmed fishery-related deaths and serious injuries (likely to result in death). Several scenarios are provided with varying levels of hypothetically-reduced entanglement mortality rates corresponding to degrees of compliance with MMPA regulations. While the paper presents a simple representation of complex processes, the model parameters are reasonable, and the results are informative for the reader to appreciate the cumulative impact of entanglement on the population. Any element of natural mortality or other processes affecting the population other than documented entanglement mortality is accounted for by using the time series of abundance estimates as a baseline.

The inclusion of the unrealized calves in the paper acknowledges basic population biology and the outsized effect of removing productive females on a population's trajectory cannot be ignored. Kenny (2018) treats this effect conservatively. Proven female calving intervals have varied between 3 and 10 years, but are primarily in the 3- to 7-year range, so the choice of a 5-year calving interval is well-founded. The paper's total of 26 calves lost due to the deaths of 15 females over 27 years equals an unrealized population increase of much less than 0.01 per year (1 divided by the average annual population size). This undoubtedly underrepresents the actual value, given that only known females documented as dead or seriously injured were used in the analysis.

Comment 13: MLA notes that the draft NARW SAR includes recent research by Stewart *et al.* (2021) without stating that the NARW body size since 1981 does not correlate with calving rates. MLA believes there are limitations to the study's sample size of seven individuals with severe maternal entanglement injuries, particularly when these instances are conflated by the primary factor driving body size—birth year (*i.e.*, oceanographic conditions). To this point, MLA comments that the draft SAR should not only cite Christiansen (2020) when drawing inferences from the southern population of right whales, but also Miller *et al*. (2011). Additionally, in the years following 1998-2002 (the time period sampled by Miller *et al*. (2011)), there were 9 consecutive above-average years in NARW calving rate.

Response: NMFS agrees that prey availability is likely an important contributor to the observed decrease in right whales' size. Decreased size also appears to be related to reduced fecundity, with smaller and less robust females less likely to calve (Stewart *et al*. 2022). Miller *et al*. (2011) is a good addition to this section, along with Fortune *et al*. (2013). The impact of injury on the physiological state of females is also well documented (*i.e*., Rolland *et al*. 2016; Pettis *et al*. 2017; van der Hoop 2017), so it is likely the population's fecundity is being impacted by injury as well. Variation in birth rates should be expected for capital breeders in a variable environment, and the current downward trend in calving corresponds to documented shifts in right whale prey. However, the impacts of injury must be considered. Mortality rates have increased significantly during the same period, and sublethal injuries have likely increased as well.

Bryde's whale, Gulf of Mexico stock (Rice's whale)

Comment 14: Natural Resource Defense Council (NRDC) is concerned by the draft's assessment of scientific information on Rice's whale habitat use in the western Gulf of Mexico, and particularly by its suggestion that the whale's regularity of occurrence there is "unknown." The persistent occurrence of some Rice's whales in the northwestern Gulf of Mexico has recently been documented using passive acoustics. This evidence of regular use of the continental shelf break by at least a portion of the Rice's whale population complements newly available habitat suitability predictions as well as forthcoming habitat suitability and prey condition analyses from NOAA, all of which indicate an extension of the whale's habitat between the 100 and 400 meter (m) isobaths across the northwestern Gulf. NRDC recommends that the draft be lightly edited to make this distinction clear, and also recommends that the present distribution map be replaced with one that displays the species' extended habitat, with the hydrophone locations from Soldevilla *et al*. (2022a, 2022b) and the 3 western Gulf sightings also indicated, if desired.

Response: NMFS has slightly edited the "Stock Definition and Geographic Range" section per the suggestion to remove "unknown" and better clarify that there is some information regarding Rice's whale distribution in the northwestern Gulf. The distribution map includes the genetically confirmed sighting in the northwestern Gulf off Texas, and the core habitat is shaded. All information about known distribution, including the genetically confirmed sighting, is included within the text. We believe that including the locations of high-frequency acoustic recording packages (HARP) on the map, which typically includes locations of visual sightings only, could confuse readers. We refer those interested in details of the calls detected from HARPs to see Soldevilla *et al.* (2022a), which we reference and summarize within the SAR.

Comment 15: NRDC recommends that NMFS update the Rice's whale draft SAR to align with the 2023 revisions to the Guidelines for Preparing Stock Assessment Reports Pursuant to the MMPA and report PBR as 0.07.

Response: NMFS has edited the SAR to report PBR as 0.07, per this public comment.

Comment 16: NRDC recommends including information on the potential for disturbance from vessel noise and activity in the draft SAR for Rice's whale.

Response: Per the comment, NMFS has edited the "Habitat Issues" text to include the anecdotal evidence from Soldevilla *et al.* (2022b) regarding Rice's whales that temporarily stopped calling when approached by the research vessel.

Comments on Pacific Issues

North Pacific Humpback Whale Stocks

Comment 17: The Commission recommends using a maximum net productivity rate (R_{max}) of 8.2 percent for the Mainland Mexico - CA/OR/WA stock and a default Rmax value of 4 percent for the Central America/Southern Mexico - CA/OR/WA stock.

Response: Current estimated annual rates of increase for the Central America/Southern Mexico - CA/OR/WA stock (1.6 percent, incorrectly stated as 1.8 percent in the draft SAR) should not be confused with the R_{max}. Where annual rates of increase have been estimated for different humpback populations, they have consistently been higher than the MMPA default of 4.0 percent (Zerbini *et al*. 2010 [7.3 percent and 8.6 percent annually, using 2 different approaches], Zerbini *et al*. 2006 [6.6 percent], Barlow and Clapham 1997 [6.5 percent], Calambokidis and Barlow 2020 [8.2 percent]). Zerbini *et al*. (2010) proposed an upper 99th percentile of 11.8 percent annually. Still, this value has not been utilized in MMPA stock assessments due to the availability of region and/or stock-specific estimates for U.S. waters. Based on the best available data on estimated rates of increase for multiple humpback populations, use of the MMPA default of 4.0 percent for the Central America/Southern Mexico - CA/OR/WA is unnecessarily conservative, given the spatial and temporal overlap with the larger Mainland Mexico - CA/OR/WA stock of humpbacks, both of which are exposed to the same types of anthropogenic threats along the U.S. West Coast. The mean estimate of annual growth rate of 8.2 percent reported by Calambokidis and Barlow (2020) for all humpbacks in U.S. West Coast waters also includes anthropogenic-related mortality; thus, the true R_{max} is likely to be higher than that observed. Additionally, the PBR calculated for the Central America/Southern Mexico - CA/OR/WA stock is conservative, based on a recovery factor of 0.1 to reflect its endangered status. Therefore, NMFS will continue to use an R_{max} of 8.2 percent.

Comment 18: The Commission notes that the PBR levels for the Mainland Mexico–CA/OR/WA and Central America/Southern Mexico –CA/OR/WA Stocks are divided by two to produce a "U.S. PBR" to assess the status of each stock. The Commission emphasizes there are no data, analyses, or references to support the conclusion that each stock spends approximately half its time outside the U.S. EEZ. The Commission recommends that NMFS use information on the timing of arrival to and departures from the U.S. EEZ by these two humpback whale stocks, as well as information on seasonal occupancy rates within the U.S. EEZ, to provide a more precise estimate of the "proportion of time spent in U.S. waters" for calculating the U.S. PBRs for these two humpback whale stocks.

Response: NMFS agrees that a more refined estimate of humpback residency time in California, Oregon, and Washington, is required to prorate PBR for the Mainland Mexico–CA/OR/WA and Central America/Southern Mexico –CA/OR/WA Stocks. Ryan *et al*. (2019) provides both sighting and acoustic data suggesting that: 1) humpbacks are present in central California waters at least 8/12 months annually, and 2) December and April represent "transition months," where whales are moving out of or into the central California region (see Figure 5d in Ryan *et al*. 2019). Counting December and April each as 1/2 of a month of residency time during migration, plus the 7 months of May through November when sightings are abundant, yields 8/12 months of residency time, or ⅔ of the year. This may be considered as a minimum residency time, as some whales are still present within the U.S. EEZ in waters north or south of the central California study area. NMFS has implemented this new PBR proration in the final SARs, which increased the calculated PBR for the Central America / Southern Mexico – CA-OR-WA stock from 2.6 to 3.5, and for the Mainland Mexico - CA-OR-WA stock, from 32.5 to 43.

Comment 19: The Commission comments that the Mainland Mexico – California/Oregon/Washington and Central America / Southern Mexico–

California/Oregon/Washington SARs do not estimate or apply an appropriate correction factor to account for the undetected "cryptic mortality" of humpbacks due to fisheries interactions, and recommends that NMFS revise the SARs to provide estimates of total fisheries M/SI for these stocks using appropriate correction factors to account for undetected whale carcasses.

Response: There are no published estimates of carcass detection rates for humpback whales in this region. Some range-wide estimates were made for gray whales (Punt and Wade 2012), including remote coastlines of Mexico, Canada, and Alaska that are not directly applicable to the U.S. West Coast. As such, these estimates are not applied to gray whale strandings involving anthropogenic sources in U.S. waters. Most cases of humpback whale injury and mortality due to fishery entanglements are based on opportunistic detection of injured whales at sea, stranded animals, and floating carcasses. This detection process does not include quantifiable "search effort," which is needed to estimate the undetected portion. Methods used to estimate carcass detection for more coastal species, such as bottlenose dolphins (Wells *et al.* 2015; Carretta *et al.* 2016), are also not applicable to humpback whales, given the differences in detection processes. With regard to vessel strikes, NMFS is already using the estimated vessel strike deaths reported by Rockwood *et al.* (2017) in the Central America/Southern Mexico - CA-OR-WA and Mainland Mexico - CA-OR-WA SARs; thus, no correction is necessary for that source of anthropogenic mortality. We also compare reported numbers with estimates from Rockwood *et al.* (2017) to give the reader a sense of the detected fraction of vessel strikes. NMFS continues to work on the issue of undetected injury and mortality and states in SARs that reported entanglement cases represent a minimum accounting of total interactions.

Comment 20: WDFW comments pertain to the Central America/Southern Mexico-CA-OR-WA, Mainland Mexico–CA-OR-WA and Hawaii stocks of humpback whales in the Pacific. WDFW is concerned about the exclusion of whales that summer in WA state waters from the Hawai'i distinct population segment (DPS), which affects estimates of M/SI for Washington fisheries. WDFW recommends that estimates of total mortality and proration to ESA-listed stocks include an estimate of non-listed stocks off Washington, and that more research is conducted on understanding the stock and DPS/Demographically Independent Population (DIP) composition of whales in Southern British Columbia (SBC), northern WA, and the Salish Sea.

Response: NMFS agrees that more research will aid in determining the relative fractions of whales summering in WA State waters that winter in Hawai'i waters. In the final SAR, we revised the proration scheme to prorate WA State human-caused M/SI to all three stocks that occur in these waters (Central America/Southern Mexico - CA/OR/WA, Mainland Mexico - CA/OR/WA, and Hawai'i) based on summer to winter area movement probabilities in Wade (2021). Human-caused M/SI from CA/OR/WA waters for the Hawaiʻi stock (based on movement probabilities from WA/SBC to Hawai'i) has now been added to the Hawai'i stock SAR published in the Alaska stock assessments (Young *et al.* 2023).

Comment 21: WDCFA comments that the SARs contradict previous studies by Wade in 2016 and 2021 in relation to the composition of humpback populations that forage off the coast of Washington. WDCFA believes that Wade's analysis revealed that the humpback populations off Washington differ significantly from those in California and Oregon. Instead of two distinct populations (both ESA-listed), WDCFA comments that Washington's foraging humpbacks consist of three distinct population segments (two listed and one not). Also, WDCFA comments that the exclusion of the SBC/WA stock (estimated at 1,593 distinct animals) from the SARs' total estimated humpback whale abundance for the U.S. West Coast (4,973 humpback whales) is problematic. WDCFA believes a more accurate calculation for the minimum population estimate (N_{min}) and

PBR would benefit and be more reflective of population abundance from a proportional inclusion of SBC/WA populations.

Response: The 1,593 whales noted by the commenters are partially included in the estimate of abundance for CA/OR/WA waters because three stocks (Central America/Southern Mexico - CA/OR/WA, Mainland Mexico - CA/OR/WA, and Hawai'i) use CA/OR/WA waters during summer and autumn. Becker *et al*. (2020) estimated humpback abundance in 2018 for all CA/OR/WA waters to be 4,784 whales. Becker *et al.'s* estimate is lower than that of Calambokidis and Barlow (2020) for CA/OR mark-recapture data (4,973), which lends support to Calambokidis and Barlow (2020) noting that their estimate likely represents whales in WA waters (representing multiple stocks), as there is interchange between CA/OR and WA. The fraction of SBC/WA whales attributable to the Hawai'i stock that occur north of the U.S. EEZ is unknown; thus, it is incorrect to imply that the 1,593 SBC/WA whales should be added to the estimates of either Becker *et al*. (2020) or Calambokidis and Barlow (2020). NMFS has changed the language in the SAR to reduce this confusion, now noting that some whales from the Hawai'i stock are present in U.S. west coast waters during the summer. We have also prorated CA/OR/WA human-caused M/SI for Hawai'i stock whales in addition to Central America/Southern Mexico - CA/OR/WA and Mainland Mexico - CA/OR/WA whales, based on movement probabilities in Wade (2021). The Hawai'i stock M/SI totals derived from the U.S. West Coast fisheries and vessel strikes in Washington State are summarized in the Hawai'i SAR, published with the Alaska marine mammal stock assessments (Young *et al.* 2023).

Comment 22: CCCA notes that while the M/SI data are averaged over the period from 2016 to 2020, 22 humpback whale interactions occurred in 2016 out of the 34 reported in the SAR. CCCA requests NMFS to acknowledge in the final SAR that the interaction rates and M/SI rates for the fishery are skewed higher due to the spike in

2015-2016, and do not accurately reflect the current lower interaction rates based on the best available scientific information.

Response: The entanglement data for 2016-2020 reported in the SAR are based on the number of reported cases, presumably related to fishing effort and the number of people on the water (or beaches) that detect entangled whales. In order to assess the "rate of interactions" (and any change thereof), both the number of entanglement cases and total fishing effort are required. Information on the total number of traps set annually is lacking; therefore, it is unclear if the decline in reported entanglement cases after 2016 is related to reduced fishing effort, a change in humpback distribution, or both. The 5-year total entanglement summary also includes the year 2020, with the lowest number of pot-trap fishery entanglements recorded for the period. This is likely a reflection of reduced economic activity due to COVID-19 shutdowns. Thus, NMFS believes the additional text requested is not warranted.

Comment 23: CCCA believes that the Mainland Mexico-CA/OR/WA humpback whale stock is too narrowly defined, and that the stock should include all animals that interbreed when mature. CCCA emphasizes that the draft SAR improperly skews the impact of fisheries that interact with the stock because it compares the M/SI from those fisheries against a PBR that is based only on a portion of the actual stock.

Response: NMFS disagrees. Martien *et al.* (2021) note that humpback whale stocks in the North Pacific were previously designated at large geographically defined scales with names referring to feeding grounds (for example, the CA/OR/WA stock). However, these feeding ground aggregations do not represent DIPs. Rather, they comprise animals originating from multiple wintering grounds, which NMFS has recognized as different DPSs under the ESA. Martien *et al.* (2020) suggest that humpback research and management under the MMPA should focus on “migratory whale herds,” defined as groups of animals that share the same feeding ground and wintering ground. Recruitment into a herd is almost entirely through maternally directed learning of the migratory destinations. Photographic and genetic data show strong fidelity of animals to a given feeding and wintering area and, therefore, to a herd, suggesting very little dispersal (permanent movement of animals) between herds. If dispersal between herds is low enough to render them demographically independent, a migratory whale herd is a particular case of a DIP. Two strong lines of evidence (movements and genetics) support that the Mainland Mexico-CA/OR/WA unit of humpback whales meet the DIP definition, with levels of movement and genetic differentiation similar to those used to define DPSs.

Comment 24: CCCA comments that the Central America Stock is not being prevented from reaching or maintaining its optimum sustainable population. Curtis *et al.* (2022) estimate that the “Central America CA/OR/WA DIP” (which corresponds to the Central America Stock) has been growing at an annual rate of 4.8 percent from the period of 2004-2006 to the more recent period of 2019-2021. Although there is uncertainty with that estimated growth rate, the most recent population numbers indicate that there are approximately 1,494 whales that are part of the Central America Stock (Curtis *et al*. 2022), which is a significant increase of 1,083 whales since the Central America DPS (which also corresponds to the Central America Stock) was listed 7 years ago. CCCA argues that NMFS should revisit the assumptions it has made for this stock because the low PBR proposed in the draft SAR does not reflect the fact that this population is growing significantly despite the M/SI rates reported in the draft SAR.

Response: NMFS disagrees. The PBR reference point has several features that allow for a population to be increasing while human-caused M/SI exceed PBR. The calculation of PBR involves using: 1) One-half of the theoretical or estimated maximum net productivity level (instead of the point estimate); 2) The minimum population size estimate (or 20th percentile, rather than the point estimate); 3) A recovery factor below 1 for all stocks that are not at an optimum sustainable population (OSP) level. The goal of keeping M/SI below PBR is to ensure populations reach or maintain OSP. There is no evidence that the Central America/Southern Mexico - CA/OR/WA stock is at OSP. The depletion level of this population is unknown; if the population is well below OSP, it is possible for it to be increasing now, but may level off and not reach OSP if M/SI is too high. NMFS also notes that the estimated population growth rate for this population is lower than that of other humpback whale populations in the North Pacific (Curtis *et al*. 2022; Calambokidis and Barlow 2020; Mizroch *et al*. 2004; Zerbini *et al*. 2010).

Comment 25: WCP comments that it is difficult to accurately compile population numbers for transboundary stocks, and that sampling a mixture of similar populations is challenging for assessments. WCP believes counting these animals when they return to their birth-origin habitat should predominate other methods for censuses.

Response: Conducting wintering area surveys is not always feasible, but NMFS notes that estimates of wintering area abundance are available for multiple DPSs (*e.g*., Central America, Hawai'i). In cases where wintering area abundance is not available, it is necessary to assess human-caused M/SI against summering area abundance determined from U.S. waters, where anthropogenic threats from U.S. fisheries and vessel strikes are well-documented.

Comments on Alaska Issues

Eastern Bering Sea Beluga Whales

Comment 26: The Commission recommends that NMFS use the default R_{max} value of 4.0 percent for the Eastern Bering Sea (EBS) beluga whale stock until uncertainties are resolved or an R_{max} value specific to the EBS stock is available. The draft 2022 SAR for the EBS beluga whale stock suggests that the default R_{max} value of 4.0 percent should be used for the stock, as an R_{max} value specific to the EBS beluga whale is not available. Although an R_{max} of 4.8 percent was calculated for the Bristol Bay beluga whale stock, the most recently published SAR for that stock rejected the 4.8 percent value in favor of the 4.0 percent default due to the large coefficient of variation (CV) associated with the estimate.

Response: NMFS has considered the concern raised in the comment and decided to continue to use 4.8 percent for R_{max} for the EBS beluga stock for the following reasons. As stated in the draft SAR, NMFS' "Guidelines for Preparing Stock Assessment Reports Pursuant to the MMPA" (Guidelines) suggest that, in general, substitution of other values for the default R_{max} value should be made with caution and when reliable stock-specific information is available on R_{max} (NMFS 2023). However, the NMFS Guidelines also state that for stocks subject to subsistence harvests, NMFS will consult with appropriate Alaska Native co-management partners regarding scientific and other information relevant to preparing SARs, including information used to calculate PBR. Co-management of the EBS beluga whale stock is conducted by the Alaska Beluga Whale Committee (ABWC) and NMFS. Through the co-management process, NMFS, in consultation with ABWC, determined that the nearby Bristol Bay beluga whale stock has similar environmental conditions and habitat to the EBS beluga whale stock. Since the Bristol Bay beluga stock exhibited an estimated rate of increase of 4.8 percent per year (95 percent confidence interval (CI): = 2.1-7.5 percent), and despite the large CV associated with this estimate, NMFS determined that the actual realized value for the growth rate of the Bristol Bay beluga population is a more accurate value to use for the EBS beluga whale stock's R_{max} than the default value. The Alaska SRG supported the use of 4.8 percent for R_{max} for the EBS beluga whale stock.

Southeast Alaska Harbor Porpoise

Comment 27: ADFG, SEAFA, USAG, and two members of the public expressed concern regarding NMFS' genetic analyses of Southeast Alaska (SEAK) harbor porpoise. They assert that the genetic differences observed between stocks is, at least in part, an artifact of limitations in the spatial distribution of the collected environmental DNA (eDNA) samples (Parsons *et al*. in prep). In addition, they state that based on the methodology described in Zerbini *et al*. (2022b), the eDNA samples could not have resulted in independently identifiable individuals. Zerbini *et al*. (2022b) and the SAR treat the sampled haplotypes as independently sampled individuals for analysis when it is likely that a large portion of samples were pseudo-replicates. They assert that this makes it impossible to verify if the results presented reflect a genuine biological pattern, and said additional genetic analyses based on appropriate independent sampling are necessary to assess harbor porpoise stock structure in SEAK.

Response: NMFS appreciates the concerns raised in the comment. Regarding the spatial distribution of the eDNA sample collection, we note that samples included in the analysis of population genetic structure included both tissue and eDNA samples (using the methods presented in Parsons *et al*. 2018). The eDNA samples were collected during several vessel surveys, between July 2016 and September 2019. eDNA samples were used to capture mitochondrial DNA (mtDNA) genetic diversity across geographic regions where harbor porpoise aggregations were detected. The data generated from eDNA included an informative section of the mitochondrial control region that is comparable to that sequenced from tissue samples. eDNA samples were collected immediately after a porpoise sighting, directly in the fluke prints of individuals, or small groups of harbor porpoise. Individual genotypes were not generated from eDNA samples; however, both tissue and eDNA samples were collected over multiple days, months, and years in both Northern-SEAK (N-SEAK) and Southern-SEAK (S-SEAK) inland water stocks, minimizing the likelihood that the same individual would be sampled more than once. Surveys were conducted throughout inland waters of SEAK, whereby eDNA sampling reflects the locations of harbor porpoise aggregations at the time of the survey. Regarding the concerns of pseudo-replication, while the possibility of genetic recaptures (or pseudo-replicates) cannot be completely excluded, efforts were made to minimize possible pseudo-replicates by moving away from small groups of porpoises between consecutive sample collections. In addition, the elusive or evasive nature of harbor porpoise behavior limits the likelihood of repeated close approaches by the sampling vessel of the sampled individuals. Samples of eDNA collected in the fluke prints of cetaceans often result in the discovery of multiple unique mtDNA haplotypes from a single sample. This highlights the likelihood of capturing eDNA from multiple individuals in a single sample, even when sample collections target the fluke prints of a single animal. This is not surprising given that shed cellular material can diffuse (and decay) in the marine environment in which it has been shed. Treating each sampled mtDNA haplotype as a single occurrence is a conservative approach adopted when samples represent an unknown number of unique individuals. This approach offers a valuable method for generating genetic haplotypes from eDNA samples, but likely results in an underestimate of the true haplotype frequency, particularly for common haplotypes.

Comment 28: ADFG requests NMFS reevaluate the harbor porpoise population structure in N-SEAK and S-SEAK SARs, and reconsider the calculations for the PBR. Dahlheim *et al*. (2015) found differing trends in abundance between N-SEAK and S-SEAK harbor porpoise populations, with an unusually high growth rate of 25 percent in S-SEAK between 2006 and 2007, and 2010 and 2012. The study acknowledged that such an increase is not biologically possible for a closed population, implying immigration into the area. However, the authors used this influx to hypothesize fine-scale population structure, which contradicts the evidence of significant immigration. This discrepancy necessitates a reevaluation of the population structure and PBR calculations.

Response: NMFS appreciates this comment and the opportunity to provide more context. The increasing trend in abundance of 25 percent per year implied by the estimates of abundance of S-SEAK between 2006 and 2007 and 2010 and 2012 presented in Dahlheim *et al*. (2015) applies only for the high density areas of harbor porpoise near Zarembo Island and the town of Wrangell, not the entire range of the S-SEAK DIP. It is conceivable that the unusual trend occurred because animals from areas within the range of the DIP that were not surveyed in 2006-2007 by Dahlheim *et al*. (2015) may have moved towards the region around Zarembo Island and Wrangell and may have been sampled in the early 2010s. Additionally, taking the CIs of the abundance estimate in Wrangell/Zarembo in 2006-2007 and 2010-2012 into consideration, the trend implied by the data is still within biologically plausible values. For example, the trend between the upper CI for the 2006-2007 estimate (317 individuals) and the lower CI of the 2010-2012 estimate (392 individuals) is approximately 4.7 percent per year, which is biologically feasible given the reproductive potential for harbor porpoise and has been documented in other regions (*e.g.*, California, Forney *et al*. 2021). Finally, the differential trend between N-SEAK and S-SEAK was used as supporting, not primary, evidence that harbor porpoise in these two areas should be considered two separate DIPs. Other lines of evidence (*e.g.*, differences in mitochondrial DNA between the two regions and areas of low density/potential gaps in distribution between N-SEAK and S-SEAK) provide stronger support for the separation of the two regions into two DIPs. Given all this, NMFS has determined that a re-evaluation of the population structure in N-SEAK and S-SEAK is not warranted at this time.

Comment 29: ADFG comments that NMFS should assess the degree of intermixing between harbor porpoise populations using a more rigorous sampling design and appropriate genetic methods and data. The distribution of harbor porpoise is not discontinuous, with high-density areas and regular observations outside these hotspots. Although no harbor porpoise were observed in Wrangell Narrows during aerial or boat-based surveys (Zerbini *et al*. 2022b), an eDNA sample was collected there (Parson *et al*., in prep). ADFG notes that a more comprehensive assessment using proper sampling design and genetic methods is needed to better understand their population structure.

Response: NMFS agrees that additional genetic samples throughout the region would be helpful to better understand putative genetic boundaries and seasonal variances in porpoise density and distribution. However, existing information on the genetics of harbor porpoise in the inland waters of SEAK is currently sufficient to separate stocks following NMFS' process for reviewing and designating stocks (NMFS 2019). NMFS acknowledges that harbor porpoise are notoriously difficult to study and approach for genetic sampling, requiring considerable resources and limiting the number of genetic samples available for analysis. Moreover, the movement of harbor porpoise can result in temporary spatial aggregations in response to tidal cycles and prey concentrations. As a result, the distribution of harbor porpoise is often patchy and variable on relatively small scales, which is reflected in the spatial distribution of samples and the large number of surveys conducted to collect the represented samples. Ideally, population genetic analyses would make use of tissue samples collected by remote biopsy sampling approaches; however, dedicated efforts to collect tissue samples from SEAK harbor porpoise demonstrated that this method is not efficient enough to be feasible. The tissue samples included in Zerbini *et al*. (2022b) were collected over multiple decades, highlighting the challenges of amassing a representative sample size for this species. Vessel-based surveys for eDNA samples were conducted throughout inshore waters of SEAK in 2016 (July and September) and 2019. Samples of eDNA collected during these surveys are representative of regions where harbor porpoise were encountered in those years.

Rough boundaries between marine mammal stocks can be identified using known low-density areas or discontinuities. Of the boundaries identified using this approach, two boundaries between the northern and southern stocks were identified. These include the boundary at the north end of Wrangell Narrows and the boundary at Keku Strait. Low harbor porpoise density, not a lack of harbor porpoise, is implied. Known low-density areas or discontinuities in distribution have been used to identify boundaries for other harbor porpoise stocks (Carretta *et al*. 2002). Therefore, NMFS continues to rely on the original methodology and resulting stock structure at this time.

Comment 30: ADFG, SEAFA, UFA, USAG, and two members of the public request that NMFS reevaluate the bycatch estimation methods for harbor porpoise in the SEAK salmon drift gillnet fishery, taking into account interannual variability and adequacy of survey effort, and reassess whether the PBR level is being exceeded for the proposed S-SEAK stock. The current bycatch estimation is based on the 2012-2013 Alaska Marine Mammal Observer Program (AMMOP), which only observed 6-7 percent of the drift gillnet fishery. The large CVs for serious injury and mortality indicate a lack of precision in the estimate. The draft SAR does not account for interannual variability, with no observed bycatch in 2012 but documented interactions in 2013. The low survey coverage and potential for Type I or Type II errors make it difficult to determine if the PBR level is being exceeded or if the documented interactions were merely a fluke. A member of the public commented that the fishery had changed significantly since it was observed, thus invalidating the estimates, and a new observer program to monitor fishery takes should be undertaken.

Response: NMFS acknowledges the concerns raised in the comment. Analyses predicting the expected precision of the SEAK AMMOP for given levels of effort were conducted prior to the implementation of the observer program. The achieved effort level (~6.5 percent observer coverage for the three observed fishing districts) was considered sufficient to detect harbor porpoise bycatch if it was occurring at a level greater than the PBR level. For example, if the true bycatch level was 1.5 times PBR, there is a very low (2 percent) probability that no harbor porpoise bycatch would be observed. The estimated bycatch does take into account the lack of observations of bycatch in 2012; the estimate from 2013 is averaged with the zero from 2012 to estimate an annual bycatch. The effect of averaging with the zero in 2012 is included in the estimated CVs for the annual average, which are still 0.7 and 1.0 for the two stocks. Although the CVs of the estimated bycatch are high, this is well within the range of CVs tested in the development of the PBR framework (*i.e.*, a robustness trial was run with CV of bycatch estimate equal to 1.2). Therefore, it is still appropriate to use these estimates in the SAR. The Guidelines specify that the recovery factor should be lowered to a value less than 0.5 in situations such as these, where the CV of bycatch is relatively high. This adjustment will be evaluated for incorporation in the next SAR revision.

The bycatch estimate presented in the SAR should be considered a minimum. AMMOP only operated in fishing districts six, seven, and eight, representing only a fraction (*i.e.*, 16 percent of fish landed, the metric used to represent effort in the fishery) of the SEAK salmon drift gillnet fishery. The other fishing districts represent 84 percent of the landings, and bycatch estimates from districts six, seven, and eight were not extrapolated to those other areas. In other words, bycatch has not been estimated for the other districts. If one were to extrapolate the observed bycatch estimates in districts six, seven, and eight to the effort in the other districts, the estimated bycatch for the entire fishery would be six times higher, indicating that the current estimate of bycatch could be substantially underestimated. Another reason why the estimated bycatch should be considered a minimum estimate, with the potential for substantial negative bias, is that the observers were on a separate boat from the fishing vessel and their view of the gear during hauls was usually poor. In more than 90 percent of the hauls: 1) the observer's view of the portion of the net being pulled was obstructed for 25-50 percent of the time and 2) the observer could not see the net underwater. This means that the detection rate may not have been 100 percent in observed hauls and that the observations should be considered minimums. Less than a 100 percent detection would lead to a negative bias in the bycatch estimates.

It is worthwhile to consider Type I and II error rates in planning survey effort levels. To evaluate whether the estimated M/SI level would cause a fishery to be considered Category I in the List of Fisheries, the most important metric to measure accurately is whether the number of M/SI harbor porpoise per year is below 50 percent of the PBR level for S-SEAK harbor porpoise. Using binomial probabilities, the false positive rate (incorrectly estimating M/SI to be above PBR) for this situation would be 0.236. Similarly, it is important to measure accurately when M/SI is well above PBR (*e.g.*, 150 percent of PBR), and the false negative rate for that situation (incorrectly estimating M/SI to be below PBR) would be 0.298. These error rates are similar and not exceptionally high, and could be improved by increasing observer coverage relative to what was conducted previously. NMFS acknowledges the age of available data; regardless, without additional data, it remains the best available data on bycatch in the fishery. Planning efforts are underway for the AMMOP to consider new observer effort in the SEAK salmon drift gillnet fishery to gather more recent bycatch information for the fishery, as resources allow.

Comment 31: ADFG, SEAFA, UFA, USAG, and two members of the public request that NMFS reevaluate the most recent boat-based survey estimate for harbor porpoise in SEAK, considering potential biases such as the species' elusive nature, avoidance of approaching boats, and inadequate sampling in nearshore shallow waters and known concentration areas, and one member of the public recommended that a new aerial-based survey be completed. Harbor porpoise are known to be shy, elusive, and difficult to detect, which may lead to underestimation in boat-based surveys. The assumption of perfect detection at a Beaufort wind scale of 0 is unrealistic for such an elusive species. The survey's effective strip width does not appear to account for the effects of the sun's position on the detection probability. The vessel size used in the survey may have limited sampling in shallow waters where harbor porpoise are known to frequent. Furthermore, the survey did not include Duncan Canal, a known concentration area in S-SEAK (Parsons *et al.* in prep), because it was assumed to have no harbor porpoise based on results from other S-SEAK inlets.

Response: NMFS acknowledges the concerns raised in the comment and agrees that harbor porpoise is an elusive species that tends to avoid vessels. We considered this in the 2019 survey sampling design. Highly experienced observers participated in the 2019 survey in SEAK with the goal of minimizing the negative effect of animal behavior during data collection. Search effort for porpoise during the survey was performed in a manner that maximized detection before the porpoise responded to the vessel. Search effort was focused several hundred meters ahead of the vessel. Vessel avoidance can typically be detected in line transect surveys when examining histograms of perpendicular distance data (*e.g.*, Buckland *et al*. 2001). In such circumstances (presence of negative responsive movement by the porpoise), the number of sightings is expected to be greater farther away from the survey line than on or very near the survey line. Inspection of the perpendicular distance data in the 2019 survey in SEAK did not provide any evidence of responsive movement. On the contrary, it suggested porpoise groups were detected prior to showing any response to the presence of the vessel (see Zerbini *et al.* 2022a, detection function in the Supplemental Material: *https://www.frontiersin.org/articles/10.3389/fmars.2022.966489/full*).

NMFS disagrees that sampling was inadequate. The survey was designed using advanced, well-established, and robust statistical methods to minimize bias in survey coverage. Sampling transects followed a systematic “zig-zag” design that covered most known habitats of harbor porpoise within SEAK inland waters, either near the shore or in the center of channels and inlets. In the past, NMFS was criticized for not sampling small bays and narrow inlets, and time was allocated in the 2019 survey to sample and estimate abundance within these areas. Given the resources available at the time, it was not practical to sample the large number of small bays and inlets (~170) in SEAK. Therefore, an algorithm was implemented to randomly select inlets and bays for sampling, allowing for nearly 40 percent survey coverage in the area of all inlets and bays combined. The proportion of bays and inlets sampled in the N-SEAK and S-SEAK areas was approximately the same.

The estimated average effective search width of harbor porpoise in SEAK (700-900 m) is substantially greater than that of open ocean surveys (130-375 m) (see detailed discussion and relevant literature in Zerbini *et al*. 2022a), suggesting that it is much easier to see harbor porpoise in enclosed environments such as inland waters of SEAK. Greater detectability of harbor porpoise in SEAK likely occurs because survey conditions in inland waters improve visibility of this species. For example, the presence of land in most of the region allows observers to focus on a smaller search area ahead of the vessel, likely increasing their detectability. Perhaps more importantly, sea conditions provided confidence in detectability during the 2019 surveys (92 percent of the sampling effort occurred in Beaufort state conditions varying between 0 and 3) and a rigorous protocol was implemented to stop sampling in poor visibility conditions to ensure the quality of the data were appropriate to develop density estimates of harbor porpoise. In addition, large swells, which greatly affect detection of cetaceans at sea, were extremely rare within most of SEAK inland waters where harbor porpoise were documented in the 2019 survey. Because detection of harbor porpoise is imperfect, a method was used to estimate the proportion of animals missed on the survey line - a quantity known as g(0) - under the assumption that observers will detect all porpoise in flat, calm conditions (Beaufort 0). NMFS determined this approach is appropriate, especially in a region where the environmental conditions favor the detectability of harbor porpoise.

The effect of many covariates in the probability of detecting harbor porpoise were considered as described in Zerbini *et al*. (2022a). The effect of the sun's position can affect the detectability of cetaceans, but other covariates considered in that study are typically more important (*e.g*., sea state, group size, observer, swell height, cue; Barlow *et al*. 2001). In addition, most of the survey was conducted under cloudy or partially cloudy conditions, when the effect of glare is substantially reduced or is non-existent given the sun is not visible. The vessel used was small (~27.4 m long) compared to the size of other vessels used in similar surveys in SEAK in the past and allowed for sampling most of the habitats identified prior to completing the 2019 survey. Note that nearly all regions proposed for sampling were surveyed (Fig. 1 in Zerbini *et al*. 2022a). In addition, the vessel used in the 2019 survey towed a small rigid hull inflatable boat (RHIB) for collecting eDNA samples. This RHIB was launched to visit certain areas where depth was such that the larger survey vessel was unable to survey. One of these areas was Duncan Canal, where aggregations of harbor porpoise had been previously documented. No porpoise were seen in Duncan Canal during the small boat survey. It is important to note that Duncan Canal is adjacent to eastern Sumner Strait, an area of high density of harbor porpoise. It is possible that animals move in and out of the canal and were sampled by the survey vessel in Sumner Strait, even if they regularly occur in Duncan Canal. Therefore, the fact that the primary survey vessel did not visit Duncan Canal (and potentially other areas) does not mean that porpoise that visit the canal were not seen and are not accounted for in the estimates of abundance.

Finally, NMFS agrees that additional surveys are important to improve our knowledge of abundance and stock structure of harbor porpoise in SEAK; study platform and survey design depends on many factors, including the purpose of the project, the desired level of precision, and need for consistency with previous surveys. Studies to better understand the population identity of porpoise along the outer coast are also extremely useful to assess whether animals in inland waters are separate from those in more offshore habitats.

Comment 32: ADFG and UFA request that NMFS assess trends in harbor porpoise abundance in SEAK stocks, comparing historical and recent data, and evaluate the impact of drift gillnet fishery bycatch on the population. Despite differences in survey and analytical methods, the uncorrected abundance estimates from Zerbini *et al*. (2022a) can be compared with earlier surveys to analyze trends in abundance. The comparison suggests that harbor porpoise abundance increased in N-SEAK and remained constant in S-SEAK between 2013 and 2019. Historical abundance trends can inform assessments of stock status, potential threats, and the impact of bycatch. Considering the drift gillnet fishery occurred across the time series of harbor porpoise surveys, and the most recent abundance estimates for the Wrangell and Zarembo Island area are comparable to early 1990s estimates, bycatch in the drift gillnet fishery does not seem to be a driving factor affecting abundance. The rapid increase in abundance between 2006 and 2007, and 2010 and 2012, indicates that the drift gillnet fishery may not hinder harbor porpoise population growth in the area, suggesting that the stock may be able to reach its optimum sustainable population.

Response: NMFS recognizes the need to assess trends in abundance and to evaluate the impact of the drift gillnet fishery on harbor porpoise. The latter requires calculating new estimates of mortality through a fisheries monitoring program (*e.g.*, to place the estimates of mortality in perspective with more recent abundance estimates). The uncorrected abundance from Zerbini *et al*. (2022a) cannot be directly compared to those from previous surveys because the area covered in 2019 differs from the area covered in previous years. For example, by comparing the trackline design and area coverage in Fig. 1 in Zerbini *et al*. (2022a) and those in Figs. 2, 3, and 4 in Dahlheim *et al*. (2015), one can see the differences in the spatial coverage between the two surveys, which demonstrate the potential comparability issues between estimates from the two studies. For example, note that Chatham Strait, Lynn Canal, and lower Clarence Strait were not surveyed in 2006, 2007, and 2010, whereas high coverage was achieved in these areas in 2019. The most accurate way to assess the current trend would be to conduct a survey comparable to that done in 2019 and evaluate the trend based on two recent, comparable surveys; resources to do this are currently unavailable. Nonetheless, the depletion level of this population is unknown; if it is well below OSP, it is possible for the population to be increasing now, but may level off and not reach OSP if M/SI is too high.

Comment 33: ADFG emphasizes that the timeliness and transparency of data availability should be improved to ensure that stakeholders have adequate time to review and comment on proposed changes to the SARs. A member of the public commented that the State of Alaska should be provided with all data to peer review. ADFG commented that despite a data availability statement in Zerbini *et al*. (2022a), the data were provided late in the comment period, leaving insufficient time for thorough review. Similarly, the data from Parsons *et al*. (in prep) and the associated eDNA genetic sampling and analysis methods were provided with less than 10 working days left in the comment period. ADFG stated that the lack of timely data and methods sharing hinders transparency and the ability to properly assess the potential impacts of proposed changes to the SAR, particularly in relation to the small exceedance of PBR estimated for the proposed S-SEAK stock.

Response: Data availability is important and NMFS strives to make data available in a timely manner. We experienced significant set-backs and limitations in the years between tissue and eDNA sample collection and publication of genetics results due to restrictions imposed during the global pandemic. These delays impacted progress on the publication of the genetics results, which in turn impacted the release of the data. Summary genetic data were provided to the requestor to the best of the agency's ability; raw genetic data will be made available after the results are published in a peer-reviewed journal. We note that key information used in the draft harbor porpoise SAR was included in a peer-reviewed scientific paper (Zerbini et al. 2022a) and a NOAA technical memorandum (Zerbini et al. 2022b), and those documents were also made available to the public and to the Alaska SRG during their review of the draft SARs. In addition, Alaska SRG meetings held in 2018-2022 involved discussions about new studies on abundance and genetics of harbor porpoise, and the results of those studies. Minutes from the Alaska SRG meetings include considerable detail and are available to the public at *https://www.fisheries.noaa.gov/national/marine-mammal-protection/scientific-review-groups#alaska-scientific-review-group*.

Comment 34: ADFG, UFA, and SEAFA request that NOAA carefully consider the potential economic impacts of proposed changes to the SEAK harbor porpoise SAR on the salmon gillnet fishery and coastal communities before implementing any changes. The proposed changes in the draft SAR would split the SEAK harbor porpoise stock into three separate stocks and categorize the proposed S-SEAK stock as a strategic stock under the MMPA. This categorization would require the establishment of a take reduction plan, leading to changes in regulation and operation of the salmon gillnet fishery. These changes could result in significant economic costs for the fishery and the coastal communities that rely on it, and should only be pursued if deemed necessary.

Response: NMFS' policies for delineating demographically independent populations and designating stocks under the MMPA section 117 is made on the basis of the best available science and is independent of any future agency actions under MMPA section 118 for establishing a take reduction plan that may or may not occur in the future. If a take reduction plan were implemented, NMFS recognizes that there may be economic implications for the fishery and the coastal communities that rely on the relevant stocks. Those implications would be considered as appropriate in other processes that flow from these determinations.

Comment 35: A member of the public commented that NMFS' proposal to split harbor porpoise stocks with lines of demarcation at Dry Straights, Rocky Pass, Cape Decision, and Wrangell Narrows is arbitrary and unproven, lacking in robust genetic data to support it clearly. The commenter asserted that additional sampling from multiple areas is needed to better establish a delineation between stocks.

Response: NMFS has concluded that the available evidence supports placing the boundaries between the N-SEAK and the S-SEAK stocks in Dry Straight, Wrangell Narrows, Keku Strait (Rocky Pass), and Cape Decision. These are areas with extremely low density or no recent records of harbor porpoise in the last 20 years as summarized in Zerbini *et al*. (2022b) and likely represent natural geographic/ecological boundaries supporting demographic independence of harbor porpoise between Frederick Sound and Sumner Strait. Despite being relatively wide (1.2 km), Dry Strait is shallow (~0.4-0.5 m) and strongly influenced by the shoaling waters of the Stikine River Delta. The Stikine River Delta is continually expanding and depositing sediment on the ocean floor, creating tidal flats throughout the strait. It is unclear whether harbor porpoise use Dry Strait; the area has not been surveyed by vessel because of navigational constraints, but no harbor porpoise were there during aerial surveys in 1997 (Hobbs and Waite 2010). Harbor porpoise were documented in the Wrangell Narrows in the early 1990s, but infrequently since then (only one sighting in the lower portion of the Narrows in 2011) (Hobbs and Waite 2010; Dahlheim *et al*. 2015; Zerbini *et al*. 2022). Keku Strait is a narrow channel with complex bathymetry and shallow areas in its narrowest portion. The northern end of

Keku Strait (near the town of Kake) was surveyed in 2019 and data generated from eDNA samples collected there suggest that harbor porpoise in that area are genetically more similar to harbor porpoise in Glacier Bay and Icy Strait (Parsons *et al*. in prep., Zerbini *et al*. 2022b) than those in Sumner Strait. It is unclear whether harbor porpoise cross the narrow parts of Keku Strait (Rocky Pass) towards Sumner Strait. No porpoise were seen there during aerial surveys in 1997 (Hobbs and Waite 2010). The geography and the bathymetry in the narrow reaches could represent a geographic barrier, separating animals from the northern and southern inland water DIPs. The passage between Cape Decision and Coronation Island separates two relatively large straits in SEAK: lower Chatham and lower Sumner straits. Harbor porpoise have been documented in lower Sumner Strait, to the east of Cape Decision (Dahlheim *et al*. 2015; Zerbini *et al.* 2022a) and occasionally in lower Chatham Strait (Hobbs and Waite 2010), but occurrence in these regions is uncommon. Whether harbor porpoise move between the two straits (or whether animals from offshore areas move into the straits) is presently unknown. It is important to note that demographic independence does not require a complete lack of interchange of animals between two or more DIPs. NMFS (2023) defines the term "demographic independence" to mean that "the population dynamics of the affected group is more a consequence of births and deaths within the group (internal dynamics) rather than immigration or emigration (external dynamics). Thus, the exchange of individuals between population stocks is not great enough to prevent the depletion of one of the populations as a result of increased mortality or lower birth rates."

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