APPENDIX IV. GUIDELINES FOR PREPARING THE STOCK ASSESSMENT REPORTS (PROPOSED REVISION)

Following discussions and recommendations of the GAMMS workshop in February 2011, workshop participants recommend the following revision of the guidelines for preparing the Stock Assessment Reports (next pages). To a large but not total extent, this appendix exactly reflects the recommended language changes described in the individual sections of the main body of this report (sections 1 – 9). Any inconsistencies are a result of the draft-report revision process.

Guidelines for Preparing Stock Assessment Reports Pursuant to Section 117 of the Marine Mammal Protection Act

1. General Guidelines

Introduction

Section 117 of the Marine Mammal Protection Act (MMPA) requires that the National Marine Fisheries Service (NMFS) and the U.S. Fish and Wildlife Service (USFWS) develop Stock Assessment Reports (Reports) for all marine mammal stocks in waters under U.S. jurisdiction (U.S. waters). These Reports are to be based upon the best scientific information available. Reports are not required for stocks that have a remote likelihood of occurring regularly in U.S. waters (e.g., stocks for which only the margins of the range extends into U.S. waters or that enter U.S. waters only during anomalous current or temperature shifts).

The MMPA requires Reports to include, among other things, information on how stocks were identified, a calculation of Potential Biological Removal (PBR), an assessment of whether incidental fishery takes are "insignificant and approaching zero mortality and serious injury rate," as well as other information relevant to assessing stocks. These reports are to be reviewed annually for "strategic stocks" and for stocks for which new information is available, and at least once every three years for all other stocks. This document provides guidance for how these topics are to be addressed in the Reports.

The MMPA provides some general guidance for developing the Reports. More detailed guidelines were developed at a PBR workshop in June 1994 and were used in writing the original draft Reports. The draft guidelines and initial draft stock assessment reports were subjected to public review and comment in August 1994. Final guidelines and Reports were completed in 1995 (Barlow et al. 1995). In 1996, representatives of NMFS, USFWS, regional Scientific Review Groups, and the Marine Mammal Commission reviewed the guidelines and proposed minor changes, which after public review and comment, were made final in 1997 (Wade and Angliss 1997). The guidelines were officially updated again in 2005, following a similar revision process beginning with workshop in September 2003 (NMFS 2005). In February 2011, NMFS again convened representatives of the review groups and agencies to review and, as appropriate, recommended revisions to the guidelines.

It is anticipated that the guidelines themselves will be reviewed and changed based on additional scientific research and on experience gained in their application. In this regard, USFWS and NMFS will meet periodically to review and revise, as needed, the guidelines. When the agencies recommend revisions to the guidelines, these revisions will be made available for public review and comment prior to acceptance. Furthermore, the guidelines in this document do not have to be followed rigidly; however, any departure from these guidelines must be discussed fully within any affected Report.

In the sections of the Report on Stock Definition and Geographic Range, elements of the PBR formula, Population Trend, and Annual Human-caused Mortality and Serious Injury, authors are to provide a description of key uncertainties in each element and evaluate the effects of these uncertainties associated with parameters in these sections and evaluate the effects of these uncertainties in sufficient detail to support a synthesis of how accurately stock status could be assessed.

The intent of these guidelines is to: (1) provide a uniform framework for the consistent application of the amended MMPA throughout the country; (2) ensure that PBR is calculated in a manner that ensures meeting the goals of the MMPA; (3) provide guidelines for evaluating whether fishery takes are insignificant and approaching a zero mortality and serious injury rate; and (4) make the Government's approach clear and open to the public. Where the guidelines provided here are not incorporated into a particular Report, justification for the departure will be provided within the Report. Similarly, the Reports will explain when deviations are made from specific recommendations from the Scientific Review Groups.

FWS and NMFS interpret the primary intent of the 1994 MMPA amendments and the PBR guidelines developed pursuant to the Act as a mechanism to respond to the uncertainty associated with assessing and reducing marine mammal mortality from incidental fisheries takes. Accordingly, this mechanism is increasingly conservative under increasing degrees of uncertainty. The MMPA requires the calculation of PBR for all stocks, including those that are considered endangered or threatened under the Endangered Species Act (ESA) and those that are managed under other authorities, such as the International Whaling Commission. However, in some cases allowable takes under these other authorities may be less than the PBR calculated under the MMPA owing to the different degrees of "risk" associated with, and the treatment of, uncertainty under each authority. Where there is inconsistency between the MMPA and ESA regarding the take of listed marine mammals, the more restrictive mortality requirement takes precedence. Nonetheless, PBR must still be calculated for these stocks, where possible, and discussed in the text of the Reports. As mandated under the MMPA, the PBR is calculated 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." Therefore, a PBR is an upper limit to removals that does not imply that the entire amount should be taken.

Estimates of PBR, human-caused mortality, and classification as to whether a stock is "strategic" or "non-strategic" are required by Sec. 117 to be included in the Reports for all stocks of marine mammals in U.S. waters. However, it should be noted that the co-management, between the Federal government and Alaska Native organizations, of removals of marine mammals for subsistence purposes between the Federal government and Alaska Native organizations is specifically addressed in Sec. 119. In response to Sec. 119, NMFS and FWS have entered into cooperative agreements with Alaska Native organizations to conserve marine mammals and provide co-management of subsistence use by Alaska Natives. FWS and NMFS believe that it is appropriate to develop management programs for stocks subject to subsistence harvests through the co-management process provided that commercial fisheries takes are not significant and that the process includes a sound research and management program to identify and address uncertainties concerning the status of these stocks. Estimates of PBR and classification as to

whether a stock is strategic will be determined from the analysis of scientific and other relevant information discussed during the co-management process.

Definition of "Stock"

"Population stock" is the fundamental unit of legally-mandated conservation. The MMPA defines population stock as "a group of marine mammals of the same species or smaller taxa in a common spatial arrangement, that interbreed when mature." To fully interpret this definition, it is necessary to consider the objectives of the MMPA. Sec. 2 (Findings and Declaration of Policy) of the MMPA states that "...species and populations stocks of marine mammals...should not be permitted to diminish beyond the point at which they cease to be a significant functioning element in the ecosystem of which they are a part, and, consistent with this major objective, they should not be permitted to diminish below their optimum sustainable population." Further on in Sec. 2, it states "...the primary objective of their management should be to maintain the health and stability of the marine ecosystem. Whenever consistent with this primary objective, it should be the goal to obtain an optimum sustainable population keeping in mind the carrying capacity of the habitat." Therefore, stocks must be identified in a manner that is consistent with these goals. For the purposes of management under the MMPA, a stock is recognized as being a management unit that identifies a demographically independent biological population. It is recognized that in practice, identified stocks may fall short of this ideal because of a lack of information, or for other reasons.

Many types of information can be used to identify stocks of a species (e.g., distribution and movements, population trends, morphological differences, differences in life history, genetic differences, differences in acoustic call types, contaminants and natural isotope loads, parasite differences, and oceanographic habitat differences). Different population responses (e.g., different trends in abundance) between geographic regions are also an indicator of stock structure, as populations with different trends are not strongly linked demographically. When different types of evidence are available to identify stock structure, the Report must discuss inferences made from the different types of evidence and how these inferences were integrated to identify the stock.

Evidence of morphological or genetic differences in animals from different geographic regions indicates that these populations are demographically independent. Demographic independence means 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.

Failure to detect genetic or morphological differences, however, does not necessarily mean that populations are not demographically independent. Dispersal rates, though sufficiently high to homogenize morphological or genetic differences detectable between putative populations, may still be insufficient to deliver enough recruits from an unexploited population (source) to an adjacent exploited population (sink) so that the latter remains a functioning element of its

ecosystem. Insufficient dispersal between populations where one bears the brunt of exploitation coupled with their inappropriate pooling for management could easily result in failure to meet MMPA objectives. For example, it is common to have human-caused mortality restricted to a portion of a species' range. Such concentrated mortality (if of a large magnitude) could lead to population fragmentation, a reduction in range, or even the loss of undetected populations, and would only be mitigated by high immigration rates from adjacent areas.

Therefore, careful consideration needs to be given to how stocks are identified. In particular, where mortality is greater than a PBR calculated from the abundance just within the oceanographic region where the human-caused mortality occurs, serious consideration should be given to identifying an appropriate stock in this region. In the absence of adequate information on stock structure and fisheries mortality, a species' range within an ocean should be divided into stocks that represent defensible management units. Examples of such management units include distinct oceanographic regions, semi-isolated habitat areas, and areas of higher density of the species that are separated by relatively lower density areas. Such areas have often been found to represent true biological stocks where sufficient information is available. In cases where there are large geographic areas from which data on stock structure of marine mammals are lacking, stock structure from other parts of the species' range may be used to draw inferences as to the likely geographic size of stocks. There is no intent to identify stocks that are clearly too small to represent demographically isolated biological populations, but it is noted that for some species genetic and other biological information has confirmed the likely existence of stocks of relatively small spatial scale, such as within Puget Sound, WA, the Gulf of Maine, or Cook Inlet, AK.

Each Report will state in the Stock Definition and Geographic Range section whether it is plausible the stock contains multiple demographically independent populations that should be separate stocks, along with a brief rationale (e.g., the current stock spans multiple eco-regions). If additional structure is plausible and human-caused mortality or serious injury is concentrated within a portion of the range of the stock, the Report should identify the portion of the range in which the mortality or serious injury occurs.

In trans-boundary situations where a stock's range spans international boundaries or the boundary of the U.S. Exclusive Economic Zone (EEZ), the best approach is to establish an international management agreement for the species and to evaluate all sources of human-caused mortality and serious injury (U.S. and non-U.S.) relative to the PBR for the entire stock range. In the interim, if a trans-boundary stock is migratory and it is reasonable to do so, the fraction of time the stock spends in U.S. waters should be noted, and the PBR for U.S. fisheries should be apportioned from the total PBR based on this fraction. For non-migratory trans-boundary stocks (e.g., stocks with broad pelagic distributions that extend into international waters), if there are estimates of mortality and serious injury from U.S. and other sources throughout the stock's range, then PBR calculations should be based upon a range-wide abundance estimate for the stock whenever possible. In general, abundance or density estimates from one area should not be extrapolated to unsurveyed areas to estimate range-wide abundance (and PBR). But, informed interpolation (e.g. based on habitat associations) may be used to fill gaps in survey coverage and estimate abundance and PBR over broader areas as appropriate and supported by existing data. If estimates of mortality or abundance from outside the U.S. EEZ cannot be determined, PBR

calculations should be based on abundance in the EEZ and compared to mortality within the EEZ.

Prospective Stocks

When information becomes available that appears to justify a different stock structure or stock boundaries, it may be desirable to include the new structure or boundaries as "prospective stocks" within the existing Report. The descriptions of prospective stocks would include a description of the evidence for the new stocks, calculations of the prospective PBR for each new stock, and estimates of human-caused mortality and serious injury, by source. The notice of availability of draft Reports with prospective stocks would include a request for public comment and additional scientific information specifically addressing the prospective stock structure. Prospective stocks would be expected to become separate stocks in a timely manner unless additional evidence was produced to contradict the prospective stock structure. Summary information for prospective stocks should be included in the standard table in the Reports that summarizes the minimum population estimate (N_{min}), the maximum net productivity rate (R_{max}), etc. for each stock.

PBR Elements

The 1994 amendments to the MMPA mandate that, as part of the Reports, PBR estimates must be developed for each marine mammal stock in U.S. waters. The PBR is defined as "the maximum number of animals, not including natural mortality, that may be removed from a marine mammal stock while allowing that stock to reach or maintain its optimum sustainable population." In addition, the MMPA states that PBR is calculated as the product of three elements: the minimum population estimate (N_{min}); half the maximum net productivity rate (0.5 R_{max}); and a recovery factor (F_r). The guidelines for defining and applying each of these three elements are described below. Further specific guidance on the calculation of PBR is provided in part 2 (Technical Details) of this document.

An underlying assumption in the application of the PBR equation is that marine mammal stocks exhibit certain dynamics. Specifically, it is assumed that a depleted stock will naturally grow toward OSP and that some surplus growth may be removed while still allowing recovery. There are unusual situations, however, where the formula Congress added to the MMPA to calculate PBR (N_{min}*0.5R_{max}*F_r) results in a number that is not consistent with the narrative definition of PBR (the maximum number of animals, not including natural mortality, that may be removed from a marine mammal stock while allowing that stock to reach or maintain its OSP). That is, there are situations where a stock is below its OSP and is declining or stable, yet human-caused mortality is a not a major factor in the population's trend. Thus, for unknown reasons, the stock's dynamics do not conform to the underlying model for calculating PBR. In such unusual situations, the PBR estimate should be qualified in the Report in the PBR section.

Minimum Population Estimate (N_{min})

N_{min} is defined in the MMPA amendments as an estimate of the number of animals in a stock that:

> "(A) is based on the best available scientific information on abundance, incorporating the precision and variability associated with such information; and,
>
> "(B) provides reasonable assurance that the stock size is equal to or greater than the estimate."

Consistent with these MMPA definitions, N_{min} should be calculated such that a stock of unknown status would achieve and be maintained within OSP with 95% probability. Population simulations have demonstrated (Wade 1994) that this goal can be achieved by defining N_{min} as the 20th percentile of a log-normal distribution based on an estimate of the number of animals in a stock (which is equivalent to the lower limit of a 60% 2-tailed confidence interval):

$$N_{min} = N/\exp(0.842 * (\ln(1+CV(N)^2))^{½}) \qquad (1)$$

where N is the abundance estimate and CV(N) is the coefficient of variation of the abundance estimate. If abundance estimates are believed to be biased, appropriate correction factors should be applied to obtain unbiased estimates of N. In such cases, the coefficient of variation for N should include uncertainty in the estimation of the correction factor. In cases where a direct count is available, such as for many pinniped stocks, this direct count could alternatively be used as the estimate of N_{min}. Other approaches could also be used to estimate N_{min} if they provide an adequate level of assurance that the stock size is equal to or greater than that estimate.

Abundance estimates become less dependable with time after the last survey has occurred. Therefore, estimates of N_{min} since the last survey should be reduced annually to explicitly reflect uncertainty in current abundance, and to continue providing reasonable assurance that the true stock size is equal to or greater than N_{min}.

When a population's growth rate is unknown, incorporating uncertainty may be accomplished by projecting N_{min} based on a uniform distribution of plausible growth (see Technical Details). However, at some point even these projected estimates may no longer provide reasonable assurance that the stock size is presently greater than or equal to projected N_{min}, and N_{min} should therefore be decreased further to guard against a plausible worst-case scenario that may have gone undetected. A sustained decline of 10% per year represents the greatest decline observed for a stock of marine mammals in U.S. waters (NMFS 2008), and this rate of decline would decrease the population by 50% in 8 years, which would reduce the population below OSP. Therefore, after 8 years since the most recent survey, the N_{min} for a stock should be decreased by 10 % per year, applied retroactively from the time of the last survey, unless there is evidence against doing so.

For stocks with sufficient information to adequately estimate parameters for trend models (e.g., based on a time-series of abundance estimates or trend site data), such models may be used to

help estimate values of N_{min} in years subsequent to the most recent survey. If the trend-based estimates of N_{min} are less than N_{min} projections from the uniform-distribution approach discussed in the previous paragraph, then the trend-based estimates should be used because they provide the stronger assurance that stock size is presently greater than the estimate of N_{min}. Similarly, if the trend-based estimates of N_{min} are declining by > 10% per year, they should continue to be used beyond 8 years since the most recent survey, unless new information provides evidence against doing so. On the other hand, if the trend-based N_{min} estimates are greater than those projected from a uniform distribution of growth rate, then N_{min} should be estimated as a time-weighted average of the two sets of estimates, out to 8 years from the most recent survey, after which the retroactive 10% per year reduction in N_{min} would be applied. Thus, N_{min} would fully reflect the trend-based estimate in the first year after the last survey but by the 8^{th} year would fully reflect the estimate projected by the uniformly distributed growth rate model. This weighted average recognizes our diminishing confidence through time in the ability of trend-based projections to account for new changes in environmental processes (e.g., regime shifts) or anthropogenic impacts (e.g., change in fisheries, etc). And, it provides a more reasonable assurance that the stock size is presently greater than or equal to projected N_{min}. Trend models used should attempt to appropriately account for random environmental process error and sampling covariance in the data (e.g., see fin whale example by Moore and Barlow 2011) and should not inform the projections of N_{min} if at some point model results become inconsistent with other available information.

Population Trend

The Reports will describe information on current population trend including discussion of factors that may affect the reliability of the trend. In cases where trend data could be used in the calculation of N_{min}, the authors should discuss the suitability of the data for N_{min} inferences. The Reports should state whether a future precipitous decline could be detected (see Technical Details). A precipitous decline is defined as a 50% decline in 15 years, a decline which would result in the stock likely being below OSP.

Maximum Rate of Increase (R_{max})

One-half R_{max} is defined in the MMPA as "one-half of the maximum theoretical or estimated "net productivity rate" of the stock at a small population size," where the term "net productivity rate" means "the annual per capita rate of increase in a stock resulting from additions due to reproduction, less losses due to natural mortality." Default values should be used for R_{max} in the absence of stock-specific measured values. To be consistent with a risk-averse approach, these default values should be near the lower range of measured or theoretical values (or 0.12 for pinnipeds and sea otters and 0.04 for cetaceans and manatees). Substitution of other values for these defaults should be made with caution, and only when reliable stock-specific information is available on R_{max} (e.g., estimates published in peer-reviewed articles or accepted by review groups such as the MMPA Scientific Review Groups or the Scientific Committee of the International Whaling Commission).

Details on rounding and precision, and on averaging more than one estimate of abundance to calculate N_{min}, can be found in part 2 (Technical Details) of this document.

Recovery Factor (F_r)

The MMPA defines the recovery factor, F_r, as being between 0.1 and 1.0. The intent of Congress in adding F_r to the definition of PBR was to ensure the recovery of populations to their OSP levels, and to ensure that the time necessary for populations listed as endangered, threatened, and depleted to recover was not significantly increased. The use of F_r less than 1.0 allocates a proportion of expected net production towards population growth and compensates for uncertainties that might prevent population recovery, such as biases in the estimation of N_{min} and R_{max} or errors in the determination of stock structure. Population simulation studies (Barlow et al. 1995, Wade 1998) demonstrate that the default F_r for stocks of endangered species should be 0.1, and that the default F_r for depleted and threatened stocks and stocks of unknown status should be 0.5. A stock that is strategic because, based on the best available scientific information, it is declining and is likely to be listed as a threatened species under the ESA within the foreseeable future (sec. 3(19)B of the MMPA) should use a recovery factor between 0.1 and 0.5. The default status should be considered as "unknown." Stocks known to be within OSP (e.g., as determined from quantitative methods such as dynamic response or back-calculation), or stocks of unknown status that are known to be increasing, or stocks that are not known to be decreasing taken primarily by aboriginal subsistence hunters, could have higher F_r values, up to and including 1.0, provided that there have not been recent increases in the levels of takes. Recovery factors for listed stocks can be changed from their default values, but only after careful consideration and where available scientific evidence confirms that the stock is not in imminent danger of extinction. Values other than the defaults for any stock should usually not be used without the approval of the regional Scientific Review Group, and scientific justification for the change should be provided in the Report.

The recovery factor can be adjusted to accommodate additional information and to allow for management discretion as appropriate and consistent with the goals of the MMPA. For example, if human-caused mortalities include more than 50% females, the recovery factor should be decreased to compensate for the greater impact of this mortality on the population (or increased if less than 50% female). Similarly, declining stocks, especially ones that are threatened or depleted, should be given lower recovery factors, the value of which should depend on the magnitude and duration of the decline. The recovery factor of 0.5 for threatened or depleted stocks or stocks of unknown status was determined based on the assumption that the coefficient of variation of the mortality estimate is equal to or less than 0.3. If the CV is greater than 0.3, the recovery factor should be decreased to: 0.48 for CVs of 0.3 to 0.6; 0.45 for CVs of 0.6 to 0.8; and 0.40 for CVs greater than 0.8.

Recovery factors could also be increased in some cases. If mortality estimates are known to be relatively unbiased because of high observer coverage, then it may be appropriate to increase the recovery factor to reflect the greater certainty in the estimates. Thus, in an instance where the observer coverage was 100% and the observed fishery was responsible for virtually all fishery mortality on a particular stock, the recovery factor for a stock of unknown status might be

increased from 0.5 (reflecting less concern about bias in mortality, but continued concern about biases in other PBR parameters and errors in determining stock structure). Recovery factors of 1.0 for stocks of unknown status should be reserved for cases where there is assurance that N_{min}, R_{max}, and the kill are unbiased and where the stock structure is unequivocal.

Annual Human-caused Mortality and Serious Injury

A summary of all human-caused mortality and serious injury should be provided in each Report as the first paragraph under "Annual human-caused mortality and serious injury." This summary should include information on all mortality and serious injury (e.g., U.S. commercial fishing, other fishery mortality from recreational gear and foreign fleets, vessel strikes, power plant entrainment, shooting, scientific research, after-action reports from otherwise authorized activities, etc.).

The Reports should contain a complete description of what is known about current human-caused mortality and serious injury. Information about incidental fisheries mortality should be provided, including sources such as observer programs, logbooks, fishermen's reports, strandings, and other sources, where appropriate. It is expected that this section of the Reports will include all pertinent information that is subsequently used to categorize fisheries under Sect. 118. Therefore, any additional information that is anticipated to be used to categorize a fishery should be provided here.

If mortality and serious injury estimates are available for more than one year, a decision will have to be made about how many years of data should be used to estimate annual mortality. There is an obvious trade-off between using the most relevant information (the most recent data) versus using more information (pooling across a number of years) to increase precision and reduce small-sample bias. It is inappropriate to state specific guidance directing which years of data should be used, because the case-specific choice depends upon the quality and quantity of data. Accordingly, mortality estimates could be averaged over as many years as necessary to achieve statistically unbiased estimation with a CV of less than or equal to 0.3, but estimates should usually not be averaged over a time period of more than the most recent 5 years for which data have been analyzed. However, information more than 5 years old should be used if it is the most appropriate information available in a particular case.

In some cases it may not be appropriate to average over as many as 5 years even if the CV of an estimate is greater than 0.3. For example, if within the last 5 years the fishery has changed (e.g., fishing effort or the mortality rate per unit of fishing effort has changed), it would be more appropriate to use only the most recent relevant data to most accurately reflect the current level of annual mortality. When mortality is averaged over years, an un-weighted average should be used, because true mortality rates vary from year-to-year. When data are insufficient to overcome small-sample bias of mortality estimates for purposes of comparing the estimates to PBR (see Technical Details), a statement acknowledging this elevated potential for small-sample bias should accompany mortality estimates in the Reports.

In some cases, mortality and serious injury occur in areas where more than one stock of marine mammals occurs. When biological information (e.g., genetics, morphology) is sufficient to identify the stock from which a dead or seriously injured animal came, then the mortality or serious injury should be associated only with that stock. When one or more deaths or serious injuries cannot be assigned directly to a stock, then those deaths or serious injuries may be partitioned among stocks within the appropriate geographic area, provided there is sufficient information to support such partitioning (e.g., based on the relative abundances of stocks within the area). When the mortality and serious injury estimate is partitioned among overlapping stocks, the Reports will contain a discussion of the potential for over- or under-estimating stock-specific mortality and serious injury. In cases where mortality and serious injuries cannot be assigned directly to a stock and available information is not sufficient to support partitioning those deaths and serious injuries among stocks, the total unassigned mortality and serious injuries should be assigned to each stock within the appropriate geographic area. When deaths and serious injuries are assigned to each overlapping stock in this manner, the Reports will contain a discussion of the potential for over-estimating stock-specific mortality and serious injury.

A summary of mortality and serious injury incidental to U.S. commercial fisheries should be presented in a table, providing the name of the fishery, the current number of vessels, and for each appropriate year, observed mortality, estimated extrapolated mortality and serious injury and its CV, and percent observer coverage in that year, with the last column providing the average annual mortality estimate for that fishery. Because U.S. commercial fisheries or foreign fisheries within the U.S. EEZ are subject to regulation under MMPA section 118, mortality and serious injury from such fisheries should be clearly separated from other fishery-related mortality (e.g., mortality incidental to recreational fishing or foreign fishing beyond the U.S. EEZ) in the Reports. Information should be provided (in either the table or the text) about the number of deaths and the number of injuries, and how many of the injuries are "serious" (i.e., likely to result in death).

It is often difficult to determine if an injury is serious or not, but outcomes of a NMFS technical workshop in 2007 (Andersen et al. 2008) to differentiate serious from non-serious injury for marine mammals provides useful guidance, and NMFS published its draft national policy on this issue on 18 July 2011 (76 FR 42116). Stocks that have estimated known mortality (not including injuries) that is less than PBR but have total estimated mortalities and injuries that is greater than PBR (or similarly which have estimated known mortality that is less than 10% of PBR but have total estimated mortalities and injuries that is greater than 10% of PBR) should be clearly identified. Determining which injuries are serious will be necessary for such stocks. If injuries have been determined to be serious, the Report should indicate how this determination was made.

There is a general view that marine mammal mortality information from logbook or fisher report data can only be considered as a minimum estimate of mortality, although exceptions may occur. Logbook or fisher report information can be used to determine whether the minimum mortality is greater than the PBR (or greater than 10% of the PBR), but it should not be used to determine whether the mortality is less than the PBR (or 10% of the PBR). Logbook data for fisher reports

should not be used as the sole justification for determining that a particular stock is not strategic or that its mortality and serious injury rate is insignificant and approaching zero rate.

For fisheries without observer programs, information about incidental mortality and serious injury from logbooks, fishermen's self-reports, strandings, and other sources should be included where appropriate. Such information should be presented in brackets to distinguish it from estimates of total mortality and serious injury in the fishery. If such information is not included in the table, but reports such as fishermen's self-reports are available, those reports should be described in the text and any concern with the quality of that report should be noted. Fishermen's self-reports of mortality or injuries should not be included if the fishery was observed and incidental mortality and serious injury was estimated based on observer records and associated coverage. All Category I and II fisheries listed as causing mortality or serious injury to a stock included in the MMPA List of Fisheries should be listed in the table with as much information as possible. Mortality and serious injury by those fisheries not regulated under MMPA section 118 (i.e., incidental to foreign fisheries or recreational fisheries), should be distinguished from mortality and serious injury incidental to fisheries subject to section 118. Further guidance on averaging human-caused mortality across years and across different sources of mortality can be found in the Technical Details section of these guidelines.

When including strandings and serious injury determinations as a significant component of the measure of annual human-caused mortality, the following language should be added to the Report:

> "It is important to stress that this mortality estimate results from an actual count of verified human-caused deaths and serious injuries and should be considered a minimum. Published studies attempting to evaluate potential bias in estimating human-caused mortality for numerous marine mammal species found that carcass counts accounted for < 1% to 17% (2% on average) of human-caused deaths, amounting to gross underestimates of mortality in those cases (Williams et al. 2011, Conservation Letters 4:228-233)."

Because many stocks are subject to human caused mortality or serious injury that is unmonitored or not fully quantified, authors of the Reports should add a sub-section of the Human-Caused Mortality and Serious Injury section to include a summary of the most important potential human-caused mortality or serious injury that are not quantified (e.g., fisheries that have never been observed, or have not been observed recently, and ship strikes). The Reports should summarize what are thought to be the most important unquantified or undocumented human-caused mortality or serious injury interactions so that readers realize the key sources of potential human-caused mortality and serious injury (e.g., fisheries that use gear that has a high probability of taking the species that have a large degree of overlap with the distribution of the stock, and where the fishing effort may be sufficient to result in substantial incidental mortality or serious injury). If there are no major known sources of unquantifiable human-caused mortality or serious injury, this should be explicitly stated.

Mortality Rates

Sec. 118 of the 1994 MMPA Amendments reaffirmed the goal set forth in the Act when it was enacted in 1972 that the take of marine mammals in commercial fisheries is to be reduced to insignificant levels approaching zero mortality and serious injury rate, and further requires that this goal be met within 7 years of enactment of the 1994 Amendments (April 30, 2001). This fisheries-specific goal is referred to as the "zero mortality rate goal" (ZMRG). The Reports are not the vehicle for publishing determinations as to whether a specific fishery has achieved the ZMRG. A review of progress towards the ZMRG for all fisheries was submitted to Congress in August 2004.

However, Sec. 117 of the amended MMPA requires that stock assessment reports include descriptions of fisheries that interact with (i.e., kill or seriously injure) marine mammals, and these descriptions must contain "an analysis stating whether such level is insignificant and is approaching a zero mortality and serious injury rate." As a working definition for the Reports, this analysis should be based on whether the total mortality for a stock in all commercial fisheries with which it interacts is less than 10% of the calculated PBR for that stock. The following wording is recommended:

"The total fishery mortality and serious injury for this stock is (or is not) less than 10% of the calculated PBR and, therefore, can (or cannot) be considered to be insignificant and approaching a zero mortality and serious injury rate."

Status of Stocks

This section of the Reports should present a summary of 4 types of "status" of the stock: (1) current legal designation under the MMPA and ESA, (2) status relative to OSP (within OSP, below OSP, or unknown), (3) designation of strategic or non-strategic, and (4) a summary of trends in abundance and mortality. Authors should synthesize descriptions of levels of uncertainties in the Report sections on Stock Definition and Geographic Range, Elements of the PBR Formula, Population Trend, and Annual Human-Caused Mortality and Serious Injury, including an evaluation of the consequences of these uncertainties on the assessment of the stock's status.

Stocks that have evidence suggesting at least a 50% decline, either based on previous abundance estimates or historical abundance estimated by back-calculation, should be noted in the Status of Stocks section as likely to be below OSP. The choice of 50% does not mean that OSP is at 50% of historical numbers, but rather that a population below this level would be below OSP with high probability. Similarly, a stock that has increased back to levels pre-dating the known decline may be within OSP; however, additional analyses may determine a population is within OSP prior to reaching historical levels.

The MMPA requires a determination of a stock's status as being either strategic or non-strategic and does not specify a category of unknown. If abundance or human-related mortality levels are truly unknown (or if the fishery-related mortality level is only available from logbook data),

some judgment will be required to make this determination. If the human-caused mortality is believed to be small relative to the stock size based on the best scientific judgment, the stock could be considered as non-strategic. If human-caused mortality is likely to be significant relative to stock size (e.g., greater than the annual production increment) the stock could be considered as strategic. Likewise, trend monitoring can help inform the process of determining strategic status. In cases where information on sources of human-caused mortality and serious injury is insufficient to make a determination that "the level of human-caused mortality and serious injury is not likely to cause the stock to be reduced below its optimum sustainable population" [MMPA Section 117 (a) (5) (A)], the status of the stock should be categorized as strategic in accordance with Section 117 (a) (5) (B). For example, if sample sizes from scientific observer programs are too small to overcome small-sample bias in mortality estimation relative to PBR (see Technical Details), then mortality estimates of zero would not constitute sufficient information for determining a stock to be non-strategic.

The MMPA has a definition of a strategic stock as one "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 of 1973 [16U.S.C. 1531 et seq.] within the foreseeable future" (Sec 3 (19)(B)). Under this definition, a stock shall be designated as strategic if it is declining and has a greater than 50% probability of a continuing decline of at least 5% per year. Such a decline, if not stopped, would result in a 50% decline in 15 years and would likely lead to the stock being listed as threatened. The estimate of trend should be based on data spanning at least 8 years. Alternative thresholds for decline rates and duration, as well as alternative data criteria, may also be used if sufficient rationale is provided to indicate that the decline is likely to result in the stock being listed as threatened within the foreseeable future. Stocks that have been designated as strategic due to a population decline may be designated as non-strategic if the decline is stopped and the stock is not otherwise strategic.

The MMPA requires for strategic stocks a consideration of other factors that may be causing a decline or impeding recovery of the stock, including effects on marine mammal habitat and prey, or other lethal or non-lethal factors. Therefore, such issues should be summarized in the Status section for all strategic stocks. If substantial issues regarding the habitat of the stock are important, a separate section titled "Habitat Issues" should be used. If data exist that indicate a problem, they should be summarized and included in the Report. If there are no known habitat issues or other factors causing a decline or impeding recovery, this should be stated in the Status section.