

## **Appendix I: Report of the Joint Scientific Review Group Meeting, 12-13 October 1994, Seattle, Washington**

This Appendix was prepared by the Office of Protected Species, National Marine Fisheries Service, Silver Spring, Maryland.

The three regional Scientific Review Groups (SRGs) constituted under the 1994 Amendments to the Marine Mammal Protection Act (MMPA) held their first joint meeting 12-13 October 1994 at the Alaska Fisheries Science Center in Seattle, Washington. The purpose of this first joint meeting was to: (1) organize each group; (2) review the advisory role of each group as mandated by the 1994 Amendments; and (3) to review and obtain the groups' comments on the National Marine Fisheries Services' (NMFS) proposed process for calculating Potential Biological Removals (PBRs) for all marine mammal stocks in U.S. waters.

### **Group Organization**

The following Spokesperson were appointed by each group:

Atlantic SRG - Andy Read, Woods Hole Oceanographic Institute  
Pacific SRG - John Heyning, Los Angeles Natural History Museum  
Alaska SRG - Lloyd Lowry, Alaska Department of Fish and Game

Each SRG agreed to schedule meetings to review the draft stock assessment reports for marine mammals stocks in their region. These meetings will take place as follows:

The Atlantic SRG on 4-6 January 1995 in Woods Hole;  
The Alaska SRG on 12-13 December 1994 in Anchorage; and,  
The Pacific SRG on 13-15 December 1994 in La Jolla.

The SRG agreed to get comments on the draft reports to the NMFS and the Fish and Wildlife Service (FWS) by mid-January 1995 so that the final Stock Assessment Reports can be completed by late February 1995.

### **Proposed PBR Process**

Scientists from the National Marine Mammal Laboratory and the Southwest Fisheries Science Center prepared and presented background on the development of the PBR process formulated at the PBR workshop held by the NMFS last June in La Jolla, California. Each SRG then met separately to discuss and formulate recommendations on the proposed PBR process. Their individual reports are attached (see Attachments 1-3).

## **General Comments**

All SRGs believed that the proposed PBR process was well founded and reasonably conservative so as to provide minimum risk to marine mammal stocks that are subject to removals by commercial fishing or other causes. Concern was expressed that the process may fail (i.e., identify stocks as strategic when they actually are not) when data are inadequate to determine population abundance. They recommended that, where appropriate, the PBR process should remain flexible so as to be able to consider additional information, including alternatives to abundance estimates such as population indices, on specific stocks in specific regions. Several suggestions were made to further improve the PBR process and these are summarized below.

## **Stock Identification**

The SRGs supported the proposal that stocks should be defined as the smallest units that are supported by genetic and/or other biological evidence, and at minimum, should be defined as the populations within the geographic area in which taking occurs. The SRGs suggested that before either lumping small units or splitting larger units reliable statistical and/or biological information should be required. SRGs noted that reasonable biological evidence could be a sufficient standard in appropriate cases rather than strictly requiring a specified level of statistical power as the single deciding factor for lumping or for splitting stocks.

### **$N_{\text{best}}$**

The SRGs recognized that all population estimates are subject to some degree of uncertainty, and even absolute counts cannot be assumed to include 100% of a population. In this regard, they recommended that species-regional specific correction factors (or multipliers) should be developed for "best" estimates of population size, and that abundance estimates should always include some indication of the portion of the known range of the stock to which the estimate applies.

### **$N_{\text{min}}$**

All the SRGs agreed that the use of 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) for calculation of PBR was well founded scientifically, reflected the uncertainty in the estimation of abundance by being tied to the CV of the estimate, and is appropriately conservative.

## 5-year Population Phase Out

The original PBR proposal recommended that if population abundance information were 5 years or older, that the population estimate used in the PBR calculation should be reduced 20% (of the initial minimum abundance estimate) per year such that the estimate was zero after five years. The intent here was to ensure that PBR levels are based on recent (reliable) abundance estimates and to encourage assessments of populations on a regular (nor greater than 5 years) schedule.

SRGs believed that the concept of being more conservative where assessment information is old and unreliable was appropriate; however, ratcheting down abundance estimates according to some arbitrary schedule was not scientifically acceptable. SRGs recommended in general that if a ratchet were used, it should apply to the recovery factor rather than the abundance estimate, and it should be based on some rational approach. In an individual session, the Alaska SRG recommended that when abundance estimates are >5 years old, the  $N_{\min}$  should default to "Unknown" and the corresponding PBR should be "Unknown". If there is a known or suspected fishery mortality that could be biologically significant (i.e., likely to significantly decrease recovery time or maintain a stock below its OSP range), the stock should be strategic. However, if the only human-induced mortality is subsistence harvest which in and of itself may not be biologically significant, another rule should apply. For example, if there is no evidence (including Traditional Environmental Knowledge) that the affected stock is below OSP, then the stock should be designated nonstrategic. If there is evidence that the stock is below OSP, it should be designated strategic.

### $R_{\max}$

The PBR proposal suggested that default values for  $R_{\max}$  of 0.04 for cetaceans and 0.12 for pinnipeds ( $0.5 \times R_{\max} = 0.02$  and  $0.06$ , respectively) be used to calculate PBRs except when estimates of net productivity based on observations were available.

The SRGs agreed that the defaults were reasonable for populations where no information exists on net productivity, but because different populations of the same species could have different net productivity rates, actual measurements of population trend are preferred. They agreed that additional research should be directed at obtaining observed estimates of population trend for marine mammal stocks of high priority. For populations that are known to be declining, the positive value for  $R_{\max}$  should be offset by reduction of the Recover Factor (see below).

## **Recovery Factor**

The PBR proposal recommended that the Recovery Factor ( $F_r$ ) should range from 1.0 for stocks within their Optimal Sustainable Population (OSP) range, to 0.65 for cetacean and 0.50 for pinniped stocks that are below OSP and/or threatened, and 0.1 for endangered stocks. For stocks that are known to be within OSP or known to be increasing in the presence of takes greater than the calculated PBR the  $F_r$  could have higher values up to and including 1.0. These values were based on the results of a series of robustness trials that considered plausible bias in the estimates of abundance, mortality and values for one-half  $R_{max}$  such that any stock would be maintained within OSP with 95% probability, and that stocks starting at the lower bound of OSP would remain within OSP range after 20 years with 95% probability.

SRG members supported the intent of using the  $F_r$  to compensate for uncertainty and possible unknown estimation errors, and to accommodate additional information and allow for management discretion as appropriate and consistent with the goals of the MMPA. However, the SRGs were concerned that the use of fixed values for the  $F_r$  could result in major "jumps" in the value of PBR and that this could have drastic effects on commercial fishing and other users. For example, the allowable PBR for threatened Steller sea lions could be reduced by 80% if that stock were listed as endangered without any scientific evidence to support such a reduction in allowable take.

The SRGs recommended that the  $F_r$  should be "tuned" to a specific value for each stock based on all available information on that stock and an expanded series of robustness trials. A NMFS scientist explained that additional robustness trials undertaken since the June PBR workshop suggested that the recovery factor for depleted, threatened, or unknown-status cetacean stocks is more appropriately 0.5 rather than 0.65. After some discussion, SRG members agreed that in the absence of evidence to the contrary the default value of 0.5 should be used for cetaceans.

## **Takes Other Than by Commercial Fisheries**

In their initial PBR proposal, NMFS proposed that stocks for which no information on status is available should be classified as "strategic stocks". The SRGs believed that there was no basis for such a determination and recommended that stocks for which there is no status information should not categorically be listed as strategic particularly if those stocks support subsistence takes. If there is a known or suspected fishery mortality, the stock should be strategic, however, if the only human-induced mortality is a subsistence harvest, another rule should apply. For example, if there is no evidence (including Traditional Environmental Knowledge) that the affected stock is below OSP, then the stock should not be designated strategic. If there is evidence that the stock is below OSP, it should be designated strategic. In all cases where stock status is unknown, the SRGs agreed that surveys, or other

appropriate biological research programs, should be conducted to evaluate stock status in relation to OSP.

### **Zero Mortality Rate Goal**

The PBR proposal stated that if the total fisheries related mortality was less than a small portion (10%) of the calculated PBR for a stock, the ZMRG would have been achieved. The SRGs could not reach consensus on this definition. Some believed that fisheries related mortality of less than 10% of the PBR would be an insignificant mortality rate. Others believed that while 10% of a small number may be insignificant, 10% of a large number could not be assumed to be negligible. This issue will likely require development of a government policy on criteria for attaining the ZMRG.

### **Further Research**

The SRGs recommended that additional research should be directed at:

- (1) The use of alternative population models for calculating PBRs and for robustness trials.
- (2) Incorporate stochastic and age/sex variables into the PBR calculations.
- (3) Explore the potential effects of presumed single-species harvests on multi-species populations (e.g., beaked whales).

## **Appendix II: Report of the Atlantic Scientific Review Group Meeting, 12-13 October 1994, Seattle, Washington**

Atlantic Review Group members present included: Odell, MacKinnon, Wells, Mead, Harris, Read, Brault, and DeAlteris.

Read was elected spokesperson, with Odell serving as deputy spokesperson. We agreed to meet next in Woods Hole, MA between 04-06 January 1995.

### **General Comments**

Overall, Atlantic SRG members were comfortable with the PBR approach, particularly with the flexibility of recovery factors, for example allowing an increase in the Recovery Factor if stocks are shown to be increasing when the total PBR is being taken.

PBRs are not useful for endangered species or very small populations. Presumably, these will be managed separately under the ESA through recovery plans, etc.

In keeping with the philosophy of the MMPA, we would like to attempt to identify, wherever possible, factors other than direct or indirect takes, such as exploitation of prey stocks, habitat destruction, etc. that might affect the dynamics of these populations.

We need consistency among the SARs in how information is presented. For example, both observed kills and estimated total kills are presented in the current Federal Register notice without distinction. This also pertains to survey data, so that clear specification is given as to how estimates were generated, the type of survey used, type of expansion factor, etc.

$N_{\min}$

Atlantic SRG members found the use of  $N_{\min}$  to be reasonable and conservative.

In some cases, complete census data are available and these should be used whenever possible.

Correction factors should be applied uniformly and should have associated measures of error. Where no correction factors are available, research should be directed towards obtaining them. Some consideration needs to be given in what constitutes "an updated minimum population estimate." Factors other than CV need to be considered, such as the area covered by the survey and survey methodology used.

Frequent surveys should be conducted for strategic stocks and the use of weighted averages of these time series of estimates could provide more precise and unbiased estimates of abundance.

### **$R_{\max}$**

The default values used in the PBR workshop report were acceptable to the Atlantic SRG. Whenever possible, however, empirical measures of  $R_{\max}$  should be used in place of these default values. We recommend measuring  $R_{\max}$  from small or depleted stocks through a series of annual surveys, whenever such an opportunity arises (e.g. depleted population of coastal Tursiops in mid-Atlantic).

### **Recovery Factors**

The default values for cetaceans should be changed, so that 95% of the robustness trial populations achieve OSP within 100 years, for example (three of seven bias trials do not currently achieve this goal).

### **Robustness Trials**

The Atlantic SRG members felt that the results of these trials provided clear evidence of the utility of the PBR approach and the robustness of the model in the face of potential bias and imprecision.

The base model is deterministic and it would be useful to explore the effects of stochasticity on the simulation trials. Stochastic effects could increase the amount of time stocks take to recover to OSP levels or remove stocks from the OSP range (e.g. Tursiops die-offs).

The effect of the shape parameter on recovery time should be explored and possible relationships between this parameter and stochastic effects should be examined.

The effects of age and sex structure on the dynamics of these models should be investigated.

Multiplicative effects should be considered in the formulation of these models. It is difficult to imagine a situation in which all biases are operating in the same direction, but such potential effects should not be overlooked. Currently all biases are evaluated independently.

## **Zero Mortality Rate Goal**

The proposed level (10% of PBR) appears to be arbitrary and is not tied to a well-defined goal or criterion. There was uneasiness among some members of the Atlantic SRG that the use of a biological criterion did not reflect the intent of the Act.

Research needs to be conducted to evaluate what constitutes "an insignificant take approaching zero" in biological terms, perhaps utilizing existing model structures.

The potential exists for important effects on social structure from small numbers of removals from certain social systems. Even limited removals can have important effects on the dynamics of the more social marine mammals (e.g. coastal Tursiops, pilot, killer and sperm whales). Such factors should be considered when evaluating ZMRG.

## **Stock Structure**

In general, the Atlantic SRG agreed with the strategy of using the smallest stock unit possible. This approach seems conservative and safe.

An additional tool for evaluating stock structure (not mentioned in the PBR Workshop report) is knowledge of the ranging patterns of individuals.

Multi-stock problems, which include multispecies complexes (e.g. Mesoplodon, Globicephala) need to be addressed in more detail, including examining the effects of takes of a single species from an abundance estimate generated from several species. Further research is required on the identification of such species at sea and in fishery kills.

Care should be taken when coalescing fine units of stock structure into larger units. Evidence from several sources (e.g. life history, genetics, morphology, behavior) should be required before such units are lumped.

Several stocks occur only at the margin of their range in the U.S. Atlantic EEZ, such as harp and hooded seals and white-beaked dolphins. We believe that U.S. fisheries takes of these stocks may be insignificant at the population level. Estimated PBRs on the proportion of animals in U.S. waters might be problematic (especially if estimates of cumulative stock and takes are not available over the entire range of the population).

This issue needs substantially more discussion from various interest groups, perhaps in the form of a workshop.



### **Appendix III: Report of the Alaska Scientific Review Group Meeting, 12-13 October 1994, Seattle, Washington**

Members present: Jim Branson, Joe Blum, Carl Hild, Sue Hills, Brendan Kelly, Denby Lloyd, Lloyd Lowry, Elizabeth Mathews, Caleb Pungowiyi (12 October only), Jan Straley, and Kate Wynne.

All those who had been asked by the National Marine Fisheries Service to be members of the Alaska Regional Scientific Review Group (SRG) were present. Caleb Pungowiyi explained that he would not be able to attend the second day of the meeting because he had to give a presentation at the Alaska Federation of Natives meeting in Anchorage. The SRG appointed Lloyd Lowry to act as chairman (spokesperson) by unanimous consent.

The group understood that the principal reasons NMFS called the meeting were to get recommendations from the SRGs on the methods that had been used to calculate Potential Biological Removal (PBR) levels for marine mammals stocks in the draft Stock Assessment Reports (SARs), and for the SRGs to decide how they will provide detailed review of the draft SARs. The Alaska SRG also included assessment of human takes and methods for designating strategic stocks in their discussions.

The SRG discussed each of the components of the PBR calculations and how they were used in the SARs. It was recognized that in some cases the approach used was tightly constrained by language provided in the 1994 amendments to the Marine Mammal Protection Act (MMPA), while in other cases MMPA language provided NMFS with substantial flexibility. To the extent possible, the group restricted its recommendations to areas where NMFS had latitude, but there was some discussion about problems that could result from inflexibility in interpretations of the law. With regard to the latter point, the group noted that there are a number of Alaskan species for which there is no evidence of significant conservation problems, and for which it would be very difficult (and expensive) to collect all the data necessary to do a strict numerical assessment of PBR relative to human takes. It would be inadvisable to divert funding from known conservation problems to situations of this type solely to gather data to prove that stocks are non-strategic using the PBR methods.

#### **Stock Identification**

The SRG agreed with the need for management to be based on stock units that are meaningful genetically and in relation to areas where takes are occurring. They were unsure that the policy described in the PBR, which required relatively little evidence for splitting stocks but statistically significant evidence for lumping, was entirely appropriate. The SRG recommended that wherever possible statistical testing (including considerations of statistical power) should be used both for lumping and splitting of stocks. When stock divisions are based principally on the area of takes, consideration should be given to the resolution of

available information on areas of take in relation to known or suspected genetic isolation. The group noted that the policy described in the PBR report and its references was not applied uniformly to Alaska species in the draft SARs, and it was decided that further comments on the stock identity issue would be made during the review of the individual SARs.

### $N_{\text{best}}$

The group discussed several issues relating to estimation of population size. First it was felt that the "best estimate" of population size should attempt to account for all of the animals actually in the population. The need to be conservative should be taken care of in calculation of  $N_{\text{min}}$  or by application of a recovery factor. There was concern that in many cases what was being presented in SARs as  $N_{\text{best}}$  is actually a very substantial underestimate. One significant source of underestimation is the failure to account for animals that are not visible (i.e., underwater or not on haulouts) during counts or surveys. The SRG recommended that where possible correction factors should be applied to adjust population estimates and reduce this negative bias.

While it would be ideal to be able to use survey specific correction factors (and associated CVs), the group thought that if such data were not available other relevant information (e.g., studies of the same species at a comparable haulout and during comparable seasons) should be evaluated and used if appropriate. Similarly, if survey or count data do not cover the entire range of the stock, extrapolations to estimate numbers likely to occur in uncounted areas would be appropriate. Where it is not possible to develop a numerical estimate of the number of animals missed during surveys, the SARs should provide a discussion of the adequacy of the data and some indication of the degree by which  $N_{\text{best}}$  underestimates the actual population size.

The group discussed the recommendation in the PBR report that after five years without a population estimate the value of  $N_{\text{best}}$  used to calculate PBR should be reduced by 20% per year. While it was evident that this could provide powerful incentive for producing population estimates at intervals of less than every five years, the group agreed that there was no scientific basis for taking such an approach. While there have been some relatively rapid stock declines documented for marine mammals, the likelihood of a stock's abundance actually declining to zero over such a time frame is very remote. Stocks might also stay stable or increase over periods of 5-10 years. Furthermore, applying such a policy would force NMFS to produce total population estimates for a great number of stocks for the sole purpose of being able to calculate a PBR. In many cases, attempting to estimate total population size at regular intervals is likely to be a very expensive and inefficient way to monitor population status.

The group made two recommendations on how to deal with situations where the data on population size is or becomes too old to be entirely reliable. In cases where no population estimate has been produced in the past 10 years (or the data that has been collected is obviously insufficient to estimate  $N_{\text{best}}$ ), previously published population estimates should be reviewed and summarized in the SARs.

The  $N_{\text{best}}$  for those stocks should be indicated as not available. In cases where recent population size estimates are available, NMFS should either repeat surveys at intervals of five years or less, or implement a program that will allow for monitoring of population status/trend (e.g., using counts at selected sites, sampling of biological parameters, information collected from subsistence hunters, etc.). If five years after the initial survey there has not been another adequate survey, or trend monitoring sufficient to show that the population has either stayed stable or increased, then the  $N_{\text{best}}$  for that stock should be considered as not available.

### $N_{\text{min}}$

The SRG agreed that the PBR workshop recommendation to use the 20th percentile of the distribution of estimates of  $N_{\text{best}}$  was appropriate, and satisfies MMPA guidance to be conservative in the estimation of population size.

### $R_{\text{max}}$

The group agreed that in many cases it would be necessary to use default values to estimate the maximum reproductive rate for stocks, and that the default values proposed in the PBR report should suffice for most pinnipeds and cetaceans. However, some Alaskan species (e.g., polar bear, walrus, and sea otters) have life history traits that may make use of default values inappropriate. In that regard, the proposed requirement to prove that an empirically derived measurement for a particular stock differs significantly from the default could be inappropriate and prevent use of the best scientific data available. The SRG recommended that stock-specific estimates of  $R_{\text{max}}$  should be used where they are derived from adequate scientific research programs (e.g., published in peer-reviewed articles or accepted by review groups such as the Scientific Committee of the International Whaling Commission).

## **Recovery Factors**

The SRG recognized that use of recovery factors is an area where NMFS was given considerable latitude in the MMPA amendments. The group thought that the proposed recovery factors for stocks within OSP (1.0); stocks declared depleted, threatened, or of unknown status (0.5); and endangered stocks (0.1) were generally reasonable. However, the

official listing status of a stock may not in all cases adequately reflect its population status and the degree of threat that it faces. The SRG recommended that NMFS maintain some latitude to modify  $F_r$  based on explicit information about particular stocks, and not institute a system in which the only option for change is an abrupt switch in categories.

### **Takes by Humans**

The Alaska SRG recognized the unique situation in Alaska where marine mammal stocks are subject to both taking by fisheries and taking for subsistence by Alaska Natives. Concern was expressed that the SARs focussed only on those direct takes and gave little or no attention to other possible human impacts such as habitat degradation. The group thought that the data given on fishery takes in the SARs was not sufficient to assess the likely magnitude of taking, and they requested a more complete presentation of which fisheries were likely to take from each stock, whether those fisheries had been subject to logbook or observer programs, and what take and effort data had been collected on takes in observed/logbook fisheries. With regard to collecting data on fishery takes, the group recommended that when NMFS prepares to modify the current lists of fisheries that take mammals the draft and final regulatory proposals should go through the consultative process with the SRGs.

### **Zero Mortality Rate Goal**

The SRG discussed the PBR report proposal for evaluating whether or not the Zero Mortality Rate Goal (ZMRG) has been met. The group agreed that the NMFS proposal is reasonable as it defines a rate of taking that is biologically insignificant in that it is very unlikely to deplete an OSP stock or to significantly impede recovery of a depleted stock. For assessing takes in relation to the ZMRG or PBR, the group recommended that recent data (i.e., an average over the past five years) should be used, but recognized that this might need to be modified based on stock-specific considerations.

### **Identification of Strategic Stocks**

The group understood that when stocks are officially listed as endangered, threatened, or depleted NMFS has no option other than to classify them as strategic. For all other stocks NMFS has some latitude depending on how they assess whether the stock meets the definition of non-strategic given in section 117(a)(5)(A) (i.e., "has a level of human-caused mortality and serious injury that is not likely to cause the stock to be reduced below its optimum sustainable population"). This is particularly an issue for stocks where old data indicate that populations are quite large and the only taking has been a moderate level of subsistence harvest.

The group felt very strongly that it is inappropriate to use a PBR approach that incorporates obviously incorrect data and assumptions and arrive at the conclusion that such a stock is "strategic." They recommended that stocks for which there is no significant fisheries take and that are taken principally for subsistence should be classified as non-strategic unless there is some reason to think that the stock is below OSP or will decline to below OSP. A variety of sources of information (e.g., trends in catch rates and biological parameters measured from harvested animals) could be evaluated to assess whether or not recent takes are likely to have had any impact on stock size or status. If the PBR method is used to categorize stocks used primarily for subsistence as strategic, then funding should be provided to gather adequate data on population size and take levels.

## **Conclusions**

The Alaska SRG felt that NMFS has generally done a good job of defining parameters involved in calculating PBR, and in compiling and presenting information in the stock assessments that were released for public review. However, the group thought that for their purposes the SARs should be more complete and detailed, especially in the sections that describe and evaluate data on population sizes and fishery takes.

The SRG thought that the PBR method for assessing stocks is straightforward when good data are available on population abundance and takes by humans, and that it is probably an appropriate technique to use in those cases. However for many Alaskan stocks, comparing PBR to human takes is not the best method to use. For some stocks no new data were collected during the 1988-1993 interim exemption period, and collecting the data necessary for PBR calculations in the future would be very difficult and expensive. In some cases it will be virtually impossible to gather the data necessary for accurately estimating total population size, and alternative indices will have to be pursued. NMFS needs to maintain the flexibility to use a variety of methods for evaluating and monitoring status of stocks in Alaska.

The Alaska SRG felt strongly that the intent of Congress in designing sections 117 and 118 of the MMPA was to institute a regime for identifying situations where commercial fishing is having an impact on marine mammal populations, and to provide a mechanism for reducing fishery takes in those situations. Because in Alaska marine mammals are an important subsistence resource, and because little research has been done recently on some of the subsistence-harvested species, a number of Alaskan stocks have been inappropriately proposed to have a strategic designation. NMFS needs to adapt the process it is using to evaluate non-strategic versus strategic stocks in order to clearly focus attention on situations where marine mammal populations are having problems due to interactions with commercial fisheries.

The Alaska SRG agreed to hold a meeting on 12-13 December 1994 in Anchorage to conduct detailed reviews of the Stock Assessment Reports for Alaska species. Individual SRG members volunteered to begin gathering and evaluating the data available for specific stocks in order to facilitate the SAR review at the meeting.

## **Appendix IV: Report of the Pacific Scientific Review Group Meeting, 12-13 October 1994, Seattle, Washington**

In general, the Pacific SRG supported the PBR concept. The defaults are conservative, yet the scheme is flexible enough that it provides the incentive for cooperation between industry and government to collect better information. The SRG offered the following comments and suggestions for further analyses to support the concept.

### **Mortality Estimates**

The group recommended that NMFS test the robustness of the model when the assumption that mortality estimates are collected annually is violated. Given the large amount of resources required for surveys and observer programs, the group was concerned that not all fisheries may be monitored annually. The group wanted to emphasize the importance of well-designed observer programs and recommended that the design of the observer programs be reviewed by the SRGs.

### **Recovery Factors**

The group stressed the need to establish guidelines for changing the  $F_r$  from the default settings in a consistent manner. Three situations were recommended for inclusion into the model:

- (1) Allowing the  $F_r$  to be adjusted for age- or sex-bias of the take to prevent damage to the population due to over-harvesting of females or of reproductively and socially mature animals. [During the plenary session, Dr. DeMaster pointed out that it would be easy to account for sex bias in the management scheme by establishing  $0.5 \times \text{PBR}$  as an additional limit to the number of females that could be taken. He argued that accounting for age-class bias is much more difficult to incorporate into the model. Recognizing that not every potential bias can be solved by the PBR model, it still should be recognized that populations may contain certain classes of animals whose removal may harm the population out of proportion to their numbers. Where appropriate, such factors should be incorporated into management schemes.]
- (2) Because the  $F_r$  is designed to provide a margin of safety when the mortality estimate may be underestimated, the group suggested that  $F_r$  be increased when the mortality is known with more certainty. This would provide an additional incentive for industries to participate in, and perhaps help fund, government observer programs. Some parameters that could be used as criteria are the percentages of observer coverage for the fisheries involved, or the CV of the mortality estimate when the effort is known with certainty.

(3) When population growth is in excess of that predicted by the model, the  $F_r$  could be adjusted accordingly .

### **"Aging" of Abundance Estimates:**

The group supported the idea that abundance estimates become less reliable with age, and that a correction factor should be incorporated into the model. The group was concerned at the arbitrariness of the proposed discounting of  $N_{min}$  by 20% annually after survey data are five years old. The group suggested that NMFS explore other correction factors that could have a more biological basis. One suggestion was to use the maximum rate of decline observed over a five-year period for a marine mammal as an indication of how much a five-year-old estimate could be in error if the population was decreasing in numbers.

The group suggested that NMFS consider similar discounting of mortality estimates that are not current as well.

### **Zero Mortality Rate Goal**

The group suggested that the  $0.1 * PBR$  default could be retained as a conservative default for the ZMRG, recognizing that this is an attempt to define a mortality rate that is biologically insignificant rather than numerically insignificant. Others will likely disagree with this approach, arguing that the "approaching zero mortality rate" and "small numbers" terms used by Congress meant approaching absolute zero. Given the vagueness of the language in the MMPA, however, the SRG accepted the working definition of the PBR Workshop for the ZMRG.

### **Stock Definition**

The group agreed with the proposed approach for defining stocks. It was cautioned against splitting stocks too finely such that the surveys would produce abundance estimates with high CVs.

### **Treaty Rights**

The Pacific group will be dealing issues arising from the treaty rights of Northwest Indian tribes. Most of the members of the group do not have the background to evaluate the legal basis for the treaty rights to hunt marine mammals. The extent of these treaty rights and the potential for a native non-subsistence take for commercial sale should be evaluated and summarized for the group by the NMFS or appropriate agency.



## **General Comments**

The group was concerned about how human-caused mortality from causes other than fisheries would be incorporated into the PBR (e.g. oil spills). A mechanism for subtracting such mortality from the PBR should be considered.

The group suggested that stock assessments for endangered species include a statement in the section on PBR that the take may not be as high as the PBR because the Endangered Species Act would likely take precedence over the MMPA.

The group was also concerned about distinguishing natural declines in the population, due, for example, to El Niño events or overshooting the carrying capacity, from human-related causes that would normally trigger action by the NMFS. Of particular concern was that surveys may coincide with short-term natural mortality events and that the PBR would perhaps be affected for several years until the next survey.

It was recommended that NMFS appoint a liaison that would monitor the discussions of all of the SRGs to promote consistency amongst the groups. The liaison could also attend each group's meetings so that all groups could be aware of the activities and decisions of the others. This would be particularly useful for groups that will be reviewing assessments of the same species.

The Pacific SRG agreed to hold its next meeting 13-15 December 1994 in La Jolla, California.