

RESPONSES TO COMMENTS ON DRAFT REVISED STELLER SEA LION (SSL) RECOVERY PLAN

This document contains the responses to comments received on the May 2007 version of the draft revised Steller sea lion Recovery Plan. The base document was the summary of comments on the May 2007 draft prepared by URS Corporation in October 2007.

Comments from the public (as summarized by URS) are in BLUE:
NMML-NMFS responses are in BLACK, and start with “**Response:**”.

Full citations for the references are available in the Final Revised Steller Sea Lion Recovery Plan.

Background

The draft revised Steller sea lion Recovery Plan (May 2007 version) was released for public comment on May 21, 2007 (72 FR 28473), with the comment period closing on August 20, 2007. NMFS received 8,058 letters of comment. Comments were provided by a wide range of interested parties: members of the fishing industry, non-governmental organizations (NGOs), members of academia, the public, and other interested parties. In response to two solicitations, from NMFS and the North Pacific Fishery Management Council (NPFMC), peer review comments were received from the Center for Independent Experts and from scientific experts commissioned by the North Pacific Research Board, at the request of the NPFMC. The peer review comments are also addressed in this document.

All submissions were carefully reviewed and the main substantive concerns summarized. The following section presents the summaries of the concerns expressed in each letter. The comments are grouped by category, organized based on the same structure used in the response to comments prepared by NMFS for comments on the 2006 Draft Recovery Plan to facilitate comparison. Substantive comments are summarized in this format. Comments that simply reiterate Plan content or provide general comments for or against the Plan have not been included here.

To the extent feasible in this document, NMFS has identified the corresponding change made in the final Recovery Plan. In some cases, the change is very specific and is usually identified as such. In other cases, the comment may have addressed a more global issue to which NMFS has responded more globally in the Plan text. The general treatment of the topic is explained in this document. For those comments with which NMFS disagrees, we have stated our position and rationale for that disagreement.

RESPONSES TO COMMENTS

Population Structure

Comment: Based on the current evidence it seems likely that the SSL population is really one contiguous metapopulation with clines in genetic diversity through the long coastal range. The evidence for the separation of the wDPS from the eDPS is very weak and undermines the fundamental basis for the ESA classification. NMFS should revisit this classification of the population structure and reexamine their management strategy and legal obligations for SSLs under the ESA.

NMFS should expand the discussion of alternative classifications to the current legal structure of two distinct populations (i.e. metapopulation, substructure within the eDPS, a distinct Asian population) and include criteria for how such population structure determinations would be made. The SSLRP should explore what these different classifications would mean in terms of ESA status, management, and recovery.

The SSLRP should explore in depth the current data and reasons for the division of eastern and western DPSs. It appears that there is considerable intermixing of these populations and they may be more appropriately considered one stock.

Response: NMFS acknowledges that there are many different ways (e.g., 3 DPSs, 40+ rookeries) that the Steller sea lion could be managed. However, recent genetic information from analyses of mitochondrial and nuclear DNA generally supports the two DPS structure NMFS currently recognizes. Geographical clusters or individual rookeries, representative of a metapopulation structure, could have formed the basis of recovery units (and management actions), but this assumes a level of knowledge regarding movement between units that currently does not exist. The Plan recognizes that not all parts of the western and eastern DPS are recovering or responding in the same way or at the same rates. As part of a status determination or a post delisting monitoring plan, NMFS will collect information on status and trend throughout the range of each DPS, and determine whether it meets the criteria for a change in listing status.

The stock structure currently recognized by NMFS (eastern and western DPSs separated at 144°W) is based on analyses of mitochondrial DNA (mtDNA), a marker passed on to offspring only by the mother. Bickham *et al.* (1996; 1998) and Ream (2002) reported that there was a distinct break in the distribution of mtDNA haplotypes between sea lion pups sampled on rookeries in the western part of the range (Russia to the eastern Gulf of Alaska) and eastern locations (Southeast Alaska and Oregon), indicating restricted gene flow between these two populations for a long time (thousands of years) prior to sample collection. Results of subsequent samples taken throughout the Steller sea lion range, including additional samples from rookeries in Asia, generally confirm the strong east/west population delineation, but also indicate that there is additional structure within the western DPS (Trujillo *et al.* 2004, Baker *et al.* 2005, NMFS unpublished data). Baker *et al.* (2005) hypothesize that a third population may exist just west of the Commander Islands in Russia. However, they point out that this line is not nearly as robust as the previous split between the eastern and western DPSs. Similarly, other research points to a genetic break at Samalga Pass in the Aleutian Islands within the western DPS (O'Correy-Crow *et al.* 2006). Trujillo *et al.* (2004) examined mtDNA and nuclear DNA (which is contributed by both parents) and found that the population separation apparent from the mtDNA work was not as clearly defined when males were taken into account. There was not a clear separation of populations based on genetics when markers

from both parents were included. They suggested that the difference was either due to a faster population divergence at the mtDNA locus or that, like many other mammals, Steller sea lions show a greater level of male-mediated gene flow via immigration than in females, e.g. males tend to disperse more than females and do not show the same philopatry for their natal areas as females. In addition, it appears that the boundary between western and eastern female populations may be blurring (Pitcher *et al.* submitted 2007, NMFS unpublished). Of the two most recently established rookeries in the eastern DPS, about 70% of the pups born on Graves Rock and about 45% of the pups born at White Sisters were from western DPS females (Gelatt *et al.* *in press*). This has potential long term implications regarding the management of these populations, but it appears that we have witnessed an infrequent event (in the last several thousand years) in which female sea lions from one DPS breed and give birth within the range of another.

A Status Review of the eastern and western DPSs of Steller sea lions would address more specifically the genetic distinctions in these populations and make any determination as to potential revisions to stock structure.

Population Status and Trends

Comment: In the section concerning pup versus non-pup surveys, there needs to be some background to explain the history of population surveys. Why are counts of non-pups a priority when pup counts should be more accurate and give more information on vital rates?

Response: NMFS added the following text to Section I.C. Background, Overview of Population Status, to address this comment and question.

While time series counts of pups and non-pups are available to assess population status and trend, non-pup counts have been used most often. This is because non-pup counts have been obtained across broad areas of the range (e.g., all of the western stock in Alaska) in a single year using aerial surveys, and more years of such data exist. By contrast, an assessment of pup production across such a broad area used to take 2-3 years to complete. Consequently, even though a time series of annual pup production estimates could provide more information on sea lion vital rates, it has not been possible to obtain these data on a consistent, range-wide basis until 2005 with the advent of high resolution medium format photographic aerial surveys.

Comment: Place-names referred to in the text should be present in the figures; e.g. Samalga Pass, Kenai-Kiska regions all appear to be significant place names or geographic regions, yet they are not readily discerned in the figures.

Response: NMFS redrafted Figure I-1, adding place names where appropriate, and removed reference to 'Asian Stock'.

Comment: Regarding marine habitat use (section F2), it is unclear how extensive the data set on foraging actually is (i.e. numbers of seals tracked, breakdown of gender, age and location). It would be helpful to be more explicit in this section.

Response: NMFS feels that the level of detail within the Plan is sufficient to support the statements made. If the reader wants more information, he/she is referred to the primary literature.

Comment: The trend analyses described in the background (p. 21) were conducted using linear regression of natural logs of the counts. There have been some recent improvements in the analysis of population trends using General Additive Models (GAMS) (DeLittle, Bradshaw *et al.* 2007; Van den Hoff, Burton *et al.* 2007) which should be explored.

Response: NMFS will explore the use of other models to determine trends in sea lion populations. However, all trend estimates obtained using simple log-linear models are similar to those estimated to date using more complex modeling techniques (see Pascual and Adkison 1994; York 1996; Gerber and von Blaricom 2001; Holmes and York 2003; Fay and Punt 2006; Winship and Trites 2006; Goodman 2006 (PVA in recovery plan); Holmes *et al.* 2007).

Comment: Throughout the document (e.g. p. 23), estimates of stocks and population sizes are presented without their associated errors. It is not clear if this was because none had been calculated, or whether they were left out for the sake of brevity. Inclusion of error estimates would be immensely helpful.

Response: Non-pup numbers used for population trend assessment are sums of counts at sites within sub-areas or across the range of the western stock in Alaska. Replicate surveys conducted in 1992 and 1994 confirmed NMFS understanding of sea lion haul-out behavior patterns. The number of sea lions on individual haul-outs can vary considerably from day to day, while numbers on rookeries tend to be more stable. However, if surveys are conducted in mid-June during the height of the breeding season, the sum of counts at all consistently surveyed sites within a sub-area has a much lower variance than the counts at any individual site. This is due to movement between sites within the same sub-area. Coefficients of variation associated with sub-area non-pup totals range between 5-15% (NMFS, unpublished). NMFS designed a monitoring plan using the established survey techniques to estimate the impact of the fishery management measures (Reasonable and Prudent Alternative) proposed in the 2000 Biological Opinion, and determined that there was greater than 90% chance of detecting a 1% per year change in population size over 8 years (4 surveys) (NMFS 2000).

Western DPS Status

Comment: Greater reference to age and seasonal differences in diving and movement and availability of prey and distribution of predators would have resulted in a more valuable characterization of marine habitat.

Response: NMFS agrees with this statement, but there is limited information upon which to make characterization of marine habitats on finer scales than described in the Plan or in the referenced literature.

Comment: Some sections split the wDPS into Russian and/or Asian regions, and the differentiation is unclear. There is some confusion/inconsistency with reference to Russian and/or Asian rookeries and populations. Fig 1-1 is unclear in delineating anything except eastern and western DPS. A clear and unambiguous figure detailing stocks is needed.

Response: NMFS currently recognizes only two distinct population segments (DPSs) of Steller sea lion, western and eastern. Steller sea lions born on rookeries in Russia are part of the western DPS. The only Steller sea lion rookeries in Asia are in Russia. Sea lions range as far south as Japan along the Asian coast. NMFS removed the trend counts of 'Asian Stock' sea lions from Fig. I-1.

Comment: It is difficult to justify listing the wDPS as an "endangered" population. There is strong

evidence that several pinniped populations have recovered from population levels that are two orders of magnitude lower than the SSL population. In addition, there is uncertainty about the meaning of "extinction". The PVA assumes extinction to have occurred at a population size of 4,743 sea lions. There is plenty of evidence showing that several populations of pinnipeds that are now healthy were once reduced to much lower levels than this. Conversely, relatively few have gone extinct.

Response: The Steller sea lion was initially listed as threatened under the ESA in 1990 based on the steep rate of decline observed in the 1980s and not on the absolute population level. The decline was as steep as virtually any population of pinniped has experienced. If this rate of decline had continued, there was a high likelihood of extinction for the western DPS within 50 years; hence it's endangered listing. Australian sea lions have maintained a stable, but small population for some time, but have not experienced the rapid decline (15% per year) that Steller sea lions did in the 1980s. While other endangered pinniped populations have recovered from even lower numbers (e.g., the northern elephant seal), it is NMFS' mission to prevent near-extinctions when possible.

Comment: The raw population data placed within the PVA model suggest that the current balance of birth and death rates makes the population unsustainable. But the gross evidence from the population trajectory does not support this view. The data from population surveys are likely to be more robust than modeling efforts and are therefore more believable.

Response: If this comment is referring to the Goodman PVA model in the Recovery Plan Appendix, this model does not estimate birth and death rates of the population. Goodman's PVA randomly chooses potential population growth rates from a distribution of possible growth rates based on our understanding of the magnitude of threats in the past and present, and predicting what they may be in the future. Population trends from surveys conducted between 1985 and 2007 are consistent with the results of Pendleton *et al.* (2006) and Holmes *et al.* (2007): the slowing of the rate of decline from -15% per year from 1985-89 to -5% per year from 1990-2000 is consistent with improvements in both juvenile and adult survival. The 2-3% per year increase in non-pups between 2000 and 2004 was likely due to continued improvements in survivorship, since pup counts showed no rebound. Non-pup counts obtained since 2004, while not complete across the range of the western stock, suggest that the population was stable or declining slightly between 2004 and 2007. Since the late 1990s, numbers on haul-outs (juveniles and non-reproductive adults) have decreased while numbers on rookeries (primarily reproductive-age adults) have increased. This result, along with relatively stable pup counts, is consistent with the estimated (Holmes *et al.* 2007) decline in birth rates since an increasing number of reproductively competent animals (on rookeries) have not produced more pups (evidenced in subsequent years by the declining numbers on haul-outs despite improvements in juvenile survival). Models are used to estimate vital rates changes that are consistent with counts obtained during population surveys, but it is the surveys that provide the primary metric (non-pup counts on trend sites) for determining population trend and status relative to the recovery criteria.

Comment: The SSLRP makes an inadequate presentation regarding the positive population growth and improved health of the wDPS since 2000. Numerous recent studies indicate there are no signs of current nutritional stress and no differences between the wDPS and eDPS with regard to milk composition, maternal attendance patterns, or foraging success of females in the summer.

Response: The simultaneous lack of overt signs of nutritional stress and only modest (if at all) recovery in the western DPS are the reasons why there remains such a high level of uncertainty about the factors affecting the population. It is true that most comparative studies performed to date have found no

evidence to support the claim that the western DPS sea lions are experiencing more nutritional stress than those in the eastern DPS. This serves to raise the level of uncertainty as to why the western population declined and has not recovered.

Feeding Ecology

Comment: Despite the estimated increase in juvenile and adult survival, evidence for continued low birth rates through 2004 in the central Gulf of Alaska suggests that many females are still unable to obtain adequate nutrition to successfully support pregnancy. The Plan appropriately concludes that the balance of evidence does not support the junk-food hypothesis as the mechanism leading to chronic nutritional stress in the western SSL DPS.

Response: NMFS agrees with this comment.

Comment: Data on energetic demands should be addressed separately from discussion of the validity of the "junk food hypothesis". Use of the term "junk food" in reference to nutritional studies is confusing and should be discontinued.

Pg. 40. "Energetic Demands: Rejection of the Junk Food Hypothesis". This subsection title draws a premature conclusion that is not supported by the text that follows. Pages 40-43 attempt to reject a dated hypothesis using incorrect or misleading information. The title of this section should be removed and the text modified.

The revisions made to the SSLRP contain a considerable number of factual errors and misrepresentation of information pertaining to nutritional research. The use of "nutritional stress" needs to be clearly distinguished regarding whether it is caused by quantity or quality of prey, as well as its effects on adult and juvenile sea lions. As currently written, the term nutritional stress takes on multiple meanings.

There is very little evidence to support the idea that there is nutritional stress in the wDPS population as a causal factor in the population dynamics. Nutritional stress, even if it could be hypothetically related to competition from fisheries, is not a basis for targeting the fisheries as a factor significantly affecting the species from this point forward.

Evidence for nutritional stress is very weak and should be dismissed. NMFS has unfairly pushed this hypothesis in the face of contrary evidence. The section describing nutritional stress says more about current internal agendas in NMFS than about what we actually know about the influence of nutritional stress on Steller sea lions.

Response: NMFS used the term 'junk food' because proponents coined this phrase as short-hand for the hypothesis that walleye pollock, which has a lower energy density than some other sea lion prey species, is nutritionally insufficient for sea lions, particularly juveniles, independent of the costs associated with obtaining it. NMFS recognizes that nutritional stress could result from changes in prey quality, distribution or abundance which in turn could result from natural or anthropogenic factors. Hypotheses proposing natural causes of changes in prey quality, distribution and abundance have centered primarily on the issue of prey quality: regime shifts caused changes in prey community composition and sea lion diet which led to greater consumption of low energy fish (e.g., gadids) and less high energy fish (e.g., 'oily' fishes such as Pacific herring). Trites *et al.* (2007) concluded that eating a diet composed of more low energy fish was the primary cause of a 15% per year decline in Steller sea lions in the 1980s, a lesser rate of decline in the 1990s, and stability in the 2000s following regime shifts in 1977, 1989, and

1998/99. NMFS disagrees with the prey quality part of this argument. Based on the information in Fritz and Hinckley (2005), presentations by D. Rosen (University of British Columbia) to the Steller Sea Lion Mitigation Committee, and results of experiments in which pollock was fed to transient juvenile and older sea lions at the Alaska SeaLife Center, NMFS believes evidence indicates that there is no “junk food”. Consequently, even if the prey community changed from ‘high-energy’ to ‘low-energy’ species, NMFS concluded that this change alone (absent changes in distribution and abundance) was unlikely to be the primary driver of the population trajectory observed since the mid-1970s. NMFS has decoupled ‘junk food’ from the regime shift (e.g., environmental variation)-‘junk food’- nutritional stress hypothesis due to lack of evidence that low energy prey by themselves cannot sustain a sea lion, juvenile or adult. Natural environmental changes could be involved in changes in prey distribution or abundance that may have contributed to the decline and lack of significant recovery, hence the use of the phrase ‘Potentially High’ to describe the level of threat associated with environmental variability to the recovery of Steller sea lions. NMFS also concluded that competitive effects of fisheries could contribute to natural changes in prey distribution and abundance to create the current conditions which may be causing chronic nutritional stress in sea lions. What is not known is the relative contribution of natural and anthropogenic factors to the apparent nutritional stress of Steller sea lions.

NMFS has made some revisions to the text on nutritional stress to address any inaccuracies that may have occurred in the draft revised Plan.

Conservation Measures

Comment: Changes in near-shore fisheries management must comply with applicable laws and to do so would require further environmental analyses, permits, such as a section 10(a)(1)(B) incidental take permit, and the completion of additional plans, such as a habitat conservation plan.

Response: NMFS agrees with this statement.

Comment: Current mitigation measures, which do not seem to discriminate among population segments, might be modified to give priority protection to segments of the population most important to increasing the population trend, such as breeding females, while mitigation measures that don't protect these segments might be reduced. It is recognized that any changes will need to be supported by the appropriate ESA Section 7 analyses.

Response: The current groundfish fishery-Steller sea lion management measures are designed to work in concert to minimize the likelihood of negative interactions. They are based, in part, on the distribution of at-sea locations of animals instrumented with satellite tags, most of which were juveniles under the age of 2. NMFS agrees that any changes to the current suite of management measures will require consultation pursuant to ESA Section 7.

Comment: Concerning marine area/aquatic foraging zones/critical habitat, there needs to be some clear and unambiguous description to what these areas are, why they were selected, when they were enacted, and what they were designed to achieve relative to conservation measures introduced to protect the species.

Response: A description of Steller sea lion critical habitat and the rationale for its designation can be found at 50 CFR 226:202, which is available on-line at: <http://alaskafisheries.noaa.gov/protectedresources/stellers/habitat.htm>. Critical habitat is defined in the

ESA as “the specific areas within the geographical area occupied by the species, at the time it is listed..., on which are found those physical or biological features essential to the conservation of the species and which may require special management considerations or protection.” Areas defined as critical habitat, particularly those areas within 20 nautical miles of designated rookeries and major haul-outs, formed the basis for the suite of time-area management measures enacted in 2002.

Comment: The arguments that conservation measures implemented since the late 1990's have provided greater protection for SSL critical habitat are not convincing. There is no time series of conservation measures that can be correlated, in a statistical sense, with the rate of change of the western DPS. The SSLRP should say that the conservation measures "coincided" with changes in the rate of change of the western DPS, because there is no evidence that these conservation measures actually altered the impacts of commercial fishing on the availability of prey to SSL.

Response: In general, NMFS agrees with this comment. While there is no independent evidence that measures enacted since the late 1990s directly led to the change in population trajectory, the two events occurred at about the same time.

Comment: The management actions taken during the 1990s to reduce anthropogenic effects (e.g. shooting harassment and incidental take) may have had a significant effect on the rate of decline in the wDPS. This suggests that these factors should be rated much more highly as potential causal agents. However, from the detail provided in the Plan it was difficult to determine what these measures actually were or how they were implemented. This in turn made it difficult to assess how significant a role this played in reducing SSL mortalities.

Response: NMFS agrees that direct sources of anthropogenic mortality contributed significantly to the decline in the western DPS observed through the 1980s and that management actions taken at the time of the original listing (in 1990) likely played a significant role in reducing the rate of decline in the 1990s. These actions included a prohibition on shooting at or near a Steller sea lion, a reduction (by 50%) in the number of allowable lethal takes of Steller sea lions that were incidental to commercial fishing operations, and the creation of 3 nautical mile radius (seaward) no-entry zones around all rookeries west of 150°W. The Team and NMFS determined that direct anthropogenic factors are not likely to be significant threats to recovery in the future because of the management measures in place and an increased level of community awareness of the status of the species under the ESA. Considerable support for these determinations came from the estimated changes in juvenile and adult survival between 1975 and 2004 (York 1994; Holmes and York 2003; Pendleton *et al.* 2006; Holmes *et al.* 2007). The Plan does not rate the potential that each factor was involved in the decline, only as threats to recovery.

Comment: The methods that NMFS has used to identify critical habitat from telemetry data are unconvincing. Information using the latest telemetry technology should be used to reassess critical habitat areas.

Response: The Team was not asked to reevaluate the designation of critical habitat. In addition, NMFS does not consider a discussion of the relevance of the current critical habitat designation to be an appropriate part of this Plan. NMFS will maintain, and modify as needed, critical habitat designations under Recovery Action 2.1.

Comment: The section on conservation measures is organized by threat, which, while logical and consistent with the approach used in other portions of the Plan, does not allow a reader to sense the progression of protective measures that have been implemented over time. The section could be

improved by adding text and perhaps a table describing the temporal sequence of major actions taken to conserve/recover SSL (e.g., passage of the MMPA, initial ESA listing, approval of first Recovery Plan, critical habitat designation, ESA reclassification, co-management agreements, fishery management measures, etc.), and how each of them addressed threats known at that time.

The SSLRP presents substantial detail on the conservation measures that have been enacted to date with the glaring exception of fishery regulating measures. The SSLRP needs to present much more detail on past and current fishery management regulations so readers can understand what has been done to protect SSLs without having to find and read all the referenced documents.

Response: NMFS does not believe it is necessary for the Plan to contain a description of all management actions taken since the original ESA listing of Steller sea lions. Descriptions of these management actions are available within Environmental Impact Statements, Biological Opinions, and other documents available on-line at the NMFS Alaska Regional Office website:

<http://alaskafisheries.noaa.gov/protectedresources/stellers/protection.htm>.

Primarily, a recovery plan should do the following: 1) Delineate those aspects of the species' biology, life history, and threats that are pertinent to its endangerment and recovery; 2) Outline and justify a strategy to achieve recovery; 3) Identify the actions necessary to achieve recovery of the species; and 4) Identify goals and criteria by which to measure the species' achievement of recovery (NMFS 2007).

Comment: The sub-section on Incidental Take in Commercial Fishing provides estimates of the minimum number of animals taken in commercial fisheries, describes the Marine Mammal Observer Program, and lists the fisheries that have been observed. However, it does not, but should, indicate the frequency with which each fishery has been observed and the reliability of the data and extrapolations of number of animals taken. The section should also discuss which fisheries have not been observed, and how likely it is that they might be taking SSL.

Response: NMFS and the Team adequately evaluated the threat that incidental takes in commercial fisheries pose to the recovery of Steller sea lions.

Factors Potentially Influencing the Populations

Comment: A more even-handed treatment of killer whale predation is necessary, including fair discussion of alternative hypotheses for how killer whales may have in the past or are currently affecting the wDPS.

Response: NMFS modified the discussion of killer whales in the Plan, including a reassessment of the threat they pose to Steller sea lion recovery.

Comment: Include the following points in support of a "low" ranking: 1) Evaluation of competition with commercial fisheries requires an assessment of the degree of several dimensions of overlap. While fisheries and SSL consume some of the same prey, the mean depths differ, the mean sizes differ, and the 'mean' locations differ, in addition there are species that are a significant part of SSL diet that are harvested in insignificant amounts by fisheries. These differences all serve to limit the degree of overlap and thus the degree of competition. The degree of fisheries competition is a function of the degree of cumulative overlap in several dimensions. Even if SSL and fisheries forage at the exactly the same depths (which they do not), if they do so at substantially different locations based on horizontal (lat/long) coordinates, there is a limitation in the degree of overlap via the interaction of the vertical

dimension with the horizontal dimension. Add the dimensions of time and sizes of prey, and the likelihood of head to head competition between fisheries and SSL is diminished if NMFS were ever to undertake an analysis of the cumulative overlap in a multidimensional model.

Response: NMFS assumes that the comment and the ‘low’ ranking refer to the threat posed to the recovery of Steller sea lions by competition with commercial fisheries. NMFS understands and has considered the ‘dimensions’ of potential competition listed. However, NMFS disagrees that comparison of mean depth, mean size of prey, and ‘mean’ location of fisheries and sea lions reveal the extent to which the two may compete. For instance, sea lions forage primarily at night when some prey are often distributed higher in the water column; fishery catches during the day at depths generally greater than those utilized by sea lions could reduce their foraging efficiency at shallower depths at night. With respect to size of prey, comparison of means alone can be misleading (Fritz *et al.* 1995; NMFS 2000; 2003), while additional research (Tollit *et al.* 2004; Zeppelin *et al.* 2004; Gudmundson *et al.* 2006) has shown the extent to which many of our sea lion diet characterization methods may be underestimating the size of ingested fish. An adequate model of fishing and sea lions designed to assess the magnitude of ‘head to head’ competition is likely more complicated than the cumulative ‘overlap’ estimated by multiplying the percentage ‘overlaps’ along each singular dimension.

Comment: NMFS should conduct more research on killer whale population dynamics in the North Pacific, and convene one or more workshops to discuss and resolve issues with assessment of effects of transient killer whales on the wSSL and how killer whales may affect recovery of the wSSL. A broad spectrum of scientists who hold various views on the issue of killer whale effects on SSLs should be included in this process.

Response: NMFS and other research institutions are currently conducting research on killer whale diet, stock structure, population dynamics, movements, distribution and behavior. Two workshops and meetings have been held in recent years to discuss killer whales and their potential impact. In April 2005, the Marine Mammal Commission convened a workshop to discuss the diet and dynamics of transient killer whales, and the extent to which they could have contributed to declines in pinnipeds and sea otters in the North Pacific Ocean. Their report is due in 2008. In addition, Kenney (2007) recently reviewed the book, “Whales, Whaling, and Ocean Ecosystems” (2006. Estes *et al.* (editors), University of California Press, 402 p.), which contains the proceedings of a symposium (held in 2003) whose ‘aim was “to examine the ecological roles of whales, past and present, from the broadest set of viewpoints possible”; the sequential megafaunal collapse hypothesis (Springer *et al.* 2003) comprised a major, if not the central, theme.’ Kenney concludes that between the time of the symposium and the publication of the book, “science has caught up with the sequential megafaunal collapse hypothesis. More recently published papers have pointed out several weaknesses in the hypothesis, such as the finding that killer whales are not important predators of great whales, with the exception of gray whale calves and minke whales; that there is a mismatch in the timing of the major pulse of whaling in the northern North Pacific and the observed declines in pinnipeds and sea otters; and that there have not been similar declines in Dall’s porpoise and other small cetaceans that are known to be killer whale prey. The same symposium held today would probably result in different and more balanced conclusions.”

Comment: NMFS should revise the SSLRP to address concerns about a biased presentation against fishery impacts and insufficient consideration of competing hypotheses regarding the decline of SSLs and their failure to recover (i.e. climate change and killer whale predation). The SSLRP seems to be making the case that chronic nutritional stress is limiting population growth when the evidence does not exist.

Response: The Plan states that there is considerable uncertainty about the threats posed by fisheries, environmental variability and killer whales to the recovery of Steller sea lions. This was a conclusion reached by the Team as well as NMFS. Chronic nutritional stress, which may be evidenced by the slow decline in natality rates, could result from both fisheries and environmental variability and currently, there is no method to determine the relative magnitude of each factor. The Plan contains considerable discussion of competing hypotheses and the independent review panels formed by the North Pacific Research Board and the Council of Independent Experts determined, for the most part, that the information presented in the Plan adequately described all sides of existing debates regarding each hypothesis.

Comment: Part of the case for ranking fisheries as a "high" threat rests on an assumption of a linear reduction of carrying capacity as result of the effects of a F40 harvest strategy reducing the biomass of some SSL prey species. First, it is uncertain whether such a response would be linear given that not all prey species are commercially harvested. Second, to the degree that a linear response is plausible, this should result in a change in carrying capacity. Given global control rules and the various mitigation elements in fisheries as currently managed, the threat is that the carrying capacity has shifted to something like current population levels. A shift in carrying capacity to a population level between 40,000-50,000 animals is very different from extinction.

Response: This comment appears to state that fisheries and environmental variability have contributed to a decline in carrying capacity for Steller sea lions, hypotheses that the Plan acknowledges are possible but about which there is considerable uncertainty. The Team and NMFS explored this scenario in the PVA, which accounted for the possibility that competitive effects of fishing may have changed the ecosystem but are largely mitigated by measures enacted in 2002. However, if fisheries have lowered sea lion carrying capacity and natural (i.e., less subject to mitigation) threats such as killer whale predation and environmental variability have some likelihood of causing a decline in the future similar to what some have argued occurred in the 1980s, the PVA (including the 1985-89 period of rapid decline) showed that a Steller sea lion population of only 50,000 animals would have a high probability of quasi-extinction. Given the uncertainty regarding the effects of fisheries, killer whales and environmental variability in both the past and the future, NMFS and the Team were unable to conclude that Steller sea lions have equilibrated to a new, 80% lower carrying capacity, and that the factors which contributed to this new lower level would not reoccur in the future. It is for this reason that the threats of environmental variability, competitive effects of fishing and killer whales are ranked potentially high (reflecting the considerable uncertainty in our understanding of them) and the recovery criteria are conservative.

Comment: Pg. 42. par. 2. NMFS cites unpublished data to support its position but does not provide enough information about the data to allow an independent assessment of its validity or whether NMFS has drawn the correct conclusion.

Response: The citation for this unpublished work conducted on transient juvenile Steller sea lions should be Calkins *et al.* 2005b; D. Calkins in prep.). Relevant information was presented to the Team by ASLC staff scientists. There is no published report, but information on the results of juvenile transient feeding studies is available through the ASLC and in the abstract cited below. A manuscript is in preparation for publication (D. Calkins personal communication). A brief summary of the findings is provided in the Plan.

Calkins, D., J. Mellish, S. Atkinson and D. Hennen. 2005b. Does consuming pollock truly have negative impacts on free-ranging Steller sea lions? Abstract, 16th Biennial Conference of The Society for Marine Mammalogy, 12-16 December 2005, San Diego, CA.

Comment: Pg. 42. Par. 3. "Therefore, instead of pollock being bad for sea lions (Alverson 1992), gadids are likely to have been an important component of a healthy sea lion diet for decades (Calkins *et al.* 2005, Fritz and Hinkley 2005)." This sentence is misleading and should be deleted.

Response: NMFS has edited the statement to now read: "Therefore, gadids are likely to have been an important component of a healthy sea lion diet for decades (Calkins *et al.* 2005a,b, Fritz and Hinkley 2005)."

Comment: Pg. 42. Par. 3. The assumption that reduced natality rates, derived from a simulation model for the Central Gulf, are due to nutritional stress is highly speculative and not supported by the available data.

Response: NMFS does not assume that reductions in natality rates are necessarily due to nutritional stress. NMFS and Holmes *et al.* (2007) considered two factors besides nutritional stress as potential contributors to reduced birth rates: contaminants and disease. In addition, the Plan considers nutritional stress as potentially a result of competition with fisheries and environmental variability. NMFS and the Team evaluated the evidence for contaminants and disease as major threats to recovery (and as contributors to reduced birth rates) and determined that their current threat levels were Medium and Low, respectively.

Comment: The Draft Revised Plan fails to analyze well the relative importance, going forward, of the historical causes of the SSL decline. That failure makes it extremely difficult to focus on the current and prospective conditions that are likely most relevant to the survival and recovery of the species.

Response: NMFS disagrees with this statement. The Team and NMFS assessed each threat to Steller sea lions and analyzed their roles as singular or cumulative contributors to the decline by looking at all available data and information. In addition, the Team and NMFS evaluated the magnitude of each factor as a threat to recovery. Independent reviewers in general agreed that NMFS conducted a thorough evaluation of threats – past, present and future.

Comment: The findings of the FIT studies on cod, Pollock (two separate GOA studies), and Atka mackerel (several separate studies of how fishing affects mackerel abundance at Seguam and other areas) need to be incorporated into the assessment of fisheries as a potential factor affecting SSL.

The treatment of localized depletion within the fisheries competition section is grossly unbalanced and ignores important scientific information collected through field studies by NMFS' own Fisheries Interaction Team (FIT) over the last four years. Instead the RP presents the findings from a set of depletion models studies (e.g. Fritz and Brown) where Leslie depletion model equations (closed system models) were used to theorize about fisheries creating large holes in the prey field. The FIT studies which are not mentioned in this section of the RP, however, have not confirmed these theoretical findings in terms of degree of localized prey removal. The FIT field work has in some cases not even found a statistically significant effect of fisheries removals on the local prey field.

The Unimak Pass cod fishery study is an example of the relevant empirical work (even if it does not support the RP's take on fisheries competition as a threat) that needs to be cited so the reader can contrast it to the Fritz and Brown theoretical fish down modeling exercise.

The Draft Revised Plan should summarize and discuss recent field work on localized depletion in the final recovery plan. The Draft Revised Plan ignores important work accomplished by NMFS' Fisheries Interaction Team (FIT) whose research in the past several years has focused explicitly on how fisheries may affect the prey field for SSLs.

The agency should give higher priority to field studies such as those developed by the Fisheries Interaction Team. One field study indicating that trawl fisheries did not cause localized depletion of cod (Connors *et al.* 2004) was discredited in the SSLRP in favor of a modeling exercise (Fritz and Brown 2005). This persistent preference for modeling exercises over actual field tests of localized depletion should be re-evaluated.

Response: The text of the Plan has been revised to address this issue and to better explain the FIT studies. In the plan, we now explain that, beginning in 1999, NMFS has conducted a series of investigations of fishery effects on local fish populations. These studies, commonly called the FIT studies (after the NMFS Fishery Interaction Team that conducted them), were conducted on Atka mackerel on several local populations in the Aleutian Islands, Pacific cod on the spawning aggregation north of Unimak Pass, and pollock in neighboring gullies south of Kodiak Island.

- 1) Atka mackerel: Tagging studies conducted by NMFS since 1999 show large concentrations of fish at Seguam and Kiska, and smaller concentrations at Tanaga and Amchitka. These results are similar to those of Lowe and Fritz (1997), who analyzed changes in in-season fishery catch per unit effort to estimate initial biomass and fishery harvest rates. The trawl exclusion zone around Seguam Island may meet its objective because of a natural separation of suitable habitat for Atka mackerel inside and outside of the zone. By contrast, other trawl exclusion zones (e.g., near Amchitka Pass) may be less effective because the zone bisects habitat allowing fish inside to be vulnerable to fishing outside. NMFS concluded that the results of these tagging studies (e.g., McDermott *et al.* 2005) support the initial rationale for Atka mackerel fishery management: that the Atka mackerel fishery could create localized depletions of fish within sea lion critical habitat, and management measures (e.g., exclusion zones, time and area allocations of TAC) are necessary to address these effects and allow for sea lion recovery.
- 2) Pacific cod: There are two significant differences between the FIT field study conducted by NMFS (Connors *et al.* 2004; Connors *et al.* in press) near Unimak Pass and the analyses of fishery and survey data presented by Fritz and Brown (2005). First, the spatial scale (area surveyed) of the FIT study was smaller than that of the data analyzed by Fritz and Brown (2005), which was similar in scale to the cod aggregation being fished. In addition, the temporal scale of the FIT study (replicate surveys separated by several months) may have been too coarse to detect changes in cod density (whether related to the fishery or not) that could potentially affect the foraging efficiency of Steller sea lions. Second, the field experiment was designed to detect only one response to the fishery management measures enacted – the efficacy of the trawl exclusion zone around Cape Sarichef in isolating the effects of the fishery on prey populations outside from those inside. Finding no difference between the changes in the density of fish inside and outside before and after the fishery, Connors *et al.* concluded that the trawl exclusion zone had no effect and that there was no fishery related localized depletion. While the trawl exclusion zone around Cape Sarichef may be inappropriately scaled relative to the size and movement of the prey aggregation on the SE Bering Sea shelf, these field results do not show that there is no potential for localized depletion related to fishing that could affect foraging success of Steller sea lions. As noted by both Connors *et al.* and Fritz and Brown (2005), cod immigrate and emigrate from the aggregation north of Unimak Island during the winter. However, the much smaller study area considered by Connors *et al.* greatly increases the likelihood that fish movement

would affect their results. Fritz and Brown (2005) analyzed fishery effort in 2001 outside of the (large) cod spawning area and found no evidence that large numbers emigrated. Consequently, during a 1.5 month fishing period in 2001, cod abundance (as reflected by changes in fishery catch per unit effort) north of Unimak Island declined significantly and this apparently was not related to large-scale emigration. As Fritz and Brown (2005) note, this pattern may be different depending on the pattern of immigration, emigration, and fishing each year. Based on all the available evidence, it is not possible to definitively conclude that the fishery north of Unimak Island does not affect foraging efficiency of Steller sea lions within their critical habitat by reducing densities of Pacific cod during winter (when the frequency of occurrence of cod in their diet is the highest).

3) Pollock:

- a. NMFS conducted three controlled experiments to test the effects of a pollock fishery south of Kodiak Island on the abundance and distribution of pollock, a common prey item of Steller sea lions. The results of the first experiment suggested that the fishery had no effect, the second did not have enough fishing effort to make an assessment, and the third found that the post-fishery biomass in the fished area was lower and that prey schools were more fragmented than in unfished area.
- b. NMFS has also analyzed data on pollock density and distribution collected by fishing vessels in the winter in the SE Bering Sea. Barbeaux and Dorn (2003) found that the distribution of fishing effort on pollock north of Unimak Island did not always match the distribution of fish. This could lead to differences in fishing intensity in local areas. Shen *et al* (2007) found that there was less pollock biomass, more school fragmentation, and a more dispersed prey field at the end of the pollock winter fishing season than during the beginning in the SE Bering Sea. These changes could negatively affect Steller sea lion foraging efficiency.
- c. Based on these results, NMFS could not conclude that there was little or no potential for fishery effects on the availability of pollock (as prey) for Steller sea lions

Conners, M. E., P. Munro, and S. Neidetcher. 2004. Pacific cod pot studies 2002-2003. AFSC Processed Rep. 2004-04, 64 p + Appendix. Alaska Fish. Sci. Cent., Natl. Mar. Fish. Serv., NOAA, 7600 Sand Point Way NE, Seattle WA 98115.

Barbeaux, S. J., and M. W. Dorn. 2003. Spatial and temporal analysis of eastern Bering Sea echo integration-trawl survey and catch data of walleye pollock, *Theragra chalcogramma*, for 2001 and 2002. U.S. Dep. Commer., NOAA-TM-AFSC-136, 34 p.

Shen, H., T. J. Quinn II, V. Wespestad, M. W. Dorn, and M. Kookesh. 2007. Using EDSU to investigate the spatial structure of walleye pollock (*Theragra chalcogramma*) schools in the eastern Bering Sea. Abstract, Alaska Marine Science Symposium, 21-24 January 2007, Anchorage AK. http://doc.nprb.org/web/symposium/2007/Abstract%20book_2007.pdf

Comment: A balanced review of fishery effects should provide details about the findings of Loughlin and Merrick (1989), Ferrero and Fritz (1994), and Dillingham *et al.* (2006) rather than dismissing them. It should also explore and discuss the findings of Trites and Larkin (1992), Sampson (1996), Shima *et al.* (2000), Wolf and Mangel (2004), Wolf *et al.* (2006), and Guenette *et al.* (2006). Localized depletion studies have been conducted by NMFS on pollock, Pacific cod, and Atka mackerel. These studies have bearing on understanding the effects of fisheries on SSLs. Results of the studies undertaken by Libby

Loggerwell and colleagues should therefore be presented.

The fisheries competition section should be redrafted to present the available information in a more informative and balanced manner. The Recovery Plan's description of fisheries competition as a factor that may influence the recovery of the wDPS...presents only a narrow slice of the available scientific information, particularly the portion that suits NMFS' conclusion that fishing has a large effect on SSL. Overall we feel the draft RP builds a one-sided case that fisheries competition is a leading factor affecting sea lion recovery. This is done through "cherry-picking" the arguments starting with the perceived inadequacies of MSY management, the F40 harvest strategy, and single species catch quotas.

Response: NMFS believes the Plan presents the information on potential fishery effects fairly and in sufficient detail to conclude that fisheries pose a potentially high threat to the recovery of Steller sea lions. The information contained in the Plan also indicates that there is considerable uncertainty about this threat level designation, as there is regarding the threat of environmental variability. There is considerably more literature on fishery science, theory, and management than can possibly be reviewed within the Plan. NMFS is unaware of any study proving that fishing has no potential for competitive interactions with other piscivores. The objective of this section was to describe the various dimensions of possible competition between fisheries and sea lions from the scale of the ecosystem (where quotas are set using MSY or other single species management concepts) down to the specific areas fished and size-species of prey targeted.

Threats Assessment

Comment: The science in the plan is confusing and conflicting, particularly regarding the uncertainty of potential threats.

Response: NMFS has attempted to portray the science in the plan as clearly as possible. However, NMFS acknowledges that it can be difficult to untangle the potential effects of various threats and their potential interactions. It is for this reason that the Plan recognizes that there is 'high' uncertainty associated with four potential threats to recovery: environmental variability, competitive effects of fishing, killer whale predation, and contaminants (toxic substances). This uncertainty results directly from the complexity of the ecological systems being studied, the many human and natural factors that may be affecting that system, and the difficulties of studying a long-lived, widespread, and mobile marine mammal such as the Steller sea lion over such a large range.

Comment: The SSLRP provides a comprehensive assessment of what is known about potential threats to both the eastern and western populations of SSL. These threat assessments are subject to a great deal of uncertainty, which has profound effects on the ability to manage the recovery, and research to address these areas of uncertainty should be high priorities.

Response: NMFS agrees with this statement.

Western DPS Status

Comment: While it may be that the female reproductive rate is what is holding back the population, the causal factors simply remain unknown. In the face of such uncertainty, the conclusion that the fisheries threat is "potentially high," while a factor such as killer whale predation, which is subject to similar uncertainties, is discounted, is not understandable.

Response: NMFS agrees that our understanding of the factors responsible for the estimated chronic decline in birth rates of Steller sea lions in the wDPS is limited. However, there are only a few factors that could be responsible and are consistent with the available data, as discussed by Holmes *et al.* (2007): nutritional stress caused by changes in prey distribution or abundance related to environmental variability or competitive effects of fishing, disease or contaminants. The available information on the latter two factors does not support either as major contributors to a birth rate decline, but NMFS and other research partners will continue to do research in these areas. Sources of direct mortality, such as predation, would not cause the types of population responses that have been estimated to occur, particularly given the large decline in the population of wDPS Steller sea lions. However, given the level of uncertainty surrounding the threat that killer whale predation could have on a recovering population and the precautionary goal of NMFS, the killer whale threat has been modified to “potentially high” in the final version of the Plan. The vital rate changes estimated for the wDPS since the mid-1970s (based on population modeling, and supported by other field research) are consistent with those of a population responding to a bottom-up change, such as a change in its food supply. While this does not prove that this is true, NMFS has determined that it is the hypothesis that is currently best supported by the available data, a view also supported by peer reviewers.

Comment: Failure of recovery of the wDPS of SSL could be the result of synergy among multiple threats. Although there are references to combined effects in the threats-based criteria, there needs to be a clear statement requiring satisfaction that cumulative impacts of multiple smaller effects are not likely to recur despite minimizing individual threats.

Response: NMFS will analyze cumulative effects as it assesses progress toward achieving each of the listing factor criteria during the process of down- or de-listing.

Comment: Only if one assumes there is a potential for the repeal of a large portion of the core mitigation measures would it be reasonable to rank fishing as "potentially high." NMFS should differentiate between fisheries "as managed" and the potential of fisheries managed with substantially lower levels of SSL protection measures, in assigning a "potentially high" ranking.

Response: NMFS disagrees with this statement. NMFS concluded that the mitigation measures enacted in 2002 were necessary to avoid jeopardizing the continued existence of the Steller sea lion or the destruction or adverse modification of its critical habitat. As explained in the Plan, the measures were based on a ‘zonal approach’ in which near-shore portions of critical habitat were considered more important to foraging sea lions than offshore areas. Most of the telemetry data used in the analysis supporting the ‘zonal approach’ were collected from juvenile sea lions less than 2 years of age, many of which were likely not weaned. As a consequence, the foraging habitat of adult animals, particularly females, is underrepresented in the data used to construct the current suite of management measures. Information published subsequent to the development of the current measures, but presented to the Team, NMFS and reflected in the Plan, indicates that juvenile (and adult) survival has improved and that declines in birth rates may be the most important factor affecting recovery.

Comment: By sequentially eliminating or downgrading other hypotheses (e.g., killer whales, shooting, subsistence, climate change, trawl bycatch) as the sole cause of the decline, the drafters determine, by default, that the cause must be fishing. The analysis then concludes that any changes in fishing regulations from the status quo will "appreciably diminish" the chance for recovery of sea lions. This analysis is flawed; it is designed to reach a predetermined and incorrect conclusion, ignoring the wide range of factors that may have interacted to result in the decline of the SSL.

For fisheries to be ranked as a "high" threat, the mechanism of nutritional stress must be at play to such a degree that it has impacts at the population level. There is a paucity of evidence that this is the case. While it is reasonable to have taken precautionary measures, this has been done. As such, it is inappropriate to rank fisheries as they are currently managed as a "high" threat. Further NMFS now dismisses Killer Whale predation, which it estimates (pg.89) at 2500 animals (or even substantially more based on Paul Wade's presentation to the NPFMC) as a medium threat.

If nutritional stress is still considered to be a credible mechanism that is currently limiting SSL population growth, all the factors that may be contributing to a food shortage should be addressed evenly, including competition with fisheries, changing forage base due to climate change, or inter-specific competition (e.g. from whales and arrowtooth flounder). The SSLRP selectively dismisses many of the diet studies that would lend support to environmental causes of nutritional stress, implying that competition with fisheries is the only plausible threat to recovery of the wDPS.

NMFS conclusion that nutritional stress, caused by competition for prey with the fisheries, is the greatest threat to recovery effectively dismisses the conclusions of the National Research Council (2003), the nation's most prestigious science panel, which concluded that top-down predation rather than bottom-up nutritional stress was the more likely cause of the decline. It also contradicts the weight-of-evidence approach used by the Steller Sea Lion Recovery Team. In its assessment of evidence on nutritional stress and the elimination of killer whale predation as a Potentially High threat, the 2007 revised draft seems to depart from a reasonable weight-of-evidence approach.

Response: The Plan states that there is considerable uncertainty in our understanding of the factors affecting the wDPS, particularly with respect to the relative impact of environmental variability and fishing on prey availability. The wDPS in much of Alaska (western Aleutians may be the exception) is not responding like a population subjected to a high level of direct mortality (e.g., killer whales, shooting, subsistence harvest, incidental catch in fisheries). If one or more top-down threats were major impediments to recovery for the western DPS, continued low rates of juvenile and/or adult survivorship would be expected or observed, potentially with little or no change in natality, birth rates or condition. Current estimates of sea lion vital rates do not follow these expected trends. This evidence supports the conclusion that these top-down factors, in general, pose smaller threats to recovery than indirect, 'bottom-up' factors. NMFS had no pre-determined outcome and reached its conclusions through an analysis of the available information. In addition, see the responses under Feeding Ecology above. However, due to the controversy within the scientific and stakeholder communities on this issue, and in keeping with a precautionary approach to working toward the recovery of the Steller sea lion, NMFS has returned the classification of this threat to "Potentially High."

Comment: The Plan's review of the data on potential nutritional stress is thorough, balanced, and incorporates the most recent information available based on analyses and publications to the present time.

Response: NMFS agrees.

Comment: Clarify how threats assessment ratings were determined. Are threat assessment rankings influenced by how well they might be mitigated or not? Specific rankings were questioned (e.g. high threat from competition with fisheries, downgrading of killer whale predation, medium threat from toxicity).

Response: Each threat was assigned a rating that summarized its relative impact to recovery based on

the available information summarized in the Plan, the experience and knowledge of the individual Team members, and from information (some unpublished) presented to the Team and to NMFS by scientists, managers, and researchers. Threat assessment rankings were not influenced by the feasibility of mitigation, which was assessed separately.

Killer Whales

Comment: Estimates of transient killer whale numbers in the BSAI have recently doubled, indicating that they should be even more of a concern to recovery, not less, as implicated by the demotion of the killer whale threats assessment.

For the section on killer whales in the previous draft of the RP, NMFS estimated SSL takes using extrapolations based on the potential number of SSL that would be consumed if killer whales preyed on SSL for a high percentage of the diet. Now, NMFS appears confident that the Wade *et al.* field work which evaluated killer whale diet around a limited set of areas (primarily passes) now trumps the previous approach and should be used for essentially downgrading the killer whale predation threat across the board.

Given the scientific controversy on the issue of killer whale predation, and the lack of definitive data it is premature to downgrade the killer whale predation threat from "potentially high" as recommended by the Recovery Team to "medium" as recommended by NMFS staff. NMFS is urged to reinstate the threat as "potentially high" and follow the recommendation of the NPFMC for a scientific process to further evaluate this issue.

It is difficult to follow the logic applied for down-grading of the potential threat from killer whales. NMFS has systematically dismantled the killer whale hypothesis for reasons that are not completely clear and with arguments that verge on advocacy rather than objective assessments of evidence. The way in which killer whales have been dealt with is in stark contrast to the analysis of nutritional stress. Overall, the balance of evidence put forward as supporting nutritional stress is probably weaker than the balance of evidence supporting killer whale predation effects and yet the SSLRP comes to quite different conclusions about them as threats.

It may not be appropriate to extrapolate the results of the fatty acid diet analysis from the Gulf and Eastern Aleutian Islands killer whales to all areas affecting the wDPS. We also feel the Recovery Plan should present both the earlier extrapolations based on a higher fraction of the killer whale diet comprised of SSL and more recent diet analysis work on killer whales. The earlier estimates of potentially larger number of SSL removed by killer whales can serve as an upper bound, and more recent work can serve as a lower bound, but for the lower bound it should be noted that the data collected around passes may not represent other areas where oceanic passes and gray whale migrations occur.

The agency logic that killer whale predation is not a "potentially high" threat because predation induced mortalities are lower and total natural mortality does not make sense, unless one assumes that Killer Whale populations have tracked declines in SSL populations, and that the rate of predation as a percent of natural mortality has been constant. If, by contrast, the Killer Whale populations have been constant and the absolute numbers of SSL consumed have been constant (dismissing the Sequential Megafaunal Collapse hypothesis), then there may have been a fourfold increase in the fraction of natural mortality attributable to killer whales. However, "natural" killer whale predation may have been at higher SSL population levels, the agency has not presented any compelling logic dismissing the "predator pit"

scenario.

The potential for killer whale predation on SSL to have a considerable localized effect appears significant based on work that has been done on the "Kodiak Killers", and a large number of SSL flipper tags recovered found in a single killer whale stomach.

One of the major changes in the Draft Revised Plan from the Plan released in May 2006 is the downgrading of the threat assessment for killer whale predation from "potentially high" to "medium" (see the Draft Revised Plan, p. 114). The Plan states that "[m]ajor limitations in the available data result in substantial uncertainty," and, while the Recovery Team was unable to reach consensus, NMFS changed the ranking based upon "public review and comment and additional scientific data which was not available to the Team." *Id.* If the NMFS downgrading of the killer whale threat was based on the Maniscalco paper cited on p. 111 (but not listed in the literature list), the data in the paper was presumably available prior to the preparation of the May 2006 draft since one of its authors was on the Recovery Team. Yet NMFS ranked the killer whale threat as "high" in that earlier draft.

The Draft Revised Plan ignores another paper by Maniscalco *et al.* (2005) that found very high rates of SSL pup mortality due to killer whale predation. These observations of predation events, though not cited in the Recovery Plan, seem to support the agency's own conclusion on page 114 that killer whale predation "is perhaps the largest single source of SSL mortality." So why was the threat of killer whale predation reduced from potentially high to medium?

The Draft Revised Plan misrepresents recent results about killer whale predation by unfairly comparing the results of Maniscalco *et al.* (2007) and Williams *et al.* (2004) and coming to the erroneous conclusion that Williams *et al.* (2004) were wrong. These studies used different methods and were in very different areas. The results from one study site should not be extrapolated to other sites without corroborative studies because killer whales act differently in different places.

The Draft Revised Plan presents alternative calculations of killer whale energetics to Williams *et al.*, who found that a small number of killer whales specializing in SSL consumption, could explain the initial decline, and that an even smaller number could explain the depressed rate of recovery. The data presented by the Draft Revised Plan shows that a larger number of Killer whales with a small percent of SSL consumption in their diet are "perhaps the largest single source of Steller sea lion mortality (pg. 114) and represent "about a quarter of annual natural mortality" (pg. 89) which would equate to 2500 animals dying each year as a result of killer whale predation. It is illogical to then conclude that level of mortality is "probably not hindering mortality". It becomes even more illogical in light of the data presented to the SSC by Paul Wade showing estimates of killer whale predation equating to 40-80% of natural mortality.

The Draft Revised Plan, without substantial justification, relies upon an unreferenced paper by Maniscalco, *et al.*, to dismiss estimates of killer whale predation in an earlier paper, Williams, *et al.*, "Killer appetites: assessing the role of predators in ecological communities," *Ecology* 85(12): 3373-3384 (2004). If anything, the Williams findings would appear to be even more powerful today, since the latest transient killer whale population numbers show a population of about 314 animals. Draft Revised Plan, p. 84. This would appear to indicate that minimally only about 13% of the current transient killer whale population would be sufficient to explain the original decline -- almost double the size of the threat originally ranked as "potentially high."

The downgrading of the threat assessment for killer whale predation from potentially high to medium is

largely semantic because it remains a level 2 action priority and is not something NMFS can mitigate.

The Draft Revised Plan (at p. 88) appears to understate the impacts of killer whales discussed in the Williams *et al.* (2004) paper, by stating that a population of 170 transient killer whales could account for the decline of the western SSL distinct population segment ("DPS"). In fact, Williams *et al.* (2004) suggested that fewer than 27 male mammal-eating killer whales or 40 mammal-eating female killer whales could have caused the decline.

Response: NMFS changed the threat ranking of killer whales back to 'potentially high', a ranking that is identical to the ranking given this threat by the Team. NMFS also corrected the sections in the plan that referenced Williams *et al.* (2004). A number of papers on killer whale diet, distribution, and numbers, as well as several that dealt directly with the sequential megafaunal collapse hypothesis were published between 2005 and 2007 during the development of the 2006 and 2007 draft Plans. As a consequence, the body of scientific material that the Team had on which to base its conclusions was different than that used by NMFS in developing its draft Plans (see the response on page 10 under 'Factors affecting the population' regarding a killer whale workshop). For instance, Zerbini *et al.* (2006) estimated the number of transient killer whales in the range of the wDPS of Steller sea lion was larger than that used by Williams *et al.* (2004) in their model to estimate the number of sea lions that could be consumed by killer whales given certain diet and attendance assumptions. While the number of killer whales is larger, other research summarized within the Plan showed that sea lions comprise a smaller proportion of the killer whale diet and killer whales appear to spend less time within the range of the wDPS than assumed by Williams *et al.* (2004). Therefore, new information obtained since the Team made its assessment of the threat posed by killer whales was available to NMFS in the preparation of subsequent drafts and the final Plan. NMFS is also aware of the tags from 14 Steller sea lions found in the stomach of a stranded killer whale (Heise *et al.* 2003) as noted on page 84 of the previous draft and in the citations. Heise *et al.* (2003) also reported on the examination of the stomach contents of 11 other stranded transient killer whales, and found Steller sea lion remains in only 1 other animal (for a total proportion of 2 of 12 with Steller sea lion remains). They concluded that harbor seals "are likely a more important prey item for killer whales than are Steller sea lions," and "were the most commonly reported prey of killer whales in the northern hemisphere (JeVerson *et al.* 1991)." Information on killer whale predation suggests that it could be both a high threat to the recovery of Steller sea lions (e.g., Williams *et al.* 2004) and could simply represent natural levels of mortality and as such be a relatively low threat to recovery by itself (e.g., Heise *et al.* 2003; Herman *et al.* 2005; Krahn *et al.* 2007; the eastern DPS increasing at 3% per year while sharing its range with a robust transient population). Given this level of uncertainty as to how killer whale predation might affect a recovering population and NMFS precautionary objectives, NMFS (as did the Team) concluded that predation by transient killer whales represented a potentially high threat to the recovery of Steller sea lions.

Comment: Most of the threat assessment sections consist of a statement in favor of the relevant hypothesis followed by a series of comments that appear to contradict the opening statement. There seems to have been little success in achieving a consensus within the Recovery Team on each of these issues, and the reader is left to evaluate a series of contradictory opinions.

Response: The structure of the threat assessment, and the material within it, is a reflection of the uncertainty surrounding the effects that these factors may be having on Steller sea lion populations. The lack of consensus within the Team and the scientific community on the relative impact of environmental variability, competitive effects of fishing, competition with other species, contaminants, and other threats on recovery of sea lions is reflected within these sections. NMFS made threat assessments using

the best available information and a precautionary, weight of evidence approach.

Comment: NMFS has reduced the threat of predation by killer whales from high to medium, yet the relative amount of research continuing to be undertaken by NMFS and other research groups suggests otherwise. Research continuing on killer whales is significantly higher than all of the other medium threats combined. It therefore appears that researchers feel that killer whales continue to pose a high threat to the recovery of Steller sea lion.

Response: NMFS has modified the threat listing for killer whale predation back to “potentially high” and will continue to fund research (as funds allow) on killer whales under its dual mandate to recover endangered species (e.g., the Steller sea lion) and protect and manage marine mammals (e.g., killer whales under the MMPA). There remains considerable uncertainty about the stock structure, abundance, diet, and distribution of killer whales in the North Pacific. Research conducted in the last several years, while addressing many voids in our understanding, has also led to many new questions.

Comment: NMFS should address the uncertainty regarding the relative importance of fisheries and other factors in the decline of SSLs by extending the statistical framework studies begun by Wolf and Mangel to formally test for evidence of all the hypotheses simultaneously in all the data we have. We already have the data to do these analyses but we should be constructing them now and re-running them regularly to examine the emerging pattern. It may then be possible to modify management progressively based upon the emerging results. A fair test would be to provide 3-6 independent scientists/groups with a brief and the same data and ask each group to produce their own model structure independently. It is important to do this in order to eliminate model uncertainty through model averaging.

Response: NMFS agrees with this comment and will consider use of alternative models (e.g., Wolf and Mangel 2006) in future analyses.

Comment: On page 114, the Plan discusses the importance of inter-specific competition as a potential threat under the nutritional stress section. This needs to be considered in the same way as fisheries, i.e. at appropriate spatial and temporal scales.

Response: NMFS agrees with this comment. Inter-specific competition is likely to be greater in some areas than in others depending on the overlap in distribution and diet of Steller sea lions and their competitors.

Comment: Pg. 103. Par. 2. The Revised Recovery Plan cites only 3 of the 8 studies that explored the effects of fisheries on sea lions but failed to find a consistent relationship between fishery catches and changes in sea lion numbers. The premature dismissal of studies that failed to find a relationship between fishing and the decline of sea lions is in sharp contrast to the multiple citations of Hennen (2006), which was the only study that associated the decline of sea lions with changes in fishing. The Recovery Plan should note that the conclusions drawn by Hennen are confounded by oceanic regime shifts that occurred concurrent with the implementation of management actions.

Response: NMFS has amended the discussion of fisheries competition to address this and other comments. The effects of oceanic regime shifts, however, confound all studies (not just that of Hennen) that attempt to determine the relative magnitude of natural and anthropogenic factors on the population dynamics of Steller sea lions.

Comment: Reviewers expressed agreement with the conclusion that competition with fisheries and

environmental variability are the two highest ranking threats. However, each of these should be listed as "high" rather than "potentially high" as the concept of potential is inherent in something being a threat.

Response: While NMFS generally agrees with this statement, the use of the term 'potentially' was retained from the Team's original assessment of these threats to reflect the considerable uncertainty in our understanding of the threats.

Comment: Some of the threat assessment sections conclude with a subsection of "Data gaps" while others do not. The implication is that other sections that do not present data gaps have none. The format should be consistent.

Response: NMFS has attempted to address 'Data Gaps' and make the presentation of this material more consistent.

Comment: The conclusion that bottom-up threats are now more important to the western DPS than top-down ones (p. 119) is "in contrast to ... NRC (2003) which favored top-down controls as the primary factor". The Plan justifies this contradiction by saying that, "Much of the evidence considered here was not available to the NRC in 2002 ..." (p. 119). However, the main "new" evidence in support of the bottom-up approach comes from Holmes *et al.* (in press) and this is essentially an extension of the analysis in Holmes & York (2003), with broadly similar conclusions (that natality rates in the central Gulf of Alaska have continued to decline). This information was presented to the NRC by York so they were aware of these data. The question remains whether this evidence applies to a larger segment of the wDPS than the one rookery surveyed by Holmes *et al.*

The Draft Revised Plan places a lot of emphasis on the new paper by Holmes *et al.* (in press) to argue that birth rates of SSLs are depressed and that this is evidence for chronic nutritional stress. But that study was based on the absence of pups at one rookery from aerial photography. The video camera work from Chiswell Island shows that pups may be lost at an early age by waves washing them offshore and by killer whale predation. These types of mortality would not be seen by aerial photography and would therefore make the photographic results appear to show a lower birth rate rather than a high pup mortality rate. The Holmes paper may therefore have questionable conclusions. These results should not be extrapolated to the entire range of the wDPS because they reflect a localized condition that may not apply elsewhere.

Response: NMFS does not know the extent to which information on sea lion vital rates in Holmes and York (2003) was available to the NRC as it was preparing its report that was published in the same year. Holmes *et al.* (2007) modeled vital rate changes that were consistent with counts of pups and non-pups at 5 rookeries and multiple haul-outs within the central Gulf of Alaska. In addition, time trends of pup:nonpup ratios were similar at rookeries throughout the area from the eastern Aleutian Islands through the central Gulf of Alaska, which represents approximately half of the western DPS in Alaska. While the similarity in trends of pup:nonpup ratios does not prove that the same patterns of vital rate changes occurred, it suggests that the population throughout this area has responded similarly. The Chiswell Islands have shown a generally increasing population trend in recent years despite losing pups to storms. This is in contrast to rookeries in Western Alaska where the rookeries are well above the influence of storm waves yet the pup numbers have, in some cases, declined. The localized condition of the Chiswell Islands is worthy of further study but at this time NMFS has not seen compelling evidence that the scenario described by the comment also exists in the areas of greatest decline.

Comment: The current level of uncertainty regarding the alternative hypotheses for the SSL decline is so

large that NMFS cannot develop a rationale for distinguishing between them. Instead, the plan constructs some elaborate (perhaps fanciful) arguments around very little data that are associated with a high level of uncertainty. In order to better accommodate this scientific uncertainty, NMFS should adopt the Environmental Protection Agency's risk assessment/mitigation approach to managing the SSL.

Response: NMFS agrees with the comment that the level of uncertainty regarding causes of the decline (in the past) is large. As a result, the Plan looks at the past and the present state of Steller sea lions only in order to understand threats to recovery (in the future). NMFS thinks that the Plan recommends recovery criteria and actions that are appropriate given the current understanding of the status and trend of the population and the magnitude of the threats.

Comment: The Executive Summary claims that the SSLRP was unanimously endorsed by the Recovery Team. However, it appears that NMFS lowered the threat assessment ranking for killer whale predation on their own, in opposition to the opinion of some members of the Team. NMFS should acknowledge upfront in the preface that their draft deviates significantly from the recovery team draft and, if presented to the recovery team in its present form, would not have been a consensus document.

Response: NMFS changed the Plan's introduction to reflect the fact that any drafts subsequent to the Team's draft in March 2006 were prepared by NMFS. NMFS thanks the Team for their efforts in writing the Team's draft. In addition, the final version of the Plan has labeled the killer whale threat as "potentially high" as recommended by the team.

Comment: The following factors identified in the Plan as medium or low threats to the western DPS should be changed to "not currently a threat to recovery": toxic substances; illegal shooting; entanglement in marine debris; disturbance from vessel traffic and tourism; and disturbance from research.

Response: NMFS will retain the low and medium rankings of these threats, but recognizes for those ranked low, that they are not likely to currently be threats to recovery.

Comment: The ranking of incidental take in fisheries as a "low" threat is not well justified. Given the historical information about incidental take in some fisheries and uncertainty about what is happening on vessels without observers and also foreign fleets, this may still be a substantial problem and deserve a higher ranking.

Response: NMFS based its low threat ranking for fisheries' incidental take on the relatively small number of estimated kills recently from this source in Alaska, which are based in large part on robust observer programs for many fisheries. NMFS recognizes that there are some fisheries in Alaska that have smaller or no observer programs, and that there are unobserved fisheries in Russian waters that could have incidental catches of Steller sea lions from the Alaskan portion of the western stock. NMFS has revised the section of the Plan related to "data gaps" to address this issue. However, NMFS did not believe that these potential sources of mortality justified a change in ranking.

Comment: The section on disease (pages 94-96) would benefit from a reference to the several mortality events that have struck the New Zealand sea lion population at the Auckland Islands over the last decade or so. These incidents provide the most recent examples of mortality events that have affected sea lions globally.

The SSLRP discusses the implications of an ocean regime shift on SSL. A similar regime shift has also

been proposed for the Southern Ocean at about the same time (1970s) (Weimerskirch, Inchausti *et al.* 2003), and it might have been helpful if the Team had been familiar with this hypothesis, as it highlights the global nature of some of the issues being considered. Considerable evidence suggests that similar regime shifts may be expected in the future. On-going monitoring of key demographic parameters that span future changes will be invaluable in assessing the importance of, and nature of, environmental variation on this and other species. The SSLRP should include a discussion of anthropogenic climate change, which is a very real problem for high latitude ecosystems within the time frame of the recovery plan. At least it needs to be acknowledged and suitable monitoring needs to be put in place.

Response: NMFS appreciates these comments and will utilize this information as it develops the implementation plan for the SSLRP.

Comment: The SSLRP should emphasize the fact that the factors responsible for the decline may not be identical to the factors limiting current population growth and that multiple factors are likely involved to various extents in different locations.

The SSL Recovery Plan should not have a lengthy discussion about the various hypotheses regarding the decline of SSLs because this controversy will never be resolved scientifically. Degrading some hypotheses to elevate the drafters' preferred hypotheses rather than adopting the Recovery Team's multifactor hypothesis is not consistent with good public policy. The SSLRP should focus on the current threats to recovery, which may be quite different than the factors that caused the decline.

The threats analysis in the Draft Revised Plan does not provide a clear distinction between the relative magnitudes of top-down versus bottom-up factors as causal factors in the decline of the wDPS. This inconclusive analysis makes it difficult to determine whether the recovery goals and actions listed in the plan are appropriate and likely to be effective.

Response: NMFS is aware that factors responsible for the decline may likely be different from those affecting recovery. The trends in vital rates over the last 30 years strongly suggest this. It is for this reason that bottom-up factors (environmental variability and competition with fisheries) are highlighted for future research attention, while at the time of listing in 1990, direct mortality threats were addressed first (and may have led to a slowing of the rate of decline). However, the Plan is more concerned with addressing threats to recovery than in trying to determine the relative magnitude of threats that caused the decline, and as such, looks to the past only to the extent that it can inform the future. There is evidence, particularly from the western Aleutian subarea, that some factors may currently be affecting populations in some parts of the range more than others. NMFS used the best available information to assess the magnitude of each threat (as well as combinations of them) to the recovery of the wDPS.

Comment: The SSLRP should explain and assess the potential for killer whale predation to have density dependent/density independent effects and to create a "predator pit" that threatens the current recovery of SSLs, separate from any discussion of the validity of the megafaunal collapse hypothesis.

The validity of the megafaunal collapse hypothesis should be treated separately from the threat assessment of killer whale predation. Killer whale predation could very well present a significant risk to SSL recovery regardless of their potential role in causing the decline.

Response: NMFS has revisited the killer whale threat assessment and, as discussed above, has modified the threat listing for killer whale predation back to "potentially high". Within the section of the Plan providing information about "Factors Potentially Influencing the Western Population", NMFS

provides a subsection, within the section on killer whales (III.B.1), that is focused solely on presenting information pertaining to the Sequential Megafaunal Collapse hypothesis. However, while assessment of the potential threat that killer whale predation might pose to the recovery of the Steller sea lion is not determined simply by the outcome of conclusions about the likely validity of the SMC hypothesis, neither are the two discussions entirely unrelated. If killer whale prey switching led to the precipitous decline of Steller sea lions (and other species) in the past then killer whale potential to cause declines, or impede recovery, in the future, is better established than if available evidence indicated that this was unlikely to have been the case. However, NMFS agrees that the potential threat posed by killer whales (or other factors) in the future is a distinct issue from whether evidence indicates the factor was likely an important contributor to the decline.

Comment: The SSLRP should include a Threats Assessment Table that evaluates threats to reproduction and natality using the same format as was used in Table IV-1 on page 120. For instance, toxic substances, heavy metals, diseases, parasitism, and killer whale predation of pups at rookeries are all recognized as possible threats to recovery associated with the reproductive rates of adult females and survivability of pups. Such an assessment of threats specific to particular age/sex groups will help focus and balance the development of recovery criteria and research objectives.

The SSLRP should present a better balance of presentations for alternative hypotheses by citing opposing papers (e.g. climate-change effects on carrying capacity).

There appears to be a reasonable "balance" in terms of the coverage given to each threat category, although the killer whale section appears over-represented. The debunking of the "sequential megafaunal collapse hypothesis" could have been addressed more economically.

Response: NMFS believes that the Plan contains the information necessary to assess the magnitude of each threat to recovery of the wDPS, as well as a description of its mechanism and the most vulnerable age-sex class of the population.

Recovery Strategy

Comment: A key part of the recovery process is "eliminating or controlling the threats" (p. 139). However, how can you eliminate or control regime shifts or other natural processes such as killer whale predation (or should you even try)? Natural factors should be regarded as a baseline condition and the plan should act to minimize any anthropogenic factor acting in addition to it.

Response: The Team and NMFS were asked to identify the threats potentially limiting recovery and to provide guidance to reduce those threats when possible. All known threats were identified including those for which little or no control is possible. The listing factors on pages 140-142 of the May 2007 draft Recovery Plan are only those threats that the agency felt can be addressed. This includes anthropogenic factors.

Comment: Actions 5.7.1 and 5.7.3 should be revised to require mandatory reporting and sampling of Native-harvested SSL, as is done for other marine mammal species in the Fish and Wildlife Service's Marking, Tagging, and Reporting Program.

Response: Steller sea lions harvested by Alaska natives for subsistence are included in annual reports from the state of Alaska as well as from various native marine mammal commissions. Subsistence harvest was not identified as one of the primary threats to the recovery of Steller sea lions in the western

stock. In the Final Plan, NMFS has noted that current efforts to monitor subsistence harvests should be continued and efforts made to identify, evaluate, and as possible, to reduce, sources of uncertainty in subsistence harvest data.

[Comment: Analyses of the efficacy of critical habitat and the subsequent re-evaluation of critical habitat should be given higher priority.](#)

Response: NMFS will maintain, and modify as needed, the designation of critical habitat. It is NMFS' position (in the Plan) that the current definition of critical habitat is not negatively affecting the recovery of Steller sea lions; as such, redesignation of critical habitat is not a high priority 1 action. NMFS is committed to using the best information available to designate critical habitat.

[Comment: Development of an implementation plan should be raised to a priority 1 action.](#)

Response: Priority 1 actions are defined as those necessary to prevent extinction or to prevent the species from declining irreversibly in the foreseeable future. Currently, only the need to estimate population trends has been assigned a priority of 1. Although the need for an implementation plan is of primary importance (2a) it was not deemed necessary to prevent extinction.

[Comment: Efforts to improve live-capture methods \(action 1.4.1\) should be expanded, particularly those that will permit the safe capture of older and larger individuals to fill gaps in our knowledge of foraging ecology and vital rates.](#)

Response: NMFS agrees that there is a great need for the ability to safely capture older and larger sea lions. This is currently a priority 2a action and the focus of extensive work. The greatest hurdle currently slowing the development of these techniques continues to be the lengthy permit process required for any new handling technique.

[Comment: Give high priority to recovery action 3.5; evaluating and reducing the impacts of research activities on SSLs, ensuring that such unintended effects do not bias research results, and address permitting issues to ensure that important research on SSLs can continue without unnecessary interruptions or constraints.](#)

Response: NMFS agrees that understanding the effects of research on Steller sea lions is an important focus. Recent and ongoing work by scientists at the National Marine Mammal Lab, the Alaska Sea Life Center, and the University of British Columbia has addressed the short and long term effects of disturbance, branding, and animal handling in response to these needs.

[Comment: Instead of a large-scale experimental design, the agency should modify the adaptive management proposal so that it relies on a more localized design that mitigates impacts to fishermen and fishing communities and requires that "appropriate" rather than "current" mitigation measures are maintained until the species is recovered. In this way, the Recovery Plan can best adapt to updated scientific information and test the competition from fisheries hypothesis.](#)

Response: The concept of an adaptive management experiment has been around for some time and was recommended by the review of the November 2000 Biological Opinion by Don Bowen and others. Weighing the benefits of this type of experiment with the short and long term impacts on the fishing industry remains a great challenge. The FIT experiments carried out by the Alaska Fisheries Science Center in recent years have attempted to address the localized design idea. NMFS believes that the current level of protection, or better, should be maintained, rather than necessarily maintaining the

specific existing management measures. The text has been changed to reflect this view.

Comment: It is unlikely that new information on the importance of killer whale predation would be used to take measures to enhance SSL recovery. Therefore, resources devoted to this research should be balanced against how new information would be used in recovering SSL.

Response: NMFS agrees that research on killer whales and the effects of predation on Steller sea lions should not be the only research funded. This is reflected in the extensive list of research needs identified in the Recovery Action Implementation Schedule. However it should also be noted that although mitigation measures to reduce predation might indeed be difficult to achieve that scenario does not preclude conducting research to understand the magnitude of those effects.

Comment: Reviewers generally agree on the priorities assigned to recovery actions, with some exceptions.

The benefits of continued efforts to monitor health and body condition of individuals (actions 1.3.1 and 1.3.2) are questionable. The Plan should describe the specific health and condition parameters that should be monitored and provide rationale for how such monitoring will contribute to population recovery. Given the presumed low risk of disease and contaminants in limiting the recovery of SSL, efforts to develop non-lethal sampling techniques to assess health (action 1.4.2) should have a low priority

Response: NMFS believes that assessing the health and body condition of individuals within the population remains a high priority. As with most types of monitoring, the contributions to recovery come from the ability to recognize base line levels and any changes to those levels that could indicate the appearance of a threat. NMFS recognizes that technology continues to change and that the appropriate metrics used for monitoring health and condition can also change. Individual researchers may have methods of monitoring health and body condition that are not yet available to Steller sea lion researchers but which could provide more in depth analyses than currently available. Continued effort towards minimally invasive procedures is desired as researchers become more and more aware of the possible effects of the research on the sea lions themselves.

Comment: The Plan presents a reasonable approach to the recovery strategy but the adaptive management plan needs to be much better defined and a multi-hypotheses modeling approach should be pursued.

Response: Many of the recovery actions identified will require substantial effort to design and implement. The Recovery Team was tasked with identifying actions which they thought were necessary for recovery but acknowledged the enormous difficulty in obtaining some of that information. Nevertheless, the need for the information exists. Over time it is anticipated that both field data and modeling efforts will be used to achieve these goals.

Comment: There are two other technologies not mentioned in the plan that might also be used to better understand the foraging ecology of SSL. One is the use of animal-borne video cameras to calibrate probable fish capture with dive characteristics to enhance interpretation of diving data and to determine the differential costs of prey capture as a function of prey type. The other is the use of two-way acoustic tags that could be used in combination with tagging prey to determine prey encounter rates by SSL.

Response: New and improved technologies, such as animal-borne video cameras and acoustic tags, would be included as possible methods that could be employed to achieve the goals listed under

Baseline Population Monitoring. All available technologies were not discussed as they are the mechanisms by which the information might be collected. With regards to animal-borne video specifically, this technique has been suggested but continues to be limited by the inability to recapture sea lions with enough certainty to recover the camera. Remote release mechanisms would be useful in this endeavor, but they too have not been developed to a stage that they can be reliably used in the wild. The use of acoustic tags could theoretically provide useful information but would require an enormous sample size. Additionally, instrument recovery would be necessary to get the receivers back, a technology that, as stated earlier, is currently limited.

Maintain Current Fishery Conservation Measures (Recovery Strategy and Recovery action 2.6.6)

Comment: A network of marine reserves and an adaptive management approach is needed to assess the relative impacts of factors such as the effects of fishing and climate variability on sea lion prey. Fishery managers should bear the burden of proof to show compelling evidence that the lifting or lessening of protective measures will not threaten recovery.

Response: Recovery Action 2.6.8, Design and implement an adaptive management program..., is intended to allow researchers to design appropriate comparative studies to assess the potential and relative effects of fishing, environmental change, predation etc. Any evaluation of recovery will require that NMFS provide information as to how the threats have been eliminated or mitigated. In cases where the exact threat remains unknown, but the recovery goals have been met, a precautionary approach will be followed that allows for an appropriate adjustment of any protective measure that, if lessened, could potentially increase a threat.

Comment: The Draft Revised Plan does not sufficiently recognize the need for flexibility to modify fishery conservation and management measures. NMFS should not require maintenance of "current" mitigation measures but should substitute with "appropriate" mitigation measures to allow for flexibility to changing environmental conditions, fishery stocks and new SSL information. Such flexibility would also offer opportunities to test the efficacy of protective measures while allowing sustainable fisheries. As science improves regarding the causes of the SSL decline and the constraints on the species' recovery, management agencies, such as the Council and NMFS, should be able to modify and/or remove particular fishery management and conservation measures, to the extent that they may not be relevant to achieving the objectives of the Draft Revised Plan.

Response: NMFS believes that the current level of protection, or better, should be maintained, rather than necessarily maintaining the specific existing management measures. The text has been changed to reflect this view. The Biological Opinion currently being written will address whether the current suite of management measures jeopardizes the continued existence of Steller sea lions, threatens recovery, or adversely modifies critical habitat.

Comment: If the weight of current scientific evidence suggests that the fisheries are likely not a significant factor limiting SSL recovery, then the rationale for strict maintenance of current conservation measures as required for recovery of the wDPS is weak.

Response: NMFS is not aware of scientific evidence that would remove fisheries from the list of factors that could limit the recovery of Steller sea lions. As noted in section V. B., NMFS cannot infer whether

the conservation measures “resulted in the population changes or were just coincidental”. Under the ESA, NMFS must be precautionary with respect to sea lion recovery, and recommend that the current level of protection be “maintained until it can be positively determined that reducing those protections for Steller sea lions would not reduce the likelihood or increase the time to recovery” if indeed their implementation was the cause of the abatement of the population decline.

Comment: Management flexibility may be appropriate even in the short run. For example, recent science suggests that juvenile SSLs are weaned during the summer instead of during the winter. See Trites, *et al.*, "Insights into the Timing of Weaning and the Attendance Patterns of Lactating Steller Sea Lions (*Eumetopias jubatus*) in Alaska During Winter, Spring and Summer," *Aquatic Mammals* 32(1):85-97 (2006). Winter is the most critical fishing time for the groundfish fleets because fish are aggregated and roe is an important product. Many of the mitigation measures now in place have reduced the winter fisheries in order, in theory, to protect weaning juveniles. With the new information in hand, the Council and NMFS may be able to modify those measures to enhance fishing opportunities without adverse effects on the SSL population.

Response: Weaning is not a knife-edge phenomenon. Science also shows with fatty acid and isotope work that pups likely change from a milk-only diet to a mixed diet before weaning completely. In addition, recent science also suggests that juvenile survivorship has increased in recent years while reproductive rate has continued to decline. A drop in reproductive rate could result from the abortive loss of a pup during the winter when the adult female needs to find adequate nutrition to both nurse an unweaned pup and gestate a fetus. If females are losing their pups before coming ashore than it is plausible that winter is the most important time for females. As with all new information, this information will be considered in the forthcoming Biological Opinion on the effects of groundfish fisheries on the recovery of ESA listed species.

Comment: Fishery management measures currently in place to protect the Steller sea lions and their critical habitat should be maintained. Significant changes to existing fishery management measures, such as opening fisheries in state waters, would be inconsistent with any recovery plan, and would likely jeopardize sea lions and adversely modify their critical habitat. New trawl fisheries within Steller sea lion critical habitat targeting important sea lion prey species, particularly near shore, would be irresponsible, inconsistent with the recovery of the species, and would not ensure against jeopardy to the species and adverse modification of their critical habitat.

Response: One of the recovery actions calls for the maintenance of the current or equivalent level of protection in fishery conservation measures (Action 2.6.6). This action calls for the maintenance of the current level of protection ‘until it can be positively determined that reducing those protections for Steller sea lions would not reduce the likelihood or increase the time to recovery.’

Comment: All fisheries that might impact the prey base of SSL, including those managed by the State of Alaska, should be evaluated and managed in a manner such that they will have negligible impacts on population recovery.

Response: The forthcoming Biological Opinion will evaluate the effects of groundfish fisheries on the recovery of ESA listed species as well as the efficacy of current management measures. The potential impacts of fisheries authorized by the State of Alaska will be included in the cumulative effects. In addition, Action 2.6.9 calls for the state of Alaska to prepare a habitat conservation plan for state fisheries under section 10 of the ESA.

Comment: Fishing is the only potentially high-ranked threat in the Draft Revised Plan with a high feasibility of mitigation. The fishery conservation measures put in place in the late 1990s appear to be having a positive impact, demonstrating that there is hope and value in this approach. However, simply maintaining the existing fishery conservation measures is unlikely to achieve the Draft Revised Plan's goal of enabling Steller sea lions to recover to the extent that they can be removed from the endangered species list.

Response: Maintaining the existing level of protection in fishery conservation measures is only one of many actions included for recovery. Other actions include research intended to help scientists learn more about specific threats in order to improve management to promote recovery.

Comment: One of the 3 actions the "team's draft" recommended (pg. 113) was to: "Maintain appropriate fishery conservation measures". In the "agency's draft" (pg. 124) this task is titled: "Maintain current fishery conservation measures (Action 2.6.6: Priority 2a)." In both drafts the task under 2.6.6 is actually described with different language: "Evaluate and implement appropriate fisheries regulations..." The language "evaluate and implement appropriate..." best captures the concept of using the best available information to tailor mitigation measures to our understanding of evolving hypotheses of how fisheries may impact SSL.

Setting "current regulations" into the Recovery Plan eliminates flexibility in adjusting regulations to allow adaptive management actions. At the very least, this action item should be rewritten to specifically allow deviation from current mitigation measures in at least three situations: (1) where equally protective measures are implemented, (2) to allow study of adaptive management actions which will be evaluated for effectiveness on a periodic basis, and (3) to implement adaptive management measures which have been demonstrated to be effective.

Response: One of the recovery actions calls for the maintenance of the current level of protection in fishery conservation measures (Action 2.6.6). Thus, NMFS recognizes the need to be precautionary and to maintain the current level of protection 'until it can be positively determined that reducing those protections for Steller sea lions would not reduce the likelihood or increase the time to recovery.' We anticipate evaluating and implementing appropriate fisheries regulations to achieve required protection.

Comment: Why is fishing allowed (apparently concentrated) in SSL critical habitat?

Response: Fishing is allowed in certain portions of critical habitat based on the 'zonal approach' that was developed in the 2001 Biological Opinion (and its 2003 supplement).

Adaptive Management (Recovery Strategy and Recovery Action 2.6.8)

Comment: An adaptive management approach to research will be critical to clarifying the uncertainty of Steller sea lion response to potentially depleted food resources (either from environmental variability or from competition with fisheries or other species).

Response: NMFS believes that an adaptive management approach is critical to increasing our understanding of sea lion responses in fished and unfished areas.

Comment: An adaptive management program is likely to be both expensive, complicated to design, and unable to produce any truly useful results when the "experiment" is completed. From a cost-benefit perspective, it is not likely to be worthwhile.

NMFS is already conducting an experimental manipulation of the fisheries by implementing conservation measures that affect the fisheries. It is possible that some of the recent positive increase in SSL trends could be the result of some of these conservation measures. The text on p160 says, "Given signs of recovery in the western DPS, it is important to take this opportunity to implement an adaptive management program to test the underlying hypotheses of the conservation measures". This would be a major mistake. NMFS should not impose any more restraints on the fishing industry in an attempt to assess the effects of fishing on SSLs. Adding one set of experimental measures on top of another would create a mess that confounds any useful interpretation of the results, causes unnecessary hardship on the industry, and could have unintentional adverse effects on SSLs.

The continued specification of a large-scale Adaptive Management program as a needed recovery action is inappropriate and faces innumerable difficulties, for example, the "jeopardy" and "no adverse modification" proscriptions of the ESA would make it infeasible as a matter of law.

Response: These comments characterize the risks, costs, and potential hurdles, but not the potential rewards, of an adaptive management approach. An adaptive management program will likely be expensive, but a program like this is critical to increasing our understanding of sea lion responses in fished and unfished areas. Multiple peer reviewers, including the National Research Council, have recommended such an experiment be planned and implemented. NMFS has conducted experiments such as the FIT experiments within the current fishery management framework. However, these studies are on relatively small scales and were designed to test the efficacy of some of the current measures, as well as learn more about local fish populations and fishery effects on them. This is not the same as evaluating and comparing sea lion responses to quite different fishery management regimes.

NMFS agrees that an adaptive management program would have to comply with all applicable laws, including the ESA. This is one of the issues that must be overcome in the development, planning and statistical design of an adaptive management program. However, NMFS in the Plan cannot shy away from recommending actions it feels necessary or appropriate for recovery because of low feasibility or high difficulty.

Comment: The North Pacific Research Board should be requested to convene a multi-disciplinary symposium to further explore the adaptive management approach and to build upon previous work on the statistical design of such a program that could utilize a multiple hypothesis modeling approach to secure unequivocal results while minimizing the impacts to fishermen and fishing communities.

Response: NMFS will consider this recommendation.

Comment: The objectives of an adaptive fisheries management program are confusing. It is not clear whether NMFS is proposing this as a means to mitigate potential impacts on SSL as soon as they have been identified or to develop an improved knowledge of how SSLs respond to different potential impacts through experimental manipulations.

Response: The intent of the program as outlined in the draft plan would be to help distinguish the impact of the threat from commercial fishing from other threats. It is not intended to mitigate any possible or potential impacts.

Comment: NMFS should reconsider recovery actions that require an adaptive management experimental design. An adaptive management program should be more clearly refined and include research approaches designed to determine the mechanism through which resource limitation might impact vital

rates of Steller sea lions. A more explicit explanation of the purpose of this adaptive management approach and indication of what results might prove unequivocal is warranted. This task, as defined, is seemingly impossible to accomplish without incurring great costs and potentially disenfranchising fishing participants and coastal communities.

Response: The recovery action for the adaptive management program is entitled “design and implement an adaptive management program” and as such does not include detail as to how this program will be set up. NMFS has no intention of disenfranchising fishing participants and coastal communities. However, the Endangered Species Act requires that any and all endangered species are not jeopardized by any federal action. There are numerous mechanisms through which resource limitation might impact vital rates including reduced prey availability resulting in acute or chronic nutritional stress and reduced perinatal pup survivorship, reduced reproductive rate, etc. The recovery plan did not attempt to design particular studies to fulfill recovery actions but rather listed those actions that could provide useful information towards reducing potential threats.

Comment: The team has designed a recovery strategy for the eastern and western populations of SSL that is ecologically and biologically defensible. The recovery strategy highlights the design and implementation of an adaptive management program to evaluate fishery conservation measures and key actions. This is perhaps the only way to remove some of the uncertainty around some of the major causal factors and deserves to be a top priority.

Response: The recovery plan has made the design and implementation of an adaptive management program a high priority.

Comment: There may be enough data now available to allow the relative strengths of each hypothesis to be assessed through a table-top modeling exercise, essentially making any large-scale adaptive management program unnecessary.

Response: NMFS welcomes the use of any modeling study which can assist in the accomplishment of the goal of recovery. However, NMFS does not believe it is likely that a table-top modeling exercise would provide the same quality of information as an adaptive management program.

Comment: While recognizing how difficult it will be to develop and implement, an adaptive management plan to assess fishery impacts and mitigation measures would be much better than continuing the massive reductionist research program that has not yielded conclusive evidence in spite of extraordinary levels of funding.

Response: The recovery actions in the draft Recovery Plan are extensive and include the need for an adaptive management program as well as focused research investigating particular hypotheses of the Steller sea lion decline.

Development of Recovery Criteria and the Use of the PVA

Comment: Although the ESA requires recovery criteria to be measurable and objective, it does not provide explicit standards for criteria beyond general descriptions. It is troubling that the selection of appropriate risk is a policy decision and NMFS does not have a national policy regarding extinction risks. It is not clear whether and why the metrics and thresholds for "acceptable" risk of extinction used in the Recovery Plan are appropriate for SSLs. Greater clarity and defense of the criteria set need to be

demonstrated.

Response: NMFS believes the recovery criteria in the final plan are the most appropriate to demonstrate the recovery of this population. Text in the Plan on the PVA and the weight of evidence approach to developing the criteria outline the Team's rationale, with which NMFS agrees. NMFS is currently assessing a more quantitative approach to the development of recovery criteria.

Comment: The importance of density dependent responses in the demographic parameters is identified as an important issue. Currently, few of the SSL models incorporate density dependence, even though they are likely to exist and are very likely to influence estimates of extinction times from these models. This should be a high research priority and would benefit from focused, small scale experiments associated with the Adaptive Management Plan.

Response: Any adaptive management plan would include density dependent factors for their possible role in population abundance. Food shortage is often considered as the primary density dependent factor limiting population growth and an adaptive management program that included a focused removal of prey from an area utilized by Steller sea lions would in part address this hypothesis.

Approaches to the Criteria

Weight-of-Evidence

Comment: Although the weight of evidence approach to developing recovery criteria is necessarily somewhat subjective, the recovery criteria are reasonable with regard to requiring a sustained population increase that is widely distributed throughout the population.

Response: NMFS agrees.

Comment: The "weight of evidence" approach for determining if a factor was ranked high or low meant that evidence or appraisal in support of one point of view required contrary evidence to sustain a different perspective. This sometimes clouds the relative positions of the report findings. Part of the challenge is that not all experts are in agreement on what the most important factors are, or on each factors relative importance. The weight of evidence approach is meant to synthesize and accommodate divergent perspectives. It increases the likelihood that some factors, considered unimportant by some groups but not others, are actually examined, in case they really are an important threat.

The PVA approach may be preferable to a "weight of evidence" approach by providing greater assurance that criteria are measurable and objective, are based on risk of extinction rather than more nebulous indices that may or may not accurately gauge threats to recovery, and is designed to take into consideration scientific uncertainty regarding population dynamics and threats.

Response: The draft Recovery Plan explained in detail the development of the PVA (pgs 128-132), the limitations of the PVA from the perspective of the team (pgs. 132-133) and the rationale for the weight of evidence approach to the criteria (pgs. 133-135). This explanation is retained in the final Plan. The team recognized that the PVA could provide a measurable and objective result but that it relied on the input for which the uncertainty was high. This recognition led the team to use the PVA as a tool to develop the approach for the recovery criteria.

Population Viability Analysis (PVA)

Comment: During review of the 2006 SSLRP, several technical problems were identified in the Goodman PVA that were not addressed in the 2007 revised draft (e.g. using an extinction risk of 1 percent in 100 years, lack of density dependence, and use of old growth rates) and these assumptions need to be re-examined in future analyses.

Response: Future analyses involving PVA's may include density dependence and different probabilities of extinction. NMFS appreciates these comments regarding the structure of additional population dynamics models, which are beyond the scope of the current Plan.

Comment: The Draft Revised Plan may have understated the influence of humans in the historic declines of the wSSL, and therefore the model projections may be overly pessimistic. It is almost certain that at least some of the factors (shooting, entanglement in fishing gear, etc) affecting SSLs during the early 1980s will not occur again due to changes in regulations and in fishing practices. These assumptions drive many of the results of the threats assessment in the current PVA. NMFS should re-evaluate the assumption that the conditions leading to the steep decline through the 1980's are certain to occur again.

Response: As stated previously the PVA was used as a guide for the team's weight of evidence approach. Uncertainty and the need to be precautionary because of that uncertainty continue to be the threads that tie many of the recommendations of this plan together. One of the points of greatest discussion involving the PVA was whether to include the 1985-1989 time period which showed the most dramatic decline. When this period was included, it resulted in a high probability of extinction. As noted on page 132 of the draft Recovery Plan, not including this time period as a catastrophic event that is unlikely to be repeated would not be precautionary. However, as the Team and NMFS noted the high degree of uncertainty in many of the inputs to the PVA, strict adherence to its results did not seem warranted; hence the Team's and NMFS' use of a 'weight of evidence' approach.

Comment: NMFS should modify the 1% in 100 year standard for risk of extinction to 10% over 30 years (3 generations of SSLs). The use of the 1% in 100 years criteria is based on cetaceans, not pinnipeds, which have shorter generation times.

Response: NMFS adopted the Recovery Team's recommendation of a 1% in 100 years threshold as a risk of extinction for use in the PVA. This threshold was not quantitatively used in the 'weight of evidence' approach that was eventually used to develop the recovery criteria.

Comment: The PVA should be rerun with density dependent effects and the carrying capacity issues featured more prominently.

Response: As noted in the section entitled "Limitations of the PVA" on pg. 132 of the draft Recovery Plan, the team recognized the lack of density dependence factors in the Goodman model as one of the limitations to using it. This was among the reasons that the PVA was not used exclusively in creating recovery criteria. NMFS appreciates these comments regarding the structure of additional population dynamics models. Reruns of the model are, unfortunately, beyond the scope of the existing Plan.

Comment: The Recovery Plan places more weight on the PVA undertaken by Goodman than on the published PVA's of York (1994), Gerber and VanBlaricom (2001) and Winship and Trites (2006). The assumptions made in the Goodman PVA lead to the most pessimistic population projection but are not

consistent with the current understanding of SSL population biology. The Goodman PVA should not be given greater weight within the Recovery Plan than the three published PVAs.

Response: The models listed by the commenter were not developed for the purpose of setting recovery criteria, were limited in scope of their analyses, focused analysis on a specific moment in time, or did not include periods of steep decline in the assumptions. It would have been inappropriate for the team to ignore the available data in the preparation of the PVA. Therefore the team chose to contract a recognized expert to conduct a PVA with the appropriate input parameters. The Recovery Team discussed and agreed on the assumptions used in the model. It is again relevant to note that the Goodman PVA was only used in guiding the team as a sort of sensitivity analysis and ultimately was not used exclusively to determine recovery criteria.

Comment: Although we agree with the intention to improve the PVA as new information becomes available and to adjust the recovery criteria in the future to reflect the updated PVA, we feel the current Goodman PVA is sufficiently informative to be used for establishing the recovery criteria.

It should be noted that, rather than being pessimistic, as the Plan implies, Goodman's PVA extinction calculation may present an optimistic view of the future of the western DPS. He was requested by the subgroup responsible for the PVA to include "a relative schedule of prey-competition fishery effects, expressed as instantaneous per capita mortality" (Recovery Plan Appendix) for the period 1968-2000. These equate to an additional mortality of up to 6% in some years. This is a substantial additional mortality for a population whose dynamics are known to be particularly sensitive to changes in mortality. However, there is no justification for these precise levels (or, indeed, any quantified fishery effects) anywhere in the Recovery Plan. If these mortalities were not included in Goodman's calculations, the variations in population growth rate would have been even greater, and the risks of extinction would have been higher.

Response: NMFS agrees.

Comment: Although NMFS has identified shortcomings of all the PVA models developed so far, it should not abandon the effort to improve them over time because they can be very useful management tools, especially for identifying weaknesses in the existing demographic data sets.

Response: NMFS agrees that PVAs have their strengths and perhaps the greatest use is to identify areas needed for further research.

Comment: In assessing the risk of extinction, NMFS should run different PVAs and compare results.

Response: The literature cited includes additional PVAs conducted on Steller sea lions in Alaska.

Recovery Criteria

General Comments

Comment: Using vital rates as a criterion for downlisting and delisting is not feasible because of the uncertainties associated with measuring vital rates.

Response: NMFS agrees; the vital rates criteria were removed.

Comment: Choosing a particular recovery scenario is a policy choice.

Response: The Recovery Plan is an NMFS document that is intended to meet the requirements of the Endangered Species Act. The Endangered Species Act calls for recovery of the species. NMFS sought the input of a diverse recovery team, input from public review, the best available information, and the input of its own scientific experts to develop a recovery plan for Steller sea lions that will serve as a road map for the species recovery.

Comment: Discuss how a decreased carrying capacity would affect the appropriateness of the proposed recovery criteria.

Response: Changes in the carrying capacity could influence the recovery criteria; however, there is currently no evidence for a change in carrying capacity that would lead NMFS to discuss this aspect in the final Recovery Plan.

Comment: Given the Goodman PVA results that indicate a high risk of extinction even after a substantial increase in the population, NMFS should increase the length of time and rate of increase required in the downlisting and delisting criteria.

Response: The Team and NMFS believe that 15 and 30 year time periods with significant and 3% per year growth rates, respectively, provide enough evidence that the wDPS is recovering (can be downlisted) or has recovered (can be delisted). Inherent in these criteria is the requirement that the population would not be experiencing the steep downward trend seen during the population decline.

Comment: The downlisting and delisting criteria ignore the fact that the distribution of SSLs may be shifting across its range; it assumes congruence between the current definitions of sub-populations and actual, biological sub-populations; and it assumes that some factors, e.g., fisheries competition, were more likely drivers of past population declines than others. It is insufficient in response merely to state, as NMFS does in its "Peer Review Comments on Steller Recovery Plan (the "Peer Review Comments")" (at p. 2) that "if this situation occurs, it would indicate that a significant portion of its range . . . was still in decline and suggest that NMFS has not fully understood or mitigated the threats to the population."

Response: The criteria developed in the plan are intended to address the population in its current distribution. The commenter does not indicate where the animals may be shifting to but presumably it is within the area under consideration. The Team and NMFS recognized that not all subareas may be increasing at the same rate and that one may be declining, yet the listing status of the DPS as a whole could be reevaluated.

Comment: The criteria for downlisting or delisting lack scientific justification, seem to be purely arbitrary with little to do with the health of the population as a whole and are essentially without biological basis. They are written in such a way that they will make it difficult, if not impossible, for the Draft Revised Plan to achieve its objectives.

Response: NMFS disagrees. The section of the Recovery Plan that explains the development of the criteria also explains the rationale behind the criteria chosen, references the appropriate scientific literature, and in the case of the population growth requirements, describes why the team believed this rate of growth was reasonable. Thus, the development of the criteria was not arbitrary. Given that the population declined dramatically suggesting a reduced rate of survival for specific age classes, a criterion specifying an increasing population trend is one indicator of population health. A continued

decline would suggest that the health of the population is poor.

Comment: NMFS should modify the recovery requirements to use time frames more suited to generations of SSLs: 1.5 generations for downlisting (15 years as recommended by the Recovery Team) and three generations (30 years) for delisting.

Response: NMFS agrees and has constructed its downlisting and delisting criteria as suggested. The delisting criteria include generation time as synonymous with the time frames listed. This was simply done for ease as the definition of generation time can sometimes be interpreted differently e.g. the average age of the reproducing females, the average lifespan of a female. Scientific studies that included the collection of adult females estimated that average generation time in adult females was 10 years (Calkins and Pitcher 1982).

Comment: The requirement that two adjacent sub-regions can't both be declining significantly also implicates the problem of management of SSL populations found in Russia.

Response: NMFS needs to consider all of the parts of the DPS in its decisions about the listing status of that DPS.

Comment: It is unclear what the starting date is for measuring the percentage decline.

Response: The decline of the western stock is usually referenced for the period between about 1950 and 2000, the nadir of the decline. However, the most relevant time period (with respect to consistency of methods used to obtain trend counts) is the period from 1976 – 2000, during which the western DPS in Alaska declined by 84%.

Comment: The Draft Revised Plan should specify the probability level at which the null hypotheses, corresponding to the demographic criteria, would be rejected. In the absence of this information, the demographic criteria are incomplete.

Response: NMFS is not required to specify the probability level in the Plan, but will do so during any status reviews.

Comment: The process for the 5-year evaluation of recovery criteria should be described in the recovery plan and in the implementation plan.

The recovery criteria should be reevaluated and revised every five years or as new information becomes available.

Response: NMFS generally revises Recovery Plans on a 5 year cycle. NMFS has noted this in the Plan. Further, the [Endangered Species Act of 1973 \(ESA\)](#) requires completion of periodic reviews of species that are listed as threatened or endangered to ensure that the listing of these species remains accurate. Section 4(c)(2) of the ESA states that: "The Secretary shall -- (A) conduct, at least once every five years, a review of all species included in a list..., and (B) determine on the basis of such review whether any such species should (i) be removed from such list; (ii) be changed in status from an endangered species to a threatened species; or (iii) be changed in status from a threatened species to an endangered species."

The reviews called for in this section of the ESA are known as "5-Year Reviews." One component of these reviews can be (and typically is) to make recommendations for future actions, such as recommendations about conservation actions needed to improve the species status; data, survey or

monitoring needs; possible actions on DPS-related issues; and revisions, amendments, or updates to recovery plans. More information on [5-Year Reviews is available in the 5-Year Review Guidance](#) document developed by NMFS and the U.S. Fish and Wildlife Service in July 2005. This document is available at: http://www.nmfs.noaa.gov/pr/pdfs/laws/guidance_5_year_review.pdf.

Comment: The recovery criteria appear overly stringent in comparison with criteria used in other recovery plans. **Comment:** Requiring three generations to achieve full recovery, i.e., delisting, can be viewed as requiring more than is justified by reference to the past practice of NMFS and FWS.

Response: The Team and NMFS developed criteria specific to the recovery of the western stock of Steller sea lions. However, in a report contracted by the North Pacific Fishery Management Council and presented at the August 2007 meeting in Anchorage, it was noted (Loughlin 2007) that the “recovery criteria in the SSL plan were consistent with other criteria in plans that included increasing or decreasing rates of population change, and published by NMFS and USFWS.” In addition Loughlin (2007) noted that the “requirements in the SSL recovery plan for rates of population increase over time in 5 of 7 regions were not unusual compared to other plans in that category.”

Comment: The recovery criteria should be provisional until new assessments are made regarding two important factors: whether or not the eDPS and wDPS actually form a larger metapopulation, and whether there is a new carrying capacity that would prevent the population from recovering to historical levels.

The recovery plan should include a more detailed explanation of the reasons for the recovery criteria and how their attainment will be assessed. It should also emphasize that the recovery criteria are subject to revision as new information becomes available and new analyses are undertaken with regard to extinction risk and population trends.

Response: The recovery criteria were developed based on the current recognized stock structure. It is expected that, as with other aspects of Steller sea lion ecology, our understanding of stock structure will improve over time, as additional data from studies of patterns of genetic variability, dispersal patterns, and mating systems become available. Any future change to the recognized stock structure of the species would be taken into account if NMFS proposes to change the recovery criteria based on this new information.

NMFS believes that the Plan contains (e.g., in Section V.C. Development of Recovery Criteria) considerable and adequate information about how the recovery criteria were developed and their underlying scientific rationale. However, NMFS recognizes that recovery plans are living documents. NMFS anticipates regular review of new information as it becomes available. NMFS can and will reevaluate the appropriateness of the recovery criteria in the Plan as important new information becomes available on topics highly relevant to the recovery criteria such as stock structure, population trends, extinction probabilities, etc.).

Comment: There should only be one set of criteria for listing and delisting. A species should remain on the endangered list as long as it meets the criteria for an endangered species, and it should come off of the list when it no longer meets these same criteria.

Response: NMFS disagrees. In the case of Steller sea lions, they were listed because of a steep decline in population size that if continued, would have led to extinction in the relatively near future. Even though the wDPS is now no longer declining at that rate, it is still endangered because of the large

degree of uncertainty regarding factors affecting the population at its new, now much smaller, size. Using the recovery criteria in the Plan, the wDPS will be considered a candidate for delisting at a population size much smaller than that estimated prior to the steep decline.

Western DPS Downlisting

Comment: The measure in the Draft Revised Plan requiring that no two sub-regions be declining is too restrictive. Any reference to sub-regional trends should be excluded from the final recovery plan. This is a recognition that consideration of the subareas as part of the recovery criteria may have nothing to do with the status of the wDPS as a whole. It ignores that the distribution of SSLs may be shifting across its range; it assumes congruence between the current definitions of subpopulations and actual, biological sub-populations; it ties U.S. management to actions in Russia that are beyond US control; and it ignores the possibility that the overall wDPS population could increase to 60-70 thousand animals in US waters but not qualify even for downlisting.

Response: NMFS does not agree that consideration of sub-region trends and status may have nothing to do with the status of the DPS as a whole. NMFS retained sub-region criteria because satisfying these criteria will be an important manifestation that threats to the population have been mitigated or reduced throughout much of its range.

Comment: The Russian population of SSLs should be excluded from all recovery criteria because NMFS has no jurisdiction or mechanism to promote recovery in those areas. The population trends should be an average of all of the U.S. subpopulations only. It is inappropriate to hinge recovery actions taken in U.S. waters on the performance of SSLs in a subregion outside the U.S.

Response: NMFS does not agree. NMFS expects to consider all parts of the DPS when evaluating the listing status of the DPS.

Comment: NMFS should re-evaluate the wDPS SSL recovery criteria so that the criteria are more consistent with those of other ESA listed species (citing the Loughlin report to the NPFMC). By comparison, the SSLRP criteria seem unreasonably conservative and almost punitive. NMFS should reassess the requirements for the number of generations with consistent increases and the sub-area criteria.

Response: NMFS disagrees that the wDPS criteria are not consistent with those of other ESA listed species. Loughlin (2007) stated that “recovery criteria in the SSL plan were consistent with other criteria in plans that included increasing or decreasing rates of population change, and published by NMFS and USFWS”. In addition Loughlin (2007) noted that the “requirements in the SSL recovery plan for rates of population increase over time in 5 of 7 regions were not unusual compared to other plans in that category”. NMFS retained sub-region criteria because satisfying these criteria will be an important manifestation that threats to the population have been mitigated or reduced throughout much of its range.

Comment: The wDPS of the SSL be considered for delisting when: (1) the population for the U.S. region has increased at an annual growth rate of 1% per year for 30 years, or 2.5% for 15 years, or 5% for 10 years, based on counts of non-pups (i.e., juveniles and adults); or (2) if the population remains stable for 40 years; or (3) if the population remains stable for 10 years and research demonstrates that the population is at carrying capacity.

Response: There is no rationale given for these numbers. Due to the high level of uncertainty and the need to be precautionary, NMFS followed the basic rationale laid out by the Team for the criteria. Given the large uncertainties in our understanding of the factors affecting the wDPS, there is no justification for changing the de-listing criteria to include a stable population. As new information becomes available and the circumstances warrant, NMFS will re-evaluate the recovery criteria.

Comment: It would be useful to state if it is intended that the 15-year period of average positive growth is associated with an initial reference year.

Pup counts would substantially increase confidence in population trends. NMFS has been unable to maintain comprehensive biennial counts of the US wDPS. It is easy to imagine a scenario where a paired set of complete photo count of all the sites 10 years apart could show a 5000 animal increase, but because all the intervening surveys were incomplete, selected statistical tests would not show 'significance.'

The downlisting criteria for the wDPS require that the increase over 15 years be "statistically significant", and that two adjacent sub-regions not decline "significantly." Even if the population is higher at the end of the 15 years, the ability to meet a statistical test is a function of the number of data points. The ability to downlist may be more dependent on the number of complete surveys that NMFS is able to conduct than on the real world SSL population. No start point is identified for the calculation. It was implied in the team discussions that the start date would be the "inflection point" of 2000.

Response: The wDPS declined as a whole through 2000. Surveys in 2002 and 2004 indicated that the non-pup population grew between 2000 and 2004, but subsequent (incomplete) surveys indicate that it may have stabilized through 2007. At this point, the initial reference year would be 1998 or 2000, but in practice it would be any continuous 15-year period over which a statistically significant positive growth rate is estimated. NMFS intends to conduct Alaska-wide aerial surveys to count pups every other year. During the alternate year, it will conduct aerial surveys of non-pups. NMFS recognizes that weather, permits and other issues may affect its ability to complete a survey. NMFS will analyze the data it has at the time and determine whether the population qualifies for a change in listing status.

Comment: The criteria for downlisting the wDPS seem overly precautionary and unlikely to apply even if the population remains stable for a number of years.

The criterion for downlisting wDPS should be modified to allow downlisting of the wDPS if this population continues to remain stable or increases in abundance over a period of 15 years commencing with the year 2000.

Response: Given our current understanding of factors affecting the population, NMFS disagrees that the wDPS could be downlisted if it simply remains stable for 15 years. As new information becomes available and the circumstances warrant, NMFS will evaluate the recovery criteria.

Comment: The downlisting criteria for the wDPS are too vague in regard to the meaning of a "statistically significant increasing population" over a 15 year period. This should be clarified.

Response: NMFS will address the specific statistical procedures used to test whether the wDPS has achieved this criterion during the process of status review. As stated, counts of non-pups must show a significant positive trend over a 15-year period to satisfy this criterion.

Comment: The Executive Summary suggests that a non-pup count of approximately 55,000 animals in

2015 would meet the downlisting criterion, but Goodman's analysis suggests that a population of more than 60,000 in 2014 would have a 25% risk of quasi-extinction. It is therefore hard to reconcile the proposed criterion for reclassification with the Team's own definition of endangered status.

Response: NMFS did not exclusively use the PVA to develop its recovery criteria in the Plan, and instead used a weight of evidence approach. Therefore it is not valid to compare the estimated population sizes and extinction risks using the two methods.

Comment: Recognize the choice of statistical test and confidence bounds have policy implications.

Response: NMFS agrees.

Comment: The SSLRP places too much emphasis on the avoidance of local extinctions. Changes in SSL numbers in different regions of their range over time periods of decades to centuries should be considered normal.

Response: NMFS retained sub-area criteria because satisfying them will be one additional important manifestation that threats to the population have been mitigated or reduced throughout much of the population's range.

Delisting wDPS

Comment: The delisting criteria are not relevant in terms of delisting occurring during the shelf life of this plan. It might seem that no one should 'fall on their swords' over something that appears to have no practical impact.

The delisting criteria are relevant in to the extent they define "recovery." If "recovery" is defined as a growth rate that yields 107,000 animals by 2030, and that definition of recovery is used to assess "adverse modification" in a future Bi-Op, we may be requiring a carrying capacity of 107,000 animals. An alternative view of recovery is a stable or slowly increasing population in an environment with a lower carrying capacity whether modified by environmental changes or by fishing.

It is conceivable that Steller sea lions have stabilized around a lower carrying capacity and are not at risk of extinction. The current delisting criteria do not account for a decreased carrying capacity, as opposed to other potential criteria. The carrying capacity of the environment for SSLs may have decreased substantially due to various reasons (e.g. regime shift, fishery removals of prey, growth of competitor populations such as whales and Arrowtooth flounder). The current SSL population may be at equilibrium or close to that new, lower carrying capacity and therefore the delisting criteria of a population at 107,000 would be unattainable.

The ESA is intended to prevent species from going extinct, not to exceed their current carrying capacity. The recovery goals should be flexible and rewritten to accommodate the potential for a reduced carrying capacity.

The criterion for delisting of the wDPS should be modified if this population continues to remain stable or increases in abundance over a period of 30 years commencing with year 2000.

Response: These comments state or imply that fisheries and environmental variability have contributed to a decline in carrying capacity for Steller sea lions, hypotheses that the Plan acknowledges are possible

but about which there is considerable uncertainty. The Team and NMFS explored this scenario in the PVA, which accounted for the possibility that competitive effects of fishing may have changed the ecosystem but are largely mitigated by measures enacted in 2002. However, if fisheries have lowered sea lion carrying capacity and natural (i.e., less subject to mitigation) threats such as killer whale predation and environmental variability have some likelihood of causing a decline in the future similar to what some have argued occurred in the 1980s, the PVA (including the 1985-89 period of rapid decline) showed that a Steller sea lion population of only 50,000 animals would have a high probability of extinction. Given the uncertainty regarding the effects of fisheries, killer whales and environmental variability in both the past and the future, NMFS and the Team were unable to conclude that Steller sea lions have equilibrated to a new, 80% lower carrying capacity, and that the factors which contributed to this new lower level would not reoccur in the future. It is for this reason that the threats of environmental variability, competitive effects of fishing and killer whales are ranked potentially high (reflecting the considerable uncertainty in our understanding of them) and the recovery criteria are conservative.

Comment: NMFS should use criteria for listing and delisting of species that are closer to international standards (e.g. IUCN criteria). The 1 percent risk of extinction in 100 years standard is unnecessarily conservative and should be closer to a 20 percent risk of extinction in 5 generations (50 yrs).

Response: NMFS and the Team did not explicitly use the 1% risk of extinction in 100 year standard in the development of its recovery criteria. As shown by the next comment, the PVA estimated that the risk of quasi-extinction for a population that has grown at 3% for 30 years since 2000 is almost 10 times greater. NMFS used a weight of evidence approach in the development of its recovery criteria.

Comment: The criterion for delisting from the ESA is a 3% increase maintained over 30 years (equivalent to 107,000 animals in 2030). Goodman's analysis suggests that the risk of quasi-extinction for such a population is 9.7%. Again, it seems hard to justify that such a population is no longer threatened with extinction, since it does not even meet the Team's criterion for downlisting from endangered to threatened.

Response: NMFS did not exclusively use the PVA to develop its recovery criteria in the Plan, and instead used a weight of evidence approach. Therefore it is not valid to compare the estimated population sizes and extinction risks using the two methods.

Recovery Actions

Comments on specific recovery actions

Comment: Based on 15 years of additional research on the extent to which SSLs use their habitat on a seasonal basis, the priority of Recovery Action 2.1. (maintain and monitor critical habitat designations) should be changed to 2a, an action that must be taken as first priority

Response: NMFS will maintain, and modify as needed, the designation of critical habitat. It is NMFS' position (in the Plan) that redesignation of critical habitat is not a high priority action. NMFS is committed to using the best information available to designate critical habitat.

Comment: Under recovery action number 2.3.2, "Develop stable isotope and fatty acid methodologies to

assess prey consumption", NMFS should also incorporate DNA techniques into the Draft Revised Plan. They have been used successfully in a number of laboratory based studies, including some on SSL (Jarman *et al.* 2004; Deagle *et al.* 2005; Casper *et al.* 2006).

Under recovery action number 2.4.1, "Assess the relationships between oceanographic profiles or features and sea lion foraging ecology", is research aspect needs to be broader as it is unrealistic to expect strong relationships between physical oceanography and higher predators, particularly at fine scales. Perhaps there should be more emphasis on more proximal factors such as prey and primary production. In order to address this question it would be sensible to use tags to collect oceanographic data on the seals (Lydersen *et al.* 2002; Lydersen *et al.* 2004). This will provide oceanographic data at the location and at scale of the seals feeding.

Response: NMFS appreciates these comments and will consider them in the implementation plan.

Comment: Recovery Action 2.6.6 contains sub-task (repeated in 2.6.7) to explicitly account for SSL (and other ecosystem consumers) food requirements in setting ABC. The overall 2.6.6 task is ranked "2a" priority, 2.6.7 is ranked "2b." This task is very similar to a recommendation made in the draft Aleutians Island Fishery Ecosystem Plan (AI-FEP) for explicit adjustments to OY for predator species. The SSC had concerns reflected in their June minutes, and the Council deleted the recommendation from the AI-FEP based on those concerns

Retain Recovery Action 2.6.7 as a priority 3 task. Either include cost to the fishing community, or make it more explicit in the text that only agency costs are included, that substantial cost to the fishing community are involved, and why that choice was made not to present those costs.

In defining Recovery Action 2.6.7 task, draw a clear distinction between accounting for predator needs out of the OY versus out of the ABC.

Recovery Action 2.6.7 (Explore the use of ecosystem-based (multi-species) stock assessment models to set fishery catch limits to ensure adequate prey resources for a recovered sea lion population) is already being done in the normal course of the NPFMC process. The recovery action should be re-written to reflect current practice and be given a lower priority (priority ranking 3) or removed from the Draft Revised Plan.

Response: As part of the development of ecosystem approaches to fisheries management, NMFS plans to explore new models and harvest strategies to more explicitly account for the prey requirements of species that eat commercial species.

Comment: The paragraph under Recovery Action 2.6.6 that discusses the need to account for SSL food requirements when setting acceptable biological catches of groundfish should be deleted. This action as written infers that fishery management does not account for the nutritional needs of species that utilize fish targeted in commercial fisheries. These needs are in fact deliberately and consciously accounted for in setting ABC and TAC levels for all target species.

Response: NMFS disagrees. Nutritional needs of competitors are accounted for only in the natural mortality parameter (M) within the single species models presently used to assess populations and the harvest control rules used to set catch quotas. In single species stock assessments, natural mortality of a commercial species, e.g., Atka mackerel, is a rate, and as such, the total *biomass* 'lost' to natural mortality increases and decreases as the population of Atka mackerel changes. Thus, the biomass available for consumption each year is based not on the population sizes (or needs) of species that utilize

Atka mackerel, but on the size of the Atka mackerel population itself.

Comment: Recovery action number 3.2.2 is, "Reduce threat of illegal shooting by developing and promoting use of non-lethal deterrents for commercial fisherman". This is the subject of a great deal of on-going research around the world. The Draft Revised Plan needs to identify the need (and ways of facilitating) of interactions with other nations to increase the rate of progress made in these issues.

Although the priority ranking of 2a for Recovery Action 5.7.1 is appropriate, it is important to develop a more reliable monitoring scheme for Native subsistence harvest of SSL, similar to that used by the community of St. Paul.

Response: NMFS appreciates these comments and expects to address these issues in the implementation plan.

General Comments

Comment: Because population monitoring is so important to the assessment of recovery actions, NMFS should consider switching from biennial to annual surveys of pup production at key sites. This will be very important to the success of an adaptive management plan.

Make annual pup counts at least a 2a priority.

Response: NMFS and ADFG currently monitor pup production at 3 rookeries annually (Ugamak and Marmot in the wDPS, and Forrester in the eDPS). Monitoring is done from overlooks by personnel stationed at field camps and as such, does not cause disturbance. In addition, NMFS annually assesses pup condition and does counts at selected rookeries on an annual basis, but because of the disturbance caused by these on-site visits, an individual rookery is not visited in successive years. NMFS currently has plans to conduct aerial surveys of pup production in Alaska (including SE AK) every other year, alternating with aerial surveys of adults and juveniles. This survey protocol achieves the appropriate balance of cost, risk to personnel, data variability and ability to detect trends.

Comment: Global warming represents one of the gravest threats to the long-term survival of the Steller sea lion by threatening to reduce overall ocean productivity (reducing sea lion prey availability) and raising sea levels (impacting sea lion haulouts/rookeries). The SSLRP should describe explicit measures (recovery actions) to address these threats. At the very least, the Draft Revised Plan should recommend that actions be taken to significantly reduce anthropogenic emissions of carbon dioxide and other greenhouse gases.

Response: Both the Team and NMFS recognized that global climate change could change ocean productivity and the distribution of prey for Steller sea lions, and hence affect recovery. However, it was the collective opinion of the Team and NMFS that the specific threats listed in the Plan, particularly those ranked 'potentially high' were of a higher priority than global climate change. To a large degree, the specific effects of global climate change (other than sea level rise) are included within the Plan's discussion of the effects of environmental variability.

Comment: NMFS should give greater effort to securing observer funds for under-observed fisheries.

Response: NMFS appreciates this comment and will address this issue in the implementation plan.

Comment: NMFS should revisit the recovery planning guidelines and consider adding a category for

monitoring activities, which are vital for determining the status of the population but cannot be easily construed as "an action that must be taken to prevent extinction . . ."

Response: Recovery actions listed under Baseline Population Monitoring (particularly 1.1.1) deal with research related to monitoring, pup counts, vital rates, non-pup counts and other assessments of population status.

Comment: Not enough tasks are focused on the fishery. More studies should focus on manipulating the fishery rather than simply manipulating the SSL. Experimental manipulation of the fishery and assessment of its efforts and effects are critical to the recovery of the wDPS and other species in the same range that have also experienced similar declines. The Draft Revised Plan contains no specific recommendations for how a rigorous, experimental, and adaptive approach to investigating effects of fisheries and making suggestions for appropriate mitigation might be undertaken.

Response: In Recovery Action 2.6.8, NMFS calls for the design and implementation of an adaptive management program to determine the relative impact of fishing, environmental variability and predation on the recovery of Steller sea lions. It was beyond the scope of the Plan to go any further than this. Specifics of the adaptive management program will be left for the inter-disciplinary team assigned with its design.

Comment: Recovery actions appear to be given similar weight regardless of the severity of the threat to which they are targeted.

Response: Weights assigned to recovery actions reflect not only the priority in which they should be addressed, but also the fact that some actions require others to be completed first before they can commence; this can occur independent of the severity of the threat they address. NMFS will continue to reevaluate the priorities assigned to recovery actions in the Plan as new information becomes available.

Comment: The Draft Revised Plan relies on research priorities and methodologies that appear to be a reiteration of the same approach that has been undertaken for two decades yet appears to have provided little more information on the causes of decline.

Response: While considerable uncertainty remains concerning the specific causes of the decline, NMFS disagrees that research methodologies used in the past two decades have provided little new information on factors affecting Steller sea lions. This is evidenced by the reduction in the number of possible threats to the population from 12 (in 2000; in the legislation appropriating \$20 million for Steller sea lion research) to 3 (in 2007; identified as 'potentially high' in the Plan).

Comment: The recovery actions described within the Draft Revised Plan are appropriate to meet the recovery goals, and the recovery actions are consistent with the SSL life history information and population dynamics.

The recovery actions presented in the Draft Revised Plan are consistent with current knowledge of SSL ecology, population dynamics, and threats facing the population and should promote the recovery of the western SSL. However, as the factors limiting recovery are presently poorly understood, it is not certain that there are not other actions that might be appropriate.

Response: NMFS appreciates these comments. With regard to other actions that could also be considered, NMFS will continue to reevaluate the list of and priorities assigned to recovery actions in the Plan as new information becomes available.

Comment: The recovery strategy tends to focus primarily on needed research rather than on necessary management measures.

Response: NMFS (and the Team) felt that that Plan should have both research and management actions, but given the uncertainties in our understanding of the factors affecting the population, the actions are primarily focused on research.

Comment: The SSLRP does not go far enough to protect SSLs from the effects of fisheries. It should consider other potential measures such as permanent closure of all critical habitat areas to fishing.

Response: Effects of the current fishery management regime on all ESA-listed species will be considered in the forthcoming Biological Opinion.

Implementation Schedule and Plan

Comment: On page 79, the Plan notes that unlike the direct take of a species, indirect take through competitive interactions is nearly impossible to either prove or disprove. This should be highlighted in future research priorities, especially through the adaptive management approach. If the magnitude of these indirect ecological interactions can be determined using this approach it will be a huge benefit for the management of the species.

Implement a rigorous experimental research program that employs a genuinely adaptive management approach to assess the effects of fisheries on SSL and their critical habitat.

A much greater emphasis needs to be placed on the research required to assess the nature and magnitude of the threat from fisheries, and the impact of conservation measures on it, before there can be any confidence that the proposed Recovery Plan will actually have any effect on the risks of extinction for the western DPS.

Response: NMFS agrees with these comments. Development of an adaptive management approach was proposed as a priority 2a recovery action in order to create a process through which we can begin to determine the relative impact of environmental variability, anthropogenic influences, predation, and other threats to recovery.

Comment: Efforts to obtain a better understanding of changes in vital rates (action 1.2.1) should be a Priority 1 item, along with population monitoring (action 1.1.1) and development of the implementation plan (action 1.5).

Given the lack of alternative methods for obtaining estimates of demographic vital rates, and their importance to assessing recovery, the branding and re-sighting program should be expanded to include other regions.

NMFS should reconsider the top priority ranking for Recovery Action 1.1.1 (estimate trends for pups and non-pups via aerial surveys), and downgrade this priority activity to 2a. Although this action is very important, it does not fit the definition of an action needed to prevent extinction.

Response: NMFS agrees that obtaining estimates of sea lion vital rates is one of the most important recovery actions recommended in the Plan. The definition of Priority 1 actions, however, is restricted to those actions that must be taken to prevent extinction or to prevent the species from declining irreversibly in the foreseeable future. It was the understanding of the Team and NMFS that the only

research recovery action that was priority 1 was action 1.1.1, since it was the only action that provided the information necessary to assess the trend of the population and whether it was recovering or not.

Comment: Given what has been learned over the past decade, bioenergetics research (actions 2.5.1-2.5.4) should be changed from priority 2a/2b to priority 3. It is not that such research should not be done, but it seems difficult to justify such expensive research as a recovery action when a case has not been made for how the information would be used to promote recovery.

Response: NMFS will consider these comments further as it develops its implementation plan.

Comment: In section 3.1.1., "Monitor and evaluate incidental take in commercial and recreation fisheries through observer and self-reporting programs", to what extent can state of the art video monitoring systems be used to provide a better means of obtaining data across a greater proportion of the fleet?

Response: NMFS will explore these options as it improves its observer program.

Comment: NMFS must ensure that new and emerging research and analytical techniques are applied to all aspects of Steller sea lion recovery research.

Response: NMFS agrees with this comment and will strive to do so.

Comment: NMFS should develop the Implementation Plan and prioritize actions around a multiple hypothesis testing framework, rather than the sequential testing technique used in developing the threats assessments in the Draft Revised Plan.

The development of the Implementation Plan and an interdisciplinary, interagency team should be raised to a level 1 priority. NMFS should prioritize funding for the creation and maintenance of an implementation team that can assure that research designs are focal, robust and likely to fill important data gaps and/or inform management decisions.

The Draft Revised Plan does not adequately address the need for an interagency, interdisciplinary team that would be charged with implementing and coordinating research and actions most critical to recovery efforts of the wDPS stock.

The top priority should be the development of a focused implementation plan with research objectives that are likely to reduce uncertainty surrounding the threats to recovery.

NMFS should develop an overall implementation plan as soon as possible that specifies conservation and mitigation measures needed for recovery, a monitoring program to assess the effectiveness of those conservation measures, and including a program to coordinate and conduct research needed to guide recovery actions. This implementation plan should be developed by an interdisciplinary and interagency team.

Response: NMFS agrees that development of an implementation plan is an important step to be taken subsequent to the finalization of the Recovery Plan. NMFS appreciates the comments regarding its importance and the use of a multiple hypothesis testing framework (e.g., Wolf *et al.* 2006) to assist in further prioritizing research efforts. NMFS will use an inter-disciplinary team to assist it in developing the implementation plan and coordinating research and recovery actions.

Comment: Priority should be focused on the study of adult breeding females to assess the hypothesized decrease in reproductive success in the wDPS. Highest priority within tier 2a should be given to tasks related to (1) the development of capture techniques for animals older than 3 years of age, (2) targeted research on the foraging ecology and physiological condition of adult females, and (3) removal of MMPA permitting impediments.

Response: NMFS agrees that improvements in our knowledge of the condition and reproductive performance of adult females within the wDPS will be instrumental in guiding recovery actions in the near future.

Comment: Requiring development of a State Habitat Conservation Plan (HCP) is unnecessary and would not benefit SSL. Other laws and mechanisms are already in place to provide protection. This action item should be removed or at least downgraded to priority 3.

Response: NMFS disagrees with this comment. The development of an HCP is necessary so that near-shore fisheries authorized by the state of Alaska are compliant with the ESA. Information leading to the development of the ‘zonal approach’ used to mitigate interactions between Steller sea lions and federally managed groundfish fisheries indicated that the near-shore areas 0-3 nm from rookeries and haul-outs (state-managed waters) were the most important for sea lions. This, and insuring compliance of state managed fisheries with federal laws, indicates that Item 2.6.9 is a priority 2a action.

Comment: The Draft Revised Plan recommends an ESA Section 10 permit be issued for state-managed fisheries that are taking SSLs (p. 161). While such a permit is the proper way to authorize such take, until and unless such a permit is issued, all take of SSL (and other listed species) from state-managed fisheries is unlawful. The final recovery plan should recommend NMFS enforce Section 9 against the state unless and until the state applies for and receives the required permit. Similarly, there is no currently operative permit under Section 101 of the MMPA for any federal fishery that is taking SSLs. As such, those fisheries are operating in violation of both the ESA and MMPA. NMFS should take appropriate enforcement action against these fisheries until they operate in compliance with the law.

Response: NMFS agrees, in principle, with this comment and will take this under advisement. The Plan calls for the development of an HCP by the state of Alaska (Item 2.6.9). NMFS Office of Enforcement addresses takes in fisheries as appropriate.

Comment: Since the original designation of the western and eastern DPSs, additional genetic research has generally confirmed the strong east-west population structure, but has also shown that there is less distinction when both males and females are included in the analysis. One explanation for this finding is a greater level of male-mediated gene flow than of female gene flow because males tend to disperse further than females. Another important recent finding is that a large fraction of the pups in newly established rookeries in the eastern DPS were born to western DPS females. Given these findings, continued genetic research is likely to pay further dividends.

Response: NMFS agrees with this comment.

Comment: The importance of ecological factors (regime shift) in the decline is unclear. There is a lot of evidence, such as different rates of change in the eastern and western DPSs during the widespread oceanographic changes in the 1970s, which calls the whole regime shift idea into question. The seals have evolved their foraging and life history traits in an environment that apparently contains decadal-scale changes in climate and prey base. Further, the observed changes in population trajectories in the

western stock since fisheries control measures have been implemented illustrate that these interactions were an important contributing factor. Admittedly, there may be fundamental differences in environmental factors between the western and eastern stocks, but this seems less likely than fisheries being the under-pinning causal factor in the decline. Focusing on fisheries related factors will be the best value for the money.

The Recovery Plan should consider density dependent effects in all aspects of ecosystem research and the implementation plan should seek out opportunities to investigate the carrying capacity of the ecosystem to support SSL.

Research to specifically test whether the wDPS is now under a new, lower natural carrying capacity should be included as a priority 2a action.

Response: NMFS agrees that research of the forces affecting Steller sea lion populations will greatly improve our ability to promote recovery. There is considerable uncertainty regarding the relative magnitude of natural and anthropogenic factors (e.g., environmental variability and competitive effects of commercial fisheries) on sea lion recovery, and the extent to which each may have contributed to a new, lower carrying capacity. If carrying capacity is now lower, it is unclear whether it will continue to drop, how much fishing or natural changes are contributing to this change, and whether sea lions face a greater risk of extinction from factors that would not cause concern if the population were larger (e.g., probability of a disease outbreak).

Comment: We support focused research that would help determine if chronic nutritional stress is impacting reproductive aged animals, and thus population viability.

Response: NMFS agrees with this comment.

Critical Habitat

Comment: A heightened priority should be given to redesignation of Critical Habitat that takes into account more recent survey, telemetry, and foraging ecology studies.

Recovery Task 2.1 (maintain, modify as needed, critical habitat) should be given a priority of 2a instead of 3.

Response: NMFS will maintain, and modify as needed, the designation of critical habitat. It is NMFS' position (in the Plan) that redesignation of critical habitat is not a high priority action. NMFS is committed to using the best information available to designate critical habitat.

Estimates of Recovery Time and Cost

Comment: It should be noted that the reported recovery action costs are projected costs for the agency to conduct research and outreach activities as outlined and do not reflect the costs (foregone net revenues) to communities and industry.

The cost section of both 2.6.6 and 2.6.7 only include agency costs. Neither the forgone revenue to the fishing community of the maintaining the existing measures, nor the cost of a second tier of explicit set-asides from ABC on top of the implicit set-asides encompassed in "M," are calculated in cost analysis.

Response: The comments are correct.

Other General Comments

Comment: The Steller Sea lion Recovery Plan provides a comprehensive background of the biology, ecology and historical abundance of the species, factors potentially affecting its conservation status, an objective evaluation of threats and a range of action items designed to ensure delisting of the Western DPS over the next 30 year period. The overall output is very balanced and objective and the Recovery Team should be congratulated for their efforts.

The Draft Revised Recovery Plan is well crafted, thorough, and accurately describes the threats facing the western DPS of the Steller sea lion as well as the current research and protection measures. It should be promptly finalized after making minor changes and additions.

The ecological and biological information presented in the SSLRP is comprehensive, adequate, and scientifically defensible. Where there are divergent views within the scientific community, this is identified and a balanced account of all views presented. There were some areas that would have benefited from additional detail, but these were not common.

Independent expert reviews have supported the balance and appropriateness of the SSLRP. The changes made between the 2006 and 2007 drafts are minor and there is no need for further review. The SSLRP should be a "living document" that can be adapted as new information becomes available. NMFS should now focus on quickly finalizing and implementing the SSLRP. NMFS should adopt a final plan that is the same as the revised draft in all key respects.

Response: NMFS agrees with much of the comment. However, in determining whether to make changes to the 2006 draft plan, NMFS considered the best available information including, but not limited to, the information in the draft plan, key new information that had become available since the draft, and comments received following public review. Based on careful consideration of all of the above, NMFS made appropriate revisions to the draft to prepare the final Plan.

Comment: The Draft Revised Plan provides a comprehensive review of what is currently known about the ecology of SSL in both the western and eastern DPS but the way in which the information is presented and reviewed is highly variable. Readers are likely to be confused by the combination of fact, hypothesis and opinion that characterizes some subsections, particularly the section on nutritional stress.

Response: NMFS realizes there is a lack of consensus in the scientific literature (and on the Team) regarding the magnitude of certain factors in the past and as threats to recovery. NMFS has attempted to address some of this confusion in the final version of the Plan.

Comment: Given the serious deficiencies with regard to the Draft Revised Plan's treatment of the eastern DPS, that portion of the Draft Revised Plan should be severed from the western DPS plan, significantly revised, and recirculated for public comment prior to finalization.

Response: NMFS disagrees. The eastern DPS as a whole has increased at between 3-4% per year since at least the late 1970s (Pitcher *et al.* 2007), and does not appear to be subjected to the same suite or magnitude of threats as the western DPS. NMFS feels that the Plan's recommended recovery criteria and actions are consistent with the available information on status and trend of the eastern DPS.

Comment: To guard against the perception of an unbalanced treatment of the scientific data, a small group of non-agency scientists should be included in a team responsible for preparing a final draft of the

recovery plan.

The policy arm of NMFS, not the scientists involved in SSL research, should provide a clear statement of NMFS policy with respect to recovery, independent of the SSLRP, based on the legal obligations upon NMFS. NMFS should then establish an independent panel (mainly of scientists, many of whom should not be involved in SSL research) to map the current science into the policy and to produce a new SSLRP to achieve the objectives.

The SSLRP has been written by a group of stakeholders, all of whom have attempted to manipulate the process in one way or another. This results in the worst of all worlds - a plan that has no purpose other than to address the standoffs between the different stakeholder groups.

NMFS personnel that are making scientific judgments cannot also be making policy regarding the recovery plan. The temptation to manipulate the scientific evidence to support a particular policy view is just too great and the perception is that the SSLRP is seriously infected with this type of bias. NMFS staff should not be allowed, or allow themselves, to get involved in these types of arguments. In the end, NMFS has to sit in judgment on biological arguments and make management decisions. In this case, they are acting as both the judge and the advocate, which is morally and procedurally wrong.

Response: NMFS disagrees with these comments and suggestions. The original Recovery Team was composed of a very diverse group that represented the broadest possible range of interests in the recovery of Steller sea lions. This undoubtedly lengthened the process because of the discussions that ensued on most topics and the inability to provide strong explanations for the past and present declines, but this also brought all possible views to the table. NMFS scientists that served as Team members have no policy views other than seeing that the scientific information used in the Plan is the best available.

Comment: NMFS did not respond to specific concerns and comments submitted on the 2006 Draft SSL Recovery Plan. Many of the problems with the current Draft Revised Recovery Plan, noted in comments on the 2006 draft, have not been remedied. Comments on the 2006 draft therefore should be incorporated by reference.

Response: NMFS considered comments on the 2006 draft in producing the May 2007 draft. See the Responses to Comments document posted on the NMFS website (www.fakr.noaa.gov) for the responses to comments on the May 2006 draft.

Comment: The decision to convene a Recovery Team whose members held such diametrically opposite views on the main causes for the reduction in abundance of the western DPS of SSL was a bold, but high risk one. It does not appear that this conflicted Team has succeeded in developing an ecologically and biologically defensible recovery strategy for the wDPS. They could not agree on the relative importance of the threats and thus produced a grocery list of research needs that reflect the recent past research efforts. This shotgun approach has failed to provide any clarity to distinguish among the threats and needs to be abandoned in favor of a more focused approach.

Response: NMFS disagrees. Comments on the May 2007 draft Plan from multiple peer reviewers and the public have been largely favorable regarding the overall strategy for recovery, and the final Plan reflects changes made to address comments received. Considerable progress has been made in the last decade on the magnitude of various threats. In 2000, twelve factors were listed as possible contributors to the Steller sea lion decline and the lack of recovery up to that point in time. This Plan now lists only three (environmental variability, competitive effects of fishing, and killer whales) as potentially high

threats to recovery. Progress has been made regarding the potential impact of the remaining threats to rate them as low or medium threats to recovery.

Comment: NMFS should designate an SSL research coordinator to reduce the potential for unnecessary or duplicative research.

Response: The Steller sea lion research community has met, and continues to meet, annually to discuss and coordinate research plans for the year. Currently, these meetings are held at the Alaska Marine Science Symposium in January. Both before the Symposium-related meeting began and currently, the Steller sea lion research community has communicated with each other continually throughout the year to avoid duplication and unnecessary disturbance at field locations. NMFS has filled the Steller sea lion coordinator position. This coordinator is kept informed about all active field research activities and funnels research findings through the management arena.

Comment: NMFS should provide to the NPFMC and the public an annual report on the status of SSLs in the North Pacific. This report would discuss new scientific information, summarize new trends in the population, summarize any actions taken pursuant to the revised recovery plan, and provide information on the status of the population relative to recovery factors and the listing criteria.

Response: NMFS provides updates on Steller sea lion status and recent research findings to the groundfish plan teams of the NPFMC, the Steller sea lion mitigation committee (of the NPFMC), and to the Pribilof Island Collaborative on an annual or more frequent basis. In addition, a summary of sea lion status is updated each year in the Ecosystem Considerations chapter of the SAFE reports. This information can be found at the NMFS Alaska Fisheries Science Center's website at <http://www.afsc.noaa.gov/REFM/docs/2007/ecosystem.pdf>, or <http://access.afsc.noaa.gov/reem/ecoweb/index.cfm>). A summary of a recent survey for adults and juveniles is available at <http://www.afsc.noaa.gov/nmml/pdf/SSLNon-Pups2007memo.pdf>. These websites are updated with new information when it becomes available).

Comment: NMFS should revise comments and research priorities in the Recovery Plan that unnecessarily undermine or criticize the exceptional management of fisheries in waters off the coast of Alaska, including criticism of MSY, F40, OY, and other harvest control rules. Alaska fisheries management is the best in the world with regard to ecosystem management and the SSLRP should not undermine this exemplary system.

Response: NMFS is developing ecosystem approaches to fisheries management, and this process is underway in the North Pacific in the management of Alaskan groundfish fisheries. The Plan accurately indicates that current harvest strategies employed in the North Pacific are based on single-species concepts. NMFS has enacted other measures (e.g., time-area allocations of catch quotas) to distribute effort to minimize the likelihood of deleterious interactions with Steller sea lions.

Comment: It is not clear to what the items in parentheses refer (e.g. 55 FR 12645, 50 CFR 226.202, etc.). It would be helpful to provide some explanation.

Response: These refer to specific sections of the Federal Register (FR) or Code of Federal Regulations (CFR). For example, 55 FR 12645 refers to Volume 55 of the Federal Register, page 12645. Regulations and Federal Register notices regarding sea lions and sea lion protection measures that are referred to in the Recovery Plan are available through the NMFS Alaska Region Steller sea lion website: <http://stellersealions.noaa.gov/>.

Comment: NMFS has an unstated objective to put further controls on the fishing industry based on a "belief" that it is necessary, but without the scientific evidence to properly justify it, and has presented information in a way that supports this hidden agenda. The analyses of fishery effects/nutritional stress compared with killer whale predation are notably inconsistent and illustrate a general lack of objectivity in the underlying approach.

Response: NMFS disagrees with this comment and believes that we have presented information objectively. NMFS used this information to recommend appropriate recovery criteria and actions. This belief is supported by the comments of multiple reviews from scientists, managers and marine mammal experts from around the world.

Comment: Pg. 24. "Long-range trips started around 9 months of age and likely occurred most frequently around the time of weaning...". Behavioral observations of sea lions at haulouts suggest the timing of weaning is around 12 months of age, not 9 months of age (Trites and Porter 2002; Trites *et al.* 2006).

Response: Loughlin *et al.* (2003) noted that changes in trip lengths and other metrics of at-sea behavior associated with weaning started as early as 9 months of age. This starting age would thus include individual sea lions that began behavioral changes associated with weaning at slightly older ages (e.g., 12 months).

Comment: Pg. 43. par. 1. The correct citation for dietary information of Steller sea lions in Southeast Alaska is Trites *et al.* (2007a).

Suggestions are made for improving organization of the document to bring related concepts together.

There are a number of suggestions for editorial improvements listed by page number and line or by table and figure number.

There are many references cited in the text that are missing from Chapter 8, Literature Cited.

Response: NMFS appreciates these comments and made corrections as necessary.

The system used to number paragraphs is irritatingly complex and makes it very difficult to navigate through the document.

Response: NMFS apologizes for any confusion caused by the system used to organize the Plan. The organization was developed based on guidance on recovery plan format used throughout NMFS for consistency.

Miscellaneous Issues

NMFS should finalize and implement the Draft Revised Recovery Plan

Fishing is the only high-ranked threat identified in the Draft Revised Recovery Plan that has a high feasibility to mitigate impacts.

The fisheries conservation measures put in place in the late 1990s appear to be having a positive impact, "demonstrating that there is hope and value in this approach".

Response: NMFS agrees with these comments. Our intent is to finalize and implement the Plan. While fishing is the only highly ranked threat with a high feasibility of mitigation, management actions to

promote sea lion recovery must still be crafted such that they mitigate the actual threat and are not simply crafted because they are feasible. Regarding the efficacy of the measures enacted since the late 1990s, the Plan has an action item (2.6.6) to ‘evaluate and implement appropriate fishery regulations to protect foraging habitat and prey resources for sea lions.’ This action calls for the maintenance of the current level of protection ‘until it can be positively determined that reducing those protections for Steller sea lions would not reduce the likelihood or increase the time to recovery.’