Review of the Steller Sea Lion (*Eumetopias jubatus*) Recovery Plan for the Center of Independent Experts

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23-28 June 2007

1. Executive Summary

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 multi-jurisdictional distribution of the species and uncertainty regarding much detail of the species ecology and demography, and the broad range of views regarding the relative importance of a multitude of natural and anthropogenic factors impinging on the recovery of the species provide considerable challengers for managing the recovery of the species. I think the overall output is a very balanced and objective, and the Recovery Team should be congratulated for their efforts.

A number of key recommendations based on review of this document are provided. The most critical relate to recovery actions. The recovery team correctly identifies that the most critical recovery actions focus around baseline population and monitoring, as this will underpin assessment of the success of the Recovery Plan. Because this is so important, I strongly recommend that Team consider the merits of changing the proposed monitoring of pup production at key sites from biennial to annual surveys. This will ultimately double the power of detecting changes in population trajectories, and enhance the likelihood of success in determining the relative importance of natural and anthropogenic factors in affecting sea lion reproductive output, as proposed in the adaptive management program.

2. Description of the review

The following description of the review is subdivided, for ease, into the main sections of the Steller Sea lion Recovery Plan. Within each section I provide a summary of my appraisal of the section, followed by specific corrections or suggestion to the text within that section of the report.

Executive summary

General comments
The executive summary provides a concise overview of the Recovery Plan

Specific comments
In paragraph 1 on page 1, it is not clear to me to what the items in parentheses refer (55 FR 12645, 62 FR 24345, 62 FR 30772); these are also referred to later in the document (eg. p. 9). It would be helpful to provide some explanation. Are these documents, items of legislation or what? It is unclear.

I. Background

General comments
Overall the background of the Recovery Plan provides a good synthesis of the current knowledge of the biology and ecology of the Steller sea lion. There is clearly a lot of information to synthesize, and concisely present.

In Section B, there are a couple of issues to address. Firstly, the reference to "62 FR 24345" and their like (eg. 62 FR 24345 (p. 9, paragraph 3); 62 FR 24345, 62 FR 30772 (p. 10. paragraph 1); 58 FR 45269 (p.24, paragraph 4); 50 CFR 226.202 (Figures 1-9 and 1-10)). To what do these refer? No explanation is given anywhere.

Secondly, some sections split the western DPS into Russian and/or Asian regions, and the differentiation is unclear. There is some confusion/inconsistency with reference to Asian rookeries (p. 10, paragraph 3) and Asian populations (p. 10, paragraph 6). Fig 1-1 is unclear in delineating anything except eastern and western DPS. A clear and unambiguous figure detailing stocks is needed. Do Asian populations or rookeries occur, are these west of the Commander Islands, and are these Korean of Japanese? This seems contrary to the figures and tables. Figure 1-4 clearly states the western haul-outs and rookeries are Russian. Tables 1.3 and 1.4 are also clear in indicating these sites are in Russia. Under subheading 2 Russia and Asia (p.16), all references to the region in this section refer to Russia or Russian, with no reference to Asia. So, in paragraph 3 on page 22, when the Asian coast referred to, is this meant to be Russian? These inconsistencies need to be addressed.

Section C – Overview of population status. This is the most troubled section, principally because there are a lot of disparate data sets to synthesize. Some editorial improvement would help the reader significantly.

There needs to be care given in insuring that place-names referred to in the text are present in 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. This is especially so for the sections on status and trends where all geographic names in the text. These must be clearly identified in the figures.

Regarding marine habitat use (section F2), it is unclear how extensive the data set on foraging actually is (ie. numbers of seals tracked, what is the breakdown of gender, age and location). It would be helpful for the reader to have some indication on how representative the data sets are. It is apparent, here, although not stated, that there are limited data on the foraging behaviour of sub-adult and adult males. It would be helpful to be more explicit in this section.

In the section concerning pup versus non-pup surveys, there needs to be some background to the history of population surveys to the species given in the background. To the uninitiated, it is unclear why the non-pup surveys have been undertaken, given their highly qualitative nature.

Greater explanation is needed up-front, so that the reader understands why data are being presented.

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. There needs to be consistency in their naming, as well as having clear and informative figures that detail their location.

Specific comments

Page 9, paragraph 3. There is reference to 62 FR 24345 without any explanation as to what it means.
Page 10, paragraph 1. As before, there is a reference to 62 FR 24345, 62 FR 30772 without any explanation as to what it means.
Page 10, paragraphs 3 and 6. Reference to rookeries in Asia (see general comments above).
Page 10, paragraph 4, line 3. Suggest changing sentence from "There was not a clear separation." to "There was no a clear separation….."
Page 11, paragraph 1. Samalga Pass – reference to these geographic locations in the figures would be helpful.
Page 12, paragraph 3. Reference to 16,000 sea lions in Asia - is this west of Commander Islands or inclusive of them? Is this is meant to be Russian?
Page 15, paragraph 2. There are 2 pup multipliers used, 4.5 and 5.1. Here the 4.5 correction used, in other places both correction are listed. Check consistency.
Page 15, paragraph 4. Reference to Walrus Island includes pup count data from, 1960, 1982, 1991, 2001 and 2005. There should be reference to Table 1-2. Also, data referred to in the text is absent in Table 1-2 (eg. 2,866 pups in 1960, 50 pups in 1991). Also years 1985-89, 1994, and 1997 are missing in the text but are presented in Table. It is fine to summarize information from the table in the text, but there is a clear problem of data presented in the text that is not included in the table.
Page 16, paragraph 2. First and second sentence clearly indicate that of 77 haul-outs, 3 had been rookeries, 49 haul-outs active (20 abandoned), 5 uncertain and no breeding. However, the last sentence of the paragraph states that in 2005 sea lions numbered about 16,000 (including pups)? If there are no rookeries, how can there be pups? This also contradicts Tables 1-4 that list pups on Russian sites.
Page 18, section 3. British Columbia – there is no reference to Figure 1-7 indicated.
Page 19, sections 4, 5, and 6 there is no reference to Figures 1-7, 1-8.
Page 24, paragraph 1, line 4, I recommend changing "suggesting that sea lions do not..." to "suggesting that **they** do not…."
Page 24, paragraph 3. It is unclear how extensive the data set on foraging actually is (ie. numbers of seals tracked, what is the breakdown of gender, age and location). It would be helpful for the reader to have some indication on how representative the data sets are.
Page 25, paragraph 2. The reference to three "marine areas" being chosen is ambiguous for two reasons. First, I note in Figure 1-9 there is reference to "Aquatic foraging areas" – geographically these seem analogous to those mentioned in the text (p.25, paragraph 2). If so, the terminology should be made consistent. Are they also the same as the areas designated as "critical habitat" (p. 24, paragraph 4)? Second, the reference to these areas being chosen is unclear as there is no indication for what reason areas where chosen. Are these areas of marine reserves, fisheries closures, or other management designation?
Page 28, paragraph 3, line eight. Phrase "showed an erosion in natality …", - I suggest replacing "erosion" with "decline".
Page 35, paragraph 2. "Forrester **i**sland" is missing a capital.

Page 35, paragraph 3. There is a reference to "..a SDR to determine locations" - what is an SDR (satellite-dive recorder?)
Page 47. Table 1-2. As indicated above, why not extend data in table back to 1960 for Walrus Island (see notes for p. 15 paragraph 4).
Page 49. Table 1-4. In the column "Sea of Okhotsk", does it include just Iory Island? Looking at Figure 1-4, it is the only location, or does it include Yamsky Island?
Page 60. Figure 1-1. This is a poor quality figure. Based where it is referenced in the text, it appears it should clearly delineate the stocks. There is no reference to Russian stocks (Asian?). Also there is a large red E and T, and no indication in the caption what these refer to. The smaller trends figure has a separate trend line for Western and Asian stocks, yet it is not apparent in the figure or in the text (see general comments above) where the Asian (or if it is a Russian stock) is.
Page 61. Figure 1-2. There is no reference to Kenai-Kiska region. This would be helpful.
Page 62. Figure 1-3. There is a part polygon – does this delineate the EAI region or something else? This should be made clear in the caption.
Page 63. Figure 1-4. This figure is harder to read than 1-2, 1-3, 1-7 and 1-8, and there are style differences from these other figures. No trend data is presented, lettering is very hard to read, no location of trend sites marked, and the style for haul-out/rookeries is different (trend sites, principal rookeries in other figures). East Kamchatka region is not delineated (referred to in Table 1-4). All regions and sites mentioned in text and tables should be detailed clearly in Figures.
Page 65. Figure 1-6. Is this figure redundant? Otherwise a figure like this that includes the whole Western DPS would be useful (ie. replace Figure 1-1 with a figure like 1-6, with the latter being clearer).
Page 66. Figure 1-7. Note the different style in use of haul-out , major rookery and SE AK trend site.
Page 68. Figure 1-9 (Aquatic foraging area). Again (as above) there is no indication in the caption or in the general text as to what these regions are. Are they protected areas, fishery closures or what? Also see p. 25, paragraph 2 comments above. What is the reference in caption to "50 CFR 226.202"?
Page 89. Figure 1-10. What is the reference in caption to "50 CFR 226.202"?

II. Conservation measures

General comments
This section provides an overview of the conservation measures that have been undertaken to reduce threats to Steller sea lions. This includes sections detailing conservation measures relating to A) intentional and illegal killing, B) incidental takes in commercial fisheries, C) subsistence takes, D) research-related mortality, E) pollution, contaminants, and entanglements in marine debris, F) disturbance on terrestrial sites and critical habitat, and G) reduced prey availability due to fisheries.

All the sections provide useful and informative summaries, and provide some level of detail on the actual conservation measures introduced. The one exception is section G) reduced prey availability due to fisheries. On page 74, there is reference to NMFS implementing "a number of conservation measures intended to ensure that commercial harvests (of fish)….not limit the recovery of Steller sea lions" following the listing of the species in the early to mid-1990s. On page 75, there is reference to "additional conservation measures" being implemented following NMFS" review of groundfish fishery management in the late 1990s and early 2000s. There is

also reference to a “suite of fishery conservation measures” being implemented in 2002, and an evaluation of conservation measures in 2003 after they had been implemented in 2002, and so forth. The key point is that unlike all the other sections where some detail of the conservation measures introduced to mitigate the threat is given, section G provides the reader with no indication as to the level and extent of commercial fishery conservation measures. Reference to documents detailing the measures introduced and a review of their effectiveness is given, but this is not very informative. All the reader is told is that the conservation measures “were intended to reduce fishing in near-shore critical habitat, reduce seasonal competition for prey during critical winter months, and disperse spatially and temporally to avoid local depletions of prey and increase the survival rates of juveniles” (p. 75).

It is very important that the critical conservation measures are presented, even in tabular form. Surely these conservation measures were some of the most difficult to implement from a socio-economic and political perspective, and (as indicated in the report) have probably been the most important in arresting the decline in western stocks. For these reasons, I believe some greater efforts are required to document what the critical conservation measures were. This would also help address some of the ambiguities in Section 1, especially with reference to “marine areas”, “aquatic foraging areas”, “critical habitat” and “20 nm zones” (Figure 1-9), which presumably all relate to the fishery conservation measures, but for which no detailed explanation is given.

Specific comments

Page 74, paragraph 5. Reference to Figures II-1, 2 and 3 in text simply state that “(f)ishery removals have the potential to reduce the availability of these species to sea lions at a variety of spatial and temporal scales”. These figures show some variation in catch rates over time at various locations. The main body of the text and the captions are not overly informative and do not help to demonstrate the point being made in the text (ie. three figures for one sentence of text). Also the figures make reference to “critical habitats”; these should be clearly indicated in figures in Section I. Are these the “aquatic foraging areas” demarcated in Fig 1-9, or are they within the 20nm around rookeries? Unless a greater explanation or use of these figures is given in the text, I would recommend deleting them. As they stand, they provide little to the document.

Also note that in Figure II-2 that the “nm” is missing from the legends in 2 of the graphs. Also there is no reference to what “0-10nm”, “Total CH” or “Total catch” refer too. I presume “total catch” refers to the total catch in the region, the 0-10nm refers to the portion of the total catch taken from within 0-10nm of rookeries (and maybe haul-out?), but I cannot discern what “total CH” refers to (“critical habitat” I presume from Figure II-1, but there is no reference to where this critical habitat is). Again, explanation in the text and figure captions could be improved significantly.

III. Factors potentially influencing the Western Population

General comments

This section provides an overview of the potential importance of a range of factors that may be influencing the western Steller sea lion population. It is broken into two main sections, A) Food Web Interactions (1. direct and indirect, 2. top-down and 3. bottom up), and B) Factors affecting Steller sea lions. The later covers a range of topics including 1) killer whale predation, 2) shark predation, 3) commercial harvest, 4) subsistence harvest, 5) incidental take by fisheries, 6) illegal shooting, 7) entanglement in marine debris, 8) disease and parasitism, 9) toxic

substances, 10) disturbance, 11) nutritional stress and 12) climate change. These present a large range of topics, and the section is generally well put together and covers the huge ground and material well.

There appears a reasonable "balance" in terms of the coverage given to each topic, although the killer whale section (7 plus pages) appears over-represented. The debunking of the "sequential megafaunal collapse hypothesis" could have been addressed more economically. I was surprised that in the section on "Direct impact of killer whales on Steller sea lions", there was no reference to any trend estimates in killer whale abundance in the region. I would have thought that this would be important in determining the relative impact their predation may have caused during the recent past, and what the trends are telling us now about how their relative impact may change into the future. The section on data gaps should clearly emphasize under point 3 the need to determine trends in relative abundance of the three killer whale groups.

I note that some of the 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, and I am sure this is not the case. It would be good to see consistency with a section on "Data gaps" at the end of each of the sections, even if it these state that at present data deficiencies are limited.

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.

Specific comments
Page 92, line 4. The full stop following "…on St. Paul Island**.** (Zavadil et al. 2006)." should be removed.

IV. Threats assessment for the Western Population

General comments
This section provides an appraisal of the factors that may represent a threat to the western population of Steller sea lions. A qualitative "weight of evidence approach" was used to assess the relative importance or impact of these factors (discussed in section III) because of the high level of uncertainty surrounding the relative impact of each threat on sea lion population dynamics. Generally I think this approach is appropriate, practical and pragmatic. Eleven threats are identified, including 1) environmental variability, 2) competition with fisheries, 3) predation by killer whales, 4) toxic substances, 5) incidental take by interaction with active fisheries, 6) subsistence harvests, 7) illegal shooting, 8) entanglement in marine debris, 9) disease and parasites, 10) disturbance from vessels and tourism, and 11) disturbance for research activities. Environmental variability and competition with fisheries were considered to be potential high threats, while predation with killer whales and toxic substance was considered to be of medium threat. All remaining factors were considered to be a low threat.

The main issue I picked up in this section was that the weigh 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 sometime clouds the relative positions of the report findings, especially for section III. For example in the section examining threats from environmental variability (A1), the case presented in support of a

high ranking (2nd paragraph) appears directly contrary to the conclusions reached on pages 100-102. Perhaps there can be greater reference between these sections where information may appear contrary, when it is not meant to. I understand that 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 perspective to reduce the risk that some factors, considered unimportant by some groups but not others, are actually examined in case they really are an important threat.

I was surprised to see that incidental take in active fishing gear was listed as a low threat. The information on the historic levels of incidental take are sparse in the background sections (although the Table 2 Appendix clearly indicates the magnitude of possible incidental take in the past), and because of the limited data /information presented on the specific fishery conservation measures introduced (see above), such as the level of independent observer coverage on vessels, it is difficult to develop an objective and informed appraisal on this factor. Is there a lot of confidence that incidental take is negligible because of the high level of independent observer coverage on fishing vessels, or because of other fishery conservation measures (not detailed) that have been introduced? I note that there are fisheries listed with limited or no observer coverage at all. Again, given that historic issues with fisheries interaction have been considered the most important factors contribution to declines in the stocks, this section's support for a low ranking is almost overtly casual. Given that some rookeries in the western population have still yet to show signs of recovery, the uncertainty of foraging information for many sites, and the issues of uncertainty of incidental take in Russian waters, there would seem to be a case for this factor to still have potentially high importance.

To me the support for a low category is weak given the uncertainty presented. I suggest that this section be improved to provide more compelling support for the low ranking. In its present form it is not overly convincing. If there is a contrary view it should be well articulated. I also note in for the recovery strategy (section V) that two of the four key action items recommended to be implemented relate to maintenance and evaluation of the fishery conservation measures (Actions 2.6.6 and 2.6.8).

Specific comments

Page 110/111 – there needs to be some reference to Table IV-1 here, it provides a synthesis of the threat assessment, and yet no reference is made to it in the section. Mention should also be made in the synthesis and discussion section of threats (pages 118-119) – or if the table is redundant, it can be deleted.

Page 114, last sentence. Is killer whale predation the single largest source of sea lion mortality? I would have thought starvation mortality of pups and yearlings as the single largest source of mortality.

Page 115 – See earlier comments above regarding incidental take in active fishing gear.

Page 116, second last line. Insert "many" – "potential for entanglement because **many** entangled animals may die..".

V. Recovery Plan for the Western population

General comments

This section essentially follows the statutory requirements set forth in the ESA, that recovery plans provide 1) a description of site-specific management action required to achieve the plan's

goals of survival and conservation of the species, 2) objective measurable criteria which when met result in the species being de-listed and 3) estimates of the costs and time require to carry out the conservation measures.

The section has seven major sections, a) definition of recovery, b) goals, c) recovery strategy d) development of recovery criteria, e) delisting, f) recovery action outline and g) recovery action implementation and schedule. Note there are some serious section formatting errors here that need to be addressed. There are two section As and two section Es. The current order of sections is A,A,B,C,E,D,E. Under the development of recovery criteria section (currently section C, but I think it should be D), the numbered subsections are messed up (1,1,2,3,4,D,1,2,3).

The sections on defining recovery, the conservation goals (with the ultimate goal being sea lion removal from Federal list of Endangered Wildlife and Plants, intermediate goal, delisting from endangered to threatened), and the recovery strategy provide a useful background and framework.

In “developing the recovery criteria” section, the plan sets out a clear framework that recovery criteria must include biological and recovery factor criteria, with biological criteria requiring evidence that the population status has improved in response to the reduction of threats, while the recovery factor criteria require evidence that the threats have been eliminated or controlled and are not likely to recur. This section deals primarily with the use of PVA approaches to develop biological recovery criteria – there is reference to the PVA developed that is presented in the plan’s appendix (also see comments on the appendix, below). As stated, the team essentially rejected the quantitative PVA approach, given the significant uncertainty associated with many of the factors required to be estimated. As indicated, the process has helped advise the team on the importance of addressing many of the data deficiencies, that have become focal points for recovery actions in the new plan.

I was curious to read that although the recovery criteria are required to be measurable and objective, the ESA does not provide explicit standards of criteria beyond general descriptions, and that the selection of risk is a policy decision based on the acceptance of risk. There is no agency policy regarding extinction risks.

Following on from this it appears up to NMFS to determine what the appropriate risk or extinction standards should be. On page 127, it is mentioned that the NMFS held a workshop to consider recovery criteria for whales, and that the Quantitative Working Group proposed guidelines on ESA listing criteria. Based on these, a 1% probability of extinction over 100 years was considered of high risk (presumably endangered). I think it would be worthwhile providing some additional detail here. What is presented does not leave me feeling confident that the criteria developed are entirely appropriate. Generally, it is vague what the DeMaster et al. 2004 review used as the basis for determining appropriate extinction risk. For example, it is unclear whether the extinction risk is based just on whales (if so, is this really appropriate for sea lions?). Also, there should be at least some reference to other endangered pinnipeds, in term of the general approach to setting risk criteria. Moreover, how does the criteria set (ie. endangered, ≥1% extinction probability in 100 years, threatened, <10% probability of becoming endangered in 20 years) differ to IUCN criteria? Finally, what criteria would need to be met for delisting the species to not-threatened? While this question is addressed in the section on the eastern DPS, which is listed as threatened, the criteria for de-listing appear to be the same for the endangered western DPS (ie. de-list from threatened to not-threatened on the basis of a 3% growth over 30 years). Greater clarity and defense of the criteria set need to be demonstrated here.

A large part of this section is taken up with an outline of the Recovery Actions recommended for the Western DPS. Each is detailed in dot point under key headings (eg. baseline population monitoring, insure adequate habitat and range for recovery, protection from over-utilization, protections from disease, contaminants and predation and protection from other natural or anthropogenic factors). Short summaries of each of these then follows. I suppose that in general and by necessity these summaries are very brief and often short on detail, and I found that many of them raised more questions than answers provided. I was left wondering how you would best evaluate priorities/needs and value for money. I also had trouble evaluating which ones address real needs versus those that certainly provide interesting avenues for research, but which may be less critical to achieving the aims of the plan.

From my perspective, and it is clearly a view shared by the recovery team that the continuation and improved development of population monitoring methods underpins the entire recovery process. However, it is unclear to me why the team is sticking to biennial surveys at trend sites. I can see the justification for non-pup surveys, as these provide less quantitative information about population vital rates. However, for pup production trend sites, I question why the team has not consider annual counts, at least for some of the more critical monitoring locations. If biennial counts are done, then there will only be 15 data points over the next 30 years, and this will reduce the potential statistical power by half compared to annual surveys. I strongly recommend a re-evaluation of the survey design on this matter.

I applaud the team's insistence that a branding and re-sighting program should be maintained and in fact expanded to other regions, despite some imposing logistical constraints. As stated, the importance of obtaining estimates of vital demographic rates and the lack of alternate methods for obtaining these estimates justify these activities.

There seems some cross-over in methods and goals for some of the sections. For example, section 2.4.3 and section 2.6 deal a lot with ecosystem modeling, addressing data deficiencies and needs. There could some simplification (i.e. coalescing) of projects/needs focused under groupings of scientific disciplines.
With respect to section 2.6.8, "Design and implement an adaptive management program for fisheries, climate change and predation", It is good to see this listed here and discussed, but I question the feasibility of such an experiment that can tease apart the relative impacts of fisheries, climate change, and predation.

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? Also, what is being done to support the development of observer programs in the western stocks in Russian/Asian waters? Finally, are there any high-seas fisheries that need to be addressed in terms of implementing observer programs?

In section 3.2.2, "Reduce threats of illegal shootings", is there any chance of legislating no fire-arms on boats?

In section 5.6.2, "Publicize current conservation efforts and protective measures", I understand there have been some serious delays in implementing some of the research needed to underpin conservation measures, due to opposition from animal welfare groups. I think there is a clear challenge and need to better engage with these groups so that they understand the importance

of the research, such that these lobby groups do not in themselves become a threatening process, impacting the recovery of the species.

With respect to the final section, that concerning the recovery action implementation schedule, this is a table outlining actions, projected costs and responsible agencies. It is a very difficult task for the reviewer to evaluate these. Clearly many are estimates, and full costings have not been undertaken in detail. As such it is difficult to evaluate their appropriateness.

Specific comments

Page 123, paragraph 3 line 6. The line, "…protection of the ESA remands the agencies management responsibility …" should read "…protection of the ESA **remains** the agencies management responsibility …".

Page 130, paragraph 2 line 15. It is unclear what is meant by "Trites et al (2007) who **posited**.."?

Page 131, paragraph 3. Reading this section, it would be most helpful to determine at what point on a 3% annual growth curve the extinction risk falls below 1% in 100 years. This is critical because it will give a clearer term of reference to the anticipated time at which the species can be de-listed to threatened, based on continual current observed growth rates. I finally see this mentioned in last sentence on page 134, but I recommend that it would good to mention this earlier, on page 131.

Page 134. Population growth section, first 2 sentences. This is a critical observation and provides some capacity to improve PVAs for western stock, using the variance rates from eastern stocks.

Page 134. Population growth section, first paragraph, last 2 sentences. I guess the contrary observation here is that how did the population growth in the eastern stock vary before and after conservation measures were introduced? Has the eastern stock responded similarly since these measure compared to the western stock, If not why?

Page 136. Demographic criteria: threatened. Dot point one. Recovery is based on non-pup counts. This goes back to the Background section as well. Nowhere is it made clear why there is a focus on monitoring non-pup trends - is this to do with biological reasons, or for practical/logistical and historical reasons (ie. Is the counting of non-pup numbers continued because most historical trend data is based on these, and not pup counts)? If it is the case, then it would be worth while stating a sentence or two that although annual monitoring of pup numbers is the most reliable means for estimating change in population abundances, because earlier (historic) data sets are mainly counts of non-pups, there is value in maintaining these longitudinal data.

Page 138. Factor D point 1 and 2. To what do 50CFR part 679 and 50 CR parts 223 and 226 refer? A footnote is needed.

Page 138. Factor E. I think a point 7 needs to be added here stating that there needs to be evidence based on independent fishery observer data that incidental take of sea lions remains low, and is not likely to limit recovery.

Page 139. Delisting. It would be helpful to list the demographic criteria needed to demonstrate removal from the Federal list of Endangered Wildlife and Plants.

Page 140. Factor B point 1. It is questionable if PBR is really appropriate here, given the PVA models would be much better at determining by catch rates that do not limit risk of recovery. PBR is a very crude tool, and surely all the demographic data collected and the development of PVAs provide a much better approach than PBR.

Page 141. Point 4, bottom of page. Alaska stranding network. This was mentioned earlier but it is not stated what such a group would do? Would it be related to rescue and rehabilitation work?

Page 142 point 6. It states that "… the State will **comport** with the MMPA." Does this refer to **comply**?
Page 151, 3 lines up form bottom of page. Again a footnote or explanations to what 50CFR 226.202 refers is needed.

VI. Factors potentially influencing the Eastern Population

General comments
This section details briefly a number of factors that are or have the potential to affect the status of the eastern DPS. Given that the eastern DPS has shown a strong consistent recovery for some period, no threats to recovery have been identified. A range of potential threats are examined including a) predation from killer whales and sharks, b) harvest, killing and other human impacts, c) entanglement in debris, d) parasitism and disease, e) toxic substances, f) global climate change, g) reduced prey biomass and h) disturbance. I have no broad issues with this section.

Specific comments
Page 189, paragraph 3. Be consistent with use of "/" or "per".
Page 189, paragraph 4, line 4. The word "lion" should be "lion**s**"

VII. Recovery Plan for the Eastern Population

General comments
This section details the recovery plan for the eastern DPS, to warrant their de-listing from threatened to not-threatened (ie. removal from the List of Endangered and Threatened Wildlife). Given the lack of threats to recovery, this section essentially provides support for ongoing monitoring of the population.

Specific comments
Page 193, last line. There is a typo – "delsiting" change to "delisting".
Page 194, paragraph 5, line 9. The sentence "..Alaska portion there is **not** data.." should be changed to "..**no** data".
Page 198. There are a couple of places (including here) where "de-listing" is used; elsewhere in document "delisting" is ubiquitous.

VIII. Literature cited

Specific comments
The order of references needs to be checked, as it is not always alphabetical. For example, Ban should be between Baker et al. and Baraff et al.; similarly, Call and Loughlin (2005) should be after Calkins et al. (2005).
Trites et al. 2006a-f are not in appropriate order. Also many are in press, yet they are designated by year. They should listed as "in press" throughout text.

Appendix

I did not go through the model of Goodman in detail. Given that the essential elements of the output of this model are reported in the text (in the main body and as well as a summary in the Appendix), I am unsure of the merit of retaining it in the final document. If the team wishes to keep it as an appendix, then the team should ensure that the formatting is consistent with the remainder of the document. Also, there are generally no captions for figure or tables in this section.

Page 231. Second subheading. The spelling of “estimate” is incorrect.

Other specific comments

Table of contents - Format corrections - Section III B 10-12 , and Section IV A 10-11 are indented. Section V in contents, two section As and section Es. Also, the order of sections is wrong (A,A,B,C,E,D,E).

Tables and figures should be formatted consistently throughout the entire document.

3. Summary of findings

This section addresses the main terms of reference with respect to the Recovery Plan.

1. Does the Plan thoroughly describe what is known about potential threats to both the eastern and western populations of Steller sea lion? Are there additional significant threats to the species? Does the evidence presented in the Recovery Plan support the threats assessment?

The Plan provides a very comprehensive summary of what is known about the status, biology, and ecology of Steller sea lions, and the potential threats, past, present and future. There are no additional threats to the species that have not been addressed in the Plan, and the Plan provides adequate support for the threats assessment.

2. Is the ecological and biological information presented in the Plan adequate, thorough, and scientifically defensible?

As indicated above, the synthesis of information presented on the ecology and biology of the species is generally of a high standard, comprehensive and scientifically defensible.

3. Does the Plan adequately present an ecologically and biologically defensible recovery strategy for the eastern and western populations of Steller sea lion? Describe any shortcomings in the recovery strategy.

Overall I believe that the Plan sets out a scientifically defensible recovery strategy for the species.

4. Are the recovery actions described within the Plan appropriate to meet recovery goals? Are the recovery actions consistent with the SSL life history information, population dynamics and threats assessment presented in the Plan? Are there other

recovery actions that have not been included in the Plan that should be included to achieve recovery?

Broadly the recovery actions described within the Plan are appropriate to meet the recovery goals. Perhaps the area of greatest concern to me is that the plan recommends pup production surveys for the key trend sites to be biennial. Whether the survey design is due to a historic hang-over or due to practical/logistical factors is not detailed; however, I strongly recommend that the survey design be revisited. There are many benefits to annual pup production surveys, not the least of which will be to double the statistical power to detect changes in pup abundances over the next 30 years. Much of the Plan is focused around assessing the role and importance of natural (oceanographic and climatic events) and anthropogenic factors (changing spatial and temporal commercial fisheries catch) on Steller sea lion populations. Given that the species operates reproductively on annual timescales, as does seasonal variability in oceanographic, climatic and fishery factors, it would seem logical if there is to be any hope in detecting correlates between a range of potential factors with sea lion reproductive output, that these must be measured at annual intervals. I think at least some of the key trend sites should be monitored annually. I cannot see the adaptive management program proposed (which I believe would an excellent development) being able to be established as a feasible experiment, unless annual data are collected on the reproductive output of experiment rookeries.

5. Are the recovery tasks in the Plan's Implementation Schedule appropriately prioritized to facilitate recovery?

I believe generally that the priority rankings on the implementation schedule are appropriate. The only exception would be Plan Tasks 3.1.1 and 3.1.2 that have to do with monitoring and evaluating incidental take through observer programs in commercial and non-commercial fisheries. I think at least for 3.1.1 (commercial fisheries), that its priority ranking should be up-listed to 2a or b. The Plan details extensively that the past rapid declines in the Western DPS were largely due to fishery interaction issues, with the biggest single contributor of mortality being through incidental take. Given this, it would seem to me to be a priority to ensure that observer programs are maintained to clearly demonstrate that incidental take is not a contributing factor into the future. I note that for many commercial fisheries detailed in the Plan, there has been limited or no observer coverage at all.

6. Does the information in the Plan appropriately support the recovery criteria described in the Plan? Are the recovery criteria consistent with and do they meet the requirement of the ESA to ensure the conservation of the species (i.e., recovery and ultimate delisting: "conservation" as defined in the ESA 16 USC § 1532 (3))?

The information in the Plan does appropriately support the recovery criteria. The recovery team has been faced with a challenge. The PVA results have provided a lot of insight and have informed the recovery plan actions required. They have also informed the population growth and time frame over which extinction probabilities are negligible, and sufficient for de-listing. However, the data deficiencies were such that the team essentially rejected the quantitative PVA approach, given the significant uncertainty associated with many of the factors required to be estimated. As a consequence the team have primarily used the "weight of evidence approach" to develop the recovery criteria. Given the data limitation, I believe this is the best approach and is consistent with meeting the requirements of the ESA to ensure the conservation of the species.

Conclusions and recommendations

My overall view of the Recovery Plan is that it provides a comprehensive background of the biology, ecology and historical abundance of the species, factors potentially affecting its conservations status, an objective evaluation of threats and a range of action items designed to ensure delisting of the Western DPS within a 30 year period. The Recovery Team should be congratulated on their efforts, considering the multi-jurisdictional distribution of the species, the uncertainty regarding aspects of the species ecology and demography, and the broad range of views regarding the relative importance of a multitude of natural and anthropogenic factors impinging on the recovery of the species. These documents must, by their very nature, accommodate the views of a range of experts and I think the overall output is a very balanced and object Recovery Plan.

I did find the Recovery Plan somewhat top-heavy, with a considerable portion of the documents relating to the species background and threat assessments, but comparably less on the justification of the recovery strategy and the recovery actions. Given the large number of recovery actions detailed, and the limited detail provided on each, it made for a challenging appraisal of the relative merits of each action item against others, and in some places their priority over others.

The Recovery Plan is also highly parochial in that it presents almost exclusively data just on Steller sea lions. I can understand this from the perspective that the Recovery Plan needs to synthesize an enormous volume of scientific information relevant to the background and threats to the species, but for some sections, such as factors potentially affecting populations, there could be a greater accommodation of relevant literature from other species, especially where data on Steller sea lions is more limited. There are other threatened or endangered pinniped species throughout the world, and some reference to these, especially where relevant to recovery actions for Steller sea lions, would seem appropriate.

The key recommendations for each section follow. Details on each are given in the previous sections.

I Background

- Resolve consistency over Russian vs. Asian populations.
- Place names and regions mentioned in the text or tables need to be clearly identified in the figures.
- Formatting and style of figures and tables needs to be improved.
- Pup versus non-pup surveys: There needs to be some background to the history of population surveys to the species.
- 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.

II Conservation measures

- Improve detail and explanation on fishery conservation measures and other relevant spatial management measures enacted.

III Factors affecting Western DPS

- Reduce detail on killer whales.

- Ensure that all sections conclude with a subsection detailing data gaps.

IV Threat assessments Western DPS

- Review the relative importance of incidental take in commercial fisheries.

V Recovery Plan Western DPS

- Resolve ambiguity of recovery criteria.
- Review survey design of pup production at trend sites (biennial to annual).
- Fix the formatting errors of sections.

Appendix 1: Background material

National Marine Fisheries Service 2007. Draft Revised Recovery Plan for the Steller sea lion (*Eumatopius jubatus*). National Marine Fisheries Service, Silver Spring, MD. 305pp

Appendix 2: Statement of Work

Subcontract between the University of Miami and South Australian Research & Development Institute (SARDI) (Dr. Simon Goldsworthy)

Statement of Work

June 14, 2007

The first Steller Sea Lion (SSL) Recovery Plan was completed in 1992 and provided recovery guidance to the National Marine Fisheries Service (NMFS) for the species, which at that time was listed range-wide as threatened.

NMFS organized a new SSL Recovery Team in January 2002, and charged the new Team with writing a revised Plan to reflect the current view of stock structure and the differences in stock status under the ESA (eastern Distinct Population Segment (DPS) listed as threatened, and western DPS listed as endangered). The Team completed its draft of the second Plan in February 2006, at which time the Team sought an external peer review from 5 highly qualified experts (see Attachment 1).

Upon receipt of the peer reviewer comments, the Team revised the Plan and submitted it to NMFS. NMFS released the Plan for public review in May 2006 and received detailed written comments from 18 parties or individuals. Based on these comments and those of the expert reviewers listed above, NMFS revised the Plan into the document being presented to the Center for Independent Experts (CIE) for an additional peer review (document dated May 2007).

The CIE experts" comments will assist NMFS in making recovery decisions for the Steller sea lion based upon the best scientific and commercial data available (as required by the Endangered Species Act of 1973, as amended).

Reviewer Requirements

The CIE shall provide three expert reviewers. Each reviewer's duties shall require a maximum of six days of effort, including time to read the relevant document and to produce an individual written report consisting of his/her comments and recommendations. No travel is required; each reviewer shall work from his/her home location. Each reviewer's report shall reflect his/her area(s) of expertise, and no consensus opinion (or report) will be required.

As a group, the panel of CIE reviewers must possess expertise in the areas listed below.
* Familiarity with relevant sections of the Endangered Species Act (http://www4.law.cornell.edu/uscode/html/uscode16/usc_sup_01_16_10_35.html), and as applicable, the Marine Mammal Protection Act, and related wildlife management legislation (e.g, NEPA).
In particular,

* Experience as a Recovery Team member, contributor, or reviewer of Recovery Plans developed for other listed species; as a current or recently retired employee of a federal or state agency holding a position implementing ESA regulations; or from an academic position that has focused on ESA statutes and implementation.
* In depth expertise in the biology and management of marine and/or other large mammals; specifically population dynamics, reproductive and foraging biology and physiological ecology.

At least two of the reviewers must have in-depth experience with the ESA and recovery plans, and one reviewer must have in-depth knowledge of marine mammals. Former reviewers and former SSL Recovery Team members and support staff shall be excluded from consideration as reviewers of this document. See Attachment 1, below.

Specific Reviewer Tasks and Schedule

The Alaska Region shall provide the CIE with copies of the May 2007 draft revised SSL Recovery Plan for the review, or a link to it, by May 31, 2007. Delay in meeting this schedule will result in a minimum of an equivalent delay in delivering the final CIE reviews. The document to be reviewed will be approximately 200 pages in length.

1. The CIE reviewers shall read and assess the May 2007 draft revised Steller Sea Lion (*Eumetopias jubatus*) Recovery Plan.

2. The CIE reviewers shall focus on and address the following questions in their review reports:
   - Does the Plan thoroughly describe what is known about potential threats to both the eastern and western populations of Steller sea lion? Are there additional significant threats to the species? Does the evidence presented in the Recovery Plan support the threats assessment?

   - Is the ecological and biological information presented in the Plan adequate, thorough, and scientifically defensible?

   - Does the Plan adequately present an ecologically and biologically defensible recovery strategy for the eastern and western populations of Steller sea lion? Describe any shortcomings in the recovery strategy.

   - Are the recovery actions described within the Plan appropriate to meet recovery goals? Are the recovery actions consistent with the SSL life history information, population dynamics and threats assessment presented in the Plan? Are there other recovery actions that have not been included in the Plan that should be included to achieve recovery?

   - Are the recovery tasks in the Plan's Implementation Schedule appropriately prioritized to facilitate recovery?

   - Does the information in the Plan appropriately support the recovery criteria described in the Plan? Are the recovery criteria consistent with and do they meet the requirement of

the ESA to ensure the conservation of the species (i.e., recovery and ultimate delisting: "conservation" as defined in the ESA 16 USC § 1532 (3))?

3. No later than June 29, 2007 each CIE reviewer shall submit a written report[1] to the CIE that addresses the points in item 2 above. See Annex I for additional details on the report outline. Each report shall be sent to Dr. David Die, via email at ddie@rsmas.miami.edu, and to Mr. Manoj Shivlani, via email at mshivlani@rsmas.miami.edu

Submission and Acceptance of CIE Reports

The CIE shall provide the final individual reviewer reports for review for compliance with this Statement of Work and approval by NOAA Fisheries to the COTR, Dr. Stephen K. Brown (Stephen.K.Brown@noaa.gov), no later than July 13, 2007 The COTR shall notify the CIE via e-mail regarding acceptance of the reviewers" reports. Following the COTR's approval, the CIE shall provide pdf format copies of the reviewers" reports to the COTR.

[1] Each written report will undergo an internal CIE review before it is considered final.

ATTACHMENT 1.
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Dr. Terry Quinn (University of Alaska Fairbanks and member of the North Pacific Fishery Management Council's Science and Statistical Committee).

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ANNEX 1. Contents of CIE Reviewer's Report

1. The reviewer's report shall be prefaced with an executive summary of findings and/or recommendations.

2. The main body of the reviewer's report shall consist of a background, description of the review, summary of findings, and conclusions/recommendations. The summary of findings shall address each Term of Reference.

3. The reviewer's report shall include as separate appendices the bibliography of materials provided for the review and a copy of the CIE Statement of Work.

Please refer to the following website for additional information on report generation:
http://www.rsmas.miami.edu/groups/cie/cierevrep.htm