

**REVIEW AND COMPARISON OF RECOVERY  
CRITERIA IN THE 2006 DRAFT REVISED  
STELLER SEA LION RECOVERY PLAN**

Prepared by:

Thomas R. Loughlin, Ph.D.  
TRL Wildlife Consulting  
17341 NE 34th Street  
Redmond, WA 98052  
[trlwc@comcast.net](mailto:trlwc@comcast.net)

On behalf of

Chris Oliver, Executive Director  
North Pacific Fishery Management Council  
605 W. 4<sup>th</sup> Ave., Suite 306  
Anchorage, AK 99501-2817

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## EXECUTIVE SUMMARY

This review was prepared to assist the North Pacific Fishery Management Council compare proposed recovery criteria in the 2006 Draft Revised Steller Sea Lion Recovery Plan with recovery criteria developed and implemented for other species. Eleven recovery plans (six from NMFS and five from USFWS) were included in the review, depending on available information in the plan and relevance to the SSL plan. Three of the plans were for species or sub-species that have been removed or proposed for de-listing from the ESA list (gray whale, Greater Yellowstone grizzly bear, and Northern Rocky Mountain gray wolf). Each plan was reviewed and pertinent information summarized in text and table format. Summaries of each recovery plan were presented in Appendix 1 (species under NMFS jurisdiction) or Appendix 2 (species under USFWS jurisdiction).

Results indicate that recovery criteria grouped into three categories: (1) those that included increasing or decreasing rates of population change by geographic areas; (2) those that included changes in the number of animals over a prescribed period and area; and (3) a mix of categories one and two. The 2006 Draft Revised Steller Sea Lion Recovery Plan was in the first category; the recovery criteria in the SSL plan were consistent with other criteria in plans in the first category and published by NMFS and the USFWS (i.e., for killer whale, fin whale, right whale, and manatee). Recovery criteria in the SSL recovery plan requiring rates of population increase over time in 5 of 7 regions were not unusual, compared to other plans in category 1. The SSL Recovery Plan included recommendations from the NMFS Quantitative Working Group for developing the listing or de-listing criteria.

Part of the review was to determine if recovery plans provided a rationale or scientific justification for the recovery criteria and recovery tasks. Some of the older plans (e.g., the gray wolf recovery plan which is 20 years old) did not contain the same amount of information or justification included in recent plans. However, in that plan and in the other ten recovery plans there was sufficient rationale and background to justify the proposed recovery criteria and the tasks needed to meet those criteria.

Habitat degradation was important as contributing to the species status or lack of recovery in all plans reviewed. Excessive mortality and low survival were contributors to reduced status in most (but not all) plans. Food limitation, disease/contaminants, or over harvesting were contributors to species decline or status in half or fewer of the plans. A PVA was used as an analytical tool in six of the ten plans (including the SSL plan).

Existing legislation was adequate to enhance the recovery and subsequent de-listing of gray whales, whereas numerous management and conservation actions were needed to enable the delisting of Northern Rocky Mountain gray wolves and Greater Yellowstone grizzly bears.

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## I. Introduction

This report reviews recovery criteria included in the May 2006 Draft Revised Steller Sea Lion Recovery Plan (the May 2007 revision was not available at the time of this project). The report includes a summary of information on recovery planning and information on the listing, down-listing and delisting of Endangered Species Act (ESA) listed species in other parts of the U.S. The objective was to compile information on the criteria developed by recovery teams for changing the listing status of species on, or that were on, the ESA list of threatened or endangered species and to compare this information with the draft criteria proposed for down-listing and de-listing the Steller sea lion (SSL; *Eumetopias jubatus*). The report includes discussion and comparison of recovery actions (tasks) in the plans and their similarity to those in the SSL plan. The purpose of the review was to assist the North Pacific Fishery Management Council (Council) compare the proposed SSL recovery criteria with recovery criteria developed and implemented for other species elsewhere.

Recovery plans represent the primary tool used by both the National Marine Fisheries Service (NMFS) and the U.S. Fish and Wildlife Service (USFWS) for managing and conserving endangered species under their jurisdiction. In 1991 the U.S. Congress requested that the National Academy of Sciences study 'several issues related to the Endangered Species Act.' Some of the specific issues included were the definition of a species, recovery planning, conservation conflicts between species, and the role of habitat conservation (NRC 1995). Since the NRC review, the ESA and recovery planning by the agencies has come under further scrutiny. Various reviews of ESA recovery plans found that plans vary in the amount, quality, and type of information that they provide (Brigham et al. 2002; Tear et al. 1993), but they all require inclusion of specific topics such as species biology, recovery actions, recovery criteria, etc. The effectiveness of the plans in meeting their goal to conserve the species and remove it from the list was variable and equivocal. A preliminary review of the effectiveness of ESA recovery plans was published by Boersma et al. (2001). That review was followed by a comprehensive review of 135 recovery plans for 181 species conducted by the Society for Conservation Biology (SCB; summarized in Hoekstra et al. 2002). Results of that broad review, which was funded by the USFWS and the National Center for Ecological Analysis and Synthesis, were published in numerous papers in the journal *Ecological Applications* in 2002; data used in the reviews are available at their web site<sup>1</sup>.

The ESA list of endangered and threatened species is not the only list of species at risk. The World Conservation Union, or International Union for the Conservation of Nature and Natural Resources (IUCN), also maintains a list that includes many of the species reviewed in this project. The overall aim of the Red List is to convey the urgency and scale of conservation problems to the public and policy makers, and to motivate the global community to try to reduce species extinctions. The IUCN has defined some quantitative criteria for inclusion of species in their Red Book of Threatened and Endangered Wildlife. The criteria are primarily oriented for terrestrial species and are difficult to apply to the marine ecosystem (Gerber 1999; Gerber and DeMaster 1999). In

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<sup>1</sup> [www.nceas.ucsb.edu/recovery](http://www.nceas.ucsb.edu/recovery)

addition, the IUCN criteria do not include uncertainty in available data (Gerber and DeMaster 1999). The IUCN uses nine categories to describe the status of wildlife in their Red List system: Extinct, Extinct in the Wild, Critically Endangered, Endangered, Vulnerable, Near Threatened, Least Concern, Data Deficient, and Not Evaluated. The classification as vulnerable under the IUCN is equivalent to threatened under the ESA. The SSL is listed as endangered under the IUCN Red List. The IUCN defines endangered as a species that is not Critically Endangered but is facing a very high risk of extinction in the wild in the near future, as defined by any of the five criteria described on their web page. SSLs qualify as endangered through criteria (A) population reduction >80% and (B) probability of extinction in the wild at least 50% over the next ten years or three generations (IUCN definitions and criteria are at: [http://www.iucnredlist.org/info/categories\\_criteria1994#categories](http://www.iucnredlist.org/info/categories_criteria1994#categories)). The IUCN red List does not include recovery planning.

As summarized in the Executive Summary of the draft 2006 SSL Recovery Plan, the SSL was listed as a threatened species under the ESA in April 1990 due to substantial declines in the western portion of the range. In contrast, SSLs in the eastern portion of the range (in southeastern Alaska and Canada) were increasing at 3% per year. Critical habitat was designated in 1993 based on the location of terrestrial rookery and haulout sites, spatial extent of foraging trips, and availability of prey items. In 1997, the SSL population was split into a western stock and an eastern stock based on demographic and genetic dissimilarities (Bickham et al. 1996; Loughlin 1997). Due to the persistent decline, the western stock was reclassified as endangered, while the increasing eastern stock remained classified as threatened. Through the 1990s the western stock continued to decline. However, the western population has shown an increase of approximately 3% per year between 2000 and 2004. This was the first recorded increase in the population since the 1970s. Based on recent counts, the western stock is currently about 60,000 animals (44,800 in Alaska and 16,000 in Russia) and may be increasing due to higher juvenile and adult survival. However, it remains unclear whether SSL reproduction has also improved and whether the observed 3% annual population growth will continue. The eastern stock is currently between 45,000 and 51,000 animals, and has been increasing at 3% per year for 30 years.

The first SSL recovery plan was completed in December 1992 and covered the entire range of the species. However, the recovery plan became obsolete after the split into two stocks in 1997. Therefore, in 2001, NMFS assembled a new SSL Recovery Team (Team) to revise the plan. The Team completed the draft revision in early 2006 and forwarded the plan to NMFS.

The draft 2006 SSL plan contains over 70 specific tasks contained within five broad actions required for species recovery. The plan also contains broad criteria for down-listing or de-listing the western and eastern stocks of SSL. These broad tasks each contain separate criteria that must be achieved before down-listing or de-listing can occur. The objective of this review is to summarize the criteria proposed for SSL recovery and for changing the listing of the western stock of SSLs and to compare these criteria to those contained in other recovery plans.

## II. Methods

The SCB review mentioned above was based on >450 questions on 13 forms separated by topic which were completed by graduate students reviewing recovery plans in university seminars across the country. The completed forms included information from 135 plans; the information was then placed into a large data base for analysis. An abbreviated version of some of the questions contained in these forms applicable to the SSL plan, plus additional questions posed by the Council staff specific to the SSL recovery plan, were used in this review (see below). Extracted information was placed in both text and spreadsheet format and subjective comparisons made between each species' plan and the SSL plan.

Eleven recovery plans (six from NMFS and five from USFWS) were included in the review, depending on available information in the plan and relevance to the SSL plan. Two of the plans were for species or sub-species (and one proposed for delisting in April 2007) that have been removed from the ESA list (gray whale, Yellowstone grizzly bear, and Northern Rocky Mountain gray wolf—noted by \* below).

The Councils' Scientific and Statistical Committee recommended at the March 2007 Council meeting that when practical, species chosen for the review be based on their similarity to SSLs in terms of taxonomy, population abundance and trends, commonality of threats, and relative magnitude of biological uncertainty (e.g., level of knowledge on vital rates). Species under NMFS jurisdiction were perused in terms of these criteria, especially for population abundance and trends, and similarity of uncertainty. The great whales listed under the ESA met these criteria but there was no recovery plan for sei whales. The gray whale had no recovery plan and was delisted in 1994, but because it is the only species delisted by NMFS comparable to the SSL issue, it is reviewed here in the context of its biology and numerical trends. The blue whale recovery plan is almost ten years old (1998) and contains no criteria for changing the species' listing status. The humpback whale recovery plan also is over ten years old (1991) and the proposed recovery criteria in the plan are characterized as biological goals, numerical goals, and political goals. Because of the context of that plan, it was difficult to make comparisons of recovery criteria to the SSL plan. However, the fin whale, southern resident killer whale and North Atlantic right whale plans contained criteria that allowed comparison to the SSL. The Hawaiian monk seal plan fit these criteria and was included in the review. The sperm whale plan was appropriate for inclusion but was arbitrarily excluded due to the overall number of plans in the review.

For those species under USFWS jurisdiction, the southern sea otter (*Enhydra lutris nereis*) was chosen based on its taxonomic similarity to sea lions and commonality of threats. Sea otters in Alaska (*Enhydra lutris kenyoni*) would have been a better choice because of the relative size of the population prior to the recent decline, the rate and duration of the recent decline, and level of knowledge on vital rates, etc. But the sub species was listed too recently and a recovery plan is not available. Also chosen were the

West Indian manatee, grizzly bear, spectacled eider, and gray wolf. The Canada lynx was originally proposed for review but the USFWS has not developed a Recovery Plan for that species. This review included seven species listed as endangered, three listed as threatened, and three species or populations that were delisted or considered for delisting (Table 1). Therefore, recovery plans for each agency chosen for this review included:

NMFS

Steller sea lion-western (E)  
Hawaiian monk seal (E)  
Fin whale (E)  
Southern resident killer whale (E)  
Northern Atlantic right whale (E)  
Eastern Pacific gray whale\*

USFWS

Southern sea otter (T)  
West Indian manatee in Florida (E)  
Grizzly bear (T) (Greater Yellowstone\*)  
Spectacled eider (T)  
Gray wolf (E) (Northern Rocky Mountain \*)

*A. Summarize information in a spreadsheet for each species.*

Each plan was reviewed and information from the following bullets extracted and inserted into a spreadsheet. Species under NMFS jurisdiction are presented first and those under USFWS second.

- Initial population size prior to and at the time of listing.
- Relative scale of population decline (temporal and percentage).
- Population size at down-listing or delisting.
- How long from listing to down-listing or delisting?
- Types of threat including habitat degradation, food limitation, over harvest, high mortality level, etc.
- Recovery criteria for that species (number and type).
- Were recovery criteria related to habitat, number of individuals, or both?
- Habitat issues factored into the listing decision (yes or no)?
- Number of recovery tasks suggested in the plan.
- Utilization of Population Viability Analysis (PVA) in recovery plans.

Additional to this information, the following seven questions were addressed, when possible.

1. Summary of recovery criteria
2. What were the key elements of the recovery plan and what were the recovery goals?
3. What has happened to the population over the years since the species was listed (or de-listed)?
4. What actions were taken to help the population recover?
5. For de-listed species, how were the threats mitigated so that the species could be de-listed?
6. Were monitoring efforts sufficient in determining if delisting was warranted or if recovery had been achieved?
7. Did the recovery plan provide a rationale or scientific justification for the recovery tasks?

### *B. Threat Similarity Index*

In the scoping paper preliminary to this review it was proposed to include a threat similarity index (TSI) developed by Clark and Harvey (2002). Their TSI attempted to quantify the similarity of threats to species within multi-species recovery plans. That index was explored for this review and found to be duplicative of information in Table 2 and that the results were somewhat misleading. Results tended to infer some level of quantitative confidence to similarity of threats in single species plans that was likely not valid. The Clark and Harvey index compared threats to species in a common ecosystem (e.g., fish, insects, and plants in a river system) where here the single species plans were from different ecosystems. Consequently the inclusion of the TSI for this review was deleted.

### *C. Summarize and compare/contrast NMFS policy and guidelines for recovery planning.*

DeMaster et al. (2004) stated that uniform guidelines for listing, reclassifying, or delisting species had not been developed by either NMFS or the USFWS. The lack of uniform guidelines for listing decisions has led to inconsistencies and inequities in the listing process. NMFS responded to this problem by establishing a Steering Committee and a Quantitative Working Group (QWG) to work toward developing quantitative procedures that would make listing decisions "more transparent, consistent, and scientifically and legally defensible." Included in the recommendations was the use of population viability analysis (PVAs) for development of listing and recovery criteria in that they provide extinction time probability functions. The QWG recommendations were reviewed for this project and compared to the justification for delisting criteria included in the draft SSL Recovery Plan.

## **III. Results and Discussion**

### *Summary of recovery criteria.*

The primary goal of this project was to review the proposed SSL recovery criteria and compare them to recovery criteria developed and implemented for other species elsewhere. The primary goal of all plans reviewed was to change the listing from either endangered to threatened or threatened to de-list. That goal, of course, is the statutory obligation of the agencies pursuant to the ESA so it was no surprise that it was the shared goal of all recovery plans. But all recovery plans differed in their suggested recovery criteria based on threats to the species, likelihood of extinction (compare Hawaiian monk seals and SSL), available information, technical expertise of team members, and many other variables. In regard to the species reviewed in this project, there were three general categories for changing listing with some overlap between categories. The first category included increasing or decreasing rates of population status or of changing vital rates over time with consideration to rates of change in geographic areas. The second category was based on the number of animals counted over a prescribed period and area. The third was a mix of categories one and two.

Recovery plans for species in the first category were the SSL, fin whale, North Atlantic right whale, southern resident killer whale, and West Indian manatee. Those in the



second category included southern sea otter, grizzly bear, spectacled eider, and Northern Rocky Mountain gray wolf. The third category included the Hawaiian monk seal. The use of categories one and two was agency specific with species under NMFS jurisdiction using the first category and those under USFWS jurisdiction using the second (except for the manatee). There was no recovery plan for the eastern North Pacific gray whale while it was listed under the ESA.

In terms of the first category that relied on changes in rates of population status, vital rates, and the like, the down-listing recovery criteria in the SSL plan require that western stock of SSLs increase for 15 years on average and that population ecology and vital rates be consistent with this increasing trend. The plan also requires that trends in non pups in at least 5 of the 7 sub-regions be consistent with this increasing trend. There is no numerical level of population numbers at which listing would change. It is useful to remember the context of the listing of SSLs in that part of the justification for the listing was the magnitude of the decline over a broad geographic area in a short time period. The NMFS and the Recovery Team considered the overall abundance of the species as appropriate listing or delisting criteria but used the weight of evidence on the nature and magnitude of the decline rather than absolute population level as crucial listing and delisting criteria. Similarly, the southern resident killer whale plan requires that the whales exhibit an increasing population trend at an average rate of 2.3%/year for 14 years and that available information on population and social structure be consistent with the observed increasing population trends. Criteria for down-listing fin whales to threatened (they like SSLs number in the tens of thousands) requires that the overall population in each ocean basin remain stable or increase for at least 26 years, or that the chance of quasi-extinction in each ocean basin is <1% in 100 years. The plan for the West Indian manatee requires that the average annual rate of adult survival is 90% or greater; the average annual percentage of adult female manatees accompanied by first or second year calves in winter is at least 40%; and the average annual rate of population growth is equal to or greater than zero.

Each of the four plans in the second category relies on the number of animals counted or estimated, or on the number of breeding pairs counted. In each case this number is relatively small when compared to population estimates for SSLs or fin whales. For example, the southern sea otter population could be considered for delisting when the average population level over a 3-year period exceeds 3,090 animals. The Northern Rocky Mountain gray wolf population could be considered recovered when a minimum of thirty or more breeding pairs comprising some 300+ wolves exist in a metapopulation. Spectacled eiders, a more numerous species, could be considered recovered when each of the three recognized populations is stable or increasing over 10 or more years and the minimum estimated population is at least 6,000 breeding pairs, or numbers at least 10,000 breeding pairs over 3 or more years, or numbers at least 25,000 breeding pairs in one year.

The recovery plan for the Hawaiian monk seal includes both trend and numerical criteria. For a change in listing status the plan requires that aggregate numbers exceed 2,900 total individuals, that at least 5 of the 6 main sub-populations are above 100 individuals, and

that survivorship of females in each subpopulation is high enough that, in conjunction with the birth rates in each subpopulation, the calculated population growth rate for each subpopulation is not negative (but see species summary for more detail). It is of interest to note the apparent disparity within NMFS for changing the listing of species under its jurisdiction. Monk seals can be down-listed when the population is at 2,900 and that 5 of 6 sub-populations are above 100 individuals. The proposed down-listing criteria for the western stock of SSLs (which number >44,000 animals) requires an increase for 15 years on average and that population ecology and vital rates are consistent with this increasing trend. The plan also require that trends in non pups in at least 5 of the 7 sub-regions be consistent with this increasing trend.

*Summary of additional information for each species.*

Table 1 provides summary information for each species reviewed for this project. The species include those that have been on the list since early versions of the ESA (1967 – manatee) to those recently added (2005—killer whale) with population estimates ranging from tens of breeding pairs or individuals to over 150,000 (fin whale). The western DPS of SSLs was added to the list as an endangered species in 1997 and number ~60,000 animals (44,800 in Alaska and 16,000 in Russia)).

Habitat degradation was important as contributing to a population's status or lack or recovery in all plans reviewed (Table 2). Similarly, excessive mortality and low survival were contributors to reduced status in most (but not all) plans. Food limitation, disease/contaminants, or over harvesting were contributors to species decline or status in half or fewer of the plans.

A PVA was used as an analytical tool in six of the ten plans. For those plans that did not use a PVA, two were written for species under NMFS jurisdiction (monk seal and right whale). The plans were written in 2004 (right whale) or 2006 (monk seal) but the team members for the right whale plan were either unaware of the guidelines and tools in DeMaster et al. (2004) or chose not to use them, including the recommendation to use a PVA for developing recovery criteria. The recovery team members for the monk seal plan proposed use of a PVA once population data become available from which a PVA could be based.

*Summary of NMFS policy and guidelines for recovery planning.*

The SSL Recovery Plan included recommendations from the NMFS QWG published in DeMaster et al. (2004) for developing the listing or de-listing criteria. The recommendations are discussed in the Plan in Appendix 3 – A PVA model for evaluating recovery criteria for SSLs. Those recommendations were incorporated in the development of the recovery criteria and in the formulation of the PVA provided to the Team by a contractor.

Text from the Appendix 3 of the Plan states that “the Team reviewed the overall model structure, assumptions, and parameter values used in the PVA, and decided to use a weight of evidence approach for the criteria instead of the quantitative probability of extinction approach. The PVA was instrumental in providing the Team with insights on how the threats

need to be addressed in order to develop down-listing and delisting criteria. Those insights were applied in using the weight of evidence approach in selecting the criteria, and in developing the listing factor criteria that determine how the threats must be controlled or eliminated.”

#### **IV. Conclusions**

For ease of review conclusions are presented in bullet format. Please see main text for rationale and context for the conclusions.

- ▶ Recovery criteria grouped into three categories: (1) those that included changes in rates of population change by geographic areas; (2) those that included changes in the number of animals over a prescribed period and area; and (3) a mix of categories one and two.
- ▶ The 2006 Draft Revised Steller Sea Lion Recovery Plan fits into the first category.
- ▶ Recovery criteria in the SSL plan are consistent with others published by NMFS and the USFWS (i.e., killer whale, fin whale, right whale, and manatee).
- ▶ 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 category 1
- ▶ The SSL Recovery Plan included recommendations from the NMFS Quantitative Working Group for developing the listing or de-listing criteria.
- ▶ SSLs, fin whales, and spectacled eiders stand out amongst the other species reviewed and for which a recovery plan exists in that they number in the tens of thousands of animals versus hundreds (or less).
- ▶ In regard to the bullet above, it is important to put into context the rate and magnitude of population decline over time for some listed species and the level of knowledge on the cause of the decline and its mitigation.
- ▶ All the recovery plans contained sufficient rationale and background to justify the proposed recovery criteria and the tasks needed to meet those criteria.
- ▶ Habitat degradation was important as contributing to the species status or lack of recovery in all plans reviewed. Excessive mortality and low survival were contributors to reduced status in most (but not all) plans. Food limitation, disease/contaminants, or over harvesting were contributors to species decline or status in half or fewer of the plans
- ▶ A PVA was used as an analytical tool in six of the ten plans (including the SSL plan).

- Existing legislation was adequate to enhance the recovery and subsequent de-listing of gray whales, whereas numerous management and conservation actions were needed to enable the delisting of Northern Rocky Mountain gray wolves and Greater Yellowstone grizzly bears.

## V. Acknowledgements

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