

SOUTHWEST ALASKA SEA OTTER RECOVERY TEAM

Meeting Minutes
for
10-11 April 2007
at the
North Pacific Research Board Conference Room
1007 West 3rd Avenue, Suite 100
Anchorage, Alaska 99501

Recovery Team Members in Attendance

Lance Barrett-Lennard (via teleconference), David Benton, Jim Bodkin, Kathy Burek, Douglas Burn, Jim Curland, Doug DeMaster Jim Estes, Dick Jacobsen, Lloyd Lowry, Ken Pitcher, Kathy Ralls, Tim Tinker, Margaret Roberts, Kate Wynne

Other Meeting Attendees

Angela Doroff, Emily Fruzza, Lianna Jack, Judy Jacobs, Dana Jeniski, Ellen Lance, Rosa Meehan, Peggy Osterback, Charla Sterne, Miranda Terwilliger, Donna Willoya, Bill Wilson

Day One

During the review and approval of the [agenda](#), Margaret Roberts asked that presentations by Lianna Jack be moved to the second day to accommodate Ms. Jack's schedule. The change was approved.

Update on SWAK SO management actions

Douglas Burn provided history and background regarding the Special Rule under Section 4(d) of the ESA. Jim Curland encouraged everyone to read the correspondence between Defenders et al. and the Service rather than take time during the meeting to go over it point by point. He indicated that he would welcome feedback from any team member. The letter in question raised 10 specific questions, at least some of which may be directly relevant to sea otter recovery in southwest Alaska.

Jim Estes stated that in the broad sense, any take from such a depleted stock is important, however, in the Aleutians the subsistence harvest is really limited to only a few sites around certain villages and any impact on the population is probably trivial. Burn responded that the Service has looked at the relationship between the subsistence harvest and the geographic pattern of the decline – the areas with the steepest declines have little or no subsistence harvest. This led the Service to conclude that the current harvest is not materially or negatively impacting the population. The team may want to consider identifying criteria for the level of harvest that might reach this threshold, however.

Tim Tinker noted that in the western part of the DPS, there may be certain types of habitat that are critical to the survival and hunting in such areas should be avoided. Therefore, it will be important to consider the subsistence harvest in a spatially explicit way. Burn showed several tables from the draft recovery plan showing subsistence harvest information from the marine mammal Marking, Tagging, and Reporting Program (MTRP). Curland asked if the harvest data collection needs to be improved. Burn noted that FWS currently has no way to evaluate

compliance with the tagging regulations. Angela Doroff noted that in the current budget situation, travel by MTRP staff to subsistence hunting villages has been reduced in recent years.

Kathy Burek stated that necropsies of subsistence hunted sea otters from the DPS could be a potentially important source of information. Doroff described the biosampling program that the Service and The Alaska Sea Otter and Steller Sea Lion Commission (TASSC) had operated for many years, and offered to review the available information for otters taken from the southwest Alaska DPS.

Burn provided the team with a chronology of the lawsuit over failure to designate critical habitat for the southwest Alaska DPS of the northern sea otter. The suit was settled shortly before this team meeting, with work on critical habitat designation to begin in October 2007. The Service has committed to making a “not prudent” determination or publishing a proposal to designate critical habitat by November 30, 2008, with a final rule published by October 1, 2009.

Estes noted that the existing process for designation of critical habitat does not make sense; rather than designate it at the time of listing, it would be better to have the process integrated with recovery planning. Jim Bodkin asked if the recovery team discussion of critical habitat is confined by this settlement schedule, to which Lloyd Lowry responded “no”.

Burn distributed background information about the statutory and regulatory framework for designation of critical habitat. The Service is asking the team to first consider whether “there are specific areas within the geographical area currently occupied by a species, at the time it is listed in accordance with the Act, on which are found those physical or biological features essential to the conservation of the species.”

Doug DeMaster stated that it is important to set aside adequate habitat for the recovery of the species/DPS. Conservation is essentially the same as recovery, therefore you need to know what your recovery or delisting criteria are. The current timeline makes it unlikely that FWS will have delisting criteria in place, however the Service would have the option to modify critical habitat at a later time. Lowry stated that the team could have draft recovery criteria by November 2007. A subgroup of the team (Estes, DeMaster, and Kathy Ralls) will prepare a white paper that will discuss scientific and policy aspects of designating critical habitat for this DPS.

Dick Jacobsen asked how critical habitat was going to protect sea otters, as there are few people living in most of the area, and therefore what are you protecting the otters from? Lowry responded that there may be specific areas that provide protection from threats such as oil spills or predation, that warrant protection. Jacobsen stated that he would be in favor of a limited designation of critical habitat for sea otters and protecting those areas, but there is concern about it getting out of hand.

Lance Barrett-Lennard talked about the recovery plan for resident killer whales, and said that the most contentious part of the plan was critical habitat. The approach taken in this case involved development of an attribute-based model for killer whale critical habitat, and he offered to share this information with the team.

Tim Tinker briefly described GIS models of sea otter distribution in British Columbia and in Prince William Sound, and said that similar models could be created for sea otters in southwest

Alaska. There was agreement in the team that a quantitative analysis of habitat use for this DPS could and should be done. There was some discussion of whether funding would be available to hire someone to do this type of analysis. Burn responded that if the work is done it most likely will be done by Service staff.

Estes returned to the subject of the critical habitat “white paper”, the background information on policy, and the use of biological information to guide this process. He stated that the problem is that critical habitat is designed to be “lines on maps” and nature doesn’t behave that way. We need to get away from that idea, and the development of the white paper would provide some depth and substance to this issue.

Burn reiterated that the Service has agreed to a settlement date, and that either lines will be put on a map somewhere, or the Service may reach the conclusion that critical habitat does not exist. The first step is to identify the Primary Constituent Elements (PCEs) that define critical habitat.

Lowry noted that the recovery team does not have to say anything at all about critical habitat if they don’t have the expertise to do so, don’t like the law, etc. Bodkin noted that biologists have barely defined sea otter habitat in the absence of the decline, making the job that much more difficult. DeMaster pointed out that the legal standard is to use the best available data at the time. Ralls observed that in the case of the desert tortoise, critical habitat that was designated was something the lawyers liked but wasn’t that biologically meaningful.

Lowry asked the team how deeply involved they wanted to get into this issue? Tinker asked when is the white paper expected to be completed? Ralls stated that it would be good to make some recommendations, and perhaps catch up the science to what the law says. Lowry observed that the document sounded like a paper that could be published in Conservation Biology, so why not proceed along those lines.

Burn explained how critical habitat is used in a management context as part of the ESA Section 7 consultation process. DeMaster stated that it will be important to have enough habitat available to support at least the number of sea otters that it would take to delist the population

The team next reviewed the Regional Director’s response to the team’s letter of December 6, 2006. Lowry pointed out that the team writing letters to the Regional Director seemed to be a useful tool, and for other significant issues there may be additional letters.

Update on Fiscal Year 2007 Funding

Burn reviewed the status of the Service’s budget. Add-on funding that had been available in previous years for Cooperative Agreements under Section 119 of the MMPA were gone this year, however, there will be approximately \$80K for a sea otter agreement from the Marine Mammals Management Office base budget. The Alaska SeaLife Center had also been receiving add-on funding for eider and otter recovery, but no new funds will be available in FY2007

The Marine Mammals Management Office has been getting some add-on funding for population assessment. Most of this money has gone to the Pacific walrus survey in past years, but as that project is essentially complete, the funds available this year (\$750) will be used to support sea otter and polar bear work.

Estes stated that the loss of funding for the ASLC was a major blow for activities after this calendar year, and that they may need to terminate or downsize staff there. It also does not look like they will have the funds to recover the time-depth recorders from the Commander Islands, Russia. There is funding from the FY2006 grant that will allow ASLC to support some work in the Commander Islands this year.

DeMaster stated that in his opinion, it was unacceptable to interrupt a major long-term study on a stable population like the Commander Islands. Curland said he would be in Washington and could advocate for funding, however, others cautioned that this could result in the funding being taken from another existing program, which wouldn't solve the problem.

Bodkin described the USGS Alaska Science Center situation, which is that there are no new funds available. His program is essentially level-funded for FY07.

Margaret Roberts talked about the funding outlook for TASSC. With only \$80K available, they would not be able to sustain the level of operations that they have had in previous years. She also stated that the future for TASSC is looking somewhat grim right now. Lowry asked about other possible sources of funds that come into the Native organizations such as tribal grants. Roberts agreed that while tribal grants may be available, TASSC, as a tribally-authorized Alaska Native Organization, may not be eligible. Roberts also described some work that the Sitka Marine Mammal Commission has been doing with a sub-grant from TASSC.

Peggy Osterback of the Aleut Marine Mammal Commission (AMMC) described some planned work to conduct aerial surveys of sea otters along the south Alaska Peninsula. She added that AMMC will be looking for additional funds to continue that work.

Lowry expressed an interest in sending a letter from the team to the Regional Director stating that the lack of stable funding for long-term studies was not acceptable.

Planned studies relating to SW Alaska DPS

Burn reviewed the Marine Mammals Management Office plans for skiff surveys of sea otters in the Aleutians and a live-capture and radio-telemetry study of otters in lower Cook Inlet. The Service will also cover the aircraft charter costs for the USGS to conduct an aerial survey of otters in lower Cook Inlet.

Bodkin discussed USGS planned studies for the upcoming year, including aerial surveys, skiff surveys, and foraging observations of sea otters in Katmai and Kenai Fjords National Parks, and Prince William Sound. They will also be capturing sea otters in Prince William Sound for cytochrome P450 analysis, which is an indicator of hydrocarbon exposure.

Estes discussed planned studies by the ASLC (see above), and also talked briefly about other proposals, including a National Science Foundation study on sea otter habitat in the Aleutians (funded) and a North Pacific Research Board proposal under review. He offered to provide copies of both proposals to interested team members.

DeMaster asked about other major projects that might be planned but not be funded in FY2008. Burn stated large-scale aerial surveys of the Aleutians and Alaska Peninsula are overdue. Lowry noted that the need for stable funding to conduct regular population surveys was included in the

team's letter to the Regional Director, and although there was agreement on this point, there was no guarantee of funding. Bodkin noted that USGS sea otter studies are also underfunded.

Review of progress on Recovery Plan Background and Threats sections

Biological background (lead Bodkin)—This section was reviewed by Tinker, Lowry, and others. Lowry stated that the section was thorough and well-written, although it may be a bit long. The level of information may be pared back during the final editing of the plan. For now Bodkin considers this section done unless more comments come in.

Estes asked if the plan should have some kind of statement that helps put the sea otter decline into a broader ecosystem context. There was general agreement that this should be included in the plan, and it could be done in the introduction or as a lead-in to the threats analysis.

Abundance and trends (lead Burn)—When listing occurred, the logical structure for organization of this information was by survey area. Now that the recovery plan had moved towards the use of management units, it made more sense to organize the information that way and the section has been revised in that way. In addition to changes in the geographic structure of the data, Burn also presented the survey information in each management unit as what fraction of the pre-decline abundance remains.

Tinker suggested adding a column to the summary table that identifies the time period that is represented. Estes noted that the data from the aerial surveys seem a bit conservative compared to what they have observed. He suggested that comparing the survey results by a common metric, such as density, might be useful. However, Burn noted that this may be difficult to do because of the different types of survey methods used.

Burn asked the team if they were comfortable with the division of the Aleutian archipelago into two management units, as was proposed during the second meeting. The team discussed the oceanographic differences between the eastern and western Aleutians that occurs at the continental shelf break. During this discussion, it was decided to have both eastern and western Aleutian management units, but that the current division was in the wrong place. Burn agreed to revise the management unit maps, and revise the abundance and trends section of the recovery plan accordingly. He asked that all team members review this section and send him their comments.

Infectious diseases (lead Burek):—This section of the plan was reviewed by Bodkin, Estes, Lowry, and Burn. Other reviewers from outside the team include Steve Raferty and Melissa Miller; Lowry noted that the team should acknowledge these contributions in the plan. Burek also authored sections on biotoxins and contaminants, which have been reviewed and revised. Burn agreed to distribute the revised sections to the team after the meeting, and if people have further comments they can send them to Burek.

Food limitation (lead Tinker):—This section was reviewed by Bodkin, Estes, Burn, and Lowry. There were few changes other than the addition of a final paragraph. Burn will include the revised version in the combined draft document and distribute it to the team.

Disturbance (lead Barrett-Lennard):—Although not completed in advance of this meeting, Barrett-Lennard reaffirmed his commitment to writing this section. He also asked if some of this

information shouldn't be included in the section on subsistence harvest. Lowry stated that we could decide where to information should go after the section has been written.

Entanglement (lead Wynne):—This section was reviewed by Lowry. Wynne said there is a need to be clear in use of the terms “entanglement” and “bycatch.” Although both have to do with fishing gear, entanglement could also encompass animals interacting with other types of debris. Lowry suggested changing the title of the section to Bycatch and Entanglement. Wynne said she will revise the section and include what information there is on debris.

Subsistence harvest (lead Burn):—Data for this section are from the marine mammal MTRP. Data are organized by MMPA stock, and within the southwest Alaska DPS, also organized by age and sex, and by management unit. Burn considers the section done, but is willing to consider any additional comments from the team.

Predation (leads Tinker/Barrett-Lennard):—Tinker had written the bulk of this section, and was waiting for a contribution about killer whale predation from Barrett-Lennard. DeMaster suggested that this section should also evaluate the statistical and demographic significance of different types of predation. Bodkin noted that the introduction and theoretical considerations in this section were very good, and suggested that each section should have these components. There was a brief discussion about eagle predation of pups, and also shark predation on sea otters. Available information on shark predation seemed largely anecdotal. There is some evidence that the sleeper shark population has increased, but it is unclear if they occur at the same water depths as otters. Anyone with comments on the section should send them to Tinker.

Habitat concerns (lead Pitcher):—This section was reviewed by Estes and Lowry. There was discussion among the team about vessel and shipping traffic in the range of the DPS – some information exists about current levels. In addition, the Alaska Department of Environmental Conservation maintains a database of reported oil spills. Jacobsen reported that there is lots of fuel being transported through these shipping lanes from Russia. He also commented on fuel storage facilities at Adak.

Curland raised the subject of proposed oil exploration in the North Aleutian Basin lease sale area (Bristol Bay), which may be something of importance to recovery of otters. Burn reported on a meeting he attended in November 2006 with the Minerals Management Service. An EIS for the North Aleutian Basin is in preparation, and there will be consultation under Section 7 of the ESA. DeMaster noted that the threat of oil spills was a major concern for the southern sea otter recovery plan. Jacobsen pointed out that there are other possible types of development, including mining and geothermal energy in the Aleutians.

Burn asked what level of analysis for shipping and oil spill risks were appropriate for the recovery plan, i.e. should it be part of the plan, or should the analysis be a recommended action in the plan? Lowry stated that there was a good argument that this analysis be done, but the team may not make it a high priority action at this time.

DeMaster noted that the southern sea otter recovery plan addressed acute mortality, not chronic impacts. There was some discussion about evidence for prolonged hydrocarbon exposure in Prince William Sound. The team agreed that oiling should be a separate threat section, and Burn will take the lead on drafting it, using text from this section and also the contaminants section by Burek. Any additional comments on this section should be sent to Pitcher.

Illegal take (lead Burn):—Very little information is available on illegal take, as the area is vast and the presence of law enforcement is minimal. Estes asked if the plan should say that we have little knowledge on this subject, or that we have little reason to believe this is a threat. Burn considers the section to be done, but will take additional comments.

Discussion of Draft Recovery Strategy

Lowry had sent the team a rough draft of where we are on recovery strategy, goals, and criteria. The team discussed the role of killer whale predation in the Aleutians, and possibly also disease in the eastern part of the DPS. Burek pointed out that with the Unusual Mortality Event (UME), it is not clear what the extent of disease impacts may be. After much discussion, the list of items to include in the recovery strategy was revised to the following:

1. The DPS has shown major decline, to “perilously low levels” in the Aleutians.
2. The range of the DPS is large, should be dealt with as “management units” (now 5).
3. Killer whale predation is likely major cause of the decline in the Aleutians, with disease possibly contributing elsewhere.
4. Additional research into current and future threats to recovery is warranted.
5. Top priority should be given to studies that will help understand and assess the importance/implications of predation and disease.
6. There needs to be a comprehensive and systematic system to monitor population abundance and trends.
7. There may be few actions that can be taken to mitigate threats if they are predation and disease.
8. Actions should be taken to minimize mortality and maximize potential for productivity.
9. The coastal kelp forest system will/has collapse(d) and this will affect recovery to original numbers/density.
10. Demographic changes in otters are “simply an epiphenomenon of environmental change.”

Day Two

Report on TASSC sea otter research

Lianna Jack presented information to the team about TASSC research and programs, beginning with a brief overview of their organizational structure. Projects included the “Real-Time Community Monitoring” project, which was developed in consultation with the FWS. A report on this project is in preparation.

The “Local and Traditional Knowledge of Sea Otters Project” involved interviews of 67 persons from 3 communities (King Cove, Ouzinkie, and Unalaska). Although this project is somewhat behind schedule, they intend to present the summarized information in the fall of 2007. Ralls asked if there was a specific structure and set of questions for the interview process; Jack responded that there was.

TASSC has also supported the development of Sea Otter Management Plans. These plans may have three scales: regional, subregional, and local (tribal). Curland inquired about how these plans are enforced within the communities. Jack responded that peer-pressure seems to be the best way to describe what happens in small communities, where everybody knows what’s going on and things are discussed in community meetings. The Sitka Marine Mammal Commission

hosted a workshop on sea otter management planning in February 2006, with partial financial support from TASSC through their cooperative agreement with TASSC.

The “Sea Otter Biosampling Program” was based on training village residents to conduct necropsies on subsistence hunted and beachcast carcasses. Using a standardized protocol, 65 biosamplers conducted 430 necropsies. This project has been suspended for multiple reasons, including limited funding, lack of storage space for samples, and issues related to the quality of sample collection. A related project involves beach surveys to document winter mortality of sea otters, which are conducted in the communities of Cordova, Yakutat, and Seldovia.

Donna Willoya provided a summary of the Local Sea Otter Abundance Trend Surveys, or Small Boat Survey (SBS) project. Surveys of sea otters have been conducted by village residents of Unalaska, Chignik Lagoon, Ouzinkie, Port Graham/Nanwalek, Seldovia, Cordova, Yakutat, Craig, and Hydaburg. Some of these communities have been conducting surveys for several years, while others are relatively new to the program. Continuity of observers is an important consideration.

Jack stated that there are final reports in development for several of these projects. Also, given the uncertainties with funding, TASSC faces an uncertain future. Lowry asked how TASSC selects which programs and projects to conduct. Jack stated that it is a joint process between TASSC and the FWS. Lowry stated that the team would like to have input from TASSC and other ANOs regarding priority actions to be identified in the plan. Burek asked if there was any information about killer whales from the local communities. Willoya responded that in Sand Point, there were very few actual predation events noted, but no shortage of opinions.

Discussion of Recovery Goals and Criteria

Doroff asked if the recovery goals and criteria should be developed on a management unit basis, or for the DPS as a whole. Lowry stated that the goal is to recover the DPS, which could be accomplished by satisfying recovery criteria for all or some management units depending on how the criteria were designed. Burn noted that de-listing criteria are required in the recovery plan, and that criteria for up-listing the population to endangered is not a requirement. Doroff observed that the distinction between PVA and non-PVA based criteria is a bit fuzzy, but may become clearer following Tinker’s presentation.

DeMaster noted that there is a quantitative working group that is working on developing guidelines for criteria to guide ESA listings. Ralls, who is a member of that group, stated that there were originally three approaches under consideration, that have been decreased to two. DeMaster pointed out that FWS may not accept all the recommendations of the group.

Lowry restated that the task is to determine at what point recovery has occurred based on metrics that will be applied to management units. Estes asked if the criteria should be based on historical population levels, or probability of future extinction. DeMaster stated that typically it is easier to list a species/subspecies/DPS than it is to delist.

Tinker presented the results of a [PVA modeling](#) exercise he conducted. The first decision he had to make was whether the model should be based on count information alone, or should it be a demographically explicit matrix model. In his opinion, there is sufficient information for a demographic matrix model that includes multiple sub-populations that are linked by dispersal. Rates of transition between age-classes can be estimated from life-history information.

Mortality during the decline in the western and central Aleutians appeared to have been age-independent. If we assume an intrinsic growth rate of 12% per year, what level of age-independent mortality (AIM) was needed to drive the decline that was observed? On average, it was about 32%. This rate did not appear to vary much with changes in population density.

Tinker noted that the ratio of pups to adults seems to have remained stable at around 20% throughout the time series of data. He then displayed the results of a simulation model of 5 islands beginning at carrying capacity (K). Using Monte Carlo simulation, he looked at which parameters have the strongest effects on time to extinction. With low dispersal rate and randomized AIM, half of the simulations led to extinction within 30 years. With high dispersal rate, the results were not much different. With low dispersal rate and non-random AIM (simulating refugia from predation), persistence of some populations was considerably longer.

There was discussion of whether this approach appeared to be useful, and how best to model uncertainty. The approach could be further refined using real population data from each management unit. A minimum of three data points for abundance are required. Burn noted that we should be getting abundance data from the South Alaska Peninsula management unit in 2007 that would be suitable for modeling. Estes suggested that it should be possible to run these models using existing data from the Andreanof and Rat islands in the Aleutians. There was further discussion about how to refine the modeling approach, and a commitment by Tinker to implement some suggested improvements before the next team meeting.

Discussion returned to the dividing line between the western and eastern Aleutian management unit. The team decided that a division was needed, but that the current line was incorrect and needed to be moved eastward to Samalga Pass. Burn agreed to revise the management unit maps accordingly. Concern was also raised regarding the division between the South Alaska Peninsula and Kodiak management units. Burn defended the current management unit structure as reflecting the best available information, but agreed that new information may require changes in the future.

There was discussion about what type(s) of criteria could be used as a proxy for recovery until there was sufficient information available for PVA modeling. Burn noted that if these proxy criteria would be based on trends in abundance, wouldn't that be the same kind of information needed for PVA modeling? Estes suggested using the status of the western Aleutian management unit as a proxy for the DPS. Lowry asked if that would mean not delisting until the western Aleutian unit showed improvement. There was some discomfort expressed about using the population trajectory from one management unit, as they appear to be behaving differently from one another. Doroff noted that there are differences in habitat types between management units, but thus far that has not been considered.

There was general agreement within the team that the modeling approach showed promise, but needs further development. Lowry concluded the discussion by saying that it looked like the team needed to form two subgroups, one to work on the issues of PVA modeling, and the other to consider the broad issue of what is needed in the recovery plan by way of uplisting and delisting criteria.

Recovery Action Outline

Lowry began by stating the outline was based on the draft of the revised Steller sea lion recovery plan. Tinker asked if the list was prioritized, to which Lowry responded that prioritization

comes later in the development of the implementation schedule. The team then went through the existing draft outline and discussed the items in it.

Someone asked if it was feasible to create refuge areas to provide otters with protection from predators. Bodkin asked if it would be possible to enhance existing areas to provide more protection; there are some places on Adak Island that might be suitable for this type of action. Barrett-Lennard noted that killer whales can be pretty clever when they are sufficiently motivated, but it may be possible to find ways to deter transient whales from going certain places. Burn noted that the challenge to this approach would be to create something that would deter killer whales, but not impact otters or other species. Jacobsen stated that weather conditions in southwest Alaska are extreme, and would likely pose a challenge to the engineering of such deterrents.

Estes expressed concern over the item regarding monitoring distribution and abundance of kelp beds, specifically the amount of work that would be required. Barrett-Lennard inquired if this was something that could be done using satellite imagery. Doroff noted that mapping of kelp beds could be done during skiff surveys of sea otters. The team discussed the utility of monitoring kelp beds – would this even be useful? The role of kelp beds as resting habitat that may provide protection from predators was also discussed. Jacobsen pointed out that kelp forests are highly dynamic and seasonal.

Estes next asked if the Recovery Action Outline was intended as all-inclusive list of all possible things that could be done, and pointed out that this could potentially lead to proposals and funding for lower-priority activities simply because they are on this list. Relative to other things on the list, Estes stated that monitoring kelp forests was not very important, in his opinion.

Roberts asked about the deletion of a “co-management” item that was present in the original Steller sea lion outline. Lowry pointed out that it is present in other sections of the outline.

Curland asked about capture for public display, and how likely that would be to occur. Burn responded that it would be possible for someone to submit an application for live-capture under the MMPA.

Burn asked if it would be valuable to incorporate subsistence harvested sea otters into the current necropsy program. Tinker noted the need for standardized methods for disease screening, data sharing, etc.

A new item was added to the outline regarding the need to evaluate the population-level effects of identified diseases. A new section was also added for the development of predation management plans.

Estes stated that it was important to begin thinking about the underlying processes that drive the threats to the population, rather than just treating the symptoms. Barrett-Lennard observed that there may be human activities, such as commercial fishing, that play a role here. Lowry added a new item to the outline to evaluate “top-down” vs. “bottom-up” ecosystem impacts.

A new item was added to the outline to monitor the occurrence of biotoxins in sea otters.

Curland asked about possible political sensitivity to the use of translocation. Burn stated that many of the concerns about the southern sea otter translocation project in California would not be applicable in southwest Alaska. Burek expressed concern about the use of translocation, including the introduction of disease and the possible vulnerability of translocated animals to predators. This item was modified to evaluating the feasibility of translocation as a management action. Burek remained concerned that translocating otters into an occupied area could spread disease. Lowry concluded that this item needs further consideration.

The authors of each threats section were assigned to write the narratives for the corresponding sections on recovery actions.

Methods for developing remaining sections of the recovery plan

Judy Jacobs gave a presentation to the team about how to conduct a [threats analysis](#) (TA). Typically, TAs focus on the source of the stress itself. There are two basic types of TAs that have been used. The first is a matrix of parameters including stressors, exposure, severity, geographic scope, immediacy, etc. The second type is a diagrammatic approach that estimates probabilities for the various relationships in the model.

The team agreed that a matrix-TA would be a useful exercise that may help point out which actions should have higher priority. The team discussed what the various column headings should be, and after some editing agreed upon the format for the TA. A means of capturing the level of uncertainty was included in the structure. Burn agreed to complete a template for the TA, and the team will fill one out for each management unit.

Schedule for future meetings

Lowry stated that the team could probably use more time for discussion at their meetings especially for those points where there is not complete agreement. The team agreed that the next meeting should be 3 days long, in either October or November 2007.

Lowry asked if the team thought that there were items arising from this meeting that merited sending another letter to the Regional Director. After some discussion it was decided that a letter to the Regional Director was not necessary.

The team completed the following table that outlines what the various members have committed to doing before the next meeting.

What	Who
Write critical habitat white paper	Estes, DeMaster, Ralls
Write critical habitat modeling plan	Tinker, Bodkin, Burn
Draft introduction/ecosystem context section for recovery plan	Estes, Tinker, Bodkin
Draft oil spills/contamination threat section for recovery plan	Burn
Draft disturbance section for recovery plan	Barrett-Lennard
Draft killer whale predation section for recovery plan	Barrett-Lennard
Draft justification for management unit structure for recovery plan	Lowry
Draft recovery action narratives for recovery plan	Various team members
Develop threats assessment template	Burn, Lowry
Develop options for structure of delisting/uplisting criteria	Ralls (lead), DeMaster, Lowry, Estes
Apply PVA model to Western Aleutian management unit & collate data for other units	Tinker (lead), Doroff, Bodkin
Move Western/Eastern Aleutian management unit boundary to Samalga Pass	Burn

Provide feedback on Defender's 10 questions/concerns
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All team members
