REVISED DRAFT

Multi-Criteria Decision Tool to Evaluate Proposals for Change in Steller Sea Lion Protection Measures in the Gulf of Alaska and Bering Sea/Aleutian Islands Groundfish Fisheries, 2007

"Proposal Ranking Tool"

Revised Report: Model Documentation and Rationale

Developed by the

Steller Sea Lion Mitigation Committee

North Pacific Fishery Management Council

February 2007

TABLE OF CONTENTS

Page

LIST OF TABLES

Table **Page**

LIST OF FIGURES

Figure **Page**

LIST OF APPENDICES

Appendix **Page**

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INTRODUCTION

The North Pacific Fishery Management Council (NPFMC) reinstituted the Steller Sea Lion Mitigation Committee (SSLMC) for the purpose of tracking the recent Section 7 Consultation, and to accept proposals for possible changes to existing Steller sea lion (SSL) mitigation measures for Pacific cod, pollock and Atka mackerel in the Gulf of Alaska and the Bering Sea/Aleutian Islands. The SSLMC began work in early 2006 by reviewing all relevant SSL research completed since the last Biological Opinion (2003 supplement). Next, the SSLMC developed a decision tool for evaluating proposals, which was presented to the NPFMC and the SSC in June 2006. The SSLMC was advised to institute a more rigorous approach to identifying potential anthropogenic impacts to the SSL resulting from fishing activity, and how changes in fishery regulations could be gauged to minimize impacts to the SSL. During July 25-27, August 29-30 and September 12-13, 2006, SSLMC members and scientific advisors with the National Marine Fisheries Service Alaska Fisheries Science Center (NMFS-AFSC), as well as members of the public, met in Seattle to develop a decision tool (hereafter called the proposal ranking tool or PRT).

The intent of the PRT is to assist the SSLMC in forming consensus judgments about their perception of the problem, and their beliefs in the likely relative consequences of fishery regulation proposals regarding the SSL and their prey field.

The PRT was developed using a facilitated systems approach to planning and evaluation – the Analytic Hierarchy Process (AHP). The AHP has been used extensively for decades to address planning, conflict resolution, and prioritization in such areas as policy development, economics, engineering, medical and military science, and has more recently been applied to fisheries research and management (Leung et al. 1998; Merritt and Criddle 1993; Merritt 1995, 2000 and 2001; Merritt and Skilbred 2002; Merritt and Quinn 2000; Ridgley et al. 1997; USFWS 2005, 2006). The AHP is a tool for facilitating decision-making by structuring the problem into levels comprising a hierarchy. Breaking a complex problem into levels permits decision makers to focus on smaller sets of decisions, improving their ability to make accurate judgments. Structuring also allows decision makers to think through a problem in a systematic and thorough manner. The AHP encourages people to explicitly state their judgments of preference or importance. Decision support software, Expert Choice 11,[1] was used interactively to structure the problem, depict the influence of weights, and derive the priority of elements.

The PRT is being reviewed and developed in phases:

1. July 25-27, Seattle, the SSLMC developed a prototype PRT, in collaboration with the NMFS-AFSC staff;

2. August 16, Juneau, the SSC reviewed and commented on the prototype PRT;

3. August 28-30, Seattle, the SSLMC explored comments from the SSC, and completed initial development of the PRT;

[1] Forman, E., T. Saaty, M. Selly, and R. Waldron. Expert Choice, Decision Support Software, McLean VA. 1983.

4. September 12-14, Seattle, the SSLMC reviewed the first four chapters of the new Biological Opinion in light of the PRT, and ran hypothetical proposals through the PRT to examine performance;

5. October 2-4, Dutch Harbor, the SSC reviewed the revised PRT and provided comments;

6. October 30–November 1, Seattle, the SSLMC reviewed comments from the SSC and completed a draft final PRT and report;

7. January 8-9, 2007, Anchorage, the SSLMC further revised the PRT, sensitivity tested the PRT, and prepared the PRT and report for SSC review in February 2007.

The purpose of this draft report is to describe and present the PRT as developed to date by the SSLMC, in concert with the NMFS-AFSC and the public in Seattle, July 25-27, August 29-30, September 12-14, October 30-November 1, 2006, and January 8-9, 2007. This draft report provides a basis for additional review by the SSC at their February 5-7, 2007 meeting in Portland.

Work on the PRT by the SSLMC does not imply that a clear linkage between fish harvest and abundance of SSL is known to exist. Rather, the PRT is predicated on the assumption by the NMFS in the current Biological Opinion that fishing had, and may continue to have, a relationship with SSL abundance. The judgments of SSLMC members reflect their assessments of the validity of that assumption. The meetings to date have been solely concerned with developing a tool to evaluate fishing impacts to the SSL and their prey field; insufficient time and information have been available to the SSLMC to fully develop a tool to evaluate benefits or "credit" in a proposal.

NOTE: Much of the following descriptive information on development and performance of the PRT is the same or similar to previous reports. The SSLMC reviewed its weighting of elements in the PRT hierarchy and developed additional rationale for these weightings as well as the structure of the model. Most of this additional work by the SSLMC is contained in their meeting minutes (October 30-November 1).

METHODS

PARTICIPANTS

A majority of SSLMC members participated in developing the PRT (see Appendix A), although not all members were present at all four meetings. Advice and scientific information was provided by NMFS-AFSC staff as well as members of the public. The meeting was facilitated by Dr. Margaret Merritt (Resource Decision Support).

APPROACH

The AHP was used to structure the problem and derive the interactions of its parts using data (when available) in combination with expert judgment (Saaty 1999). Expert judgment is defined as "previous relevant experience, supported by rational thought and

knowledge" (Saaty and Kearns 1985; see Appendix B). The SSLMC used a variety of references, data tables and other sources of information in structuring and rating elements in the PRT. Those information sources not directly referenced in this report are found in Appendix C.

STRUCTURING AND ESTABLISHING PRIORITIES

A top-down structuring approach was used, whereby the goal forms the top of the hierarchy and dimensions form the second level of the hierarchy. A dimension is a path along which an impact can be measured. Variables are components of proposed changes to fishing regulations relevant to the PRT, and form the starting point for discussing the lower levels of the hierarchy. When variables are included into the hierarchy, they become "children" of the dimensions and are scored as to their potential degree of impact, relative to their "parent" dimension (see a schematic of a hierarchy in Figure 1). The group was tasked with discerning how variables associated with fishing regulation changes would be likely to impact the dimensions of the SSL and their prey.

1st Level Goal	**2nd Level Dimension** Parent node	**3rd Level Variable-1st order** Child node of the 2nd level, and parent node of the 4th level	**4th Level Variable-2nd order** Child node
Evaluate proposed changes in regulations	Effects of fishing on the SSL	SSL site type and sensitivity by season	Proximity of fishing activity
	Effects of fishing on the target prey field	Fishing season	Removal amount and duration

Figure 1. Schematic of a hierarchical structure, showing four levels.

Development of the hierarchy was completed first, and then priorities were assigned to the elements of the hierarchy, with discussion about criteria for judging importance. Judgments on the degree of importance (or degree of sensitivity to impact) of a group of elements was always made in relation to their parent node - thus linking the elements in the lower levels to the upper levels of the hierarchy. In discussing criteria, a question such as the following was asked for each group of judgments, "Are all elements of this group of equal importance in assessing impacts, or is one element of more or less importance than another, in relation to its parent node?" A specific example follows: "Are all SSL site types (rookery, haulout, or other) of equal importance (sensitivity) to impact from fishing activity, or is one of more or less importance than another, in relation to a given season (winter or summer)?" In-depth discussion, with supporting data from NMFS-AFSC staff (Appendix D) and research updates previously received by the SSLMC, followed each such question, in an attempt to establish a rationale for judging importance.

Using criteria as guidelines, the SSLMC was asked to use supporting data (when possible) and/or their expert judgment in individually assigning ratings of importance to elements in each level of the hierarchy. The relative importance of the dimensions was evaluated, then that of the variables within each dimension. Participants were given time to think and write down their ratings of importance before sharing and discussing their judgments. A positive ratio scale with associated verbal equivalents was used to rate importance, where numbers between those listed (e.g., 2, or 2.5, etc.) were used to interpolate meanings as a compromise:

Scale of Importance	Definition
9	Extreme importance
7	Very strong importance
5	Strong importance
3	Moderate importance
1	Slight importance

Elements judged to be of equal importance were given equal scores. Consensus in the rank order of elements was usually achieved among committee members. Disagreement is defined in this report as differences in the rank order of importance; for example, if one committee member rated elements "A" and "B" as 2 and 4, respectively, and another member rated "A" as 5 and "B" as 3, they disagreed about which element is more important. When disparity in judging importance occurred, it meant disagreement existed, and discussion and debate was encouraged. Debates advanced the understanding of important concepts and often resulted in a clearer definition of the dimension or variable. By seeking consensus not only were dialogue and learning encouraged, but also the formation of a group solution, rather than individual solutions, was promoted.

Expert Choice was used interactively to depict the influence of weights and derive the priority of variables. Priorities approximate the strength of importance for each variable, adjusted to reflect the importance assigned to the dimension addressed by that variable. Mathematically, relative ratings of importance are entered into a vector and normalized. The values from the vector are then multiplied by the weight in the next highest level, and the result is the weight of importance for variables. The total score for each variable is then calculated by adding the weighted proportions over all variables within a dimension:

$$T_m = \sum_{k=1}^{d} W_k p_{k,m}$$

where

T_m = the total weighted score for variable *m,*
W_k = the weight for dimension k,
$p_{k,m}$ = the weighted proportion of the total score for variable m addressing dimension k
d = the number of variables.

STRUCTURAL ADJUST

Structural imbalance in the hierarchy can lead to dilution of the weight of many variables under a single dimension, so an adjustment feature in Expert Choice can be used to restore priorities to their respective proportion of weight. Adjustment can be made to the priorities of the children of the current node, based on the total number of grandchildren. While approximate balance is sought and desired, complex problems do not always lend themselves to balance – thus the advantage of the structural adjust feature. Structural adjustment must always be examined to see if the results capture the intended proportion of weight and make sense.

In a conceptual example, consider that if (A) has four grandchildren, and (B) has two grandchildren, then there are six grandchildren in all and structural adjusting multiplies A's priority by 4/6 and B's by 2/6, then normalizes. Thus, the overall priorities for A's grandchildren are not diluted simply because there are many of them.

DISCUSSION OF SSC RECOMMENDATIONS

SSC August 15-16, 2006 Meeting

Before further development of the PRT, SSC review comments from their August 15-16 meeting in Juneau were carefully examined and discussed. The SSC made nine specific suggestions, six of which require SSLMC response. The remaining three suggestions were requested additions or general comments on the PRT. The SSC suggested that the tool should provide for:

- the suite of anthropogenic factors that have been identified as potential threats to the recovery of distinct population segments of the SSL population;
- the impact of proposals on non-target prey species, including species taken in fisheries for salmon and groundfish as well as bycatch of other non-target species that are SSL prey;
- a variable set other than a TAC/biomass ratio for depicting potential effects of fishing on the prey field;
- estimates of fishery removal rates as a function of gear type and total effort;
- an alternative to frequency of occurrence of prey items in scat as a proxy for SSL nutritional needs when better measures become available; and
- provisions to evolve the PRT as more refined data become available.

Additionally, the SSLMC should retain flexibility to address situations not currently incorporated into the PRT.

In regards to how a proposal may influence anthropogenic effects on SSL, such as through incidental catch or entanglement by fishing gear, illegal shooting or disturbance from vessel traffic, SSLMC discussion ensued at length. The SSLMC reviewed its previous in-depth considerations of this factor at the July 25-27 meeting and felt that its conclusions are still valid. The SSLMC also noted that historically this factor had greater

importance; instances of anthropogenic effects currently are significantly reduced from the pre-1990 period. The SSLMC decided that this factor should be considered outside the PRT for several reasons. First, there is a lack of accurate information on several aspects of anthropogenic factors, and thus no way to judge impacts and legitimately assign ratings among separate fishery sectors. Lack of substantiating information would only lead to unnecessary speculation and contention, and likely would diminish the reliability of the PRT. Further, anthropogenic impacts are addressed by fishery in the annual List of Fisheries (LOF) process under the Marine Mammal Protection Act. The LOF process will be considered in the proposal review process.

The issue of bycatch of non-target SSL prey raised by the SSC led to a discussion of the importance of prey other than the three fishery target species to the nutritional needs of the SSL. The SSLMC noted that the entire prey field had already been considered at the July 25-27 meeting in Seattle; weightings of target species in relation to the frequency of occurrence of non-target prey in the scat of the SSL is accounted for in the model structure based on data in NMFS (2006a), under the node concerning nutritional needs of the SSL. The SSLMC wished to address SSC concerns for bycatch of non-target prey in relation to its biomass; however, biomass estimates for non-target prey were not readily available at the August 28-30 meeting in Seattle. Staff at the NMFS-AFSC agreed to develop a data set of biomass estimates of target and non-target prey by region so that the SSLMC can consider bycatch of non-target prey in the PRT to determine how this may affect overall proposal scoring. The data set was made available to the SSLMC on September 19 (Appendix F). The SSLMC intends to consider more fully the SSC recommendations to evaluate proposals in terms of impacts on other SSL prey items; however, the Committee will include the information in Appendix F, as it reviews proposals. This data set will be but one of a series of data the Committee will use "outside the model" in the overall proposal review process.

Several members of the SSLMC cautioned that placing too much weight on the total sum of non-target prey in the SSL diet in some regions could discount the importance of the target species to the SSL, and thus run counter to the Biological Opinion on the impact of fisheries for Atka mackerel, Pacific cod and pollock on the SSL. The difficulty in understanding the dynamics of SSL prey based on scat data was noted again. It is yet to be fully described in the draft Biological Opinion.

An alternative to the TAC/biomass ratio was explored, with valuable input from NMFS-AFSC staff. Discussion included concern over lack of data to improve upon the TAC/biomass ratio. One suggested alternative was to use the target species biomass after removal by a fishery, relative to the combined pre-fishery biomass of Pacific cod, pollock and Atka mackerel. This ratio would put into perspective the harvest relative to the total prey field. For example, one region might have a large abundance of pollock relative to the combined biomass of all three target species, whereas another region might have a small amount of pollock relative to total combined species biomass. Thus, removals of pollock from each region would have potentially different impacts. However, it was noted that the alternative idea did not appear to improve the scoring process over the original idea because both were limited to data collected at the regional scale. Additionally, biomass survey data are collected during summer, whereas fishing occurs primarily in winter, thus reducing the utility of survey data. After considerable detailed discussions, the SSLMC concluded that no quantitative data set, or method to combine

data sets, would serve as an acceptable proxy for judging the effects of fishing on the prey field. Therefore, the SSLMC turned to a qualitative way in which to judge the potential effects of fishing on the prey field relative to the status quo, by asking the following questions:

- In regards to harvest removal rate (intensity of fishing), will the proposal result in a shorter (longer, or the same) fishing duration, relative to the status quo?

- In regards to target fish biomass removed, will the proposal result in removing a lot more (a moderate amount more, a slight amount more, or the same or less) of target fish, relative to the status quo?

The status quo is defined by the SSLMC as the current fishing regulatory situation for each proposal. By asking questions in this manner, the SSLMC will be able to judge effects of the proposal at a local scale in relation to the current fishing situation.

While the rationale for a hierarchy of fishing power by gear type was provided in the June 2003 Supplement to the Biological Opinion (page 36), and explained to the SSLMC by NMFS-AFSC staff, the SSLMC concluded at the July 25-27 meeting in Seattle that gear type and vessel size are not satisfactory proxies for removal rate. Concerns include the lack of consideration for the number of vessels fishing, fisheries occurring on large schools of fish, agreement between sectors to avoid fishing conflicts, and the expectation that some proposals may be presented that would control removal rate directly.

The AHP that was used to create the PRT can also be used to modify it to accommodate any new information as it becomes available for examination and discussion.

SSC October 2-4, 2006 Meeting

The SSC again reviewed the revised PRT during their meeting of October 2-4 meeting in Dutch Harbor. The excerpt from the SSC minutes of that meeting that address the PRT are attached as Appendix E.

The SSLMC reviewed these suggestions and comments, and made additional revisions to the PRT during its meetings of October 30-November 1, 2006 and January 8-9, 2007. The Committee developed some structural changes to the hierarchy and developed the rationale for how the model is constructed and prepared narratives for why the Committee chose the weighting factors for the hierarchical elements. The following addresses the SSC's October 2-4 meeting comments. In the Results and Discussion section of this report the full narrative of the rationale for the PRT is provided.

Response to SSC Comments from October 2006 Meeting

The SSC provided the SSLMC with additional comments and suggestions for improving the PRT. These SSC comments were made at their October 2006 meeting in Dutch Harbor, and specific responses to each are as follows. These responses are based on the SSLMC's October 30-November 1, 2006 meeting and were further updated during the SSLMC's January 8-9, 2007 meeting:

1. The SSLMC agrees that the PRT will help compare proposals and combinations of proposals. The SSLMC will likely evaluate proposals singly, but will also compare scores to status quo for each proposal. Additional "tools" will also be used to evaluate proposals including SSL trends and counts by SSL census region; bycatch of target and nontarget species important in the SSL diet, by region and season; gear type considerations; and information on "special" or unique SSL sites (e.g. Marmot Island). Some of these "outside the model" data sets are listed later in this report under the section entitled Implementation of the Proposal Review Process.
2. The Structural Adjust feature of the AHP methodology has been of interest to the SSLMC also. The Committee discussed this feature of the model, and agreed to run proposals with and without the Structural Adjust to determine effects on scores. During the SSLMC's January 8-9, 2007 meeting the Structural Adjust feature was tested to determine how it may affect proposal scores. The Committee will likely run proposals with and without this adjustment and compare scores, both from the proposal and from its corresponding status quo model runs, to illustrate effects of the adjustment.
3. The interaction among distance zones and numbers of sites was revisited. The SSLMC agrees with the SSC about the apparently illogical scoring of proposals that might affect one site or many sites, each receiving the same score for potential effects within zones around SSL sites. The SSLMC revisited this part of the model, debated the issue at some length, and decided to re-weight the elements in this category to give more weight (more adverse effect) for many sites affected and less weight (less adverse effect) if few sites are affected, with intermediate weights between extremes. The SSLMC also conducted some tests of the model to be sure scorings reflect Committee members' intents (and common sense). More sensitivity testing will be accomplished as the model is used to score proposals. A detailed synopsis of the SSLMC's debate and discussion of this SSC comment is provided in the SSLMC October 30-November 1 meeting minutes. The Committee also re-tested the PRT and conducted additional sensitivity tests during its January 8-9, 2007 meeting; the Committee was comfortable with the model's performance when testing hypothetical proposals that could have large or small effects on SSLs. That testing involved not only extreme example proposals but also testing effects of manipulating individual elements in the PRT to see the effects on proposal scores; again, the SSLMC was comfortable with the model's performance – i.e. it matched what the SSLMC would expect as output.
4. The SSLMC agrees that the PRT should be well documented and referenced. This revised report contains a synopsis of the PRT with documentation and rationale for each element in the model's hierarchy. The SSLMC's October 30-November 1 meeting minutes provide additional and more detailed discussion of the rationale for how the model was constructed and for how elements in the hierarchy were scored. That information is presented in the latter part of this report.
5. The SSLMC discussed the SSC suggestion that some SSL sites may be more "important" or perhaps more sensitive than others, and thus could merit additional protection or other considerations when evaluating a proposal that might affect such sites. The SSLMC also realizes that individual SSL site demographics could

be used to better evaluate a proposal's effects on SSL sites, and given the detailed data available for sites and regions, the SSLMC feels it better to evaluate proposals on a case by case basis using these data outside the PRT. The SSLMC agrees that there is a relative wealth of information on the status and trends of SSL populations in different management regions. The SSLMC however has difficulty understanding how these data should inform our decision making process. Should the SSLMC consider regions that have declining populations more sensitive than regions with increasing populations? This type of reasoning would preserve the geographic range and genetic diversity of the species, but might lead to a relatively large decrease in absolute numbers of animals, or a reversal of the current trend of overall stable or slightly increasing SSL numbers (currently driven by those regions that are increasing). Conversely, should the SSLMC consider regions that have increasing populations more sensitive than areas with decreasing populations? This type of reasoning might lead to a contraction of the historic range of SSL, a loss of genetic diversity, and run counter to the SSL Recovery Team recommendations for delisting criteria, which state that no regions (or at least no two adjacent regions) should be declining. The SSLMC therefore intends to consider demographic information "outside" the model.

6. The SSLMC discussed the issue of fishery catch rate and the meaning of such data in terms of potential impacts on SSLs. Fishing rate can be considered an indicator of potentially adverse effects on the SSL prey field (high catch rate, prey reduced accordingly, less food for SSLs), but it also can be considered an indicator of little effect (lots of prey, high catch rate, therefore lots of food available to SSLs). The SSLMC discussed this at considerable length, but believes that resolution to this dilemma will be unlikely unless the committee can obtain input from the NMFS Office of Protected Resources for an opinion. This input will likely be found in the draft Biological Opinion which may not be available to the Committee until later in 2007. In the mean time, the SSLMC wishes to complete development of the PRT and will evaluate this issue outside the PRT based on input from other experts, and eventually the draft BiOp. The SSLMC also intends to discuss this issue with pollock, cod, and Atka mackerel stock assessment biologists at the AFSC to seek their advice during the proposal review process.
7. The SSC recommended that the PRT documentation report be provided to Protected Resources Division (PR), NMFS, for their review and comment. Some believe that the SSLMC's judgments in the PRT should not conflict with PR's view of the available scientific information. For example, the SSLMC currently ranks summer about equally with winter in terms of seasonal sensitivity of SSLs to fishery effects. The SSLMC discussed whether this is more of a science issue and that the Alaska Fisheries Science Center might be more appropriate for a review. Some on the SSLMC may feel it might be good to be sure PR has input on whether the PRT has the appropriate elements. The SSLMC noted that in the past, some comments from PR suggested a difference in opinion on some parts of the PRT, and that perhaps their review would be appropriate. However, the SSLMC also noted that we are already subjecting the PRT to scientific review before the SSC, and have to date done so twice including a special SSC meeting in August 2006, and the PRT will undergo a third SSC review in February 2007. The Committee generally concurred that the SSC review would accomplish the

need for a scientific review. The SSLMC noted that the SSC has already commented on whether the PRT is appropriate, adequate, and are we applying it correctly, and that the upcoming additional review in February will give the SSC the opportunity to again review the model as it is now configured. The consensus is to subject the PRT to another round of SSC review and then use the model after that has been completed. The SSLMC also acknowledges that the PRT may need to be revisited once the draft BiOp is released for public review.

8. The SSLMC recognizes the non-alignment of fishery management area boundaries with SSL census boundaries. The SSLMC consciously has chosen to rank proposals in terms of how they might affect SSL census areas, as opposed to areas receiving TAC allocations, to better provide a tool for evaluating potential impacts on wSSL population subunits. Data on regional SSL trends are summarized by SSL census region. The SSLMC discussed this at their October 30-November 1 meeting and concurs with the SSC on the importance of evaluating proposals in this geographic context. The Committee does not see an issue in evaluating proposals in this manner as long as this is applied to all proposals consistently and that there is conscious recognition that SSL census area boundaries do not match fishery regulatory area boundaries. The important issue is how proposals rank in terms of potential effects on SSLs, and the PRT as constructed should provide that kind of information.
9. The SSLMC believes that the node structure of the current PRT is appropriate for the kind of proposals it has received. We do not believe that proposals that will be evaluated with the PRT will affect multiple dimensions of a single node. The Committee has tried to structure the PRT so that a proposal scoring will involve only a single element per node.
10. This SSC comment provided fodder for the lengthiest discussions of the SSLMC. Many on the Committee agree that the spring period is most sensitive to SSLs and perhaps a third season should be added to the model. The Committee previously considered adding more than two seasons to the model, but because of lack of more refined data by subseason agreed to stay with summer and winter. While a third season encompassing the sensitive period of time, spring, when females are just beginning to wean juveniles, are pregnant and about to deliver pups, and are about to become pregnant, the SSLMC felt that their previous scorings of importance of the summer season included this consideration. The SSLMC also felt that they would require additional data to justify adding a third season, and additional time to reconfigure the structure of the model. However, consideration of the importance and the interaction among season, site type, location of the site affected, types of SSLs present at the site, proximity of the activity to the site, potential prey items that might be affected are all embodied in this model and will receive not only the model score but further evaluation by the Committee "outside the PRT" as well. In other words, the SSLMC intends to evaluate proposals not only through the mathematical process embodied in the PRT but also with other biological, economic, and other data.

The SSC also provided two additional comments, one suggesting caution in interpreting small differences in scores that might come from comparing proposals using the PRT, and another expressing caution in over weighting proposals that might provide a "management bonus". The latter issue will be considered by the SSLMC, but outside the

PRT process. The SSLMC agrees with the SSC's first comment and will be cautious in evaluating scores developed for proposals evaluated using the PRT.

RESULTS AND DISCUSSION

GOAL

The SSLMC's goal statement for the AHP model is to build upon previous efforts to develop a rational approach to evaluating proposed changes in fishing regulations for Atka mackerel, pollock and Pacific cod in the Bering Sea/Aleutian Islands and Gulf of Alaska that had been put in place previously to protect the SSL and their prey.

In the most recent Biological Opinion on the impact of Federal fisheries for Atka mackerel, pollock and Pacific cod in the Bering Sea, Aleutian Islands and Gulf of Alaska, the Protected Resources Division of NOAA Fisheries postulated that fisheries have somehow contributed to the decline in the number of SSL (in the western Distinct Population Segment), including indirectly by reducing the prey available to the SSL. Although the SSLMC's work on the PRT proceeded with the assumption that there may be a relationship between prey and the nutritional balance of the SSL, this does not imply that the SSLMC concurs with the assumption or not.

STRUCTURE OF THE PROPOSAL RANKING TOOL

Although the SSLMC discussed several topics of concern at great length, three major questions are currently included in the PRT because reasonably reliable data are available to address these questions that are not available for other issues of concern. The three questions are:

1. To what extent does fishing alter the (target) prey field by season, putting the percentage of removal and duration of removal in the context of the status quo?

2. To what extent is the SSL sensitive to fishing activity, in relation to proximity to a given site type, and the percentage of sites affected in the region, and by season?

3. To what extent do the target species appear in the diet of SSL, by region and season?

The SSLMC identified two dimensions of the problem along which impacts may occur,

- how fisheries affect the prey field of the SSL, and
- how fisheries affect the SSL.

The SSLMC then structured the questions as a hierarchy, according to the two dimensions:

Goal: Evaluate proposed changes in regulations that encompass relevant dimensions of the SSL and their prey

- Dimension: effects of fishing on the prey field (Question #1)
- Dimension: effects of fishing on the SSL
    - Sensitivity of the SSL in relation to site type and proximity (Question #2)
    - Appearance of target species in SSL scat (Question #3).

In a previous report on the PRT, the SSLMC outlined its rationale for building the model. Since that report, dated September 2006, the SSLMC has met twice to consider SSC comments and specifically to develop a rationale for how the model was built, the reference materials the SSLMC used to make their judgments, and the rationale behind weighting given to the various elements in the hierarchy.

In the September 2006 report was considerable detail on the initial construction of the PRT and the weightings given to the various elements. This material will not be repeated here, but the reader is referred to that report for those materials.

Rather, we report now the specific rationale for the model as it is currently configured. The general hierarchy of the PRT has not changed, although one addition to the structure was made – adding "other prey items" to the target fish species (diet) element. This will be discussed below. Otherwise, the structure is the same as before, just documented in more detail in this report. See Table 1 and Appendix G for the PRT hierarchy.

Table 1. Variables from proposed fishing regulation changes that are included in the model to evaluate impacts to the SSL and their prey.

Variable	Sub-units
1. Target fish species	a. Pacific cod b. Pollock c. Atka mackerel d. Other prey items
2. Target species removals	a. a slight increase in amount harvested = 1 to 5% of the total seasonal TAC for all sectors in that fishery for season. b. a moderate increase = 6 to10% increase in amount harvested c. a large increase is > 10% increase in amount harvested d. no change or a decrease in amount harvested
3. Fishing duration	a. a shorter fishing season relative to status quo b. a longer fishing season relative to status quo c. a fishing season of the same duration as status quo
4. Geographic regions	a. Eastern Gulf of Alaska (EGOA) b. Central Gulf of Alaska (CGOA) c. Western Gulf of Alaska (WGOA) d. Eastern Aleutian Islands (EAI; includes the Bering Sea) e. Central Aleutian Islands (CAI) f. Western Aleutian Islands (WAI) g. Pribilof Islands
5. Seasons	a. Summer (the SSL breeding season, defined as May-September) b. Winter (non-breeding season, October-April) c. Shifting fishing from winter to summer d. Shifting fishing from summer to winter
6. SSL site types – summer and winter for each type	a. Rookery b. Haulout c. other
7. Proximity zones to a SSL site	a. 0-3 nm b. 3-10 nm c. 10-20 nm d. 20+ nm in CH e. 20+ nm outside CH
8. The percentage of SSL sites affected in a region	a. 1-10% b. 11-25% c. 26-50% d. 51-75% e. 76-100%

OVERVIEW OF PRT STRUCTURE – MAIN ELEMENTS

The PRT is designed to evaluate a proposal in terms of potential effects on SSLs. The SSLMC determined that this issue could logically be broken down into two main questions: effects of fishing on SSLs directly (by either affecting their food sources or SSLs themselves), or effects of fishing on the prey field. The SSLMC acknowledged that the model could be structured in other ways, but that these two main questions are the most important issues related to fishery effects on SSLs. Those two main elements are weighted about 60:40, although the structural adjust feature in the model may revise these proportions.

The Committee discussed these proportions. The higher weighting on effects on SSLs is due partly to SSLMC concerns over fishery effects on the *needs* of SSLs – space around sites to forage, food that may vary by season and region, and how many sites occur in a region, among other variables. The effect on SSLs also includes potential effects on SSL access to fish. Dr. DeMaster indicated that this model structure and its ranking of the relative importance of fishery effects are in agreement with the current BiOp, because it answers the question: are fish available to SSLs in terms of localized depletion and overall abundance, with localized depletion being a more important consideration. The Committee discussed how this part of the model addresses how fishing may affect SSLs through disturbance or SSL foraging near sites, and thus addresses competition for prey.

The Committee generally reaffirmed the main structure of the model and the higher weighting for a proposal's potential effects on SSLs.

The SSLMC also has developed a list of the data sets it may use to evaluate proposals "outside the model" – these data sets are listed later in this report in the section entitled Implementation of the Proposal Review Process.

Committee decision-making

In the development of the PRT, the SSLMC, in most cases, was hampered from making clear judgments of weighting of elements in the model because of lack of sufficient data or the presence of uncertainty. Thus, much of the decision-making in the development of the PRT was the result of iterative discussion. The Committee voting occurred only after a usually-exhausting discussion and debate of what data were available and the potential meaning of those data as related to individual elements in the PRT hierarchy.

The process involved a lot of back and forth discussion and debate on each element. SSLMC members questioned each other, the scientists, and the available data. Alternative explanations were raised and explored, and some committee member conclusions were changed based on this debate. The Committee also discussed the limitations of the data bases, especially uncertainty, and how differing opinions on the meaning of these data sets could be derived. This process raised the level of understanding of the available information and prepared committee members for voting on weighting factors for the various elements in the hierarchy.

Fishery effects on the prey field

This hierarchical category includes three elements: season, % TAC, and duration. These will be discussed in detail below. Season addresses when a fishery occurs and recognizes that SSLs have different sensitivities to changes in their prey field that may occur within or between seasons. A season element occurs in another part of the PRT, but for different reasons, and thus the PRT does not place double emphasis on season. For future evaluation of proposals, the SSLMC has developed and will use a data set that describes the actual fishing periods for each fishery in the GOA and BSAI by target species, fishing sector, and subregion; these data will allow the SSLMC to compare actual fishing periods with the current regulatory periods.

The committee had long and extensive debate about how to include an element that estimates a fishery's impact on SSL prey availability. A number of parameters were considered that might reflect a fishery's impact. These included: (1) Biomass of the three target groundfish species as a parameter to illustrate the size of the prey fields available to SSL. The SSLMC was dissuaded when groundfish stock assessment biologists indicated the lack of precision for biomass estimates by area. (2) The element of % TAC replaced biomass and was intended to capture seasonal shifts in the removal of prey species and magnitude. (3) Including "other species" to illustrate that the SSL prey field consumed is often much broader and diverse than the three target species. (4) Duration was considered to reflect the nutritional research described in the 2001 BiOp that indicated fisheries of short duration (less than 3 days) are of less concern since SSLs are not as sensitive to such short interruptions in prey availability. On the other hand, the BiOp expressed concern for prey field interruptions that might impact foraging within a longer, or 10 day, period. Though we do not have a model for determining how fishing affects a prey field, depletion studies have shown that in many fisheries, removal of prey is likely followed by a replenishment of prey from adjacent areas. All of these factors reflect the discussions of members of the committee that the supposition depicting removal of fish as having an adverse impact on SSLs may not necessarily accurately reflect what occurs in the environment.

The SSLMC noted that the PRT does not provide a limited means to score a proposal in terms of its potential beneficial effects on SSLs or their prey. That kind of evaluation will primarily occur outside the PRT. The SSLMC noted that the PRT considers elements that can be regulated – quota, season dates, and spatial closures. The SSLMC also noted that cooperatives can be beneficial by slowing a fishery, reducing removal rates, etc. – this is another element in fishery management that is not contained in the PRT but can be considered by the SSLMC outside the PRT.

Sensitivity of SSLs to fishing – spatial/temporal

This part of the PRT has three elements: site type, proximity, and % of sites. Site types are from the current list of known SSL rookeries or haulouts, by season, based on NMML survey data and the list provided to NMFS PR for the current consultation. The SSLMC adopted this list as it is the most current knowledge of SSL use of terrestrial sites throughout the range of the wSSL available. The SSLMC discussed how to address a proposal that might affect multiple sites, and how an effect on one site might be compared with an effect on multiple sites. This is addressed in the % of sites element. The proximity element relates to site type and number of sites, since a fishery may differentially affect SSLs depending on how close the activity is to a SSL site. The SSC raised an issue in their comment #3 – the current PRT rates equally an impact on one site and an impact on many sites. The SSLMC revoted on this issue and acknowledged there is logically a difference in impacts on few sites versus impacts on many sites. More detail is provided below.

Sensitivity of SSLs to fishing – diet composition

This part of the PRT includes season, subregion, and target species. There is an obvious season component to fishery effects on species that are important in a SSL diet. The importance of pollock, cod, or Atka mackerel to SSLs varies with season based on available scat data. Those data were used by the SSLMC in placing fishery effects on SSL diet in a seasonal context. Season also is partly based on the SSL breeding and nursing phenology; more discussion on this seasonal element is in a later part of this report. Regions are from the NMML SSL census data base; the SSLMC acknowledges that fishery effects should be evaluated in regions important to SSL population trends, and that there are known regional differences in SSL diet based on scat analysis. A Pribilof Islands region is included to allow the PRT to evaluate proposals for changes in SSL sites there. Generally, the main Bering Sea is included in the eastern Aleutian Islands area as this SSL subregion is closest in geographic terms and in terms of potential dietary composition. Amak Island is part of the eastern AI region.

The SSLMC discussed at length the importance of all elements in a SSL diet, not just the three target species that were addressed in the current BiOp and current regulations. For example, salmon in the central GOA are very important seasonally but are not regulated by the Council. Arrowtooth flounder are important as well, and are regulated by the Council, but are abundant now and not targeted heavily. The SSLMC will use the data provided by Dr. Sarah Gaichas at the AFSC for a proposal that might change the level of bycatch of elements in the SSL diet that are not the three main target species subject to current regulation. Those data will be used outside the PRT but will be important considerations in judging proposals, because the currently-regulated fishery on the three main target species may, in some instances, have less effect on SSLs because of the availability, and use, of alternative prey items; the Gaichas data base provides those data sets.

PRT DOCUMENTATION

The following is a more detailed documentation and rationale for the PRT structure (see Appendix G) and weightings of various elements.

Effects on SSLs in a Temporal/Spatial Context

Number (Percent) of Sites Affected by a Proposal

The Committee started its review of the PRT at this node in the hierarchy – the lowest level in the spatial/temporal part of the model. The main hierarchical element, Effects on SSLs in a Temporal and Spatial Context, addresses how a proposal might affect SSLs by impacting areas near their terrestrial sites. SSLs may be differentially sensitive to fishery effects depending on the site type (rookery, haulout – each of which may have different concerns depending on season, so there is a seasonal component in this element), by how close the fishing activity might be to a site (using the distance zones developed in the 2001 BiOp and its 2003 Supplement), and the number of sites affected by the fishing activity.

Starting with number of sites affected, the SSLMC felt that the model should evaluate a proposal in terms of how many sites it could impact. The SSLMC acknowledged that the SSL census regions contain varying numbers of haulouts and rookeries, and thus a specific numerical hierarchy may not be appropriate but a percentage of the sites in a region may be more appropriate. Thus, this criterion perhaps should be differentially weighted for the percent of SSL sites affected, with a higher score (more impact) for larger numbers of sites and a lower score (less impact) for fewer (small percentages).

The Committee discussed at length the effects of impacting one or a few sites in the 0-3 n mi zones versus impacting a larger number of sites in the 0-3 n mi zones (or other geographic zones around sites). This was an issue raised by the SSC and by the public – as previously scored, the model gave equal weight (same level of impact) to a proposal that affected a zone around a SSL site where there might be a few sites affected or many sites affected (the Fraser argument). While the SSLMC felt that *any* disturbance in the 0-3 n mi zone would be of highest concern regardless the number of sites involved, they acknowledged that logically there should be higher concern for fishing in multiple sites as opposed to fishing in a single site or a few sites. Thus the SSLMC revoted to rank as higher impact a proposal that might affect a higher percentage of sites in a region, and lower impact a proposal that might affect a lower percentage of sites in a region.

Proximity of Fishing to SSL Sites

This element relates to how a fishery might affect food sources that occur near SSL sites. The SSLMC discussed how this could also relate to disturbance of SSLs, but this is not the meaning for this element. Proximity is more related to fisheries effects on prey rather than disturbance. The SSLMC has previously considered direct anthropogenic effects on SSLs, but determined that these impacts currently are very minimal and are summarized in the annual List of Fisheries process under the MMPA and disturbance is not an element that readily can be regulated. Such effects will be considered "outside the model" (see section later in this report entitled Implementation of the Proposal Review Process for a list of "outside the model" data sets). The five categories under proximity are the zones identified in the 2001 BiOp and its 2003 Supplement[2]. These zones also relate to available telemetry data and the relative importance of distance from sites based on SSL occurrence. The SSLMC noted a lower score (on a data sheet provided several meetings ago) was placed by NMML on areas outside CH, and Lowell Fritz acknowledged that, based on telemetry data, there is not a lot of difference in usage by SSLs between CH outside 20 n mi and non-CH outside 20 n mi, but these data are based on juvenile animals (telemetry). Mr. Fritz acknowledged that the foraging areas outside CH may have been undervalued to some extent; Mr. Fritz indicated he would increase the importance of foraging area from what was previously provided. The SSLMC revisited the scoring of this element; three members changed their rankings on the 20+ n mi CH and 20+ n mi non-CH elements.

Site type

The SSLMC revisited the definitions of the six categories, noting these are based on numbers of SSLs using a site, by season, as well as differences in type of use such as breeding activity or maternal attendance. SSL site types based on NMML definitions are:

- Summer rookery - >50 pups counted in at least one year since 1975
- Summer haulout - >200 non-pups counted in at least one year since 1990
- Summer other – site does not meet minimum number of observations in the summer to count as a haulout or a rookery since 1990, but is still critical habitat under the ESA (>200 non-pups counted at least once)
- Winter rookery – site is a rookery in summer and a haulout in winter (>100 non-pups counted in at least one year since 1990)
- Winter haulout - >100 non-pups counted in at least one year since 1990
- Winter other – site does not meet minimum number of observations in the winter to count as a haulout since 1990, but is still critical habitat under the ESA (>200 non-pups counted at least once)

[2] These zones are defined as: "Allow fishing: 1) to the beach, 2) outside 3 n mi, 3) outside 10 n mi, 4) outside 20 n mi but not in Critical Habitat foraging areas, and 5) anywhere outside Critical Habitat."

In general, zones closest to sites are scored higher, particularly the 0-3 and 3-10 n mi zones. The SSLMC discussed at length the potential difference in concern over summer versus winter, considering particularly SSC comment #10 (see Appendix E). For summer haulouts, animals may range further and there may be more equality between zones because of distance of use. NMML scientists would not devalue summer haulouts because they are used by juveniles and females; some SSL biologists believe that comparing usage of sites in summer with winter is very difficult. Winter haulouts have females with young pups and also pregnant females. The SSLMC discussed possibly increasing the value of winter haulouts. Dr. Ken Pitcher suggested that summer haulouts should be of lower value in the PRT. Mr. Fritz, however, felt that all SSL sites are relatively equally important, although he acknowledged that perhaps, as Dr. Pitcher suggested, a third season, spring (April and May), might help differentiate what is likely a more sensitive season compared with the rest of summer. The SSLMC noted that winter haulouts and rookeries are being used more because females are attending their young throughout the winter months so these sites may be more important than summer haulouts.

The SSLMC has previously had the mindset that distance away from a site may be ranked different in sensitivity to fishing if it is an activity that occurs in winter versus summer and if it is an activity that occurs at a haulout versus a rookery. There is a synergism between season and site type that is recognized in the structure of the PRT. For example, activity in 10 – 20 n mi at a summer rookery may be of less concern because female foraging is more restricted to 0 – 3 or 3 – 10 n mi because these nursing females do not tend to forage further away from dependent pups; an activity in 10 – 20 n mi, however, at a winter rookery could be of more concern because the female is not as tied to shore in winter, forages further to acquire food, and thus could be more affected further away from shore.

The SSLMC asked: are we moving back to the hypothesis that winter may be more important? In general, summer is important for juveniles, and winter is important for reproductive females. It is difficult to choose an importance level for season. If the natality study is accurate, then winter and spring are more important for late term pregnant females. Dr. Pitcher's concern is the need to protect reproductive females.

The SSLMC discussed SSL concern #10 further. Some believe the SSC was asking for a rationale for seasonal weightings rather than recommending changing the model structure by adding a season. The main question seems to be: is it more important to restrict fishing around one kind of site versus another kind of site? This is the question that was used for the previous committee voting on proximity for season and site. A winter rookery and a winter haulout are the same thing biologically and should be ranked the same. The site type summer rookery was ranked the most important.

The SSLMC attained no consensus resolution to differing opinions on seasonal importance. The Committee felt that adding a third season might be a good idea but it likely would not appreciably change the results of scoring proposals. The SSLMC does not have sufficient data to judge which season is more important. The SSLMC also discussed whether the trade offs between the amount of work needed to change the entire structure of the model, given the relatively small increment of expected performance of the model, would merit taking that action. In general, the Committee thought that the substantive amount of work to add a third season would not improve the model performance all that much. Thus, based on these discussions, the SSLMC decided to leave the seasonal portion of the model as is.

Effects on SSL Diet Composition

Target species

This element addresses how important pollock, cod, or Atka mackerel are in the diet of SSLs, relative to other elements in their diet. The model is structured to acknowledge the synergism among season, region, and prey species. The SSLMC previously scored the importance of the three main target species by answering this question (this is an example specific to pollock in the eastern GOA): how important is pollock in the diet of SSLs in the eGOA in summer relative to all elements in its diet in that region and season, based on available diet data and recognizing the limitations of the scat sampling in accurately characterizing the SSL diet; this also recognizes the limitations of the frequency of occurrence metric as accurately characterizing the number and size of prey items in the scat samples.

The SSLMC revisited their rationale for scoring this question. The issue of including species other than the three target species received considerable discussion. Most felt that excluding recognition that SSLs prey on other items than the three target species is greatly misleading and a measure of the importance of other diet items should be accommodated in the PRT. Scat data used in the SSLMC's evaluation of target species, and other species, are summarized in Table 3.21 (included in the PRT report and being used in the ongoing consultation)(Appendix D contains this table). The SSLMC also based their discussions and scoring on the diet presentations from scientists during past SSLMC meetings.

The target species category recognizes the current fisheries regulated for SSL protection; these are the species identified to be of concern in the 2001 BiOp. The SSLMC has some concerns over how to interpret the data contained in Table 3.21. Do these data reflect SSL preferences, and thus selection, or just the availability of prey? Do these data accurately characterize the importance of items in scat to SSL nutrition? Size of prey items is an issue; sand lances are very small fish and a SSL must consume many to attain the equivalent of a single cod or pollock or greenling or salmon. Frequency of occurrence measures how often an item occurs in a sample; to what degree is this accurately indicative of prey availability or prey selection? And some species important to SSLs may not have hard bony parts that occur in scat (e.g. octopus or squid).

The SSLMC struggled with alternative ways to measure the importance of the three target species relative to the whole SSL diet. Scat data may be the best proxy available for identification of SSL diet. The SSC comment #6 (Appendix E) is also an issue the SSLMC discussed at length. The SSLMC recognizes that harvest rate could indicate abundant fish for SSLs after fishing ceases, or it could also mean lower abundance because of high fishery removals.

The SSLMC agreed to add another category to the target species element: "other". This would give the Committee four choices when voting on the importance of various elements in the SSL diet. This also would provide a "modifier" to the scores for pollock, cod, and Atka mackerel based on the level of importance of other species, relative to these three, in the SSL diet, by region and by season. Some SSLMC members argued that, because of the way the model works such that it sums to 1.0 the scores for all four categories, the "other" category would reduce the value of the other big three species when some think that the big three are not as important as other species in the diet. Committee members indicated this is a desirable result of adding the "other" category. Therefore, the SSLMC changed the structure of the model to accommodate an "other" cell for each of the areas in each of the seasons.

The Committee discussed whether to vote on the (now) four categories, or perhaps just use the data in Table 3.21 in the model by calculating proportions of each diet element. The SSLMC argued against this idea and felt that committee members should be able to vote their interpretations of the Table 3.21 data; this feature in the PRT process is why the AHP procedure is being used by the SSLMC – to seek expert opinion from a group of knowledgeable individuals.

Also, the committee felt that this is not a straight math equation based on just frequency of occurrence in scat. Members will use their judgment to determine how to score. The Committee acknowledged that while the inclusion of other species is reflective of the importance of other species in the SSL diet, its inclusion also reduces the importance of the three species scores within the model. There are no scat data on the Pribilofs so the previous scoring of the importance of pollock, cod, and Atka mackerel for the Pribilofs was based on SSLMC best judgment and consideration of data for the eastern AI and knowledge of central Bering Sea fisheries. Also, the SSLMC noted that we have no proposals for change in the Pribilof Islands area that would invoke this category in the model. With "other" included, the SSLMC revoted this element in the PRT hierarchy and retained the previous scoring of the big three for the Pribilofs, each reduced proportionally to allow for a 20% score for "other" in this region. The 20% was judged by the SSLMC members familiar with commercial and research catches in this region to be a likely portion of SSL diet in the areas of the Bering Sea that would be foraging grounds for Pribilof Island-based SSLs.

Subregion

This element is part of the above discussion and each region remains the same as previously weighted. The Committee did recognize that some could argue that one region containing more SSL sites or a larger number of SSL pups or nonpups could be considered more important than another region containing fewer. The draft revised SSL Recovery Plan recommends a criterion for recovery that requires that no two adjacent SSL census regions experience a decline in abundance over a 15 year period of time (wSSL downlisting criterion). Given this statement and the rationale for it as described in the draft Recovery Plan, the SSLMC previously acknowledged that all regions (SSL census regions) should be considered of approximately equal importance. The Committee could find no justifiable way to rank one region more "important" than another. The Pribilofs region is ranked slightly lower, principally due to the considerably fewer SSLs using this area because it is near the furthest north extension of the wSSL range.

Season

Again, season is part of the above discussion. This category and its elements, and the rationale for their inclusion, remain the same.

Effects on the Prey Field

Duration

The concept of duration is related to rate of fishing. Duration is related to intensity of harvest (amount and time) and addresses localized depletion concerns. Less harvest in a longer time frame is less likely to result in localized depletion, and in this scenario the fishery would be considered a longer duration fishery. The SSLMC discussed how better to evaluate a proposal in terms of how it might lengthen or shorten a fishery, or shift fishing timing without changing length. Rate of harvest of fish may be a better metric, and the SSLMC reviewed data from the 2001 BiOp and its 2003 Supplement (Figure III-7, weekly catch of pollock) showing rate of fishing in the BSAI for pollock during the years 1996-2002. However, the SSLMC did not feel that including a metric for rate of fishing would be any better than the current duration element. Some suggested removing duration and addressing this outside the PRT. Some noted that duration is an artifact left over from extensive discussions and debates in previous meetings for how to address a proposal that could increase the length of a fishery – just what would this mean to SSLs? Scoring of duration and target species removal (% of TAC) is intended to serve as a proxy for harvest rate within the model. Additional data on harvest rate by gear and target species will be considered by the Committee outside the model.

% TAC

This category relates to whether a proposal seeks to add quota to a status quo fishery or will result in a greater percentage of TAC being fished in a season or area than is currently fished under status quo. This element in the PRT that addresses seasonal shift in prey is discussed above in more detail in the introduction to this section. The SSLMC decided not to change this element or scoring.

Season

This category was discussed previously as well (above). It relates to whether a proposal would result in shifting harvest within a season or from one season to another.

The three elements above (duration, %TAC, season) are considered together in the PRT. The SSLMC previously ranked each element based on the question (using an example of a proposal that would shift harvest from winter to summer and affect the duration of the fishery): if a lot of TAC (> 10%) is shifted from winter to the summer, and the fishery results in a duration that is shorter than it currently is, then how large an effect would this be on the prey field?

The SSLMC did not change scores or debate these elements further. And during the January 8-9, 2007 meeting the SSLMC reaffirmed its view on the similarity of effects of fishing activities on SSLs in the two seasons.

In summary, the above documentation of the model explains the SSLMC's approach to the use of the Analytic Hierarchy Process for reviewing proposals for changes in the SSL protection measures that affect the pollock, Pacific cod, and Atka mackerel fisheries. This documentation and rationale is accompanied by the data provided in Appendix D and the references provided in Appendix C.

IMPLEMENTATION OF THE PROPOSAL RANKING TOOL

The metric against which proposals will be measured has been debated by the SSLMC at several meetings. Questions about implementation of the PRT include:

- "What is the relative ranking of proposals in terms of negative impact?"
- "How much more impact does each proposal create relative to status quo?"
- "Do the cumulative effects of a suite of proposals put the SSL (western Distinct Population Segment) in jeopardy?"
- "Once we know how much additional impact to SSL is acceptable, can we use the model to evaluate trade-off scenarios, including benefits from additional closures?"

The PRT can answer the first two questions by ranking proposals according to their relative impact to SSL against each other, and against the status quo as defined for each proposal. It is very important to note, however, that the PRT does not provide any information about whether or not the proposals individually or cumulatively will result in jeopardy to the SSL or adverse modification of their designated critical habitat - that determination will come from the draft and final Biological Opinion, yet to be published. Scores from both the proposed and status quo scenarios can be used to 'trade' one score for another, and to compare status quo to additional restrictions, in order to find a suitable cumulative accounting of impacts.

EVALUATION OF THE MODEL

At the September 12-14 meeting, staff ran example proposals through the model so that the SSLMC could examine model performance. The PRT is spatially and temporally explicit, so its use in scoring proposals that have spatial and temporal components is straightforward. Many of the proposals received by the SSLMC and some examples discussed at the September 12-14 meeting do not fit easily into the current model structure. These proposals will require clarification and additional information from the proposers to ensure the model correctly characterizes expected effects.

In September, the SSLMC used the PRT to examine two proposals that were considered in 2004 for potential changes to GOA SSL protection measures. One of the proposals was accepted by the NPFMC and NMFS and implemented (Puale Bay), and one proposal (Marmot Island) was rejected. Because the expert judgments in the PRT weight proximity and site-type very heavily in scoring proposals, the model gave a higher score (more negative impact) to the Puale Bay proposal than to the Marmot Island proposal. Even though Marmot Island is a rookery, this proposal only opened up critical habitat down to 10nm from shore. The Puale Bay (haulout) proposal opened up critical habitat down to 3nm. In 2004, Protected Resources Division determined that Marmot Island as a single rookery was important to the recovery of the species and the agency needed to maintain protection in that area. Currently the model does not have this level of detail. The SSLMC discussed the possibility of assigning differential weights to individual sites based on detailed information from the Protected Resources Division. If the model is not fully informed with this type of information, then decisions about proposals outside the use of the model would be fully documented with that information.

Another test example proposal discussed by the SSLMC in September involved multiple sites in the CGOA.

> "Open waters around all haulouts in area 620 of the CGOA from 10-20 nm to pollock trawling. These sites would include: Kak, Lighthouse Rocks, Sutwik Is., and Nagai Rocks."

This example showed the many considerations necessary to place a proposal's score in the correct bin. Defining status quo in this context is more complicated and generated discussion. Previous examples included proposed changes at just one SSL site, so status quo was considered to be the protection measures in place at just that one site. In this example, what is the spatial scope of status quo? Is it the entire CGOA? Is it area 620? Is it just the four haulouts? Additionally, if the four haulouts currently had different weights of impact, a decision would have to be made with regards to which bins should

be selected in the model, in order to characterize status quo correctly. The PRT subcommittee will examine each proposal submitted to the SSLMC and determine a consistent way to enter status quo.

Other example proposals discussed included a temporal shift of TAC and gear allocation shifts. The SSLMC discussed whether it is possible to use the model to score these proposals. Because the site-type and proximity category of the SSL dimension is weighted heavily, proposals without a score for this element will receive a lower total score (less impact). The SSLMC felt that this was a good indication that these types of proposals would have less of an impact on SSL than proposals which open up SSL critical habitat.

Sensitivity Testing

At the September meeting, the SSLMC conducted an initial evaluation of the sensitivity of the model. In Expert Choice software, the user can interactively shift priorities among variables, and watch the resulting model weight change. Two hypothetical proposals were run through the model to test model response. One had an expected high impact, and the other had an expected low impact.

	Hypothetical proposal with an expected high impact	**Hypothetical proposal with an expected low impact**
1. Target fish species	Atka mackerel	cod
2. Target species removals	A lot	slight
3. Fishing duration	shorter	longer
4. Geographic sub-regions	WAI	CGOA
5. Seasons	summer	winter
6. SSL site types	rookery	other
7. Proximity zones to a SSL site	0-3nm	20+nm
8. The percentage of SSL sites affected in a region	76-100%	1-10%

Scores for each of the three questions were examined individually, summed, and compared between the two hypothetical proposals. The results are as follows:

	Hypothetical proposal with an expected high impact	**Hypothetical proposal with an expected low impact**
Score for just Question #1: The prey field	.019	.002
Score for just Question #2: Sensitivity to proximity	.008	.003
Score for just Question #3: Target species in scat	.014	.0004
Total score	.041	.005

The SSLMC was pleased to see that the PRT generated scores that reflect a common sense approach to categorizing impacts to SSL.

Additionally, SSLMC members wanted to see what happened to total proposal scores when different bins were selected for the variables. For example, if a proposal changed from a shorter duration to the same (current) duration, they could see the total score decrease, reflecting the preference for a longer temporal fishery distribution to avoid SSL nutritional stress. Also, if a proposal changed species from Atka mackerel in the western Aleutian Islands to Pacific cod in the same area, the total score decreased, reflecting the importance of Atka mackerel in SSL scats in that area. This also pleased the SSLMC, as the PRT is accurately representing the expert judgments of the SSLMC members who contributed to its development.

Robustness in model performance can be tested by changing the weight of influence of the two dimensions: (1) effects of fishing on the target prey field, and (2) effects of fishing on the SSL. A model is thought to be robust if rank order of variables in the lower levels of the hierarchy is preserved with a 10% or greater shift in weights in the higher levels of the hierarchy. Increasing weight on the SSL dimension reinforced the rank order of variable sets. However, as weight increased on the prey field dimension, rank order of fishing duration increased from third to second. A good 10% change in weight in one direction (increasing weight on the prey field) was needed to effect change in rank order of lower level variable sets; thus, the model may be characterized as fairly robust.

Weights for: Effects of fishing on the target prey field / Effects of fishing on the SSL	Rank order of the percentage of SSL sites affected in a region	Rank order of target fish species	Rank order of fishing duration
25/75 (Actual adjusted model)	1	2	3
20/80 (Increase weight on the SSL)	1	2	3
15/85 (Increase weight on the SSL)	1	2	3
30/70 (Increase weight on the prey field)	1	2	3
35/65 (Increase weight on the prey field)	1	3	2

PRT Review and Update, Sensitivity Testing, and Committee Validation

During their meeting of January 8-9, 2007, the SSLMC again reviewed the PRT as it was modified based on SSC suggestions and other improvements made during the last SSLMC meeting (Halloween meeting). Dr. Peggy Merritt reviewed the revised PRT including a structural change which added "other" to the category of Target Species harvested – to allow for consideration of the regional importance of other elements in the diet of SSLs based on available scat data. The revised PRT also now includes the revised weightings the Committee gave to elements in the Site Type, Proximity, % of Sites, and Season categories.

The Committee reviewed scores for proposals that were run through the last version of the model to see how the revised PRT would score these same proposals. The SSLMC also ran sensitivity tests using these proposals as examples to see how scores might change if different elements were assigned to the proposals.

An hypothetical high impact example proposal was tested, allowing Atka mackerel harvest to the shore around rookeries in the AI. There was some concern over the weighting of 'proximity' which may mask effects from changing the target species, for example changing species from Atka mackerel to pollock. The Committee felt that this concern can be addressed outside the model. If a proposal applies to two areas, the SSLMC will need to add the effects together from each area. The proposal will need to be broken into areas first and then the subcommittee would sum the scores of status quo and sum the scores of the proposals. If a proposal is to open all sites in one area, this would get a higher score than if the proposal is to open half the sites from two areas.

The SSLMC also discussed which elements in the model might affect scores more than other elements. Some suggested we prepare a "gradient chart" that would show which elements had the most effect on a score down to those that had the least. A suggestion was made to develop a spreadsheet showing all 206 "bins" and the weightings each bin gives to the model scoring calculus. However, the Committee generally agreed that the most important part of the proposal ranking process is to see how a proposal stacks up against the status quo for that specific proposal.

The Committee tested additional proposal examples – a high impact and a low impact proposal – and changed various elements and weightings to see the resultant effect on the proposal score. The Committee had considerable discussion on the "meaning" of a proposal score generated by the PRT. The PRT will treat each proposal as unique, and comparisons of raw scores between proposals are inappropriate; rather, these scores are a means to "rank" the proposals in a continuum and are not a score of impact on SSLs. A better way to look at this is that a score for a proposal can be "weighed" against the score for that proposal's status quo to see how this difference, or the proposal's departure from status quo, stacks up against another proposal's departure from status quo. The SSLMC noted that there is no absolute meaning of a specific score; that score only reflects that proposal's rank relative to another proposal's score. The SSLMC notes that the PRT will not determine a specific score that is "okay", below which all higher scores are "not okay".

The SSLMC conducted additional testing of the PRT by retesting the two proposals run through the model at the last meeting, the Puale Bay and Marmot Island proposals. Puale Bay was considered a proposal with few SSL concerns and thus should result in a low PRT score; Marmot Island was a proposal rejected because of the high level of concern with the SSL population at that site and thus should have received a high PRT score. Indeed, at the last meeting, both proposals generated the expected scores. However, both were again tested with the revised PRT, and both again generated scores in the range that was expected by the SSLMC. The SSLMC also tested another potentially high impact hypothetical proposal and compared it wit its status quo; the proposal score was .041 compared to the status quo score for that proposal of .018 - the higher the score, the more impact that proposal would have. The Committee was satisfied with this test. It also tested how changing fishing relative to distance from a SSL site would impact PRT

scores. A proposal where fishing would be allowed around a rookery up to 3 n mi versus only up to 10 n mi resulted in scores of .028 versus .018. The SSLMC discussed these kinds of model output and felt comfortable with the relative scores – they made sense.

Structural Adjust Testing

One question concerning the model framework is the effect of structural imbalance on the ranking of proposals. Structural imbalance can lead to dilution of the weight of many variables. A Structural Adjust feature in the Expert Choice software is an optional treatment for imbalance, and this works by restoring priorities to their respective proportion of weight. Adjustment can be made to the children of the current node, based on the number of grandchildren.

However, it was unclear to the SSC whether the structurally adjusted weights will reflect the relative weights intended by the SSLMC. With these concerns in mind, the SSC recommended at their October 30- November 1, 2006 meeting that the "…SSLMC contrast the standard and structurally weighted results of a few representative proposals before deciding to use a structurally balanced framework for evaluating the actual proposals". Accordingly, the Structural Adjust feature was discussed and tested by the SSLMC at their January 8-9, 2007 meeting. Model runs were made with and without the Structural Adjust; the SSLMC observed how this feature preserves the weightings that were established for the mother elements; that is, it preserves the relative weightings of the mothers throughout the hierarchy beneath these main elements.

Additional sensitivity testing was conducted during the week of January 15, and these preliminary results are presented here. To illustrate the effects of the Structural Adjust feature in Expert Choice, a portion of the model appears below, along with the unadjusted weights for each node; the children are denoted as "X", and the grandchildren are denoted as "y".

		.112 Summer (ya)
	.200 Appearance of species in scat (Xa)	.088 Winter (ya)
.600 Effects of fishing on the SSL		
		.031 Winter other (yb)
	.400 Site sensitivity to proximity (Xb)	.072 Winter haulout (yb)
		.079 Winter rookery (yb)
		.035 Summer other (yb)
		.074 Summer haulout (yb)
		.109 Summer rookery (yb)

Notice that there are two grandchildren for the child, "Xa", whereas there are six grandchildren for the child, "Xb". Adjusting for imbalance in the children will trickle down to the priorities at the bottom of the hierarchy. Adjustment is made as follows:

Adjusted priority Pa = (Xa) (Σya)/ Σya + Σyb or (.2) (2/8) = .05, normalized to .6 = .08
Adjusted priority Pb = (Xb) (Σyb)/ Σya + Σyb or (.4) (6/8) = .30, normalized to .6 = .5

The adjusted priorities are:

		.048 Summer (ya)
	.086 Appearance of species in scat (Xa)	.038 Winter (ya)
.600 Effects of fishing on the SSL		
		.040 Winter other (yb)
	.514 Site sensitivity to proximity (Xb)	.093 Winter haulout (yb)
		.101 Winter rookery (yb)
		.045 Summer other (yb)
		.096 Summer haulout (yb)
		.140 Summer rookery (yb)

The effects of Structural Adjust on the rating of hypothetical proposals was examined. The same hypothetical proposals used previously were tested to determine model response to structural adjustment:

	Hypothetical proposal with an expected high impact	**Hypothetical proposal with an expected low impact**
1. Target fish species	Atka mackerel	cod
2. Target species removals	A lot	slight
3. Fishing duration	shorter	longer
4. Geographic sub-regions	WAI	CGOA
5. Seasons	summer	winter
6. SSL site types	rookery	other
7. Proximity zones to a SSL site	0-3nm	20+nm
8. The percentage of SSL sites affected in a region	76-100%	1-10%

Scores for structurally adjusted and unadjusted models were compared between the two hypothetical proposals. The results are as follows:

	Hypothetical proposal with an expected high impact	**Percent of total score**	**Hypothetical proposal with an expected low impact**	**Percent of total score**
Structurally unadjusted	.054	85.7%	.009	14.3%
One adjustment to the model: a) structural adjust children of the node, "Effects of fishing on the SSL" to affect imbalance in the grandchildren (2 vs. 6 variables)	.048	90.6%	.005	9.4%
Two adjustments to the model: a) structural adjust children of the 1st level goal, to affect imbalance in the grandchildren (2 vs. 4). b) structural adjust children of the node, "Effects of fishing on the SSL" to affect imbalance in the grandchildren.	.056	90.3%	.006	9.7%

It appears that in the current PRT, structural adjustment slightly increases the distinction between the hypothetical proposal with expected high impacts and the proposal with expected low impacts. However, there is no difference in the rank order of the proposals between the structurally adjusted and unadjusted model. Additionally, the difference in relative percent of scores between adjusted and unadjusted models is slight.

The SSLMC intends to continue testing structural adjustment; for example, to examine the impacts of structural adjustment on hypothetical proposals that are similar in nature (in contrast with the previous examples which were sharply in contrast). An accurate description of the effects of structural adjustment through all levels of the hierarchy is also sought.

A Closing Comment

The SSLMC also notes that, when new information is available, such as the upcoming draft BiOp, then the SSLMC could revisit the PRT and perhaps revisit portions of the hierarchy and weighting factors and make adjustments if it felt the new information justified this.

FINAL REVIEW OF THE PRT

As discussed above, the SSLMC met January 8-9, 2007 to reevaluate the PRT in its new configuration, test proposals with the PRT, conduct some additional sensitivity and verifications tests, and prepare this report. The PRT will again be presented to the SSC in February 2007. After that review, the PRT should be ready for use in evaluating proposals, pending, perhaps, additional testing of the Structural Adjust feature. The process envisioned for proposal review is provided in the following section.

IMPLEMENTATION OF THE PROPOSAL REVIEW PROCESS

The proposal review process will involve the following steps:

1. Proposals will be reviewed by a subcommittee of the SSLMC composed of "impartial" individuals (those without any connection to any proposal). Proposals will be broken down into components that can be fit into the PRT, and scored. The subcommittee will also score status quo for each proposal. If a proposal can be scored by the PRT, it will have explicit geographical and/or temporal components. Status quo for each proposal is the management situation that exists before the proposed action, in the same geographical and/or temporal space.
2. The subcommittee will then present their initial scoring to the entire SSLMC and the proposal authors for review and identification of portions of each proposal which may not be clearly defined, or may have been placed into the PRT incorrectly by the subcommittee.

3. The SSLMC will then evaluate proposals with data sets that have been assembled for evaluating proposals "outside the model". These data sets will include:
    a) All recorded data on individual SSL rookery and haulout site counts and trends – for more insights into a proposal's potential effects on special SSL sites, on regions where count trends are known, etc.
    b) The Gaichas and Hiatt data table on fishery bycatch of SSL prey items by region and season (see Appendix F) – for insights into a proposal's potential bycatch effects – that is, removals of prey items other than pollock, P. cod, or Atka mackerel from an area where SSLs consume these "other" items
    c) Harvest rate data by gear and target species for gear type considerations that have to do with potential fish removal rate
    d) Annual TACs, by region, season, and fishery, from the specifications tables – to evaluate potential effects of a proposal on other fisheries or regions
    e) Information on special or unique SSL sites – research reports on Marmot Island, for example - will be used to judge a proposal's potential effects on any known SSL sites that might be uniquely sensitive
    f) SSLs and gear interactions data
    g) Other data sets as needed
4. Proposals will also be evaluated in light of other potential effects or benefits such as:
    a) Does the proposal include a research component, thereby providing benefit to science along with the requested change in the fishery
    b) Will the proposal result in improved ability to manage a fishery; will the proposal complicate enforcement of the fishery; will it improve, or exacerbate, safety
    c) Will the means in which the fishery is conducted be improved or otherwise affected by the proposal
    d) What may be the social and/or economic effects
    e) Will the proposal result in less competition with other fisheries, less grounds conflicts or preemption, smoother coordination with State fisheries, etc.
    f) Are there other components of a proposal that may mitigate or minimize effects on SSLs
5. If the draft BiOp (June 1, 2007) establishes an alternative management emphasis for wSSL, the SSLMC may need to revisit the weightings in the PRT (but not the model structure). In this case the positioning of proposals within the model would still be valid, but the model weightings, and thus the proposal rankings, may shift.

Additional information, common sense, and the expertise of the members of the SSLMC, as well as public input, will all be used by the SSLMC in evaluating proposals. The outcome of this effort will be a recommendation to the Council that certain proposals move forward in the analysis process. This would include Council, AP, and SSC review, additional public comment, and preparation of a package of proposals that would be considered the "proposed action" that would be further evaluated by NMFS in the continuing Section 7 consultation. It is expected that this package would be reviewed in a dialogue with the Protected Resources Division to develop a final "proposed action" that would avoid jeopardy and adverse modification concerns. This package would be subject to a NEPA analysis, at a level appropriate to the degree of proposed change in regulations.

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Appendix B. Glossary of terms used in the discussion and development of the PRT, as defined by the SSLMC.

AHP – Analytic Hierarchy Process

Critical habitat – Sites that are considered by the NMFS as important; this includes rookeries and haulouts as well as sites that do not do not meet the criteria for being classified as rookery or haulout, and yet SSL can still be present at those sites.

Dimension – the path or extent along which impacts of fishing on SSL are assessed in an overarching, broad category.

Duration - related to intensity of harvest (amount and time) and addresses localized depletion concerns. For example, a smaller harvest in a longer time frame is less likely to result in localized depletion - this would be considered a longer duration fishery. Shifting TAC by eliminating or instituting seasonal splits may change the duration of a fishery, but not necessarily the duration within the season.

Expert judgment - previous relevant experience supported by rationale thought and knowledge.

Hierarchy – a tree-like structure that is used to decompose a complex decision problem; it has a top-down flow, moving from general categories to more specific ones.

Node – a group of elements in the hierarchy that are related by criteria and structure; a parent node is an element in the next higher level that is connected to children nodes in the lower level.

Percent TAC - percentage of the sum of all the sectors seasonal Total Allowable Catches (TACs) for that target species. The calculation would either add or subtract the percent of TAC from the status quo, thus eliminating the need to specify a TAC value for a given year.

Season - based on breeding/non-breeding SSL behavior.

Status Quo – the current fishing regulatory situation for each proposal**.**

Target prey – pollock, Pacific cod, Atka mackerel.

Variable – pertains to any fishing regulation that is open to change, and that is considered in the PRT.

Appendix C. List of references relevant to the structuring and rating of elements in the PRT.

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Logerwell, E.A., and S. F. McDermott. 2004. Are trawl exclusion zones effective at mitigating competition between commercial fisheries and Steller sea lions? Presented paper, in Sea Lions of the World Symposium, September 30-October 3, 2004, Anchorage, AK.

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University of British Columbia and Vancouver Aquarium. 2006. North Pacific Universities Marine Mammal Research Consortium, SSL Research Program: Presentation to SSLMC, AFSC, April 2006, May 2006.

SSL Diet

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University of British Columbia and Vancouver Aquarium. 2006. North Pacific Universities Marine Mammal Research Consortium, SSL Research Program: Presentation to SSLMC, AFSC, April 2006, May 2006.

Wynne, K, R. Foy, and C. Foy. 2006. University of Alaska and Aleutians East Borough, SSL Research Program: Presentation to SSLMC, AFSC, August, 2006.

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SSL Abundance/Trends/Counts

Alaska Fisheries Science Center. 2006. AFSC and NMML SSL Research Program, Presentations to SSLMC, AFSC, April 2006, May, 2006.

Holmes, E., and A.E. York. 2003. Using age structure to detect impacts on threatened populations: a case study using Steller sea lions. Conservation Biology 17 (6):1794-1806.

Prey Abundance/Fields/Biomass

Alaska Fisheries Science Center. 2006. AFSC and NMML SSL Research Program, Presentation to SSLMC, AFSC, April 2006.

Dorn, M., K. Aydin, S. Barbeaux, M. Guttormsen, B. Megrey, K. Spalinger, and M. Wilkins. 2005. Assessment of walleye pollock in the Gulf of Alaska. In: Stock assessment and fishery evaluation report for the groundfish resources of the Gulf of Alaska. North Pac. Fish. Mgmt. Council, Anchorage, AK, 1:41-153.

Ianelli, J.N., S. Barbeaux, T. Honkalehto, B. Lauth and N. Williamson. 2005. Bering Sea-Aleutian Islands walleye pollock assessment for 2005. In: Stock assessment and fishery evaluation report for the groundfish resources of the Bering Sea/Aleutian Islands regions. North Pac. Fish. Mgmt. Council, Anchorage, AK, section 1:31-124.

NMFS. 2006. Catch rate distribution of BSAI pollock, Atka mackerel and cod fisheries. Binned range of groundfish catch (mt) by target fisheries only in 100 km² grid cells per day. Unpublished data provided to the SSLMC, Talaris Conference Center, July 2006.

Gear Interactions/Incidental Take

Angliss, R.P., and R.B. Outlaw. 2005. Alaska marine mammal stock assessments, 2005. U.S. Department of Commerce, NOAA Technical Memorandum, NMFS-AFSC-161. 250 p.

NOTE: The SSLMC has been provided with compact diskettes containing all of the presentations they received during their meetings in 2006. This CD also contains scientific reports, peer-reviewed publications, data tables, maps, and other information collected during these SSLMC meetings. This CD was also used as a resource during the process of preparing the Proposal Ranking Tool.

Appendix D. Handouts developed by the NMFS-AFSC and provided to the SSLMC and referenced during development and scoring elements in the PRT.

Percent frequency of occurrence of prey occurring in Steller sea lion scats collected from 1999 to 2005 (NMFS 2006b).

Weighting factors for area by species harvested in the pollock, P. cod, and Atka mackerel fisheries.

Weighting factors for summer and winter periods, by distance from centrum of SSL sites.

Proportions of locations associated with diving to >4 m for juvenile Steller sea lions >10 months old at capture; zones based on distances from nearest listed haulout or rookery and proportions stratified by season. Proportions of 14,441 locations associated with diving to >4 m for 116 juvenile Steller sea lions based on distance to nearest listed haulout or rookery and stratified by region and season.

Catch rate distribution of 2004 BSAI pollock, Atka mackerel, and P. cod fisheries.

(Tables follow)

Table 3.21 Percent frequency of occurrence of prey occurring in Steller sea lion scats collected from 1999 to 2005 (NMFS 2006b).

Region	Central & Western Aleutians		Eastern Aleutians		Western Gulf		Central Gulf		Eastern Gulf	Western DPS		
Season	Summer	Winter	Summer	Winter	Summer	Winter	Summer	Winter	Summer	Summer	Winter	ALL
Number of scats	483	301	290	773	184	42	85	204	38	1080	1320	2400
Pollock	7	12	46	53	53	93	46	44	8	28	44	37
Pacific cod	6	26	18	39	36	31	2	43	5	14	37	26
Atka mackerel	96	55	32	43	21		1	2		55	38	46
Salmon	17	6	38	25	57	17	56	29	84	35	21	27
Herring			35	1	3	2	12	12	24	12	2	6
Sand lance	4	1	34	28	65	17	16	38	39	25	23	24
Arrowtooth	1	1	8	21	14	7	45	31	5	9	17	13
Irish Lord sp.	3	23	11	33	13	5		17		7	27	18
Sand fish	1	5	16	11	3	7		13		5	10	8
Halibut		1	1	10	4	5	4	12		1	8	5
Cephalopods	13	18	7	4	1		5	7	3	8	7	8
Rock sole	0	6	19	14	9	5		7		7	11	9
Snailfish sp.	1	12	1	14				4		1	12	7
Capelin			2	0	3		13	4	13	3	1	2
Poacher sp.			14	1						4	0	2

Area by Species Harvested

	WAI		CAI		EAI	
	Summer	Winter	Summer	Winter	Summer	Winter
POLL	0.5	3	0.5	3	5	6
PCOD	0.5	3	0.5	3	3	5
ATKA	7	6	7	6	5	5

	WGOA		CGOA		EGOA	
	Summer	Winter	Summer	Winter	Summer	Winter
POLL	6	7	5	5	0.5	3
PCOD	5	5	0.5	5	0.5	3
ATKA	3	0	0.5	0.5	0	0

Limited Sampling in the EGOA
Assigned low weight in summer based on data
Assigned moderate weight in winter based on seasonal relationships in other areas (see WAI/CAI)
Rationale for Seasonal Split:
Reflects seasonal differences in prey aggregations and representation in SSL diets

% FO	Weight	Description
>70	7	Very Strong
50-70	6	Kinda Very Strong
30-50	5	Strong
10-30	3	Moderate
<10	0.5	Trace

Summer = May-October; Winter = November – April

SSL Location Type by Proximity

Distance	Summer			Winter		
	Rookery	Haulout	Neither	Rookery	Haulout	Neither
<3	~~8~~ 9	8	5	8	8	5
3-10	7	7	4	7	7	4
10-20	4	~~4~~ 3	3	3	~~3~~ 2	2
>20	2	~~2~~ 1	1	2	~~2~~ 1	1
Not CH	2	~~2~~ 1	1	2	~~2~~ 1	1

	Importance to SSLs
0-10	High
10-20	Low to Moderate (less in winter)
>20	Low
Out CH	Low

A winter 'rookery' is a site that is a rookery in summer and acts as a haulout in winter

Importance 'adjectives' from 2003 supplement to 2001 BiOp

Table 3.16 Table II-9 (NMFS 2003) updated with proportions of locations associated with diving to >4 m for juvenile Steller sea lions >10 months old at capture and instrumented during 2000-2005. Zones based on distances from nearest listed haulout or rookery, and proportions were stratified by season.

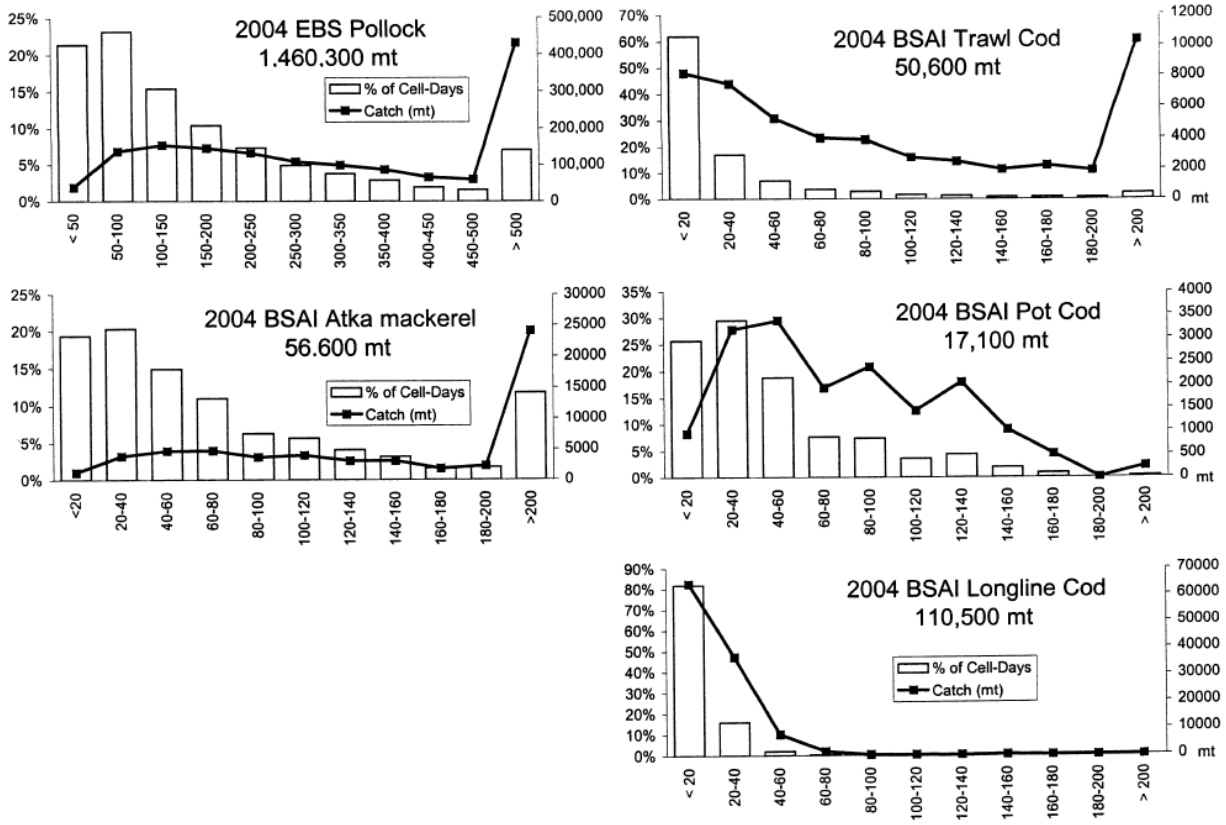
	Level of concern	Summer (Apr-Sept)	Winter (Oct-Mar)
Zone	2001 BiOp	>10 months (n=4,816)	>10 months (n=1,990)
Inside CH			
0-10 nm	High	78.4%	88.9%
10-20 nm	Low to moderate	8.7%	8.9%
>20 nm	Low	0.9%	0.3%
Outside CH	Low	11.9%	1.9%

Table 3.17 Proportion of 14,441 locations associated with diving to >4 m for 116 juvenile Steller sea lions based on distance to nearest listed haulout or rookery and stratified by region and season.

	Prince William Sound		Kodiak		Eastern Aleutians		Central/Western Aleutians	
Zone	Summer[1]	Winter[2]	Summer	Winter	Summer	Winter	Summer	Winter
Inside CH								
0-10 nm	92.0%	94.5%	86.8%	93.0%	88.5%	91.2%	68.8%	100.0%
10-20 nm	7.1%	4.6%	7.5%	5.2%	5.5%	6.9%	8.8%	0.0%
>20 nm	0.0%	0.1%	0.3%	0.3%	2.8%	0.2%	0.5%	0.0%
Outside CH	0.9%	0.9%	5.4%	1.6%	3.3%	1.7%	21.9%	0.0%

[1] Summer is defined as April through September.
[2] Winter is defined as October through March.

Catch Rate Distribution of BSAI Pollock, Atka mackerel and Cod Fisheries



Binned Range of Groundfish Catch (mt) by Target Fisheries only in 100 km^2 grid cells per day

Appendix E. SSC Meeting Minutes From October 2-4, 2006 Meeting in Dutch Harbor (excerpt)

C-1 SSL Management

Bill Wilson (NPFMC staff), Kristen Mabry (NMFS AK Region) and Larry Cotter (SSLMC chair) provided an overview of ongoing development of a multi-criteria decision tool to be used to evaluate proposals for changes to SSL protection measures in the GOA and BSAI groundfish fisheries. Dave Fraser (Adak Fisheries), Ed Richardson (Pollock Conservation Cooperative), and Clem Tillion (Aleutian Enterprise Corporation) provided public comment.

The SSC commends the SSLMC and staff for the substantial effort that has been invested in the development of the proposal review tool (PRT). In particular, the SSC notes that the PRT has been adjusted to incorporate many of the suggestions included in our June and August 2006 minutes including use of the Analytic Hierarchical Process approach. The SSC recognizes the difficulty facing the SSLMC in developing a PRT that realistically reflects the relative impacts of competing proposals and a proposal against the status quo. Many of the data required by the model are either not readily available or have not reached agreement among SSL biologists.

The SSC remains encouraged by the progress that has been made and recommends that the PRT continue to be refined as the SSLMC moves forward with review of the proposals that have been received. The PRT provides an explicit representation of the criteria that the SSLMC considers relevant to discriminating among proposals, the weights assigned to those criteria, and the variables used to inform those criteria. This transparency facilitates public review, which can be expected to lead to evolution of the criteria, weights, and variables and to identify information gaps. In examining the PRT, it is important to remember that the PRT is intended as a mechanism to help the SSLMC develop advice to help the Council identify proposals or suites of proposals to advance for analysis and review.

As it continues to refine the PRT, the SSC encourages the SSLMC to consider the following:

1. Although there are many advantages to pairwise comparison of alternatives, with 29 proposals and many possible combinations of proposals to consider, the number of pairwise comparisons is too large. (There are 435 unique pairings of the 29 proposals, with each pairing requiring the evaluation of multiple variables.) Therefore, the SSC recommends that the PRT be used to rate proposals and suites of proposals.
2. It appears that "structural adjustment" decreases the effective weight of nodes with smaller numbers of subsidiary nodes. While this may be appropriate if the subsidiary nodes are all of equal importance, it is unclear if the structurally adjusted weights will reflect the relative weights intended by the SSLMC. Therefore, the SSC recommends that the SSMLC contrast the standard and structurally weighted results of a few representative proposals before deciding whether to use a structurally balanced framework for evaluating the actual proposals.
3. The interaction of distance zones and numbers of sites warrants careful review; the lack of difference between impacts to single sites and multiple sites in the 0-3 mile zone is counterintuitive. This is one example; the SSC encourages the SSLMC to continue its sensitivity analyses and investigation of the PRT to be sure it reflects the weights intended by the committee.
4. Because this is the first time that the PRT will be used to inform Council deliberations, it would be very useful to have it very well documented. The final report should elaborate on the reasoning that led the SSLMC to adopt the particular criteria, variables, and model structure. This includes the reasoning that led to the weighting scores of each of the criteria, the data used, the role of and rationale behind expert opinions, etc. For example, from discussion it appears that the % TAC variable is intended to use the regional/seasonal TAC but that is not explicitly stated.
5. The percent of sites affected in a region may not be a good proxy for the significance of the impact of proposals because sites differ in SSL numbers and demographics and in the timing of use. It may be advantageous to solicit NMFS-PRD input regarding the relative importance of individual sites and to use that importance to weight the number of sites impacted and the magnitude of impact anticipated. If

numbers of animals on terrestrial sites is incorporated into the PRT, then the SSC suggests getting the detailed data on seasonal use of rookeries and haulouts such as data from the western and central Gulf of Alaska collected under the oversight of Kate Wynne of the University of Alaska Fairbanks. The Alaska Sea Life Center has limited data on seasonal use of several sites in the eastern Gulf of Alaska.

6. The assumption that fishing during the spawning season would result in localized depletion of the prey field available to SSL should be carefully discussed. The SSC notes that the argument for the Shelikof Strait pollock allocation was that the likelihood of localized depletion would be reduced in the winter because pollock have a strong behavioral response that could be expected to result in rapid re-composition of schools in the wake of disturbance by fishing. The goal of TAC management with time area partitions is to maintain more even exploitation rates over meso-scale spatial areas.
7. The SSC notes that use of the PRT has not yet been evaluated by NMFS-PRD and suggests that NMFS-PRD seek an early opportunity to meet with the SSLMC to contribute to further development of the PRT.
8. The SSC concurs with the principle of dividing the TAC into subunits more aligned with SSL regions. There is some question about how well the groundfish fishery statistical areas correlate with the SSL regions and how to best align these two different regional reporting methods.
9. When proposals have impacts that could affect multiple dimensions of a single node, the node should be restructured into two or more nodes.
10. The SSC suggests that the SSLMC reexamine which season is the most important for SSL, especially adult females. Summer haulouts are ranked second, below summer rookeries but ahead of winter rookeries and winter haulouts. However, summer haulouts are occupied by non-reproductive animals without the strong affinity to specific terrestrial sites. It might be appropriate to reconsider this ranking and assign a ranking of summer haulouts below that of winter rookeries and winter haulouts, both of which contain females with dependent young. Unfortunately, only limited data are available on the winter foraging range of reproductive females with dependent young. It is known that lengths of foraging trips are relatively short, 2-3 days (Trites and Porter, 2002)[3], therefore females cannot range great distances from winter haulouts. The SSC suggests that the SSLMC re-examine the bioenergetics data, especially Winship et al. (2002)[4]. It may be most appropriate to add a third season (spring) to the model or to weight the score by a bioenergetics curve. The SSC requests that whatever the decision is, that the SSLMC document the decision thoroughly and specifically.

As they review proposals rated by the SSLMC using the PRT, the Council and public should be aware that:

1. Irrespective of whether the SSLMC relies on ratings of proposals against a status quo, or conducts pairwise comparisons, the significance of differences in scores will be uncertain. It is important not to make too much of small differences in ratings unless these differences are insensitive to modest variations in the weights.
2. SSC heard several suggestions by fishers to do a "pre-fishery" assessment of local biomass using their own vessels so that local fisheries could be established. The SSC cautions against taking this idea to the limit of de facto individual TACs. Carried to the extreme, someone could propose to go assess the biomass in a particular area, then take some percentage of that within some period of time at some distance from SSLs with the idea being that "enough" fish are left in the water so that SSLs in the area have enough food so that no nutritional stress occurs. We don't know what "enough" is, what the energetic demand is, or even how many SSLs are feeding in any given area. Nevertheless, the SSC is supportive of projects that could lead to refined understanding of spatial and temporal patterns of fish populations and interactions with SSL. Giving heightened priority to proposals that include a research component to collect the necessary information may be advantageous, although it is not clear whether such a "research-bonus" should be incorporated into the PRT, considered in general discussions of the SSLMC, or reserved for consideration in the Council's analysis and review processes. For example, if a proposal calls for opening an area near a haul-out or rookery where seasonal attendance is uncertain,

[3] Trites A. W., and B. T. Porter. 2002. Attendance patterns of Steller sea lions and their young during winter. Journal of Zoology, London. 256:547-556

[4] Winship, A. J., A. W. Trites, and D.A.S. Rosen. 2002. A bioenergetics model for estimating the food requirements of Steller sea lions in Alaska. Mar. Ecol. Prog. Ser. 229:291-312.

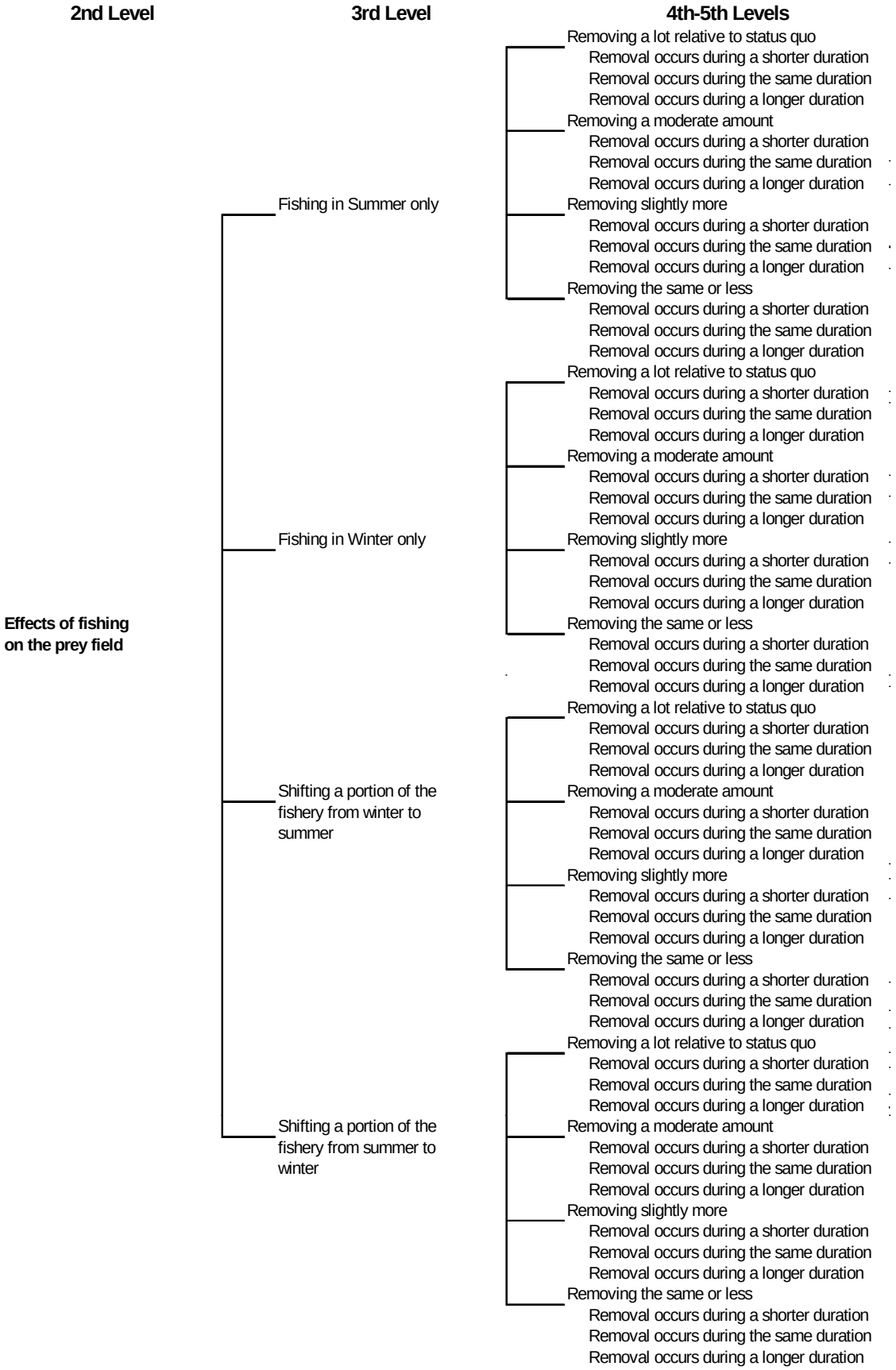
"extra points" could be given to those proposals that provided a sampling design that would allow collection of information to reduce the uncertainty in seasonal attendance and diet information or if it included a sampling design for conducting an assessment of local prey density prior to opening the fishery.

Appendix F. Bycatch of SSL Prey Items in GOA and BSAI Groundfish Fisheries, 2003-2005, by Target Fishery, Gear Type, and Season (Gaichas and Hiatt, pers. comm., AFSC, 2006)

Data tables follow in Excel format.

Appendix G. Updated Proposal Ranking Tool Hierarchy

See following pages.

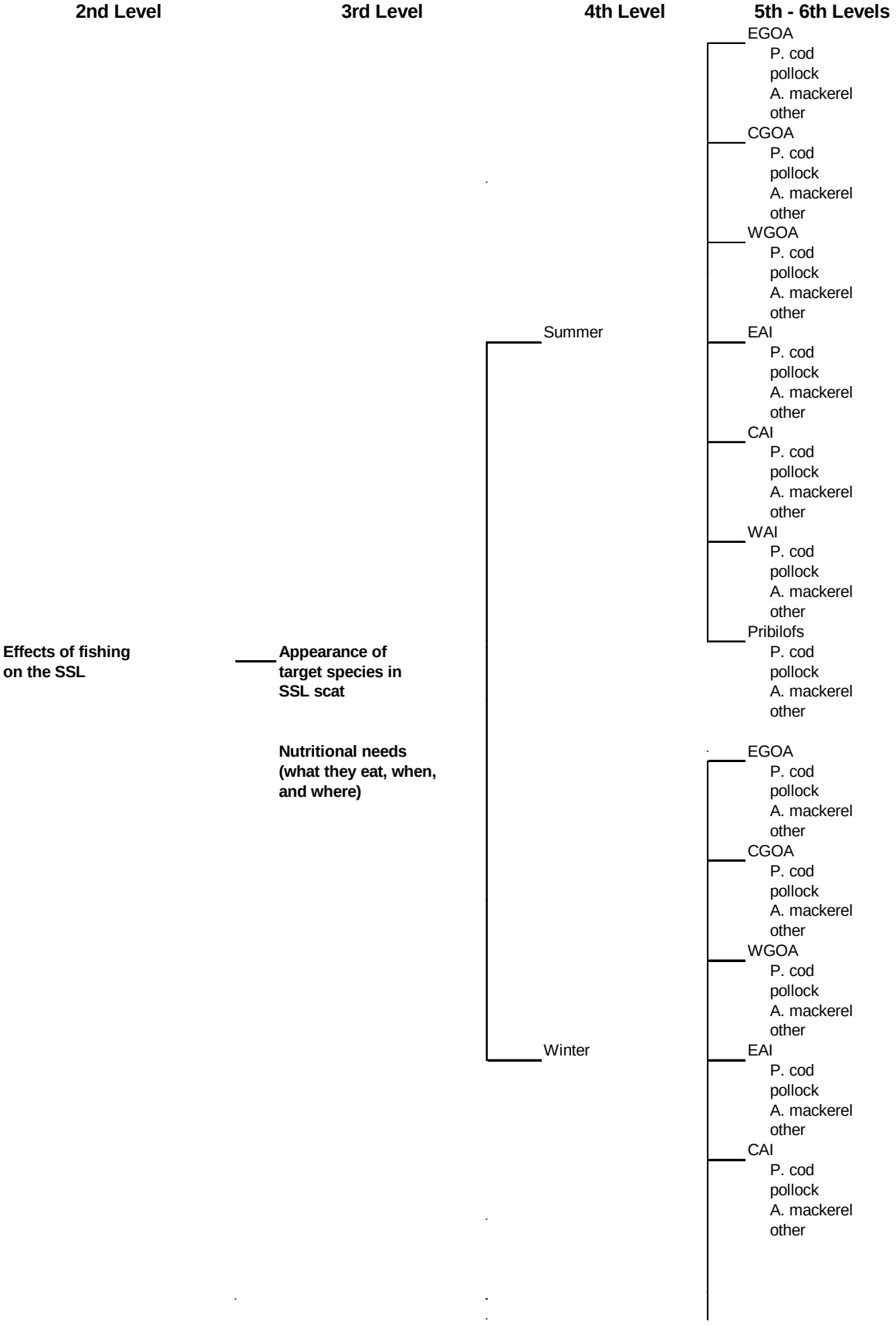

2nd Level
3rd Level
4th-5th Levels
Effects of fishing on the prey field
Fishing in Summer only
Fishing in Winter only
Shifting a portion of the fishery from winter to summer
Shifting a portion of the fishery from summer to winter
Removing a lot relative to status quo
Removing a moderate amount
Removing slightly more
Removing the same or less
Removal occurs during a shorter duration
Removal occurs during the same duration
Removal occurs during a longer duration

2nd Level	3rd Level	4th Level	5th - 6th Levels

- **Effects of fishing on the SSL**
  - **Sensitivity of the SSL in relation to site type and proximity**
    - Winter other
      - 0-3nm
        - 76-100%
        - 51-75%
        - 26-50%
        - 11-25%
        - 1-10%
      - 3-10nm
        - 76-100%
        - 51-75%
        - 26-50%
        - 11-25%
        - 1-10%
      - 10-20nm
        - 76-100%
        - 51-75%
        - 26-50%
        - 11-25%
        - 1-10%
      - 20+nm
      - not ch
    - Winter haulout
      - 0-3nm
        - 76-100%
        - 51-75%
        - 26-50%
        - 11-25%
        - 1-10%
      - 3-10nm
        - 76-100%
        - 51-75%
        - 26-50%
        - 11-25%
        - 1-10%
      - 10-20nm
        - 76-100%
        - 51-75%
        - 26-50%
        - 11-25%
        - 1-10%
      - 20+nm
      - not ch
    - Winter rookery
      - 0-3nm
        - 76-100%
        - 51-75%
        - 26-50%
        - 11-25%
        - 1-10%
      - 3-10nm
        - 76-100%
        - 51-75%
        - 26-50%
        - 11-25%
        - 1-10%
      - 10-20nm
        - 76-100%
        - 51-75%
        - 26-50%
        - 11-25%
        - 1-10%
      - 20+nm
      - not ch

2nd Level	3rd Level	4th Level	5th - 6th Levels

- **Effects of fishing on the SSL**
  - **Continued… Sensitivity of the SSL in relation to site type and proximity**
    - Summer other
      - 0-3nm
        - 76-100%
        - 51-75%
        - 26-50%
        - 11-25%
        - 1-10%
      - 3-10nm
        - 76-100%
        - 51-75%
        - 26-50%
        - 11-25%
        - 1-10%
      - 10-20nm
        - 76-100%
        - 51-75%
        - 26-50%
        - 11-25%
        - 1-10%
      - 20+nm
      - not ch
    - Summer haulout
      - 0-3nm
        - 76-100%
        - 51-75%
        - 26-50%
        - 11-25%
        - 1-10%
      - 3-10nm
        - 76-100%
        - 51-75%
        - 26-50%
        - 11-25%
        - 1-10%
      - 10-20nm
        - 76-100%
        - 51-75%
        - 26-50%
        - 11-25%
        - 1-10%
      - 20+nm
      - not ch
    - Summer rookery
      - 0-3nm
        - 76-100%
        - 51-75%
        - 26-50%
        - 11-25%
        - 1-10%
      - 3-10nm
        - 76-100%
        - 51-75%
        - 26-50%
        - 11-25%
        - 1-10%
      - 10-20nm
        - 76-100%
        - 51-75%
        - 26-50%
        - 11-25%
        - 1-10%
      - 20+nm
      - not ch


2nd Level
3rd Level
4th Level
5th - 6th Levels
Effects of fishing on the SSL
Appearance of target species in SSL scat
Nutritional needs (what they eat, when, and where)
Summer
Winter
EGOA
CGOA
WGOA
EAI
CAI
WAI
Pribilofs
P. cod
pollock
A. mackerel
other

2nd Level	3rd Level	4th Level	5th - 6th Levels
			WAI
			P. cod
			pollock
			A. mackerel
			other
			Pribilofs
			P. cod
			pollock
			A. mackerel
			other

September 19 2006
Three data sources were used to compile these tables (see prey list below for which prey species come from which source):

1. AKRO catch accounting system prohibited species tables (V_GG_PSCNQ_ESTIMATE, CDQ_CATCH_REPORT)
2. AKRO nontarget species tables (V_GG_NONTARGET_ESTIMATE)
3. AKRO target species tables (V_GG_TXN_PRIMARY_ALL, CDQ_CATCH_REPORT)

Queries were completed between Sept 12 and Sept 18 2006, and only data from the three complete years 2003-2005 were used in calculating averages
S. Gaichas did the prohib and nontarget queries, and T. Hiatt did the target species queries.

Steller Sea Lion seasons (SSL_Season) were defined as May through September for "Summer" and October through April for "Winter."

Fisheries were defined in the AKRO catch accounting system tables by the TRIP_TARGET_CODE or TARGET_FISHERY_CODE field, and all flatfish targets were combined.

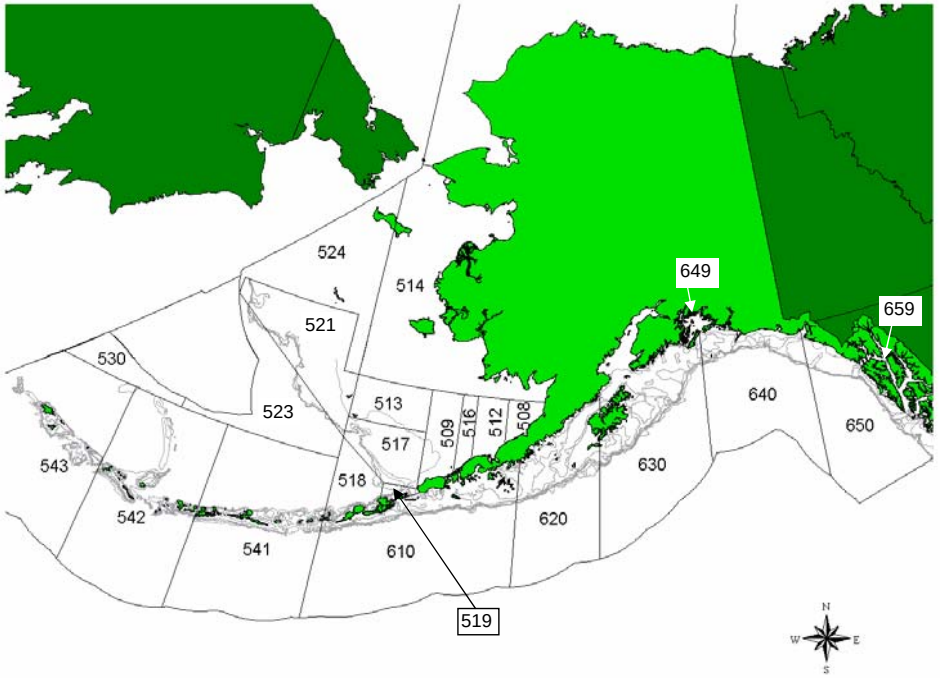
Gears were defined in the AKRO catch accounting system tables by the AGENCY_GEAR_CODE field, and were grouped into the following categories.

HAL	"Hook and Line" includes longline gear and jig gear
POT	"Pot" includes pot gear
TRW	"Trawl" includes non-pelagic trawl, pelagic trawl, and undefined trawl gear

Areas are AKRO management areas, which are defined on the map below, and are defined in words in the AI and GOA.

SSL prey species (listed below) were taken from Table 3.21 of the recovery plan which lists frequency of occurrence of prey in SSL scats 1999-2005.
Where no estimate was available for a given prey species, an aggregate category containing that species is listed. Therefore, catches in the aggregate categories may be higher than the catch of the individual prey species.
PLEASE NOTE DIFFERENT UNITS used by AKRO in making these estimates

Prey	Data Source	Units	Species category in tables
Salmon	1	numbers	Chinook salmon and Other salmon
Halibut	1	kilograms	Halibut
Herring	1	kilograms	Herring
Sand lance	2	kilograms	Sand lance
Irish Lord spp	2	kilograms	Large sculpins
Capelin	2	kilograms	Capelin
Cephalopods	2	kilograms	Octopus and Squid
Poacher spp	2	kilograms	Misc fish
Snailfish spp	2	kilograms	Misc fish
Sand fish	2		**Not found in estimated catch
Pollock	3	tons	Pollock
Pacific cod	3	tons	Pacific cod
Atka mackerel	3	tons	Atka mackerel
Arrowtooth	3	tons	Arrowtooth
Rock sole	3	tons	Rock sole



Three year average bycatch estimates 2003-2005						Prohibited species				NonTarget species						Target species				
						NUMBERS	NUMBERS	KILOGRAMS	KILOGRAMS	KILOGRAMS	KILOGRAMS	KILOGRAM	KILOGRA	KILOGRAM	KILOGRAM	TONS	TONS	TONS	TONS	TONS
Region	Fishery	Gear	SSL_Season	Area		Chinook	Other salmon	Pacific halibut	Pacific herring	Sand lance	Large Sculpins	Capelin	Octopus	Squid	Misc fish	Pollock	P. cod	Atka mack.	Arrowtooth	Rock Sole
AI	Atka mackerel	TRW	summer	Eastern AI	541	107	0	6,084	0	0	766	0	0	6	1,047	2.229	17.971	1,416.858	2.485	1.299
				Central AI	542	0	123	21,988	0	0	58,466	0	513	4,262	39,606	90.443	622.920	15,164.444	55.990	42.849
				Western AI	543	0	219	13,729	0	0	25,660	0	0	3,684	23,211	52.439	204.819	6,462.365	24.562	11.740
			winter	Eastern AI	541	0	56	4,549	0	0	1,389	0	59	96	1,285	6.769	107.301	2,468.129	18.189	2.217
				Central AI	542	272	30	3,440	3	0	145,336	0	861	496	15,196	93.133	611.199	15,552.244	21.910	39.755
				Western AI	543	147	866	14,389	4	0	49,343	0	137	3,193	27,348	69.692	488.287	12,763.273	33.200	15.766
	Cod	HAL	summer	Eastern AI	541	0	0	49,073	0	0	11,258	0	1,118	0	194	1.754	321.438	1.807	7.375	0.444
				Central AI	542	0	0	14,735	0	0	5,731	0	1,631	0	371	0.878	287.895	4.752	2.349	0.113
				Western AI	543	0	0	52,387	0	0	1,090	0	132	0	421	1.233	147.226	2.304	3.489	0.028
			winter	Eastern AI	541	0	0	57,587	0	0	91,352	0	4,582	0	381	5.600	1,298.226	5.565	8.140	1.682
				Central AI	542	0	0	16,967	0	0	2,843	0	584	0	119	0.701	183.202	0.544	0.866	0.111
		TRW	summer	Eastern AI	541	13	0	16,857	0	0	2,816	0	9	272	1,310	1.766	459.599	97.804	47.470	5.824
				Central AI	542	0	0	446	0	0	524	0	0	2	55	0	12.450	0.102	0.015	0.536
			winter	Eastern AI	541	1,043	133	34,593	0	0	41,395	0	6,003	1,613	12,496	355.883	16,254.385	354.985	148.878	479.033
				Central AI	542	55	7	8,828	15	0	26,298	0	623	135	4,173	204.631	3,942.402	135.925	25.504	79.585
				Western AI	543	17	0	6,464	0	1	37,766	0	93	27	2,695	101.395	2,736.965	112.868	2.634	80.682
	Flatfish	HAL	summer	Eastern AI	541	2	0	243,824	0	0	419	0	210	0	33	0.100	45.136	0.008	23.268	0.199
				Central AI	542	0	0	85,713	0	0	1,544	0	221	0	51	0.071	13.147	0.095	28.960	0.038
				Western AI	543	0	0	95,050	0	0	528	0	243	0	19	0.001	42.272	0.177	9.659	0.221
			winter	Eastern AI	541	0	0	52,918	0	0	159	0	7	0	15	0.132	15.104	0.003	4.510	0
				Central AI	542	0	0	25,531	0	0	67	0	0	0	16	0	0.065	0	3.668	0
		TRW	winter	Eastern AI	541	0	0	315	1	0	45	0	0	0	3	0.192	2.771	0.001	0.216	6.167
	Pollock	TRW	summer	Eastern AI	541	0	0	0	0	0	0	0	0	31	0	3.869	0	0.251	0	0
			winter	Eastern AI	541	14	6	0	0	0	34	0	0	108	31	64.958	0	0	0.130	0
	Rockfish	HAL	summer	Eastern AI	541	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0
			winter	Western AI	543	0	0	38	0	0	0	0	0	0	0	0	0	0	0.004	0
		TRW	summer	Eastern AI	541	0	0	19,828	0	0	1,305	0	59	2,701	595	96.984	91.811	197.776	185.298	1.627
				Central AI	542	0	0	16,219	0	0	924	0	113	1,641	3,912	172.052	8.191	70.118	75.293	1.216
				Western AI	543	0	0	27,311	0	0	1,808	0	362	3,684	12,628	135.212	14.023	50.664	77.863	0.552
			winter	Eastern AI	541	0	0	1,005	0	0	33	0	0	174	136	11.332	40.210	16.089	2.980	7.495
				Central AI	542	0	0	0	0	0	55	0	0	7	0	0.122	0.295	9.271	0.099	0.014
				Western AI	543	0	0	15	0	0	32	0	0	38	220	3.198	5.026	55.930	0.033	0.075
	Sablefish	HAL	summer	Eastern AI	541	0	5	27,618	0	0	6	0	2	0	297	0.016	2.648	0	8.547	0.474
				Central AI	542	0	0	17,053	0	0	3	0	7	0	166	0.004	0.917	0	7.121	0
				Western AI	543	0	0	1,708	0	0	0	0	0	0	7	0.002	0.081	0.071	0.884	0
			winter	Eastern AI	541	0	0	12,852	0	0	1	0	9	0	65	0.077	2.848	0.004	13.912	0
				Central AI	542	0	0	14,837	0	0	1	0	0	0	55	0	0.018	0	5.058	0
				Western AI	543	0	0	42	0	0	0	0	0	0	0	0.000	0	0	0.300	0
		POT	summer	Eastern AI	541	0	0	4,575	0	0	4	0	100	0	36	0.009	0.638	0.012	7.749	1.246
				Central AI	542	0	0	1,165	0	0	1	0	523	0	13	0.003	0.114	0	1.886	0.093
			winter	Eastern AI	541	0	0	2,368	0	0	1	0	42	0	55	0.019	0.094	0.022	12.235	0

					Prohibited species				NonTarget species						Target species				
Three year average bycatch estimates 2003-2005					NUMBERS	NUMBERS	KILOGRAMS	KILOGRAMS	KILOGRAMS	KILOGRAMS	KILOGRAMS	KILOGRAMS	KILOGRAMS	KILOGRAMS	TONS	TONS	TONS	TONS	TONS
Region	Fishery	Gear	SSL_Season	Area	Chinook	Other salmon	Pacific halibut	Pacific herring	Sand lance	Large Sculpins	Capelin	Octopus	Squid	Misc fish	Pollock	P. cod	Atka mack.	Arrowtooth	Rock Sole
EBS	Atka mackerel	TRW	summer	517	1	2	4,406	1	0	1,163	0	0	46	341	23.446	21.489	76.618	39.409	5.515
				519	2	6	17,079	11	0	18,099	0	596	401	2,450	120.654	115.874	502.256	116.238	24.078
			winter	517	17	0	3,870	0	0	1,746	0	0	77	127	9.019	24.016	111.848	17.373	4.533
				519	17	5	8,719	1	0	15,197	0	0	1	215	11.904	23.907	265.042	58.599	9.006
	Cod	HAL	summer	509	0	2	206,690	0	0	15,538	0	655	0	378	157.543	2,906.848	0.004	68.060	2.617
				512	0	0	2,950	0	0	3,732	0	43	0	0	4.162	216.154	0.000	0.784	0.036
				513	0	0	80,760	0	0	22,299	0	888	0	1,880	114.522	2,181.575	0.109	34.234	0.940
				514	0	0	572	0	0	0	0	0	0	0	2.821	32.125	0	0.008	0.006
				516	0	0	4,375	0	0	2,016	0	0	0	12	3.494	367.158	0	0.699	0.040
				517	3	12	288,038	0	0	11,354	0	3,444	0	1,889	178.267	3,711.899	0.192	164.108	1.575
				518	0	0	317	0	0	83	0	0	0	2	0	10.422	0	0	0
				519	0	4	66,192	0	0	12,166	0	1,016	0	1,261	10.311	454.552	6.372	7.668	1.328
				521	4	29	402,695	2	0	86,097	0	6,417	0	2,802	498.294	9,946.280	0.015	264.346	5.312
				523	0	2	10,121	0	0	1,223	0	1,091	0	76	21.117	445.713	0.007	17.737	0.223
				524	2	0	85,969	2	0	14,501	0	222	0	97	219.534	2,476.791	0	47.675	3.772
			winter	509	2	0	317,711	0	0	42,983	0	3,538	0	1,225	301.853	6,848.127	0.027	35.832	1.854
				512	0	0	5,377	0	0	3,242	0	5	0	1	9.764	227.613	0	0.260	0.074
				513	0	1	499,131	0	0	224,367	0	1,184	0	3,718	499.882	12,367.870	0.183	41.629	9.708
				514	0	0	969	0	0	73	0	0	0	1	3.818	33.504	0	0.032	0.005
				516	0	0	34,578	0	0	5,331	0	84	0	11	44.957	1,062.305	0	0.602	0.334
				517	0	0	584,152	0	0	66,368	0	3,351	3	8,377	302.022	7,709.337	0.345	203.447	2.187
				518	0	0	4,408	0	0	914	0	0	0	38	0	123.493	0	0.000	0.000
				519	0	0	188,255	0	0	63,980	0	5,250	0	3,750	12.930	1,839.291	4.098	10.698	1.605
				521	16	3	1,236,908	1	0	256,044	0	9,151	17	20,767	2,554.245	48,555.360	0.524	439.718	8.517
				523	0	0	58,210	0	0	4,225	0	1,186	0	195	92.767	1,375.257	0	34.175	0.371
				524	1	0	114,766	1	0	38,939	0	1,049	1	195	488.648	6,766.971	0	51.767	2.615
		POT	summer	509	0	0	244	0	0	1,129	0	14,558	0	541	0.257	291.295	0.016	0.023	0.007
				513	0	0	3	0	0	16	0	3	0	4	0	2.919	0	0	0
				517	0	0	450	0	0	409	0	3,908	0	289	0.033	102.598	1.476	0.085	0.036
				519	0	0	15,366	0	0	11,194	0	41,996	178	4,919	2.260	2,808.068	100.007	2.495	0.494
				521	0	0	106	0	0	105	0	0	0	5	0.434	99.534	0	0	0
				524	0	0	543	0	0	89	0	0	0	3	0.735	367.835	0	0	0.005
			winter	509	0	0	1,097	0	0	22,440	0	26,205	0	4,944	2.936	4,689.467	4.009	0.297	0.398
				513	0	0	2,134	0	0	12,205	0	132	0	66	1.348	2,080.531	0	0	0.034
				516	0	0	48	0	0	206	0	103	0	37	0.015	44.161	0.127	0	0.002
				517	0	0	1,036	0	0	8,066	0	13,167	0	2,648	0.489	1,390.909	1.170	0.231	0.062
				518	0	0	1	0	0	5	0	2	0	0	0	0.469	0.001	0	0
				519	0	0	11,807	0	0	80,643	0	75,480	0	6,020	1.669	5,981.866	92.219	1.368	0.687
				521	0	0	574	0	0	4,348	0	29	0	41	1.498	466.079	0.104	0.008	0.110
				524	0	0	605	0	0	1,153	0	0	0	90	0.753	415.134	0.000	0.003	0.131
		TRW	summer	509	735	1,622	295,475	4,425	51	133,737	1	4,055	22	14,182	1,698.913	1,848.522	30.688	1,381.111	988.363
				513	3	6	26,135	3,658	0	74,677	0	1,708	0	837	373.436	620.907	0.187	209.624	107.563
				514	2	1	1,026	29	0	783	3	0	0	53	9.273	12.119	0	0	5.996
				516	0	0	433	1	0	167	0	0	0	19	1.273	6.953	0.431	1.589	1.431
				517	342	450	365,187	1,175	0	67,553	7	4,822	959	12,057	1,250.879	2,679.404	572.995	1,676.978	213.867
				519	162	149	229,014	754	0	77,545	0	953	1,364	28,684	752.374	2,062.901	1,627.419	817.052	142.508
				521	10	85	75,186	582	0	27,161	0	551	117	760	441.945	571.673	14.446	253.497	293.979
				524	1	0	7,841	229	0	9,905	0	0	0	428	193.176	250.841	0.000	16.108	316.104
			winter	509	1,493	180	586,648	916	45	350,964	0	13,524	439	76,840	4,624.181	17,712.300	26.308	222.013	4,646.486
				513	4	5	5,146	17	0	7,498	0	0	0	150	47.451	83.299	0	3.742	32.641
				514	0	0	0	0	0	1,475	0	0	0	44	7.462	5.448	0	0	1.415
				516	0	0	1,415	1	0	1,236	0	0	0	22	13.006	9.909	0	1.480	19.298
				517	551	90	435,608	110	0	112,664	0	6,315	196	22,008	1,016.562	7,414.756	166.984	474.096	255.093
				519	232	13	63,945	104	0	68,772	0	1,928	23	2,633	150.207	994.473	492.360	228.629	35.086
				521	153	30	16,404	91	0	14,649	27	1,529	3	655	151.090	355.827	0.003	137.131	38.000
				523	10	0	259	0	0	0	0	0	0	6	1.556	0.373	0	1.359	0.013
				524	5	0	416	2	0	3,395	0	0	3	0	7.671	19.866	0	1.781	8.656
	Flatfish	HAL	summer	513	0	0	1,373	0	0	2	0	76	0	0	0	1.005	0	0	0
				514	0	0	876	0	0	1	0	12	0	0	0.001	0.289	0.004	0.076	0.002

			517	0	0	22,317	0	0	38	0	1	0	844	0.009	1.710	0	15.553	0
			518	0	0	72,106	0	0	149	0	43	0	292	0.016	22.269	0.004	10.832	0.104
			519	0	0	11,362	0	0	42	0	18	0	5	1.183	3.831	0.005	1.998	0.006
			521	3	32	72,975	0	0	65	0	114	0	458	1.457	23.988	0.006	81.902	0.007
			523	7	13	46,382	0	0	45	0	13	0	588	0.065	3.325	0	45.547	0.001
			524	0	0	25,010	0	0	189	0	22	0	58	0.023	6.375	0.009	4.707	0.081
		winter	517	0	0	10,616	0	0	43	0	1	0	6	0.011	0.748	0	2.421	0
			518	0	0	5,875	0	0	7	0	0	0	2	0	0.515	0	1.016	0
			519	0	0	4,683	0	0	2	0	0	0	1	0	0.452	0	0.088	0
			521	0	0	6,018	0	0	7	0	0	0	0	0.005	0	0	0.996	0
			523	0	0	618	0	0	0	0	0	0	0	0.002	0	0	0.817	0
			524	0	0	0	0	0	11	0	0	0	0	0	2.078	0	0.073	0
	POT	summer	517	0	0	25	0	0	0	0	0	0	0	0	0	0	0.029	0
			521	0	0	28	0	0	0	0	2	0	0	0.004	0	0	0.065	0
			523	0	0	56	0	0	0	0	0	0	0	0	0.233	0	0.041	0
	TRW	summer	509	70	38	76,886	161	8	26,341	20	1,247	11	2,903	337.578	326.910	0.631	312.075	629.151
			512	1	1	915	10	0	112	0	0	0	52	22.736	5.390	0	6.118	2.291
			513	41	383	223,305	16,633	0	305,040	74	1,513	593	30,414	4,141.104	1,785.674	3.113	997.567	1,537.330
			514	82	111	339,444	19,833	95	269,658	1,380	0	2	21,041	1,435.833	822.926	0.024	44.557	6,592.662
			516	2	0	456	5	0	306	0	0	0	27	17.789	0.739	0	2.268	2.819
			517	109	93	103,862	452	2	23,062	9	1,232	8,628	13,871	618.695	166.997	97.817	1,115.558	83.488
			519	106	16	63,450	69	0	34,473	1	116	3,903	4,986	152.318	92.718	215.191	329.740	32.949
			521	2	827	168,303	1,301	0	136,207	0	1,537	129	4,291	1,267.210	772.847	0.009	1,052.742	662.107
			524	0	1	26,904	2,847	0	13,158	40	262	1	3,919	763.321	449.313	0.065	270.519	577.254
		winter	509	380	0	689,241	14,682	9	217,116	0	16,246	0	15,149	6,617.510	3,491.967	6.448	278.749	11,270.519
			513	159	2	214,238	2,937	0	107,419	73	349	9	18,311	3,758.463	874.128	0.061	103.995	1,374.997
			514	0	0	12,304	4,352	0	66,440	75	0	0	5,369	782.824	312.708	0	1.022	824.860
			516	67	0	160,983	11	2	48,427	0	1,181	0	2,699	1,233.097	986.564	13.889	62.503	6,411.023
			517	1,312	6	91,953	51	0	8,590	8	3,188	3,010	4,193	169.043	142.899	9.017	1,005.692	119.107
			518	0	0	0	0	0	0	0	0	0	0	0.064	0	0	0.038	0
			519	69	2	30,229	25	0	15,782	0	107	710	3,352	76.092	47.945	111.966	292.713	10.278
			521	144	53	157,316	1,630	0	77,796	1	3,960	15	3,052	903.527	798.743	0.021	503.589	833.780
			524	12	0	6,103	2,893	0	77,168	5	42	0	6,078	527.608	307.143	0.002	41.755	355.291
Pollock	TRW	summer	509	446	22,446	767	46,264	0	1,169	5	2,638	3,731	108	43,919.291	149.639	26.861	20.607	1.097
			513	66	1,742	304	8,017	0	1,043	0	13	69	1,391	16,023.372	45.254	0.232	10.853	3.306
														2.311	0.591	1.963	0.196	0.039
			516	2	33	5	78	0	315	0	2	0	7	1,317.933	2.585	0.002	0.154	0.426
			517	4,614	270,809	15,540	475,528	0	7,437	96	373	328,566	21,035	302,705.177	612.350	280.085	213.633	8.669
			518	0	0	0	0	0	0	0	0	10	0	0	0.086	0	0.019	0
			519	710	17,102	13,483	169,561	0	3,088	0	56	325,124	4,272	33,724.223	40.546	339.470	48.636	1.833
			521	3,849	57,558	12,478	97,931	0	15,225	0	477	19,174	8,439	377,087.726	737.818	5.247	81.203	4.545
			523	184	2,899	282	360	0	53	0	34	647	33	5,398.481	13.700	0.207	1.006	0.043
			524	229	6,202	190	6,550	0	1,922	0	15	8	667	19,334.133	79.922	0.003	23.310	0.504
		winter	509	12,356	978	29,794	3,052	0	23,982	0	647	482	27,721	262,370.917	2,486.868	12.517	84.042	872.481
			512	2	7	4	42	0	1	0	0	0	4	58.759	0.129	0.000	0.000	0.115
			513	2,165	807	8,035	40,079	0	10,858	0	30	821	10,064	70,296.791	461.980	0.283	21.504	295.954
														3.926	3.328	0.000	0.554	1.624
			516	210	35	1,052	200	0	3,409	0	0	10	1,226	17,510.777	61.219	0.012	1.178	147.867
			517	20,526	42,185	12,330	31,941	0	8,668	53	97	250,270	19,277	150,482.440	1,305.784	26.886	89.817	156.895
			519	2,965	7,632	4,291	93	0	1,097	0	28	77,366	2,207	12,350.941	10.845	135.693	24.916	1.156
			521	4,770	7,595	5,489	2,238	0	27,754	4	217	17,574	18,133	124,708.017	578.650	0.605	17.556	203.363
			523	599	1,318	47	449	0	50	0	0	118	82	870.702	3.688	0.326	0.204	0.000
			524	121	1,191	4	5,561	0	221	54	2	55	1,723	7,418.326	11.395	0.011	3.585	0.024
Rockfish	HAL	summer	513	0	0	42	0	0	0	0	0	0	0	0	0	0	0.212	0
			518	0	0	65	0	0	0	0	0	0	0	0	0	0	0.025	0
			519	0	2	13	0	0	2	0	0	0	0	0	0.008	0	0.057	0
			523	0	0	0	0	0	0	0	0	0	1	0.012	0.005	0	0.039	0.001
	TRW	summer	508	0	0	336	0	0	57	0	0	3	72	0.308	4.504	0	0.254	0.566
			517	0	0	283	0	0	6	0	0	321	116	7.137	2.386	0	11.404	0.021
			518	0	0	117	0	0	0	0	0	0	0	8.026	0	0	0.473	0
			519											0.020	0	0	0.219	0
		winter	517	0	0	621	0	0	16	0	0	52	1	0.151	0	0	4.580	0.405

Sablefish	HAL	summer	508	0	0	138	0	0	0	0	0	0	1					
			517	0	0	1,804	0	0	0	0	0	0	14	0	0.340	0	0.866	0
			518	0	1	11,769	0	0	2	0	0	0	94	0.005	1.052	0	2.160	0
			519	0	0	2,702	0	0	0	0	0	0	22	0.013	0.059	0	3.524	0
			521	0	0	315	0	0	0	0	0	0	3	0	0	0	0.041	0
			523	0	0	34	0	0	0	0	0	0	0					
		winter	508	0	0	195	0	0	0	0	0	0	2	0	0	0	0.446	0
			517	0	0	1,252	0	0	3	0	0	0	0	0.070	0.334	0	0.428	0
			518	0	0	1,254	0	0	0	0	0	0	10	0	0	0	0.035	0
			519	0	0	1,651	0	0	3	0	0	0	26	0	0	0	0.011	0
			521	0	0	17	0	0	0	0	0	0	0	0	0.010	0	0	0
	POT	summer	517	0	0	170	0	0	3	0	0	0	1	0.001	0.038	0	0.709	0.045
			518	0	0	4,562	0	0	1	0	34	0	53	0.010	0.005	0	13.812	0
			519	0	0	3,257	0	0	7	0	1,386	0	69	0.058	0.403	0	16.765	0
		winter	517	0	0	293	0	0	1	0	0	0	4	0.001	0.007	0	2.514	0
			518	0	0	740	0	0	0	0	23	0	24	0.013	0.053	0.002	6.181	0
			519	0	0	1,463	0	0	22	0	82	0	118	0.273	1.434	0.165	20.189	0.001
	TRW	summer	519	0	0	1,005	211	0	194	0	0	80	1	10.911	1.137	1.267	10.037	0.368
		winter	521	0	0	137	44	0	40	0	0	0	0	5.667	0.000	0.000	0.167	0.000

					Prohibited species				NonTarget species						Target species				
Three year average bycatch estimates 2003-2005					NUMBERS	NUMBERS	KILOGRAMS	KILOGRAMS	KILOGRAMS	KILOGRAMS	KILOGRAMS	KILOGRAM	KILOGRAM	KILOGRAMS	TONS	TONS	TONS	TONS	TONS
Region	Fishery	Gear	SSL_Seas	Area	Chinook	Other salmon	Pacific halibut	Pacific herring	Sand lance	Large Sculpins	Capelin	Octopus	Squid	Misc fish	Pollock	P. cod	Atka mack.	Arrowtooth	Rock Sole
GOA	Cod	HAL	summer	Shumagin (Western GOA) 61	2	0	195,900	0	0	7,966	0	146	0	277	0.113	580.893	1.379	18.353	0.8115
				Chirikof (Central GOA) 620	0	0	5,660	0	0	228	0	30	0	36	0.100	82.594	0	0.159	0
				Kodiak (Central GOA) 63	1	0	164,550	0	0	7,573	0	19	0	459	0.159	884.108	0	0.002	0
				Yakutat (Eastern GOA) 64	0	0	203	0	0	9	0	0	0	2	0	1.119	0	0.000	0
				Prince William Sound 64	0	0	3	0	0	0	0	0	0	0	0	0.008	0	0.000	0
				Southeast Outside 65	0	0	56	0	0	2	0	0	0	0	0	0.271	0	0.000	0
				Southeast Inside 6	0	0	1,554	0	0	72	0	0	0	6	0	5.803	0	0.028	0
			winter	Shumagin (Western GOA) 61	1	2	448,230	0	0	18,171	0	453	563	3,461	5.150	3,223.670	0.936	13.478	0.54
				Chirikof (Central GOA) 620	0	0	123,123	0	0	3,999	0	292	0	558	1.776	1,300.209	0.001	1.881	0.3965
				Kodiak (Central GOA) 63	1	1	798,926	0	0	36,704	0	5,014	2,946	1,596	21.902	5,127.332	0.003	19.086	0.029
				Yakutat (Eastern GOA) 64	0	0	4	0	0	0	0	0	0	0	0	0.019	0	0.000	0
				Prince William Sound 64	0	0	67	0	0	3	0	0	0	0	0	0.370	0	0.000	0
				Southeast Outside 65	0	0	7,374	0	0	375	0	2	0	36	0.003	35.925	0	0.001	0
				Southeast Inside 6	0	0	3,149	0	0	148	0	30	0	21	0.009	17.078	0	0.010	0
		POT	summer	Shumagin (Western GOA) 61	0	0	27,648	0	0	6,173	0	44,654	82	5,215	0.097	2,115.636	6.874	0.740	0.002
				Chirikof (Central GOA) 620	0	0	3,082	0	0	2,014	0	305	0	1,010	0.022	320.561	0.136	0.025	0
				Kodiak (Central GOA) 63	0	0	25,145	0	0	601	0	3,716	0	13,318	0.003	497.495	0.434	0.164	0.012
			winter	Shumagin (Western GOA) 61	0	0	50,774	0	0	78,870	0	80,674	1	15,477	3.146	11,437.270	5.679	0.119	0.02
				Chirikof (Central GOA) 620	0	0	26,709	0	0	14,972	0	6,992	0	8,882	1.471	3,339.019	0.395	0.080	0
				Kodiak (Central GOA) 63	0	0	33,450	0	0	39,692	0	54,250	6	16,254	3.867	5,837.250	0.674	0.831	0.0065
				Prince William Sound 64	0	0	87	0	0	1	0	16	0	3	0.000	7.576	0.005	0.000	0
		TRW	summer	Shumagin (Western GOA) 61	64	1	21,219	0	0	196	0	0	328	856	10.157	74.288	17.508	117.237	9.95
				Chirikof (Central GOA) 620	145	0	41,075	0	0	636	0	11	10	800	0.263	440.035	0	450.670	23.412
				Kodiak (Central GOA) 63	270	61	713,288	7	0	1,958	0	770	0	35,688	6.567	3,830.323	0.016	262.798	235.028
			winter	Shumagin (Western GOA) 61	86	2	98,442	1	0	31,434	0	1,288	730	4,006	31.146	2,436.308	0.994	38.718	4.1555
				Chirikof (Central GOA) 620	57	0	27,915	0	0	236	0	0	0	66	5.273	100.667	0	45.946	8.365
				Kodiak (Central GOA) 63	812	0	238,086	0	3	5,357	0	44	0	16,482	102.804	5,782.007	0.035	177.472	189.2215
	Flatfish	HAL	summer	Shumagin (Western GOA) 61	0	7	352,355	0	0	11,492	0	1,301	0	161	0.030	99.049	0.005	7.581	0.0365
				Chirikof (Central GOA) 620	1	2	115,597	0	0	698	0	266	0	53	0	22.606	0.001	1.376	0.004
				Kodiak (Central GOA) 63	0	15	579,692	0	0	3,326	0	1,208	0	574	0.001	32.272	0	2.754	0
				Yakutat (Eastern GOA) 64	0	2	86,681	0	0	1,077	0	122	0	71	0.002	1.912	0	0.174	0
				Prince William Sound 64	0	1	196,915	0	0	1,425	0	108	0	170	0	18.630	0	0.496	0
				Southeast Outside 65	0	4	250,082	0	0	2,586	0	735	0	335	0.011	8.257	0	1.790	0
				Southeast Inside 6	0	1	57,497	0	0	589	0	323	0	160	0	7.911	0	0.178	0
			winter	Shumagin (Western GOA) 61	0	0	142,833	0	0	1,615	0	45	0	29	0	46.825	0.001	3.693	0.0365
				Chirikof (Central GOA) 620	0	1	173,025	0	0	1,533	0	0	0	84	0.053	21.018	0.002	7.302	0.0265
				Kodiak (Central GOA) 63	0	3	609,704	0	0	2,592	0	0	0	307	0.208	23.659	0	9.022	0.0025
				Yakutat (Eastern GOA) 64	0	1	91,081	0	0	842	0	0	0	126	0	0.157	0	2.356	0
				Prince William Sound 64	0	0	2,889	0	0	34	0	0	0	2	0	0.068	0	0.012	0
				Southeast Outside 65	0	3	170,956	0	0	1,866	0	0	0	235	0	2.284	0	5.605	0
				Southeast Inside 6	0	0	35,375	0	0	351	0	0	0	72	0	6.188	0	0.935	0
		TRW	summer	Shumagin (Western GOA) 61	377	303	95,588	0	0	2,660	0	117	438	3,055	54.271	103.942	36.599	1,972.970	40.5725
				Chirikof (Central GOA) 620	594	266	243,287	7	0	17,407	1	39	601	10,517	14.289	439.402	3.895	2,786.093	420.778
				Kodiak (Central GOA) 63	203	1,727	473,120	27	0	51,598	7	1,883	68	10,022	96.291	606.567	0.547	2,164.888	1643.097
			winter	Shumagin (Western GOA) 61	1,399	109	134,754	0	0	4,722	0	76	650	2,973	58.146	194.740	24.992	1,955.845	14.497
				Chirikof (Central GOA) 620	292	87	182,106	2	0	3,211	0	84	183	2,885	17.404	204.701	0.771	1,550.321	57.7895
				Kodiak (Central GOA) 63	1,255	284	657,342	47	1	50,062	23	3,080	1,045	18,476	267.907	847.923	0.733	6,762.755	446.2455
				Yakutat (Eastern GOA) 64	0	0	5,235	0	0	165	0	0	32	0	0.729	2.303	0.000	16.013	0.2905
	Pollock	TRW	summer	Shumagin (Western GOA) 61	357	1,331	258	0	0	0	0	0	3,566	232	7,525.296	19.767	0.295	31.764	0.036
				Chirikof (Central GOA) 620	319	216	248	1,772	0	0	8	0	605	1,425	1,822.405	8.692	0	33.309	0.281
				Kodiak (Central GOA) 63	797	456	3,805	31,674	0	0	12	0	432	674	3,819.982	33.642	0	190.775	2.942
			winter	Shumagin (Western GOA) 61	2,638	322	293	4,631	0	1	647	0	4,230	3,259	15,735.869	81.794	6.778	127.867	0.1375
				Chirikof (Central GOA) 620	4,098	60	4,402	57,992	1	27	24,601	2	252,302	13,295	22,196.461	92.650	0	279.278	0.784
				Kodiak (Central GOA) 63	6,883	182	5,877	4,508	0	0	38	17	4,518	4,713	10,912.667	140.487	0.059	659.122	1.367
				Yakutat (Eastern GOA) 64	186	36	23	456	0	0	130	0	476	280	1,010.631	0.042	0	4.471	0
				Prince William Sound 64	83	7	6	1,131	0	0	209	0	7,938	131	1,021.756	0.260	0	1.080	0

Rockfish	HAL	summer	Shumagin (Western GOA)	61	0	0	152	0	0	0	0	0	0	0	0	0.019	0	0	0
			Chirikof (Central GOA)	620	0	0	1,531	0	0	0	0	0	0	0	0	0.145	0	0	0
			Kodiak (Central GOA)	63	0	0	814	0	0	0	0	0	0	42	0	3.910	0	0.069	0.0875
			Yakutat (Eastern GOA)	64	0	0	1,083	0	0	0	0	0	0	0	0	0.042	0	0	0
			Prince William Sound	64	0	0	254	0	0	0	0	0	0	0	0	0.017	0	0	0
			Southeast Outside	65	0	0	4,677	0	0	0	0	0	0	0	0	0.518	0	0	0
			Southeast Inside	6	0	0	2,796	0	0	0	0	0	0	0	0	1.145	0	0	0
		winter	Shumagin (Western GOA)	61	0	0	6	0	0	0	0	0	0	0	0	0	0	0	0
			Chirikof (Central GOA)	620	0	0	6	0	0	0	0	0	0	0	0	0	0	0	0
			Kodiak (Central GOA)	63	0	0	853	0	0	0	0	0	0	0	0	0.385	0	0	0
			Yakutat (Eastern GOA)	64	0	0	120	0	0	0	0	0	0	0	0	0	0	0	0
			Prince William Sound	64	0	0	52	0	0	0	0	0	0	0	0	0.103	0	0	0
			Southeast Outside	65	0	0	16,889	0	0	0	0	0	0	0	0	5.202	0	0	0
			Southeast Inside	6	0	0	4,683	0	0	0	0	0	0	0	0	2.393	0	0	0
	TRW	summer	Shumagin (Western GOA)	61	0	0	44,274	0	0	7,585	0	18	2,966	15,394	183.513	86.991	378.915	169.107	11.3965
			Chirikof (Central GOA)	620	0	37	34,283	0	0	2,976	0	298	2,604	41,224	6.027	55.844	178.596	152.859	0.9
			Kodiak (Central GOA)	63	722	1,943	313,288	0	0	9,214	0	108	787	61,349	117.318	1,307.271	9.319	1,037.390	52.072
			Yakutat (Eastern GOA)	64	42	179	6,735	0	0	91	0	0	817	6,813	4.488	0.107	0	7.388	0
		winter	Shumagin (Western GOA)	61	0	0	9,560	0	0	0	0	0	333	1,530	0.530	7.444	53.286	11.436	0
			Chirikof (Central GOA)	620	0	0	1	0	0	0	0	0	17	0	0.137	0	0	0.052	0
Sablefish	HAL	summer	Shumagin (Western GOA)	61	0	19	163,024	0	0	4,580	0	110	56	433	1.020	32.314	0.017	51.652	0
			Chirikof (Central GOA)	620	0	6	66,467	0	0	424	0	10	14	164	0.001	0.975	0	4.316	0
			Kodiak (Central GOA)	63	0	77	642,594	0	0	97	0	614	1,160	3,511	0.041	15.766	0	52.548	0
			Yakutat (Eastern GOA)	64	2	33	72,007	0	0	24	0	7	0	349	0.010	1.482	0	8.053	0
			Prince William Sound	64	0	0	4,180	0	0	9	0	1	5	31	0	0.122	0	0.433	0
			Southeast Outside	65	1	12	181,823	0	0	200	0	41	0	3,043	0.012	4.217	0	19.100	0
			Southeast Inside	6	1	12	108,071	0	0	186	0	13	17	758	0.004	3.685	0	10.296	0
		winter	Shumagin (Western GOA)	61	0	2	126,103	0	0	293	0	62	0	723	0.430	14.974	0.004	67.571	0
			Chirikof (Central GOA)	620	0	0	52,382	0	0	13	0	4	1	76	0.010	1.554	0	5.944	0
			Kodiak (Central GOA)	63	0	5	400,215	0	0	127	0	172	16	669	0.001	5.333	0	14.737	0
			Yakutat (Eastern GOA)	64	0	2	56,458	0	0	38	0	0	0	302	0	0.411	0	3.338	0
			Prince William Sound	64	0	0	2,296	0	0	3	0	3	0	14	0	0.032	0	0.091	0
			Southeast Outside	65	0	4	161,575	0	0	18	0	5	0	5,834	0.026	1.246	0	10.156	0
			Southeast Inside	6	0	4	40,500	0	0	84	0	0	0	280	0	1.006	0	6.748	0
	TRW	summer	Kodiak (Central GOA)	63	0	0	122	0	0	0	0	0	0	16	0	0.660	0	4.000	0
			Yakutat (Eastern GOA)	64	0	0	614	0	0	0	0	0	65	50	0	0	0	3.205	0
		winter	Kodiak (Central GOA)	63	0	0	0	0	0	0	0	0	0	0	0.314	0	0	2.351	0