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, 2006

Developed by the

Steller Sea Lion Mitigation Committee

North Pacific Fishery Management Council

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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 fisheries in the Gulf of Alaska and the Bering Sea/Aleutian Islands. Over a period of several months and three meetings, the SSLMC reviewed new scientific information on SSL and their distribution, abundance, site trends, diet, movement patterns, and other life history parameters as well as the results of fishery interaction studies. This phase of work was to prepare the Committee for receiving and reviewing proposals. In addition, the SSLMC began work to prepare and develop a tool for evaluating proposals, and this concept 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, 2006 SSLMC members and scientific advisors with the National Marine Fisheries Service - Alaska Fisheries Science Center (NMFS-AFSC) met in Seattle to begin development of an evaluation tool 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,[1] was used interactively to structure the problem, depict the influence of weights, and derive the priority of elements.

The evaluation tool will undergo several phases of development and review:

1. July 25-27, 2006 the SSLMC develops a prototype evaluation tool, in collaboration with the NMFS-AFSC staff in Seattle;

2. August 4-8, 2006 the SSLMC reviews and comments on a draft report of the prototype evaluation tool;

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

3. August 16, 2006 the SSC reviews and comments on the SSLMC's progress toward development of a prototype evaluation tool; and,

4. the SSLMC incorporates comments from the SSC in the development of the evaluation tool during their August 28-30, 2006 meeting in Seattle. Additional SSLMC work sessions will occur as needed to finalize the tool, including a possible second SSC review at the October 2006 Council meeting.

The purpose of this draft report is to describe and present the evaluation tool developed by the SSLMC, in concert with the NMFS-AFSC and public in Seattle, July 25-27, 2006. The SSLMC have had an opportunity for initial review and comment on the draft report (August 3-8, 2006). This draft report constitutes the first phase in the development of the evaluation tool, and provides a basis for review and comment from the SSC at their August 16, 2006 meeting in Juneau.

Work on the evaluation tool by the SSLMC does not imply that a clear linkage between fish harvest and abundance of SSL is known to exist. Rather, the evaluation tool 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 or other life history parameters. The judgments of SSLMC members in developing this tool partly reflect their assessments of the validity of that assumption but also are based on their review of new scientific information on SSL and their prey. The July 25-27, 2006 meeting in Seattle was solely concerned with developing a tool to evaluate impacts; the Committee recognized that additional information would be used in conjunction with the tool to evaluate benefits or "credit" in a proposal.

METHODS

PARTICIPANTS

A total of 13 SSLMC members participated in developing the evaluation tool (see Appendix A). 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).

STRUCTURING AND ESTABLISHING PRIORITIES

A top-down structuring approach was used, whereby the mission forms the top of the hierarchy and dimensions form the second level of the hierarchy. The mission is a

responsibility to fulfill. A dimension is a path along which an impact can be measured. Variables and their sub-units are components of proposed changes to fishing regulations relevant to the evaluation tool, 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 "mother" dimension. The group was tasked with discerning how variables associated with fishing regulation changes would be likely to impact the dimensions of SSL prey and SSL needs.

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 "mother" node - this linked 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 mother 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, 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 children (variables) within each dimension, then that of the grandchildren, and so on. Participants were given time to think and write their ratings of importance down 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 between 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, then there is disagreement about which element is the more important. When disparity in judging importance occurred, it meant there was disagreement, 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.

RESULTS AND DISCUSSION

MISSION

The SSLMC's mission statement for the AHP model is to build upon previous efforts that were made 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, Protected Resources division of NOAA Fisheries postulated that fisheries have somehow contributed to the decline in the number of SSL in the Western DPS, probably indirectly by reducing the prey available to the SSL. Although the SSLMC's work on the evaluation tool proceeded with the assumption that there may be a relationship between prey and the health of the SSL, this does not imply that the SSLMC concurs with the assumption.

DIMENSIONS ALONG WHICH IMPACTS OF PROPOSED CHANGES ARE EVALUATED

The SSLMC identified two dimensions of the problem – how fisheries affect:

- the prey of the SSL, and
- the needs of the SSL (where and when they are sensitive to a changed prey field).

The Prey of the SSL

The SSLMC engaged in lengthy discussions about concepts relating fishing to the prey field, including NMFS' concerns about the availability of prey as affected by dispersal from fishing activities. Issues discussed included the response of the prey field to fishing, possible changes in fish schooling behavior, prey switching, and the SSL's ability to capture and consume prey. The question that arises is, "Will prey availability be altered in a manner that affects the SSL?" The NMFS assumption is that more aggregated prey are easier for the SSL to capture, and removal of fish can result in a reduced number of fish or fish aggregations. The question that arises is, "Will prey be measurably depleted in a manner that affects the SSL?"

Both of the above concerns were ultimately combined by the SSLMC into one dimension because it was thought that realistically there could be little measurable distinction between the two.

The Needs of the SSL

Much discussion focused on SSL foraging ecology, reproductive behavior, energy balance needs, and potential disturbance from fishing activity. Degree of impacts was related to adult females and weanlings, as these categories of individuals have more

restrictive energy balance needs, as compared with adult males. Non-territorial adult males are able to forage further and longer because they do not care for young, and do not need to expend energy on lactation. Females have dual roles of maintenance and reproduction. For NMFS, fishing competition with juvenile SSL that have not yet weaned and are still partly reliant on maternal care is a primary concern. Weanlings have lesser diving capability and fewer reserves for energy balance over time than adults because of smaller body size. In addition to the concept of competition, the concept of other effects of fishing activity on SSL through disturbance was discussed. The SSLMC intended the term "disturbance" to include behavioral and physical aspects.

All concerns were ultimately combined into one dimension because adult females and weanlings largely overlap in time and space, thus making these components of the problem nearly indistinguishable from an impact point of view; disturbance is an overarching concern, related to several variables, including proximity.

Judgments of importance between the prey field and the SSL dimensions were based on the degree to which change may result in an adverse effect on the energy balance of an individual SSL. The geometric mean of all scores resulted in ratings of importance for the dimensions (Figure 1). Only one committee member preferred ranking the "prey field" higher in importance than the needs of the SSL; the majority of the SSLMC voted as the rank order depicted in Figure 1.

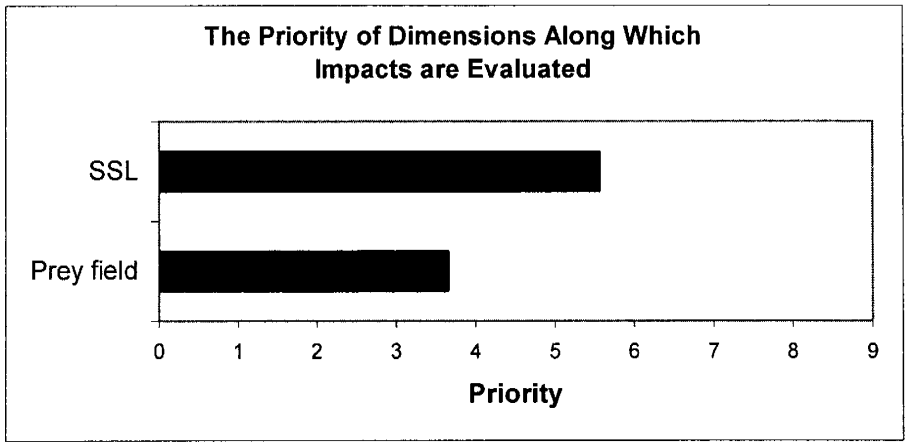

Figure 1. The relative priorities of SSL needs and fishing effects on SSL prey.

VARIABLES

Prior to the meeting, a scoping survey was distributed to a sub-group, to identify variables that might be encountered in proposals. The question asked was, "What's on the table for change?" And, "Given the set of variables, what sub-set will be used in the evaluation tool?" At the meeting, the entire SSLMC modified the list. Table 1 lists the variable field identified as useful to the evaluation tool.

Table 1. The potential set of 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. Fish Species of Interest	a. Pacific cod b. Pollock c. Atka mackerel
2. TAC	The TAC is calculated for each fish species, for each region for a year
3. Fish Biomass	The biomass is estimated for each fish species, for each region for a year
4. Fishing duration	a. Pulse (TAC is taken in 3-10 days) b. Prolonged (TAC is spread out across time)
5. 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
6. Seasons	a. Summer (the SSL breeding season, defined as May-September) b. Winter (non-breeding season, October-April)
7. SSL site types	a. Rookery b. Haulout c. other
8. Proximity zones to a SSL site	a. 0-3 nm b. 3-10 nm c. 10-20 nm d. 20+ nm e. not critical habitat
9. The percentage of SSL sites affected in a region	a. 1-10% b. 11-25% c. 26-50% d. 51-75% e. 76-100%

Explanations of variables used in the hierarchy follow for each dimension.

Variables Applicable to the Prey Dimension

Variables that can potentially impact the prey field dimension are:

- the TAC for a given fish species in a given region,
- estimates of fish biomass in a given region, and
- fishing duration.

The ideal way to evaluate impacts of proposed changes on the prey field would be to know fish biomass at the site and time in question, understand SSL prey needs at the site and time, and be able to predict with accuracy the amount and rate of harvest relative to biomass associated with the proposed change. However, this is a data-poor environment in which to make decisions, so judgments must be made on the best available information. 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 that gear type and vessel size are not satisfactory proxies for removal rate. Concerns for using gear type and vessel size as proxies for removal rate include the lack of consideration for the number of vessels fishing in an area, fisheries occurring on large schools of fish (quota may be harvested quickly if the target species are aggregated), agreement between sectors to avoid fishing conflicts (which could spread out effort and fish removal rate), and the

expectation that some proposals may be presented that would control removal rate directly.

The SSLMC launched into a lengthy debate on how best to account for fish removal relative to available biomass, and raised the possibility of assigning a rating to a fishery based on the percentage of the TAC taken. Staff from the NMFS-AFSC was asked if exploitation rates could be estimated in areas smaller than a regulatory subarea? Unfortunately, fish biomass data are not collected on a scale suitable to provide estimates in small areas; rather, fish biomass is estimated on a regional scale. Therefore, the group decided that the best characterization of removal rate, given limited knowledge, is a qualitative assessment of the ratio of the TAC to biomass, per species, on a regional basis for a year (e.g., not apportioned according to season). For example, a proposal for a high harvest in an area of low target species abundance would be rated high (more adverse to the SSL). The NMFS-AFSC agreed to provide to the SSLMC a qualitative statement of biomass in each region. Catch to biomass comparisons could be provided by developing a ratio between TAC for a region with the estimated biomass in that region, projected for 2008, from the next stock assessments and SAFE reports. The NMFS-AFSC would use their best judgment to estimate regional biomass for Pacific cod, pollock and Atka mackerel.

Prey removal rate may be complicated by seasonal behavior of fish; for example, pollock aggregate for spawning in winter and a fishery targeting these fish would have an exploitation rate that is high, in part because of the schooling behavior of the fish. Fish migratory behavior could also affect exploitation rate.

The TAC/biomass ratio can be scaled by degrees of impact to the prey field according to Saaty's 1-9 ratio scale in the following manner:

- A fishery in areas having a high TAC/low biomass ratio is interpreted as having an extreme impact on the prey field, and is given a value of "9".
- A fishery in an area having a low TAC/high biomass ratio is interpreted as having a slight impact on the prey field, and is given a score of "1".

Between the values of "9" and "1", are gradations (scores of 2-8) that can be used to depict the degree of impact to the prey field. For each proposal, the SSLMC must judge the expected proportion of removal, and score it according to the following guide:

TAC/Biomass per species, per region	**Weight of impact (score)**
High TAC/Low Biomass	9
	8
	7
	6
	5
	4
	3
	2
Low TAC/High Biomass	1

The data supplied by the NMFS-AFSC for this piece of the evaluation tool are found in Appendix B. (These data were not available to the SSLMC until after completion of this draft report).

Characterization of removal rate must be discussed in relation to the duration of removal – so, the SSLMC engaged in an extended debate about the impacts of "pulsed" (defined as approximately 3-10 days) versus "prolonged" fishing on the prey field (small amounts of fish harvested incrementally over long periods of time). The SSLMC turned to the NMFS-AFSC for data in this regard. There is some research that suggests SSL are most vulnerable to prey field disruptions that are characterized by a high removal rate in a pulsed time frame in a given area (June 2003 Supplement to the Biological Opinion). That is, an individual SSL can probably deal with low food abundance for a few days, but going without food for 3-10 days would be detrimental to the health of the SSL. The concern with pulsed fishing is localized removals of large quantities of available biomass. Ultimately, the majority (90%) of the SSLMC decided that at high removal rates, pulsed fishing has the highest impact; however, at low removal rates the duration of fishing is of slight consequence (Table 2). While there was a wide spread of scores, nonetheless the rank order was largely similar among committee members. The SSLMC intends to continue discussion on this topic upon receipt of additional information.

Table 2. Judgments on the degree of impact (group geometric mean) that scenarios of removal rate and duration of fishing have on the SSL prey. A high geometric mean score reflects a highly adverse impact.

TAC/Biomass Score[a]	Duration of Fishery	Geometric Mean Group Score
9	Pulsed	8.74
	Prolonged	1.43
8	Pulsed	8.00
	Prolonged	1.41
7	Pulsed	6.90
	Prolonged	1.40
6	Pulsed	6.15
	Prolonged	1.38
5	Pulsed	5.36
	Prolonged	1.16
4	Pulsed	4.04
	Prolonged	1.12
3	Pulsed	3.15
	Prolonged	1.06
2	Pulsed	2.00
	Prolonged	1.06
1	Pulsed	1.19
	Prolonged	1.06

[a] A high TAC/low biomass ratio reflects a high rate of removal, which is deemed as having an adverse effect on the SSL prey field.

Removal rate and duration was considered in the context of region; however, all regions were assigned equal weight because recovery of the SSL is required in all areas for downlisting the SSL from endangered status (the western DPS). The SSLMC also considered removal rate and duration in the context of fish species, but again assigned equal weight to all three target species of interest, because all are important in the diet of SSL and relative importance by region is captured in the Needs of SSL dimension.

Variables Applicable to the Needs of SSL Dimension

Variables that can potentially impact the Needs of SSL dimension are:

- fishing near a type of SSL site,
- fishing within zones of proximity to the site, in a given season,
- the percentage of SSL sites in a region affected by the proposed change,
- fish species targeted for harvest, and
- fishing within a geographic region, in a given season.

Structural Adjust

The SSLMC partitioned the above variables into two categories:

1) SSL site type by season and proximity, and the percentage affected; and,
2) fish species harvested, by region and season,

which are found at the third level of the hierarchy. The children and grandchildren differ in number, where there are far more in the node, "SSL site type by season and proximity, and the percentage affected", than in the node, "fish species harvested, by region and season". To ensure priorities throughout the nodes remain at their respective proportion of weight, the structural adjust feature of Expert Choice was used. The following is an approximation of the math used by the Expert Choice software, where rounding errors at the thousandth decimal place may result in slight deviations between the example below and the model software result.

Node	Intended weight	No. grandchildren	Math	Structural Adjusted weight
SSL site type by season and proximity…	.400	6 = .75	.400 x .75 = .3	(.3 x .604)/.35 ≈ .517
Fish species harvested…	.204	2 = .25	.204 x .25 = .05	(.05 x .604)/.35 ≈ .086
Total	.604	8 = 1.0	.35	.603

This was the only structural adjustment made to the model because it makes sense to restore priorities to their intended proportion of weight.

SSL Site Type by Season and Proximity, and the Percentage Affected

The ideal way to evaluate the impacts of proposed changes to fishing regulations on the degree of effect on SSL would be to examine the impacts related to the number of SSL per site on a seasonal basis, and the trend in SSL abundance. However, survey counts of SSL are not conducted at every site, occur primarily in summer, and movement of SSL between sites is known to occur; thus, the effects of fishing in winter at a particular site would have little relation to SSL abundance counts that were conducted in summer. Lack of complete knowledge of SSL abundance per site on a seasonal basis and the extent of movement between sites also hampers incorporation of SSL trend information into the evaluation tool. Trends per area are subject to error due to variability in SSL movement between sites, and thus trends are not meaningful on a per-site basis. The NMFS-AFSC staff suggested that incorporation of the concept of the sensitivity of site type and proximity of fishing activities to the site in a given season into the evaluation tool would serve as the best available proxy to SSL abundance and trend, because data on sites are more reliable.

The SSLMC discussed the best way in which to incorporate time, and concluded that seasons based on the energy needs of the SSL would be the most useful since we are discussing the availability of energy (food) to the SSL. Summer is defined as the breeding season (May-September) and is roughly equivalent to the B and C fishing seasons. It is assumed that energy needs are greater for lactating females and other nutritional stresses associated with breeding; thus, summer would be a more important (sensitive) time than winter. Winter is defined as the non-breeding season (October-April) and is roughly equivalent to the D and A fishing seasons.

The NMFS-AFSC staff distributed a table characterizing SSL site types as rookery, haulout or "other", based on the occurrence of breeding activity at the site and the numbers of animals counted there (Appendix C). The "other" designation is given to sites that are listed in the Biological Opinion, but do not meet the seasonal criteria for rookery or haulout; SSL can still be present at these sites. The new telemetry data show that both rookeries and haulouts are used for a longer period of time by a more diverse group of SSL than previously observed. Following testimony from the NMFS-AFSC staff regarding site type and importance based on seasonal use, votes were taken on the degree of sensitivity, where a high score represents a site that has great importance in the overall recovery of the SSL and is sensitive to change (Figure 2).

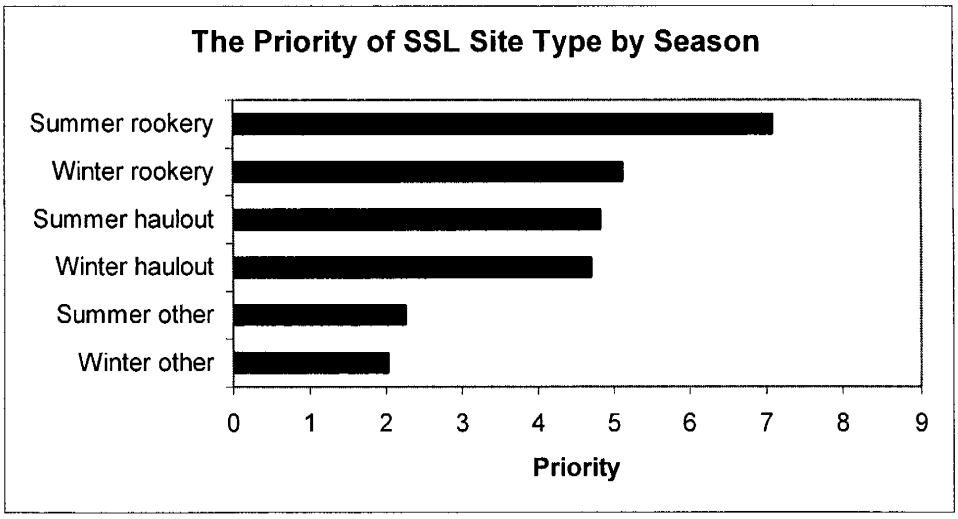

Figure 2. The priority of SSL site types, by season

Thus, a summer rookery is more important and is more sensitive to impact than a winter "other" site because of SSL breeding activity. The SSLMC all voted similarly in regards to rank order, rating summer rookery as most important and winter "other" as least important; there were some differences of opinion in regards to the rank order of the remaining middle-ranked site types.

The impact of fishing to a site/season combination depends on how close fishing takes place to the site. The NMFS assumption is that fishing in increasing proximity to a SSL site may have increasingly deleterious effects on the prey of the SSL. Much work and discussion has previously gone into the "zonal approach" presented in Tables II 1-9, on pg 94 of the June 2003 Supplement to the Biological Opinion. New juvenile telemetry data (Appendix C) supports high sensitivity for the 0-3 nm and 3-10 nm zones. The assumption is that increasing distance of activity from the SSL site reduces disturbance to the SSL. The SSLMC wished to incorporate the concept of the zonal approach into the evaluation tool, and prior ratings of importance were adjusted to reflect the 1-9 rating scales used in the AHP. The SSLMC expanded on the zonal approach by considering sensitivity to proximity in relation to site type and season (Figure 3).

There was agreement among the SSLMC on the sensitivity of the zones per site/season combination. The most important zone is 0-3 nm for all site types by season; the least important zones are the 20+ nm areas outside critical habitat. The priority scores assigned by the SSLMC are consistent with those recommended by the NMFS-AFSC. The most critical habitat surrounds rookeries, in the 0-3 nm and 3-10 nm zones.

Members of the SSLMC wanted to account for the percentage of SSL sites in a region affected by a proposal, combined with proximity to a site. Consensus was reached to include five categories of site percentages affected, within three proximity zones (Figure 4). The greatest adverse impacts (scored as "9") would occur if the proposal sought to affect from 11-100% of SSL sites in the 0-3 nm zone for a given region.

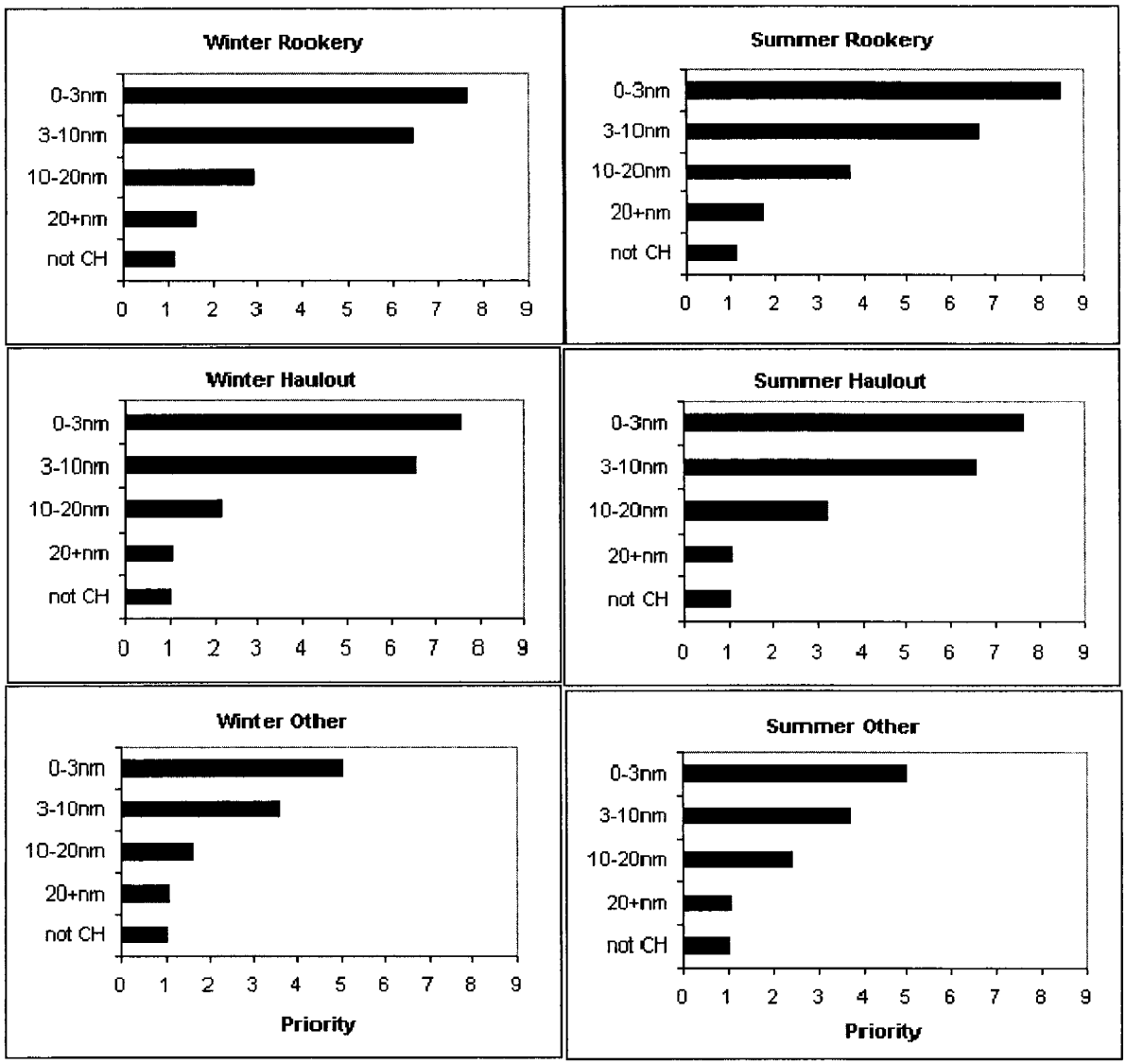

Figure 3. The sensitivity (priority) of a SSL site type to proximity of fishing, by season.

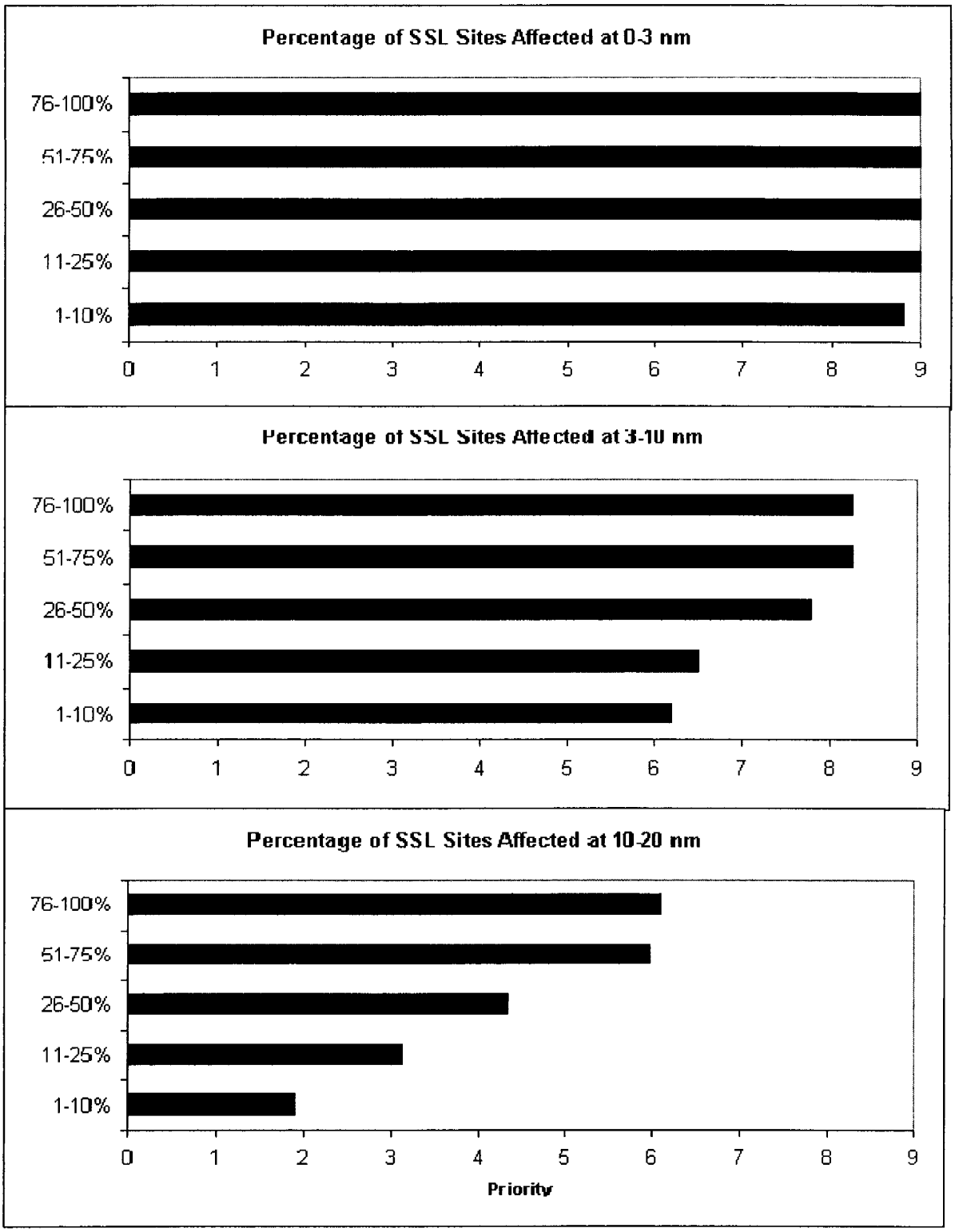

Figure 4. The potential of adverse impact (priority) of a change in fishing, considering percentages of SSL sites affected in a region, and fishing in proximity to the sites.

Fish Species Harvested, by Region and Season

The combination of fish species harvested by a fishery, in a given geographic region, on a seasonal basis, could be considered a proxy for nutritional needs of the SSL. Fish species of interest are Pacific cod, pollock and Atka mackerel; scat research has defined these species as occurring frequently in the diet (Sinclair and Zeppelin *in review*). Data presented to develop ratings of importance included the most recent SSL food habits data (including Sinclair and Zeppelin 2002). Members of the SSLMC did not assign any species/region combination a score of "9" because the SSL diet is diverse and not wholly comprised of Pacific cod, pollock or Atka mackerel, but rather a combination of prey items. Other species observed in high diet proportions include Irish lords, salmon, and cephalopods. Thus, a fishery that harvested Pacific cod, pollock or Atka mackerel would still leave unharvested many other SSL prey items.

The seven geographic regions are defined in relation to the SSL draft revised recovery plan; also, proposals concerning these regions are expected. The seven regions include three in the Gulf of Alaska (western, central, eastern), three in the Aleutian Islands (western, central, eastern [which includes the Bering Sea]), and the Pribilof Islands region. The NMFS stated that equal weights of importance (score = 5) must be assigned to each of the Gulf of Alaska and Aleutian Islands regions because the draft revised recovery plan requires an increasing trend in all regions for delisting, so all are considered of equal importance to recovery[2]. (If the criteria in the draft recovery plan change regarding the importance of regions, then the evaluation tool would need to be adjusted to reflect those criteria changes.) The Pribilofs were assigned a slightly lesser rating of importance (score = 3.56) because those haulouts are not identified in the draft revised recovery plan; the Committee expects that at least one proposal is likely to address that area.

The importance of the combination of fish species by region and season was assigned based on diet data (Figure 5). A concern was raised about the relatively high ratings of importance for Pacific cod and pollock removals in the EGOA – i.e. how could these two species be so important in the eastern DPS SSL diet if their abundance is low (as evidenced by the general lack of large Pacific cod or pollock fisheries in the region).

OVERALL MODEL

The hierarchy consists of 215 total elements: two dimensions, 11 variables in the third level, 26 variables in the fourth level, 44 variables in the fifth level, and 132 variables in the sixth level (Appendix D). Variable names are repeated, so the hierarchy consists of 31 unique elements. Variable names were repeated to capture different aspects in relation to other variables and to provide multiple scenarios, thus allowing flexibility in the scoring process. For example, one scenario could be that a proposal seeks to harvest Pacific cod in an area with a moderate TAC/biomass ratio of cod over a prolonged time period, in the summer, in the Eastern Gulf of Alaska, in the 10-20nm zone, and affect 1-10% of rookeries in the region.

[2] Although, the draft revised recovery plan requires an increasing trend in only five of seven regions for downlisting.

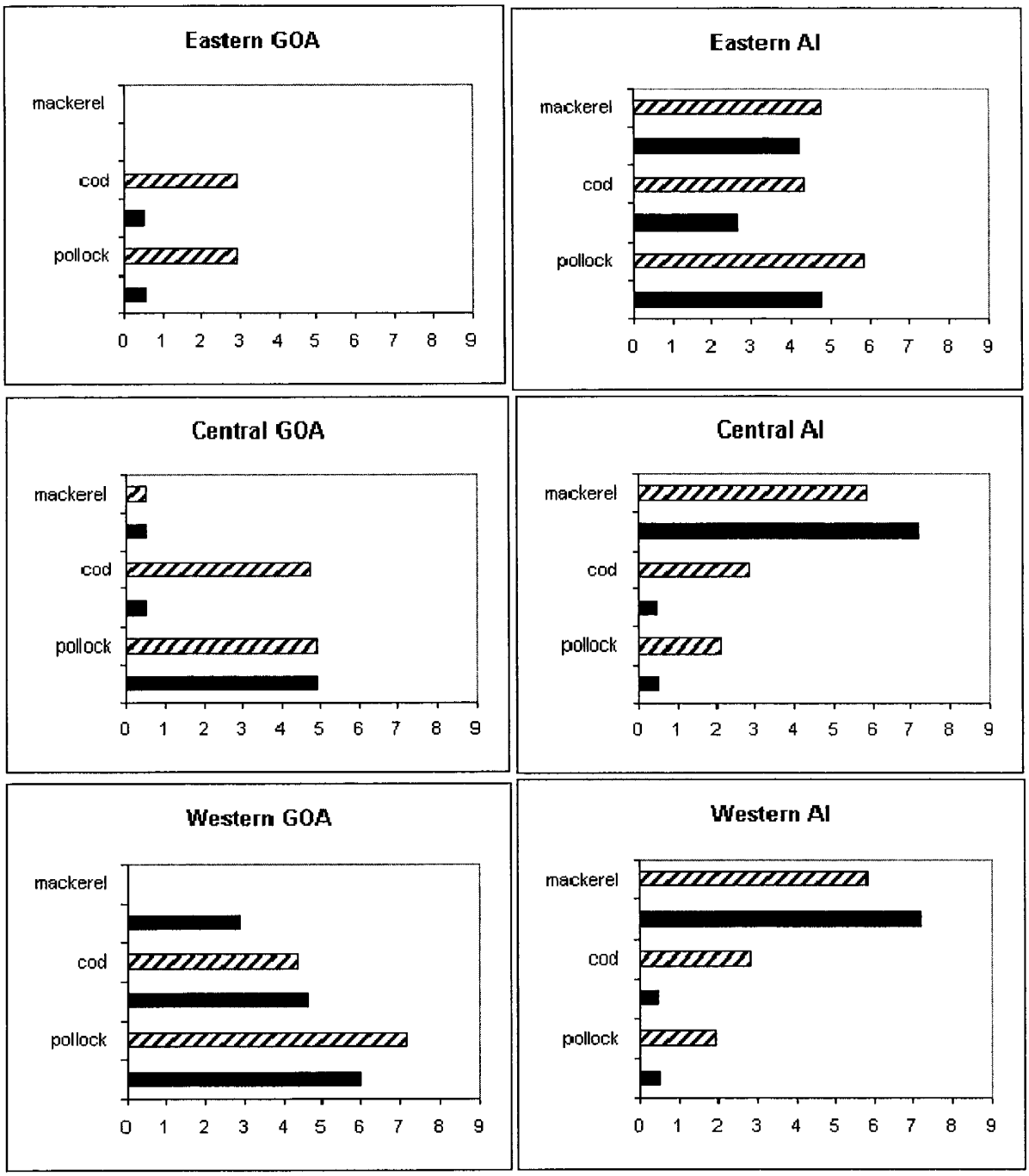

Figure 5. Ratings of importance of Atka mackerel, Pacific cod and pollock to the SSL, by region and season; the striped bar is winter and the solid black bar is summer. The absence of a bar indicates the lack of a fishery for the species in that region. A high score indicates high relative importance of that species in the SSL diet in that region at that season.

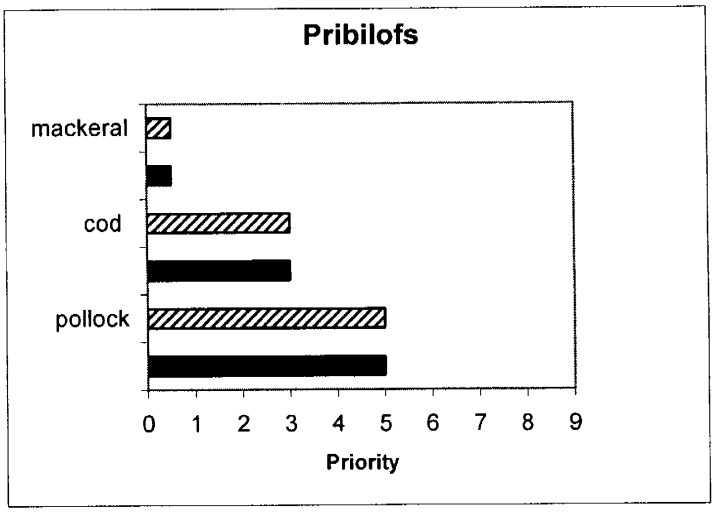

Figure 5 continued.

The repetition of a variable name does not result in inappropriate weights for these elements because different aspects of the variables are considered. For example, the variable name "season" is found in several places of the hierarchy but in one place it refers to the seasonal occupation of the SSL sites, in another the relative importance of a diet element, and in another the timing of a fishery.

To facilitate the evaluation of proposals, the lowest levels of the hierarchy were transferred to the Data Grid format (see example in Appendix E). The Data Grid is a recommended format for evaluating large numbers of alternatives (proposals) with respect to each variable in the next highest level in the hierarchy.

OTHER VARIABLES

The SSLMC considered possible variables that do not apply to evaluating impacts; that is, those variables that may offer a benefit, or a "credit". One such variable discussed was whether a fishery was rationalized. A rationalized fishery has some capacity to reduce practices that could adversely affect SSL; however the capacity might not always be exercised. The consensus of the SSLMC was not to include the variable, "rationalized fishery", in the model.

Other variables mentioned that do not apply to the impacts model are proposals that seek to increase safety or economic benefits, and proposals to improve administrative or management efficiency. These benefits can be listed during the proposal screening process and examined after the impact evaluation is completed.

IMPLEMENTATION OF THE EVALUATION TOOL

The metric against which rated proposals will be measured was debated by the SSLMC. Questions such as these arose, "How will proposals compare to the jeopardy bar?", and "Can we compare proposals to the status quo?" One approach suggested was to run proposed regulation changes through the model and obtain its score; then run the current

regulatory situation through the model to see the net effect of the proposed change for that specific proposal.

As an example, the following three scenarios were run through the model and scores were obtained for the proposed change, and each proposal's current regulatory situation. Each scenario's scores add to 1, because the proposed change is being compared to its own current regulatory situation. A lower score is better. So, for example, if the proposed change scored 0.4 and the current regulatory situation scored 0.6, that means that the proposed change would have less of an impact on the SSL than the current regulatory situation.

Scenario # 1

Proposed regulatory change:

"Change the seasonal apportionments for the longline catcher/processor Pacific cod fishery in the BSAI from 60/40 A/B season to 80/20 in the A/B season. The amount of harvest from the increase in A season fishing would be restricted to areas outside SSL critical habitat (outside 20nm and outside foraging areas)."

Interpretation: The region mostly affected is the EAI (because this area contains the eastern Bering Sea). The change will mostly entail shifting fishing from summer to winter, and additional A season fishing will be outside the 20+nm zone, around "other" sites. The TAC/biomass ratio is about "5" and will not likely change. Fishing is prolonged.

Variables : TAC/biomass of 5, prolonged, winter, EAI, Pacific cod, other site, 20+nm.

Current regulatory situation:

Fishing occurs at about a TAC/biomass ratio of 6, is prolonged, occurs mostly in summer, in the EAI, in the 10-20nm zone, and affects about 26-50% of rookeries in the region.

Variables: TAC/biomass of 6, prolonged, summer, EAI, Pacific cod, rookery site, 10-20nm, 26-50% sites affected.

	TAC/biomass ratio, prolonged	Season/EAI/cod	Season/SSL site type/ proximity/ % affected	Totals
Proposed	.008[a] (.448)[b]	.002 (.505)	0 (.001)	.010 (.371)
Current	.010 (.552)	.002 (.495)	.005 (.999)	.017 (.629)

[a] Score is approximate to additive weights in Treeview, where rounding errors at the thousandth decimal place may result in slight deviations between the example and the model software result.

[b] Score in parentheses is relative to the pair (proposed and current regulatory changes).

Scenario # 2

Proposed regulatory change:

"Relax pollock trawl fishing closures around rookeries and haulouts in the western GOA area 620 between 155 degrees and 150 degrees 30 minutes. Allow pollock trawl fishing between 10 and 20 nm around those sites during the A and B seasons only."

Interpretation: The region affected is the WGOA. The TAC/ biomass ratio is about "7" and fishing is prolonged. There are 4 haulouts & 2 rookeries affected & the proposal affects 26-50% of all sites in Area 620. The proposal seeks to allow fishing in the 10-20nm zone, in both winter and summer. **Variables:** TAC/biomass of 7, prolonged, WGOA, pollock, 26-50% of sites affected in the region, at 10-20nm, both winter and summer, for both haulouts and rookeries.

Current regulatory situation:

"Fishing for pollock occurs in the WGOA at about a TAC/biomass ratio of 7, is prolonged, occurs year round, but is only allowed outside 20 nm."

Variables: TAC/biomass of 7, prolonged, WGOA, pollock, 20+nm, both winter and summer, for both haulouts and rookeries.

Because this proposal spans SSL sites and season, the least and most impacts will be examined.

	TAC/biomass ratio, prolonged	Season/ WGOA/ pollock	Season/SSL site type/ proximity/ % affected	Totals
Proposed-least impact (summer, haulout)	.010[a] (.500)[b]	.003 (.500)	.002 (.999)	.015 (.536)
Current-least impact	.010 (.500)	.003 (.500)	0 (.001)	.013 (.464)
Proposed-most impact (winter, rookery)	.010 (.500)	.004 (.500)	.005 (.999)	.019 (.576)
Current-most impact	.010 (.500)	.004 (.500)	0 (.001)	.014 (.424)

[a] Score is approximate to additive weights in Treeview, where rounding errors at the thousandth decimal place may result in slight deviations between the example and the model software result.

[b] Score in parentheses is relative to the pair (proposed and current regulatory changes).

Scenario # 3

Proposed regulatory change:

"New science shows that pollock are important in the SSL diets and therefore some of the haulouts where SSL occur should have protection by shifting pollock trawling further offshore. Therefore, close to pollock trawl fishing all haulouts on the Pribilofs from 0-10 nm winter."

Interpretation: The TAC/biomass is about 3, and prolonged. This change would affect 100% of haulouts. It would affect winter.

Variables: TAC/biomass of 3, prolonged, Pribilofs, winter, pollock, would allow fishing 10-20nm, 100% of haulouts.

Current regulatory situation:

Currently there are closures at Pribilof haulouts only from 0-3 nm.

Variables: TAC/biomass of 3, prolonged, Pribilofs, winter, pollock, allows fishing in 3-10nm, 100% of haulouts.

	TAC/biomass ratio, prolonged	Winter/Pribs/pollock	Winter/ haulout/ proximity/ 100% affected	Totals
Proposed	.007[a] (.500)[b]	.002 (.500)	.003 (.292)	.012 (.423)
Current	.007 (.500)	.002 (.500)	.007 (.708)	.016 (.572)

[a] Score is approximate to additive weights in Treeview, where rounding errors at the thousandth decimal place may result in slight deviations between the example and the model software result.

[b] Score in parentheses is relative to the pair (proposed and current regulatory changes).

Of the three scenarios, it is predicted that only #2 could result in greater impact to the SSL. Scenarios #1 and 3 could remove some level of existing impact to the SSL.

The evaluation tool can be used to not only compare a proposed regulatory change to its own current regulatory situation, but to compare ratings among a set of proposed regulatory changes, such as in the following example:

Proposal	Rating
Proposal A	0.553
Proposal B	0.369
Proposal C	0.347
Proposal D	0.225

The SSLMC can examine a suite of proposed regulatory changes, as well as individual proposals. The SSLMC agreed that additional discussion will be required to develop a process for using the model to rate proposals. The SSLMC also needs to decide on a process for selecting a set of proposals that will be the least likely to hamper recovery of the SSL. That work will commence following review and advice from the SSC.

ADDENDUM- REVIEW COMMENTS FROM THE SSLMC

A draft of the report was reviewed by the SSLMC August 3-8, 2006. Comments were received from several committee members (comments received in emails are found in Appendix F). Some comments were editorial or requested clarifications, and this draft report reflects those changes. Other comments included questions on the application of an evaluation tool to specific proposals or concerns with how a proposal is analyzed using the model. These issues will be discussed at the next SSLMC meeting, but are summarized below so that those who read this report will know of the kinds of issues the SSLMC will likely work on during the next iteration of this model. A summary of these questions and concerns follows:

- The model currently is not structured for fine scale changes to fishing regulations. For example, if a proposal is to move a small percentage of a fishery TAC from one season to another, it seems that the model needs to be able to differentiate between magnitudes of the TAC removed – i.e. what are the relative effects on model outcome of moving 1%, or 2% or 3-5%, etc. of the TAC? The same can be said for portions of a season affected – e.g. days or weeks? HOWEVER, while the model could be structured to deal with finer changes to fishing regulations, one committee member wondered, "...at what level of change (1%, 10%, 90%) would anyone be able to differentiate potential impacts?"

- The model will use a ratio of TAC to biomass for each region for each fishery (to be supplied by the NMFS-AFSC). The SSLMC has not reviewed these data nor seen the table of ratios; these data were only very recently developed.

- Some believe the model could better reflect the relative effects of removals of target species in an area with high diversity of prey species to the effects of such removals in areas of low diversity of prey species. A similar concern relates to removals of target species in areas where the magnitudes of prey species (whether diverse or less so) are relatively high.

- The definitions of pulsed and prolonged fisheries should be revisited. How do fisheries that extend for long periods of time, but harvest at slow rates, compare with fisheries that occur for short periods of time, and also harvest at slow rates.

- The term status quo was largely edited from this report. But the concept of how proposals will be judged may require additional discussion. At present, the concept the SSLMC discussed was to run a proposal through the model, and then run only the changes from how that fishery is currently prosecuted through the model, to obtain a net effect. There also are questions on how to judge effects of multiple proposals on the overall fishery management process – i.e. the cumulative effects.

- Benefits (or "credits") that are not related to SSLs or their prey may accrue from some proposals. These may include economic benefits, community or other social improvements, improvements to fishing safety, streamlined fishery management, and others. The SSLMC recognized that the "impacts" evaluation

tool does not incorporate benefits. Benefits will be addressed by the SSLMC outside the process of applying the evaluation tool. Ultimately it is recognized that the NPFMC weighs all aspects of a proposal as it provides recommendations and makes decisions on new fishery management measures.

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Appendix A. Participants involved in the development of the evaluation tool, Seattle, July 25-27, 2006.

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Rapporteur	Bill Wilson	907 271-2809	bill.Wilson@noaa.gov

Appendix B. TAC/Biomass ratio estimates for pollock, Pacific cod, and Atka mackerel in seven subareas for the year 2008.

Species	Area	Ratio for 2008
Pollock	Eastern GOA	0.08
Pollock	Central GOA	0.08
Pollock	Western GOA	0.08
Pollock	Pribilof Islands	0.12
Pollock	Eastern AI	0.15
Pollock	Central AI	0.15
Pollock	Western AI	0.15
Pacific cod	Eastern GOA	0.07
Pacific cod	Central GOA	0.07
Pacific cod	Western GOA	0.07
Pacific cod	Pribilof Islands	0.10
Pacific cod	Eastern AI	0.10
Pacific cod	Central AI	0.10
Pacific cod	Western AI	0.10
Atka mackerel	Eastern GOA	n/a
Atka mackerel	Central GOA	n/a
Atka mackerel	Western GOA	n/a
Atka mackerel	Pribilof Islands	n/a
Atka mackerel	Eastern AI	0.14
Atka mackerel	Central AI	0.14
Atka mackerel	Western AI	0.14

Appendix C. Handouts given at the July meeting (next 5 pages)

Appendix C.

Handouts provided by AFSC during the SSLMC meeting:

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.

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

	Summer			Winter		
Distance	**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.

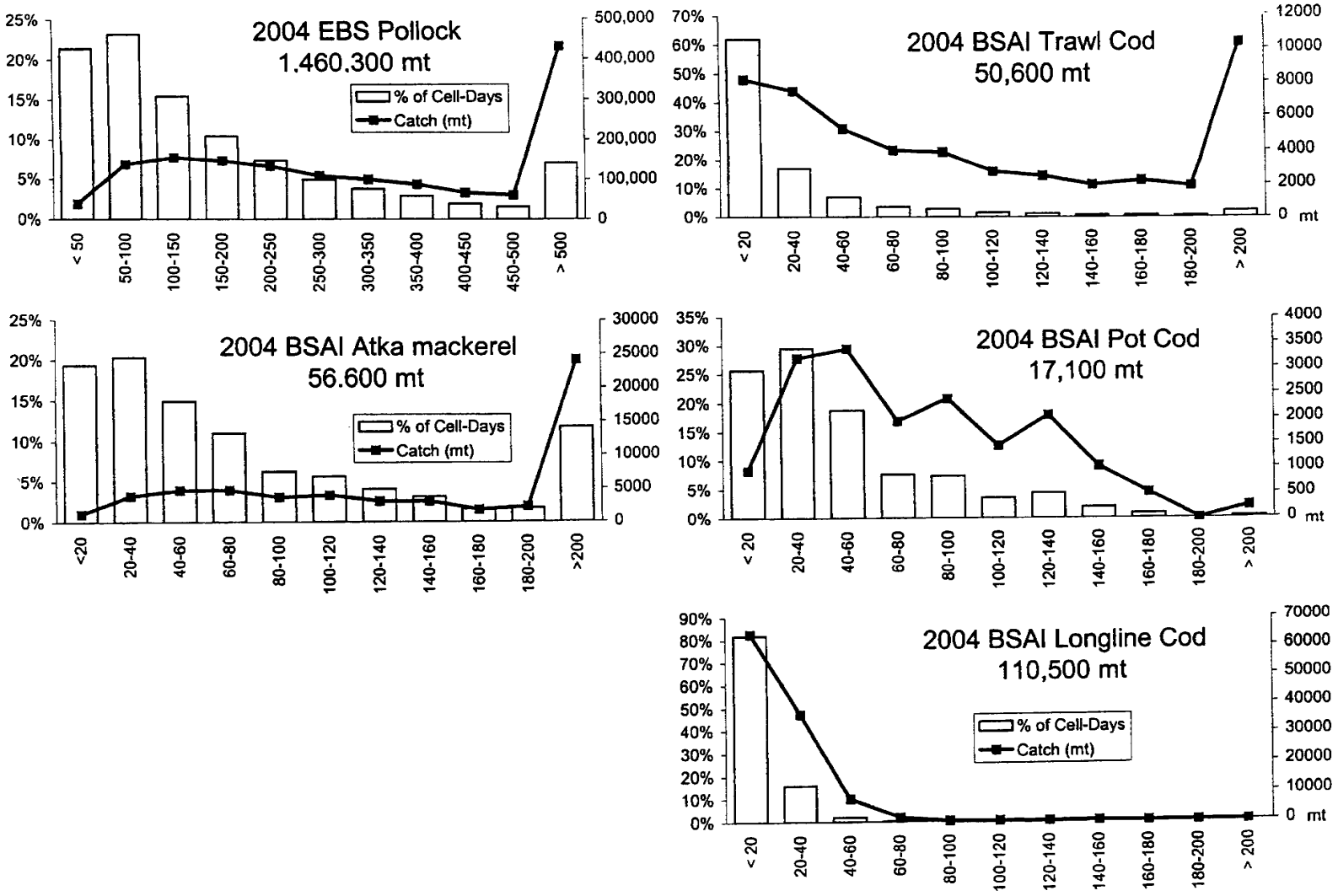
	Level of concern	Summer (Apr-Sept)	Winter (Oct-Mar)
Zone	2001 BiOp	>10 months (n=4,816)	>10 months (n=1,990)
Inside CH			
0-10 nm	High	78.4%	88.9%
10-20 nm	Low to moderate	8.7%	8.9%
>20 nm	Low	0.9%	0.3%
Outside CH	Low	11.9%	1.9%

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

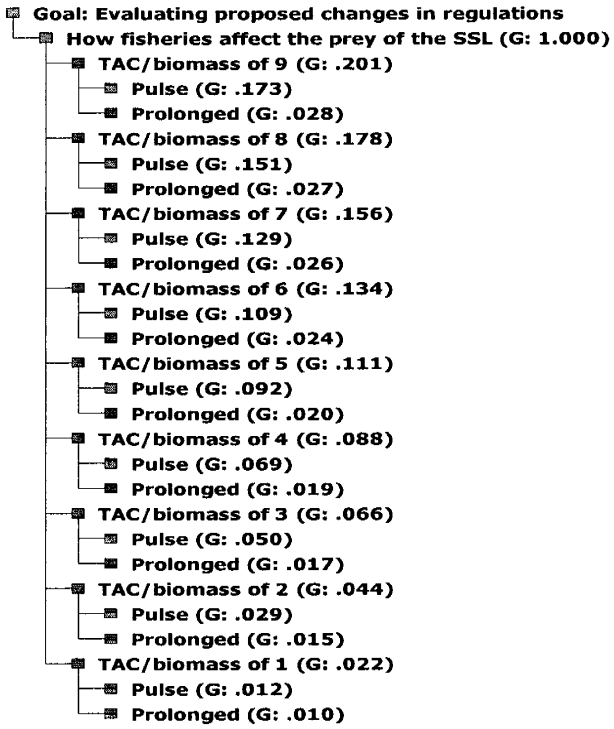


Binned Range of Groundfish Catch (mt) by Target Fisheries only in 100 km^2 grid cells per day

Appendix D. Treeview of the structurally adjusted hierarchy

Model Name: SSL old prey

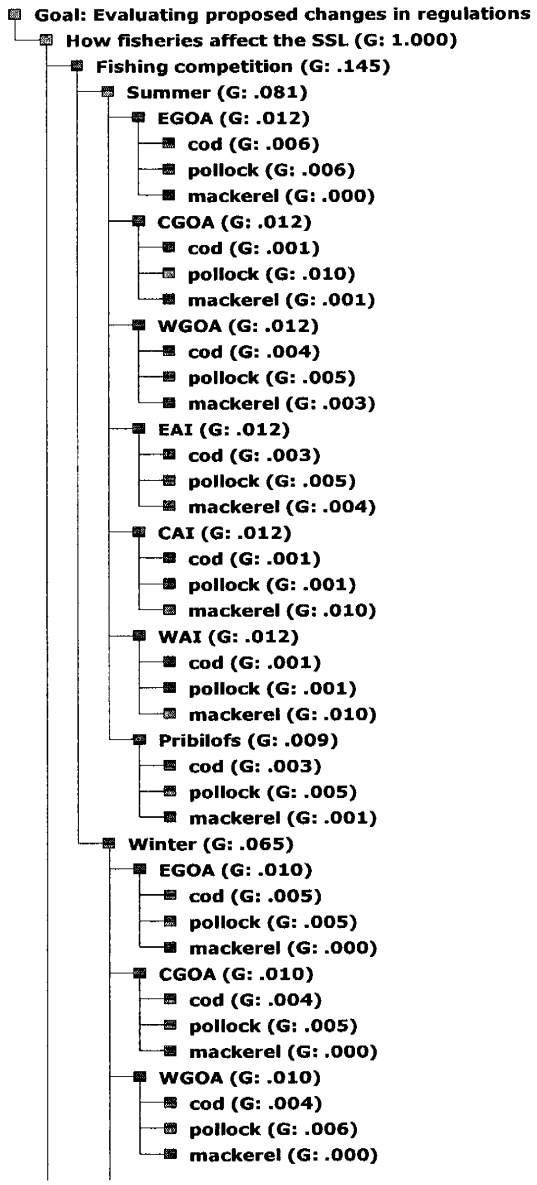
Treeview



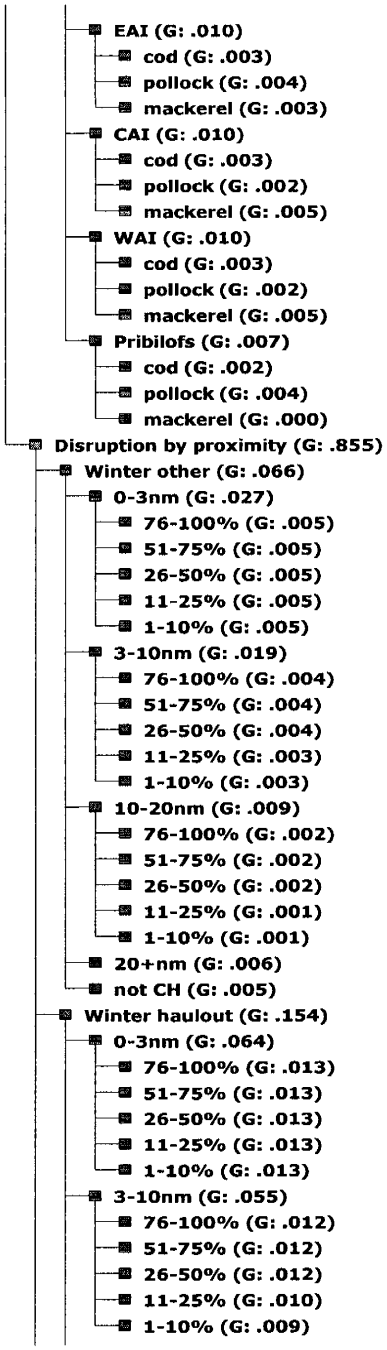
Peggy Merritt

Model Name: SSL old SSL

Treeview



Peggy Merritt



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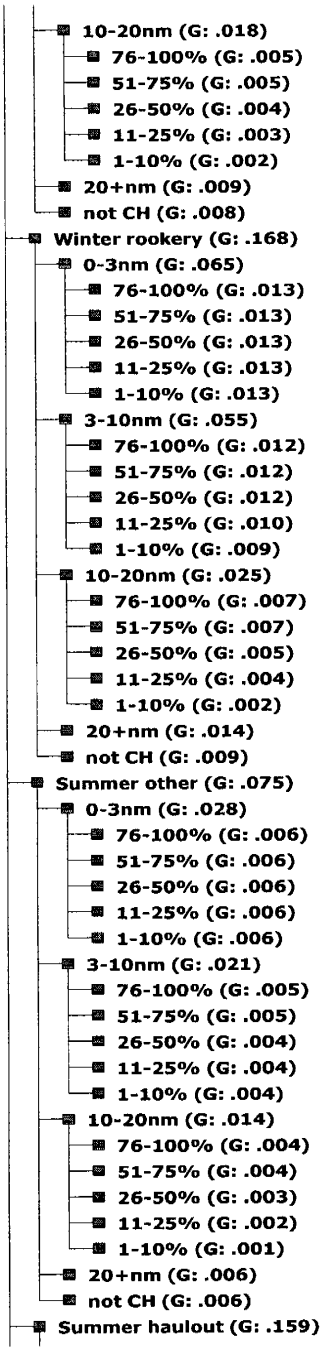

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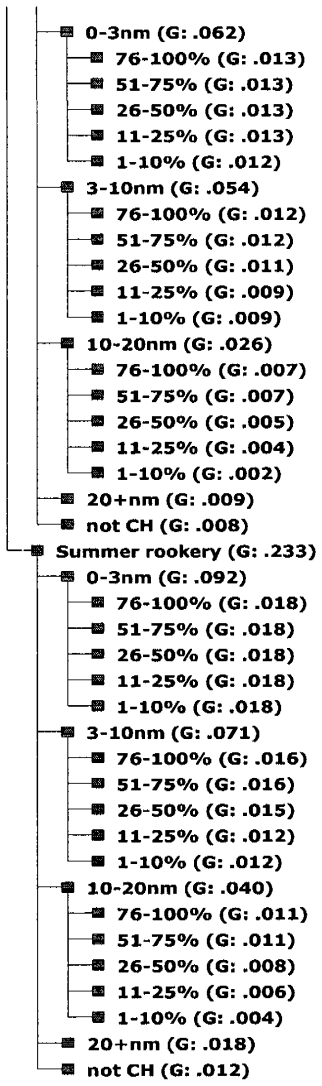

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Appendix E. Data grid example

Model Name: SSL old prey

Data Grid

	Distributive		RATINGS	RATINGS	RATINGS
AID	Alternative	Total	How fisheries affect the prey TAC/ biomass of 9 (G: .201)	How fisheries affect the prey TAC/ biomass of 8 (G: .178)	How fisheries affect the prey TAC/ biomass of 7 (G: .156)
A1	Proposal 1	.533		pulse	
A2	Proposal 2	.467			prolonged

Peggy Merritt

Appendix F. Review comments received in emails from SSLMC members

Subject: RE: SSLMC proposal ranking tool report
Date: Tue, 8 Aug 2006 23:25:32 -0700
From: "John Gauvin" <gauvin@seanet.com>
To: "Art Nelson" <artnelson49@yahoo.com>, "Bill Wilson" <Bill.Wilson@noaa.gov>, "Dan Hennen" <danielhennen@alaskasealife.org>, "Dave Little" <dlittle@clipperseafoods.com>, "Douglas Demaster" <Douglas.Demaster@noaa.gov>, "Earl Krygier" <Earl_Krygier@fishgame.state.ak.us>, "Ed Dersham" <outlook@ptialaska.net>, "Jerry Bongen" <jbongen@mac.com>, "John Henderschedt" <johnh@prempac.com>, "Julie Bonney" <jbonney@gci.net>, "Kevin Duffy" <kduffy@atsea.org>, "Kristin R. Mabry" <Kristin.Mabry@noaa.gov>, "Larry Cotter" <lcotter@apicda.com>, "Lowell. Fritz@noaa. gov" <Lowell.Fritz@noaa.gov>, "Max Malavansky Jr." <max_malavan@hotmail.com>, "Sam Cotten" <resourceanalyst@aleutianseast.org>, "Sue Hills" <shills@ims.uaf.edu>, "Terry Leitzell" <TerryL@icicleseafoods.com>, <smaclean@TNC.ORG>
CC: "Peggy Merritt" <pmerritt@ak.net>

Sorry it has taken me so long to put these comments together. Because I missed a considerable portion of the meeting, I may have misconstrued some of the components and workings of the model. Hope these are useful to the committee work and process. JRG

Attached are my comments. I found myself agreeing with Terry, Dan Hennen, and now Stgeve Maclean. n Tue, 8 Aug 2006 14:00:32 -0800, Steve MacLean wrote
> First, I apologize for the delay in my comments, I hope there is still time for them to be useful.
>
> I, too, agree with most of the comments so far raised. I think Sue hit the nail on the head when she stated " the whole logical construction is based on the primary assumption that fishing affects SSL negatively, which may or may not be true." I think that needs to be stated at the beginning, regardless of whether we all agree with the assumption or not. We are unlikely to come to consensus on that assumption, but that is the reason we're all here.
>
> Regarding John's comment re: Scenario #1, I wonder at what level of change (1%, 10%, 90%) would anyone be able to differentiate potential impacts. The model, as Dan pointed out, serves to compare proposals to current situations, rather than comparing proposals to each other. We would, presumably, have to rely on our best judgment when comparing two proposals. The model would, in my mind, only serve as one of the criteria by which proposals were considered, not the answer. With this in mind, I agree strongly with Dan's suggestion that any sort of qualitative comparison between potential impacts between proposals and status quo (the *not much* on p 18) should be removed, and not included in future drafts.
>
> In all, I consider this a reasonable first draft that will be much improved in future iterations.
>
> Best regards,
> Steve

> -----Original Message-----
> **From:** John Henderschedt [mailto:johnh@prempac.com]
> **Sent:** Tuesday, August 08, 2006 9:16 AM
> **To:** Daniel Hennen; Bill Wilson; Jerry Bongen; Julie Bonney; Sam Cotten; Larry Cotter; Ed Dersham; Earl Krygier; Kevin Duffy; John Gauvin; Sue Hills; Frank Kelty; Terry Leitzell; Dave Little; Steve MacLean; Max Malavansky, Jr.; Art Nelson; Kristin R. Mabry; Douglas Demaster; Lowell Fritz
> **Cc:** Peggy Merritt
> **Subject:** RE: SSLMC proposal ranking tool report
>
>
> I agree with the comments presented thus far and would like to expand on Dan's comments in

1. I agree with all of Terry Leitzell's comments on characterization of the SSL committee's mission in developing the model to evaluate effects of changes relative to the current SSL protection measures. I would prefer that the language about assumptions and "buy in" in terms of fisheries affecting SSL be dropped. As was clear during the SSL committee meeting, not all committee members agree with the assumptions about effects of fishing on SSL. We have all agreed, however, to help develop the model to look at the effects of adjusting the SSL protection measures based on the parameters of the ESA regulation box we find ourselves in at this time.
2. I want to echo Terry's concerns on the model's inability to deal with partial changes in factors affecting SSL. The model run for scenario involves a 20 % shift of fishing from summer to winter. Winter has one effect weighting and summer another. The shift in the Scenario 1 example is for a 20% shift in fishing from one season to another. It seems that the model gives all the weight to the lower impact season instead of a proportional change.
3. The Report correctly points out that many on the committee were uncomfortable with gear type ranking in the model in terms of effects on SSL. We strongly preferred that catch in a given fishery/gear type be considered in the context of removals relative to how much fish is there (hence how much is left in the water). I certainly don't pretend to understand the TAC/Biomass factor that is used as a proxy in the example model runs. Maybe it was sent out but I don't have the Appendix B that presumably would explain the methods NMFS used or at least the data. In any case, I think that the concept of a proxy here is OK as long as it does not penalize fisheries where the TAC is already apportioned by sub-area (e.g. GOA cod, AI mackerel). Fisheries where the TAC is already apportioned by area are examples where managers have already taken a big step to avoid high localized exploitation rates. So TAC to biomass ration scores for these fisheries should be lower (better) in terms of potential impacts on SSL. Also, it stands to reason that fisheries such as BS pollock and AI Atka mackerel where the TAC is set as a fraction of ABC should also get lower (better) scores in terms of effects on SSL. I would of course prefer a real estimate of the fraction of removal relative to what is in a given localized fishing area. If we need to use a proxy, the TAC to biomass ratio, if would be good to explain the methods for coming up with how the proxy works.
4. The methods for ranking "pulse" versus "prolonged" fisheries need to be explained and need to be consistently applied. The model run for shifting the longline CP cod season from 60 percent in the first half of the year to 80 percent gets a "prolonged" rating in terms of effect of the proposal. I'm trying but I can't understand why this is the case. Longline catch rates may are lower and slower relative to the BS pollock fishery for sure. But a shift of more longline cod to A season would be unlikely to "prolong" the CP cod fishery relative to its status quo. CPUE in the winter for longline cod fishing would likely be higher and the catch per day would increase (that's why they want to fish more in winter, same for the other cod sectors). So what is meant by "prolonged" in the ranking of scenario 1 that considers shifting more LL CP cod to the A season?

5. Dan Hennen's email of comments on the model asks about the meaning of the status quo for a given proposal. This is an interesting issue. At first I assumed that each proposal would be rated compared to the status quo overall (all existing protections, essentially *ceteris paribus*). That would give the amount of effect that the proposal would be expected to create holding everything else constant. But Dan correctly points out that there is no status quo for a given proposal and if we are not careful here, we will assume that a large number of small tweaks to the existing measures equal a small tweak. I think that the cumulative effects of all the adjustments to the regulations need to be compared cumulatively to status quo. If not, then if we use this tool for deciding which proposal to recommend which proposals should move forward, then first proposal that is considered will raise the bar for the next one even if the second proposal created no more (or even less) individual effect than the first.
6. I share Dan's concerns about the black box effect of the "structural adjust" part of the model. The effects of repetition of variables on the model outcomes are still unknown in terms of the mechanics of the model. The incorporation of somewhat redundant variables (here I mean the variables in terms of factors affecting the "mothers") such as distance that fishing occurs from sites is hard to understand. Dan points out that the scoring is not consistent for the simple additive ranking he did- so the "structural adjust" must be affecting the repetitive lays or a given factor. I thought the use of this model was to get away from arbitrary ranking of weights and factors and so we need to know and understand exactly how these multiple layers of the same factors are handled by the model.
7. The report on the committee's development of the weights for "prey species" states that prey items other than mackerel, cod, and pollock were taken into consideration in the explicit rankings by SSL committee members. The report states: "Members of the SSLMC did not assign any species/region combination a score of "9" because the SSL diet is diverse and not wholly comprised of Pacific cod, pollock or Atka mackerel, but rather a combination of prey items. Other species observed in high diet proportions include Irish lords, salmon, and cephalopods. Thus, a fishery that harvested Pacific cod, pollock or Atka mackerel would still leave unharvested many other SSL prey items". Here's my beef with this statement. While the committee did not assign any rankings of 9, it did not seem to consistently take the multitude of species in the diet (based on scat data) into consideration. For instance, Atka mackerel in Central and Western AI received the same rankings for winter and summer when the scat data shows a multitude of these "non-SSL critical" fish species. Yet the rankings of the Central AI mackerel are essentially the same as for Western AI mackerel when the SSL diet data for Central AI shows a huge dependence of fish other than pollock, cod , and Atka mackerel. Also, the ranking of AI pollock really could have been lower based on variety of non-pollock, cod, and Atka mackerel species in the diet of SSL. So it might be OK to state that we recognized the other species by not assigning any scores of nine, I think we didn't really fully take the role of these other species into consideration.

Subject: RE: SSLMC proposal ranking tool report
Date: Tue, 8 Aug 2006 10:15:53 -0700
From: "John Henderschedt" <johnh@prempac.com>
To: "Daniel Hennen" <danielhennen@alaskasealife.org>, "Bill Wilson" <bill.wilson@noaa.gov>, "Jerry Bongen" <jbongen@mac.com>, "Julie Bonney" <jbonney@gci.net>, "Sam Cotten" <samc.er@gci.net>, "Larry Cotter" <LCotter371@aol.com>, "Ed Dersham" <outlook@ptialaska.net>, "Earl Krygier" <Earl_Krygier@fishgame.state.ak.us>, "Kevin Duffy" <kduffy@atsea.org>, "John Gauvin" <gauvin@seanet.com>, "Sue Hills" <shills@ims.uaf.edu>, "Frank Kelty" <fvkelty@arctic.net>, "Terry Leitzell" <TerryL@icicleseafoods.com>, "Dave Little" <dlittle@clipperseafoods.com>, "Steve MacLean" <smaclean@tnc.org>, "Max Malavansky, Jr." <max_malavan@hotmail.com>, "Art Nelson" <artnelson49@yahoo.com>, "Kristin R. Mabry" <Kristin.Mabry@noaa.gov>, "Douglas Demaster" <Douglas.Demaster@noaa.gov>, "Lowell Fritz" <lowell.fritz@noaa.gov>
CC: "Peggy Merritt" <pmerritt@ak.net>

I agree with the comments presented thus far and would like to expand on Dan's comments in regard to the model and the results of the three scenarios-

In looking at Scenario #1, it seem that the results are not very instructive unless there were a variable that captures the exact percentage to be moved. A transfer of seasonal apportionment from the CD to the AB season appears to result in a lower impact on sea lions, but I don't think that the model can distinguish between a movement of 1% and a movement of all of the CD quota to AB season. This clearly limits the committee's ability to use the model to compare certain types of proposals, and it also creates the possibility that the model would inappropriately calculate two proposals as "offsetting" when one may have a much more severe change in impact on SSL than the other.

Dan states that "the model doesn't have meaningful units except in terms of judging one proposal relative to others". Given the model's inability to capture "scale", I am less certain that units can be compared across various elements of the "status quo". For instance, the model may be effective at scoring various proposals for the WGOA pollock fishery (the limitation described above notwithstanding), but I am doubtful that, for instance, there is a meaningful relationship between the unit scores for the proposed changes under scenario #2 and scenario #3.

I do not recall nor can I determine from the attached "Treeviews" the the proportional weight of the TAC/biomass Prey score relative to the Effect on Sea Lions score, but I suspect that this may have something to do with the issues that I am raising.

I am not sure of the extent to which these comments are useful in the drafting of the report, but they are, I think, topics for future discussion.

Best regards,

John Henderschedt
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111 West Harrison
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(206) 286-8584

From: Daniel Hennen [mailto:danielhennen@alaskasealife.org]
Sent: Monday, August 07, 2006 11:39 AM
To: Bill Wilson; Jerry Bongen; Julie Bonney; Sam Cotten; Larry Cotter; Ed Dersham; Earl Krygier; Kevin Duffy; John Gauvin; John Henderschedt; Sue Hills; Frank Kelty; Terry Leitzell; Dave Little; Steve MacLean; Max

Subject: RE: SSLMC proposal ranking tool report
Date: Fri, 04 Aug 2006 11:53:39 -0800
From: Earl Krygier <earl_krygier@fishgame.state.ak.us>
To: 'Terry Leitzell' <TerryL@IcicleSeafoods.com>, 'Bill Wilson' <bill.wilson@noaa.gov>, 'Jerry Bongen' <jbongen@mac.com>, 'Julie Bonney' <jbonney@gci.net>, 'Sam Cotten' <samc.er@gci.net>, 'Larry Cotter' <LCotter371@aol.com>, 'Ed Dersham' <outlook@ptialaska.net>, 'Kevin Duffy' <kduffy@atsea.org>, 'John Gauvin' <gauvin@seanet.com>, 'John Henderschedt' <johnh@prempac.com>, 'Dan Hennen' <danielhennen@alaskasealife.org>, 'Sue Hills' <shills@ims.uaf.edu>, 'Frank Kelty' <fvkelty@arctic.net>, 'Dave Little' <dlittle@clipperseafoods.com>, 'Steve MacLean' <smaclean@tnc.org>, '"Max Malavansky, Jr."' <max_malavan@hotmail.com>, 'Art Nelson' <artnelson49@yahoo.com>, '"Kristin R. Mabry"' <Kristin.Mabry@noaa.gov>, 'Douglas Demaster' <Douglas.Demaster@noaa.gov>, 'Lowell Fritz' <lowell.fritz@noaa.gov>
CC: 'Peggy Merritt' <pmerritt@ak.net>

I agree with the concern you provide Terry - but should we not propose wording changes that reflect your concern, rather than dropping? I think we need to provide the context. Here are some suggestions:

For example: Page 1 line 7 "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 to fishery regulations could be gauged to minimize impacts to the SSL." And Page 2: line 7: "... Rather, the evaluation tool is predicated on the assumption that the activity of fishing had, and may continue to have a relationship with SSL abundance."

Thus we could modify "Work proceeded with the assumption that there is a relationship between prey and the nutritional balance of the SSL." to "Work proceeded with the assumption that the SSLMC would need to evaluate proposals in the context of the existing restrictions developed in the current BiOp. Providing a balance between potential benefits from existing regulations and proposed changes, while incorporating new information."

"The SSLMC's perception of the problem mirrors primary concerns of the Endangered Species Act, which are the potential for jeopardy or adverse modification through fishing effects on the SSLs and their habitat with changes in the prey field or the ability of the SSLs to acquire food." could say :

"The SSLMC was tasked with considering new proposals that would modify existing regulations that were developed within the context of the current BiOp. These regulations provided spatial and temporal buffers from fishing activity in areas utilized by SSL."

etc...covering other edits to reflect this thought --- eek

-----Original Message-----
From: Terry Leitzell [mailto:TerryL@IcicleSeafoods.com]
Sent: Friday, August 04, 2006 8:48 AM
To: Bill Wilson; Jerry Bongen; Julie Bonney; Sam Cotten; Larry Cotter; Ed Dersham; Earl Krygier; Kevin Duffy; John Gauvin; John Henderschedt; Dan Hennen; Sue Hills; Frank Kelty; Dave Little; Steve MacLean; Max Malavansky,

Jr.; Art Nelson; Kristin R. Mabry; Douglas Demaster; Lowell Fritz
Cc: Peggy Merritt; Terry Leitzell
Subject: RE: SSLMC proposal ranking tool report

Bill,

Thanks to you and Peggy for getting this draft out in a timely manner. I am working on it and will try to give thoughtful comments on Monday. However, I am seriously concerned with statements on pp. 4 & 5 and wanted to relay my concerns immediately.

The second paragraph under "Mission" on p. 4 and the last paragraph on page 4 state an SSLMC "assumption" and "perception" that I believe are incorrect-the statements do not reflect my views. The SSLMC has been tasked by the Council to receive and review proposals for changes in fishery management measures, and to make recommendations to the Council. I do not assume that there is a relationship between prey and "nutritional balance"-I don't know if that is even a relevant assumption today since many believe that nutritional stress is not a current problem. I also disagree that the ESA's primary concern is fishing effects on SSLs and their habitat by changes in the prey field or the ability of SSLs to acquire food. My "perception of the problem" certainly doesn't mirror that ESA view. My concerns continue on p. 5, (for example, I do not agree with the "assumption" that "fewer fish diminishes the value of the prey field"-last sentence of top paragraph on p. 5).

The SSLMC is working within the context of the current BiOp and will continue its work in the context of the new draft BiOp in the fall. That does not mean that the committee or individual members believe that the primary ESA issue is fishing effects on the SSL prey field. We have been asked to evaluate proposals dealing with fishery restrictions because those restrictions exist.

I recommend that great care be taken in the narrative regarding SSLs and the issues the Committee is addressing. A description of the Council's charge to the Committee should be included, perhaps verbatim. I recommend that all Committee "assumptions" and "perceptions" be dropped from the narrative, since I don't believe they are necessary to the task.

Terry

Terry L. Leitzell

General Counsel

Icicle Seafoods, Inc.

Subject: RE: SSLMC proposal ranking tool report
Date: Mon, 7 Aug 2006 15:22:34 -0700
From: "Terry Leitzell" <TerryL@IcicleSeafoods.com>
To: "Bill Wilson" <bill.wilson@noaa.gov>, "Jerry Bongen" <jbongen@mac.com>, "Julie Bonney" <jbonney@gci.net>, "Sam Cotten" <samc.er@gci.net>, "Larry Cotter" <LCotter371@aol.com>, "Ed Dersham" <outlook@ptialaska.net>, "Earl Krygier" <Earl_Krygier@fishgame.state.ak.us>, "Kevin Duffy" <kduffy@atsea.org>, "John Gauvin" <gauvin@seanet.com>, "John Henderschedt" <johnh@prempac.com>, "Dan Hennen" <danielhennen@alaskasealife.org>, "Sue Hills" <shills@ims.uaf.edu>, "Frank Kelty" <fvkelty@arctic.net>, "Dave Little" <dlittle@clipperseafoods.com>, "Steve MacLean" <smaclean@tnc.org>, "Max Malavansky, Jr." <max_malavan@hotmail.com>, "Art Nelson" <artnelson49@yahoo.com>, "Kristin R. Mabry" <Kristin.Mabry@noaa.gov>, "Douglas Demaster" <Douglas.Demaster@noaa.gov>, "Lowell Fritz" <lowell.fritz@noaa.gov>
CC: "Peggy Merritt" <pmerritt@ak.net>, "Terry Leitzell" <TerryL@IcicleSeafoods.com>

Bill, et al,

I have attached a mark-up of the draft report. My more generic comments follow.

1. Assumptions. The Report states and characterizes several assumptions as being Committee assumptions that were used by Committee members to construct the model. That is certainly not correct for me and I doubt that it is correct for at least some other Committee members. Each of us worked from individual knowledge bases supplemented by the many fine presentations we have heard over the past several meetings. I recommend deleting all assumptions.
2. Treeview--Disruption. The revised structure of the model incorporates the problem of the assumptions by assuming that everything is either fisheries effects on SSLs or fisheries effects on SSL prey. Some SSL needs are not affected by fisheries at all. The original approach of "SSL needs" as one "mother" and fisheries effects on prey as the other made sense. "Disruption by Proximity" is not a significant issue for anyone (at least beyond the fact that the 0-3 mile no transit zones at rookeries are in place, have been in place for many years, and haven't been challenged by industry at all). Assigning a weight of .855 to disruption and .145 to fishing competition is impossible to explain. The previous BiOps have argued that prey competition by fishing is the key issue regarding fisheries and is the source of most of the current regulations. The "disruption" branch is really another segment of the fishing competition branch and brings the five zones and number of affected sites into the equation.
3. Treeview—Prey. Are the three species of concern (pollock, cod, and mackerel) aggregated in this dimension? Will the NMFS Appendix B be species-by-species or aggregated? If aggregated, the impacts of changing the cod or mackerel fisheries will be overwhelmed by pollock since the pollock biomass in several areas is many times the size of the biomass of cod and mackerel combined. I recognize that the three species are separate in the SSL effect dimension, but that does not include the different species values in the TAC/Biomass variable.
4. Figures. Please use the full 1-9 scale of importance in each figure, rather than changing the size of the figure depending on the longest line/highest value.
5. Partial Change Proposals. How does the model accommodate a proposal that includes partial changes? Scenario # 1 demonstrates the question. The proposal is to shift 20% of the cod longline TAC from summer to winter. I am not picking on the specifics of the scenarios, but on the point

that proposals may be at a more detailed level than the model, and that variables are binary (fully on or fully off).

a. Part of the "summer" variable changed to "winter" (20% of the longline TAC), with the remaining 20% staying in the summer. But the model will change the variable from summer to winter entirely, thus giving the proposal more credit than it should.
b. Will the TAC/Biomass variable reflect only longline cod TAC? Or will the entire TAC/Biomass variable change based on the entire cod fishery?

Finally, I recognize that you and Peggy Merritt have a short time period to do revisions and provide a draft to the SSC. I assume that you will not be able to circulate a revision to the Committee before sending it to the SSC—that's fine. But, since it will become a public document at that point, I recommend that you stress in the Introduction (pp.1-2) that this remains a draft by the Committee.

Terry

Terry L. Leitzell

General Counsel

Icicle Seafoods, Inc.

From: Bill Wilson [mailto:bill.wilson@noaa.gov]
Sent: Thursday, August 03, 2006 2:05 PM
To: Jerry Bongen; Julie Bonney; Sam Cotten; Larry Cotter; Ed Dersham; Earl Krygier; Kevin Duffy; John Gauvin; John Henderschedt; Dan Hennen; Sue Hills; Frank Kelty; Terry Leitzell; Dave Little; Steve MacLean; Max Malavansky, Jr.; Art Nelson; Bill Wilson; Kristin R. Mabry; Douglas Demaster; Lowell Fritz
Cc: Peggy Merritt
Subject: SSLMC proposal ranking tool report

Greetings:

Attached is a preliminary draft of the report on the development of the proposal ranking tool the Committee completed about a week ago. This report will go to the SSC for their review and comments at their August 15-16 meeting in Juneau.

Several of the Committee members did not attend last week's meetings and I don't expect you to have comments on this report - but I'm sending it to you so you have a sense of what the Committee accomplished.

Since we need to get this to the SSC as soon as possible, we have only a short period of time in which to

Terry Leitzell

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, 2006

Developed by the

Steller Sea Lion Mitigation Committee

North Pacific Fishery Management Council

August 2006

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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 the Pacific cod, pollock and Atka mackerel fisheries in the Gulf of Alaska and the Bering sea/Aleutian Islands. The SSLMC began work to prepare and develop a tool for evaluating proposals, which was presented to the NPFMC and the SSC in June 2006. The SSLMC were advised to institute a more rigorous approach to identifying potential impacts to the SSL resulting from fishing activity, and how changes in fishery regulations could be gauged to minimize impacts to the SSL. In July 25-27, 2006 SSLMC members and scientific advisors with the National Marine Fisheries Service Alaska Fisheries Science Center (NMFS-AFSC) met in Seattle to begin development of an evaluation tool 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,[1] was used interactively to structure the problem, depict the influence of weights, and derive the priority of elements.

The evaluation tool will undergo several phases of development and review:

1. July 25-27, 2006 the SSLMC develops a prototype evaluation tool, in collaboration with the NMFS-AFSC staff in Seattle;

2. August 4-9, 2006 the SSLMC reviews and comments on a draft report of the prototype evaluation tool;

3. August 15-16, 2006 the SSC reviews and comments on the prototype evaluation tool in Juneau; and,

4. The SSLMC incorporates comments from the SSC in the development of the evaluation tool.

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

The purpose of this report is to describe and present the evaluation tool developed by the SSLMC, in concert with the NMFS-AFSC and public in Seattle, July 25-27, 2006. This report constitutes the first phase in the development of the evaluation tool, and is intended to provide a basis for review and comment from the SSC at their August 15-16, 2006 meeting in Juneau.

Work on the evaluation tool by the SSLMC does not imply that a clear linkage between fish harvest and abundance of SSL is known to exist. Rather, the evaluation tool is predicated on the assumption by NMFS in the current Biological Opinion that the activity of fishing had, and may continue to have a relationship with SSL. The rankings by Committee Members include their assessments of the validity of that assumption. The July 25-27 meeting in Seattle was solely concerned with developing a tool to evaluate impacts; insufficient time and information has been available to the SSLMC to fully develop a tool to evaluate benefits or "credit" in a proposal.

Deleted:

Deleted: fishing has

Deleted: some

METHODS

PARTICIPANTS

A total of 13 SSLMC members participated in developing the evaluation tool (see Appendix A). 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).

STRUCTURING AND ESTABLISHING PRIORITIES

A top-down structuring approach was used, whereby the mission forms the top of the hierarchy and dimensions form the second level of the hierarchy. The mission is a responsibility to fulfill. A dimension is a path along which an impact can be measured. Variables and their sub-units are the set of proposed changes to fishing regulations, and form the starting point for discussing the lower levels of the hierarchy. The group was tasked with discerning how variables associated with fishing would be likely to impact the dimensions of the SSL and their prey.

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 "mother" node - this linked 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 mother 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, followed each such question, to attempt to establish a rationale for each question.

Comment [TL1]: At least for this Committee member, the rationale was frequently not clearly established.

Deleted: so that the rationale for judging importance was clearly established

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, then that of the sub-units within each variable. Participants were given time to think and write their ratings of importance down 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

Comment [TL2]: This scale suffers from the same deficiency as some of the assumptions—that the SSL problem is "fishing" and that the only question is the relative importance of each variable. The use of "strong importance" as the middle variable makes that clear. When the Committee was asked for text definitions of the 1-9 scale for the "TAC/Biomass" variable, the result was "high—high to moderate—moderate—moderate to low—low". Interestingly that text is not in the report on p.8 where that variable is discussed.

Elements judged to be of equal importance were given equal scores. Consensus within a range of two to three points on the rating of elements was usually achieved among participants. When disparity in judging importance occurred, it meant there was disagreement, 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 was 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

Comment [TL3]: I have the same question as Dan Hennen: is this used in the three examples? I don't remember any discussion of this in the committee meeting.

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. While approximate balance is sought and desired, complex problems do not always lend themselves to balance – thus the advantage of the structural adjust feature.

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

RESULTS AND DISCUSSION

MISSION

The mission of the SSLMC is to build upon previous efforts in developing a rational approach to evaluating proposed changes in regulations (relevant to existing mitigation measures) that encompasses relevant and measurable dimensions of the SSL and their prey.

Work proceeded with the assumption supplied by NMFS that there is a relationship between prey availability and the health of the SSL. The Committee was tasked with considering new proposals that would modify existing regulations that had been developed under the current Biological Opinion, while taking account of new information and new research results.

Deleted: nutritional balance

DIMENSIONS ALONG WHICH IMPACTS OF PROPOSED CHANGES ARE EVALUATED

The SSLMC identified two dimensions of the problem:

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

Comment [TL4]: As discussed in my cover e-mail, I thought the two dimensions were "SSL Needs" and "Fisheries". SSL Needs are important to label and identify, partly because some SSL needs are not affected by fisheries at all.

The Prey of the SSL

The SSLMC engaged in lengthy discussions about concepts relating fishing to the prey field, including NMFS' concerns about the availability of prey from dispersal caused by fishing activities. Issues discussed included the response of the prey field to fishing, possible changes in fish schooling behavior, prey switching, and the SSL's ability to capture and consume prey. The question that arises is, "Will prey availability be altered in a manner that affects the SSL?" The NMFS assumption is that more aggregated prey are easier for the SSL to capture, and that removal of fish can result in a reduced number of fish or fish aggregations. The question that arises is, "Will prey be measurably depleted in a manner that affects SSLs?"

Both of the above concerns were ultimately combined by the SSLMC into one dimension because it was thought that realistically there could be little measurable distinction between the two.

The SSL

Much discussion focused on SSL foraging ecology, reproductive behavior and energy balance needs, and potential disruptions from fishing activity. Degree of impacts was related to adult females and weanlings, as these categories of individuals have varying energy balance needs over time, as compared with adult males. Males are able to forage further and more independently because they do not care for young, and do not need to expend energy converting food into maternal milk. There can be degrees of impact to adult females through competition. The assumption is that females have dual roles of maintenance and reproduction. For NMFS, fishing competition with juvenile SSLs that have not yet weaned and are still partly reliant on maternal care is a primary concern. The assumption is that weanlings have smaller body size, lesser diving capability and must balance energy over a shorter period of time than adults.

All concerns were ultimately combined into one dimension because adult females and weanlings overlap in time and space, thus making these components of the problem nearly indistinguishable from an impact point of view.

Judgments of importance between the prey field and the SSL dimensions was based on the degree to which change may cause an impact that may result in an adverse effect on the energy balance of an individual SSL. The geometric mean of all scores resulted in ratings of importance for the dimensions (Figure 1). The spread of scores was between 3-4, on a scale of 1-9, which can be characterized as mild disagreement, occurring within a minority of the SSLMC.

Deleted: The SSLMC's perception of the problem mirrors primary concerns of the Endangered Species Act, which are the potential for jeopardy or adverse modification through fishing effects on the SSLs and their habitat with changes in the prey field or the ability of the SSLs to acquire food. ¶

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Deleted: Dispersal of the prey field through fishing activities may also induce "prey switching".

Deleted: . A second concern is the likelihood of depletion of prey by removal. R

Deleted: The assumption is that fewer fish diminishes the value of the prey field.

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Comment [TL5]: I do not understand what "disruption" means with regard to SSLs. No transit zones at rookeries (0-3 miles) were at least partly to avoid frightening animals on the rookeries, but the major suite of current restrictions have nothing to do with disruption.

Deleted: In addition to the concept of competition, the concept of disruption to the SSL by fishing activity was discussed. The SSLMC intended the term "disruption" to include behavioral and physical aspects.

Deleted: ; and, disruption is an overarching concern, related to several variables, including proximity.

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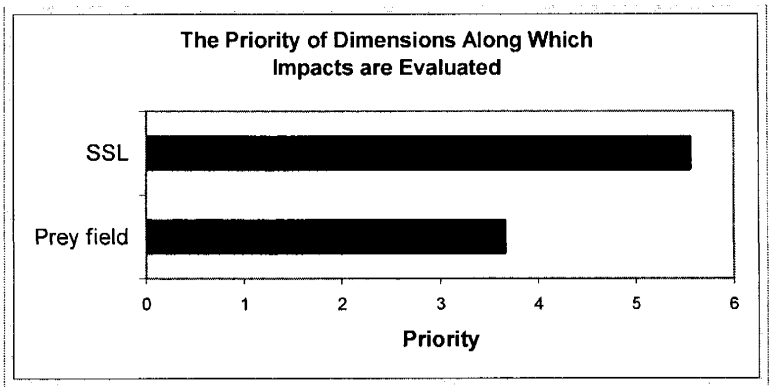
Comment [TL6]: I think that a disagreement of 4 points—for example the difference between "very strong" and "moderate", is hard to characterize as mild.



Comment [TL7]: Please show this and all figures on the full 1-9 scale. For visual people, it is much easier to compare one figure to another if the full scale is printed at the same size.

Figure 1. The priority of SSL and their prey.

VARIABLES

Prior to the meeting, a scoping survey was distributed to a sub-group, to identify variables. The question asked was, "What's on the table for change?" And, "Given the set of variables, what sub-set will be used in the evaluation tool?" At the meeting, the entire SSLMC modified the list. Table 1 lists the variable field identified as useful to the evaluation tool.

Table 1. The potential set of 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. Fish Species of Interest	a. Pacific cod b. Pollock c. Atka mackerel
2. TAC	The TAC is calculated for each fish species of interest, for each region.
3. Fish Biomass	The biomass is estimated for each fish species of interest, for each region
4. Fishing duration	a. Pulse (TAC is taken in 3-10 days) b. Prolonged (TAC is spread out across time)
5. 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
6. Seasons	a. Summer (the SSL breeding season, defined as May-September) b. Winter (non-breeding season, October-April)
7. SSL site types	a. Rookery b. Haulout c. other
8. Proximity zones to a SSL site	a. 0-3 nm b. 3-10 nm c. 10-20 nm d. 20+ nm e. not critical habitat
9. The percentage of SSL sites affected	a. 1-10% b. 11-25% c. 26-50% d. 51-75% e. 76-100%

Explanations of variables used in the hierarchy follow for each dimension.

Variables Applicable to the Prey Dimension

Variables that can potentially impact the prey field dimension are:

- the TAC for a given fish species in a given region,
- estimates of fish biomass in a given region, and
- fishing duration.

The ideal way to evaluate impacts of proposed changes on the prey field would be to know fish biomass at the site in question, understand SSL prey needs at the site, and be able to predict with accuracy the amount and rate of harvest relative to biomass associated with the proposed change. However, this is a data-poor environment in which to make decisions, so judgments must be made on the best available information. While the rationale for a hierarchy of fishing power by gear type was provided in the June 2003 Supplement to the BiOp (page 36), and explained to the SSLMC by NMFS-AFSC staff, the SSLMC concluded that gear type and vessel size are dissatisfactory proxies for removal rate. Concerns for using gear type and vessel size as proxies for removal rate include the lack of consideration for the number of vessels fishing, fisheries occurring on large schools of fish, and agreement between sectors to avoid fishing conflicts.

The SSLMC launched into a lengthy debate on how best to account for fish removal relative to available biomass, and raised the possibility of assigning a rating to a fishery based on the percentage of the TAC taken. Staff from the NMFS-AFSC were asked if exploitation rates could be estimated in areas smaller than a given region? Unfortunately, fish biomass surveys do not provide estimates on a per-site basis; fish biomass per species is estimated on a regional scale. Therefore, the group decided that the best characterization of removal rate, given limited knowledge, is a qualitative assessment of the ratio of the TAC to biomass ratio, per species, on a regional basis. For example, a proposal for a high harvest in an area of low target species abundance would be rated high (more adverse to the SSL). The NMFS-AFSC agreed to provide to the SSLMC a qualitative statement of biomass in each region. Catch to biomass comparisons could be provided by developing a ratio between TAC for a region with the estimated biomass in that region, projected for 2008, from the next stock assessments and SAFE reports. The NMFS-AFSC would use their best judgment to estimate regional biomass for Pacific cod, pollock and Atka mackerel.

Comment [TL8]: The species and regions are not show on the treeview for the TAC/Biomass variables.

Prey removal rate may be complicated by seasonal behavior of fish; for example, pollock aggregate for spawning in winter and a fishery targeting these fish would have an exploitation rate that is high, in part because of the schooling behavior of the fish. Fish migratory behavior could also affect exploitation rate.

The TAC/biomass ratio can be scaled by degrees of impact to the prey field according to Saaty's 1-9 ratio scale in the following manner:

- A high TAC/low biomass ratio is interpreted as having an extreme impact on the prey field, and is given a value of "9".
- A low TAC/high biomass ratio is interpreted as having a slight impact on the prey field, and is given a score of "1".

Between the values of "9" and "1", are gradations (scores of 2-8) that can be used to depict the degree of impact to the prey field. For each proposal, the SSLMC must judge the expected proportion of removal, and score it according to the following guide:

TAC/Biomass per species, per region	**Weight of impact (score)**
High TAC/Low Biomass	9
	8
	7
	6
	5
	4
	3
	2
Low TAC/High Biomass	1

The data supplied by the NMFS-AFSC for this piece of the evaluation tool is found in Appendix B. This data was not available to the Mitigation Committee when it met nor when it reviewed the draft of this report.

Characterization of removal rate must be discussed in relation to the duration of removal – so, the SSLMC engaged in an extended debate about the impacts of "pulsed" (defined as approximately 3-10 days) versus "prolonged" fishing on the prey field (small amounts of fish harvested incrementally over long periods of time). The SSLMC turned to the NMFS-AFSC for data in this regard. There is some research that suggests SSL are most vulnerable to prey field disruptions that are characterized by a high removal rate in a pulsed time frame in a given area (June 2003 Supplement to the BiOp). That is, SSL can probably deal with low food abundance for a few days, but going without food for 3-10 days would be detrimental to the health of the SSL. The concern with pulsed fishing is localized removals of large quantities of available biomass. Ultimately, the majority (90%) of the SSLMC decided that at high removal rates, pulsed fishing has the highest impact; however, at low removal rates the duration of fishing is of slight consequence (Table 2). The spread of scores shows that general agreement (defined as a spread of 0-3) is lacking about the impacts of fishing duration in relation to fishing removal rate on the prey field. The SSLMC intends to continue discussion on this topic upon receipt of better information.

Removal rate and duration was considered in the context of region; however, all regions were assigned equal weight because recovery of the SSL is required in all. The SSLMC also considered removal rate and duration in the context of fish species, but again assigned equal weight to all three species of interest, because all are important in the diet of SSL.

Table 2. Judgments on the degree of impact (group geometric mean) that scenarios of removal rate and duration of fishing have on the SSL prey. A high geometric mean score reflects a highly adverse impact.

TAC/Biomass Score[a]	Duration of Fishery	Geometric Mean Group Score	Spread of Scores
9	Pulsed	8.74	1
	Prolonged	1.43	8
8	Pulsed	8.00	0
	Prolonged	1.41	7
7	Pulsed	6.90	2
	Prolonged	1.40	6
6	Pulsed	6.15	0
	Prolonged	1.38	5
5	Pulsed	5.36	3
	Prolonged	1.16	2
4	Pulsed	4.04	4
	Prolonged	1.12	1
3	Pulsed	3.15	6
	Prolonged	1.06	1
2	Pulsed	2.00	7
	Prolonged	1.06	1
1	Pulsed	1.19	7
	Prolonged	1.06	1

[a] A high TAC/low biomass ratio reflects a high rate of removal, which is deemed as having an adverse effect on the SSL prey field.

Variables Applicable to the SSL Dimension

Variables that can potentially impact the SSL dimension are:

- fishing near a type of SSL site,
- fishing within zones of proximity to the site, in a given season,
- the percentage of SSL sites in a region affected by the proposed change,
- fish species targeted for harvest, and
- fishing within a geographic region, in a given season.

SSL Site Type by Season and Proximity, and the Percentage Affected

The ideal way to evaluate the impacts of proposed changes to fishing regulations on the degree of disturbance to SSL would be to examine the impacts related to the number of SSL per site on a seasonal basis, and the trend in SSL abundance. However, survey counts of SSL are not conducted at every site, occur primarily in summer, and movement of SSL between sites is known to occur; thus, the effects of fishing in winter at a particular site would have little relation to SSL abundance counts that were conducted in summer. Lack of complete knowledge of SSL abundance per site on a seasonal basis and the extent of movement between sites also hampers incorporation of SSL trend information into the evaluation tool. Trends per area are subject to error due to variability in SSL movement between sites, and thus trends are not meaningful on a per-site basis. The NMFS-AFSC staff suggested that incorporation of the concept of the sensitivity of site type and proximity per season into the evaluation tool would serve as the best available proxy to SSL abundance and trend, because data on sites is the better data source.

Comment [TL9]: Again, disturbance is just the wrong term to use. The previous BiOp and the zonal approach have little, if anything, to do with disturbance or disruption. The NMFS concern is with prey availability for SSLs.

The SSLMC discussed the best way in which to incorporate time, and concluded that seasons based on the energy needs of the SSL would be the best characterization. Summer is defined as the breeding season (May-September) and is roughly equivalent to the BC fishing seasons. It is assumed that energy needs are greater for lactating females and other nutritional stresses associated with breeding; thus, summer would be a more important (sensitive) time than winter. Winter is defined as the non-breeding season (October-April) and is roughly equivalent to the DA fishing season.

The NMFS-AFSC staff distributed a table characterizing SSL site types as rookery, haulout or "other", according to usage (Appendix C). The "other" designation is given to sites that are listed under the Endangered Species Act, but do not meet the seasonal criteria for rookery or haulout; SSL can still be present at these sites. Following testimony from the NMFS-AFSC staff regarding site type and importance based on seasonal use, votes were taken on the degree of sensitivity, where a high score represents a site that has great importance in the overall recovery of the SSL and is sensitive to change (Figure 2).

Comment [TL10]: I believe that Appendix C is only the list of rookeries, haulouts, and others and has no diet information.

Deleted: The new telemetry information included SSL diet composition by region and season (Appendix C).

Comment [TL11]: This data was not before the Committee and should not be referenced. In fact, the Agency refused to provide it, saying that it would be in the new draft BiOp.

Deleted: The new telemetry data show that both rookeries and haulouts are used for a longer period of time by a more diverse group of SSL than previously observed.

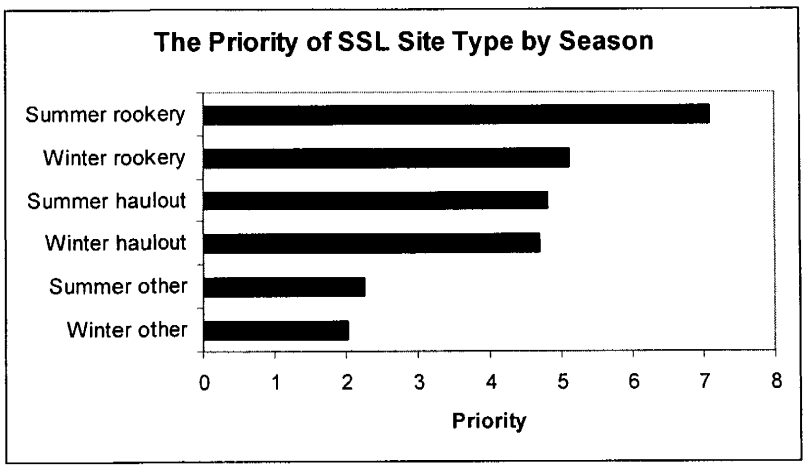


Figure 2. The priority of SSL site types, by season

Thus, a summer rookery is more important and is more sensitive to impact than a winter "other" site because of SSL breeding activity.

The impact of fishing to a site/season combination depends on how close fishing takes place. The NMFS assumption is that fishing in increasing proximity to a SSL site may have increasing effects on the prey field for the SSL. Much work and discussion has previously gone into the "zonal approach" presented in Tables II 1-9, on pg 94 of the June 2003 Supplement to the BiOp. The SSLMC wished to incorporate the concept of the zonal approach into the evaluation tool, and prior ratings of importance were adjusted to reflect the 1-9 rating scales used in the AHP. The SSLMC expanded on the zonal approach by considering sensitivity to proximity in relation to site type and season (Figure 3).

There was agreement (a spread of 0-3) among the group on the sensitivity of the zones per site/season combination. The most important zone is 0-3 nm for all site types by season; the least important zones are the 20+ nm and that area designated as "not critical habitat (CH)". The priority scores assigned by the SSLMC are consistent with those recommended by the NMFS-AFSC. The most critical habitat surrounds rookeries, in the 0-3nm and 3-10 nm zones.

Members of the SSLMC wanted to account for the percentage of SSL sites in a region affected by a proposal, combined with proximity to a site. Consensus was reached to include five categories of site percentages affected, within three proximity zones (Figure 4). The greatest adverse impacts (scored as "9") would occur if the proposal sought to affect from 11-100% of SSL sites in the 0-3 nm zone.

Comment [TL12]: If the Report is going to comment on how many Members voted which way, it should do so for all choices made by the Committee. I recommend deleting all of these comments.

Deleted: The majority of the group voted similarly, with a 4 -5 spread in scores due to only a disagreement from one or two members, depending upon the site/season in question

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Comment [TL13]: Again, data not presented to the Committee should not be included or characterized in the Committee's Report.

Deleted: New juvenile telemetry data (Lowell Fritz, personal communication) supports high sensitivity for the 0-3 nm and 3-10 nm zones. The assumption is that increasing distance of activity from the SSL site reduces disturbance to the SSL.

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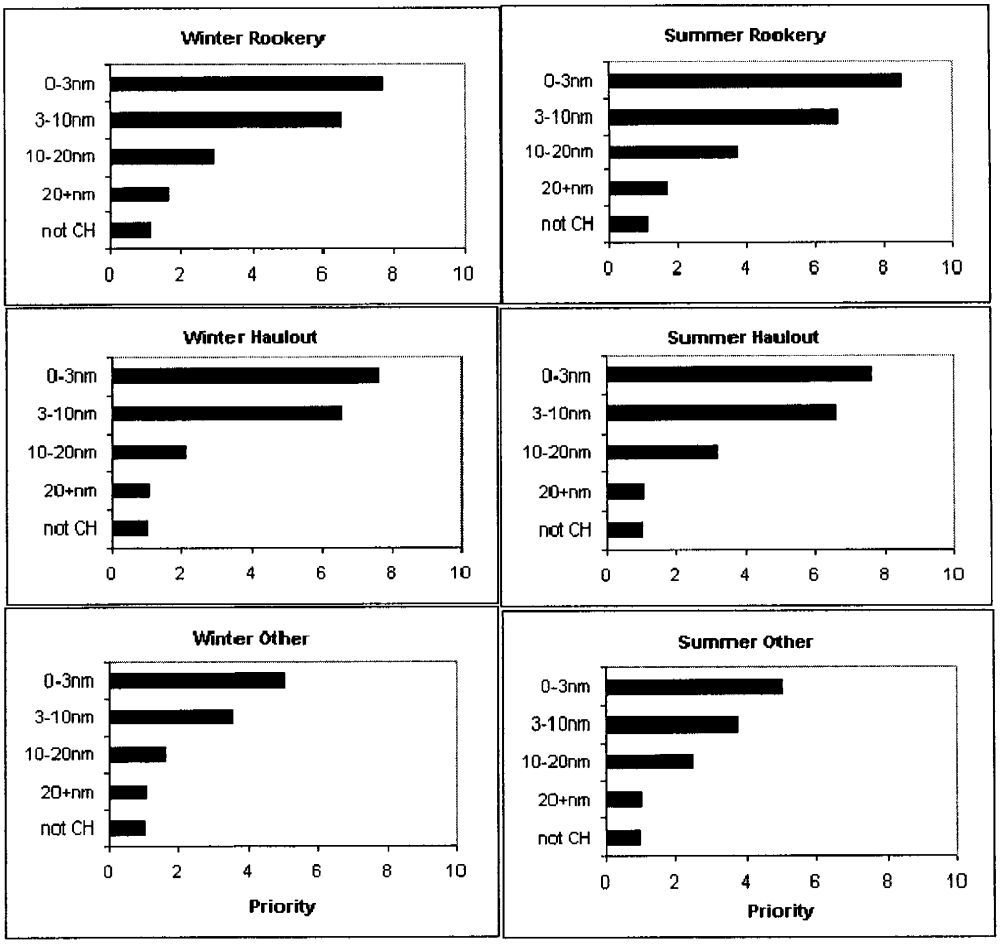

Figure 3. The sensitivity (priority) of a SSL site type to proximity of fishing, by season.

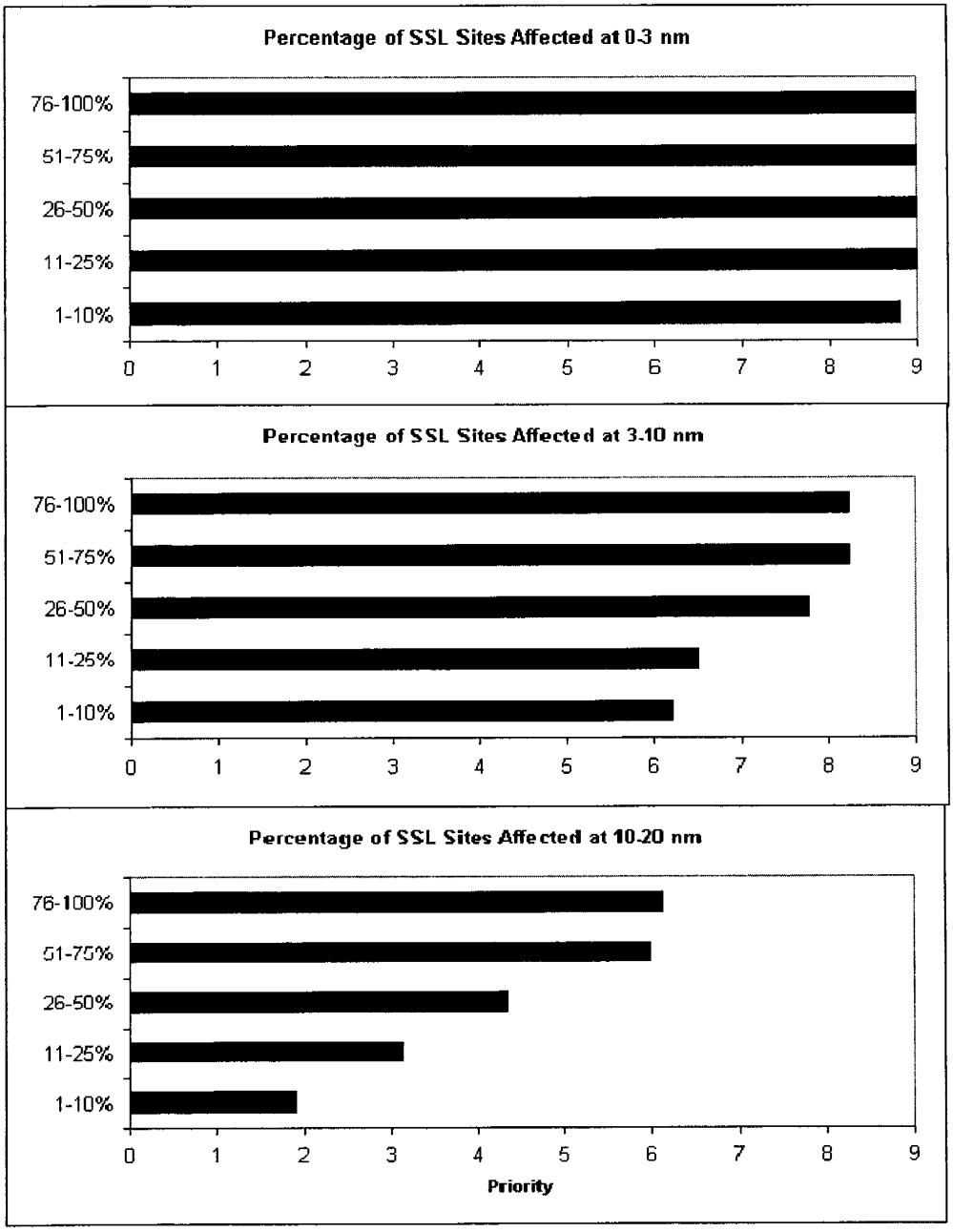

Figure 4. The potential of adverse impact (priority) of a change in fishing, considering percentages of SSL sites affected in a region, and fishing in proximity to the sites.

Fish Species Harvested, by Region and Season

The combination of variables - fish species harvested, in a given geographic region, on a seasonal basis - is a proxy for nutritional needs of the SSL. Fish species of interest are Pacific cod, pollock and Atka mackerel, based on scat research that has defined these species as occurring frequently in the diet (Sinclair and Zeppelin *in review*). Data presented to develop ratings of importance included the most recent SSL food habits data (including Sinclair and Zeppelin 2002). Members of the SSLMC did not assign any species/region combination a score of "9" because the SSL diet is diverse and not wholly comprised of Pacific cod, pollock or Atka mackerel, but rather a combination of prey items. Other species observed in high diet proportions include Irish lords, salmon, and cephalopods. Thus, a fishery that harvested Pacific cod, pollock or Atka mackerel would still leave unharvested many other SSL prey items.

The seven geographic regions are defined in relation to the SSL draft revised recovery plan and include three in the Gulf of Alaska (western, central, eastern), three in the Aleutian Islands (western, central, eastern which includes the Bering Sea), and the Pribilof Islands region. NMFS stated that equal weights of importance (score = 5) must be assigned to each of the Gulf of Alaska and Aleutian Islands regions because the draft recovery plan requires an increasing trend in all regions, so all are considered of equal importance to recovery (although the draft Recovery Play requires an increasing trend in only 5 of 7 Regions for downlisting). (If the criteria in the draft recovery plan change regarding the importance of regions, then the evaluation tool would need to be adjusted to reflect those criteria changes). The Pibilofs were assigned a slightly lesser rating of importance (score = 3.56) because the haulouts are not identified in the recovery plan.

Deleted: The group unanimously assigned

The SSLMC scored the importance of the combination of fish species by region and season (Figure 5). A concern was raised about the relatively high ratings of importance for Pacific cod and pollock removals in the EGOA given the increasing trend in SSL in this region and the general lack of large Pacific cod or pollock fisheries in the region.

OVERALL MODEL

The hierarchy consists of 215 total elements: two dimensions, 11 variables in the third level, 26 variables in the fourth level, 44 variables in the fifth level, and 132 variables in the sixth level (Appendix D). Variables are repeated, so in reality, the hierarchy consists of only 31 unique elements. Variables were repeated in order to provide multiple scenarios, thus allowing flexibility in the scoring process. For example, one scenario could be that a proposal seeks to harvest P. cod in an area with a moderate TAC/biomass ratio of cod over a prolonged time period, in the summer, in the Eastern Gulf of Alaska, in the 10-20nm zone, and affect 1-10% of rookeries in the region.

To facilitate the evaluation of proposals, the lowest levels of the hierarchy were transferred to the Data Grid format (see example in Appendix E). The Data Grid is a recommended format for evaluating large numbers of alternatives (proposals) with respect to each variable in the next highest level in the hierarchy.

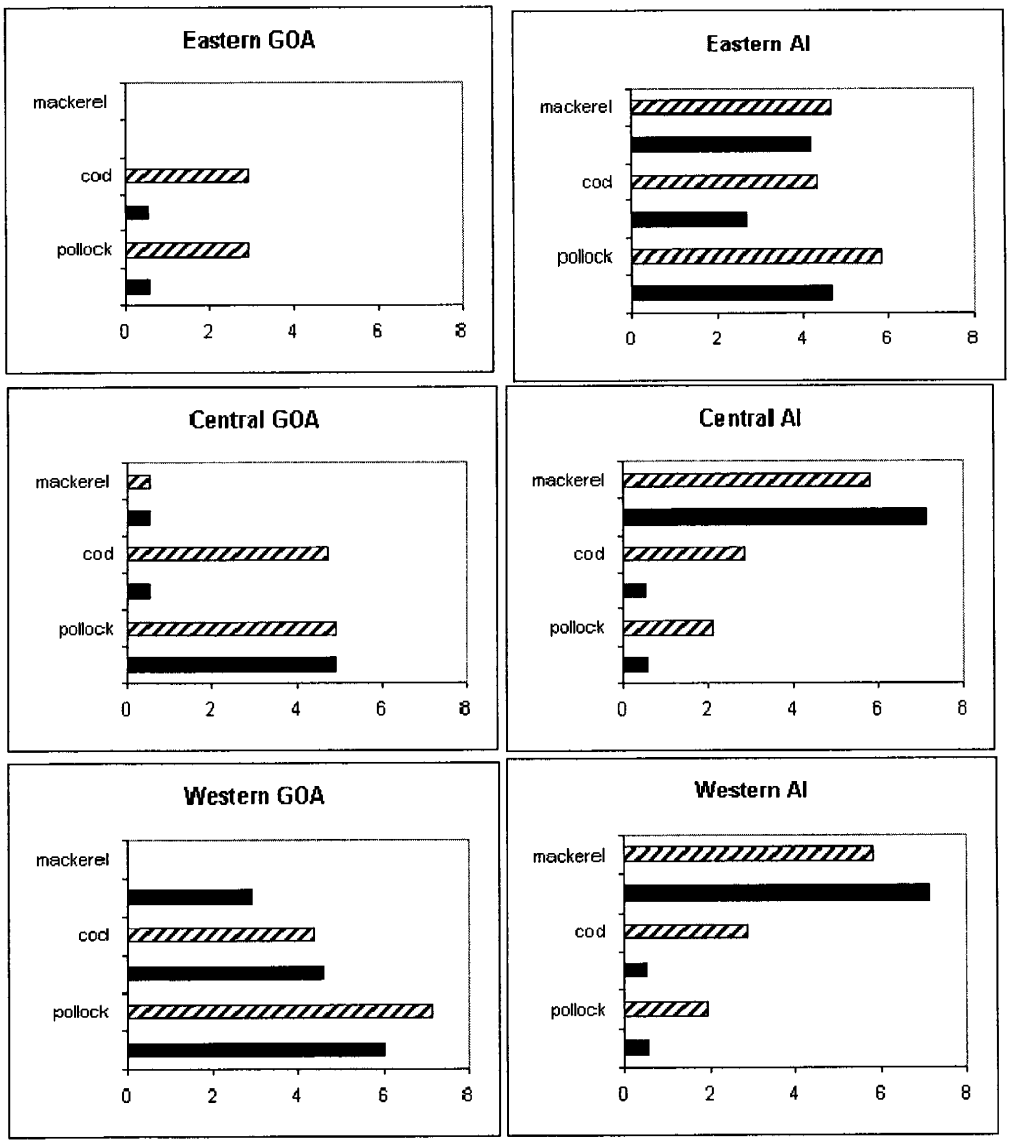

Figure 5. Ratings of importance of Atka mackerel, Pacific cod and pollock to the SSL, by region and season; the striped bar is winter and the solid black bar is summer. The absence of a bar indicates the lack of a fishery for the species in that region. A high score indicates a high impact to the SSL.

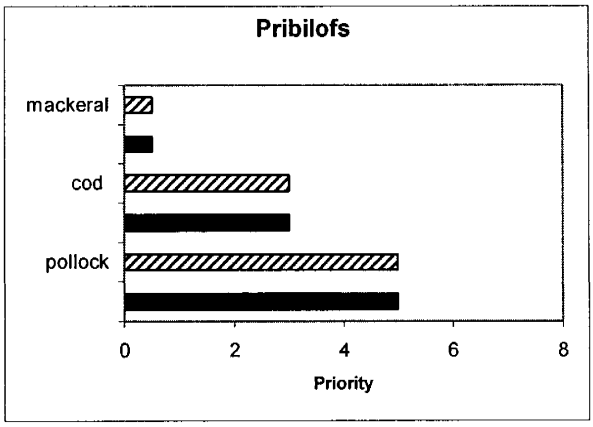

Figure 5 continued.

OTHER VARIABLES

The SSLMC considered possible variables that do not apply to evaluating impacts; that is, those variables that may offer a benefit, or a "credit". One such variable discussed was whether a fishery was rationalized. A rationalized fishery has some capacity to reduce practices that could adversely affect SSL, however the capacity might not always be exercised. The consensus of the SSLMC was not to include the variable, "rationalized fishery", in the model.

Other variables mentioned that do not apply to the impacts model are proposals that seek to increase safety or economic benefits, and proposals to improve administrative or management efficiency. These benefits can be listed during the proposal screening process and examined after the impact evaluation is completed.

IMPLEMENTATION OF THE EVALUATION TOOL

The metric against which rated proposals will be held up to was debated by the SSLMC. Questions such as these arose: "How will proposals compare to the jeopardy bar?", and "Can we compare proposals to the status quo?" One approach suggested was to run a proposal through the model and obtain its score; then run its status quo through the model to see the net effect of the proposed change for that specific proposal.

As an example, the following three scenarios were run through the model and scores were obtained for the proposed change, and its status quo. Each scenario's scores add to 1, because the proposed change is being compared to its own status quo. A lower score is better. So, for example, if the proposed change scored 0.4 and the status quo scored 0.6, that means that the proposed change would have less of an impact on the SSL than the current situation.

Scenario # 1	Score
Proposed change: "Change the seasonal apportionments for the longline catcher/processor Pacific cod fishery in the BSAI from 60/40 A/B season to 80/20 in the A/B season. The amount of harvest from the increase in A season fishing would be restricted to areas outside SSL critical habitat (outside 20nm and outside foraging areas)." **Interpretation:** The region mostly affected is the EAI (because this area contains the eastern Bering Sea). The change will mostly entail shifting fishing from summer to winter, and additional A season fishing will be outside the 20+nm zone, around "other" sites. The TAC/biomass ratio is about "5" and will not likely change. Fishing is prolonged. **Variables :** TAC/biomass of 5, prolonged, winter, EAI, Pacific cod, other site, 20+nm.	.369
Status Quo: Fishing occurs at about a TAC/biomass ratio of 5, is prolonged, occurs mostly in summer, in the EAI, in the 10-20nm zone, and affects about 26-50% of rookeries in the region. **Variables:** TAC/biomass of 6, prolonged, summer, EAI, Pacific cod, rookery site, 10-20nm, 26-50% of sites affected.	.661
Scenario # 2	**Score**
Proposed change: "Relax pollock trawl fishing closures around rookeries and haulouts in the western GOA area 620 between 155 degrees and 150 degrees 30 minutes. Allow pollock trawl fishing between 10 and 20 nm around those sites during the A and B seasons only." **Interpretation:** The region affected is the WGOA. The TAC/ biomass ratio is about "7" and fishing is prolonged. There are 4 haulouts & 2 rookeries affected & the proposal affects 26-50% of all sites in Area 620. The proposal seeks to allow fishing in the 10-20nm zone, in both winter and summer. **Variables :** TAC/biomass of 7, prolonged, WGOA, pollock, 26-50% of sites affected in the region, at 10-20nm, both winter and summer, for both haulouts and rookeries.	.553
Status Quo: Fishing for pollock occurs in the WGOA at about a TAC/biomass ratio of 7, is prolonged, occurs year round, but is only allowed at 20+nm. **Variables:** TAC/biomass of 7, prolonged, WGOA, pollock, 20+nm, both winter and summer, for both haulouts and rookeries.	.447

Scenario # 3	Score
Proposed change: "New science shows that pollock are important in the SSL diets and therefore some of the haulouts where SSL occur should have protection by shifting pollock trawling further offshore. Therefore, close to pollock trawl fishing all haulouts on the Pribilofs from 0-10nm year round." **Interpretation:** The TAC/biomass is about 3, and fishing is prolonged. This change would affect 100% of haulouts. It would affect both summer & winter. **Variables:** TAC/biomass of 3, prolonged, Pribilofs, winter and summer, pollock, 10-20nm, 100% of haulouts.	.347
Status Quo: Currently there are pollock trawl closures at Pribilof haulouts only from 0-3 nm. **Variables:** TAC/biomass of 3, prolonged, Pribilofs, winter and summer, pollock, 3-10nm, 100% of haulouts.	.653

Of the three scenarios, only #2 would result in greater impact to the SSL, although not much. Scenarios #1 and 3 would actually remove some level of existing impact to the SSL.

The SSLMC agreed that additional discussion will be required to develop a process for using the model to rate proposals. That work will commence following review and advice from the SSC.

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Appendix A. Participants involved in the development of the evaluation tool, Seattle, July 25-27, 2006.

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Appendix B. The TAC/biomass tables to be supplied by Doug

Appendix C. Handouts given at the July meeting

Appendix D. The word documents, Treeview of prey & Treeview of SSL

Appendix E. The word document, Data Grid.