MEMORANDUM

TO: Council, SSC, and AP Members

FROM: Clarence G. Pautzke
Executive Director

DATE: April 13, 1998

SUBJECT: Groundfish Overfishing Definitions

ESTIMATED TIME
2 HOURS

ACTION REQUIRED

Initial review of amendment to modify the definitions of the overfishing level and acceptable biological catch.

BACKGROUND

National Standard 1 states that conservation and management measures shall prevent overfishing while achieving, on a continuing basis, the optimum yield from each fishery for the United States fishing industry. The Sustainable Fisheries Act (SFA), which amended the Magnuson-Stevens Act in 1996, contained several provisions that affected national standard 1, though the standard itself was not changed. The SFA added a definition of "overfishing" and "overfished," changed the definition of "optimum," required that each fishery management plan specify objective and measurable criteria for identifying when a fishery is overfished and added a section on identifying and rebuilding overfished fisheries.

Last August, NMFS published proposed national standard guidelines in the Federal Register to assist the Councils with amending FMPs to conform with new provisions of the Act. The comment period was reopened in December for further comment, and, as far as I know, the guidelines have not been finalized yet. Nonetheless, all councils are moving ahead with changing their overfishing definitions and establishing rebuilding plans as appropriate.

To bring our groundfish plans into compliance with the new provisions of the Act, Grant Thompson at the Alaska Fisheries Science Center, drafted the EA/RIR under D-1(d) that examines alternative definitions of the overfishing level and acceptable biological catch, in accordance with the proposed rule. This plan amendment proposal considers three alternatives:

> Alternative 1: No change. MSY is treated as a target rather than a limit under certain circumstances, no minimum stock size threshold is identified, specification procedures can be inconsistent depending on information level, and uncertainty in projected and reference stock sizes is not addressed.
>
> Alternative 2: Modest change. MSY is consistently treated as a limit rather than a target, a minimum stock size threshold is identified, uncertainty in projected and reference stock sizes is addressed, and specification procedures are consistent *given a sufficient* information level.
>
> Alternative 3: Substantial change. MSY is consistently treated as a limit rather than a target, a minimum stock size threshold is identified, uncertainty in projected and reference stock sizes is addressed, and specification procedures are consistent *regardless of* information level.

Grant Thompson will be on hand to present the results of the analysis. We need to send the analysis out for public review and then schedule final action for June.

DRAFT ENVIRONMENTAL ASSESSMENT AND REGULATORY IMPACT REVIEW FOR AMENDMENT 56 TO THE FISHERY MANAGEMENT PLAN FOR THE GROUNDFISH FISHERY OF THE BERING SEA AND ALEUTIAN ISLANDS AREA AND AMENDMENT 56 TO THE FISHERY MANAGEMENT PLAN FOR THE GROUNDFISH FISHERY OF THE GULF OF ALASKA

TO REDEFINE ACCEPTABLE BIOLOGICAL CATCH AND OVERFISHING

Prepared by

Staff
National Marine Fisheries Service
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April, 1998

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Executive Summary

The Magnuson-Stevens Fishery Conservation and Management Act (Magnuson-Stevens Act) contains a number of provisions pertaining to the content of fishery management plans (FMPs) and a requirement that all FMPs be updated so as to be consistent with those provisions by October 11, 1998. In addition, the Magnuson-Stevens Act requires the Secretary of Commerce to establish advisory guidelines, based on the Magnuson-Stevens Act's "National Standards," to assist in this process. A draft of these National Standard Guidelines (NSGs) was published as a proposed rule on August 4, 1997. Because the draft NSGs were written for a general audience, the National Marine Fisheries Service (NMFS) decided to supplement them with a more technically oriented report containing examples of methods that might be used to satisfy the NSGs (Restrepo et al. *in press*).

With regard to the definitions of the overfishing level (OFL) and acceptable biological catch (ABC) presently contained in the FMPs for the groundfish fisheries of the Bering Sea and Aleutian Islands Region (BSAI) and the Gulf of Alaska (GOA), the following are areas in which changes are suggested by the Magnuson-Stevens Act, the NSGs, or the Restrepo report:

1) Maximum sustainable yield (MSY) should be treated as a limit rather than a target. This means that "limit" harvest strategies (such as the rules used to specify OFL) should result in a long-term average catch that approximates MSY, and that "target" harvest strategies (such as the rules used to specify ABC) should result in catches that are substantially more conservative than the limit. Tiers 2-4 of the current ABC/OFL definitions could be interpreted as treating MSY as a target rather than a limit.

2) A minimum stock size threshold should be identified for each stock so as to provide a means to determine whether the stock is overfished. The current ABC/OFL definitions do not identify such a threshold.

3) The procedures used to specify both limit and target harvest levels should address uncertainty in stock status as well as reference points. Tier 1 of the current ABC/OFL definitions considers uncertainty in the target fishing mortality rate, but does not address uncertainty in projected or reference stock size.

4) The procedures used to specify both limit harvest levels (e.g., OFL) and target harvest levels (e.g., ABC) should be consistent across stocks within an FMP, even when the levels of information available for those stocks vary considerably. This means that a specification procedure which prescribes a reduction in the fishing mortality rate when relative abundance is low should not be abandoned whenever absolute abundance is uncertain. Tiers 4 and 5 of the current ABC/OFL definitions do not adjust the fishing mortality rate when stock size is low, and Tier 6 of the current definitions implicitly increases the fishing mortality rate when stock size is low.

This plan amendment proposal considers three alternatives:

> Alternative 1: No change. MSY is treated as a target rather than a limit under certain circumstances, no minimum stock size threshold is identified, specification procedures can be inconsistent depending on information level, and uncertainty in projected and reference stock sizes is not addressed.

Alternative 2: Modest change. MSY is consistently treated as a limit rather than a target, a minimum stock size threshold is identified, uncertainty in projected and reference stock sizes is addressed, and specification procedures are consistent *given a sufficient* information level.

Alternative 3: Substantial change. MSY is consistently treated as a limit rather than a target, a minimum stock size threshold is identified, uncertainty in projected and reference stock sizes is addressed, and specification procedures are consistent *regardless of* information level.

The impacts of the alternatives were analyzed by calculating what changes, if any, would have been required in the 1998 total allowable catch (TAC) levels had either Alternative 2 or Alternative 3 been in place at the end of 1997. In the case of Alternative 2, no changes in TAC would have been required. In the case of Alternative 3, the possible impacts would have depended on the relative abundance levels determined by the Scientific and Statistical Committee (SSC) for stocks managed under Tiers 4, 5, or 6 of the current ABC/OFL definitions. Because no such determinations were actually made in 1997, the analysis proceeds by applying a default "rule of thumb" to judge relative sizes of these stocks. If the SSC were to have determined that all such stocks were at a moderate or high level of abundance (as would have been the case for the 1998 fishery had the default rule been followed), no changes in TAC would have been required under Alternative 3. At the other extreme, if the SSC were to have determined that all such stocks were currently overfished (i.e., if the SSC were to have judged that the default rule drastically over-estimated stock size in all cases), individual TAC reductions under Alternative 3 would have summed to 37,800 t in the GOA and 105,000 t in the BSAI, or 12% and 5% of the sum of the actual 1998 TACs, respectively. However, some or all of these reductions could potentially have been offset by increasing TACs on stocks for which TAC was below ABC.

None of the alternatives are likely to significantly affect the quality of the human environment, and the preparation of an environmental impact statement for the proposed action is not required by Section 102(2)(C) of the National Environmental Policy Act or its implementing regulations.

1.0 INTRODUCTION

The groundfish fisheries in the Exclusive Economic Zone (3 to 200 miles offshore) off Alaska are managed under the Fishery Management Plan for the Groundfish Fisheries of the Gulf of Alaska (GOA) and the Fishery Management Plan for the Groundfish Fisheries of the Bering Sea and Aleutian Islands Area (BSAI). Both of these fishery management plans (FMPs) were developed by the North Pacific Fishery Management Council (Council) under the Magnuson-Stevens Fishery Conservation and Management Act (Magnuson-Stevens Act). The GOA Groundfish FMP was approved by the Secretary of Commerce and became effective in 1978 and the BSAI Groundfish FMP became effective in 1982.

Actions taken to amend the FMPs or implement other regulations governing the groundfish fisheries must meet the requirements of Federal laws and regulations. In addition to the Magnuson-Stevens Act, the most important of these are the National Environmental Policy Act (NEPA), the Endangered Species Act (ESA), the Marine Mammal Protection Act (MMPA), Executive Order (E.O.) 12866, and the Regulatory Flexibility Act (RFA).

NEPA, E.O. 12866, and the RFA require a description of the purpose and need for the proposed action as well as a description of alternative actions which may address the problem. This information is included in Section 1 of this document. Section 2 contains information on the biological and environmental impacts of the alternatives as required by NEPA. Impacts on endangered species and marine mammals are also addressed in this section. Section 3 contains a Regulatory Impact Review (RIR) which addresses the requirements of both E.O. 12866 and the RFA that economic impacts of the alternatives be considered.

This Environmental Assessment/Regulatory Impact Review (EA/RIR) addresses plan amendments to redefine "acceptable biological catch" (ABC) and "overfishing" in the BSAI and GOA Groundfish FMPs.

1.1 Purpose of and Need for the Action

On October 11, 1996, the President signed into law the Sustainable Fisheries Act (Public Law 104-297). The Sustainable Fisheries Act made numerous amendments to the Magnuson Fishery Conservation and Management Act, resulting in what is now known as the Magnuson-Stevens Act. In particular, Section 108(a) of the Sustainable Fisheries Act amended Section 303(a) of the old Magnuson Act, resulting in Section 303(a) of the new Magnuson-Stevens Act. Section 303(a) describes required provisions of fishery management plans, including the following new requirement (paragraph (10)):

> "Specify objective and measurable criteria for identifying when the fishery to which the plan applies is overfished (with an analysis of how the criteria were determined and the relationship of the criteria to the reproductive potential of stocks of fish in that fishery) and, in the case of a fishery which the Council or the Secretary has determined is approaching an overfished condition or is overfished, contain conservation and management measures to prevent overfishing or end overfishing and rebuild the fishery."

This language supersedes the requirement in the 1989 version of the National Standard Guidelines (NSGs), which read,

> "Each FMP must specify, to the maximum extent possible, an objective and measurable

definition of overfishing for each stock or stock complex covered by that FMP, and provide an analysis of how the definition was determined and how it relates to reproductive potential."

In addition to replacing the above regulatory requirement with a new statutory requirement, the Sustainable Fisheries Act also instituted the following definition of "overfishing," a term which had previously lacked a statutory definition (paragraph (29) of Section 3):

> "The terms 'overfishing' and 'overfished' mean a rate or level of fishing mortality that jeopardizes the capacity of a fishery to produce the maximum sustainable yield on a continuing basis."

This language supersedes the definition in the 1989 version of the NSGs, which read,

> "'Overfishing' is a level or rate of fishing mortality that jeopardizes the long-term capacity of a stock or stock complex to produce MSY on a continuing basis,"

where "MSY" denotes "maximum sustainable yield."

Responsibility for complying with the language in the new Section 303(a) of the Magnuson-Stevens Act is given in Section 108(b) of the Sustainable Fisheries Act as follows:

> "Not later than 24 months after the date of enactment of this Act, each Regional Fishery Management Council shall submit to the Secretary of Commerce amendments to each fishery management plan under its authority to comply with the amendments made in subsection (a) of this section."

Thus, the Council must submit amendments bringing the FMPs for the BSAI and GOA groundfish fisheries into compliance with the above by October 11, 1998. To aid in the development of such amendments, the National Marine Fisheries Service (NMFS) is required by Section 301(b) of the Magnuson-Stevens Act to revise the NSGs. A draft of the revised NSGs was published as a proposed rule on August 4, 1997. Because the specification of overfishing currently contained in the BSAI and GOA Groundfish FMPs is formally linked to the specification of ABC, overfishing and ABC specifications are considered jointly in this amendment package.

1.2 Alternatives Considered

1.2.1 Alternative 1: No Change. MSY is treated as a target rather than a limit under certain circumstances, no minimum stock size threshold is identified, specification procedures can be inconsistent depending on information level, and uncertainty in projected and reference stock sizes is not addressed. The following language would remain in the groundfish FMPs (where "OFL" denotes the "overfishing level" and "SSC" denotes the "Scientific and Statistical Committee"):

Acceptable Biological Catch is a preliminary description of the acceptable harvest (or range of harvests) for a given stock or stock complex. Its derivation focuses on the status and dynamics of the stock, environmental conditions, other ecological factors, and prevailing technological characteristics of the fishery. The fishing mortality rate used to calculate ABC is capped as described under "overfishing" below.

Overfishing is defined as any amount of fishing in excess of a prescribed maximum allowable rate. This maximum allowable rate is prescribed through a set of six tiers which are listed below in descending order of preference, corresponding to descending order of information availability. The SSC will have final authority for determining whether a given item of information is "reliable" for the purpose of this definition, and may use either objective or subjective criteria in making such determinations. For tier (1), a "pdf" refers to a probability density function. For tiers (1-3), the coefficient α is set at a default value of 0.05, with the understanding that the SSC may establish a different value for a specific stock or stock complex as merited by the best available scientific information. For tiers (2-4), a designation of the form "$F_{X\%}$" refers to the F associated with an equilibrium level of spawning per recruit (SPR) equal to $X\%$ of the equilibrium level of spawning per recruit in the absence of any fishing. If reliable information sufficient to characterize the entire maturity schedule of a species is not available, the SSC may choose to view SPR calculations based on a knife-edge maturity assumption as reliable. For tier (3), the term $B_{40\%}$ refers to the long-term average biomass that would be expected under average recruitment and $F=F_{40\%}$.

1) *Information available: Reliable point estimates of B and B_{MSY} and reliable pdf of F_{MSY}.*

   1a) Stock status: $B/B_{MSY} > 1$

   $F_{OFL} = \mu_A$, the arithmetic mean of the pdf

   $F_{ABC} \le \mu_H$, the harmonic mean of the pdf

   1b) Stock status: $\alpha < B/B_{MSY} \le 1$

   $F_{OFL} = \mu_A \times (B/B_{MSY} - \alpha)/(1 - \alpha)$

   $F_{ABC} \le \mu_H \times (B/B_{MSY} - \alpha)/(1 - \alpha)$

   1c) Stock status: $B/B_{MSY} \le \alpha$

   $F_{OFL} = 0$

   $F_{ABC} = 0$

2) *Information available: Reliable point estimates of B, B_{MSY}, F_{MSY}, $F_{30\%}$,* and $F_{40\%}$.

   2a) Stock status: $B/B_{MSY} > 1$

   $F_{OFL} = F_{MSY} \times (F_{30\%}/F_{40\%})$

   $F_{ABC} \le F_{MSY}$

   2b) Stock status: $\alpha < B/B_{MSY} \le 1$

   $F_{OFL} = F_{MSY} \times (F_{30\%}/F_{40\%}) \times (B/B_{MSY} - \alpha)/(1 - \alpha)$

   $F_{ABC} \le F_{MSY} \times (B/B_{MSY} - \alpha)/(1 - \alpha)$

   2c) Stock status: $B/B_{MSY} \le \alpha$

   $F_{OFL} = 0$

   $F_{ABC} = 0$

3) *Information available: Reliable point estimates of B, $B_{40\%}$, $F_{30\%}$,* and $F_{40\%}$.

   3a) Stock status: $B/B_{40\%} > 1$

   $F_{OFL} = F_{30\%}$

   $F_{ABC} \le F_{40\%}$

   3b) Stock status: $\alpha < B/B_{40\%} \le 1$

   $F_{OFL} = F_{30\%} \times (B/B_{40\%} - \alpha)/(1 - \alpha)$

   $F_{ABC} \le F_{40\%} \times (B/B_{40\%} - \alpha)/(1 - \alpha)$

   3c) Stock status: $B/B_{40\%} \le \alpha$

   $F_{OFL} = 0$

   $F_{ABC} = 0$

4) *Information available: Reliable point estimates of B, $F_{30\%}$,* and $F_{40\%}$.

   $F_{OFL} = F_{30\%}$

$F_{ABC} \leq F_{40\%}$

5) *Information available: Reliable point estimates of B and natural mortality rate M.*
$F_{OFL} = M$
$F_{ABC} \leq 0.75 \times M$

6) *Information available: Reliable catch history from 1978 through 1995.*
OFL = the average catch from 1978 through 1995, unless an alternative value is established by the SSC on the basis of the best available scientific information
ABC ≤ 0.75 × OFL

Maximum sustainable yield (MSY) is an average over a reasonable length of time of the largest catch which can be taken continuously from a stock under current environmental conditions. It should normally be presented with a range of values around its point estimate. Where sufficient scientific data as to the biological characteristics of the stock do not exist or the period of exploitation or investigation has not been long enough for adequate understanding of stock dynamics, a preliminary MSY will be estimated from the best information available.

1.2.2 Alternatives 2 and 3: Modest and Substantial Change, Respectively. Under Alternatives 2 and 3, MSY is consistently treated as a limit rather than a target, a minimum stock size threshold is identified, and uncertainty in projected and reference stock sizes is addressed. Under Alternative 2, specification procedures are consistent given a sufficient information level, while under Alternative 3, specification procedures are consistent regardless of information level. The following language would be incorporated into the groundfish FMPs, replacing existing definitions of "acceptable biological catch," "overfishing," and "maximum sustainable yield" and adding definitions of "harvest control rules" and "proxies" (language is identical under Alternatives 2 and 3 except as indicated in bold type):

Harvest Control Rules (see Figure) are mathematical formulae used to relate fishing mortality to projected spawning biomass, where spawning biomass is defined in terms of the combined sexes (either the sum of female spawning biomass and male spawning biomass, or female spawning biomass divided by the proportion of females in the spawning population). These formulae involve quantities which are estimated with some degree of uncertainty. For each such quantity, this uncertainty is described by a probability density function (pdf). In particular, for a stock that is fished at a constant per-capita rate, let the fishing mortality rate that would maximize equilibrium yield be designated F_{MSY}, and let the corresponding level of equilibrium spawning biomass be designated B_{MSY}. Because the true values of F_{MSY} and B_{MSY} cannot be known with certainty, the control rules are parametrized not in terms of F_{MSY} and B_{MSY} directly, but in terms of statistics pertaining to their respective pdfs. Likewise, because future spawning biomass cannot be known with certainty, the independent variable in the control rules is defined in terms of the pdf of projected spawning biomass. Specifically, the control rules use the following quantities:

Quantity	Definition
B	the geometric mean of the pdf of projected spawning biomass
α	a fraction, set at a value of 0.05 except where specified otherwise by the SSC
β	the geometric mean of the pdf of B_{MSY}
ϕ	the arithmetic mean of the pdf of F_{MSY}
γ	the harmonic mean of the pdf of F_{MSY}

Two control rules are defined: a target control rule and a limit control rule. The target control rule places a cap on the intended harvest rate. Because the intended harvest rate is seldom achieved exactly, the limit control rule serves to cap the acceptable amount of error involved in implementing the intended harvest rate. The limit control rule is comprised of three sections, given by the three right-hand columns below:

Stock Status:	$B/\beta \le \alpha$	$\alpha \le B/\beta \le 1$	$1 \le B/\beta$
F_{lim}:	0	$\phi(B/\beta - \alpha)/(1-\alpha)$	ϕ

The target control rule is proportional to the limit control rule, specifically, $F_{tar} = (\gamma/\phi)F_{lim}$.

Proxies are used to estimate B, β, ϕ, and γ in the harvest control rules when direct estimates are unavailable. The following quantities are used to define various proxies:

- C_{ave}, the average catch since 1978;
- M, the instantaneous natural mortality rate;
- $F_{35\%}$, the fishing mortality rate associated with an equilibrium level of spawning per recruit (SPR) equal to 35% of the equilibrium level of spawning per recruit in the absence of any fishing;
- $F_{40\%}$, the fishing mortality rate associated with an equilibrium level of SPR equal to 40% of the equilibrium level of spawning per recruit in the absence of any fishing; and
- $B_{35\%}$, the long-term average biomass that would be expected under average recruitment and $F=F_{35\%}$;

The proxies shown in the table below are listed in order of preference, where "n/a" means that a particular proxy level is not applicable to the quantity in question:

Quantity	Proxy 1	Proxy 2	Proxy 3	Proxy 4
B	point estimate of spawning biomass	depends on alternative [(a)]	n/a	n/a
β	point estimate of B_{MSY}	point estimate of $B_{35\%}$	depends on alternative [(b)]	n/a
ϕ	point estimate of F_{MSY}	point estimate of $F_{35\%}$	point estimate of M	point estimate of C_{ave}/β
γ	point estimate of $(F_{MSY} \times F_{40\%}/F_{35\%})$	point estimate of $F_{40\%}$	point estimate of $M \times 0.75$	point estimate of $C_{ave}/\beta \times 0.75$

Footnotes

a) **Under Alternative 2, Proxy 2 for B consists of β.**
Under Alternative 3, Proxy 2 for B consists of the SSC's best subjective estimate.

b) **Under Alternative 2, Proxy 3 for β consists of B.**
Under Alternative 3, Proxy 3 for β consists of the SSC's best subjective estimate.

The following rules will govern the computation and use of the above proxies:

1) A particular proxy will be used only if it is based on reliable estimates. The SSC will have final authority for determining whether a given estimate is "reliable" and may use either objective or subjective criteria in making such determinations.

2) If reliable information sufficient to characterize the entire maturity schedule of a species is not available, the SSC may choose to base calculations of spawning biomass or SPR on a knife-edge maturity assumption.

3) "Average" means arithmetic mean except as specified otherwise by the SSC. In computing C_{ave}, the average will be computed with respect to those years for which catch was greater than zero. In computing average recruitment, the average will be computed with respect to those years for which recruitment is reliably estimated.

4) If Proxy 4 is used to estimate ϕ or γ, then the catch corresponding to the limit or target control rule will be computed as $F_{lim} \times B$ or $F_{tar} \times B$, respectively.

The following additional rule would apply under Alternative 3 only:

5) A subjective estimate of β will be expressed as a multiple of C_{ave}, for example C_{ave}/M. A subjective estimate of B will consist of one of four qualitative abundance levels: overfished, low, moderate, and high. To map these qualitative levels into the control rules, they will be interpreted quantitatively as shown in the two left-most columns of the table below, which in turn imply the limit and target fishing mortality rates shown in the middle two columns. The two right-most columns of the table will apply in the special case where Proxy 4 is used to estimate both ϕ and γ.

Biomass Level	B/β	F_{lim}/ϕ	F_{tar}/ϕ	C_{lim}/C_{ave}	C_{tar}/C_{ave}
Overfished	0.24	0.2	0.15	0.048	0.036
Low	0.62	0.6	0.45	0.372	0.279
Moderate	1	1	0.75	1	0.75
High	1.6	1	0.75	1.6	1.2

Acceptable Biological Catch (ABC) is a preliminary description of the target harvest (or range of harvests) for a given stock or stock complex. Its derivation focuses on the status and dynamics of the stock, environmental conditions, other ecological factors, and prevailing technological characteristics of the fishery. The fishing mortality rate used to calculate ABC is capped by the relationship $F_{ABC} \leq F_{tar}$.

Overfishing is any amount of fishing in excess of the maximum fishing mortality threshold, which in turn is defined as F_{lim}. The catch corresponding to F_{lim} is the "overfishing level" (OFL). In addition to constituting the maximum fishing mortality threshold, F_{lim} also plays a role in defining the minimum stock size threshold (MSST). The MSST is estimated formally by whichever of the following is greater: $\beta/2$, or the minimum stock size at which rebuilding to β would be expected to occur within 10 years if the stock were exploited consistently at F_{lim}. For stocks lacking formal estimates, the MSST is estimated provisionally as $\max(1/2, 1-M)\beta$. Should a stock fall below its MSST, the stock will be considered "overfished" and remedial action will be undertaken to rebuild the stock in accordance with the Magnuson-Stevens Act and the National Standard Guidelines.

Maximum Sustainable Yield (MSY) is the largest long-term average catch or yield that can be taken from a stock or stock complex under prevailing ecological and environmental conditions. MSY is estimated

formally as the long-term average catch that would be obtained if the stock were exploited consistently at F_{lim}. For stocks lacking formal estimates, MSY is estimated provisionally as $\phi \times \beta$.

1.3 Summary of Similarities and Differences Between the Alternatives

The major similarities and differences between the alternatives may be summarized as follows:

1) Use of MSY. Alternatives 2 and 3 make clear that MSY is to be treated as a limit rather than a target. Alternative 1 does not.

2) Estimation of MSY. Alternatives 2 and 3 specify the method by which provisional estimates of MSY are to be made in cases where formal estimates of MSY are unavailable because of insufficient data or analysis. Alternative 1 does not.

3) Identification of MSST. Alternatives 2 and 3 identify MSST and specify how it is estimated. Alternative 1 does not.

4) Use of a single pair of harvest control rules. Alternatives 2 and 3 use a single pair of harvest control rules (one limit rule and one target rule) for all stocks. Alternative 1 does not.

5) Consideration of uncertainty in stock size. Alternatives 2 and 3 address uncertainty in projected and reference stock sizes in those cases where such uncertainty can be quantified. Alternative 1 does not.

6) Independence of information levels associated with different quantities. Alternatives 2 and 3 allow the information levels associated with the various quantities used in the control rules to vary independently (e.g., under Alternatives 2 and 3, it is possible to use Proxy 1 for B while using Proxy 3 for γ). Alternative 1 does not.

7) Use of subjective estimates. Alternative 3 requires the SSC to provide its best subjective estimates of projected stock size (B) and reference stock size (β) when these quantities cannot be estimated objectively. Alternatives 1 and 2 do not.

8) Consistent treatment of stocks below reference abundance levels. Alternative 3 allows for consistent treatment of stocks below reference abundance levels by using subjective estimates where necessary. Alternatives 1 and 2 do not. (When information is severely limited, Alternative 2 assumes that stocks are always at their reference abundance levels, i.e., $B = \beta$.)

2.0 ENVIRONMENTAL ASSESSMENT

An environmental assessment (EA) is required by the National Environmental Policy Act of 1969 (NEPA) to determine whether the action considered will result in significant impact on the human environment. If the action is determined not to be significant based on an analysis of relevant considerations, the EA and resulting finding of no significant impact (FONSI) would be the final environmental documents required by NEPA. An environmental impact statement (EIS) must be prepared for major Federal actions significantly affecting the human environment.

An EA must include a brief discussion of the need for the proposal, the alternatives considered, the environmental impacts of the proposed action and the alternatives, and a list of document preparers. The purpose and alternatives were discussed in Sections 1.1 and 1.2, and the list of preparers is in Section 6. This section contains the discussion of the environmental impacts of the alternatives including impacts on threatened and endangered species and marine mammals.

2.1 Environmental Impacts of the Alternatives

The environmental impacts generally associated with fishery management actions are effects resulting from (1) harvest of fish stocks which may result in changes in food availability to predators and scavengers, changes in the population structure of target fish stocks, and changes in the marine ecosystem community structure; (2) changes in the physical and biological structure of the marine environment as a result of fishing practices, e.g., effects of gear use and fish processing discards; and (3) entanglement/entrapment of non-target organisms in active or inactive fishing gear. A summary of the effects of the annual groundfish harvests on the biological environment and associated impacts on marine mammals, seabirds, and other threatened or endangered species are discussed in the final environmental assessment for the annual groundfish total allowable catch specifications.

2.1.1 Methods. The alternatives considered here would establish policies for setting ABC and OFL levels in each future year based on estimates of stock size available at the time. It is difficult to evaluate the long-term impacts of these alternatives quantitatively, because there is no way to tell at present what the estimated size of any given stock will be in the future. Instead, this assessment focuses on short-term impacts, which were evaluated by considering how OFL, ABC, and total allowable catch (TAC) would likely have changed in 1998 had a particular alternative been in place at the end of 1997. Even with this simplifying restriction, a special set of problems remains for stocks managed under Tiers 4, 5, and 6 of the current ABC/OFL definitions, because the impacts of Alternative 3 on catch specifications for such stocks depend upon subjective estimates (i.e., Proxy 2 for B and Proxy 3 for β) which have not yet been made. One way to establish these subjective estimates would be for the SSC to adopt a "rule of thumb" that could be applied in all situations, then deviate from that rule as appropriate on a case-by-case basis, using its best scientific judgment developed from whatever other information is available. The procedure described in Appendix A represents one possible form for such a rule of thumb, and is the basis upon which likely impacts of Alternative 3 are determined in this assessment. Other assumptions made in conducting this assessment include the following:

1) Only information published or distributed prior to 1998 could be used in specifying 1998 OFL, ABC, and TAC under any of the alternatives. Such information includes the 1997 SAFE reports (BSAI Groundfish Plan Team 1997, GOA Groundfish Plan Team 1997).

2) In cases where an estimate of $B_{40\%}$ is given in the relevant SAFE report but an estimate of $B_{35\%}$

is lacking, $B_{35\%}$ was estimated as $B_{40\%} \times 7/8$.

3) In cases where estimates of $F_{40\%}$ and M are given in the relevant SAFE report but an estimate of $F_{35\%}$ is lacking, $F_{35\%}$ was estimated as described in Appendix B. This method is based on an equation presented by Thompson (1993).

4) In cases where a species occurs in both the BSAI and the GOA but an estimate of M is given in only one of the two SAFE reports, it was assumed that the given estimate applies to both the BSAI and the GOA stocks.

5) In cases where estimates of M are given for some members (the "first sub-group") of a species group for which a single TAC is specified but estimates of M are not given for the other members (the "second sub-group"), M was estimated for the members of the second sub-group as the biomass-weighted average of the estimates for the members of the first sub-group.

6) In the case of BSAI squid, M was estimated at a value of 0.8. An M of 0.8 implies a cumulative survival rate of about 0.1 through age 3, approximating the observation of Trumble (1973) that few squid survive beyond this age.

7) In cases where Alternative 2 or 3 gave an F_{lim} value equal to the F_{OFL} value given under Alternative 1, the OFL under Alternative 2 or 3 was set equal to the OFL under Alternative 1.

8) In cases where Alternative 2 or 3 gave an F_{lim} value different from the F_{OFL} value given under Alternative 1, the OFL under Alternative 2 or 3 was set equal to the product of the OFL under Alternative 1 and the ratio F_{lim}/F_{OFL}.

9) In cases where Alternative 2 or 3 gave an F_{tar} value less than the F_{ABC} value given under Alternative 1, the ABC under Alternative 2 or 3 was set equal to the product of the ABC under Alternative 1 and the ratio F_{tar}/F_{ABC}.

10) In cases where Alternative 2 or 3 gave an F_{tar} value greater than or equal to the F_{ABC} value given under Alternative 1, the ABC under Alternative 2 or 3 was set equal to the ABC under Alternative 1.

11) In cases where Alternative 2 or 3 gave an ABC less than the TAC given under Alternative 1 (i.e., the actual 1998 TAC), the TAC under Alternative 2 or 3 was set equal to the ABC under the respective alternative.

12) In cases where Alternative 2 or 3 gave an ABC greater than or equal to the TAC given under Alternative 1 (i.e., the actual 1998 TAC), the TAC under Alternative 2 or 3 was set equal to the TAC under Alternative 1.

2.1.2 Results. Based on the rule of thumb described in Appendix A, stocks in the GOA are generally at a high level of abundance, while stocks in the BSAI are generally at a moderate level of abundance.

Possible impacts associated with each of the alternatives are detailed in Tables 1-4. The organization of these tables is outlined below. Tables 1-2 correspond to the GOA and Tables 3-4 correspond to the BSAI. Odd-numbered tables focus on fishing mortality rates and even-numbered tables focus on catch specifications. Tables are further subdivided according to different possible assumptions regarding the relative abundance of certain stocks managed under Alternative 3. For stocks managed using Proxy 2 for B, the following possibilities were considered: a) all such stocks are at a high level of abundance, b) all such stocks are at a moderate level of abundance, c) all such stocks are at a low level of abundance, and d) all such stocks are overfished. Locations of results corresponding to the rule of thumb described in Appendix A are shaded below.

Focus:	Fishing Mortality Rates				Catch Specifications			
Stocks:	High	Moderate	Low	Overfished	High	Moderate	Low	Overfished
GOA:	Table 1a	Table 1b	Table 1c	Table 1d	Table 2a	Table 2b	Table 2c	Table 2d
BSAI:	Table 3a	Table 3b	Table 3c	Table 3d	Table 4a	Table 4b	Table 4c	Table 4d

If all stocks managed by using Proxy 2 for B or Proxy 3 for β under Alternative 3 were judged to be at the same level of relative abundance, the likely impacts of Alternative 3 on 1998 TACs are as follow:

	Sum of GOA TAC Reductions		Sum of BSAI TAC Reductions	
Stock Status	Absolute (t)	As % of Total	Absolute (t)	As % of Total
High	0 t	0%	0 t	0%
Moderate	0 t	0%	0 t	0%
Low	10,000 t	3%	33,800 t	2%
Overfished	37,800 t	12%	105,000 t	5%

In those cases where Alternative 3 would have resulted in individual TAC reductions, it should be noted that some or all of these reductions could potentially have been offset by increasing TACs on stocks for which TAC was below ABC.

The following table summarizes the use of proxies under Alternatives 2 and 3. For each quantity used in the control rules (B, β, ϕ, and γ) and each FMP (GOA and BSAI), the table describes the total number of stocks or stock complexes that would have been managed in 1998 using the definition of the quantity itself and each proxy thereof. For example, the shaded cells in the table should be read as follows: "In the BSAI, no stock would have been managed using β itself, 1 stock would have been managed using Proxy 1 for β, 9 stocks would have been managed using Proxy 2 for β, and 12 stocks would have been managed using Proxy 3 for β." If a stock complex includes stocks which would be managed under different proxy levels for the same quantity, the stock was counted under the least-preferred proxy.

Quantity:	B			β				ϕ					γ				
Proxy Used:	None	1	2	None	1	2	3	None	1	2	3	4	None	1	2	3	4
GOA:	0	13	4	0	0	6	11	0	0	9	7	1	0	0	9	7	1
BSAI:	0	21	1	0	1	9	12	0	1	13	8	0	0	1	13	8	0
Total:	0	34	5	0	1	15	23	0	1	22	15	1	0	1	22	15	1

Had Alternative 2 or Alternative 3 been in place for the 1998 season, the above table indicates that the majority of stocks would have been managed using Proxy 1 for B, Proxy 3 for β, and Proxy 2 for both ϕ and γ. All stocks required resorting to some proxy for each of the quantities used in the control rules.

2.1.3 Discussion. The above results indicate that the three alternatives may be indistinguishable in terms of their short-term impacts on TACs (e.g., if the more poorly understood stocks are all judged to be at high or moderate levels of abundance, as in Tables 1a, 2a, 3b, and 4b). However, the impacts of the alternatives can be distinguished in other ways. Two of the most important are discussed below.

1) OFLs for stocks managed under Tiers 3 and 4 of the current ABC/OFL definitions would be lower under Alternatives 2 or 3, because Proxy 2 for ϕ consists of $F_{35\%}$ in Alternatives 2 and 3 whereas Tiers 3 and 4 of Alternative 1 are based on $F_{30\%}$. In addition, the OFL for EBS pollock, which is currently calculated under Tier 2, would be significantly lower under Alternatives 2 or 3. However, it should be noted that the OFL shown for EBS pollock under Alternatives 2 and 3 in Tables 4a-4d is most likely under-estimated, because the approximation implied by assumption #8 in Section 2.1.1 tends to break down as the ratio of F_{OFL} to F_{lim} increases. This ratio is much greater for EBS pollock than for any other stock, due largely to the fact that EBS pollock is the only stock managed under Tier 2 of the current ABC/OFL definitions (i.e., it is the only stock for which a reliable estimate of F_{MSY} is available).

2) The degree of future protection that would be afforded to the more poorly understood stocks is greater under Alternative 3 than under Alternatives 1 or 2, because Alternative 3 requires that fishing mortality be reduced when it appears that a stock has fallen to a low level, even if it is not possible to estimate the size of the stock statistically. Thus, even though there is presently no evidence to suggest that any of the more poorly understood stocks is at risk, should qualitative evidence of such risk arise in the future, Alternative 3 would provide a mechanism for reducing fishing mortality.

In terms of the alternatives' compliance with the Magnuson-Stevens Act, some guidance may be taken from Restrepo et al. (in press), who provide a set of "default" harvest control rules (both limit and target) which they consider to be consistent with a precautionary approach to fisheries management in general, and with the Magnuson-Stevens Act and NMFS' draft revision of the NSGs in particular. All three of the alternatives considered here are at least as conservative as the default rules of Restrepo et al. in some respects. However, there are exceptions. Values of OFL prescribed under Tiers 2-4 of Alternative 1 and values of ABC prescribed under Tier 2 of Alternative 1 are less conservative than those prescribed under the default rules when stock abundance is high. Values of both OFL and ABC prescribed under Tiers 4-6 of Alternative 1 are less conservative than those prescribed under the default rules when stock abundance is low. Likewise, values of both OFL and ABC prescribed by using Proxy 2 for B and Proxy 3 for β under Alternative 2 are less conservative than those prescribed under the default rules when stock abundance is low. Values of OFL and ABC prescribed under Alternative 3, on the other hand, are at least as conservative as those prescribed under the default rules in all cases.

2.2 Impacts on Endangered or Threatened Species

Background. The ESA provides for the conservation of endangered and threatened species of fish, wildlife, and plants. The program is administered jointly by the Department of Commerce (NMFS) for most marine species, and the U.S. Fish and Wildlife Service (FWS) for terrestrial and freshwater species.

The ESA procedure for identifying or listing imperiled species involves a two-tiered process, classifying species as either threatened or endangered, based on the biological health of a species. Threatened species are those likely to become endangered in the foreseeable future [16 U.S.C. ' 1532(20)]. Endangered species are those in danger of becoming extinct throughout all or a significant portion of their range [16 U.S.C. ' 1532(20)]. The Secretary, acting through NMFS, is authorized to list marine mammal and fish species. The Secretary of Interior, acting through the FWS, is authorized to list all other

organisms.

In addition to listing species under the ESA, the critical habitat of a newly listed species must be designated concurrent with its listing to the "maximum extent prudent and determinable" [16 U.S.C. ' 1533(b)(1)(A)]. The ESA defines critical habitat as those specific areas that are essential to the conservation of a listed species and that may be in need of special consideration. The primary benefit of critical habitat designation is that it informs Federal agencies that listed species are dependent upon these areas for their continued existence, and that consultation with NMFS on any Federal action that may affect these areas is required. Some species, primarily the cetaceans, listed in 1969 under the Endangered Species Conservation Act and carried forward as endangered under the ESA, have not received critical habitat designations.

Listed Species. The following species are currently listed as endangered or threatened under the ESA and occur in the GOA and/or BSAI:

Endangered

Northern Right Whale	*Balaena glacialis*
Bowhead Whale[1]	*Balaena mysticetus*
Sei Whale	*Balaenoptera borealis*
Blue Whale	*Balaenoptera musculus*
Fin Whale	*Balaenoptera physalus*
Humpback Whale	*Megaptera novaeangliae*
Sperm Whale	*Physeter macrocephalus*
Snake River Sockeye Salmon	*Oncorhynchus nerka*
Short-tailed Albatross	*Diomedia albatrus*
Steller Sea Lion[1]	*Eumetopias jubatus*

Threatened

Snake River Fall Chinook Salmon	*Oncorhynchus tshawytscha*
Snake River Spring/Summer Chinook Salmon	*Oncorhynchus tshawytscha*
Steller Sea Lion[2]	*Eumetopias jubatus*
Spectacled Eider	*Somateria fishcheri*

Section 7 Consultations. Because both groundfish fisheries are federally regulated activities, any negative affects of the fisheries on listed species or critical habitat and any takings[3] that may occur are subject to ESA section 7 consultation. NMFS initiates the consultation and the resulting biological opinions are issued to NMFS. The Council may be invited to participate in the compilation, review, and analysis of data used in the consultations. The determination of whether the action "is likely to jeopardize

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[1]listed as endangered in waters west of Cape Suckling.

[2]listed as threatened in waters east of Cape Suckling.

[3]the term "take" under the ESA means "harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or attempt to engage in any such conduct" (16 U.S.C. ' 1538(a)(1)(B)).

the continued existence of" endangered or threatened species or to result in the destruction or modification of critical habitat, however, is the responsibility of the appropriate agency (NMFS or FWS). If the action is determined to result in jeopardy, the opinion includes reasonable and prudent measures that are necessary to alter the action so that jeopardy is avoided. If an incidental take of a listed species is expected to occur under normal promulgation of the action, an incidental take statement is appended to the biological opinion.

Section 7 consultations have been done for all the above listed species, some individually and some as groups. Below are summaries of the consultations.

Endangered Cetaceans. NMFS concluded a formal section 7 consultation on the effects of the BSAI and GOA groundfish fisheries on endangered cetaceans within the BSAI and GOA on December 14, 1979, and April 19, 1991, respectively. These opinions concluded that the fisheries are unlikely to jeopardize the continued existence or recovery of endangered whales. Consideration of the bowhead whale as one of the listed species present within the area of the Bering Sea fishery was not recognized in the 1979 opinion, however, its range and status are not known to have changed. No new information exists that would cause NMFS to alter the conclusion of the 1979 or 1991 opinions. NMFS has no plan to reopen Section 7 consultations on the listed cetaceans for this action. Of note, however, are observations of Northern Right Whales during Bering Sea stock assessment cruises in the summer of 1997 (NMFS pers. commun.). Prior to these sightings, and one observation of a group of two whales in 1996, confirmed sightings had not occurred.

Steller sea lion. The Steller sea lion range extends from California and associated waters to Alaska, including the Gulf of Alaska and Aleutian Islands, and into the Bering Sea and North Pacific and into Russian waters and territory. In 1997, based on biological information collected since the species was listed as threatened in 1990 (60 FR 51968), NMFS reclassified Steller sea lions as two distinct population segments under the ESA (62 FR 24345). The Steller sea lion population segment west of 144EW. longitude (a line near Cape Suckling, Alaska) is listed as endangered; the remainder of the U.S. Steller sea lion population maintains the threatened listing.

NMFS designated critical habitat in 1993 (58 FR 45278) for the Steller sea lion based on the Recovery Team's determination of habitat sites essential to reproduction, rest, refuge, and feeding. Listed critical habitats in Alaska include all rookeries, major haul-outs, and specific aquatic foraging habitats of the BSAI and GOA. The designation does not place any additional restrictions on human activities within designated areas. No changes in critical habitat designation were made as result of the 1997 re-listing.

Beginning in 1990 when Steller sea lions were first listed under the ESA, NMFS determined that both groundfish fisheries may adversely affect Steller sea lions, and therefore conducted Section 7 consultation on the overall fisheries (NMFS 1991), and subsequent changes in the fisheries (NMFS 1992). The most recent biological opinion on the BSAI and GOA fisheries effects on Steller sea lions was issued by NMFS January 26, 1996. It concluded that these fisheries and harvest levels are unlikely to jeopardize the continued existence and recovery of the Steller sea lion or adversely modify critical habitat. NMFS has no plan to reopen Section 7 consultations on Steller sea lions for this action.

Pacific Salmon. No species of Pacific salmon originating from freshwater habitat in Alaska are listed under the ESA. These listed species originate in freshwater habitat in the headwaters of the Columbia

(Snake) River. During ocean migration to the Pacific marine waters a small (undetermined) portion of the stock go into the Gulf of Alaska as far east as the AI. In that habitat they are mixed with hundreds to thousands of other stocks originating from the Columbia River, British Columbia, Alaska, and Asia. The listed fish are not visually distinguishable from the other, unlisted, stocks. Mortal take of them in the chinook salmon bycatch portion of the fisheries is assumed based on sketchy abundance, timing, and migration pattern information.

NMFS designated critical habitat in 1992 (57 FR 57051) for the for the Snake River sockeye, Snake River spring/summer chinook, and Snake River fall chinook salmon. The designations did not include any marine waters, therefore, does not include any of the habitat where the groundfish fisheries are promulgated.

NMFS has issued two biological opinions and no-jeopardy determinations for listed Pacific salmon in the Alaska groundfish fisheries (NMFS 1994, NMFS 1995). Conservation measures were recommended to reduce salmon bycatch and improve the level of information about the salmon bycatch. The no jeopardy determination was based on the assumption that if total salmon bycatch is controlled, the impacts to listed salmon are also controlled. The incidental take statement appended to the second biological opinion allowed for take of one Snake River fall chinook and zero take of either Snake River spring/summer chinook or Snake River sockeye, per year. As explained above, it is not technically possible to know if any have been taken. Compliance with the biological opinion is stated in terms of limiting salmon bycatch per year to under 55,000 and 40,000 for chinook salmon, and 200 and 100 sockeye salmon in the BSAI and GOA fisheries, respectively.

Short-tailed albatross. The entire world population in 1995 was estimated as 800 birds; 350 adults breed on two small islands near Japan. The population is growing but is still critically endangered because of its small size and restricted breeding range. Past observations indicate that older short-tailed albatrosses are present in Alaska primarily during the summer and fall months along the shelf break from the Alaska Peninsula to the Gulf of Alaska, although 1- and 2-year old juveniles may be present at other times of the year (FWS 1993). Consequently, these albatrosses generally would be exposed to fishery interactions most often during the summer and fall--during the latter part of the second and the whole of the third fishing quarters.

Short-tailed albatrosses reported caught in the longline fishery include two in 1995, one in October 1996, and none so far in 1997. Both 1995 birds were caught in the vicinity of Unimak Pass and were taken outside the observers' statistical samples.

Formal consultation on the effects of the groundfish fisheries on the short-tailed albatross under the jurisdiction of the FWS concluded that BSAI and GOA groundfish fisheries would adversely affect the short-tailed albatross and would result in the incidental take of up to two birds per year, but would not jeopardize the continued existence of that species (FWS 1989). Subsequent consultations for changes to the fishery that might affect the short-tailed albatross also concluded no jeopardy (FWS 1995, FWS 1997). The US Fish and Wildlife Service does not intend to renew consultation for the 1998 groundfish fisheries.

Spectacled Eider. These sea ducks feed on benthic mollusks and crustaceans taken in shallow marine waters or on pelagic crustaceans. The marine range for spectacled eider is not known, although Dau and

Kitchinski (1977) review evidence that they winter near the pack ice in the northern Bering Sea. Spectacled eider are rarely seen in U.S. waters except in August through September when they molt in northeast Norton Sound and in migration near St. Lawrence Island. The lack of observations in U.S. waters suggests that, if not confined to sea ice polyneas, they likely winter near the Russian coast (FWS 1993). Although the species is noted as occurring in the GOA and BSAI management areas no evidence that they interact with these groundfish fisheries exists.

Conditions for Reinitiation of Consultation. For all ESA listed species, consultation must be reinitiated if: the amount or extent of taking specified in the Incidental Take Statement is exceeded, new information reveals effects of the action that may affect listed species in a way not previously considered, the action is subsequently modified in a manner that causes an effect to listed species that was not considered in the biological opinion, or a new species is listed or critical habitat is designated that may be affected by the action.

Impacts of the Alternatives on Endangered or Threatened Species. None of the alternatives under consideration would affect the prosecution of the groundfish fisheries of the BSAI or GOA in a way not previously considered in the above consultations. None of the alternatives are expected to increase overall TAC amounts, PSC limits, or takes of listed species. Therefore, none of the alternatives are expected to have a significant impact on endangered, threatened, or candidate species.

2.3 Impacts on Marine Mammals

Marine mammals not listed under the ESA that may be present in the BSAI include cetaceans, [minke whale (*Balaenoptera acutorostrata*), killer whale (*Orcinus orca*), Dall's porpoise *(Phocoenoides dalli*), harbor porpoise (*Phocoena phocoena*), Pacific white-sided dolphin (*Lagenorhynchus obliquidens*), and the beaked whales (e.g., *Berardius bairdii* and *Mesoplodon spp.*)] as well as pinnipeds [northern fur seals (*Callorhinus ursinus*), and Pacific harbor seals (*Phoca vitulina*)] and the sea otter (*Enhydra lutris*).

None of the alternatives are expected to increase overall TAC amounts, PSC limits, or takes of marine mammals. Therefore, none of the alternatives are expected to have a significant impact on marine mammals.

2.4 Coastal Zone Management Act

Implementation of each of the alternatives would be conducted in a manner consistent, to the maximum extent practicable, with the Alaska Coastal Management Program within the meaning of Section 30(c)(1) of the Coastal Zone Management Act of 1972 and its implementing regulations.

2.5 Conclusions or Finding of No Significant Impact

None of the alternatives are likely to significantly affect the quality of the human environment, and the preparation of an environmental impact statement for the proposed action is not required by Section 102(2)(C) of the National Environmental Policy Act or its implementing regulations.

_____ _____

Assistant Administrator for Fisheries, NOAA Date

3.0 REGULATORY IMPACT REVIEW

NMFS requires the preparation of a Regulatory Impact Review (RIR) for all regulatory actions that either implement a new FMP or significantly amend an existing plan or regulation. This section provides information about the economic and socioeconomic impacts of the alternatives including identification of the individuals or groups that may be affected by the action, the nature of these impacts, quantification of the economic impacts if possible, and discussion of the tradeoffs between qualitative and quantitative benefits and costs. This section also addresses the requirements of both E.O. 12866 and the Regulatory Flexibility Act (RFA) to provide adequate information to determine whether an action is "significant" under E.O. 12866 or will result in "significant" impacts on small entities under the RFA.

3.1 Executive Order 12866

The requirements for all regulatory actions specified in E.O. 12866 are summarized in the following statement from the order:

> In deciding whether and how to regulate, agencies should assess all costs and benefits of available regulatory alternatives, including the alternative of not regulating. Costs and benefits shall be understood to include both quantifiable measures (to the fullest extent that these can be usefully estimated) and qualitative measures of costs and benefits that are difficult to quantify, but nevertheless essential to consider. Further, in choosing among alternative regulatory approaches, agencies should select those approaches that maximize net benefits (including potential economic, environment, public health and safety, and other advantages; distributive impacts; and equity), unless a statute requires another regulatory approach.

E.O. 12866 requires that the Office of Management and Budget review proposed regulatory programs that are considered to be "significant." A "significant regulatory action" is one that is likely to:

> (1) Have an annual effect on the economy of $100 million or more or adversely affect in a material way the economy, a sector of the economy, productivity, competition, jobs, the environment, public health or safety, or State, local, or tribal governments or communities;
>
> (2) Create a serious inconsistency or otherwise interfere with an action taken or planned by another agency;
>
> (3) Materially alter the budgetary impact of entitlements, grants, user fees, or loan programs or the rights and obligations of recipients thereof; or
>
> (4) Raise novel legal or policy issues arising out of legal mandates, the President's priorities, or the principles set forth in this Executive Order.

Based on the analysis summarized in Tables 1a, 2a, 3b, and 4b, none of the alternatives would have been likely to cause any 1998 groundfish TACs to decrease. Thus, none of the alternatives are expected to result in a "significant regulatory action" as defined in E.O. 12866.

3.2 Regulatory Flexibility Act

The objective of the RFA is to require consideration of the capacity of those affected by regulations to bear the direct and indirect costs of regulation. If an action will have a negative significant impact on a substantial number of small entities, an Initial Regulatory Flexibility Analysis (IRFA) must be prepared to identify the need for the action, alternatives, potential costs and benefits of the action, the distribution of these impacts, and a determination of net benefits.

The Small Business Administration has defined all fish-harvesting or hatchery businesses that are independently owned and operated, not dominant in their field of operation, with annual receipts not in excess of $3,000,000 as small businesses. In additional, seafood processors with 500 employees or fewer, wholesale industry members with 100 employees or fewer, not-for-profit enterprises, and government jurisdictions with a populations of 50,000 or less are considered small entities. NMFS has determined that a "substantial number" of small entities would generally be 20 percent of the total universe of small entities affected by the regulation. A regulation would have a negative "significant impact" on these small entities if it reduced annual gross revenues by more than 5 percent, increased total costs of production by more than 5 percent, or resulted in compliance costs for small entities that are at least 10 percent higher than compliance costs as a percent of sales for large entities, or resulted in at least 2% of the affected small businesses ceasing operation.

Based on the analysis summarized in Tables 1a, 2a, 3b, and 4b, none of the alternatives would have been likely to cause any 1998 groundfish TACs to decrease. Thus, none of the alternatives are anticipated to result in a negative significant impact on small entities participating in the BSAI or GOA groundfish fisheries.

4.0 REFERENCES

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Tables

Gulf of Alaska

	Quantities Used in Control Rules								1998 Fishing Mortality Rates					
	Proxy Level				Value (Alternative 3 shaded)				Alternative 1		Alternative 2		Alternative 3	
Species	B	β	ϕ	γ	B	β	ϕ	γ	OFL	ABC	OFL	ABC	OFL	ABC
Walleye pollock	1	2	2	2	258,000	234,000	0.43	0.36	0.50	0.34	0.43	0.36	0.43	0.36
Pacific cod	1	2	2	2	146,000	93,600	0.41	0.34	0.45	0.18	0.41	0.34	0.41	0.34
Arrowtooth flounder	1	2	2	2	1,010,000	238,000	0.23	0.19	0.28	0.19	0.23	0.19	0.23	0.19
Sablefish	1	2	2	2	153,000	158,000	0.14	0.12	0.15	0.085	0.14	0.12	0.14	0.12
Pacific ocean perch	1	2	2	2	107,000	127,000	0.094	0.076	0.079	0.055	0.078	0.063	0.078	0.063
Thornyhead rockfish	1	2	2	2	22,800	14,400	0.098	0.080	0.12	0.080	0.098	0.080	0.098	0.080
Rex sole	1	3	3	3	72,300	45,200	0.20	0.15	0.20	0.15	0.20	0.15	0.20	0.15
Flathead sole	1	3	3	3	206,000	129,000	0.20	0.15	0.20	0.15	0.20	0.15	0.20	0.15
Shallow water flatfish	1	3	2,3	2,3	316,000	197,000	0.21	0.15	0.21	0.15	0.21	0.15	0.21	0.15
Shortraker/rougheye	1	3	2,3	2,3	65,400	40,900	0.042	0.030	0.042	0.030	0.042	0.030	0.042	0.030
Other slope rockfish	1	3	2,3	2,3	104,000	64,800	0.073	0.053	0.073	0.053	0.073	0.053	0.073	0.053
Northern rockfish	1	3	2	2	83,400	52,100	0.11	0.075	0.11	0.060	0.11	0.075	0.11	0.075
Pelagic shelf rockfish	1	3	2	2	55,600	34,800	0.15	0.10	0.15	0.090	0.15	0.10	0.15	0.10
Demersal shelf rockfish	1,2	3	2	2	27,500	17,200	0.038	0.025	0.038	0.020	0.038	0.025	0.038	0.025
Deep water flatfish	1,2	3	3	3	103,000	64,400	0.10	0.076			0.10	0.076	0.10	0.076
Atka mackerel	2	3	3	3	23,100	14,500	0.30	0.23			0.30	0.23	0.30	0.23
Other species	2	3	4	4										

Table 1a. Impacts of alternatives on 1998 OFL and ABC fishing mortality rates in the GOA, assuming that poorly understood stocks are all judged to be at a **high** level of abundance under Alternative 3. The columns under the heading "Quantities Used in Control Rules" show which proxies would have been substituted for each of the four quantities used in the control rules defined by Alternatives 2 and 3, along with the values of those proxies. The columns under the heading "1998 Fishing Mortality Rates" show the fishing mortality rates corresponding to OFL and ABC. In the case of Alternative 1, these are the rates corresponding to the OFL and ABC values actually specified for 1998. In the case of Alternatives 2 and 3, these are the rates emerging from the control rules, given the estimates shown in the "Value" columns (note that the ABC rate shown is thus an upper limit; i.e., the Council could choose a lower value). Stocks for which objective estimates of both B and β are available (i.e., those for which Proxy 1 is used for B and Proxy 1 or 2 is used for β) are shown in the upper portion of the table. For the stocks in the lower portion of the table, Alternative 3 requires the SSC to use its best subjective estimate of B or β when an objective estimate is unavailable. The shaded cells in this table show hypothetical examples of such estimates. For these stocks, Alternative 2 always assumes a moderate level of abundance.

Gulf of Alaska

	Quantities Used in Control Rules								1998 Fishing Mortality Rates					
	Proxy Level				Value (Alternative 3 shaded)				Alternative 1		Alternative 2		Alternative 3	
Species	B	β	ϕ	γ	B	β	ϕ	γ	OFL	ABC	OFL	ABC	OFL	ABC
Walleye pollock	1	2	2	2	258,000	234,000	0.43	0.36	0.50	0.34	0.43	0.36	0.43	0.36
Pacific cod	1	2	2	2	146,000	93,600	0.41	0.34	0.45	0.18	0.41	0.34	0.41	0.34
Arrowtooth flounder	1	2	2	2	1,010,000	238,000	0.23	0.19	0.28	0.19	0.23	0.19	0.23	0.19
Sablefish	1	2	2	2	153,000	158,000	0.14	0.12	0.15	0.085	0.14	0.12	0.14	0.12
Pacific ocean perch	1	2	2	2	107,000	127,000	0.094	0.076	0.079	0.055	0.078	0.063	0.078	0.063
Thornyhead rockfish	1	2	2	2	22,800	14,400	0.098	0.080	0.12	0.080	0.098	0.080	0.098	0.080
Rex sole	1	3	3	3	72,300	72,300	0.20	0.15	0.20	0.15	0.20	0.15	0.20	0.15
Flathead sole	1	3	3	3	206,000	206,000	0.20	0.15	0.20	0.15	0.20	0.15	0.20	0.15
Shallow water flatfish	1	3	2,3	2,3	316,000	316,000	0.21	0.15	0.21	0.15	0.21	0.15	0.21	0.15
Shortraker/rougheye	1	3	2,3	2,3	65,400	65,400	0.042	0.030	0.042	0.030	0.042	0.030	0.042	0.030
Other slope rockfish	1	3	2,3	2,3	104,000	104,000	0.073	0.053	0.073	0.053	0.073	0.053	0.073	0.053
Northern rockfish	1	3	2	2	83,400	83,400	0.11	0.075	0.11	0.060	0.11	0.075	0.11	0.075
Pelagic shelf rockfish	1	3	2	2	55,600	55,600	0.15	0.10	0.15	0.090	0.15	0.10	0.15	0.10
Demersal shelf rockfish	1,2	3	2	2	27,500	27,500	0.038	0.025	0.038	0.020	0.038	0.025	0.038	0.025
Deep water flatfish	1,2	3	3	3	102,000	102,000	0.10	0.076			0.10	0.076	0.10	0.076
Atka mackerel	2	3	3	3	14,500	14,500	0.30	0.23			0.30	0.23	0.30	0.23
Other species	2	3	4	4										

Table 1b. Impacts of alternatives on 1998 OFL and ABC fishing mortality rates in the GOA, assuming that poorly understood stocks are all judged to be at a **moderate** level of abundance under Alternative 3. The columns under the heading "Quantities Used in Control Rules" show which proxies would have been substituted for each of the four quantities used in the control rules defined by Alternatives 2 and 3, along with the values of those proxies. The columns under the heading "1998 Fishing Mortality Rates" show the fishing mortality rates corresponding to OFL and ABC. In the case of Alternative 1, these are the rates corresponding to the OFL and ABC values actually specified for 1998. In the case of Alternatives 2 and 3, these are the rates emerging from the control rules, given the estimates shown in the "Value" columns (note that the ABC rate shown is thus an upper limit; i.e., the Council could choose a lower value). Stocks for which objective estimates of both B and β are available (i.e., those for which Proxy 1 is used for B and Proxy 1 or 2 is used for β) are shown in the upper portion of the table. For the stocks in the lower portion of the table, Alternative 3 requires the SSC to use its best subjective estimate of B or β when an objective estimate is unavailable. The shaded cells in this table show hypothetical examples of such estimates. For these stocks, Alternative 2 always assumes a moderate level of abundance.

Gulf of Alaska

	Quantities Used in Control Rules								1998 Fishing Mortality Rates					
	Proxy Level				Value (Alternative 3 shaded)				Alternative 1		Alternative 2		Alternative 3	
Species	B	β	ϕ	γ	B	β	ϕ	γ	OFL	ABC	OFL	ABC	OFL	ABC
Walleye pollock	1	2	2	2	258,000	234,000	0.43	0.36	0.50	0.34	0.43	0.36	0.43	0.36
Pacific cod	1	2	2	2	146,000	93,600	0.41	0.34	0.45	0.18	0.41	0.34	0.41	0.34
Arrowtooth flounder	1	2	2	2	1,010,000	238,000	0.23	0.19	0.28	0.19	0.23	0.19	0.23	0.19
Sablefish	1	2	2	2	153,000	158,000	0.14	0.12	0.15	0.085	0.14	0.12	0.14	0.12
Pacific ocean perch	1	2	2	2	107,000	127,000	0.094	0.076	0.079	0.055	0.078	0.063	0.078	0.063
Thornyhead rockfish	1	2	2	2	22,800	14,400	0.098	0.080	0.12	0.080	0.098	0.080	0.098	0.080
Rex sole	1	3	3	3	72,300	117,000	0.20	0.15	0.20	0.15	0.20	0.15	0.12	0.09
Flathead sole	1	3	3	3	206,000	333,000	0.20	0.15	0.20	0.15	0.20	0.15	0.12	0.09
Shallow water flatfish	1	3	2,3	2,3	316,000	509,000	0.21	0.15	0.21	0.15	0.21	0.15	0.12	0.09
Shortraker/rougheye	1	3	2,3	2,3	65,400	105,000	0.042	0.030	0.042	0.030	0.042	0.030	0.025	0.018
Other slope rockfish	1	3	2,3	2,3	104,000	167,000	0.073	0.053	0.073	0.053	0.073	0.053	0.044	0.032
Northern rockfish	1	3	2	2	83,400	134,000	0.11	0.075	0.11	0.060	0.11	0.075	0.07	0.045
Pelagic shelf rockfish	1	3	2	2	55,600	89,700	0.15	0.10	0.15	0.090	0.15	0.10	0.09	0.06
Demersal shelf rockfish	1,2	3	2	2	27,500	44,400	0.038	0.025	0.038	0.020	0.038	0.025	0.023	0.015
Deep water flatfish	1,2	3	3	3	102,000	165,000	0.10	0.075			0.10	0.075	0.06	0.045
Atka mackerel	2	3	3	3	8,960	14,500	0.30	0.23			0.30	0.23	0.18	0.13
Other species	2	3	4	4										

Table 1c. Impacts of alternatives on 1998 OFL and ABC fishing mortality rates in the GOA, assuming that poorly understood stocks are all judged to be at a **low** level of abundance under Alternative 3. The columns under the heading "Quantities Used in Control Rules" show which proxies would have been substituted for each of the four quantities used in the control rules defined by Alternatives 2 and 3, along with the values of those proxies. The columns under the heading "1998 Fishing Mortality Rates" show the fishing mortality rates corresponding to OFL and ABC. In the case of Alternative 1, these are the rates corresponding to the OFL and ABC values actually specified for 1998. In the case of Alternatives 2 and 3, these are the rates emerging from the control rules, given the estimates shown in the "Value" columns (note that the ABC rate shown is thus an upper limit; i.e., the Council could choose a lower value). Stocks for which objective estimates of both B and β are available (i.e., those for which Proxy 1 is used for B and Proxy 1 or 2 is used for β) are shown in the upper portion of the table. For the stocks in the lower portion of the table, Alternative 3 requires the SSC to use its best subjective estimate of B or β when an objective estimate is unavailable. The shaded cells in this table show hypothetical examples of such estimates. For these stocks, Alternative 2 always assumes a moderate level of abundance.

	Quantities Used in Control Rules								1998 Fishing Mortality Rates					
	Proxy Level				Value (Alternative 3 shaded)				Alternative 1		Alternative 2		Alternative 3	
Species	B	β	ϕ	γ	B	β	ϕ	γ	OFL	ABC	OFL	ABC	OFL	ABC
Walleye pollock	1	2	2	2	258,000	234,000	0.43	0.36	0.50	0.34	0.43	0.36	0.43	0.36
Pacific cod	1	2	2	2	146,000	93,600	0.41	0.34	0.45	0.18	0.41	0.34	0.41	0.34
Arrowtooth flounder	1	2	2	2	1,010,000	238,000	0.23	0.19	0.28	0.19	0.23	0.19	0.23	0.19
Sablefish	1	2	2	2	153,000	158,000	0.14	0.12	0.15	0.085	0.14	0.12	0.14	0.12
Pacific ocean perch	1	2	2	2	107,000	127,000	0.094	0.076	0.079	0.055	0.078	0.063	0.078	0.063
Thornyhead rockfish	1	2	2	2	22,800	14,400	0.098	0.080	0.12	0.080	0.098	0.080	0.098	0.080
Rex sole	1	3	3	3	72,300	301,000	0.20	0.15	0.20	0.15	0.20	0.15	0.04	0.03
Flathead sole	1	3	3	3	206,000	859,000	0.20	0.15	0.20	0.15	0.20	0.15	0.04	0.03
Shallow water flatfish	1	3	2,3	2,3	316,000	1,310,000	0.21	0.15	0.21	0.15	0.21	0.15	0.04	0.03
Shortraker/rougheye	1	3	2,3	2,3	65,400	272,000	0.042	0.030	0.042	0.030	0.042	0.030	0.008	0.006
Other slope rockfish	1	3	2,3	2,3	104,000	432,000	0.073	0.053	0.073	0.053	0.073	0.053	0.015	0.011
Northern rockfish	1	3	2	2	83,400	347,000	0.11	0.075	0.11	0.060	0.11	0.075	0.02	0.015
Pelagic shelf rockfish	1	3	2	2	55,600	232,000	0.15	0.10	0.15	0.090	0.15	0.10	0.03	0.02
Demersal shelf rockfish	1,2	3	2	2	27,500	115,000	0.038	0.025	0.038	0.020	0.038	0.025	0.008	0.005
Deep water flatfish	1,2	3	3	3	102,000	424,000	0.10	0.075			0.10	0.075	0.02	0.015
Atka mackerel	2	3	3	3	3,470	14,500	0.30	0.23			0.30	0.23	0.06	0.04
Other species	2	3	4	4										

Table 1d. Impacts of alternatives on 1998 OFL and ABC fishing mortality rates in the GOA, assuming that poorly understood stocks are all judged to be **overfished** under Alternative 3. The columns under the heading "Quantities Used in Control Rules" show which proxies would have been substituted for each of the four quantities used in the control rules defined by Alternatives 2 and 3, along with the values of those proxies. The columns under the heading "1998 Fishing Mortality Rates" show the fishing mortality rates corresponding to OFL and ABC. In the case of Alternative 1, these are the rates corresponding to the OFL and ABC values actually specified for 1998. In the case of Alternatives 2 and 3, these are the rates emerging from the control rules, given the estimates shown in the "Value" columns (note that the ABC rate shown is thus an upper limit; i.e., the Council could choose a lower value). Stocks for which objective estimates of both B and β are available (i.e., those for which Proxy 1 is used for B and Proxy 1 or 2 is used for β) are shown in the upper portion of the table. For the stocks in the lower portion of the table, Alternative 3 requires the SSC to use its best subjective estimate of B or β when an objective estimate is unavailable. The shaded cells in this table show hypothetical examples of such estimates. For these stocks, Alternative 2 always assumes a moderate level of abundance.

1998 Catch Specifications

Species	Alternative 1			Alternative 2			Alternative 3		
	OFL	ABC	TAC	OFL	ABC	TAC	OFL	ABC	TAC
Walleye pollock	186,100	130,000	124,730	160,000	130,000	124,730	160,000	130,000	124,730
Pacific cod	141,000	77,900	63,470	128,000	77,900	63,470	128,000	77,900	63,470
Arrowtooth flounder	295,970	208,340	35,000	243,000	208,340	35,000	243,000	208,340	35,000
Sablefish	23,450	14,120	14,120	21,200	14,120	14,120	21,200	14,120	14,120
Pacific ocean perch	18,090	12,820	10,776	18,000	12,820	10,776	18,000	12,820	10,776
Thornyhead rockfish	2,840	2,000	2,000	2,320	2,000	2,000	2,320	2,000	2,000
Rex sole	11,920	9,150	9,150	11,900	9,150	9,150	11,900	9,150	9,150
Flathead sole	34,010	26,110	9,040	34,000	26,110	9,040	34,000	26,110	9,040
Shallow water flatfish	59,540	43,150	18,630	59,500	43,150	18,630	59,500	43,150	18,630
Shortraker/rougheye	2,740	1,590	1,590	2,740	1,590	1,590	2,740	1,590	1,590
Other slope rockfish	7,560	5,260	2,170	7,560	5,260	2,170	7,560	5,260	2,170
Northern rockfish	9,420	5,000	5,000	9,420	5,000	5,000	9,420	5,000	5,000
Pelagic shelf rockfish	8,390	5,260	5,260	8,390	5,260	5,260	8,390	5,260	5,260
Demersal shelf rockfish	950	560	560	950	560	560	950	560	560
Deep water flatfish	9,440	7,170	7,170	10,400	7,170	7,170	10,400	7,170	7,170
Atka mackerel	6,200	600	600	6,930	600	600	6,930	600	600
Other species			15,460			15,460			15,460
Total	817,620	549,030	324,726	724,310	549,030	324,726	724,310	549,030	324,726

Table 2a. Impacts of alternatives on 1998 catch specifications in the GOA, assuming that poorly understood stocks are all judged to be at a **high** level of abundance under Alternative 3. In the case of Alternative 1, the values listed under OFL, ABC, and TAC for each species are the values actually specified for 1998. In the case of Alternative 2, the value listed under OFL for each species is the value emerging from application of the limit control rule, the value listed under ABC for each species is the lesser of the ABC under Alternative 1 and the value emerging from application of the target-control rule, and the value listed under TAC for each species is the lesser of the ABC under Alternative 2 and the TAC under Alternative 1. In the case of Alternative 3, the values listed under OFL, ABC, and TAC for each species are analogous to those listed under Alternative 2. Stocks for which objective estimates of both B and β are available (i.e., those for which Proxy 1 is used for B and Proxy 1 or 2 is used for β) are shown in the upper portion of the table. For the stocks in the lower portion of the table, Alternative 3 requires the SSC to use its best subjective estimate of B or β when an objective estimate is unavailable. Under the scenario shown in this table, no reductions in 1998 TACs would have been required under Alternative 2 or Alternative 3.

Gulf of Alaska

	1998 Catch Specifications								
	Alternative 1			Alternative 2			Alternative 3		
Species	OFL	ABC	TAC	OFL	ABC	TAC	OFL	ABC	TAC
Walleye pollock	186,100	130,000	124,730	160,000	130,000	124,730	160,000	130,000	124,730
Pacific cod	141,000	77,900	63,470	128,000	77,900	63,470	128,000	77,900	63,470
Arrowtooth flounder	295,970	208,340	35,000	243,000	208,340	35,000	243,000	208,340	35,000
Sablefish	23,450	14,120	14,120	21,200	14,120	14,120	21,200	14,120	14,120
Pacific ocean perch	18,090	12,820	10,776	18,000	12,820	10,776	18,000	12,820	10,776
Thornyhead rockfish	2,840	2,000	2,000	2,320	2,000	2,000	2,320	2,000	2,000
Rex sole	11,920	9,150	9,150	11,900	9,150	9,150	11,900	9,150	9,150
Flathead sole	34,010	26,110	9,040	34,000	26,110	9,040	34,000	26,110	9,040
Shallow water flatfish	59,540	43,150	18,630	59,500	43,150	18,630	59,500	43,150	18,630
Shortraker/rougheye	2,740	1,590	1,590	2,740	1,590	1,590	2,740	1,590	1,590
Other slope rockfish	7,560	5,260	2,170	7,560	5,260	2,170	7,560	5,260	2,170
Northern rockfish	9,420	5,000	5,000	9,420	5,000	5,000	9,420	5,000	5,000
Pelagic shelf rockfish	8,390	5,260	5,260	8,390	5,260	5,260	8,390	5,260	5,260
Demersal shelf rockfish	950	560	560	950	560	560	950	560	560
Deep water flatfish	9,440	7,170	7,170	10,300	7,170	7,170	10,300	7,170	7,170
Atka mackerel	6,200	600	600	4,350	600	600	4,350	600	600
Other species			15,460			15,460			15,460
Total	817,620	549,030	324,726	721,630	549,030	324,726	721,630	549,030	324,726

Table 2b. Impacts of alternatives on 1998 catch specifications in the GOA, assuming that poorly understood stocks are all judged to be at a **moderate** level of abundance under Alternative 3. In the case of Alternative 1, the values listed under OFL, ABC, and TAC for each species are the values actually specified for 1998. In the case of Alternative 2, the value listed under OFL for each species is the value emerging from application of the limit control rule, the value listed under ABC for each species is the lesser of the ABC under Alternative 1 and the value emerging from application of the target control rule, and the value listed under TAC for each species is the lesser of the ABC under Alternative 2 and the TAC under Alternative 1. In the case of Alternative 3, the values listed under OFL, ABC, and TAC for each species are analogous to those listed under Alternative 2. Stocks for which objective estimates of both B and β are available (i.e., those for which Proxy 1 is used for B and Proxy 1 or 2 is used for β) are shown in the upper portion of the table. For the stocks in the lower portion of the table, Alternative 3 requires the SSC to use its best subjective estimate of B or β when an objective estimate is unavailable. Under the scenario shown in this table, no reductions in 1998 TACs would have been required under Alternative 2 or Alternative 3.

1998 Catch Specifications

Species	Alternative 1			Alternative 2			Alternative 3		
	OFL	ABC	TAC	OFL	ABC	TAC	OFL	ABC	TAC
Walleye pollock	186,100	130,000	124,730	160,000	130,000	124,730	160,000	130,000	124,730
Pacific cod	141,000	77,900	63,470	128,000	77,900	63,470	128,000	77,900	63,470
Arrowtooth flounder	295,970	208,340	35,000	243,000	208,340	35,000	243,000	208,340	35,000
Sablefish	23,450	14,120	14,120	21,200	14,120	14,120	21,200	14,120	14,120
Pacific ocean perch	18,090	12,820	10,776	18,000	12,820	10,776	18,000	12,820	10,776
Thornyhead rockfish	2,840	2,000	2,000	2,320	2,000	2,000	2,320	2,000	2,000
Rex sole	11,920	9,150	9,150	11,900	9,150	9,150	7,130	5,470	5,470
Flathead sole	34,010	26,110	9,040	34,000	26,110	9,040	20,400	15,600	9,040
Shallow water flatfish	59,540	43,150	18,630	59,500	43,150	18,630	35,800	25,900	18,630
Shortraker/rougheye	2,740	1,590	1,590	2,740	1,590	1,590	1,650	959	959
Other slope rockfish	7,560	5,260	2,170	7,560	5,260	2,170	4,560	3,170	2,170
Northern rockfish	9,420	5,000	5,000	9,420	5,000	5,000	5,680	3,770	3,770
Pelagic shelf rockfish	8,390	5,260	5,260	8,390	5,260	5,260	5,030	3,510	3,510
Demersal shelf rockfish	950	560	560	950	560	560	569	420	420
Deep water flatfish	9,440	7,170	7,170	10,200	7,170	7,170	6,130	4,600	4,600
Atka mackerel	6,200	600	600	2,690	600	600	1,610	600	600
Other species			15,460			15,460			15,460
Total	817,620	549,030	324,726	719,870	549,030	324,726	661,079	509,179	314,725

Table 2c. Impacts of alternatives on 1998 catch specifications in the GOA, assuming that poorly understood stocks are all judged to be at a **low** level of abundance under Alternative 3. In the case of Alternative 1, the values listed under OFL, ABC, and TAC for each species are the values actually specified for 1998. In the case of Alternative 2, the value listed under OFL for each species is the value emerging from application of the limit control rule, the value listed under ABC for each species is the lesser of the ABC under Alternative 1 and the value emerging from application of the target control rule, and the value listed under TAC for each species is the lesser of the ABC under Alternative 2 and the TAC under Alternative 1. In the case of Alternative 3, the values listed under OFL, ABC, and TAC for each species are analogous to those listed under Alternative 2. Stocks for which objective estimates of both B and β are available (i.e., those for which Proxy 1 is used for B and Proxy 1 or 2 is used for β) are shown in the upper portion of the table. For the stocks in the lower portion of the table, Alternative 3 requires the SSC to use its best subjective estimate of B or β when an objective estimate is unavailable. The shaded cells in this table show instances where reductions in 1998 TACs would have been required under Alternative 3. No reductions in 1998 TACs would have been required under Alternative 2.

Gulf of Alaska

1998 Catch Specifications

Species	Alternative 1			Alternative 2			Alternative 3		
	OFL	ABC	TAC	OFL	ABC	TAC	OFL	ABC	TAC
Walleye pollock	186,100	130,000	124,730	160,000	130,000	124,730	160,000	130,000	124,730
Pacific cod	141,000	77,900	63,470	128,000	77,900	63,470	128,000	77,900	63,470
Arrowtooth flounder	295,970	208,340	35,000	243,000	208,340	35,000	243,000	208,340	35,000
Sablefish	23,450	14,120	14,120	21,200	14,120	14,120	21,200	14,120	14,120
Pacific ocean perch	18,090	12,820	10,776	18,000	12,820	10,776	18,000	12,820	10,776
Thornyhead rockfish	2,840	2,000	2,000	2,320	2,000	2,000	2,320	2,000	2,000
Rex sole	11,920	9,150	9,150	11,900	9,150	9,150	2,390	1,830	1,830
Flathead sole	34,010	26,110	9,040	34,000	26,110	9,040	6,800	5,220	5,220
Shallow water flatfish	59,540	43,150	18,630	59,500	43,150	18,630	12,000	8,690	8,690
Shortraker/rougheye	2,740	1,590	1,590	2,740	1,590	1,590	549	319	319
Other slope rockfish	7,560	5,260	2,170	7,560	5,260	2,170	1,520	1,060	1,060
Northern rockfish	9,420	5,000	5,000	9,420	5,000	5,000	1,890	1,250	1,250
Pelagic shelf rockfish	8,390	5,260	5,260	8,390	5,260	5,260	1,670	1,170	1,170
Demersal shelf rockfish	950	560	560	950	560	560	189	139	139
Deep water flatfish	9,440	7,170	7,170	10,200	7,170	7,170	2,050	1,540	1,540
Atka mackerel	6,200	600	600	1,040	600	600	207	156	156
Other species			15,460			15,460			15,460
Total	817,620	549,030	324,726	718,220	549,030	324,726	601,785	466,554	286,930

Table 2d. Impacts of alternatives on 1998 catch specifications in the GOA, assuming that poorly understood stocks are all judged to be **overfished** under Alternative 3. In the case of Alternative 1, the values listed under OFL, ABC, and TAC for each species are the values actually specified for 1998. In the case of Alternative 2, the value listed under OFL for each species is the value emerging from application of the limit control rule, the value listed under ABC for each species is the lesser of the ABC under Alternative 1 and the value emerging from application of the target control rule, and the value listed under TAC for each species is the lesser of the ABC under Alternative 2 and the TAC under Alternative 1. In the case of Alternative 3, the values listed under OFL, ABC, and TAC for each species are analogous to those listed under Alternative 2. Stocks for which objective estimates of both B and β are available (i.e., those for which Proxy 1 is used for B and Proxy 1 or 2 is used for β) are shown in the upper portion of the table. For the stocks in the lower portion of the table, Alternative 3 requires the SSC to use its best subjective estimate of B or β when an objective estimate is unavailable. The shaded cells in this table show instances where reductions in 1998 TACs would have been required under Alternative 3. No reductions in 1998 TACs would have been required under Alternative 2.

	Quantities Used in Control Rules								1998 Fishing Mortality Rates					
	Proxy Level				Value (Alternative 3 shaded)				Alternative 1		Alternative 2		Alternative 3	
Species	B	β	ϕ	γ	B	β	ϕ	γ	OFL	ABC	OFL	ABC	OFL	ABC
Walleye pollock (EBS)	1	1	1	1	5,820,000	6,000,000	0.38	0.31	0.66	0.30	0.37	0.30	0.37	0.30
Pacific cod	1	2	2	2	383,000	308,000	0.35	0.29	0.42	0.25	0.35	0.29	0.35	0.29
Yellowfin sole	1	2	2	2	757,000	519,000	0.13	0.11	0.16	0.11	0.13	0.11	0.13	0.11
Greenland turbot	1	2	2	2	95,000	121,000	0.32	0.26	0.27	0.17	0.25	0.20	0.25	0.20
Rock sole	1	2	2	2	650,000	234,000	0.19	0.16	0.23	0.16	0.19	0.16	0.19	0.16
Sablefish (EBS)	1	2	2	2	16,800	17,300	0.14	0.12	0.15	0.085	0.14	0.12	0.14	0.12
Sablefish (AI)	1	2	2	2	19,300	20,000	0.14	0.12	0.15	0.085	0.13	0.12	0.13	0.12
True POP (EBS)	1	2	2	2	23,900	30,100	0.072	0.058	0.056	0.031	0.06	0.05	0.06	0.05
True POP (AI)	1	2	2	2	129,000	111,000	0.084	0.068	0.096	0.055	0.08	0.07	0.08	0.07
Atka mackerel	1	2	2	2	152,000	127,000	0.42	0.34	0.50	0.23	0.42	0.34	0.42	0.34
Walleye pollock (AI)	1	3	3	3	106,000	66,300	0.30	0.23	0.30	0.23	0.30	0.23	0.30	0.23
Walleye pollock (Bog.)	1	3	2	2	280,000	1,750,000	0.33	0.27	0.035	0.026	0.33	0.27	0.038	0.031
Arrowtooth flounder	1	3	2	2	531,000	332,000	0.28	0.23	0.36	0.23	0.28	0.23	0.28	0.23
Flathead sole	1	3	2	2	824,000	515,000	0.19	0.16	0.23	0.16	0.19	0.16	0.19	0.16
Other flatfish	1	2,3	2	2	313,000	162,000	0.32	0.26	0.39	0.26	0.32	0.26	0.32	0.26
Other red rockfish (EBS)	1	3	3	3	11,600	7,270	0.031	0.023	0.031	0.023	0.031	0.023	0.031	0.023
Sharpchin/Northern (AI)	1	3	3	3	94,000	58,800	0.060	0.045	0.060	0.045	0.060	0.045	0.060	0.045
Shortraker/Rougheye (AI)	1	3	3	3	46,500	29,100	0.028	0.021	0.028	0.021	0.028	0.021	0.028	0.021
Other rockfish (EBS)	1	3	3	3	7,030	4,390	0.070	0.053	0.070	0.053	0.070	0.053	0.070	0.053
Other rockfish (AI)	1	3	3	3	13,000	8,130	0.070	0.053	0.070	0.053	0.070	0.053	0.070	0.053
Other Species	1	3	3	3	669,000	418,000	0.20	0.15	0.20	0.039	0.20	0.15	0.20	0.15
Squid	2	3	3	3	4,680	2,920	0.80	0.60	0.80	0.60	0.80	0.60	0.80	0.60

Table 3a. Impacts of alternatives on 1998 OFL and ABC fishing mortality rates in the BSAI, assuming that poorly understood stocks are all judged to be at a **high** level of abundance under Alternative 3. The columns under the heading "Quantities Used in Control Rules" show which proxies would have been substituted for each of the four quantities used in the control rules defined by Alternatives 2 and 3, along with the values of those proxies. The columns under the heading "1998 Fishing Mortality Rates" show the fishing mortality rates corresponding to OFL and ABC. In the case of Alternative 1, these are the rates corresponding to the OFL and ABC values actually specified for 1998. In the case of Alternatives 2 and 3, these are the rates emerging from the control rules, given the estimates shown in the "Value" columns (note that the ABC rate shown is thus an upper limit; i.e., the Council could choose a lower value). Stocks for which objective estimates of both B and β are available (i.e., those for which Proxy 1 is used for B and Proxy 1 or 2 is used for β) are shown in the upper portion of the table. For the stocks in the lower portion of the table, Alternative 3 requires the SSC to use its best subjective estimate of B or β when an objective estimate is unavailable. The shaded cells in this table show hypothetical examples of such estimates. For these stocks, Alternative 2 always assumes a moderate level of abundance.

	Quantities Used in Control Rules								1998 Fishing Mortality Rates					
	Proxy Level				Value (Alternative 3 shaded)				Alternative 1		Alternative 2		Alternative 3	
Species	B	β	ϕ	γ	B	β	ϕ	γ	OFL	ABC	OFL	ABC	OFL	ABC
Walleye pollock (EBS)	1	1	1	1	5,820,000	6,000,000	0.38	0.31	0.66	0.30	0.37	0.30	0.37	0.30
Pacific cod	1	2	2	2	383,000	308,000	0.35	0.29	0.42	0.25	0.35	0.29	0.35	0.29
Yellowfin sole	1	2	2	2	757,000	519,000	0.13	0.11	0.16	0.11	0.13	0.11	0.13	0.11
Greenland turbot	1	2	2	2	95,000	121,000	0.32	0.26	0.27	0.17	0.25	0.20	0.25	0.20
Rock sole	1	2	2	2	650,000	234,000	0.19	0.16	0.23	0.16	0.19	0.16	0.19	0.16
Sablefish (EBS)	1	2	2	2	16,800	17,300	0.14	0.12	0.15	0.085	0.14	0.12	0.14	0.12
Sablefish (AI)	1	2	2	2	19,300	20,000	0.14	0.12	0.15	0.085	0.13	0.12	0.13	0.12
True POP (EBS)	1	2	2	2	23,900	30,100	0.072	0.058	0.056	0.031	0.06	0.05	0.06	0.05
True POP (AI)	1	2	2	2	129,000	111,000	0.084	0.068	0.096	0.055	0.08	0.07	0.08	0.07
Atka mackerel	1	2	2	2	152,000	127,000	0.42	0.34	0.50	0.23	0.42	0.34	0.42	0.34
Walleye pollock (AI)	1	3	3	3	106,000	106,000	0.30	0.23	0.30	0.23	0.30	0.23	0.30	0.23
Walleye pollock (Bog.)	1	3	2	2	280,000	1,750,000	0.33	0.27	0.035	0.026	0.33	0.27	0.038	0.031
Arrowtooth flounder	1	3	2	2	531,000	531,000	0.28	0.23	0.36	0.23	0.28	0.23	0.28	0.23
Flathead sole	1	3	2	2	824,000	824,000	0.19	0.16	0.23	0.16	0.19	0.16	0.19	0.16
Other flatfish	1	2,3	2	2	313,000	192,000	0.32	0.26	0.39	0.26	0.32	0.26	0.32	0.26
Other red rockfish (EBS)	1	3	3	3	11,600	11,600	0.031	0.023	0.031	0.023	0.031	0.023	0.031	0.023
Sharpchin/Northern (AI)	1	3	3	3	94,000	94,000	0.060	0.045	0.060	0.045	0.060	0.045	0.060	0.045
Shortraker/Rougheye (AI)	1	3	3	3	46,500	46,500	0.028	0.021	0.028	0.021	0.028	0.021	0.028	0.021
Other rockfish (EBS)	1	3	3	3	7,030	7,030	0.070	0.053	0.070	0.053	0.070	0.053	0.070	0.053
Other rockfish (AI)	1	3	3	3	13,000	13,000	0.070	0.053	0.070	0.053	0.070	0.053	0.070	0.053
Other Species	1	3	3	3	669,000	669,000	0.20	0.15	0.20	0.039	0.20	0.15	0.20	0.15
Squid	2	3	3	3	2,920	2,920	0.80	0.60	0.80	0.60	0.80	0.60	0.80	0.60

Table 3b. Impacts of alternatives on 1998 OFL and ABC fishing mortality rates in the BSAI, assuming that poorly understood stocks are all judged to be at a **moderate** level of abundance under Alternative 3. The columns under the heading "Quantities Used in Control Rules" show which proxies would have been substituted for each of the four quantities used in the control rules defined by Alternatives 2 and 3, along with the values of those proxies. The columns under the heading "1998 Fishing Mortality Rates" show the fishing mortality rates corresponding to OFL and ABC. In the case of Alternative 1, these are the rates corresponding to the OFL and ABC values actually specified for 1998. In the case of Alternatives 2 and 3, these are the rates emerging from the control rules, given the estimates shown in the "Value" columns (note that the ABC rate shown is thus an upper limit; i.e., the Council could choose a lower value). Stocks for which objective estimates of both B and β are available (i.e., those for which Proxy 1 is used for B and Proxy 1 or 2 is used for β) are shown in the upper portion of the table. For the stocks in the lower portion of the table, Alternative 3 requires the SSC to use its best subjective estimate of B or β when an objective estimate is unavailable. The shaded cells in this table show hypothetical examples of such estimates. For these stocks, Alternative 2 always assumes a moderate level of abundance.

	Quantities Used in Control Rules								1998 Fishing Mortality Rates					
	Proxy Level				Value (Alternative 3 shaded)				Alternative 1		Alternative 2		Alternative 3	
Species	B	β	ϕ	γ	B	β	ϕ	γ	OFL	ABC	OFL	ABC	OFL	ABC
Walleye pollock (EBS)	1	1	1	1	5,820,000	6,000,000	0.38	0.31	0.66	0.30	0.37	0.30	0.37	0.30
Pacific cod	1	2	2	2	383,000	308,000	0.35	0.29	0.42	0.25	0.35	0.29	0.35	0.29
Yellowfin sole	1	2	2	2	757,000	519,000	0.13	0.11	0.16	0.11	0.13	0.11	0.13	0.11
Greenland turbot	1	2	2	2	95,000	121,000	0.32	0.26	0.27	0.17	0.25	0.20	0.25	0.20
Rock sole	1	2	2	2	650,000	234,000	0.19	0.16	0.23	0.16	0.19	0.16	0.19	0.16
Sablefish (EBS)	1	2	2	2	16,800	17,300	0.14	0.12	0.15	0.085	0.14	0.12	0.14	0.12
Sablefish (AI)	1	2	2	2	19,300	20,000	0.14	0.12	0.15	0.085	0.13	0.12	0.13	0.12
True POP (EBS)	1	2	2	2	23,900	30,100	0.072	0.058	0.056	0.031	0.06	0.05	0.06	0.05
True POP (AI)	1	2	2	2	129,000	111,000	0.084	0.068	0.096	0.055	0.08	0.07	0.08	0.07
Atka mackerel	1	2	2	2	152,000	127,000	0.42	0.34	0.50	0.23	0.42	0.34	0.42	0.34
Walleye pollock (AI)	1	3	3	3	106,000	171,000	0.30	0.23	0.30	0.23	0.30	0.23	0.18	0.13
Walleye pollock (Bog.)	1	3	2	2	280,000	1,750,000	0.33	0.27	0.035	0.026	0.33	0.27	0.038	0.031
Arrowtooth flounder	1	3	2	2	531,000	856,000	0.28	0.23	0.36	0.23	0.28	0.23	0.17	0.14
Flathead sole	1	3	2	2	824,000	1,330,000	0.19	0.16	0.23	0.16	0.19	0.16	0.11	0.10
Other flatfish	1	2,3	2	2	313,000	241,000	0.32	0.26	0.39	0.26	0.32	0.26	0.32	0.26
Other red rockfish (EBS)	1	3	3	3	11,600	18,800	0.031	0.023	0.031	0.023	0.031	0.023	0.018	0.014
Sharpchin/Northern (AI)	1	3	3	3	94,000	152,000	0.060	0.045	0.060	0.045	0.060	0.045	0.036	0.027
Shortraker/Rougheye (AI)	1	3	3	3	46,500	75,000	0.028	0.021	0.028	0.021	0.028	0.021	0.017	0.012
Other rockfish (EBS)	1	3	3	3	7,030	11,300	0.070	0.053	0.070	0.053	0.070	0.053	0.042	0.032
Other rockfish (AI)	1	3	3	3	13,000	21,000	0.070	0.053	0.070	0.053	0.070	0.053	0.042	0.031
Other Species	1	3	3	3	669,000	1,080,000	0.20	0.15	0.20	0.039	0.20	0.15	0.12	0.09
Squid	2	3	3	3	1,810	2,920	0.80	0.60	0.80	0.60	0.80	0.60	0.48	0.36

Table 3c. Impacts of alternatives on 1998 OFL and ABC fishing mortality rates in the BSAI, assuming that poorly understood stocks are all judged to be at a **low** level of abundance under Alternative 3. The columns under the heading "Quantities Used in Control Rules" show which proxies would have been substituted for each of the four quantities used in the control rules defined by Alternatives 2 and 3, along with the values of those proxies. The columns under the heading "1998 Fishing Mortality Rates" show the fishing mortality rates corresponding to OFL and ABC. In the case of Alternative 1, these are the rates corresponding to the OFL and ABC values actually specified for 1998. In the case of Alternatives 2 and 3, these are the rates emerging from the control rules, given the estimates shown in the "Value" columns (note that the ABC rate shown is thus an upper limit; i.e., the Council could choose a lower value). Stocks for which objective estimates of both B and β are available (i.e., those for which Proxy 1 is used for B and Proxy 1 or 2 is used for β) are shown in the upper portion of the table. For the stocks in the lower portion of the table, Alternative 3 requires the SSC to use its best subjective estimate of B or β when an objective estimate is unavailable. The shaded cells in this table show hypothetical examples of such estimates. For these stocks, Alternative 2 always assumes a moderate level of abundance.

	Quantities Used in Control Rules								1998 Fishing Mortality Rates					
	Proxy Level				Value (Alternative 3 shaded)				Alternative 1		Alternative 2		Alternative 3	
Species	B	β	ϕ	γ	B	β	ϕ	γ	OFL	ABC	OFL	ABC	OFL	ABC
Walleye pollock (EBS)	1	1	1	1	5,820,000	6,000,000	0.38	0.31	0.66	0.30	0.37	0.30	0.37	0.30
Pacific cod	1	2	2	2	383,000	308,000	0.35	0.29	0.42	0.25	0.35	0.29	0.35	0.29
Yellowfin sole	1	2	2	2	757,000	519,000	0.13	0.11	0.16	0.11	0.13	0.11	0.13	0.11
Greenland turbot	1	2	2	2	95,000	121,000	0.32	0.26	0.27	0.17	0.25	0.20	0.25	0.20
Rock sole	1	2	2	2	650,000	234,000	0.19	0.16	0.23	0.16	0.19	0.16	0.19	0.16
Sablefish (EBS)	1	2	2	2	16,800	17,300	0.14	0.12	0.15	0.085	0.14	0.12	0.14	0.12
Sablefish (AI)	1	2	2	2	19,300	20,000	0.14	0.12	0.15	0.085	0.13	0.12	0.13	0.12
True POP (EBS)	1	2	2	2	23,900	30,100	0.072	0.058	0.056	0.031	0.06	0.05	0.06	0.05
True POP (AI)	1	2	2	2	129,000	111,000	0.084	0.068	0.096	0.055	0.08	0.07	0.08	0.07
Atka mackerel	1	2	2	2	152,000	127,000	0.42	0.34	0.50	0.23	0.42	0.34	0.42	0.34
Walleye pollock (AI)	1	3	3	3	106,000	442,000	0.30	0.23	0.30	0.23	0.30	0.23	0.06	0.04
Walleye pollock (Bog.)	1	3	2	2	280,000	1,750,000	0.33	0.27	0.035	0.026	0.33	0.27	0.038	0.031
Arrowtooth flounder	1	3	2	2	531,000	2,210,000	0.28	0.23	0.36	0.23	0.28	0.23	0.06	0.05
Flathead sole	1	3	2	2	824,000	3,430,000	0.19	0.16	0.23	0.16	0.19	0.16	0.04	0.03
Other flatfish	1	2,3	2	2	313,000	445,000	0.32	0.26	0.39	0.26	0.22	0.18	0.22	0.18
Other red rockfish (EBS)	1	3	3	3	11,600	48,500	0.031	0.023	0.031	0.023	0.031	0.023	0.006	0.005
Sharpchin/Northern (AI)	1	3	3	3	94,000	392,000	0.060	0.045	0.060	0.045	0.060	0.045	0.012	0.009
Shortraker/Rougheye (AI)	1	3	3	3	46,500	194,000	0.028	0.021	0.028	0.021	0.028	0.021	0.006	0.004
Other rockfish (EBS)	1	3	3	3	7,030	29,300	0.070	0.053	0.070	0.053	0.070	0.053	0.014	0.010
Other rockfish (AI)	1	3	3	3	13,000	54,200	0.070	0.053	0.070	0.053	0.070	0.053	0.014	0.010
Other Species	1	3	3	3	669,000	2,790,000	0.20	0.15	0.20	0.039	0.20	0.15	0.04	0.03
Squid	2	3	3	3	702	2,920	0.80	0.60	0.80	0.60	0.80	0.60	0.16	0.12

Table 3d. Impacts of alternatives on 1998 OFL and ABC fishing mortality rates in the BSAI, assuming that poorly understood stocks are all judged to be **overfished** under Alternative 3. The columns under the heading "Quantities Used in Control Rules" show which proxies would have been substituted for each of the four quantities used in the control rules defined by Alternatives 2 and 3, along with the values of those proxies. The columns under the heading "1998 Fishing Mortality Rates" show the fishing mortality rates corresponding to OFL and ABC. In the case of Alternative 1, these are the rates corresponding to the OFL and ABC values actually specified for 1998. In the case of Alternatives 2 and 3, these are the rates emerging from the control rules, given the estimates shown in the "Value" columns (note that the ABC rate shown is thus an upper limit; i.e., the Council could choose a lower value). Stocks for which objective estimates of both B and β are available (i.e., those for which Proxy 1 is used for B and Proxy 1 or 2 is used for β) are shown in the upper portion of the table. For the stocks in the lower portion of the table, Alternative 3 requires the SSC to use its best subjective estimate of B or β when an objective estimate is unavailable. The shaded cells in this table show hypothetical examples of such estimates. For these stocks, Alternative 2 always assumes a moderate level of abundance.

1998 Catch Specifications

Species	Alternative 1			Alternative 2			Alternative 3		
	OFL	ABC	TAC	OFL	ABC	TAC	OFL	ABC	TAC
Walleye pollock (EBS)	2,060,000	1,110,000	1,110,000	1,150,000	1,110,000	1,110,000	1,150,000	1,110,000	1,110,000
Pacific cod	336,000	210,000	210,000	280,000	210,000	210,000	280,000	210,000	210,000
Yellowfin sole	314,000	220,000	220,000	255,000	220,000	220,000	255,000	220,000	220,000
Greenland turbot	22,300	15,000	15,000	20,500	15,000	15,000	20,500	15,000	15,000
Rock sole	449,000	312,000	100,000	371,000	312,000	100,000	371,000	312,000	100,000
Sablefish (EBS)	2,160	1,300	1,300	1,950	1,300	1,300	1,950	1,300	1,300
Sablefish (AI)	2,230	1,380	1,380	2,000	1,380	1,380	2,000	1,380	1,380
True POP (EBS)	3,300	1,400	1,400	3,320	1,400	1,400	3,320	1,400	1,400
True POP (AI)	20,700	12,100	12,100	18,100	12,100	12,100	18,100	12,100	12,100
Atka mackerel	134,000	64,300	64,300	113,000	64,300	64,300	113,000	64,300	64,300
Walleye pollock (AI)	31,700	23,800	23,800	31,700	23,800	23,800	31,700	23,800	23,800
Walleye pollock (Bog.)	8,750	6,410	1,000	82,500	6,410	1,000	9,550	6,410	1,000
Arrowtooth flounder	230,000	147,000	16,000	179,000	147,000	16,000	179,000	147,000	16,000
Flathead sole	190,000	132,000	100,000	157,000	132,000	100,000	157,000	132,000	100,000
Other flatfish	253,000	164,000	89,434	203,000	164,000	89,434	203,000	164,000	89,434
Other red rockfish (EBS)	356	267	267	356	267	267	356	267	267
Sharpchin/Northern (AI)	5,640	4,230	4,230	5,640	4,230	4,230	5,640	4,230	4,230
Shortraker/Rougheye (AI)	1,290	965	965	1,290	965	965	1,290	965	965
Other rockfish (EBS)	492	369	369	492	369	369	492	369	369
Other rockfish (AI)	913	685	685	913	685	685	913	685	685
Other Species	134,000	25,800	25,800	134,000	25,800	25,800	134,000	25,800	25,800
Squid	2,620	1,970	1,970	2,620	1,970	1,970	2,620	1,970	1,970
Total	4,202,451	2,454,976	2,000,000	3,013,381	2,454,976	2,000,000	2,940,431	2,454,976	2,000,000

Table 4a. Impacts of alternatives on 1998 catch specifications in the BSAI, assuming that poorly understood stocks are all judged to be at a **high** level of abundance under Alternative 3. In the case of Alternative 1, the values listed under OFL, ABC, and TAC for each species are the values actually specified for 1998. In the case of Alternative 2, the value listed under OFL for each species is the value emerging from application of the limit control rule, the value listed under ABC for each species is the lesser of the ABC under Alternative 1 and the value emerging from application of the target control rule, and the value listed under TAC for each species is the lesser of the ABC under Alternative 2 and the TAC under Alternative 1. In the case of Alternative 3, the values listed under OFL, ABC, and TAC for each species are analogous to those listed under Alternative 2. Stocks for which objective estimates of both B and β are available (i.e., those for which Proxy 1 is used for B and Proxy 1 or 2 is used for β) are shown in the upper portion of the table. For the stocks in the lower portion of the table, Alternative 3 requires the SSC to use its best subjective estimate of B or β when an objective estimate is unavailable. Under the scenario shown in this table, no reductions in 1998 TACs would have been required under Alternative 2 or Alternative 3.

1998 Catch Specifications

	Alternative 1			Alternative 2			Alternative 3		
Species	OFL	ABC	TAC	OFL	ABC	TAC	OFL	ABC	TAC
Walleye pollock (EBS)	2,060,000	1,110,000	1,110,000	1,150,000	1,110,000	1,110,000	1,150,000	1,110,000	1,110,000
Pacific cod	336,000	210,000	210,000	280,000	210,000	210,000	280,000	210,000	210,000
Yellowfin sole	314,000	220,000	220,000	255,000	220,000	220,000	255,000	220,000	220,000
Greenland turbot	22,300	15,000	15,000	20,500	15,000	15,000	20,500	15,000	15,000
Rock sole	449,000	312,000	100,000	371,000	312,000	100,000	371,000	312,000	100,000
Sablefish (EBS)	2,160	1,300	1,300	1,950	1,300	1,300	1,950	1,300	1,300
Sablefish (AI)	2,230	1,380	1,380	2,000	1,380	1,380	2,000	1,380	1,380
True POP (EBS)	3,300	1,400	1,400	3,320	1,400	1,400	3,320	1,400	1,400
True POP (AI)	20,700	12,100	12,100	18,100	12,100	12,100	18,100	12,100	12,100
Atka mackerel	134,000	64,300	64,300	113,000	64,300	64,300	113,000	64,300	64,300
Walleye pollock (AI)	31,700	23,800	23,800	31,700	23,800	23,800	31,700	23,800	23,800
Walleye pollock (Bog.)	8,750	6,410	1,000	82,500	6,410	1,000	9,550	6,410	1,000
Arrowtooth flounder	230,000	147,000	16,000	179,000	147,000	16,000	179,000	147,000	16,000
Flathead sole	190,000	132,000	100,000	157,000	132,000	100,000	157,000	132,000	100,000
Other flatfish	253,000	164,000	89,434	203,000	164,000	89,434	203,000	164,000	89,434
Other red rockfish (EBS)	356	267	267	356	267	267	356	267	267
Sharpchin/Northern (AI)	5,640	4,230	4,230	5,640	4,230	4,230	5,640	4,230	4,230
Shortraker/Rougheye (AI)	1,290	965	965	1,290	965	965	1,290	965	965
Other rockfish (EBS)	492	369	369	492	369	369	492	369	369
Other rockfish (AI)	913	685	685	913	685	685	913	685	685
Other Species	134,000	25,800	25,800	134,000	25,800	25,800	134,000	25,800	25,800
Squid	2,620	1,970	1,970	2,620	1,970	1,970	2,620	1,970	1,970
Total	4,202,451	2,454,976	2,000,000	3,013,381	2,454,976	2,000,000	2,940,431	2,454,976	2,000,000

Table 4b. Impacts of alternatives on 1998 catch specifications in the BSAI, assuming that poorly understood stocks are all judged to be at a **moderate** level of abundance under Alternative 3. In the case of Alternative 1, the values listed under OFL, ABC, and TAC for each species are the values actually specified for 1998. In the case of Alternative 2, the value listed under OFL for each species is the value emerging from application of the limit control rule, the value listed under ABC for each species is the lesser of the ABC under Alternative 1 and the value emerging from application of the target control rule, and the value listed under TAC for each species is the lesser of the ABC under Alternative 2 and the TAC under Alternative 1. In the case of Alternative 3, the values listed under OFL, ABC, and TAC for each species are analogous to those listed under Alternative 2. Stocks for which objective estimates of both B and β are available (i.e., those for which Proxy 1 is used for B and Proxy 1 or 2 is used for β) are shown in the upper portion of the table. For the stocks in the lower portion of the table, Alternative 3 requires the SSC to use its best subjective estimate of B or β when an objective estimate is unavailable. Under the scenario shown in this table, no reductions in 1998 TACs would have been required under Alternative 2 or Alternative 3.

1998 Catch Specifications

	Alternative 1			Alternative 2			Alternative 3		
Species	OFL	ABC	TAC	OFL	ABC	TAC	OFL	ABC	TAC
Walleye pollock (EBS)	2,060,000	1,110,000	1,110,000	1,150,000	1,110,000	1,110,000	1,150,000	1,110,000	1,110,000
Pacific cod	336,000	210,000	210,000	280,000	210,000	210,000	280,000	210,000	210,000
Yellowfin sole	314,000	220,000	220,000	255,000	220,000	220,000	255,000	220,000	220,000
Greenland turbot	22,300	15,000	15,000	20,500	15,000	15,000	20,500	15,000	15,000
Rock sole	449,000	312,000	100,000	371,000	312,000	100,000	371,000	312,000	100,000
Sablefish (EBS)	2,160	1,300	1,300	1,950	1,300	1,300	1,950	1,300	1,300
Sablefish (AI)	2,230	1,380	1,380	2,000	1,380	1,380	2,000	1,380	1,380
True POP (EBS)	3,300	1,400	1,400	3,320	1,400	1,400	3,320	1,400	1,400
True POP (AI)	20,700	12,100	12,100	18,100	12,100	12,100	18,100	12,100	12,100
Atka mackerel	134,000	64,300	64,300	113,000	64,300	64,300	113,000	64,300	64,300
Walleye pollock (AI)	31,700	23,800	23,800	31,700	23,800	23,800	19,000	14,300	14,300
Walleye pollock (Bog.)	8,750	6,410	1,000	82,500	6,410	1,000	9,550	6,410	1,000
Arrowtooth flounder	230,000	147,000	16,000	179,000	147,000	16,000	107,000	88,300	16,000
Flathead sole	190,000	132,000	100,000	157,000	132,000	100,000	94,100	79,100	79,100
Other flatfish	253,000	164,000	89,434	203,000	164,000	89,434	203,000	164,000	89,434
Other red rockfish (EBS)	356	267	267	356	267	267	212	159	159
Sharpchin/Northern (AI)	5,640	4,230	4,230	5,640	4,230	4,230	3,370	2,530	2,530
Shortraker/Rougheye (AI)	1,290	965	965	1,290	965	965	774	579	579
Other rockfish (EBS)	492	369	369	492	369	369	296	222	222
Other rockfish (AI)	913	685	685	913	685	685	547	410	410
Other Species	134,000	25,800	25,800	134,000	25,800	25,800	80,300	25,800	25,800
Squid	2,620	1,970	1,970	2,620	1,970	1,970	1,570	1,180	1,180
Total	4,202,451	2,454,976	2,000,000	3,013,381	2,454,976	2,000,000	2,734,589	2,330,470	1,966,194

Table 4c. Impacts of alternatives on 1998 catch specifications in the BSAI, assuming that poorly understood stocks are all judged to be at a **low** level of abundance under Alternative 3. In the case of Alternative 1, the values listed under OFL, ABC, and TAC for each species are the values actually specified for 1998. In the case of Alternative 2, the value listed under OFL for each species is the value emerging from application of the limit control rule, the value listed under ABC for each species is the lesser of the ABC under Alternative 1 and the value emerging from application of the target control rule, and the value listed under TAC for each species is the lesser of the ABC under Alternative 2 and the TAC under Alternative 1. In the case of Alternative 3, the values listed under OFL, ABC, and TAC for each species are analogous to those listed under Alternative 2. Stocks for which objective estimates of both B and β are available (i.e., those for which Proxy 1 is used for B and Proxy 1 or 2 is used for β) are shown in the upper portion of the table. For the stocks in the lower portion of the table, Alternative 3 requires the SSC to use its best subjective estimate of B or β when an objective estimate is unavailable. The shaded cells in this table show instances where reductions in 1998 TACs would have been required under Alternative 3. No reductions in 1998 TACs would have been required under Alternative 2.

1998 Catch Specifications

Species	Alternative 1			Alternative 2			Alternative 3		
	OFL	ABC	TAC	OFL	ABC	TAC	OFL	ABC	TAC
Walleye pollock (EBS)	2,060,000	1,110,000	1,110,000	1,150,000	1,110,000	1,110,000	1,150,000	1,110,000	1,110,000
Pacific cod	336,000	210,000	210,000	280,000	210,000	210,000	280,000	210,000	210,000
Yellowfin sole	314,000	220,000	220,000	255,000	220,000	220,000	255,000	220,000	220,000
Greenland turbot	22,300	15,000	15,000	20,500	15,000	15,000	20,500	15,000	15,000
Rock sole	449,000	312,000	100,000	371,000	312,000	100,000	371,000	312,000	100,000
Sablefish (EBS)	2,160	1,300	1,300	1,950	1,300	1,300	1,950	1,300	1,300
Sablefish (AI)	2,230	1,380	1,380	2,000	1,380	1,380	2,000	1,380	1,380
True POP (EBS)	3,300	1,400	1,400	3,320	1,400	1,400	3,320	1,400	1,400
True POP (AI)	20,700	12,100	12,100	18,100	12,100	12,100	18,100	12,100	12,100
Atka mackerel	134,000	64,300	64,300	113,000	64,300	64,300	113,000	64,300	64,300
Walleye pollock (AI)	31,700	23,800	23,800	31,700	23,800	23,800	6,330	4,760	4,760
Walleye pollock (Bog.)	8,750	6,410	1,000	82,500	6,410	1,000	9,550	6,410	1,000
Arrowtooth flounder	230,000	147,000	16,000	179,000	147,000	16,000	35,800	29,400	16,000
Flathead sole	190,000	132,000	100,000	157,000	132,000	100,000	31,400	26,400	26,400
Other flatfish	253,000	164,000	89,434	140,000	113,000	89,434	140,000	113,000	89,434
Other red rockfish (EBS)	356	267	267	356	267	267	71	53	53
Sharpchin/Northern (AI)	5,640	4,230	4,230	5,640	4,230	4,230	1,130	845	845
Shortraker/Rougheye (AI)	1,290	965	965	1,290	965	965	258	193	193
Other rockfish (EBS)	492	369	369	492	369	369	98	74	74
Other rockfish (AI)	913	685	685	913	685	685	182	137	137
Other Species	134,000	25,800	25,800	134,000	25,800	25,800	26,800	19,800	19,800
Squid	2,620	1,970	1,970	2,620	1,970	1,970	525	395	395
Total	4,202,451	2,454,976	2,000,000	2,950,381	2,403,976	2,000,000	2,467,014	2,148,947	1,894,571

Table 4d. Impacts of alternatives on 1998 catch specifications in the BSAI, assuming that poorly understood stocks are all judged to be **overfished** under Alternative 3. In the case of Alternative 1, the values listed under OFL, ABC, and TAC for each species are the values actually specified for 1998. In the case of Alternative 2, the value listed under OFL for each species is the value emerging from application of the limit control rule, the value listed under ABC for each species is the lesser of the ABC under Alternative 1 and the value emerging from application of the target control rule, and the value listed under TAC for each species is the lesser of the ABC under Alternative 2 and the TAC under Alternative 1. In the case of Alternative 3, the values listed under OFL, ABC, and TAC for each species are analogous to those listed under Alternative 2. Stocks for which objective estimates of both B and β are available (i.e., those for which Proxy 1 is used for B and Proxy 1 or 2 is used for β) are shown in the upper portion of the table. For the stocks in the lower portion of the table, Alternative 3 requires the SSC to use its best subjective estimate of B or β when an objective estimate is unavailable. The shaded cells in this table show instances where reductions in 1998 TACs would have been required under Alternative 3. No reductions in 1998 TACs would have been required under Alternative 2.

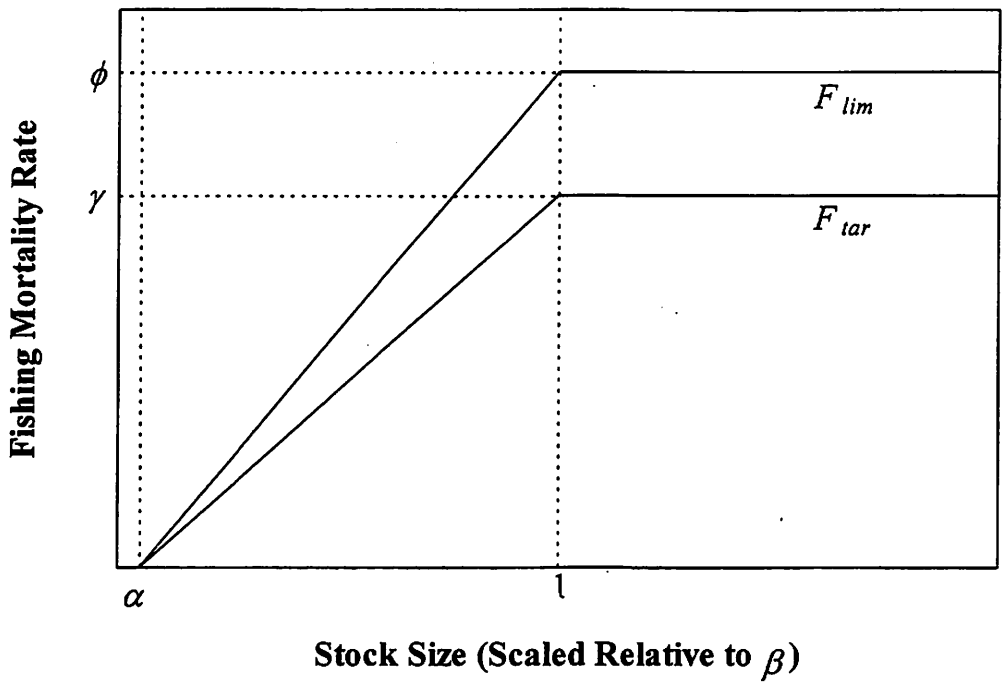

Figure. Limit (F_{lim}) and target (F_{tar}) control rules under Alternatives 2 and 3. Each control rule gives fishing mortality as a function of stock size. The parameters of the control rules are α, β, ϕ, and γ (see text). Although the definitions of some terms are different, these control rules are identical in form to Tier 1 of the current ABC/OFL definitions (Alternative 1).

Appendix A: A Procedure for Estimating Relative Abundance

One way to establish the "subjective" proxies called for in Alternative 3 would be for the SSC to adopt a rule of thumb that could be applied in all situations, then deviate from that rule as appropriate on a case-by-case basis, using its best scientific judgment developed from whatever other information is available. The following is an example of one such rule of thumb.

a) From the set of stocks managed under an FMP, form two groups:
Group 1: stocks for which objective estimates of B and β exist, and
Group 2: stocks for which objective estimates are lacking for either B or β.

b) For each stock in Group 1, list the following: B, β, C_{ave}, and M.

c) For the n stocks in Group 1 (indexed $i = 0, ..., n\text{-}1$), compute the following averages:

$$\theta = \left(\frac{1}{n}\right)\sum_{i=0}^{n-1}\frac{B_i}{\beta_i}, \quad q = \left(\frac{1}{n}\right)\sum_{i=0}^{n-1}\frac{C_{ave_i}}{M_i\beta_i}.$$

d) Determine relative abundance and define parameter p according to the following table:

If the value of θ is...	then assume stocks may be characterized as...	and set p equal to...
less than 0.6	overfished	0.24
between 0.6 and 1.0	low in abundance	0.62
between 1.0 and 1.6	moderate in abundance	1.00
greater than 1.6	high in abundance	1.60

e) For each stock in Group 2 that has an objective estimate of B but not β, estimate β as B/p.

f) For each stock in Group 2 that has an objective estimate of β but not B, estimate B as βp.

g) For each stock in Group 2 that lacks objective estimates of both B and β,
first estimate β as C_{ave}/Mq,
then estimate B as βp.

Based on current information, the above rule of thumb would indicate that Group 1 GOA stocks tend to be at a high level of abundance ($\theta = 1.72, p = 1.6$), while Group 1 BSAI stocks tend to be at a moderate level of abundance ($\theta = 1.23, p = 1.0$). The values shown under Alternative 3 in Tables 1a, 2a, 3b, and 4b result from assuming that these levels apply to all Group 2 stocks as well. Values of q used for these tables were 1.43 and 1.12 for the GOA and BSAI, respectively.

Appendix B: A Procedure for Estimating $F_{35\%}$

Equation (17) of Thompson (1993) can be manipulated to provide an estimate of $F_{35\%}$ based on values of $F_{40\%}$ and M. First, define

$$x = \frac{F_{40\%}}{M}$$

and

$$K'' = \frac{-2x^2 + x + 3}{2x^2 + 4x - 3}.$$

Then, the following solution holds for the simple dynamic pool model in which growth (in weight) is a linear function of age:

$$F_{35\%} = \left(\frac{10 + 2\sqrt{25 + 35K''(K'' + 1)}}{7(K'' + 1)} - 1 \right) M.$$

Reference:

Thompson, G. G. 1993. A proposal for a threshold stock size and maximum fishing mortality rate. *In* S. J. Smith, J. J. Hunt, and D. Rivard (editors), Risk evaluation and biological reference points for fisheries management, p. 303-320. Can. Spec. Publ. Fish. Aquat. Sci. 120.

ALASKA MARINE CONSERVATION COUNCIL
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March 31, 1998

Johnny Frazier
Acting Inspector General
Office of the Inspector General
United States Department of Commerce
14th and Constitution Ave., NW
Washington, D.C. 20230

Dear Inspector General Frazier,

We write to request that you initiate an investigation into the National Marine Fisheries Service (NMFS) management of the groundfish fisheries in the North Pacific. The Alaska Marine Conservation Council is a community-based organization of fishermen, subsistence users, biologists and coastal residents committed to protecting the health and diversity of our marine ecosystem.

Recent events reveal a pattern of irregularities in NMFS management including violations of environmental laws and breaches of the public trust, calling into question the performance of our Government in the management of natural resources. These events include the following:

- NMFS knew in 1990 that it must prepare a supplementary environmental impact statement for North Pacific groundfish fisheries yet it did not do so. Thus, NMFS allowed the fisheries to operate without considering their environmental impacts.

- NMFS allowed the North Pacific groundfish fisheries to proceed this year in clear violation of the National Environmental Policy Act and the Endangered Species Act.

- NMFS has ignored recommendations from the Steller Sea Lion Recovery Team and its own staff concerning needed changes to management of the fisheries. It did so without public review or discussion of the recommendations or NMFS' reasons for ignoring them.

- NMFS unilaterally authorized an out-dated and underreporting catch measurement for the factory trawl fleet in the Bering Sea pollock A season.

The facts surrounding these events, and relevant documents from NMFS and other sources, are set out in the enclosed Report in Support of the Request to the Inspector General to Investigate Federal Management of Fisheries in the North Pacific.

AMCC does not know with certainty why the conservative, fair and open management of the North Pacific has so regularly been compromised. There appears to be an institutional bias which favors decisions that benefit industry at the expense of the environment.

AMCC does know, however, that it is the duty of Department of Commerce employees to maintain

> unusually high standards of honesty, integrity, impartiality, and conduct . . . [as these standards are] essential to assure the proper performance of the Government business and the maintenance of confidence by citizens in their Government.

15 C.F.R. § 0.735-6. Moreover, AMCC asserts that the events described above and detailed in the enclosed Report call into question NMFS' compliance with these duties.

It is the duty of the Inspector General to investigate and report on abuses in the programs or operations of NMFS. Inspector General Act, Title 5, App. 3, Section 4. The Alaska Marine Conservation Council requests that you make the results of any investigation public, specifically recommend corrective action regarding problems, abuses or deficiencies in the management of North Pacific fisheries and, of course, take whatever other action you deem appropriate.

With this request and concurrent Report, AMCC sincerely hopes that the Inspector General will start us back on track to the conservative, fair and open management of our fisheries. And that the confidence of the public, so shaken by these events, can be restored. Finally, and perhaps most importantly, a thorough investigation would redirect the management focus toward ensuring that a healthy and diverse North Pacific ecosystem be in place for generations to come.

Thank you for your careful consideration of this request. The Alaska Marine Conservation Council stands ready to assist in such an investigation in any way you deem appropriate. Please do not hesitate to contact either Peter Van Tuyn at Trustees for Alaska (907) 276-4244 <pete@trustees.org> or the Alaska Marine Conservation Council if you have any questions.

Sincerely,

Dorothy Childers

Dorothy Childers
Executive Director

cc w/ enc: Senator Ted Stevens
Representative Don Young
Governor Tony Knowles
NMFS, Alaska Region
NMFS, Alaska Fisheries Science Center
Chairman Richard Lauber, North Pacific Fisheries Management Council

ALASKA MARINE CONSERVATION COUNCIL
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REPORT IN SUPPORT OF THE REQUEST TO THE INSPECTOR GENERAL TO INVESTIGATE FEDERAL MANAGEMENT OF FISHERIES IN THE NORTH PACIFIC

March 1998

Prepared by _____, Trustees for Alaska.
Peter Van Tuyn

Trustees for Alaska is a non-profit public interest environmental law firm

People throughout Alaska working to protect the health and diversity of our marine ecosystem

Contributors to this Report include:

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The National Marine Fisheries Service is charged by Congress, through the U.S. Department of Commerce, with the task of balancing the various values and uses of our nation's offshore waters to ensure both the conservation and management of fishery resources. While Congress vested NMFS with discretion in conducting this balancing act, it also stated unequivocally that NMFS must first ensure the conservation of our marine environment and thereafter to maximize the long-term economic benefits to the Nation of commercial fishing. See e.g., Magnuson-Stevens Fishery Conservation and management Act, 16 U.S.C. § 1801 et seq.

NMFS' management of the groundfish fisheries in the North Pacific indicates that it is giving significantly more weight to alleviating the short term economic implications of its decisions rather than making decisions based on the conservation and sustainability of the marine resources of the North Pacific. The confidence of the public in NMFS' management of these fisheries has reached an all-time low. From the events documented in this Report, it is apparent that the Alaska Region of NMFS has abused the public decision-making process and is not engaged in the proper performance of its Governmental functions.

This Report begins with a description of the North Pacific and why it is important to the people of Alaska and the United States that it be a healthy and diverse ecosystem able to provide for all species inhabiting its area, humans included. The history of human's commercial fishing interaction with the North Pacific is relayed, with a focus on the two components of the North Pacific; the Bering Sea and the Gulf of Alaska. The fishery management process is then reviewed.

These sections provide a foundation for the following discussion of the duty owed to the public by NMFS employees and the series of events occurring for much of the last ten years which show an alarming disregard for the public trust. From violations of law to unilateral and biased decision-making, the record speaks loudly of abuses of the Government process.

That the disturbing events described below truly took place is supported by documents referenced in and attached to this Report. The vast majority of these documents come from NMFS itself. The few that did not originate from within NMFS are correspondence directed to NMFS, scientific reports commissioned by NMFS or readily and publicly available and verifiable information relevant to NMFS' management of the North Pacific fisheries. The facts, therefore, are all verified.[1]

I. THE NORTH PACIFIC ECOSYSTEM IS IMPORTANT TO ALASKA AND THE UNITED STATES

The North Pacific Ocean is one of the world's richest and most productive marine ecosystems. Its waters support over 300 fish species – many of which live on or near the bottom and therefore are called "groundfish. The North Pacific is also home for all or part

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[1] Due to their large volume, documentary support for general background information is not attached to this Report. It is, moreover, readily available from NMFS. The Alaska Marine Conservation Council is also available to provide support for any factual assertion contained in this Report.

of the year to some of the world's greatest bird and marine mammal populations. Tens of millions of seabirds breed and feed in the North Pacific, as do significant portions of the world's population of walrus, Steller sea lions, fur and harbor seals and sea otters.

Humans are also part of the North Pacific ecosystem. People living along the North Pacific's coastline have long depended on fish and other marine life as their main source of food. For many, the ocean is their "garden " and provides them with their daily food. Coastal residents subsist on fish species such as crab, cod, salmon, halibut, herring and marine mammals such as seals and whales. These species, in turn, are but pieces in the intricate web of marine life that is the North Pacific.

Over the last 30 years, the North Pacific has yielded literally billions of fish to commercial fishermen. Indeed, the world's largest single species fishery – for walleye pollock – is in the North Pacific. The economic value of Alaska's groundfish fisheries is substantial. The catch from the groundfish fisheries, after primary processing, was estimated at $1.23 billion in 1996. The catch represents an astounding 40% of the total catch from America's shores.

This vast amount does not include additional wealth from salmon and shellfish not included in the groundfish complex. The ex-vessel value (the price paid to fishermen) for salmon and shellfish alone exceeded one-half billion dollars in 1996.

The terrific monetary wealth that Alaskan fisheries produce gives an indication of their importance to coastal communities. In the last 50 years, major coastal towns such as Kodiak, Homer, King Cove and Dutch Harbor have flourished with strong economic growth from commercial fisheries. Far away North Pacific fisheries also support cities such as Seattle, home to some of the fishing fleet and processors. Kodiak was the number one port in the nation for several years, falling to 3rd by the mid-1990s. At the same time, Dutch Harbor rose to prominence as the nation's number one port.

II. HISTORY OF THE GROUNDFISH FISHERIES

The foreign distant water trawl fleet, lead primarily by the Japanese, first began to target groundfish in the North Pacific in the 1950s. The fleets consisted of motherships that would tend the catcher vessels, carrying supplies and receiving and processing the catch. Fish were caught between the late spring and early fall, targeting on rockfishes, mainly Pacific Ocean perch, and herring in the pelagic (above-bottom) zone, and halibut and other flatfishes on the bottom. Pollock was considered incidental catch and processed into fish paste or surimi. In the mid-60's an international ban of trawling for halibut was imposed for biological and economic reasons. By the early 70's, the perch stocks had declined and the foreign fleet became more and more dependent on pollock as those stocks dramatically increased.

With the establishment of the U.S. 200 mile Exclusive Economic Zone in 1976 and the transition toward the Americanization of the fisheries, a process was set in motion for the displacement of the tremendous foreign fishing effort in the U.S. North Pacific by

American vessels. Little data existed to accurately measure the size of the stocks or the total catch prior to this point. A Total Allowable Level of Foreign Fishing (TALFF) was allocated by NMFS and the newly created North Pacific Fishery Management Council until the transition was complete. During the late 70's and early 80's, joint ventures (JV's) were also established between American catcher vessels and foreign floating processors while shore side processing capacity was developed in Alaska. These joint ventures began by targeting the large spawning aggregations in the winter in Shelikof Strait and, as infrastructure developed, in the southeastern Bering Sea. The TALFF was quickly replaced by the JV allocation which was displaced entirely by the domestic fleet allocation by 1987.

With the reduction in the TALFF, and subsequently the elimination of the joint ventures, the foreign fishing effort became concentrated in the "Donut Hole" area of the Bering Sea, the area of international waters completely surrounded by the 200 mile economic zones of the United States and Russia. As competition for these fish increased, and the world market developed for pollock roe and surimi, the fishery became focused in time on the vast spawning aggregations of pollock. The pollock fishery in the Donut Hole collapsed and closed to fishing in 1991. Despite a moratorium on fishing in the Donut Hole, the fishery has not recovered.

Throughout this time, and particularly in the 1980s, the trawl fleet in U.S. waters has grown considerably. It consists of both factory trawlers, which both catch and process fish, and a shore-based trawl fleet. The shore-based fleet generally consists of smaller boats that deliver fish to onshore processors, although some deliver to floating processors in the Bering Sea. The harvesting capacity of the domestic fleet increased exponentially when the factory trawlers came to the North Pacific starting in 1987. Today, the fishing capacity of the entire trawl fleet exceeds fish availability. See Whitney, Trawler Bill Hits Trouble, Anchorage Daily News at B-6, 7 (March 27, 1998).

A. Bering Sea Groundfish Fishery

Much of the fleet's fishing effort in the Bering Sea is targeted on the pollock fishery, with over half of the Fishery Management Plan's two million metric ton cap for groundfish allocated to that fishery alone. Due to the intense competition brought about by the large number of vessels participating in the fishery, and their ever-increasing efficiency at catching fish, the pollock fishery is prosecuted faster now than ever before, occurring in two short seasons lasting less than two months in total. The pollock fishery in the Bering Sea has also been geographically compressed to the point where 93% of the total pollock catch comes from the southeastern Bering Sea shelf.

Harvest rates in the Catcher Vessel Operating Area (CVOA),[2] much of which is designated critical habitat for the Steller sea lion, have increased in the last two years to as much as 46%. While the overall eastern Bering Sea pollock biomass declined 38% from 1994-97, the decline in the CVOA has been 81% since 1994.

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[2] The CVOA is closed to factory trawlers during the Bering Sea pollock B season.

The geographic and temporal compression of the pollock fishery has coincided with a vast shift in effort from the June to September time period, when pollock are not spawning, to a time frame in which the majority of the fishery targets mass spawning aggregations of pollock. As noted above, a similar concentration of fishing effort occurred in the Donut Hole before its fishery collapsed. Moreover, intensive harvests on spawning aggregations of cod and haddock on the East Coast coincided with the collapse of those fisheries.

million Despite the substantial decline in eastern Bering Sea pollock biomass from a high of 13-15 metric tons (mt) in the mid-'80s to approximately 6 mt today, intense fishing pressure has continued. Catch quotas have been maintained at an average 1.1 to 1.4 mt throughout the biomass decline in the '90s. Meanwhile, other pollock stocks around the Bering Sea have collapsed or are in decline, including Donut Hole, western Bering Sea, Aleutian Islands and Bogoslof pollock.

Trawlers also prosecute the Bering Sea Atka mackerel fishery. The intense fishing pressure, likely combined with bottom trawling impacts on habitat, has led to significant localized depletions of Atka mackerel, much of which occurs in habitat designated as critical to the Steller sea lion. See e.g., NMFS, Draft Biological Opinion for the Bering Sea, February 9, 1998 at 1-3, Att. Y.

B. Gulf of Alaska Groundfish Fishery

The domestic groundfish industry in the Gulf of Alaska began in earnest in 1981 and 1982 with the JV effort focused on the large winter spawning school of pollock in Shelikof Strait. A small local Kodiak fleet fished the remainder of the year for Pacific cod and some pollock.

The effort in Shelikof Strait increased rapidly and by 1987 the large concentrations of pollock had dissipated and the pollock population had declined dramatically. This directly coincided with a steep decline in the population of Steller sea lions. As the experts stated:

> In the GOA [Gulf of Alaska], pollock catches from [sea lion] critical habitat increased from trace amounts in 1980 to over 200,000mt in 1985, primarily from the Shelikof Straight foraging areas. Pollock landings from GOA critical habitat dropped (as the annual TAC declined) to about 50,000mt, and remained at that level through 1992. However, the percentage of total annual GOA pollock taken from critical habitat did not decline after 1985, but has remained between 50% and 90%.

Fritz, Ferrero and Berg, The Threatened Status of Steller Sea Lions under the Endangered Species Act: Effects on Alaskan Groundfish Fisheries Management, Marine Fisheries Review, vol. 57 at 13 (1995); Att. II (relevant portions).

In 1989, factory trawlers moved into the Gulf of Alaska and took the entire pollock allocation in 7-10 days, an allocation which the local fleet had anticipated fishing and

processing onshore over the next 6 months (eliminating 3,500 to 4,000 jobs in Kodiak that summer and fall). This incident was the impetus behind a split in the quota allocation between the inshore and offshore fleet that effectively has confined the factory trawler fleet to the Bering Sea.

The inshore catcher boat fleet in the central Gulf of Alaska has increased from 7 vessels under 110 feet fishing year-round in 1985 to over forty vessels up to 125 feet in 1998. This increase includes a large influx of Oregon and Washington trawlers which moved north because of the dramatic crash of fish populations on the West Coast.

C. Concurrent Changes In The Ecosystem

Looking at the North Pacific from a broader perspective, the growth and industrialization of groundfish fisheries in the North Pacific have coincided with declines in marine mammal and seabird species. For example, as early as 1990, scientists recognized a decline in the populations of "Pribilof Island fur seals, sea lions, harbor seals, sea birds and certain fish stocks." Steller Sea Lion Recovery Team Update #1, NMFS, May 15, 1990 at 4, Att. A (comments of the Chairman). As the Chairman noted, these declines "suggest an ecosystem-wide problem." Id.

An indication of the health of an ecosystem is found in the health of species in higher trophic levels of that system. The Steller sea lion is one such "apex predator" at the higher trophic level of the North Pacific ecosystem. Therefore, it is relevant to focus on Steller sea lions as a barometer of change in the North Pacific ecosystem. NMFS listed the Steller sea lions as a threatened species under the Endangered Species Act in 1990. In doing so, NMFS commented that food stress was one likely cause of the decline in sea lion populations. See e.g., Steller Sea Lion Recovery Team Update #1, May 15, 1990 at 5, Att. A. This theme has been repeated over the years. NMFS memo July 24, 1992, Att. J; NMFS E-mail, December 5, 1994, Att. N.

In 1997, NMFS downlisted the western population of Steller sea lions (west of 144 degrees) from threatened to endangered. Att. V. NMFS still considers food stress to be a primary factor in the continuing decline sea lion populations. Research has also revealed that the food requirements of adult females with pups are greater in the winter than in the summer, and that lactating and pregnant females need high quality and diverse prey in accessible quantities. Further, declines in the Steller sea lion population has been greatest where diet diversity is the least. Att. V.

Parallel with this decline in Steller sea lion populations have been dramatic increases of fishing in habitat designated as critical to the survival of Steller sea lions. For example, in 1977, the trawl fleet caught 10% of the total pollock quota in the Bering Sea in areas now designated Steller sea lion critical habitat. By 1995, this percentage had increased to nearly 70% of the Total Allowable Catch (TAC). For Atka mackerel, commercial catches within critical habitat are as high as 73% to 84% of the quota for recent years. In some areas, the catch in critical habitat has gone as high as 98% of that area's quota. In the Gulf of Alaska, the catch of pollock in Steller sea lion critical habitat ranges from 50% to 90%. Att. II.

III. FISHERY MANAGEMENT PROCESS

NMFS prepared the original Environmental Impact Statement (EIS) for the Gulf of Alaska Fishery Management Plan (FMP) in 1978 and the Bering Sea/Aleutian Island FMP in 1981. Since then, and until the 1998 A season, NMFS authorized annual catch limits and allocations pursuant to brief Environmental Assessments (EAs), which primarily consider the impacts of NMFS authorization on groundfish abundance, without an in-depth look at ecosystem impacts.

As noted above, NMFS listed the Steller sea lion as a threatened species under the Endangered Species Act in 1990. NMFS designated critical habitat for the Steller sea lion in 1993. In 1997, NMFS downgraded the western population (west of 144 degrees) of Steller sea lions from threatened to endangered. The eastern population of sea lions (basically those in Southeast Alaska) remains listed as threatened, although this population appears to have stabilized.

NMFS recognized in 1990 that significant changes in the fisheries and the ecosystem had occurred such that the duty to supplement the earlier EISs was triggered. See e.g., NMFS memo of May 16, 1990, Att. B; Draft Agenda for March 12-13, 1992 NMFS Alaska Region/Alaska Fishery Science Center Planning Meeting, Att. I. Nevertheless, NMFS did not supplement the EISs at that time.

In December 1996, Trustees for Alaska and Earthjustice (then-Sierra Club) Legal Defense Fund (on behalf of Greenpeace) commented on the EA for the 1997 Total Allowable Catch (TAC) specifications in the groundfish fisheries. These law firms pointed out that significant change in the fisheries, the North Pacific ecosystem and the federal fisheries management law mandate that NMFS supplement its earlier EISs and consider through a new ESA-required Biological Opinion the impacts of the fisheries on the endangered Steller sea lions.

In early 1997, NMFS publicly agreed that it had to supplement the EISs. 62 Fed. Reg. 15151 (March 31, 1997). It decided to do so in one document and stated that the "[p]reparation of the SEIS is expected to take one year and include distribution of a draft SEIS and incorporation of comments on it into the final EIS." Id. at 15152 col. 3.

In December 1997 NMFS released for public comment a draft EA for the 1998 TAC. Att. W. AMCC pointed out in comments to the draft EA for the 1998 groundfish fisheries that "in order to comply with the letter and spirit of NEPA, NMFS should finalize the EIS process before it establishes the 1998 TAC specifications." Att. HH at 2.

At such a late date, however, it was impossible for NMFS to do this, and indeed NMFS' inactivity on the SEIS made it unlikely, if not impossible, for NMFS to meet its own one year schedule. AMCC, recognizing this, went on to request that NMFS commit to a specific time frame for completion of the SEIS so the same problem would not recur in the future. Att. HH at 2. Finally, AMCC commented that "under no circumstances should

NMFS proceed with finalizing the 1998 specifications until the biological opinion on impacts to Steller sea lions is amended." Id.

In the normal course of business, NMFS would then have taken public input into account and finalized the EA before the pollock A season began. Hand in hand with this requirement, NMFS should have a comprehensive biological opinion that adequately addressed whether the federal action jeopardizes the continued existence of the sea lion. In a significant departure from what the law allows, however, NMFS did not finalize the EA or issue a "no jeopardy" biological opinion before the groundfish fisheries began. Yet NMFS authorized the Bering Sea pollock A season, the Bering Sea Atka mackerel season and the Gulf of Alaska pollock A season to begin.

Finally, on February 12, 1998, NMFS announced its intent to use old, inaccurate methods of accounting for pollock catch by factory trawlers during the first half of the 1998 Bering Sea pollock fishery. NMFS-Alaska Information Bulletin 98-(08), February 12, 1998, Att. Z. Based on its own catch measurement research, NMFS acknowledged that use of these inaccurate methods results in underestimating the amount of pollock caught. Id.

IV. NMFS' EMPLOYEES MUST ACT RESPONSIBLY IN MANAGING FISHERIES

The National Marine Fisheries Service is divided into different Regions. Within these Regions, different Offices handle different tasks, be they research, fisheries management or some other governmental function. The Alaska Region, based in Juneau, houses an Office of Protected Resources responsible for conducting the consultations required under the Endangered Species Act. It also houses an Office of Sustainable Fisheries, which is responsible for managing fisheries in conjunction with the North Pacific Fishery Management Council. A Regional Director, who is ultimately responsible for the work conducted by each Office, leads the Alaska Region.

Each NMFS employee "has a positive duty to acquaint himself with the numerous statutes relating to the ethical and other conduct of [Commerce Department] employees." 15 C.F.R. 0.735-9. This includes statutes such as the Magnuson-Stevens Fishery Conservation and Management Act, the National Environmental Policy Act and the Endangered Species Act.

Additionally, "there are certain principles of fair dealing which are applicable to all officers of the Government [as a] public office is a public trust." 15 C.F.R. § 0.735-5 (1997). The primary aim of the "unusually high standards of honesty, integrity, impartiality, and conduct" required of Government employees is "to assure the proper performance of the Government business and the maintenance of confidence by citizens in their Government." 15 C.F.R. § 0.735-6.

V. EVENTS SUGGESTING IMPROPER CONDUCT BY NMFS IN ITS MANAGEMENT OF NORTH PACIFIC FISHERIES

Since at least 1990, the Alaska Region of NMFS has demonstrated a disturbing pattern of disregarding fundamental conservation laws in making decisions about the North Pacific groundfish fisheries. NMFS also has a history of disregarding the weight of scientific evidence when the scientific experts suggest that the groundfish fisheries should be modified to take into account environmental factors. The events detailed below provide details on exactly how the Alaska Region of NMFS has thwarted the law and science.

A. The Alaska Region Of NMFS Disregarded The Law For Seven Years

The National Environmental Policy Act (NEPA), 42 U.S.C. §§ 4321-4370a, is "our basic national charter for protection of the environment." 40 C.F.R. § 1500.1(a). NEPA expressly declares Congress' purpose of promoting efforts "which will prevent or eliminate damage to the environment." 42 U.S.C. § 4321.

NEPA accomplishes its objective by compelling federal agencies to consider the environmental consequences of their actions and by informing the public, and Congress, of those consequences. It does this by requiring federal agencies to prepare a detailed "environmental impact statement" (EIS) for all "major federal actions significantly affecting the quality of the human environment." 42 U.S.C. § 4332(2)(C).

Pursuant to NEPA, "federal actions" include "new and continuing activities." 40 C.F.R. § 1508.18(a). Thus, the duty to comply with NEPA is ongoing. Federal agencies must supplement an EIS when:

(i) The agency makes substantial changes in the proposed action that are relevant to environmental concerns; or
(ii) There are significant new circumstances or information relevant to environmental concerns and bearing on the proposed action or its impacts.

40 C.F.R. § 1502.9(c)(1). As a legal matter, an SEIS must address the same NEPA considerations as the original EIS.

As pointed out above, the existing EIS for the Bering Sea is 17 years old and the EIS for the Gulf of Alaska is 20 years old. See 62 Fed. Reg. 15151. Since then, and until 1998, NMFS authorized annual catch limits and allocations pursuant to brief EAs, which primarily consider the impacts of NMFS authorization on groundfish abundance. The fundamental problem with using EAs is that the wide range of environmental impacts that occur from activities authorized by the groundfish fishery regulations have never been thoroughly analyzed in any EIS. An SEIS is required to "update" the earlier EISs to take into account the changed circumstances, new information and uncertainties regarding the types and intensity of fishery impacts on the environment.

At the heart of AMCC's concern that NMFS has been acting improperly and violating the public trust is the fact that NMFS knew in the early 1990s that NEPA required it to prepare an SEIS. In May 1990, for example, the Alaska Region of NMFS met to discuss the groundfish fisheries. In relaying the results of this meeting to the Regional Director, one member of this group stated that "the process of developing SEISs for the groundfish FMPs should be begun . . .." NMFS memo, May 16, 1990 at 2, Att. B. The NMFS' employees based this statement on their view that

> [i]t is clear that the action (the fishery and regulations) have changed since the original GOA and BSAI groundfish fishery FMP EISs were finalized, in 1978 and 1981, respectively. The significant new circumstance that might cause us to reassess the EISs is the emergency listing of the sea lion as threatened. The [final] EISs for the groundfish FMPs considered sea lions to be at optimum sustainable population levels.

Id. Shortly thereafter, the NMFS Alaska Regional Director responded that "[w]e need to draft a letter to the Council from me suggesting the need for an SEIS and giving the rationale and background." NMFS memo, June 6, 1990, Att. C. The draft letter which followed stated that the

> environmental documentation prepared for the[] two FMPs would be considered grossly inadequate by today's standards. . . . Overall, the EISs do not reflect existing conditions and the level of environmental/biological analysis would not be considered acceptable if the EISs were reviewed today. . . . I think it imperative that we bridge this information gap so that the FMPs are procedurally consistent with federal environmental statutes.

Draft letter to Council, attached to NMFS memo, May 16, 1990, Att. B.

Despite the rather urgent tone of the 1990 internal NMFS correspondence, there was no action to comply with the law. Indeed, the preparation of SEISs was still languishing in the planning stages in 1992. See March 12-13, 1992 Draft Agenda for Alaska Region/Alaska Fishery Science Center Planning Meeting (Item III "Development of SEIS for the two groundfish FMPs"), Att. I. In the end, NMFS never released for public comment and review or finalized an SEIS for the groundfish fisheries of the North Pacific.

NMFS foot-dragging continues to this day. As noted above, in response to firm requests that it do so, NMFS publicly acknowledged in 1997 that it had to supplement these EISs due to changes in the fishery and in the marine environment. See supra section III; 62 Fed. Reg. 15151. NMFS also stated that it would aim to finalize the SEIS in one year. 62 Fed. Reg. at 15152.

Another indication of misconduct on behalf of NMFS, therefore, is the fact that it is now one year later and NMFS has not yet even released a Draft SEIS for public review and comment. At this late stage it is doubtful that NMFS can prepare an SEIS before the scheduled start of the 1999 groundfish fisheries and still do an adequate analysis.

This series of events strongly suggests that the Alaska Region of NMFS is violating the public trust by failing to work in good faith to comply with our nation's fundamental laws for the protection of the environment. The tendency to be reactive in complying with these laws, as opposed to proactive, is egregious in any circumstance, and particularly so where, as here, the very future of the federal action depends upon a healthy and diverse environment.

B. The Alaska Region Of NMFS Authorized The 1998 Groundfish Fisheries To Proceed In Violation Of NEPA And The Endangered Species Act.

The National Environmental Policy Act and the Endangered Species Act require federal agencies to analyze the potential effect of their actions on the environment *before* the agency proceeds with its activity. See 42 U.S.C. § 4332(2)(C); 16 U.S.C. § 1536(a)(2). This requirement is grounded in common sense as well as the law, for without it, agencies would be taking actions without knowing the likely consequences of the actions and without planning to avoid or minimize those consequences.

As the facts set out below demonstrate, however, NMFS disregarded this legal requirement for the 1998 North Pacific groundfish fisheries. NMFS once again abused the process in a manner that allowed fishing to continue unhindered by the consideration of protections for the ecosystem.

1. National Environmental Policy Act

Initially, the fact that NMFS announced that an SEIS was necessary for the groundfish fishery is an admission of the significance of its action. See supra section V.A. Thus, the less-detailed EA process, which includes a Finding Of No Significant Impact (FONSI), is not legally available to NMFS.

That said, NMFS' delay in preparing the SEIS made it factually impossible for NMFS to comply with NEPA in time for the 1998 groundfish fishery. See Att. HH. Due to its own intransigence, NMFS was then left in the position of halting all fishing until completing the SEIS *or* allowing the fishery to proceed in violation of the law.

NMFS chose the latter option. As noted above, in December 1997 NMFS released for public comment another in its long line of Draft EAs for the annual TAC setting process. See supra section III; NMFS "Interested Party" letter and Draft EA, December 3, 1997, Att. W. For this minimal analysis to have even been relevant to the federal action of authorizing the fisheries to proceed, NMFS would have had to finalize the EA and FONSI before the fishing season began in January.

And, indeed, if one were to rely upon NMFS' Federal Register notice concerning the groundfish specification for the Gulf of Alaska fishery, it would seem that NMFS had met this goal. See 63 Fed. Reg. 12027 (March 12, 1998) ("Copies of the Environmental Assessment (EA) for 1998 Groundfish Total Allowable Catch (TAC) Specifications, *dated*

January 1998, may be obtained from the NMFS, Alaska Region") (emphasis added). Nevertheless, the EA and FONSI were actually not finalized until *March 3, 1998*, See Final EA and FONSI at 61(a), Att. DD, and not noticed to the public until March 12. 63 Fed. Reg. 12027.

Consequently, for more than the first two months of 1998 NMFS acted in complete defiance of NEPA. During this time frame the Bering Sea pollock A season, the Bering Sea Atka mackerel season and the Gulf of Alaska pollock A season started and finished. See Att. FF. And through the statement in the Federal Register Notice concerning the final date for the EA, NMFS misled the public into believing that it had complied with NEPA in authorizing these fisheries.

2. *Endangered Species Act*

NMFS' actions are no less egregious when it comes to compliance with the Endangered Species Act. Congress enacted the Endangered Species Act (ESA) out of a concern for the rate at which fish and wildlife species were disappearing. It sought to reduce the extinction of species by, among other things, prohibiting the "take" of species listed as either endangered or threatened under the ESA. 16 U.S.C. § 1538. Also, federal agencies must ensure that their actions are "not likely to jeopardize the continued existence of any endangered species . . . or result in the destruction or adverse modification of [critical] habitat of such species." 16 U.S.C. § 1536.

Where marine mammals are concerned, NMFS essentially consults with itself to make these determinations. Incident to these consultations, NMFS produces a biological opinion summarizing relevant information and detailing how the action affects the listed species or its critical habitat. 16 U.S.C. § 1536(b)(3).

In apparent acknowledgement that its past consideration of the needs of Steller sea lions was deficient, NMFS stated in the Draft EA for the Bering Sea and the Gulf of Alaska that it "is considering an amendment to the 1996 biological opinion on Steller sea lions prior to finalizing the 1998 TAC specifications and [Prohibited Species Catch] limits." Att. W at 41. Unfortunately, NMFS did not finalize the specifications for either the the Bering Sea or the Gulf of Alaska before the fisheries began. Indeed, NMFS only finalized the specifications for the Bering Sea and the Gulf of Alaska in March. See 63 Fed. Reg. 12689 (March 16, 1998); 63 Fed. Reg. 12027 (March 12, 1998) (final specifications for the Gulf of Alaska). Thus, in tying finalization of the Biological Opinion to the finalization of the TAC specifications and not the beginning of the federal action itself, e.g., the beginning of fishing, NMFS failed to ensure that its action would not "jeopardize the continued existence" of the endangered Steller sea lion. 16 U.S.C. § 1536(a)(2).

a. Bering Sea

Even more disturbing, moreover, is NMFS subsequent treatment of impacts of the fisheries on the endangered Steller sea lions. As noted above, in the draft EA, NMFS stated

that it was considering an amendment to the Bering Sea Biological Opinion for the 1998 fishery. Att. W at 41.

NMFS released a draft Biological Opinion for the Bering Sea on February 9, 1998. Att. Y. In it, NMFS expressed concern only about the relationship between the Atka mackerel fishery and the Steller sea lion, ignoring the other groundfish species such as pollock that are fished under the FMP. Id. at 2. As NMFS noted, the Atka mackerel fishery had evolved over the years such that "the major pulse of effort has occurred in the first few weeks after the opening of the fishery in January." Id. This fishery "operates within and near Steller sea lion critical habitat." Id. at 6.

Nevertheless, NMFS states in the draft that

> [t]he new information describes localized Atka mackerel depletions resulting from pulses of fishing activity, but it is not apparent that these potential depletions are severe enough or occur over a sufficiently large area to cause an appreciable reduction in the Steller sea lion's ability to survive and recover. It is clear the western population of Steller sea lions is at risk due to its continuing decline, and the life history characteristics of the species limit its potential rate of recovery. However, based on the best available information, the prosecution of the 1998 Atka mackerel fishery can not be reasonably expected to appreciably reduce the likelihood of both the survival and recovery of the Steller sea lion.

NMFS Draft Biological Opinion on the Bering Sea at 7-8, February 9, 1998, Att. Y.

In the normal course of business, NMFS, Alaska Region would have transmitted this draft to its headquarters for final approval. While the paper trail does not reveal any correspondence from headquarters, the Alaska Region of NMFS never finalized this draft. Instead, at the end of February, it released a *one-paragraph* memorandum simply stating that "The 1996 Biological Opinion remains valid for the 1998 [Bering Sea] fishery." NMFS Memo, February 26, 1998, Att. AA.

Of course, by this time, the Atka mackerel fishery was completed so there was nothing NMFS could have done to protect the Steller sea lion from jeopardy. In effect, because it waited so long to act, NMFS had no choice but to issue a no jeopardy conclusion or it would have publicly admitted that its actions were jeopardizing the very existence of an endangered species.

b. Gulf of Alaska

NMFS' treatment of the Gulf of Alaska fishery was as strained. On February 6, 1998, NMFS, Alaska Region sent a memo to NMFS, Headquarters transmitting a draft amendment to the 1996 Biological Opinion for the Gulf of Alaska fishery. Att. X. It states that "the Amendment addresses only the 1998 fishery, and not the continued implementation of the GOA FMP for groundfish beyond 1998." Id.

NMFS finalized this Biological Opinion on March 2, 1998. Att. CC. It analyzes a 60% increase in TAC for the Gulf of Alaska. Id. at 2. Split between three seasons, starting January 20, June 1 and September 1, catch is distributed between the three seasons with 25% for each of the first two seasons and 50% for the last. Id.

Given this amount of fishing and its distribution through the year, NMFS concludes in the Biological Opinion that the fishery "was likely to adversely affect the western population of the Steller sea lion." Id.; see also Id. at 4 ("NMFS has determined that the proposed action is likely to adversely affect the endangered western population of the Steller sea lion . . . and its designated critical habitat"). At least to this point, the Biological Opinion is rather straightforward.

NMFS quickly complicates matters, however, by saying that the TAC will be "revised through a rulemaking to a distribution of 35% and 40% for the last two seasons." Id. at 2. This minor temporal change in the fishery will, according to NMFS,

> minimize potential adverse effects of the fishery on Steller sea lions during the winter months, when weaned pups are learning to forage and adult females may be both pregnant and lactating.

Id. NMFS then reaches the conclusion without which it could not proceed with the fishery:

> the GOA fishery is not likely to jeopardize the continued existence of the western population of Steller sea lions and is not likely to destroy or adversely modify designated critical habitat for the species in Alaska.

Id. at 9; see also NMFS cover memo to GOA Biological Opinion, March 2, 1998, Att. CC.

Yet NMFS' conclusion makes no sense. Briefly recapping recent events in the plight of the sea lion, NMFS acknowledges that the very existence of the animal is so threatened that its status is downgraded from threatened to endangered. NMFS also acknowledges that food stress is a primary cause for its continued decline. NMFS then authorizes a 60% increase in the Gulf of Alaska TAC. With such facts, NMFS cannot rationally conclude that a 10% redistribution from one season to the next will change a "jeopardy" conclusion to a "no jeopardy" conclusion.

The irrationality of NMFS' conclusion becomes even more evident when one examines NMFS' stated justification for its change of opinion. NMFS states that reducing the catch in the September season from 50% to 40% will shorten the fishery such that the weaned pup and adult female sea lions will have more prey during the winter months, when they are most vulnerable. Att. CC at 2. NMFS' reasoning is absurd given the fact that sea lion pups wean, at the earliest, four months after their June births. See NMFS Draft Biological Opinion for the Bering Sea, February 9, 1998 at 6, Att. Y. This means that, at the earliest, they are learning to forage for their own food in October, and many not until much later in the winter. Id. Thus, by NMFS' own reasoning, it should never have authorized the opening of the January season, when most pups are truly learning to forage and females are

either pregnant or still lactating. If sea lions are stressed in September as NMFS suggests, they are doubly so in the middle of the winter.

Of course, this option was not available to NMFS, as it didn't finalize its Biological Opinion until March 2, 1998, long after the January season had ended. Thus, NMFS had to manipulate the catch in the seasons remaining to be fished, likely hoping that its statement that it would re-do the Biological Opinion for the 1999 season would somehow temper the arbitrary nature of the 1998 Biological Opinion. It does not.

C. NMFS Has Ignored Groundfish-Related Recommendations From Steller Sea Lion Experts To Protect The Steller Sea Lion And Its Critical Habitat

Steller sea lions have declined by 85 to 90% in their core range since the 1960s. This precipitous, unprecedented decline has occurred entirely in the Bering Sea and Gulf of Alaska and has coincided with the development of the large-scale groundfish trawl fisheries. As noted above, Steller sea lions were listed as a threatened species under the Endangered Species Act in 1990. The western population was downlisted to an endangered species in 1997.

Following a lawsuit filed in 1991, NMFS implemented modest protective measures intended to reduce interaction between sea lions and the fisheries, including 10 nm no-trawl zones around key rookeries and seasonal 20 nm no-trawl zones around six particular rookeries. Perhaps the most notable truth about these measures is "how little [they have] affected the fishery." NMFS email, February 28, 1996, Att. S. Not surprisingly, this mild set of protections "do not appear to have been effective in stopping the decline or starting a population recovery." Letter from Steller Sea Lion Recovery team to NMFS, February 1, 1995, Att. Q.

At the same time, the volume of groundfish caught in Steller sea lion critical habitat in the Bering Sea has gone up dramatically in the last decade, from about 200,000 mt to around 700,000-800,000 mt. This equates with 70% of the total Bering Sea pollock quota. NMFS notes this disturbing fact but fails to address it meaningfully or to explain why this huge increase in fishing in critical habitat is not adversely modifying that habitat. Incidentally, the rate of decline of sea lions in the Bering Sea has begun to accelerate, from about 5% in 1991-1996 to 10-12% in the last two years. In the Gulf of Alaska, the volume of catch in critical habitat has remained roughly stable but very high in the 1990s, averaging well over 50% of the total catch. See e.g., Att. II.

Despite the continued declines in sea lions and the reclassification of the western population as endangered, since 1993 NMFS has neither proposed nor publicly considered, much less implemented, any additional measures to limit the interaction between sea lions and the Bering Sea pollock fisheries. NMFS has done very little in the Bering Sea Atka mackerel or Gulf of Alaska pollock fisheries to address the same concerns. This inaction has occurred in the face of specific recommendations for additional protections from the Steller Sea Lion Recovery Team and from within the agency itself:

* in January 1994, a NMFS official stated for the record that, in the Gulf of Alaska, a large proportion of the pollock catch was coming from within 20 nm of major haulouts, which currently receive no protection. This memorandum concluded that, "in light of the continuing, high-rate of sea lion population decline in the GOA and the increased importance of haulout sites during winter, NMFS should consider the need for additional no trawl zones . . . [p]rior to the start of the 1995 fishery." NMFS memo at 5, January 31, 1994, Att. K;

* in February 1994, the NMFS Steller sea lion-fishery team agreed that "trawl closures could be modified to increase protection to sea lions while avoiding unnecessary restrictions on fisheries" by altering closures to reflect sea lions seasonal distributions (year-round closures at sites used year-round, summer closures at rookeries used only for breeding, and winter closures around haulouts); NMFS Memo, February 18, 1994, Att. L;

* in November 1994, the Steller Sea Lion Recovery Team recommended that since food availability appears to be the most likely problem, juveniles are the age class most affected, and juveniles feed mostly in nearshore waters, "NMFS should evaluate the need to close or otherwise regulate" all fisheries occurring near to all rookeries and haulouts in the Bering Sea and Gulf of Alaska; NMFS Memo, December 5, 1994, Att. O; Recovery Team letter, February 1, 1995, Att. Q;

* in 1997, NMFS scientists concluded that, if decreasing fishery-sea lion interactions was a primary objective of fishery management, then the trawl exclusion zones "should be redefined to reflect the seasonal use of habitats by different age groups of Steller sea lions" and that "zone diameter could change to reflect the larger foraging ranges observed in winter." Att. V. This paper noted that, while such measures would change the distribution and structure of the groundfish fisheries, they "may be necessary in order to insure its long-term viability." Att. V.

These illustrations represent but a fraction of the evidence from the agency itself that indicts NMFS for its unwillingness and inability to address the needs of this endangered species as required by law. NMFS' inaction concerning Steller sea lions is inexcusable. In 1993, NMFS recognized the next 20 years would be "particularly critical to the fate of the Steller sea lion." Notice regarding Steller sea lion status review, 58 Fed. Reg. 58318 (November 1, 1993). We are now five years into this twenty-year period, the Steller decline has continued unabated, yet NMFS has done nothing. Even worse, as noted above, NMFS has permitted the volume of fish caught in sea lion critical habitat to increase dramatically. See also Att. V.

Plainly there are a number of measures to protect Steller sea lions that NMFS can and should implement immediately. These include extending no trawl zones to haulouts as well as rookeries and reducing the catch in critical habitat. Rather than acting, the agency has produced inadequate, boilerplate Biological Opinions which arbitrarily conclude that all is well.

Unfortunately, NMFS' approach to this endangered species appears to be that "[i]t usually takes a lawsuit or an irate fish industry consultant to get [the agency's] attention on sea lions these days..." NMFS memo, February 28, 1996, Att. S.

D. The Alaska Region Of NMFS Allowed Factory Trawlers To Underreport Their Groundfish Catch

The Magnuson-Stevens Fishery Conservation and Management Act mandates that "[c]onservation and management measures shall be based upon the best scientific information available." National Standard 2, Section 301(a)(2), 16 U.S.C. § 1851(a)(2). The Act further provides for special requirements to ensure the accurate measurement of total catches in the North Pacific fisheries. Section 313(h); 16 U.S.C. § 1862(h).

Research conducted in 1996-97 revealed that NMFS' prior catch measurement criteria "was too low, resulting in underestimation of catch weight by 5 to 9% for observer estimated hauls." Determination of Catch Quantity and Composition in the Federal Groundfish Fisheries off Alaska, February 1998 at 17, Att. EE (this Report summarized data from NMFS, Alaska Fisheries Science Center Processed Report 97-07, Evaluation of Haul Weight Estimation Procedures Used by At-sea Observers in Pollock Fisheries off Alaska, December 1997). In response to this research, and in compliance with the Magnuson-Stevens Act legal requirements, NMFS prescribed new, more accurate catch measurement "for use in 1998 pollock fisheries." Id. At the early February meeting of the North Pacific Fishery Management Council NMFS stated that it would use this new, more accurate, measurement. See e.g., NPFMC meeting minutes, February 5-8, 1998; Letter from State of Alaska to NMFS, February 27, 1998, Att. BB.

Nevertheless, almost immediately after the Council meeting concluded, the Alaska Region of NMFS announced its intent to allow factory trawlers to use the old, admittedly inaccurate methods of accounting during the first half of the 1998 Bering Sea pollock fishery. NMFS-Alaska Information Bulletin 98-(08), February 12, 1998, Att. Z. In doing so, NMFS acknowledged that use of these inaccurate methods would result in the underestimation of the amount of pollock caught. Id.

NMFS' decision essentially sanctioned allowing the factory trawl fleet to take at least 2% more pollock during the first half of 1998 than was allocated and than would be reported. Id. In real numbers, this would mean an unaccounted for pollock catch of from 6,000 to 10,000 mt above what was allocated to the factory trawlers for this season of the Bering Sea pollock fishery.

Significantly, NMFS' decision authorized use of these inaccurate methods during a period when virtually all, if not all, of the Bering Sea pollock catch is taken within Steller sea lion critical habitat. Equally important, NMFS could not have ignored the fact that the increased fishing effort resulting from underestimating catch would happen during a time of year when the endangered Stellers are particularly susceptible to food stress. See e.g., Biological Opinion, February 9, 1998, Att. Y. Nevertheless, in making its decision, NMFS made no mention of the ecological implications. See Att. Z.

Alarmed at this unilateral decision to use inaccurate measurement criteria, the State of Alaska sent a letter to NMFS expressing displeasure at its decision. The State noted that the effect of NMFS' decision would be a "reallocation of harvest between the A and B seasons toward the A season harvest." Letter from State of Alaska to Alaska Region, NMFS, February 27, 1998, Att. BB. The State also noted that NMFS' "policy of knowingly exceeding the current A season apportionment should not be condoned given the level of existing concern for Steller sea lions." Id. The State also estimated that NMFS' decision effectively and conservatively provided factory trawlers with a $4-$6 million windfall. Id.

Congress and the State of Alaska are not the only entities that recognize the importance of using the best available information. In a report commissioned by NMFS, the National Research Council recently emphasized that without accurate fish counts and proper management "exploited fish populations can collapse, creating severe economic, social and ecological problems." Council: Fish data lacking; Report warns that counting errors may threaten fisheries, Anchorage Daily News, December 10, 1997 at page F-1 quoting National Research Council Report "Improving Fish Stock Assessments."

Thus, NMFS agreed to a deal that would allow factory trawlers to exceed their quota of pollock taken from Steller Sea lion critical habitat during crucial winter months resulting in a gain of millions of dollars by one segment of the industry. And it did this outside the Congressionally-established Council management process.

VI. CONCLUSION

The recent history of NMFS' management of the huge North Pacific groundfish fisheries is appalling. The record demonstrates that the Alaska region of NMFS consistently dodges tough decisions concerning any limitation on the fishery which would ensure the sustainability of the target species, the health of the North Pacific ecosystem and the very existence of the Steller sea lion.

It is possible, if not probable, that legal action against NMFS is the likely outcome of the agency's sustained inaction in violation of conservation laws. Yet, if we can determine why the process has become so skewed in the first place, perhaps we can also find a way to fix it. We can then usher in a new era of fisheries management, management designed to reduce the detrimental effect of human interactions with the North Pacific while maximizing a *sustainable* benefit to Alaska and the United States.

It is with this result in mind that the Alaska Marine Conservation Council requests that the Inspector General initiate an investigation into NMFS, Alaska Region's management of the North Pacific groundfish fisheries.

LIST OF ATTACHMENTS

ATTACHMENT A
National Marine Fisheries Service (NMFS) Memo dated May 15, 1990 regarding April 27, 1990 Steller Sea Lion Recovery Team Update #1 and Minutes of the First Meeting

ATTACHMENT B
NMFS Memo dated May 16, 1990 on Sea Lion Section 7 Consultation

ATTACHMENT C
NMFS Memo dated June 6, 1990 on Sea Lions

ATTACHMENT D
NMFS Memo dated July 16, 1990 on Supplemental EISs for FMPs

ATTACHMENT E
NMFS Memo dated February 5, 1991 on Sea Lions

ATTACHMENT F
NMFS electronic mail dated December 3, 1991

ATTACHMENT G
NMFS Briefing Notes on North Pacific Fishery Management Council meeting Dec. 3-8, 1991

ATTACHMENT H
NMFS memo dated January 30, 1992 on Marine Mammal Fisheries Interaction

ATTACHMENT I
Draft Agenda for Alaska Region/Fishery Science Center Planning Meeting March 12-13, 1992

ATTACHMENT J
NMFS Memo dated July 24, 1992 on Section 7 Consultation on Inshore/Offshore Allocation

ATTACHMENT K
NMFS Memo dated January 31, 1994 for the Record on Section 7 Consultation for the 1994 Total Allowable Catch Specifications for the Gulf of Alaska Groundfish Fishery and research paper

ATTACHMENT L
NMFS electronic mail dated February 18, 1994 on sea lion fishery team meeting with attached draft memo to the record

ATTACHMENT M
Informal NMFS Memo dated September 1, 1994

ATTACHMENT N
NMFS memo dated December 5, 1994 on Steller Sea Lion Recovery Team Recommendations

ATTACHMENT O
NMFS electronic mail dated December 5, 1994 on Sea Lion Recovery Team

ATTACHMENT P
NMFS electronic mail dated December 22, 1994 on 20 nm closure zones

ATTACHMENT Q
Steller Sea Lion Recovery Team letter dated February 1, 1995

ATTACHMENT R
NMFS Memo dated February 8, 1995 on Steller Sea Lion Recovery Team Meeting with attachments

ATTACHMENT S
NMFS electronic mail dated February 28, 1996

ATTACHMENT T
NMFS letter dated April 9, 1996 with attached minutes of the Steller Sea Lion Recovery Team meeting

ATTACHMENT U
Letter from Trustees for Alaska dated January 5, 1997 regarding Draft EA for 1998 Groundfish TAC for Bering Sea/Aleutian Islands and Gulf of Alaska

ATTACHMENT V
Fritz, Ferrero, Options in Steller Sea Lion Recovery and Groundfish management (including graphs showing catch in critical habitat)

ATTACHMENT W
NMFS cover letter and Draft EA dated December 3, 1997 (relevant portions)

ATTACHMENT X
NMFS Memo dated February 6, 1998 regarding Draft Amendment to the Biological Opinion under section 7 of the ESA for the Gulf of Alaska (GOA) Groundfish Fisheries and their effects on Steller sea lions.

ATTACHMENT Y
NMFS memo dated February 9, 1998 on Draft Amendment to the Biological Opinions under section 7 of the ESA for the Bering Sea/Aleutian Islands (BSAI) Groundfish Fisheries and their affects on Steller sea lions.

ATTACHMENT Z
Information Bulletin 98- (08) February 12, 1998 titled Clarification of standard pollock density factors to be used in the 1998 pollock fisheries

ATTACHMENT AA
NMFS memo dated February 26, 1998 on Steller Sea Lions

ATTACHMENT BB
State of Alaska letter dated February 27, 1998 regarding information bulletin 98- (08)

ATTACHMENT CC
NMFS Memo dated March 2, 1998 on Endangered Species Act Section 7 Biological Opinion on the Fishery Management Plan for the GOA Fishery, the 1998 Total Allowable Catch Specifications, and the effects on Steller Sea Lions

ATTACHMENT DD
NMFS EA dated March 2, 1998 on North Pacific Groundfish Fisheries and FONSI dated March 3, 1998 (relevant portions)

ATTACHMENT EE
NMFS Determination fof Catch Quantity and Composition in the Federal Groundfish Fisheries off Alaska February 1998 (relevant portions).

ATTACHMENT FF
1998 Fishermen's Calendar, Kodiak Daily Mirror, March 24, 1998.

ATTACHMENT GG
NMFS Stellar Sea Lion Time Line starting May 6, 1988 through November 25, 1991

ATTACHMENT HH
AMCC comments dated on Draft EA for 1998 TAC

ATTACHMENT II
Fritz, Ferrero, Berg, The Threatened Status of Steller Sea Lions Under the Endangered Species Act (1995)