MEMORANDUM

TO: Council, SSC, and AP Members

FROM: Chris Oliver
Executive Director

ESTIMATED TIME
10 HOURS
(all D-1 items)

DATE: September 26, 2006

SUBJECT: 2007-2008 BSAI and GOA Groundfish Specifications

ACTION REQUIRED

(a) Review Ecosystem SAFE report
(b) Review and comment on draft EIS for 2007/08 Groundfish Harvest Specifications
(c) Recommend proposed groundfish specifications for 2007/08

BACKGROUND

(a) Ecosystem Considerations section

The Ecosystem Considerations section advances our understanding of marine ecosystem dynamics and delivers ecological, oceanographic, and climatic indices to stock assessment scientists and managers. The executive summary section was reorganized in 2006, following SSC recommendations (Item D-1(a)). The section is comprised of three main sections. Integration of information regarding ecosystem status and trends and the use of models to predict possible future ecosystem states using an indicator approach constitutes the *Ecosystem Assessment* subsection. These include climate, oceanographic, production, species, community, ecosystem-level, and ecosystem-based indicators. *Ecosystem Status Indicators* provides stronger links between ecosystem research and fishery management and to spur new understanding of the connections between ecosystem components by bringing together many diverse research efforts into one document. *Ecosystem-based Management Indices* provides either early signals of direct human effects on ecosystem components that might warrant management intervention or evidence of the efficacy of previous management actions.

Changes to two subsections were made to the 2006 draft section, as identified below. The final Ecosystem Considerations section will be presented in December 2006.

Ecosystem Status Indicators: The climate section is not yet updated but will be provided in the November. Current information indicates 2006 may be an El Nino year (last year was a la Nina year). Zooplankton biomasses in the Gulf of Alaska (GOA) were included. Larval fish information in the GOA was updated. Regime shift anomalies were estimated for Bering Sea/Aleutian Islands (BSAI) and GOA groundfish. Recruitment and survival indices were estimated for the aggregate BSAI and GOA ecosystems. Results from a transport model for winter spawning flatfish are presented.

Ecosystem based management Indices: The status relative to overfishing for managed stocks in the North Pacific are presented. Fish stock sustainability index (FSSI) indices are presented for species in the BSAI and GOA. Updated fishing effort for both BSAI and GOA are included. A new contribution is included on the

distribution and abundance of humans in the ecosystem. Catch information are updated for PSC species and non-target catch.

(b) Draft EIS for 2007/08 Groundfish Harvest Specifications

New this year, NMFS staff has prepared an Environmental Impact Statement, rather than an Environmental Assessment for the 2007-2008 groundfish specifications because the choice of a groundfish specifications strategy by the Council has been determined to be a major Federal action that may have significant impacts on the human environment. The Draft EIS provides decision-makers and the public with an evaluation of the environmental, social, and economic effects of alternative harvest strategies for the federally managed groundfish fisheries. It examines alternative harvest strategies that are applied to the best available scientific information to derive the total allowable catch for the groundfish fisheries. The document was distributed to you in the mail last month. The executive summary is attached as Item D-1(b)(1). An Initial Regulatory Flexibility Analysis was also prepared for the harvest specifications, and the executive summary is attached as Item D-1(b)(2). Dr. Ben Muse will summarize the analysis.

(c) 2007/08 Groundfish Harvest Specifications

Starting in 2005, the Council implemented a new policy of adopting proposed BSAI and GOA groundfish specifications for a two-year period each October with final specifications set each December. Further, the Council adopted a biennial cycle for some GOA and AI groundfish stocks, timed for when trawl surveys provide new data. Therefore, 2007 specifications that were adopted in December 2005 have been published in the *Federal Register* and will start the fishery on January 1, 2007. The proposed specifications for review at this meeting will be published in the proposed rule, and final specifications for review in December will replace those that started the 2007 fisheries, after they are published in the final rule in late February/early March 2007.

The BSAI and GOA Groundfish Plan Teams recommended projected groundfish specifications for 2007 and 2008 during their September 19-21, 2006 meeting for publication in the proposed rule (Item D-1(c)(1)). The projections for Tier 1 to 3 stocks used species-specific AFSC population models, which include information on age structure, growth and reproduction, and natural and fishing mortality. The projections for Tiers 4-6 "roll over" the 2007 final specifications. Further information on the methodology for projecting these specifications may be found in the TAC-setting EIS. Reports from the Joint and GOA groundfish plan team meetings are provided under Item D-1(c)(2); BSAI Groundfish Team minutes will be provided at the meeting.

BeringSea/Aleutian Islands. Note that the projection model uses Tier 3 calculations even for walleye pollock, a Tier 1 stock. This resulted in the following OFL and ABC projections. The DEIS projection for this stock may be less informative to the public, than current specifications. Recall, though, that these projections will not be implemented.

Species	Area	Council October 2005, from 2006-007 Dec 16 proposed rule	Council December 2005, from 2006-2007 Mar 3 final rule	DEIS projections in August 2006
Pollock OFL	BS	1,487,100	1,930,000	1,707,000
Pollock ABC	BS	1,223,200	1,790,000	1,419,800

In the BSAI, Prohibited Species Catch limits are established for halibut, red king crab, Tanner crab, opilio crab, and herring. These PSC limits are further allocated among gear types and apportioned by target fisheries. The 2007 PSC limits and apportionments, as implemented in regulation, are attached as Item D-1(c)(3). The trawl halibut allocations would start July 1, 2007, as set in the regulations.

Gulf of Alaska. In the GOA, Prohibited Species Catch (PSC) limits are established for halibut. Total halibut PSC limits for all fisheries and gear types total 2,300 mt. The halibut PSC apportionments recommended based upon the 2006 apportionments are attached as Item D-1(c)(4).

GOA TAC Considerations for State Pacific Cod Fishery: Since 1997, the Council has reduced the GOA Pacific cod TAC to account for removals of not more than 25% of the Federal P. cod TAC from the state parallel fisheries. Using the area apportionments of the 2007 P. cod proposed ABC recommended by the Plan Team (for the proposed rule), the federal TAC for P. cod would be adjusted as listed below. Note these values for the proposed rule do not employ the stair-step mechanism employed by the SSC in establishing final ABC specifications for P.cod in 2006-2007.

Proposed 2007 Gulf of Alaska Pacific cod ABCs, TACs and state Guideline Harvest Levels (GHLs) (mt).

Specifications	Western	Central	Eastern	Total
ABC	22,971	32,395	3,534	58,900
State GHL	5,743	8,099	353	14,195
(%)	25	25	10	24.1
Federal TAC	17,228	24,296	3,181	44,705

Halibut discard mortality rates. Halibut discard mortality rates are set by the Council on a 3-year cycle for non-CDQ fisheries based on an average of the past 10 years and annually for CDQ fisheries based on available data. Halibut Discard mortality rates for 2005 were presented in conjunction with recommended rates for use in 2007-2009. International Pacific Halibut Commission staff recommendations for DMRs for the BSAI CDQ (for 2007) and BSAI and the GOA non-CDQ fisheries for 2007-2009 are under Item D-1(c)(5).

SUMMARY OF MAJOR CHANGES

- Completed and posted a website for the Ecosystem Considerations report and underlying data for many of the contributions in the report on the internet: http://access.afsc.noaa.gov/reem/ecoweb/index.cfm

- Included month and year of the last update as well as contact information for each contribution.

- Excluded grenadiers contribution in September 2006, since this will be in a separate chapter.

- New contributions in September 2006:
  - Gulf of Alaska Zooplankton
  - Distribution and abundance trends in the human population of the Bering Sea/Aleutian Islands
  - Fish Stock Sustainability Index was added to the contribution entitled: Fish Stock Sustainability Index and status of groundfish, crab, salmon and scallop stocks

- Updated the following sections/contributions in September 2006:
  - Responses to comments of the Scientific and statistical committee (SSC)
  - Executive Summary
  - Ecosystem Assessment
  - Pollock Survival Indices –FOCI
  - Seasonal rainfall at Kodiak
  - Wind mixing at the southwestern end of Shelikof Strait
  - Ocean Surface Currents – Papa Trajectory Index 2005
  - Exploring Links between Ichthyoplankton Dynamics and the Pelagic Environment in the Northwest Gulf of Alaska.
  - Togiak Herring Population Trends
  - Trends in Groundfish Biomass and Recruits per Spawning Biomass
  - Update on EBS winter spawning flatfish recruitment and wind forcing
  - Combined Standardized Indices of recruitment and survival rate
  - Marine mammals -fishery mortality and native subsistence harvest levels
  - Time Trends in Bycatch of Prohibited Species
  - Time trends in groundfish discards
  - Areas closed to bottom trawling in the EBS/ AI and GOA
  - Hook and Line (Longline) fishing effort in the Gulf of Alaska, Bering, Sea and Aleutian Islands
  - Groundfish bottom trawl fishing effort in the Gulf of Alaska, Bering Sea and Aleutian Islands
  - Groundfish pelagic trawl fishing effort in the Eastern Bering Sea
  - Trophic level of the catch
  - Fish Stock Sustainability Index and status of groundfish, crab, salmon and scallop stocks
  - Total annual surplus production and overall exploitation rate of groundfish
  - Fishing overcapacity programs
  - Groundfish fleet composition

RESPONSES TO COMMENTS OF THE SCIENTIFIC AND STATISTICAL COMMITTEE (SSC)

December 2005 SSC Comments

1. The SSC suggested that, if in the future the principal discussion of the Ecosystem Considerations chapter was to be conducted during the October SSC meeting, that there should be a brief review of the most salient points in December, with an emphasis on those findings that could impact decisions about the setting of ABCs.

Response:
A brief review of the most salient points, with an emphasis on those findings that could impact decisions about the setting of ABCs, will be provided to the SSC in December, 2006.

2. BSAI pollok SAFE: Given the recent very low abundances of zooplankton, especially the copepod Calanus marshallae, on the middle shelf of the southeastern Bering Sea, it would seem that there should be either moderate or high concern about these low levels. Either [in the BSAI pollock SAFE] or in the Ecosystem SAFE, it should be discussed whether warming temperatures in the southern Bering Sea are adversely affecting the production of large species of zooplankton.

Response:
Currently, it is not clear what is causing the anomalously low summer zooplankton biomass in the Bering Sea. As new information emerges on this issue, an update will be provided in the Ecosystem Considerations report.

October 2005 SSC Comments:

1. The Ecosystem Considerations document includes an Executive Summary of Recent Trends that provides a useful and concise overview of recent conditions and trends in the stocks and the environment in the Bering Sea and Gulf of Alaska. The SSC encourages further development of this form of synthesis of the varied and numerous sources of information that comprise the main body of the document. It might be useful to frame the synthesis in terms of the effects that humans have on the ecosystem versus the effects of the ecosystem on humans.

Response:
The Executive Summary of Recent Trends was further developed to form a synthesis framed in terms of the effects that humans have on the ecosystem versus the effects of the ecosystem on humans.

2. Also because some of the information in the document will change infrequently, whereas other items will be updated regularly, each section of the report (and website) should indicate when it was last updated.

Response:
All sections now have the month and year that they were updated.

3. In the future the chapter (and website) should link stock assessment results with updates to the ecosystem assessment and consideration should be given to incorporating the climate information in to stock assessments and the ecosystem assessment.

Response:
We acknowledge that this is an important issue, and we strive and will continue to strive to attain this goal.

EXECUTIVE SUMMARY OF RECENT TRENDS

Human Effects on Ecosystems

No significant adverse impacts of fishing on the ecosystem relating to predator/prey interactions, energy flow/removal, or diversity were noted, either in observed trends or ecosystem-level modeling results.

The overall human population of BSAI fishing communities in 2000 was almost seven times larger than its 1920 population; however, the proportion of people living in those communities relative to the total Alaskan population has declined (Poole and Sepez, this report). Most (84%) of the BSAI fishing communities have shown an increase in population. Communities with a decline in population during 1990 and 2000 appear to be concentrated in the Aleutians East and West along with Lake, Peninsula, and Bristol Bay boroughs (Poole and Sepez, this report).

Time trends in bycatch of prohibited species are examples of ecosystem-based management indices that may provide early indications of direct human effects on ecosystem components or provide evidence of the efficacy of previous management actions. Interestingly, the bycatch of "other salmon" and herring increased markedly in 2003 and 2004. Between 2002 and 2003, herring bycatch increased by over 600% and "other salmon" bycatch more than doubled. After the dramatic increase in 2003, the herring bycatch increased again by about 42% and "other salmon" bycatch almost doubled in 2004.

Most of the herring bycatch in all years occurs in the BSAI trawl fisheries, primarily during the months of July, August and September with smaller amounts in January through March and October. The recent rise in bycatch can be partly explained by increases of herring biomass; the biomass of Kuskokwim herring, for example, is estimated to have increased by about 34% in 2003 and again by about 32% in 2004. Observer data reveals differences in the distribution of both effort (all pelagic-trawl hauls) and bycatch (hauls with herring in the species composition) over the years 2002-04. In most months of 2003 and 2004, the amount of effort and bycatch increased noticeably in the northwestern-most portions of the fleet's range compared to 2002.

Part of the 2003 increase in "other salmon" bycatch could be explained by the 33% increase in the overall catch of "other salmon" in 2003 compared to 2002. The "other salmon" bycatch nearly doubled again in 2004, despite an almost 6% reduction in the overall catch. In 1994, the North Pacific Fisheries Management Council and NMFS established the Chum Salmon Savings Area (CSSA) in parts of the Bering Sea and at times when salmon bycatch had been highest based on historical observer data. Unfortunately, in both 2003 and 2004 the highest chum salmon bycatch rates were outside of the CSSA and after its closure. Similar problems occurred in 2003 and 2004 with Chinook salmon bycatch outside of the Chinook Salmon Savings Area—the highest bycatch rates were encountered by the pollock trawl fleet outside of the Savings Area after regulations had forced its closure. The resulting Chinook salmon bycatch was about 28% higher in 2003 and 41% higher in 2004 than the long-term average over the period 1994-2002. To address these problems, the Council is considering other means to control salmon bycatch (Hiatt and Terry, this report).

Seabird bycatch in 2002 was the lowest recorded for the longline fleet. Efforts by the longline fleet may have contributed substantially to the observed reduction, although no analysis has been completed to ascertain the contribution of various factors. In 2003 seabird bycatch in the BSAI increased by nearly 40% over 2002, while the bycatch rate remained fairly constant (0.019 vs 0.018 in 2002). The increased bycatch was likely due, in part, to a 28% increase in effort. However, other factors may also have been at work, given the reduction in bycatch between 1998 and 2002 of 84% while effort increased over this time by 23% (Fitzgerald et al., this report).

Ecosystem Effects on Humans

Variability in climate and physical ocean processes can affect the composition, distribution, abundance, and productivity of living marine resources, thereby affecting the humans that rely on those resources. Historic and current trends in climate and biological time series enable us to assess the current state of ecosystems relative to the past and identify potential stressors that may affect the future state of ecosystems. A great deal of research has focused on the identification and characterization of shifts in climate on multiple scales and the potential effects of those shifts on marine communities. For example, evidence suggests that there were major climate regime shifts in the early 1940s (to cold conditions) and late 1970s (to warm conditions) in the North Pacific, as noted in surface air temperatures and sea surface temperature patterns (indexed by the Pacific Decadal Oscillation). In addition to these major shifts, climate variability has also occurred on shorter time-scales in the Bering Sea and Gulf of Alaska. For example, there was a climate shift in 1989, seen as a positive shift in the Arctic Oscillation index (an index of sea level pressure), and possibly in 1998, seen as a change in the spatial pattern of sea surface temperatures (PDO). Recent conditions in the North Pacific, such as those in the winter of 2004-2005, were unlike those associated with the primary modes of past variability, suggesting: (1) that the nature of North Pacific variability is actually richer in variability than appreciated previously, and (2), that there is the potential for significant evolution in the patterns of variability due to both random, stochastic effects and systematic trends such as global warming.

2004-2005 was a weak El Nino year, with minor or atypical impacts in the North Pacific. The winter of 2006 was characterized by a weak La Niña event. The Bering Sea was very warm during 2000-2005 with record high spring and summer temperatures as well as record low indices of ice. In 2006, May SST sharply dropped to the level observed in 1999. Physical data collected on the NMFS Gulf of Alaska (GOA) bottom trawl survey indicate that summer temperatures in 2005 were the warmest on record. There has been a general warming of depths less than 50 m in the GOA through to 2005 (Martin, this report).

Published literature provides examples of strong biological community reorganizations after the 1977 climate regime shift and shifts in recruitment or survival of some organisms after the 1989 climate regime shift. For example, demersal groundfish species in the BSAI had above-average recruitments from the mid- or late 1970s to the late 1980s, followed by below-average recruitments during most of the 1990s (Mueter, this report). There is an indication for above-average recruitment from 1994-2000 in the Bering Sea (Mueter, this report). More recently, coinciding with the warm conditions in the eastern BS during 2000-2004, summer zooplankton biomass was anomalously low in all four geographic domains (Napp and Shiga, this report). Jellyfish biomass, sampled in the EBS bottom trawl survey, was also low during 2001-2005 relative to the peak biomass that occurred in 2000 (Lauth, this report). Warm temperatures may have implications for some flatfish because their habitat selection appears to be influenced temporally by varying environmental conditions. Rock sole and flathead sole appear to be distributed further north in the EBS in warmer conditions (Spencer, this report).

Similar to the BSAI, GOA demersal groundfish species had above-average recruitments from the mid- or late 1970s to the late 1980s, followed by below-average recruitments during the early 1990s (Mueter, this report). There is a strong indication for above-average recruitment in the GOA from 1994-2000 (with the exception of 1996; Mueter, this report). Analyses conducted on the GOA small mesh survey data, accounting for spatial and temporal variability in survey samples, confirm that the GOA biological community shifted after the 1977 climate regime shift. Observed changes include a trend towards increased catches of jellyfish, arrowtooth flounder, walleye pollock, flathead sole and decreased catches of Pandalid shrimp, capelin, Pacific sandfish red king crab, and sculpins. Although, catches of pandalid shrimp increased after 1998, there is no evidence at this time of a rapid community reorganization, such

as that which followed the 1977 shift (Litzow, this report). Eulachon catches have also been high since about 2001 in both the nearshore GOA small mesh survey and the offshore NMFS GOA bottom trawl survey. Zooplankton time series in the central north GOA during 1998-2003 indicate zooplankton biomass was highest in 1998 and 2002, but varied with season and with habitat (shelf vs. slope as determined by local fronts and circulation; Coyle and Pinchuk, this report). Also, in the GOA, analyses conducted on larval fish abundance data indicate that both basin- and local-scale environmental conditions appear to affect the spring abundance of larval fish (Doyle et al., this report). Potential mechanisms by which environmental variables control larval fish abundance include the influence on larval transport to or away from favorable habitats, and the influence of temperature on the timing of egg and larval production and development (Doyle et al., this report).

Average species richness and diversity of the groundfish community in the Gulf of Alaska increased from 1990 to 1999 with both indices peaking in 1999 and sharply decreasing thereafter. The spatial distribution of individual species appears to drive changes in species richness. Local species diversity is a function of the number of species and their relative abundance in each haul. Changes in local species richness and diversity are strongly confounded with natural variability in spatial distribution and relative abundance (Mueter, this report).

Annual surplus production (ASP) indices, the sum of new growth and recruitment minus deaths from natural mortality, suggest high variability in groundfish production in the EBS and a decrease in production between 1978 and 2004 (Mueter, this report). Production in the GOA was much lower on average, less variable, and decreased slightly from 1978 to 2004 (Mueter, this report). Because trends in ASP indices are largely driven by variability in walleye pollock in the EBS, the index was also examined without this stock included. The results suggest a strong, significant decrease in aggregate surplus production of all non-pollock species from 1978-2004 in the Bering Sea (Mueter, this report). Theory suggests that surplus production will decrease as biomass increases above B_{MSY}, which has been the case for a number of flatfish species (arrowtooth flounder, rock sole, flathead sole) and rockfish species (Pacific ocean perch, northern rockfish). Therefore the declines in production may be a density-dependent response to observed increases in biomass (Mueter, this report).

Until 2002, the majority of seabird species showed no discernable population trends in both the BS and GOA. Of those populations that did show a trend, the majority of populations in the SE BS (including the Pribilof Islands) and GOA were decreasing and, in the SW BS, were increasing. Overall, breeding chronology was early or typical in 2002 for most regions and species within feeding guilds, and in fact there were no cases of later than normal chronology (Fitgerald et al., this report).

The number of northern fur seal pups born on the Pribilof Islands continued to decline. However, increases in Steller sea lion non-pup counts were observed in 2004 in all areas except the central GOA (slight decline) and the eastern GOA (similar counts as 2002). These time series are updated biennially and updates to these time series in 2006 will indicate whether these trends in marine mammal populations continued. NMFS, along with its research partners in the North Pacific, is exploring several hypotheses to explain these trends, including climate or fisheries related changes in prey quality or quantity, and increases in the rate of predation by killer whales (Sinclair and Testa, this report).

INTRODUCTION

The Ecosystem Considerations appendix is comprised of three main sections:

i. Ecosystem Assessment
ii. Ecosystem Status Indicators
iii. Ecosystem-based Management Indices and Information.

The purpose of the first section, Ecosystem Assessment, is to summarize historical climate and fishing effects on the eastern Bering Sea/Aleutian Islands and Gulf of Alaska ecosystems using information from the other two sections and stock assessment reports. In future drafts, the Ecosystem Assessment section will also provide an assessment of the possible future effects of climate and fishing on ecosystem structure and function.

The purpose of the second section, Ecosystem Status Indicators, is to provide new information and updates on the status and trends of ecosystem components to stock assessment scientists, fishery managers, and the public. The goals are to provide stronger links between ecosystem research and fishery management and to spur new understanding of the connections between ecosystem components by bringing together many diverse research efforts into one document.

The purpose of the third section, Ecosystem-based Management Indices and Information, is to provide either early signals of direct human effects on ecosystem components that might warrant management intervention or to provide evidence of the efficacy of previous management actions. In the first instance, the indicators are likely to be ones that summarize information about the characteristics of the human influences (particularly those related to fishing, such as catch composition, amount, and location) that are influencing a particular ecosystem component.

Since 1995, the North Pacific Fishery Management Councils (NPFMC) Groundfish Plan Teams have prepared a separate Ecosystem Considerations section to the annual SAFE report. Each new Ecosystem Considerations section provides updates and new information to supplement the original section. The original 1995 section presented a compendium of general information on the Bering Sea, Aleutian Island, and Gulf of Alaska ecosystems as well as a general discussion of ecosystem based management. The 1996 Ecosystem Considerations section provided additional information on biological features of the North Pacific, and highlighted the effects of bycatch and discards on the ecosystem. The 1997 Ecosystems Considerations section provided a review of ecosystem–based management literature and ongoing ecosystem research, and provided supplemental information on seabirds and marine mammals. The 1998 edition provided information on the precautionary approach, essential fish habitat, an overview of the effects of fishing gear on habitat, El Nino, collection of local knowledge, and other ecosystem information. The 1999 section again gave updates on new trends in ecosystem-based management, essential fish habitat, research on effect of fishing gear on seafloor habitat, marine protected areas, seabirds and marine mammals, oceanographic changes in 1997/98, and local knowledge.

In 1999, a proposal came forward to enhance the Ecosystem Considerations section by including more information on ecosystem indicators of ecosystem status and trends and more ecosystem-based management performance measures. This enhancement, which will take several years to fully realize, will accomplish several goals:

1) Track ecosystem-based management efforts and their efficacy
2) Track changes in the ecosystem that are not easily incorporated into single-species assessments
3) Bring results from ecosystem research efforts to the attention of stock assessment scientists and fishery managers,
4) Provide a stronger link between ecosystem research and fishery management, and

5.) Provide an assessment of the past, present, and future role of climate and humans in influencing ecosystem status and trends.

The 2000-2006 Ecosystem Considerations sections included some new contributions in this regard and will be built upon in future years. Evaluation of the meaning of the observed changes needs to be done separately and in the context of how the indicator relates to a particular ecosystem component. For example, particular oceanographic conditions such as bottom temperature increases might be favorable to some species but not for others. Future evaluations will need to follow an analysis framework, such as that provided in the draft Programmatic groundfish fishery environmental impact statement that links indicators to particular effects on ecosystem components.

In 2002, stock assessment scientists began using indicators in this chapter to systematically assess ecosystem factors such as climate, predators, prey, and habitat that might affect a particular stock. Also, information regarding a particular fishery's catch, bycatch and temporal/spatial distribution will be used to assess possible impacts of that fishery on the ecosystem. Indicators of concern can be highlighted within each assessment and could be used by the Groundfish Plan Teams and the Council to justify modification of allowable biological catch recommendations or time/space allocations of catch.

It was requested that contributors to the ecosystem considerations chapter provide actual time series data or make it available electronically. Most of the time series data for contributions are now available on the web, with permission from the authors. It is particularly important that we spend more time in the development of ecosystem-based management indices. Ecosystem-based management indices should be developed to track performance in meeting the stated ecosystem-based management goals of the NPFMC, which are:

1. Maintain biodiversity consistent with natural evolutionary and ecological processes, including dynamic change and variability.
2. Maintain and restore habitats essential for fish and their prey.
3. Maintain system sustainability and sustainable yields for human consumption and nonextractive uses.
4. Maintain the concept that humans are components of the ecosystem.

The Ecosystem Considerations report and data for many of the time series presented in the report are now available online at: http://access.afsc.noaa.gov/reem/ecoweb/index.cfm

Past reports and all groundfish stock assessments are available at:
http://www.afsc.noaa.gov/refm/stocks/assessments.htm

If you wish to obtain a copy of an Ecosystem Considerations Chapter version prior to 2000, please contact the Council office (907) 271-2809.

Alaska Groundfish Harvest Specifications

Draft
Environmental Impact Statement (DEIS)

August 2006

Lead Agency: National Oceanic and Atmospheric Administration
National Marine Fisheries Service
Alaska Region
Juneau, Alaska

Responsible Official: Robert D. Mecum
Acting Administrator
Alaska Region

For further information contact: Ben Muse
National Marine Fisheries Service
P.O. Box 21668
Juneau, AK 99802
(907) 586-7234

Abstract: The DEIS provides decision-makers and the public with an evaluation of the environmental, social, and economic effects of alternative harvest strategies for the federally managed groundfish fisheries in the Gulf of Alaska and the Bering Sea and Aleutian Islands management areas. The DEIS examines alternative harvest strategies that comply with Federal regulations, the Fishery Management Plans for the groundfish fisheries, and the Magnuson-Stevens Fishery Conservation and Management Act. These alternative harvest strategies are applied to the best available scientific information to derive the total allowable catch estimates for the groundfish fisheries. This document addresses the requirements of the National Environmental Policy Act.

Public Comments Due: October 23, 2006

Executive Summary

The groundfish fisheries in Federal waters off Alaska are managed under the Fishery Management Plan for Groundfish of the Bering Sea and Aleutian Islands Management Area and the Fishery Management Plan for Groundfish of the Gulf of Alaska (FMPs). In the Gulf of Alaska (GOA) and Bering Sea and Aleutian Islands (BSAI), groundfish harvests are managed subject to annual limits on the amounts of each species of fish, or of each group of species, that may be taken. The annual limits are referred to as "harvest specifications," and the process of establishing them is referred to as the "specifications process."

The proposed action would adopt a harvest strategy to determine the harvest specifications for the federally managed groundfish fisheries in the GOA and BSAI management areas. The U.S. Secretary of Commerce (Secretary) approves the harvest specifications based on the recommendations of the North Pacific Fishery Management Council (Council). The National Marine Fisheries Service (NMFS) manages the groundfish fisheries.

The harvest strategies are applied to the best available scientific information to derive harvest specifications, which include total allowable catch (TAC) and prohibited species catch (PSC). The Council's Groundfish Plan Teams use stock assessments to calculate biomass, overfishing levels, and acceptable biological catches (ABC), for each species or species group for specified management areas. Overfishing levels and ABCs are published with the harvest specifications, and provide the foundation for the Council and NMFS to develop the TACs. Overfishing levels and ABC amounts reflect fishery science, applied in light of the requirements of the FMPs.

Purpose and Need

Chapter 1 describes the proposed action and its purpose and need. The proposed action would establish a harvest strategy for the BSAI and GOA groundfish fisheries. A harvest strategy is needed for the management of the groundfish fisheries and the conservation of marine resources, as required by the Magnuson-Stevens Act and as described in the management policy, goals, and objectives in the FMPs.

The purpose of the harvest strategy is to provide for orderly and controlled commercial fishing for groundfish (including Community Development Quota (CDQ) fishing), promote sustainable incomes to the fishing, fish processing, and support industries; support sustainable fishing communities, and provide sustainable flows of fish products to consumers. The harvest strategy balances groundfish harvest in the

fishing year with ecosystem needs (such as non-target fish stocks, marine mammals, seabirds, and habitat).

Alternatives

Chapter 2 describes and compares five alternative harvest strategies. The five alternatives are summarized as follows:

Alternative 1: Set TACs to produce harvest levels equal to the maximum permissible ABCs, unless the sum of the TACs is constrained by the Optimum Yield (OY) established in the FMPs.

Alternative 2: (Status Quo; Preferred) Set TACs that fall within the range of ABCs recommended by the Council's Groundfish Plan Teams and TACs recommended by the Council.

Alternative 3: For stocks with a high level of scientific information, set TACs to produce harvest levels equal to the most recent five-year average actual fishing mortality rates. For stocks with insufficient scientific information, set TACs equal to the most recent five-year average actual catch.

Alternative 4: Set low and spatially explicit TACs for rockfish species. Reduce all other TACs by a proportion that does not vary across species, so that the sum of all TACs, including rockfish TACs, is equal to the lower bound of the OY for a given area (1,400,000 mt in the BSAI and 116,000 mt in the GOA). This alternative sets TACs to sum to the lower OY range.

Alternative 5: (No Action) Set TACs at zero. This is the no action alternative, but does not reflect status quo.

Except for the no action alternative (Alternative 5), the alternatives analyzed in this EIS are consistent with the goals of the FMPs and existing regulations. The constraints for setting harvest specifications under the FMPs are (1) setting ABCs according to FMP procedures, (2) setting TAC less than or equal to ABC for all target and other species categories, and (3) setting the sum of the TACs to be within OY range. The following is a brief comparison of the TACs that would result from each of the alternative harvest strategies.

- **Alternative 1:** In the BSAI, the sum of the ABCs would exceed the OY. Under Alternative 1, therefore, BSAI TACs have been set equal to their Alternative 2 levels. In the GOA, Alternative 1 involves increased TACs for many species. However, in many cases these increased TACs are not likely to lead to proportionate increases in harvest. Large increases in TACs for arrowtooth flounder may be difficult to market. In other instances, there is a likelihood that large increases in TACs for species that are currently constrained by PSC bycatch, or that are close to levels at which PSC constraints would be binding, would not be fully harvested.

- **Alternative 2:** Alternative 2 would provide for TAC levels that would be generally close to those of the status quo. In the BSAI, TACs have been set so that they sum to the maximum OY. In the GOA, TACs are set below the maximum OY level.

- **Alternative 3:** Alternative 3 would result in lower fish production compared to Alternatives 1 or 2. In the BSAI, Alternative 3 would result in total TAC levels similar to Alternative 4, however, a greater proportion of the harvest would be pollock. In the GOA, Alternative 3 would result in total TAC levels larger than Alternative 4.

- **Alternative 4:** Alternative 4 was developed to respond to requests received during scoping to explore the impacts of setting low harvest rates for groundfish species, including important prey species, and setting low and spatially explicit TACs for rockfish species that are long-lived and late to mature. Alternative 4 would result in somewhat less total fish production than Alternatives 1 or 2. Alternative 4 would result in a similar total BSAI TAC and a reduced total GOA TAC as under Alternative 3. However, the TACs of individual groundfish species vary between Alternative 3 and Alternative 4.

- **Alternative 5:** Under Alternative 5, there would be no groundfish fisheries in the BSAI or GOA. Alternative 5 was developed to explore the no action alternative, one of the fundamental requirements of an EIS.

Summary of the environmental consequences of the alternatives

The EIS evaluates the alternatives for their effects on resources, species, and issues within the action area. The environmental consequences of each alternative for target species, non-specified species, forage species, prohibited species, marine mammals, seabirds, Essential Fish Habitat, ecosystem relationships, the economy, and environmental justice are assessed in Chapters 4 through 13 of this EIS.

Target species

Chapter 4 analyzes the impacts of the alternatives on target species. Section 4.1 analyses the impacts on gadoids, flatfish, and groundfish species other than rockfish, while Section 4.2 analyzes impacts on rockfish. The analysis examines the impacts of the alternative harvest strategies on target species mortality, genetic structure, reproductive success, prey availability, and habitat.

The alternative harvest strategies under consideration for gadoids, flatfish, and groundfish species other than rockfish, are not expected to (1) jeopardize the capacity of the stocks to produce maximum sustainable yield on a continuing basis, (2) alter the genetic sub-population structure such that it jeopardizes the ability of the stocks to sustain themselves at or above the minimum stock size threshold (MSST) or experience overfishing, (3) decrease reproductive success in a way that jeopardizes the ability of the stocks to sustain themselves at or above the MSST, (4) alter harvest levels or distribution of harvest such that prey availability would jeopardize the ability of the stock to sustain itself at or above the MSST or experience overfishing, or (5) disturb habitat at a level that would alter spawning or rearing success such that it would jeopardize the ability of the stock to sustain itself at or above the MSST or prevent overfishing.

Rockfish stocks were grouped into Pacific ocean perch, northern rockfish, GOA dusky rockfish, shortraker rockfish, rougheye rockfish, and 'other' rockfish species for the purposes of evaluation. Rockfish with ABCs determined using the FMP Tier 3 rules do not appear to be overfished under the status quo. It is not possible to make this type of determination for other rockfish species. Status quo genetic impacts are unknown. Status quo impacts on breeding and spawning are small or unknown. Impacts on rockfish prey availability are likely to be small. Status quo impacts on rockfish habitat are likely to be small in general under the alternatives. For some species, impacts of bottom trawling on habitat features used as refugia by juvenile rockfish are possible. Localized impacts may occur for some species. Impacts under Alternatives 3 and 4 would be less than those under Alternative 2. There would be no adverse impacts under Alternative 5. Impacts under Alternative 1 would, in general, be similar to those under Alternative 2.

Non-specified species

Chapter 5 analyzes the impacts of the alternatives on non-specified species. These are species that are not defined in the BSAI or GOA FMPs as target, other, forage, or prohibited species. Grenadier, taken in longline fisheries, dominate non-specified species harvests in the GOA. Grenadier, jellyfish, and starfish dominate non-specified species harvests in the BSAI. The analysis examines the impacts of the alternative harvest strategies on non-specified species mortality, genetic structure, reproductive success, prey availability, and habitat. Status quo grenadier harvests are believed to be below the ABC levels, if ABCs were established for this species. Harvests of jellyfish and starfish in relation to biomass are not well understood, although fishing bycatch mortality as a source of overall mortality is believed to be small for jellyfish and brittle stars. Fishing mortality may be a more important component of overall mortality for sea stars. Brittle stars may be subject to mortality from the action of gear on the bottom; this source of mortality would not be reflected in bycatch mortality estimates. Status quo groundfish fishing impacts on the genetic structure of populations, reproductive success, prey availability, and habitat are unknown. Impacts of Alternatives 3, 4, or 5 would be less than those of Alternative 2. Impacts of Alternative 1 would be the same as Alternative 2.

Forage fish species

Chapter 6 analyzes the impacts of the alternatives on forage fish species as listed in the BSAI and GOA FMPs. Most forage fish bycatch consists of capelin or eulachon taken in pollock trawling operations. The analysis examines the impacts of the alternative harvest strategies on forage species mortality, genetic structure, reproductive success, prey availability, and habitat. Bycatch in recent years has ranged from 30 mt to 80 mt in the BSAI, and from 23 mt to 1,000 mt in the GOA. Status quo impacts of smelt bycatch are believed to be small in comparison with biomass (perhaps one to two percent). Status quo groundfish fishing impacts on the genetic structure of populations, reproductive success, prey availability, and habitat are all believed to be small. Impacts of Alternatives 3, 4, or 5 would be less than those of Alternative 2. Impacts of Alternative 1 would be the same as Alternative 2 in the BSAI, but somewhat higher in the GOA. Alternative 1 impacts in the GOA should still be small. However, status quo prey and habitat mediated impacts on sandfish, one of the forage fish species, are described as unknown.

Prohibited species

Chapter 7 analyzes the impacts of the alternatives on prohibited species. Prohibited species in the groundfish fisheries include Pacific salmon species and stocks (Chinook, coho, sockeye, chum, and pink), steelhead trout, Pacific halibut, Pacific herring, red king crab, Tanner crab, and snow crab. The analysis examines the impacts of the alternative harvest strategies on prohibited species mortality, genetic structure, reproductive success, prey availability, and habitat. The impacts of the alternatives on prohibited species are reduced by existing management measures such as prohibited species catch limitations on a year-round and seasonal basis, year-round and seasonal area closures, gear restrictions, and an incentive plan to reduce the incidental catch of prohibited species by individual fishing vessels. These management measures minimize adverse impacts to prohibited species. The amounts of crab and herring taken under any of the groundfish harvest alternatives considered are so low that they would have minor impacts on the stocks of these species. The prohibited species catch limits for herring are never reached. When area prohibited species catch limits are reached, limits help reduce adverse impacts to stocks by closing the fisheries in those areas. Salmon bycatch is likely to be higher under Alternatives 1 and 2 compared to Alternatives 3 and 4 based on the higher pollock TAC, especially in the BSAI. Not enough information is available to determine the impact of the bycatch on salmon stock biomass but the Council is in the process of developing additional fishery management measures to reduce salmon bycatch in the pollock fishery of the BSAI.

Marine mammals

Chapter 8 analyzes the impacts of the alternatives on marine mammals. This analysis determines (a) whether takings, prey competition, or disturbance occur under each alternative, and (b) if they do occur, the relative level of impact. Incidental takes of marine mammals would occur under all alternatives, except Alternative 5. Under all of the alternatives, potential take in the groundfish fisheries is well below the potential biological removal for all marine mammals, except killer whales and humpback whales. This means that predicted take would be below the maximum number of animals that may be removed from a marine mammal stock while allowing that stock to reach or maintain its optimum sustainable population. Under all of the alternatives, competition for key prey species is not likely to constrain foraging success of marine mammal species or cause population declines. The exceptions to this are the Steller sea lions and fur seals for which potential prey competition with the groundfish fisheries may be a concern. Alternatives 1 and 2 have a greater potential for competition for prey compared to Alternatives 3 and 4 due to higher pollock TACs. Disturbance of mammals under Alternatives 1 through 4 is not likely to cause population declines. Alternative 5 would have the least potential for incidental takes and no possibility of disturbance or competition for prey species for all marine mammals.

Seabirds

Chapter 9 analyzes the impacts of the alternatives on seabirds. Seabirds were grouped into northern fulmars, short-tailed albatross, spectacled and Steller's eiders, albatrosses and shearwaters, piscivorous seabird species, and all other seabird species for the purposes of evaluation. The analysis evaluates the impacts of the alternative harvest strategies on seabird takings, prey availability, and ability to exploit benthic habitat. In general, known direct status-quo take levels appear to be small in comparison with populations. Several sources of take are unknown. In general, status quo impacts on seabird prey are believed to be small. Guillemots and cormorants may have a lesser ability to forage widely, and may be susceptible to localized depletion of prey. Status quo impacts on benthic habitat exploited by some benthic feeders appear to be small. In some instances there may be overlap between alcid, gull, and cormorant foraging areas. Impacts under Alternatives 3 and 4 would be less than those under Alternative 2. There would be no adverse impacts under Alternative 5. Impacts under Alternative 1 would, in general, be the same as those under Alternative 2 in the BSAI, and somewhat higher in the GOA.

Essential fish habitat

Chapter 10 analyzes the impacts of the alternatives on EFH and includes references to EFH species in Chapter 4. The existing EFH conservation measures, including Habitat Areas of Particular Concern sites and other area closures and gear restrictions, are established in the FMPs. These measures protect areas of ecological importance for the long-term sustainability of managed species from fishing impacts under all of the alternatives. Alternative 2 would implement a harvest strategy that would produce harvest levels that are similar to those evaluated in the EFH EIS and would likely have similar impacts on EFH. NMFS has prepared an EFH Assessment, Chapter 10, to discuss potential adverse effects to EFH from alternative harvest strategies. The assessment determines that impacts under all alternatives are predicted to be minimal and not adverse, although some may be persistent, because the analysis in the EFH EIS found no indication that continued fishing activities at the current rate and intensity would alter the capacity of EFH to support healthy populations of managed species over the long term. Due to the many considerations, the assessment concludes no action is needed to further conserve EFH.

Ecosystem

Chapter 11 analyzes the impacts of the alternatives on the ecosystem. Ecosystem impacts were evaluated with respect to predator-prey relationships, energy flow and balance, and diversity. The status quo is

likely to be characterized by degree of spatial and temporal concentration of a fishery's impact on forage species, removal of top predators, and introduction of non-native species that are similar to those seen in the recent past. Biomass of pollock in the GOA and BSAI, and of Atka mackerel in the AI, all three sources of pelagic forage, are expected to decline in 2007 and 2008 under the status quo. Similarly, the level of energy removal, and the extent to which energy is redirected in the ecosystem (through discards of offal, for example) are expected to be similar to levels from the recent past under the status quo. The degree of energy removal may actually decline with TACs that are lower than those in the recent past. Fishery impacts on species' functional and genetic diversity are expected to remain at similar levels. Impacts under Alternative 1 would be the same as status quo in the BSAI, and may be higher in the GOA. Much of the increase in GOA TACs under Alternative 1 would come in the form of increased flatfish TACs, and halibut PSC limits are likely to constrain the industry from fully harvesting these. Impacts of Alternatives 3 or 4 would be expected to be less than those of Alternative 2. Alternative 5 would have no adverse impact.

Social and economic impacts

Chapter 12 analyzes the social and economic impacts of the alternatives. Chapter 12 described the impacts of the alternatives on a wide range of measures. Data and model limitations preclude quantitative estimation of most measures.

Alternative 2 is associated with 2007-2008 harvests and gross revenues that are at lower levels than those under the status quo strategy in 2006. BSAI non-CDQ revenues are 4 to 10 percent less than in 2006 under Alternative 2, BSAI CDQ revenues are 5 to 20 percent less, and GOA revenues are 10 to 20 percent less. Projected declines in pollock, Pacific cod, and Atka mackerel ABCs are important factors in the BSAI revenue reductions, while declines in pollock, Pacific cod, and sablefish ABCs, are important in the GOA. BSAI CDQ revenues would drop more than non-CDQ revenues because of the much greater importance of pollock as a source of CDQ revenues.

Alternative 1 ABCs may be higher than those under Alternative 2. The sum of Alternative 1 TACs may thus be higher, unless the OY constraint would be binding under Alternaive 2. This is the case in the BSAI. Alternative 1 is associated with the same impacts as Alternative 2 in the BSAI, but with somewhat higher catch and gross revenue levels than Alternative 2 in the GOA. While increased pollock TACs are likely to be harvested, it is not clear that catch and revenue increases would be associated with increases in flatfish TACs. Most GOA TAC increases would be in flatfishes; however, halibut PSC limits are likely to prevent fishermen from actually increasing harvests of many of these species.

Alternatives 3 and 4 are associated with harvest levels and gross revenues that are considerably lower than those in the recent past, and those under Alternative 2. These alternatives may be associated with about $200 million to $400 million less gross revenues in the non-CDQ BSAI fisheries, about $20 million to $40 million less in the CDQ fisheries, and about $40 million to $100 million less in the GOA.

Alternative 5 would be very disruptive to persons and firms directly involved in fishing, processing, transportation, and other operations that service these sectors; to persons, firms, and communities dependent on the health of these sectors; and to the consumers of fish products. This would be inconsistent with the portion of the guidelines for National Standard 1 that defines "optimum yield" as "the amount of fish that would provide the greatest overall benefit to the Nation, particularly with respect to food production and recreational opportunities..." (50 CFR 600.310).

Environmental justice impacts

Chapter 13 analyzes the impacts of the alternatives related to environmental justice issues. This analysis determines whether minority populations or low-income populations are present in the areas affected by the alternatives, and if so, whether the implementation of the alternatives may cause disproportionately high and adverse human health or environmental impacts on those populations. Minority populations and low-income populations subject to potential environmental justice concerns are found in both the GOA and the BSAI, the CDQ region, and in the context of subsistence issues.

Under the status quo harvest strategy, fishery ABCs, and consequently fishery TACs are expected to decrease in 2007 and 2008 from 2006 levels. Revenue declines will be proportionately larger for CDQ groups, because pollock declines are expected to be substantial, and CDQ groups depend heavily on pollock. Competition for prey between Steller sea lion, and northern fur seals and fisheries, and salmon bycatch, are not well understood and create potential environmental justice concerns. Alternative 1 impacts are the same as Alternative 2 impacts in the BSAI. Alternative 1 may provide more revenue than Alternative 2 in the GOA, but the impact is likely to be relatively small. Adverse impacts to minority and low-income populations in western Alaska would likely occur under Alternatives 3, 4, or 5 through impacts to CDQ program revenues and associated employment opportunities. Lower impacts to subsistence resources are likely under Alternatives 3 and 4 due to less likelihood of incidental take of salmon and marine mammals and less potential competition for prey species in the BSAI compared to Alternatives 1 and 2. Any potential impacts of Alternatives 1 and 2 on subsistence resources may result in disproportionate impacts to minority or low-income populations in the BSAI.

Areas of controversy and issues yet to be resolved

Management of the groundfish fisheries has long been and will remain a highly controversial subject. Chapter 1 identifies the issues with setting harvest specifications raised by the public. Many of the issues raised highlight areas of on-going controversy which, though greatly informed by analyses such as this one, are not totally resolved. Differences of opinion exist among various industry, environmental, management, and scientific groups on the appropriate harvest levels for various target species. Areas of controversy primarily focus on the effects of groundfish harvests on the ten major issues analyzed in this EIS. The most controversial of these are the effects groundfish harvest has on target groundfish species, marine mammals, and Alaskan communities.

Management decisions for all groundfish species are intended to minimize impacts from an ecosystem perspective, however, the harvest strategies remain controversial for many reasons. Harvest strategies are primarily based on single species stock assessments and TACs rather than using multispecies or ecosystem models. Some commenters express concerned that setting and managing the TACs for individual species does not adequately account for the impacts harvest of that species may have on other components of the ecosystem. Others believe that the setting of TACs for individual species is done in a sufficiently conservative manner so that other components of the ecosystem are protected.

For long lived species (e.g. rockfish), some believe that the status quo harvest strategy is too aggressive for the sustainability of the population while others believe that the harvest strategy is very conservative. See Chapter 4 for a detailed discussion on groundfish management, including a section focused on rockfish management.

The EIS for the Steller sea lion protection measures identified the controversy regarding the effects of fishing on Steller sea lions (NMFS 2001; reference in Chapter 1). The harvest specifications include limits on and seasonal apportionments of harvest of pollock, Atka mackerel, and Pacific cod, which are important Steller sea lion prey species. Some argue that fisheries compete with Steller sea lions for prey,

and that this competition reduces the survival of Steller sea lions resulting in continued decline. Others argue that the fishing industry is not responsible for the decline of Steller sea lions, but rather other factors (e.g., climate change, predation by killer whales) are to blame. Even with the large increase in research activities, conclusive proof of fisheries effects on nutritional health of Steller sea lions has not been found. The lack of unequivocal evidence regarding fisheries impacts on Steller sea lion nutritional health combined with the Endangered Species Act requirement to ensure the fisheries are not likely to cause jeopardy of extinction or adverse modification of critical habitat frustrates participants in fisheries that believe they are not impacting Steller sea lions.

The EIS for annual subsistence harvest of northern fur seals identifies the controversy regarding the effects of fishing on the availability of fur seal prey (NMFS 2005; reference in Chapter 8). Some are concerned with the potential impact of fisheries on the nutritional health of fur seals, though information on potential competition between fur seals and the fisheries also is limited. Further discussions on Steller sea lions and fur seals and fisheries impacts are in Chapter 8.

Alaskan coastal communities depend on the marine resources for their livelihoods and lifestyles, whether as participants in commercial fisheries, tourism-related businesses, subsistence or personal use. Public comment expressed concern that the status quo levels of groundfish harvest negatively impact the people and communities that rely on marine resources. Chapters 12 and 13 discuss the impacts of the alternatives on Alaskan communities.

DRAFT FOR COUNCIL REVIEW

Alaska Groundfish Harvest Specifications

Initial Regulatory Flexibility Analysis

Date:	September 2006
Lead Agencies:	Alaska Regional Office National Marine Fisheries Service Juneau, Alaska North Pacific Fishery Management Council Anchorage, Alaska
Responsible Official:	Robert D. Mecum Acting Regional Administrator Alaska Regional Office National Marine Fisheries Service
For information contact:	Ben Muse National Marine Fisheries Service Juneau, Alaska (907) 586-7234

Abstract: This Initial Regulatory Flexibility Analysis (IRFA) evaluates the impacts of alternative harvest strategies for the fisheries in the EEZ off of Alaska on small entities. This IRFA meets the requirements of the Regulatory Flexibility Act for an analysis of the impacts of the action on small entities.

Executive summary

This Initial Regulatory Flexibility Analysis (IRFA) evaluates the impacts on small entities of alternative harvest strategies for the groundfish fisheries in the EEZ off of Alaska on small entities.

This IRFA meets the statutory requirements of the Regulatory Flexibility Act (RFA) of 1980, as amended by the Small Business Regulatory Enforcement Fairness Act (SBREFA) of 1996 (5 U.S.C. 601-612).

The action under consideration is adoption of a harvest strategy to govern the harvest of groundfish in the Bering Sea and Aleutian Islands and Gulf of Alaska Management Areas. The preferred alternative is the status quo harvest strategy in which TACs fall within the range of ABCs recommended by the Council's Ground Teams and TACs recommended by the Council.

This action is taken in accordance with the Fishery Management Plans (FMPs) for the BSAI and GOA, adopted by the Council pursuant to the Magnuson-Stevens Act.

The small entities directly regulated by this action include approximately 800 small catcher vessels, less than 20 small catcher-processors, and six Community Development Quota Groups.

Estimates of first wholesale gross revenues for the BSAI non-CDQ sector, the BSAI CDQ sector, and the GOA sector, were used as indices of the potential impacts of the alternative harvest strategies on small entities. Revenues were projected to decline from 2006 levels in 2007 and 2008 under the preferred alternative due to declines in Allowable Biological Catches (ABCs) for key species.

The preferred alternative was compared to four other alternatives. These included Alternative 1, which would set TACs so as to generate fishing rates equal to the maximum permissible ABC (if the full TAC were harvested), unless the sum of TACs would exceed the regional optimum yield, in which case harvests would be limited to the optimum yield. Alternative 3 would set TACs to produce fishing rates equal to the most recent five year average of fishing rates. Alternative 4 would set TACs to equal the lower bound of the regional optimum yield range. Alternative 5 would set TACs equal to zero.

Alternatives 3, 4, and 5 produced smaller first wholesale revenues for each of the three groupings evaluated, than Alternative 2. Alternative 1 was the same as Alternative 2 in the BSAI (for both non-CDQ and CDQ groups). Alternative 1 appeared to generate higher values of the gross revenue index fish fishing operations in the GOA than the preferred alternative. However, a large part of the additional revenues under Alternative 1 appear to be due to larger TACs for flatfish that are unlikely to be caught because of halibut PSC constraints. Moreover, higher Alternative 1 TACs are associated with maximum permissible ABCs, while Alternative 2 TACs are associated with the ABCs that would be recommended to the Council by the Plan Teams and SSC, and incorporating a fuller consideration of potential biological issues.

This action does not modify recordkeeping or reporting requirements, or duplicate, overlap, or conflict with any Federal rules.

BSAI Plan Team OFL and ABC recommendations for 2007-2008

Species	Area	2006				2007			2008		
		OFL	ABC	TAC	Catch**	OFL	ABC	TAC	OFL	ABC	TAC
Pollock	EBS	2,090,000	1,930,000	1,485,000	1,485,000	1,707,000	1,419,800		1,418,100	1,168,700	
	Aleutian Islands	39,100	29,400	19,000	19,000	39,100	29,400		39,100	29,400	
	Bogoslof District	50,600	5,500	10	0	50,600	5,500		50,600	5,500	
Pacific cod	BSAI	230,000	194,000	188,180	188,180	176,100	148,500		144,900	121,700	
Sablefish	BS	3,680	3,060	2,820	921	6,200	5,200		5,400	4,500	
	AI	3,740	3,100	3,000	1,070						
Yellowfin sole	BSAI	144,000	121,000	95,701	95,701	138,900	117,100		126,200	106,400	
Greenland turbot	Total	14,200	2,740	2,740	2,487	18,300	2,630		17,500	2,630	
	BS	n/a	1,890	1,890	1,890	n/a	1,815		n/a	1,815	
	AI	n/a	850	850	597	n/a	815		n/a	815	
Arrowtooth flounder	BSAI	166,000	136,000	13,000	13,000	172,200	140,500		177,400	144,800	
Rock sole	BSAI	150,000	126,000	41,500	35,098	146,000	122,500		133,100	111,600	
Flathead sole	BSAI	71,800	59,800	19,500	18,528	67,100	55,900		62,700	52,200	
Alaska plaice	BSAI	237,000	188,000	8,000	17,000	227,100	180,200		218,400	173,200	
Other flatfish	BSAI	24,200	18,100	3,500	3,500	24,200	18,100		24,200	18,100	
Pacific ocean perch	BSAI	17,600	14,800	12,600	12,068	17,900	15,100		17,900	15,100	
	BS	n/a	2,960	1,400	868	n/a	3,020		n/a	3,020	
	AI total	n/a	11,840	11,200	11,200	n/a	12,080		n/a	12,080	
	WAI	n/a	5,372	5,085	5,085	n/a	5,481		n/a	5,481	
	CAI	n/a	3,212	3,035	3,035	n/a	3,277		n/a	3,277	
	EAI	n/a	3,256	3,080	3,080	n/a	3,322		n/a	3,322	
Northern rockfish	BSAI	10,100	8,530	4,500	3,887	10,100	8,500		10,000	8,500	
Shortraker rockfish	BSAI	774	580	580	169	774	580		774	580	
Rougheye rockfish	BSAI	299	224	224	183	299	224		299	224	
Other rockfish	BSAI	1,870	1,400	1,050	556	1,870	1,400		1,870	1,400	
	BS	n/a	810	460	251	n/a	810		n/a	810	
	AI	n/a	590	590	305	n/a	590		n/a	590	
Atka mackerel	Total	130,000	110,000	63,000	63,000	107,300	90,900		75,200	65,100	
	WAI	n/a	41,360	15,500	15,500	n/a	34,182		n/a	24,481	
	CAI	n/a	46,860	40,000	40,000	n/a	38,718		n/a	27,728	
	EAI/BS	n/a	21,780	7,500	7,500	n/a	18,000		n/a	12,891	
Squid	BSAI	2,620	1,970	1,275	1,437	2,620	1,970		2,620	1,970	
Other species	BSAI	89,404	58,882	29,000	29,000	89,404	62,950		89,404	62,950	
Total	BSAI	3,476,987	3,013,086	1,994,180	1,989,785	3,003,067	2,426,954		2,615,267	2,094,554	

**2006 catch is based on projected catch and includes CDQ.

GOA Plan Team OFL and ABC recommendations for 2007-2008

SPECIES	AREA	2006				2007			2008		
		OFL	ABC	TAC	Catch **	OFL	ABC	TAC	OFL	ABC	TAC
Pollock	W (61)		28,918	28,918	28,918		23,363			23,908	
	C (62)		30,492	30,492	30,942		24,635			25,209	
	C (63)		18,448	18,448	18,488		14,905			15,252	
	WYAK		1,792	1,792	1,792		1,447			1,481	
	Subtotal	110,100	79,650	79,650	79,650	90,200	64,350		92,700	65,850	
	EYAK/SEO	8,209	6,157	6,157	0	8,209	6,157		8,209	6,157	
	Total	118,309	85,807	85,807	79,650	98,409	70,507		100,909	72,007	
Pacific cod	W		26,855	20,141	26,855		22,971			15,639	
	C		37,873	28,405	37,873		32,395			22,055	
	E		4,131	3,718	13		3,534			2,406	
	Total	95,500	68,859	52,264	64,741	70,100[5]	58,900[5]		48,300[5]	40,100[5]	
Sablefish	W		2,670	2,670	2,680		2,464			2,213	
	C		6,370	6,370	6,370		5,879			5,278	
	WYAK		2,280	2,280	2,280		2,103			1,888	
	SEO		3,520	3,520	3,520		3,254			2,921	
	Total	17,880	14,840	14,840	14,840	16,500	13,700		14,800	12,300	
Deep water flatfish[1]	W		420	420	13		421			421	
	C		4,139	4,139	484		4,145			4,145	
	WYAK		2,661	2,661	20		2,665			2,665	
	EYAK/SEO		1,445	1,445	4		1,446			1,446	
	Total	11,008	8,665	8,665	521	11,008	8,677		11,008	8,677	
Rex sole[6]	W		1,159	1,159	467		1,096			1,084	
	C		5,506	5,506	2,301		5,207			5,147	
	WYAK		1,049	1,049	0		992			980	
	EYAK/SEO		1,486	1,486	0		1,405			1,389	
	Total	12,000	9,200	9,200	2,769	11,400	8,700		11,2000	8,600	
Shallow water flatfish[2]	W		24,720	4,500	290		24,720			24,720	
	C		24,258	13,000	4,433		24,258			24,258	
	WYAK		628	628	0		628			628	
	EYAK/SEO		1,844	1,844	3		1,844			1,844	
	Total	62,418	51,450	19,972	4,726	62,418	51,450		62,418	51,450	
Flathead sole	W		10,548	2,000	604		10,905			11,435	
	C		25,195	5,000	2,174		26,047			27,313	
	WYAK		2,022	2,022	0		2,091			2,192	
	EYAK/SEO		55	55	0		57			60	
	Total	47,003	37,820	9,077	2,778	48,600	39,100		51,100	41,000	
Arrowtooth flounder	W		20,154	8,000	3,742		20,897			21,237	
	C		134,906	25,000	20,584		139,881			142,155	
	WYAK		15,954	2,500	41		16,541			16,811	
	EYAK/SEO		6,830	2,500	35		7,081			7,197	
	Total	207,678	177,844	38,000	24,402	215,300	184,400		218,800	187,400	
Other slope rockfish[3]	W		577	577	577		577			577	
	C		386	386	386		386			386	
	WYAK		317	317	317		317			317	
	EYAK/SEO		2,872	200	23		2,872			2,872	
	Total	5,394	4,152	1,480	1,303	5,394	4,152		5,394	4,152	
Northern rockfish[3]	W		1,483	1,483	1,483		1,719			1,690	
	C		3,608	3,608	3,608		4,181			4,110	
	E		0	0	0		0			0	
	Total	7,673	5,091	5,091	5,091	7,000	5,900		7,000	5,800	

SPECIES	AREA	2006				2007			2008		
		OFL	ABC	TAC	Catch **	OFL	ABC	TAC	OFL	ABC	TAC
Pacific Ocean perch	W	4,931	4,155	4,155	4,155	5,069	4,282		5,156	4,341	
	C	8,806	7,418	7,418	7,418	9,052	7,646		9,208	7,751	
	WYAK		1,101	1,101	1,101		1,135			1,150	
	SEO		1,587	1,587	27		1,636			1,658	
	E(subtotal)	3,190	2,688	2,688	1,128	3,279			3,336		
	Total	16,927	14,261	14,261	12,701	17,400	14,700		17,700	14,900	
Shortraker rockfish	W		153	153	153		153			153	
	C		353	353	353		353			353	
	E		337	337	337		337			337	
	Total	1,124	843	843	843	1,124	843		1,124	843	
Rougheye rockfish	W		136	136	136		124			124	
	C		608	608	608		557			557	
	E		239	239	239		219			219	
	Total	1,180	983	983	983	1,100	900		1,100	900	
Pelagic shelf rockfish	W		1,438	1,438	1,438		1,452			1,653	
	C		3,262	3,262	3,262		3,270			3,751	
	WYAK		301	301	301		302			346	
	EYAK/SEO		435	435	9		437			501	
	Total	6,662	5,436	5,436	5,010	7,108	5,461		8,554	6,251	
Demersal rockfish	SEO	650	410	410	410	650	410		650	410	
Thornyhead rockfish	W		513	513	513		513			513	
	C		989	989	989		989			989	
	E		707	707	707		707			707	
	Total	2,945	2,209	2,209	2,209	2,945	2,209		2,945	2,209	
Atka mackerel	Total	6,200	4,700	1,500	1,500	6,200	4,700		6,200	4,700	
Big skate	W		695	695	695		695			695	
	C		2,250	2,250	2,250		2,250			2,250	
	E		599	599	599		599			599	
	Total	4,726	3,544	3,544	3,554	4,726	3,544		4,726	3,544	
Longnose skate	W		65	65	65		65			65	
	C		1,969	1,969	1,969		1,969			1,969	
	E		861	861	861		861			861	
	Total	3,860	2,895	2,895	2,895	3,860	2,895		3,860	2,895	
Other skates	GW	2,156	1,617	1,617	1,617	2,156	1,617		2,156	1,617	
Other species	GW	NA	NA	13,942	4,000	NA	NA		NA	NA	
TOTAL		631,293	501,366	292,776							

**Catch is 2006 catch projected in April 2006, and used to calculate the 2007 OFLs and ABCs.

1/ Deep water flatfish includes Dover sole, Greenland turbot and deepsea sole.

2/ "Shallow water flatfish" includes rock sole, yellowfin sole, butter sole, starry flounder, English sole, Alaska plaice, and sand sole.

3/ The EGOA ABC of 2 mt for northern rockfish has been included in the WYAK ABC for other slope rockfish.

* Indicates rollover from previous year (no age-structured projection data available).

4/ The ABC for sablefish has been reduced by 5% in the SEO and added to the WYK to allow for 5% of the EGOA TAC to be made available for trawl incidental catch.

5/the Pacific cod projections do not employ the stairstep mechanism utilized in 2005 for 2006-2007 final specifications

6/projections for Rex Sole in 2007 and 2008 use the projection model to approximate the biomass trend. This trend was then scaled to match the adult biomass estimates used by the author for Tier 5 calculations. Setting $F=M$ for F_{OFL} and $F=0.75M$ for F_{ABC}, the author's approach (a catch-equation method) was then employed to compute OFL and ABC.

NOTE:

ABCs and TACs are rounded to nearest mt.

GW means Gulfwide.

Catch data source: NMFS Catch Accounting Reports.

Edited through 6-9-06

Joint BSAI/GOA Plan Team Minutes

The meeting of the Bering Sea and Aleutian Islands and Gulf of Alaska groundfish Plan Teams convened on September 19th at 1pm at the Alaska Fishery Science Center, Seattle, WA.

Members of the Plan Teams in attendance included:

Loh-Lee Low	AFSC REFM(BSAI chair)	Jim Ianelli	AFSC REFM (GOA co-chair)
Mike Sigler	AFSC (BSAI vice chair)	Diana Stram	NPFMC (GOA co-chair)
Kerim Aydin	AFSC REFM	Sandra Lowe	AFSC REFM
David Carlile	ADF&G	Jeff Fujioka	AFSC ABL
Bill Clark	IPHC	Jon Heifetz	AFSC ABL
Jane DiCosimo	NPFMC	Robert Foy	UAF
Theresa Tsou	WDFW	Nick Sagalkin	ADF&G
Brenda Norcross	UAF	Tory O'Connell	ADF&G
Andy Smoker	NMFSAKRO	Tom Pearson	NMFS AKRO
Grant Thompson	AFSC REFM	Sarah Gaichas	AFSC REFM
Ivan Vining	ADF&G	Bill Clark	IPHC
Dan Lew	AFSC	Theresa Tsou	WDFW
Kathy Kuletz	USFWS	Ward Testa	NMML
Lowell Fritz	NMML	Kathy Kuletz	USFWS

Ken Goldman (ADF&G, member of the GOA Team) was unable to attend but participated by telephone.

Members of the public and state and agency staff present included: Mike Szymanski, Tom Casey, Beth Matta(AFSC), Phil Rigby (AFSC/ABL), Cindy Tribuzio (UAF), Sara Miller (UAF), Lisa Thompson (AFSC), Jennifer Ferdinand (AFSC), Mark Wilkins (AFSC/RACE), Brent Paine, Steve Davis (NMFS AKR), Liz Conners (AFSC), Mark Zimmerman (AFSC), Paul Spencer (AFSC), Mark Amend (AFSC), Russ Nelson (AFSC), Martin Dorn(AFSC), Cleo Brylinksky (ADF&G), Farron Wallace (WDFW), Dave Benson, Ed Richardson, Julie Bonney, Gary Stauffer, Lisa Butzner, Teresa A'mar(AFSC), Jennifer Boldt (AFSC), Greer Cowan, Bob Lauth (AFSC), Peggy Murphy, Jon Warrenchuk, Dave Clausen (AFSC), Thorn Smith, Steve Alger, Buck Stockhausen (AFSC), Chris Rooper (AFSC/RACE), Tom Wilderbuer (AFSC), Donna Parker, Chris Wilson (AFSC/RACE), Mike Guttormsen (AFSC/RACE).

Agenda

A revised agenda (attached) was approved for the meeting.

Summary of Council activities

Jane DiCosimo provided a written summary of current Council actions. The Teams noted that those management issues of particular relevance to the Plan Teams are on the joint Team agenda. These include groundfish specifications, the TAC EIS, rockfish management, other species management, and non-target species management. Team comments on those issues are addressed below.

Research priorities

Jane DiCosimo provided the research priorities that were adopted by the Council in April 2006. Because these were recently adopted, the Teams will provide recommendations to revise research priorities to the Council in September 2007.

State water management summary

Tory O'Connell summarized State water fishery actions in Southeast Alaska. The Board of Fisheries allocated the Southeast demersal shelf rockfish fisheries between commercial (84%) and sport (16%)

fisheries. The sport allocation was based on more than the five year average sport catch. The State also imposed new guided sport logbook reporting requirements for yelloweye rockfish, and new bag limits and retention requirements. No directed commercial fishery occurred for yelloweye rockfish in 2006. Also, ADF&G is investigating alternative approaches to estimate unreported mortality associated with commercial halibut fishing.

Ken Goldman summarized Central region management changes to state water fisheries. A commissioner's permit was approved for the lower Cook Inlet (LCI) to fish for spiny dogfish in 2006. The permit allowed one vessel to longline for spiny dogfish with a limit of 100,000 to 110,000 lb. A single landing occurred in mid-August in Homer, AK (harvest is confidential). This fishery has been available to fishermen since 2005, however, this was the first permit requested and issued.

PROPOSAL 6: 5 AAC 28.XXX. State waters pollock fishery, Cook Inlet Area, was submitted by ADF&G. The proposal requests the Board to establish a walleye pollock fishery in state waters located between 149° and 150° W long. and amend current state water closures to include only those waters within 3 nm of three Steller sea lion (SSL) haul outs. The proposal presents two options: Option A, a state waters season with 1,500 mt allowable harvest, a season opening date to coincide with the federal season and an emergency order closure, and Option B, a parallel season with no harvest limits. Elements common to both options include a commissioner's permit requirement, 300,000 lb daily trip limits and tender restrictions, 100% observer coverage, and a vessel monitoring system requirement. This proposal will be deliberated at the Board meeting scheduled for October 14 - 15, 2006.

The commercial Prince William Sound (PWS) sablefish fishery was modified. The PWS sablefish fishery is a split season fishery. The seasons run from March 15 - May 15 and August 1 – 21. In 2006, a larger number of complaints than usual about the predation of sablefish off of the longlines by Orca whales were reported. As a result, ADF&G altered the second part of the fishing season by extending the season from July 25 through August 31, 2006. Approximately 70 percent of the quota (of 242,000 lb) was harvested this year. Typically, around 90 percent of the quota has been taken in recent years.

Nick Sagalkin reported on state water management in the Westward District. State-waters Pacific cod fisheries occur in Kodiak, Chignik, and the South Alaska Peninsula Management Areas. Each of these seasons is based on a percentage of the ABC from the respective federal management area. State-waters seasons do not require VMS or observer coverage. However, state-water Pacific cod seasons in these areas limit gear to pot or jig and limit the amount of gear to 60 pots or 5 jig machines.

The State-waters season generally begins after the federal "A" season closes. State-waters Pacific cod fisheries in the Kodiak Management Area begin seven days after the Central Gulf closure, in the South Alaska Peninsula Area seven days after the Western Gulf, and the Chignik Area by regulation on March 1st. In 2006, the Kodiak Area pot season closed on March 29th, but the jig season harvest was slow and continued through the summer. In the Chignik Area, there was no effort beyond May 21st for either the pot or jig fleet. In the South Alaska Peninsula Area the pot fleet season closed on April 6th and the jig fleet continued through the summer. Because summer-time harvests in the state-waters Pacific cod fisheries was slow, and because substantial quota remained with no indication that the state-waters fishery quotas would be achieved before December 31, ADFG closed the state-waters Pacific cod seasons on September 1, and immediately reopened the state-waters for the parallel fishery to provide more opportunity. Closing the state-waters and allowing the parallel season to open, allowed more effort and gear types, and did not exclude any gear type from the fishery that could have participated during the state-waters season.

A new state-waters Pacific cod fishery opened March 15th in the Aleutian Islands west of 170° W long. Jig, longline, pot, and non-pelagic trawl gear were allowed gear types. The fishery is based on 3% of the BSAI Pacific cod ABC of 194,000 mt, which translates to a guideline harvest level of 12,830,772 pounds. The state-waters GHL is apportioned so that a maximum of 70% of the GHL is available prior to June 10th. The remaining 30% of the state GHL and any unharvested GHL from the first season is available beginning June 10th and prior to the fishery closure on December 31st. A total of 26 fishing vessels

participated in the fishery. In addition, two floating-processor vessels and two shore-based processors participated. The first fishery closed March 24th after 8.5 million pounds were harvested. The state-waters fishery reopened June 10th with a GHL of 4.3 million pounds, but less than 5% of the GHL was harvested. In order to maximize harvest opportunity the state-waters fishery closed on September 1st and immediately reopened under parallel rules. The projected unharvested portion of the state-waters GHL was made available for harvest in the federal/parallel fisheries. ADFG held 500,000 pounds of the state-waters GHL in reserved to allow for potential reopening of the state-waters fishery.

Several proposals from the public will appear before the BOF this fall concerning the creation of pollock fisheries in the South Alaska Peninsula Area.

Budget Outlook

Russ Nelson, RACE Division, summarized the effects of proposed 2007 budget and potential impacts on AFSC surveys. Because there are insufficient funds for all planned surveys, the biennial Eastern Bering Sea (EBS) slope survey (70 days of sea time) was canceled and the biennial AI survey was reduced by 20 days in 2006. In 2007, the AFSC is scheduled to conduct the annual Bering Sea bottom trawl survey and the biennial Gulf of Alaska shelf and slope bottom trawl surveys. It is expected that there will be insufficient funds to conduct all these surveys in 2007 and that decisions will need to be made on which surveys will be conducted. The 2007 budget also has potential impacts on surveys conducted from NOAA ships such as the pollock echo-integration survey because of potential shortfalls in the operational funds for those ships. Further, there may only be sufficient funding for either the Gulf of Alaska or EBS survey next year. Budgets for other divisions (REFM, Marine Mammal Lab, Auke Bay Lab) are similarly jeopardized. The status of the 2007 budget is not likely to be known until sometime early next year. Russ noted that because budgets are on annual cycles reverting to triennial surveys for the GOA and AI would not solve annual budget shortfalls.

Proposed Groundfish Specifications

Ben Muse reviewed the Council's two-year specifications process. This began in September 2005, when the plan teams recommended 2006-2007 OFLs and ABCs. The Council drew on these to recommend proposed 2006-2007 specifications in October 2005 and made revised, final recommendations in December 2005, after receiving the reports from the assessment authors and the Plan Teams.

The Council is now beginning the process of adopting 2007-2008 Groundfish Specifications. The process begins with Plan Team OFL and ABC recommendations from the September 2006 meetings. In October 2006, the Council will recommend proposed 2007-2008 Specifications, and in December 2006 will make revised, final recommendations, after receiving the reports from the assessment authors and Plan Teams.

The fishery in 2007 will begin in January on the 2006-2007 specifications adopted in December 2005. The 2007-2008 specifications will become effective, and supplant the 2006-2007 specifications, when the Secretary publishes the final rule in late February or March 2007.

Dr. Muse provided the Plan Teams with the projected 2007-2008 OFLs and ABCs used in the Groundfish Specifications Draft EIS for their use in formulating their OFL and ABC recommendations. Team members and industry representatives raised questions about the projection methodology used for EBS pollock, noting a difference between the OFL and ABC for 2007 adopted by the Council in December 2005, and the OFL and ABC projected for 2007 in the DEIS. Jim Ianelli explained that the difference occurred because the projection model used in the DEIS used a Tier 3 model to project the 2007 and 2008 OFL and ABC. In December 2005, the SSC recommended the use of a Tier 1 projection for EBS pollock OFL and ABC for 2006 and 2007. The BSAI Team will review this issue in more detail when it meets separately later in the week to adopt proposed specifications for 2007-2008 for SSC and Council review.

Marine Mammal Update

Lowell Fritz summarized the status of research and management of Steller sea lions and fur seals in 2006. In 2006 the Court vacated all Steller Sea Lion Research Permits until EIS is finished. A Draft Steller Sea Lion Recovery Plan was prepared, which summarizes Recovery Criteria and Threats Assessment. For delisting both the eastern and western populations, the criterion is a 3% per year increase in population for 30 years, 5/7 regions must be stable or increasing. Based on this criterion, the eastern population could be considered for delisting. For downlisting the western population to threatened, the criterion is a significant increase for 15 years, 5/7 regions must be stable or increasing. Threats to recovery include:

1) Potentially High –
    a) Environmental Variability;
    b) Competition with Fisheries; and
    c) Predation by Killer Whales;
2) Medium –
    a) Incidental take by fisheries (uncertainty in Russia);
    b) Toxic substances; and
3) Low –
    a) Subsistence harvest;
    b) illegal shooting;
    c) entanglement;
    d) disease and parasitism;
    e) disturbance (tourism or research)

A Biological Opinion on BSAI-GOA groundfish fisheries has commenced. Some SSL research was accomplished: 1) May: Brand-resight trips CGOA, EAI (prior to order); 2) June: Partial aerial survey for non-pup trend counts; and 3) June-July: Much reduced brand resight effort: a) No Ugamak field camp; and b) ½ of normal Marmot field camp. Lost research included: 1) June-July: Pup counts, condition, branding in CGOA; and 2) Annual: Captures for telemetry. Partial SSL aerial survey results indicated that the populations in some areas may have stabilized. Between 2000 and 2004, counts had increased in the western population overall and in most subareas. However, counts in 2004 and 2006 were essentially the same in the eastern Aleutian Islands and both the eastern and western Gulf of Alaska. Counts in the western Aleutian Islands continued to decline, as they have since the 1980s. In summary, Western SSL populations are unlikely to get sustained population increase with increases in survivorship alone; natality must also rebound.

Northern fur seal pup production on the Pribilof Islands was estimated in August 2006; results will be available for the November Plan Team meeting.

Survey Update

Bob Lauth summarized the EBS and AI bottom trawl surveys, which survey 20-200 m depths. The sampling protocol changed to include biological sampling of crabs. Summer plankton biomass was assessed. Sea surface and bottom temperatures were markedly lower than in 2005. The EBS pollock bottom trawl survey estimated a biomass of 2.8 million t, down from over 4.7 million t in 2005. The 2006 Pacific cod survey estimate was 15% lower than the estimate for 2005. The yellowfin sole also indicated a decline while northern rock sole increased slightly in 2006.

The EBS slope survey was cancelled in 2006 due to lack of funds. The survey is conducted from 200 – 1,200 m depth and divided into 6 subareas based on geologically distinct bathymetric types. Target species include rougheye rockfish, shortraker rockfish, Pacific ocean Perch, northern rockfish, Greenland turbot, arrowtooth flounder, Kamchatka flounder, SST's, and 8 species of skates. This survey was re-established in 2002 and 2004 after a hiatus of regular triennials surveys that ran from 1979 to 1991.

Mark Wilkins summarized the 2006 Aleutian Bottom Trawl Survey. Sampling occurred at 366 stations (about 85% of the usual level of sampling). By October 4, estimates of abundance, distribution, and size composition will be provided preparation of the stock assessments.

Phil Rigby reported that the sablefish longline survey had just been completed. This survey now spans 28 years of covering the upper slope and major gulleys from 200-1000 m and has been incorporated in a number of other assessments including rougheye rockfish, thornyheads, Greenland turbot, grenadiers, and sleeper sharks.

Management Strategy Evaluation

Teresa A'mar (with Martin Dorn) summarized her thesis studies on the GOA pollock fishery. She is incorporating results from ecosystem models as part of this work. Tom Wilderbuer and Jim Ianelli continue to use this approach to evaluate strategies for flatfish species. Grant Thompson was examining analytical approaches to MSE. The AFSC held an informal ad-hoc working group on MSEs this summer. This approach is also useful for examining effects of different survey frequency designs and this has been done for pollock relative to the GOA bottom trawl survey.

Off-year Assessment Criteria

The Teams discussed protocols for so-called off-year assessments and agreed upon the following criteria:

1) Authors **must** do a full assessment in "off" years if the Plan Team or SSC requests them to.
2) Authors **may** do a full assessment in "off" years if they choose to.
3) Anytime the assessment model is re-run and presented in the SAFE Report, a full assessment document **must** be produced.
4) The single-species projection model **must** be re-run and the results reported in a one-page SAFE Report summary if current-year catch differs by more than 10% from the expected value.
5) The single-species projection model **may** be re-run using new catch data without re-running the assessment model.
6) One-page SAFE Report summaries **do not** count as assessment "updates" for the purpose of the Species Information System.

Sablefish

Dana Hanselman provided the Team an overview of progress made in refining the sablefish assessment. A split sex model is now being explored. Biological data in the model were updated. By separating the model by sex, more selectivity curves needed to be estimated. Parametric and non-parametric functional forms were explored as potential options. Model selectivity estimation was modified to attempt to better represent the IFQ fishery from 1995 to the present. Further exploration needs to be done to better estimate the IFQ fishery. Differing mortality rates by sex were investigated but also require further experimentation. Trawl survey estimates were examined for the GOA as a proxy for the whole population. The author requested Plan Team input on the direction of the analysis and further ideas in need of exploration.

The author noted that ages from samples taken in gullies have yet to be added to the model. These have not been used in the past because they are considered to be outside of the exploitable population. These could be useful in indexing juvenile recruitment.

The Teams commend the author on his explorations thus far and look forward to further details on these model modifications in the next assessment iteration. Discarding and highgrading were noted as additional aspects to potentially include in further assessments. It was noted that higher prices are offered for the larger fish thus fishermen are targeting the larger fish and hence potentially highgrading to land them.

Remaining issues suggested by the author for exploration include developing better methods for specifying variances and further exploration of residual patterns. Some improvements were noted in the residual pattern under the new model configuration. There was an observed switch in the survey length residual patterns around 2000. The Teams discussed the potential necessity of modifying additional parameters under the split sex model (e.g., catchability) to improve the residual pattern. Team members noted that differential selectivities by sex ought to be sufficient to capture the dynamics (thus there may be no need to modify catchability). Growth curves are currently fixed and selectivity varies by age. Suggestions were made to explore length-based selectivity instead of age-based. The author intends to fix or constrain natural mortality estimates in the model for both sexes.

The author noted that the November chapter would include the split-sex model, updated biological information and the trawl survey data work in progress. If time permits, additional explorations with the model will also be attempted. Team members noted that some of these model additions may change the ABC estimates considerably thus additional agenda time may need to be allotted for this topic in November. The base model used in previous years will also be updated and presented in conjunction with the new split sex model. Thus the Teams will be able to compare and, if necessary, choose between the models at that time. The Teams felt comfortable with the presentation of the alternative model at this time such that if results from this model showed considerable improvement over the base model, choosing to use the alternative model in November for ABC recommendations would be acceptable. Traditionally model changes are presented at the September plan Team meeting to allow for new model configurations to be used in November as necessary.

New information on the trawl survey and area apportionments calculations was not anticipated to have a large impact on ABC calculations. Bill Clark noted that switching to a split sex model in the halibut assessments did not show a dramatic change in biomass estimates however adding additional historical age information did change the results considerably.

The Teams discussed the potential for area allocation considerations in November. Allocative changes were noted to be the purview of the Council not the Plan Teams provided they remain within the previously established biological boundaries. It was noted that if there was a biological concern these would be revisited otherwise this would remain outside of the necessity for Plan Team deliberations.

Rockfish working group

Jon Heifetz updated the Teams on activities of the rockfish working group (RWG). A workshop was held at the Auke Bay Lab during Spring to discuss modeling history, the evaluation of influential parameters and uncertainty, and standardize input and output for SAFEs. A new age-structured model for yelloweye rockfish was initiated. Considerations were also given to incorporating ecosystem components into stock assessments. A report was generated from the RWG meeting and made available for the Plan Team meeting. Recommendations from this meeting included consistency in SAFE documents, data sets and data quality and model configurations. It was recommended to obtain new maturity estimates prior to reconfiguring the northern rockfish model. Comparison should be made of BSAI and GOA model configurations. Improved documentation of priors and developing appropriate priors as well as the distributions included in the SAFE reports were also recommended.

The Teams commended the rockfish working group on their continued efforts in improving rockfish models and assessments.

CIE Review of rockfish assessments

A review of the rockfish assessments was conducted by the Center for Independent Experts over the summer. Reports from the CIE findings were made available for the Plan Team meeting. Jon Heifetz provided an overview of the CIE findings with respect to strengths and weaknesses of the rockfish assessments.

The Teams discussed some of the criticisms put forward by CIE reviewers. It was noted that the AFSC will likely produce a response to the CIE review. In the short-term many comments may be addressed in the stock assessments produced for November. The issue of exceeding area-specific TACs for some rockfish in the GOA (but below the Gulfwide OFL) was presented to the reviewers yet comments or resolutions were not provided in their reports. The Team noted that it would be useful for to highlight this omission so that potential problems can be averted.

The Teams discussed the scope of work and what information was provided prior to the meeting. A website was provided for the distribution of background materials to the reviewers in advance of the meeting (ftp://ftp.afsc.noaa.gov/afsc/public/rockfish/rfwg.html). Presentations were made by AFSC scientists over the course of the review. It was noted that while the statement of work could have potentially been more precise, that there is obviously a great deal of information and background necessary for adequate review of rockfish assessments. Team members discussed that the overall breadth of the review and complicated the focus. Phil Rigby commented that the charge for the CIE to review the degree of conservatism inherent in rockfish assessments was unusual, but was designed to address concerns about being sufficiently precautionary in managing rockfish.

The Teams discussed the CIE review in relation to the Goodman report and the current instructions to the stock assessment authors. The Teams encourage the authors to address comments as appropriate to the stock assessments. The Team felt that many of the comments were general to trawl survey and stock assessment and could be equally applicable to most groundfish species. Research in these aspects is encouraged and has been previously noted in research priorities. Phil Rigby noted that the AFSC has discussed evaluating the trawl survey protocol (and problems with untrawlable grounds) and its implication for rockfish species in 2007. Jim Ianelli commented that consistency in applying catchability estimates for rockfish is necessary and should be included in any further review of this issue. While potential funding may limit the ability to conduct extensive workshops or review of this issue, an estimate of survey trawlable grounds would represent a first step and could potentially be done with some of the available data. The Team supported a workshop to analyze untrawlable grounds and review potential solutions to this problem.

The Teams commented on some specific points, including natural mortality estimates. The Teams recommend that some guidelines be prepared for consistent treatment of the maximum age used in computing these estimates. Further evaluation of stock structure is being conducted already by stock assessment authors and will continue. The Teams discussed the issues noted by the CIE with respect to the link with assessment results and quota setting and the potential conflict in establishing bounded TACs in the assessment. It was noted that this is not an assessment issue but rather a policy issue for the Council. The Teams commented that this is representative of the North Pacific quota setting system rather than something that is specifically related to rockfish stock assessments.

Species of Concern

Jane DiCosimo updated the Teams on the species of concern management initiative and on-going work with non target species management. She reviewed the current alternatives under consideration for management of non-target species and other management initiatives with respect to non target species. Three choices for an overall goal of non-target management would identify the level of concern needed for these species: 1) preventing overfishing and rebuilding overfished non-target species; 2) preventing ESA listing and rebuilding listed non-target species; or 3) maintaining non-target stocks at or above a specified threshold (not MSY not ESA) that will allow for optimal yield of target fisheries while maintaining above ESA listing thresholds. Tools to achieve these goals include the following: In-season management of catch, creative industry / NOAA cooperation to manage bycatch (e.g. SEASTATE – dirty 20), time area management, monitoring trends in catch, maximum retainable allowances – MRAs.

Rebecca Reuter provided an overview of the issues involved in addressing management of data-poor species. This presentation was presented at the AFS meeting in September 2006. She suggested that for these data poor species our existing tier system may be insufficient. An alternative assessment strategy for these species is necessary. New strategies for addressing these species are intended to highlight data needs, prioritize research efforts and prevent overfishing of these data-poor species.

An example of a data quality assessment was provided to evaluate the adequacy of current data as an improvement over historical data. Alternative assessment information is then assessed to evaluate the degree of management concern these species represent. Alternative management strategies for these highlighted species will then be discussed and decided by the Plan Teams. The envisioned review process will mimic the current review process by the Plan Teams, SSC and Council with some differences due to the qualitative nature of the information and the need for initiating management actions as the need arises.

Team members questioned the need for an instruction sheet to all authors to give guidance on requirements for inclusion in stock assessments. The methodology by which some species were highlighted for the Observer Program for increased identification was questioned. The availability of information and the potential for identification by observers was necessary despite the fact that some species were in greater need of identification (but identification was not yet possible by observers). Differing approaches for some species as opposed to others would be advisable based upon their differing life-history characteristics. Another iteration of this analysis will be available for review at the November Joint Plan Team meeting.

HEPR Program update

Mike Sigler provided an overview of the Habitat Process Ecosystem Research program (HEPR). Two major accomplishments in the previous year include a five-year plan for essential fish habitat research, and a new program being planned to evaluate the impacts of loss of sea ice.

Ecosystem Considerations

Jennifer Boldt provided an update of the Ecosystem Considerations chapter and website which provides access to data and contributions in the chapter. The website will be updated in November 2006 with the final version of the chapter. Five sections were noted to be of particular interest to the Teams: Executive Summary, Introduction, Ecosystem Assessment, Ecosystem status indicators, Ecosystem-based management indices and information. The executive summary section was reorganized according to SSC comments.

Ecosystem Status Indicators: The climate section is not yet updated but will be provided in the November. Current information indicates 2006-2007 may be an El Nino year (last year was a La Nina year). GOA zooplankton biomass estimates were included. Larval fish information in the GOA was updated. Indices of groundfish survival (log recruit per spawning biomass anomalies) were analyzed to detect years of significant shifts in survival. Overall recruitment and survival indices across major commercial groundfish species in the BSAI and GOA were also estimated. Results from a transport model for winter spawning flatfish were presented.

Ecosystem based management Indices: The status relative to overfishing for managed stocks in the North Pacific were presented. Fish stock sustainability index (FSSI) indices were presented for species in the BSAI and GOA. Updated fishing effort for both BSAI and GOA were included. A new contribution is included on distribution and abundance trends in the resident human population of the BSAI ecosystem. Catch information were updated for PSC species and non-target catch.

Ecosystem Assessment:

Kerim Aydin provided an overview of the Ecosystem Assessment. The SSC has been encouraging the incorporation of this information into individual stock assessments. The goal of the ecosystem assessment would be to investigate simple thresholds which could be utilized in a multi-species context to provide management-related advice. New syntheses included this year are: the relationship between EBS pelagic forage species; the relationship between predation/production and fishing/production, a metric proposed to evaluate the management implications of potential exploitation of forage species and a metric proposed to evaluate the "fisheries footprint" of individual fisheries.

Model reconstructions were presented which investigate the estimated prey biomass and predation mortality over time in relation to the target species biomass trajectory. Forthcoming analyses will investigate life history traits, genetic diversity and functional diversity.

Kerim provided an overview of GOA and BSAI arrowtooth flounder population considerations for the ecosystem section of the stock assessments for these species in the SAFE reports. Mortality estimates in the BSAI indicate that there is greater predation on arrowtooth than is seen in the GOA ecosystem. To what extent there is a control exhibited by large pollock in the BSAI preying on arrowtooth is uncertain. Questions were posed from the public regarding the consumption of capelin and length-frequency of prey in the GOA given data indicating a decline of capelin in this region. Kerim noted that these data were collected offshore and primarily after 1990 thus are not representative of earlier crash periods. Bob Foy indicated that the data presented were also consistent with the recent work in Kodiak from 2000-2004 which further reiterated the importance of capelin as food production.

Sarah Gaichas provided an overview of ecosystem considerations for AI pollock and AI cod. The presentation was to demonstrate the type of information that is available for use in these assessment chapters. Information is available on single species in an ecosystem context with respect to relationships and relative role in the ecosystem as well as a comparison between the AI and the EBS. Preliminary results indicate that there are very different ecosystem roles for Pollock and cod between the AI and the EBS. Information presented uses diet data from the early 1990s. Updated information will be included in future iterations. Preliminary simulations indicate a correlation between adult pollock decline and atka mackerel increases. There is less data available for AI pollock compared with other (EBS and GOA) managed Pollock populations in the North Pacific. Model results indicate that Steller sea lions appear to represent a significant predator on cod populations in the AI. Results also indicate that bottom up effects (benthic production, phytoplankton production) exert significant effects on cod populations. While data are uncertain, an interrelationship exists between cod and sablefish with cod preying heavily on juvenile sablefish. Biomass density for cod in the AI is comparable to the EBS, while pollock biomass density in the AI is much less than pollock biomass for the EBS. Predation effects on pollock are much more pronounced in the GOA and EBS than in the AI.

Seabird monitoring

Kathy Kuletz presented an overview of the new at-sea monitoring program. Funding was acquired through an NPRB grant to survey populations in the BSAI and GOA. Preliminary results were presented and a survey protocol is being refined.

Halibut Discard Mortality Rates

Halibut discard mortality rates are set by the Council on a 3-year cycle for non-CDQ fisheries based on an average of the past 10 years and annually for CDQ fisheries based on available data. Halibut Discard mortality rates for 2005 were presented in conjunction with recommended rates for use in 2007-2009. The Teams recommend adopting the listed discard mortality rates for the CDQ and non-CDQ DMRs for the BSAI and the GOA fisheries.

Halibut Assessment

Bill Clark presented an overview of assessment and management of Pacific halibut. The assessment is based on the assumption of a closed population in each management area. Dramatic reductions in size at ages have occurred in the last 20 years. Females are very vulnerable to the fishery thus the assessment moved to a sex specific assessment to better account for this. CPUE can be used as an index of abundance for this fishery as very limited changes have occurred in fishing practices. Quotas for the stock are established by the Halibut Commission while allocative issues are managed by individual fishery management Councils in the US and Canada. Information included in the assessment model was reviewed. Sex composition of the commercial landings is estimated externally to the assessment model and then included as assessment data. Size specific yields are roughly 70% female. Bill noted that the decrease in size at age is likely density-dependent.

Bill provided an overview of recent work in PIT tag-recapture data. Lower than anticipated recapture rates were found in the GOA and especially in the AI. Seeding experiments were conducted in 2005 which improved the recovery rates for this year. Comparisons were made for mortality rates between the assessment and the mark-recapture experiment. Results were not in close agreement. Biomass estimates between the two were also compared with the mark-recapture estimates widely overestimating the biomass, particularly in the western regions. Estimates of migration rates from the central and western GOA seem to be underestimating migration from these areas. Overall results from the experiment were inconclusive. There are no immediate plans to repeat the experiment.

Estimating Pacific cod off-bottom distance from archival tags

Grant Thompson presented a summary of his paper with Dan Nichol on attempts to quantify some of the uncertainty surrounding survey catchability of Pacific cod. The authors examined archival tag data to see if distance between the fish and the sea floor could be determined. A possible method uses the Kalman filter to compute a likelihood function, and applies a hierarchical Bayesian approach to stabilize parameter estimates. The method used simulated data, where the true parameter values are known. Median distributions of fish depth and 95% confidence intervals were shown to be close to the true values. The Teams encouraged further development of both the Kalman filter approach in particular and use of archival tag data in general. The Teams noted the following points:

- For tags recovered over flat bottom, it may be reasonable to assume that bottom depth for the last few days of the time series is equal to (known) bottom depth at the point of recovery.
- The EBS and GOA exhibit different bottom contours; the EBS has large distances with low bottom height variation; soundings from charts could provide an objective prior distribution of bottom depth variability, although this will be confounded with fish behavior, because the relevant measure is the variance in bottom depth along the space-time trajectory traveled by the individual fish, which depends on fish behavior as well as topography.
- The behavioral response of fish to the approaching net is an important issue and should be addressed in the model; Somerton's work indicates that P. cod do not dive beneath or off to the sides of the net, but they may dive into the net from above. Also, fish may not be randomly distributed with respect to the bottom; for example, feeding behavior may raise questions about the assumption of normally distributed off-bottom distance.
- Headrope height is routinely recorded during the surveys. There are clear differences in headrope height between individual tows – it may vary by 0.5 - 1 m. Headrope height could affect mean CPUE of pollock, for example, which has a suspected diving response.
- Some fish appear to exhibit regular patterns of diurnal movement; perhaps it would be reasonable to assume that the maximum fish depth recorded each day corresponds to true bottom depth.
- Once the method is applied to the Pacific cod archival tag data, only daytime data will be used.

- There may be insufficient time to process all the archival tag data and apply the proposed method in this year's Pacific cod assessments.

Economic SAFE report

Ron Felthoven summarized the contents of the Economic SAFE Report for 2006. North Pacific commercial groundfish remained steady at around 2.2 million mt in 2005. Ex-vessel value for groundfish increased slightly from $645 million in 2004 to $686 million in 2005. Groundfish accounted for 52% of total Alaska ex-vessel value. Salmon accounted for 22%. Halibut accounted for 13%. Shellfish fishery accounted for 12%. Pollock catch of 1.57 million t (or 72%). Pacific Cod catch of 267,000 mt (or 12%). Flatfish (yellowfin sole, rock sole, and arrowtooth flounder) catch of 197,000 t (or 10%). Sablefish, rockfish and Atka mackerel comprised the remaining 6%. Around 91% of total catch is linked to trawl gear. Hook and line accounted for 7.9% of catch. Pot gear accounted for 1.1% of catch. Around 90% of the catch occurs using one type of gear. An exception is Pacific cod, where trawls took 37% of the catch, hook and line took 51%, and pot gear took 12%. Catcher vessels took 47% of total groundfish catch, with 51% of total ex-vessel value. Catcher-processors (CPs) took 53% of total groundfish catch, with 49% of ex-vessel value. Dr. Felthoven explained that catcher vessels take a larger proportion of higher-priced species such as sablefish ($2.18/lb in 2005). And trawl gear accounted for 91% of total catch by CPs, with 71 % of ex-vessel value. Much of the trawl catch is of low-priced species such as pollock, ($0.13 /lb in 2005). Groundfish discard rates decreased by 26%, from 7.0% in 2004 to 5.2% in 2005 (8.4% in GOA, 5.0% in BSAI). Discard rates were higher for fixed gear at 11.5% (12.6% BSAI, 6.4% GOA) than for trawl gear at 4.6% (4.3% BSAI, 8.9% GOA).

Overview of economic and social research

Dr. Felthoven identified the following research initiatives to provide economic information for managers:

1. BSAI Crab Data Collection Program
2. Mandatory Cost/earnings Data Collection Program for H&G Catcher-processor Fleet
3. Impact of Real-time Information on Salmon Bycatch and Location Choice
4. Non-consumptive Value of Steller Sea Lion Protection
5. Alaska Fishing Community Profiles
6. Emigration of IFQ Shares from Small, Remote, Fishing Communities
7. Obtaining Data to Improve Regional Economic Models for Alaska Fisheries
8. Integrating VMS Data with Commercial Groundfish Fisheries Data
9. Integrating VMS Data with Commercial Groundfish Fisheries Data
10. Market Data Collection and Translation
11. Bering Sea Pacific Cod Fishing Survey

Other species analysis update

Jane DiCosimo updated the Teams on the planned joint BSAI/GOA FMP amendment to modify how other species are managed in both regions. Jane discussed the alternatives under consideration and the role of the plan Teams in recommending OFLs and ABCs for analytical consideration for the EA/RIR/IRFA. A review of draft chapters will occur at this meeting with plan Team recommendations on group OFLs and ABCs to be made in November. These recommendations will be made for purposes of the analysis only. Current management of other species under both FMPs (aggregate OFLs and ABCs in the BSAI and $\leq$%5 of sum of total TACs in the GOA) will continue until changes are implemented by NMFS. A discussion paper on fishery interactions and separate group TACs is anticipated for the Spring of 2007. Initial review by the Council could occur in Fall 2007.

BSAI and GOA Grenadier Assessment

Dave Clausen provided an overview of the draft Grenadier assessment for the BSAI and GOA. Currently grenadiers are included under both FMPs as non-specified species, whereby no management measures are established for this species.

Biomass of the species is dominated by the giant grenadier species. No information is currently available in incidental catch of grenadiers in the halibut fishery. Bill Clark noted that during the majority of the halibut fishing season, the depth distribution of the halibut fishery would not overlap with the depth distribution of grenadiers. The majority of the GOA grenadier catch comes from the sablefish fishery.

The Teams discussed the OFL calculations put forward by the assessment author. Team members questioned the premise of no historical exploitation on the species in calculating the natural mortality rate used for OFL calculations. A downward adjustment for ABCs was proposed by the assessment author by reducing the biomass estimates for the AI and utilizing a lower natural mortality estimate. Team members questioned the inconsistency in utilizing different natural mortality rates for OFL and ABC calculations. The Teams felt that further investigation of the natural mortality rate should be done. The Teams felt that using different natural mortality rates for OFL and ABC is inappropriate and the best estimate of the ones investigated should be chosen and utilized consistently. Other mechanisms could be used to lower the ABC as necessary. The Teams felt that the author should use the lower, proxy mortality rate of 0.057 in the calculation of OFL and ABC, along with the higher biomass estimate in the AI. The Teams noted that the biomass estimate in the AI is less reliable than the biomass estimates for the GOA and BS regions.

The Teams supported the tier 5 approach for this species. The Teams discussed the recommendation that grenadiers be included under FMP managed species given that the relative bycatch of these species is high as compared to the aggregate catch of the whole other species category in the GOA. This is notably problematic in the context of the non-target species initiative which will revise management of all species.

The Teams did not feel that current evidence indicated a conservation concern for these species. However the Teams noted that directed fisheries can rapidly develop. Current catch is predominantly female which could trigger conservation concerns but current information indicates that catches are low enough at this point that this does not represent a pressing issue. A proportion of the population is likely unsurveyed given that the survey does not sample below 1000m depth. The Teams felt that giant grenadiers were an appropriate proxy for the grenadier population as a whole. The Teams request that the author aggregate discussions in the assessment to be for grenadiers as a whole (i.e., not giant grenadiers specifically). The Teams commend the author on a well written and informative assessment.

Shark Natural mortality

Cindy Tribuzio presented an overview of shark natural mortality estimates. Team members questioned the applicability of the methodology to shark species. Cindy noted that the study and original model development were developed with spiny dogfish included as well as other species and hence results for shark species are applicable. Results will be included in the SAFE chapter for next year as the paper results are not yet finalized. The Teams commended the author on her work to date and noted that the draft mortality estimates seem to fall within a reasonable range.

The Teams adjourned their meeting at 12:30pm Thursday, September 21st and broke into individual Team meetings.

Gulf of Alaska Plan Team Minutes

The meeting of the Gulf of Alaska groundfish Plan Team convened on September 21st, 2006 at 1:30pm at the Alaska Fishery Science Center, Seattle, WA.

Members of the GOA plan Team in attendance included:

Jim Ianelli	AFSC REFM (GOA co-chair)
Diana Stram	NPFMC (GOA co-chair)
Sandra Lowe	AFSC REFM
Jeff Fujioka	AFSC ABL
Jon Heifetz	AFSC ABL
Robert Foy	UAF
Nick Sagalkin	ADF&G
Tory O'Connell	ADF&G
Tom Pearson	NMFS AKRO
Ken Goldman	ADF&G (by phone)
Sarah Gaichas	AFSC REFM
Bill Clark	IPHC
Theresa Tsou	WDFW
Kathy Kuletz	USFWS
Ward Testa	NMML

Approximately 15 state and agency staff and members of the public also attended. Names of attendees are included in the Joint Plan Team minutes.

The revised agenda for the meeting is included in the Joint Plan Team minutes. A presentation of the EIT Winter survey was added to the agenda.

Echo Integration Trawl (EIT) Survey

Mike Guttormsen provided an overview of the Winter EIT survey in the Shumagins and Shelikof Strait. The Team discussed the preliminary results from using two different cod end liner mesh sizes. These investigations are intended to ascertain the selectivity of the survey trawl gear. The results suggest a potential for bias towards adult pollock relative to juveniles. If younger pollock are not sampled by the trawl gear, then the translation to relative biomass based on the acoustic signal may under-estimate the relative abundance of juvenile pollock. Martin Dorn discussed the selectivity curve utilized in the model and how information such as this could be simulated in the model. The selectivity curve used could be modified to attempt to account for this difference. Significant numbers of one year olds (the 2005 year class) were observed in the Shumagins in 2006. The 2000 year class, although age data are still being processed, appears to be relatively large based on the length frequencies from this year's survey.

The Team discussed key issues with this survey, including the alternative hypotheses about spawning biomass redistribution. It was discussed that there could be variability in Chirikof as this is only a two day survey. However, Martin Dorn noted that the inclusion of these areas outside of Shelikof in recent years provides a broader time series and may represent about 90% of the stock. A fuller evaluation of the potential to use these data within the model is recommended. It would be useful to verify that there are not additional shelf break spawning aggregations given that Chirikof was discovered recently based on fleet information. There has been limited additional exploration by the fleet, however it is possible that additional areas hold important components of the spawning pollock population. Julie Bonney suggested that additional areas be surveyed given that exploration by the fleet is limited by the short timing of the fishery. Julie noted that the industry is willing to assist in cooperative studies but awaits direction from the scientists.

The Team discussed the differing plans for either sampling multiple years in the same area versus expanding the survey to additional areas. Chris Wilson noted that while the Chirikof shelf break area could be continually surveyed, a better use of survey time might be to explore further along the shelf break to look for additional aggregations of spawning fish.

Jim Ianelli discussed the industry-funded EFP in the AI to collect acoustic information for Pollock and questioned to what extent a similar EFP might be possible in the GOA. Martin Dorn noted that interest was there in repeating this study in the Shumagin region as soon as this winter, but further development of an EFP has not progressed at this point. A broader NMFS survey in the region would also be advisable. Chris Wilson noted that the allocation of survey effort will be discussed at the annual REFM survey planning meeting to come. Chris further noted that MACE is currently working on additional projects in conjunction with industry vessels. Care should be given to the project planning in order to have the staff time and resources to analyze the data in a constructive manner. Anne Hollowed noted that this would be a good fit for an NPRB proposal or other means to address this given that staff timing and funding seems to be a limiting factor.

The report from the EIT survey will be turned into a processed report and available as such rather than attached as an appendix to the SAFE report as in years previously. The Team requested that an electronic link to this report be provided when the final pollock assessment is produced.

Kodiak Fishery Interaction Team (FIT) study

Chris Wilson reviewed preliminary results from the one month Kodiak FIT study. Differences were examined between pollock biomass during and outside of the fishing period. Data were collected in control and treatment troughs before and during the fishery period. Interpretation of the results is forthcoming. The purpose of the study is to examine the impact on biomass of the fishery in relation to foraging for sea lions. Effort information is still to be determined for the treatment trough during the time period of the study. Martin Dorn noted that this information could be useful for assessment purposes in terms of providing an additional biomass estimate and/or time trend in regional biomass over the time period of the study. Results from previous years of this study have been utilized in the current Steller sea lion BiOp.

Dark Rockfish

Diana Stram provided an overview of the initial review of the GOA dark rockfish management analysis. Initiation of this analysis to remove dark rockfish from the GOA FMP and turn it over to the State for management was recommended by the stock assessment author, plan Team and SSC in 2005. Analysis was postponed until after results from the 2005 GOA trawl survey could be included. Initial review of the analysis took place in April 2006. The SSC felt that data on the geographic and depth distribution of the species was insufficient at that time to support continued action to remove the species to State management. The 2005 trawl survey had a higher than normal biomass of dark rockfish notably from a single tow south of the Shumagins. The Council requested that the analysis be expanded to consider an additional alternative to delegate management for dark rockfish under the FMP to the State (similar to DSR management) as well as to evaluate similar management actions for dark rockfish in the BSAI. The current timing of the analysis is pending data availability to address lingering questions regarding the depth and geographic distribution of the species. The purpose of this discussion at the plan Team level was to solicit additional information availability to address these issues.

Rebecca Reuter presented an overview of dark rockfish information from the BSAI. There is limited information in the AI. Ken Goldman noted that dockside sampling in the CGOA shows some dark rockfish being landed (2-3%), but they do not show up on fish tickets in the CGOA (i.e. they all get listed on the fish tickets as dusky rockfish). No dark rockfish are picked up in State surveys, however, it was noted that the State surveys would unlikely cover rocky shores and kelp beds where dark rockfish live.

Jon Heifetz discussed that no regular surveys are available in nearshore areas and offshore surveys such as the GOA trawl survey are not appropriate for evaluating the biomass and distribution of this species. Diana questioned to what extent black rockfish are surveyed since dark rockfish are often caught in conjunction with black rockfish in the directed black rockfish fishery. It was discussed that black rockfish are not yet well assessed and acoustic methods are being sought for further assessment of these species. These methods are being explored. A great deal of anecdotal information exists however which shows black rockfish distribution nearshore in conjunction with dark rockfish. Tory O'Connell commented that submersible surveys show very few dark rockfish encounters in waters deeper than 50 fms.

The Team noted that the 1998 black rockfish amendment in the GOA was based on distribution information that is similar to what is presently the case for dark rockfish. Both species are predominantly nearshore species that are seldom caught in the GOA trawl surveys, except for very infrequent encounters. The Team noted that it seemed inconsistent to argue against taking action for dark rockfish in the absence of nearshore information when the species is not well assessed. All information available indicates that this species is most abundant in nearshore kelp beds. Sometime the species is encountered in shallow offshore areas but its primary habitat is widely believed to be at shallow depths and nearshore regions.

The Team recommended proceeding with a revised analysis since added information from the 2007 survey is unlikely to resolve the questions of dark rockfish distribution and habitat issues. This was particularly important since survey funding may be limited by budget constraints. Team members suggested that alternative methods be explored. For example, how often have other coastal species been found in offshore waters and compare this with dark rockfish frequency. This should show that while single tows of high biomass are occasionally encountered (as with rockfish species in general), that this particular species is uncommon in the offshore areas of the trawl survey. Team members commented that there was indeed a wealth of information showing that dark rockfish are not generally found in offshore water by the fact that over 5,000 survey tows have been conducted, with very few tows showing abundant dark rockfish. The Team reiterates comments from previous years on the need to shift the species to State management where plans can be made for additional survey and assessment effort to improve management of dark rockfish.

The Team further commented on the alternatives under consideration in the broader scope analysis. Alternative 3 was not recommended for analysis due to as it seems unlikely the state would take on additional assessment and monitoring responsibility for a federally managed species.

Proposed specifications

The Teams corrected a table showing the draft 2008 ABC and OFL for Rex Sole. The projections for this species were done in accordance with similar methodology for both 2007 and 2008. The projection model was used to approximate the biomass trend. This trend was then scaled to match the adult biomass estimates used by the author for Tier 5 calculations. Setting $F=M$ for F_{OFL} and $F=0.75M$ for F_{ABC}, the Team used the author's approach (a catch-equation method) to compute OFL and ABC.

The tables should also be footnoted regarding the SSC's recommended (from December 2005) for the 2006-2007 Pacific cod ABC. They chose to increment the increase in ABC for 2006 by half of the Plan Team's recommended increase (from 2005 ABC) noting that it will be revised in 2006. This affects the projected ABC shown for 2007 and 2008 since the mortality assumed in each year changed from when projections were done in 2005.

Demersal shelf rockfish

Tory O'Connell updated the Team that there will be no new survey information for yelloweye rockfish this year. She noted that survey money has been cut for at least 3 years and also that the directed

commercial fishery has been closed. Consequently next year's assessment will not have updated abundance estimates or biological data available for analysis. Biological samples may be limited to samples taken from bycatch in the commercial halibut fishery, although there are logistic difficulties with this approach. She requested the Team consider future options and pointed out the potential of having the assessment drop down a tier level. ADF&G is working with the IPHC to collect full yelloweye bycatch data on the IPHC longline survey as well as biological samples. The Team discussed the halibut fishery protocol for extrapolating bycatch data. Bill Clark noted that prior to the 20 hook subsample protocol (initiated in the late 1990s) there were some data available on sampling of on all hooks and these data are available for use. He noted that the 20 hook subsample has been a very reliable subsample of the full sampling approach. The halibut survey could be used as a relative measure of abundance. The Team did not make any decision at this point on the appropriate tier level for DSR.

Northern rockfish

Dean Courtney reviewed the revised assessment model for northern rockfish. While 2006 represents an "off-year" for rockfish assessments in the GOA, the plan Team requested that this assessment be revised in 2006 given the issues noted with the assessment in 2005. Dean reviewed comments from the plan Team last year regarding model critiques and how these were addressed in model revisions. The reference model was reviewed at the rockfish modeling workshop held in June 2006. His presentation focused upon changes to the assessment from the 2005 assessment reviewed by the plan Team.

The Team discussed the number of untrawlable stations. This information was also presented to the CIE. The 2005 survey had a higher number of larger tows than in previous years, but survey biomass is still highly variable for this species and the model continues to have a difficult time fitting this apparent variability.

The author reviewed the relative differences in model formulation for the 9 models compared in the assessment. The change in each model formulation is the relative fit to different aspects of the data inputs to the model. The author recommended the choice of model 1. This model was chosen because it was robust to both the spawner recruit information and to the added historical catch information and contained separate selectivities for fishery and survey. The Team discussed the model fit to survey biomass trends and to what extent the trend might be based high sampling error, versus true population changes (e.g. perhaps the high and imprecise estimates are more representative of the underlying distribution than the low precise biomass estimates).

The Team felt that the assessment represents a thorough investigation of the different dynamics in the model. New maturity information was noted to potentially change assessment results dramatically. The F_{40} rate in the model will likely be elevated as a result of the input of the new maturity information. Model estimated ABCs are likely to increase as a result of new maturity data. The Team notes that the maturity information would be very useful in progressing further in this evaluation and encourages the sharing of this data with the assessment authors for use in improving the input data to the model. Phil Rigby noted that this model was standardized in order to address CIE commentary and has also been modified in order to address and respond to all SSC and Plan Team comments accordingly.

The Teams commended the stock assessment author on improvements made to the assessment in response to critiques encountered over the past year.

Other Species assessments

The Team reviewed draft assessments for the other species in the GOA. These analyses have been prepared in anticipation of a comprehensive amendment package analysis to break other species out into individual species groups in the GOA. Currently there are no assessments (aggregate or otherwise) for these species in the GOA. These draft assessments and their review by the plan Team at this time are

intended to provide input and select ABCs and OFLs for purposes of the forthcoming analysis at this time.

Sharks

Dean Courtney presented an overview of changes incorporated in the draft GOA shark assessment. A joint BSAI/GOA shark assessment was presented in 2005. He noted that population trends appear to be stable or increasing in the GOA. The author noted problems encountered with extrapolating catch information and requested if methodology had changed leading to a change in catch information from 2003-2006. Team members discussed that if discrepancies are noted in the data consistently among the other species assessments, then coordination and standardization amongst assessments would be useful. The Team discussed catch information for shark species and how these estimates are extrapolated currently. The Team suggested also investigating extrapolated catch information for the halibut fishery. Tier 5 estimates increased based on new biomass estimates.

The Team discussed that tier 6 may not be a viable alternative for these species. The assessment author noted that current catch levels appear to be sustainable. Ken Goldman provided some additional information on calculation of life history parameters for some shark species. He may provide additional information in a presentation to the Team at the November plan Team meeting.

Other suggestions for the shark assessment are

1. to include recent average catch in tier calculation tables.
2. that all other species assessment be standardized in content and section information included

Calculating unobserved bycatch

Joel Rice presented an overview on the calculation of bycatch from unobserved fisheries, specifically from the halibut fishery. Extrapolated bycatch from this fishery has been noted in several plan Team discussions to be highly problematic for many species (eg skates, DSR and sharks). The focus of this calculation was on the relative estimate of shark bycatch in the halibut fishery. Dean Courtney noted that shark information is not included in the observer samples. Sarah Gaichas noted that basic dogfish information may still show up in the observer estimates and could be useful for the assessment authors.

The Team discussed extrapolation of bycatch from the commercial halibut fishery based on halibut survey data using the existing 20 hook protocol. Dogfish bycatch is notably high from the survey information with a high amount of error. The commercial catch could also be potentially broken out further based on survey station areas to obtain better estimates of bycatch. Some individual stations in the halibut survey encounter high amounts of dogfish. Catch rates appear excessively high for dogfish overall but this could be based on results from individually sampled stations and better estimation may be possible by extrapolation the estimate out in smaller areas.

Octopus

Liz Conners presented the draft octopus assessment. She noted that any interest in a directed fishery would likely require a special gear type. Retained catch has been increasing as incidental catch due to increased market value for the species. The assessment author noted that management based on tier 5 calculations from the trawl survey is not consistent with management of harvest for pot fisheries. She noted that trawl surveys are not good at estimating the biomass for this species. The author noted that larval survival for this species is particularly impacted by climate changes.

The tier system does not appear to be a good management tool for this species. This is similar to results from other investigations of other species assessments. Information was provided regarding the problems encountered under either tier 5 or tier 6 calculations. The author expressed that the tier system derived for groundfish species is inappropriate for invertebrate species such as octopus. The Team discussed to what

extent tier 5 might be appropriate and would thus encourage additional research for the species. The author felt that tier 6 was artificially low and if either tier 5 or 6 were necessary than tier 5 is preferable. The incidental catch history is from a period with no market and no incentive for catch thus establishing a target catch level based on this for tier 6 seems to be draconian. Suggestions were made to move this species solely to bycatch-only status and encourage an EFP.

The Team provided some suggestion on additional studies in the past (e.g., SeaGrant) investigating mortality estimates. Additional suggestions were made to characterize the uncertainty inherent in the assessment for this species.

Sculpins

Todd Tenbrink reviewed the draft assessment for GOA sculpins. Large sculpin species dominate the overall aggregate biomass. Biomass data for the bigmouth sculpin indicates a declining trend while other sculpin species appear to be stable or increasing. The author does not recommend the use of the aggregate sculpin biomass for use in examining biomass trends for the population as a whole given the diversity of species present. The authors recommend the M estimate as the best available at this point until additional research can be initiated. Tier 5 is recommended for this species with further qualification that the species should be on bycatch-only status with no target fishery. A three year average for biomass is recommended to adequately capture recent biomass trends.

The Teams discussed the habitat requirements for the species and to what extent the biomass and species diversity is adequately represented by the trawl survey. Some species are noted to be associated with structured (and hence untrawlable) habitat but that these species are also found in trawl surveys. Information is notably lacking in this respect for this species. Species encountered on the survey are variable by year. Some species were noted to be broken out for identification only in recent years which complicates the ability to derive some approximation of diversity from the survey species encounter table provided. Several species will be aged soon which will provide additional information for the assessment. Certain sculpin species are noted to be more difficult to age than others.

Squid

Sarah Gaichas reviewed the draft squid assessment for the GOA. Until 2004 squid catch was relatively low and increased dramatically in 2005. The majority of this catch came from the Pollock trawl fishery during the A season. Information for 2006 indicates that the catch of squid has tripled since last year. Squid comprise roughly 50% of the other species catch in the GOA. Tom Pearson noted that the squid are coming from a localized area in Shelikof straight. The species composition is believed to be largely *Berryteuthis* which are slightly longer lived then other squid species thus the dynamics behind the increased incidental catch are not well known. There is no evidence that squid are being targeted, rather the observed catch increase is a result of increasing incidental catch only. It was noted to be impractical to discard squid at-sea thus they are being landed when caught in large quantities in conjunction with pollock. Julie Bonney noted that there have been no changes in fishing location from the fleet. Changes are most likely to be attributed to changes in the squid population and are not likely due to some form of fishery effect. There appears to be some sort of localized Shelikof Straight effect as increased catch is coming solely from this area. The Team requests that the EIT survey further investigate this for additional information on species composition. Tom noted that landed squid are frozen for bait or for food.

Tier 6 estimates are not recommended for this species given the likelihood of unnecessarily constraining the pollock fishery. Tier 5 is recommended but problematic given that it is possible to have a higher exploitation rate then biomass available using the mortality rates chosen. Data from Japanese fisheries indicated some fishing mortality rates which would be more reasonable for the species. OFLs as

currently calculated in the assessment could potentially be constraining given the current catch levels in 2006.

Team members noted that this species would be a good candidate for MRA management rather than target catch levels. Similar suggestions were made for octopus. This would constrain the rapid development of a directed fishery but would not prevent the development of a target fishery. The Team commented that given the prevalence of squid throughout the water column it is likely that biomass from the trawl survey is underestimated. The EIT survey would be useful in evaluating this and also occurs at the same timing as the fishery, unlike the summer trawl survey.

The Team noted the importance of squid as a forage species. Kathy Kuletz noted that they are an important prey for seabird species as well. It was suggested that environmental conditions should be examined for clues to the population increase in recent years.

The survey Q should be evaluated further. Additional approximations from the northeast center should be explored for similar species. An exploration of the relative uncertainty could also be done. Available information for squid is noted to be limited. Additional information may be available on the depth distribution by species by evaluating commercial fisheries.

The Team discussed options for squid management in the future. Should squid be managed under ABCs and OFLs or are there better means to manage this species? Further discussion of this will occur at the November plan Team meeting.

The GOA Team adjourned at 6:30pm.

NPFMC Groundfish Plan Teams

Agenda (Sept 19th version) **September 19-22, 2006**

A. Joint Groundfish Plan Team Meetings

		Tuesday Sept 19	**Traynor Room**
13:00	Introductions	Scheduling, adoption of agenda	
13:15	Council, AFSC, ADF&G	Update on current management activities; management in State waters April 2006 research priorities; FY07 Budget Impacts on assessments	
14:00	TAC Setting EIS	EIS overview, methods used for TAC setting	
14:45	Break		
15:00	Mammals	Update on surveys for SSL non-pup counts and Pribilof Island fur seal pup production estimates	
15:30	Surveys	Survey updates: EBS and AI bottom trawl, GOA LL, EIT	
16:30	MSE	Management Strategy Evaluation update (short), off-year assessments	
		Wednesday Sept 20	
9:00	Sablefish	Review model developments	
10:30	Break		
10:45	Rockfish	Updates on rockfish working group, CIE review, splitting/lumping issue Update on Species of Concern Assessment and Ad Hoc committee	
12:00	Lunch	***—Dr. Gaichas: GOA Ecosystem modeling—***	
13:00	Ecosystem	HEPR Program update, Ecosystem Considerations Chapter review	
15:00	Break		
15:15	Ecosystem	Ecosystem sections of GOA and BSAI ATF, AI Pollock and AI cod, Seabird monitoring	
16:00	Halibut	Pacific Halibut assessment, using tagged-fish recaptures Pacific Halibut discard mortality rates (3-year revision)	
		Thursday Sept 21	
09:00	Pacific cod	Review Pacific cod analysis useful for the assessment model	
10:30	Break		
10:45	Economics	Economic SAFE report, overview of economic and social research	
12:00	Lunch		
13:00	Non-target Species	Other species analysis update BSAI and GOA grenadier assessment, Shark natural mortality discussion	
14:45	Break	Split to separate Team meetings	

B. Gulf of Alaska Groundfish Plan Team

		Thursday Sept 21	*Traynor Room*
15:00	N. Rockfish	GOA Northern rockfish assessment	
	Specifications	Adopt proposed OFLs and ABCs for 2007/2008	
16:00	Other species	Draft assessments for squid, sharks, octopus, and sculpins	
		Friday Sept 22	
09:00	Other	Arrowtooth flounder bioenergetics modeling	
10:00		Status of dark rockfish plan amendment	
12:00		Lunch	
13:00		Meet as needed	

C. Bering Sea/Aleutian Islands Groundfish Plan Team

		Thursday Sept 21	Observer Training Room
15:00	Specifications	Adopt proposed OFLs and ABCs for 2007/2008	
15:30	Pacific cod	BS and AI split discussion paper	
16:00	Splitting/Lumping	General discussion of splitting OFLs and ABCs for species and areas	
		Friday Sept 22	
09:00	Pollock	Bogoslof Survey results, Aleutian Islands EFP, Pollock EIT surveys	
09:30	Other species	Skate and sculpin ABC, splitting/lumping issue, distribution maps review	

TABLE 7.—2005 AND 2006 PROHIBITED SPECIES BYCATCH ALLOWANCES FOR THE BSAI TRAWL AND NON-TRAWL FISHERIES

Trawl fisheries	Prohibited species and zone					
	Halibut mortality (mt) BSAI	Herring (mt) BSAI	Red King Crab (animals) Zone 1[1]	*C. opilio* (animals) COBLZ[1]	*C. bairdi* (animals)	
					Zone 1[1]	Zone 2[1]
Yellowfin sole	886	183	33,843	3,101,915	340,844	1,788,459
January 20–April 1	262	.....	.....	.....	.....	.....
April 1–May 21	195	.....	.....	.....	.....	.....
May 21–July 5	49	.....	.....	.....	.....	.....
July 5–December 31	380	.....	.....	.....	.....	.....
Rock sole/other flat/flathead sole[2]	779	27	121,413	1,082,528	365,320	596,154
January 20–April 1	448	.....	.....	.....	.....	.....
April 1–July 5	164	.....	.....	.....	.....	.....
July 5–December 31	167	.....	.....	.....	.....	.....
Turbot/arrowtooth/sablefish[3]	.....	12	.....	44,946	.....	.....
Rockfish: July 5–December 31	69	10	.....	44,945	.....	10,988
Pacific cod	1,434	27	26,563	139,331	183,112	324,176
Midwater trawl pollock	.....	1,562	.....	.....	.....	.....
Pollock/Atka mackerel/other[4]	232	192	406	80,903	17,224	27,473
Red King Crab Savings Subarea[6]	.....	.....	.....	.....	.....	.....
(non-pelagic trawl)	.....	.....	42,495	.....	.....	.....
Total trawl PSC	3,400	2,012	182,225	4,494,569	906,500	2,747,250
Non-trawl Fisheries						
Pacific cod–Total	775	.....	.....	.....	.....	.....
January 1–June 10	320	.....	.....	.....	.....	.....
June 10–August 15	0	.....	.....	.....	.....	.....
August 15–December 31	455	.....	.....	.....	.....	.....
Other non-trawl–Total	58	.....	.....	.....	.....	.....
May 1–December 31	58	.....	.....	.....	.....	.....
Groundfish pot and jig	exempt	.....	.....	.....	.....	.....
Sablefish hook-and-line	exempt	.....	.....	.....	.....	.....
Total non-trawl PSC	833	.....	.....	.....	.....	.....
PSC reserve[5]	342	.....	14,775	364,424	73,500	222,750
PSC grand total	4,575	2,012	197,000	4,858,993	980,000	2,970,000

[1] Refer to § 679.2 for definitions of areas.
[2] "Other flatfish" for PSC monitoring includes all flatfish species, except for halibut (a prohibited species), Greenland turbot, rock sole, yellowfin sole and arrowtooth flounder.
[3] Greenland turbot, arrowtooth flounder, and sablefish fishery category.
[4] Pollock other than pelagic trawl pollock, Atka mackerel, and "other species" fishery category.
[5] With the exception of herring, 7.5 percent of each PSC limit is allocated to the CDQ program as PSQ reserve. The PSQ reserve is not allocated by fishery, gear or season.
[6] In December 2004, the Council recommended that Red King Crab bycatch for trawl fisheries within the RKCSS be limited to 35 percent of the total allocation to the rock sole/flathead sole/"other flatfish" fishery category (see § 679.21(e)(3)(ii)(B)).

TABLE 9.—FINAL 2005 AND 2006 PACIFIC HALIBUT PSC LIMITS, ALLOWANCES, AND APPORTIONMENTS

[Values are in metric tons]

Trawl gear		Hook-and-line gear [1]			
		Other than DSR		DSR	
Dates	Amount	Dates	Amount	Dates	Amount
January 20–April 1	550 (27.5%)	January 1–June 10	250 (86%)	January 1–December 31	10 (100%)
April 1–July 5	400 (20%)	June 10–September 1	5 (2%)		
July 5–September 1	600 (30%)	September 1–December 31.	35 (12%)		
September 1–October 1	150 (7.5%)				
October 1–December 31	300 (15%)				
Total	2,000 (100%)		290 (100%)		10 (100%)

[1] The Pacific halibut PSC limit for hook-and-line gear is allocated to the demersal shelf rockfish (DSR) fishery and fisheries other than DSR. The hook-and-line sablefish fishery is exempt from halibut PSC limits.

Table 8. Recommended Pacific halibut discard mortality rates (DMRs) for 2007-2009.

Bering Sea/Aleutians		Gulf of Alaska	
Gear/Target	**Recommendation for 2007-2009**	**Gear/Target**	**Recommendation for 2007-2009**
Trawl		***Trawl***	
Atka mackerel	76	Atka mackerel	60
Bottom pollock	74	Bottom pollock	59
Pacific cod	70	Pacific cod	63
Other Flatfish	74	Deepwater flatfish	53
Rockfish	76	Shallow water flatfish	71
Flathead sole	70	Rockfish	67
Pelagic pollock	88	Flathead sole	61
Rock sole	80	Pelagic pollock	76
Sablefish	75	Sablefish	65
Turbot	70	Arrowtooth fldr	69
Arrowtooth fldr	75	Rex sole	63
Yellowfin sole	80		
Pot		***Pot***	
Pacific cod	7	Pacific cod	16
Longline		***Longline***	
Pacific cod	11	Pacific cod	14
Rockfish	17	Rockfish	10
Turbot	13		

CDQ Fisheries	
Gear/Target	**Recommendation for 2007**
Trawl	
Atka mackerel	86
Bottom pollock	85
Flathead sole	70[1]
Pelagic pollock	90
Rockfish	76[1]
Yellowfin sole	86
Pot	
Pacific cod	7[1]
Sablefish	34
Longline	
Pacific cod	10
Turbot	13[1]

[1] Open access DMRs

BSAI Groundfish Plan Team
AFSC- Seattle, WA
September 20-21, 2006

Loh-Lee Loh (AFSC), Chair
Mike Sigler (AFSC), Vice Chair
Grant Thompson (AFSC), Rapporteur
Jane DiCosimo (NPFMC), Coordinator
Dave Carlile (ADF&G)
Andy Smoker (AKRO)
Dan Lew (AFSC)
Brenda Norcross (UAF)
Ivan Vining (ADF&G)
Kerim Aydin (AFSC)
Bill Clark (IPHC)
Lowell Fritz (NMML)
Kathy Kuletz (USFWS)

The BSAI Groundfish Plan Team convened on Thursday, September 21, 2006, at 1:45 pm. The team discussed whether to proceed with its agenda because it was ahead of its posted schedule. With the concurrence of the public, the team proceeded with its meeting as AFSC presenters were present.

Groundfish Specifications The team adopted the OFL and ABC projections as attached. For September 2007 projections, the team recommended a more complete explanation of the projection methodology. The team noted that the projection model uses Tier 3 for projecting EBS pollock OFL and ABC, although final specifications will likely use Tier 1 estimates. The team discussed the advantage of using Tier 1 estimates.

Winter 2006 Walleye Pollock Echo-Integration Survey Denise McKelvey presented the winter 2006 EIT survey of walleye pollock in the Bogoslof region. Two changes in the survey design occurred this year: 1) transect spacing was reduced from 5 nmi to 3 nmi and 2) the northern portion of the transects were reduced, where pollock were not observed in 2005. Fourteen trawl hauls were conducted, which caught 99% pollock by weight. Pollock biomass was primarily distributed in the Umnak and Samalga Pass regions. A similar length range was observed in both regions but the Unmak region is characterized by a mode at 45 cm, whereas the Samalga Pass region was biomodal at 47 and 60 cm fork length. The total abundance and biomass estimates for pollock were 239 million fish, weighing 0.24 million mt. The abundance estimate was the highest since the survey conducted in 2000 (229 million) but the length composition was much different. The increase in numbers is likely from the 2000 year class, which may be the peak recruitment for this year class or it may occur next year. The biomass estimate was similar to what was observed in 2005, but the average length for the population was 49.7, shorter than what's been characterizing the population since 1992.

Of the total pollock biomass, 58% (compared with 34% in 2005) was off Cape Idak in the Umnak region. There were normal temperatures, although Umnak water was slightly warmer. For both regions combined, the maturity composition showed that 72% of the females were in the prespawning stage. Within the Umnak region, 38% of the females were prespawning and 53% were spent, which was quite different from the Samalga region where 93% of the female pollock were still in the prespawning stage (similar to last year Samalga). There is a similar maturity at length range in each area but the smaller pollock in the Umnak region were driving the higher percentage of spawning/spent condition. Pollock tended to stay close to bottom in both regions until bottom depths reached about 350 m. As the seafloor got deeper, pollock in the Umnak region maintained a depth of 400-475 m, while pollock in Samalga Pass tended to be deeper, closer to bottom.

Because RV *Oscar Dyson* was disabled during the winter 2006 survey, intercalibration studies between it and RV *Miller Freeman* are planned for winter 2007 survey.

2006 Eastern Bering Sea Echo Integration – Trawl Survey Taina Honkalehto presented preliminary 2006 EBS EIT Survey results (for 3 m off bottom to 12 m from the surface,. The survey conducted 104 trawl hauls over 28 transects. The survey was not approved to extend into Russian waters. Intership calibration between the *Miller Freeman* and *Oscar Dyson* took place during the second leg of the survey. Water temperatures colder than normal were recorded during both the EIT survey and the annual groundfish bottom trawl survey Temperature data from the bottom trawl survey showed that many stations had bottom temperatures between -1 and -3 °C. The preliminary pollock biomass estimate was 1.49 million mt. About 40% of pollock biomass was in the western area; 25% was found east of 170° and 35% occurred between 170 and 175°. The large cold pool in the central shelf, could potentially have shifted the pollock distribution. However, in 1999, when the cold pool was also very extensive, pollock were more concentrated in edges of the canyons to the south than in 2006. The final US EEZ biomass estimate for the 2004 EIT survey was 3.31 million mt. The final 2006 estimate will be presented to the BSAI Team in November.

Splitting lumping by species and area Last September, the Team scheduled a discussion of whether to adopt a policy or consistency in splitting/lumping species from an assemblage or by management area. Some members have sought consistency in these decisions, while others preferred examining the merits for each case.

Pacific cod subarea split Jane DiCosimo summarized the background on this issue. The SSC has recommended the subarea split to the Council. While the BSAI Team does not recommend splitting P. cod specifications for the EBS and AI, it has provided the subarea allocations if the Council chooses to implement such a policy. There are major allocation issues associated with such a policy, and the Council has indicated its interest in exploring those issues further. A staff discussion paper is on the Council's October agenda.

To further the scientific discourse on whether Pacific cod are comprised of distinct EBS and AI stocks, two additional research studies were summarized for the Team. Liz Conners summarized new information on Pacific cod maturity data. There are large numbers of prespawning cod at spawning sites, located within 72 hrs of processors. Length at age, weight at age, and diet differences indicate differences between AI and EBS.

Mike Canino summarized genetic research on Pacific cod stock structure. He noted that Atlantic cod shows more stock structure than had been determined for the Pacific species. At present, two stocks are identified in the North Pacific, for the GOA and BSAI. The genetic markers (allozymes) used in the 1987 study of Pacific cod are not very variable, or sensitive. Researchers evaluated aggregates of spawning fish using more sensitive genetic markers (microsatellites). Globally, levels of population structure in Pacific cod are comparable to those in the congeneric Atlantic cod. They plotted the frequency of the most important genetic variants at each of the markers. Three showed positive clines and one showed a negative cline, with the transition occurring west of the central AI. These clines indicate a historical separation of Asian and North American populations, with secondary contact following Pleistocene glaciation, and infers that contemporary gene flow between them is low. There were not significant interannual differences between Unimak Pass and Central AI samples. So samples were pooled for both locations, and exact tests of genic and geotypic differentiation indicated some degree of genetic substructure between the two areas. Spawning appears to occur in same site and the fish are genetically the same, but they may disperse to different areas via homing. Tagging data would confirm that. But it is unknown whether migration is results in substantial gene flow opposing the weak force of genetic drift in these large, recently founded (in an evolutionary sense) populations.

Rockfish species and area splits Paul Spencer summarized the BSAI history of this issue. In November 2005, the Team requested that the BSAI shortraker/rougheye (SR/RE) assessment authors present

additional information on the distribution of fishery catches at the September 2006 Plan Team meeting and that a full discussion of this issue for all groundfish stocks be scheduled. The Team recommended no changes in area apportionments for any stocks in 2006. In December 2005, SSC concurred with the PT request. In response, Dr. Spencer posed the following questions and answers in his presentation:

1) *How does the area-species catches compare to proposed area-specific ABCs?* Proposed ABC allocation between EBS and AI uses AI survey data from 1991 – present and EBS slope survey data from 2002 and 2004, with equal weights to all years. The weighted allocation uses only the most three recent surveys, and increases the weight on the most recent of these. For AI rougheye, sometimes catch is above the possible AI ABC (2002, 2004), but usually not by much. For EBS Rougheye, usually catch is below EBS ABC (2004 is borderline). For AI Shortraker, catches are far below AI ABCs. For EBS Shortraker, catches are usually above EBS ABCs.

2) *What is the distribution of catch throughout the year, and among management areas in the EBS?* Years with higher catches are sometimes caused by very high catches in one week or a few weeks. For EBS rougheye in 2004, ~ 9 tons were caught in week 30, of ~24 tons caught for the entire year. In 2005, ~ 50 tons were caught in week 10, of ~ 108 tons for the entire year. For EBS RE, weeks 23-32 account for a large portion of the catch. For EBS SR, weeks 5-12 account for a large portion of the catch. By area, most of the SR/RE catch is from areas 517 and 521.

3) *If bycatch is non-uniform throughout the year, do target fisheries and rates of discarding differ between periods of high and low bycatch?* For EBS Rougheye, there are no obvious differences in target fisheries; bycatch is taken in Pacific cod, turbot, halibut, and mid water pollock fisheries. A large catch (8.2 t) occurred in "other species" fishery in 2004. For EBS Shortraker, bycatch is taken in the pollock fishery during weeks 5-12. The rest of year, bycatch is taken in a variety of fisheries (Pacific cod, turbot, other flatfish, Pacific halibut). For EBS rougheye and shortraker, there was no obvious pattern in discarding rates between periods and high and low catch, although shortraker retention rates seem to be increasing in recent years.

He concluded: 1) rougheye harvests between the EBS and AI are generally in proportion to observed biomass, whereas shortraker harvests are taken somewhat disproportionately in the EBS; 2) for both RE and SR, years with large catches are sometimes associated with high catch "events" of only one or a few weeks. For shortraker rockfish, a large portion of the bycatch occurs in the pollock fishery during February and March along the EBS slope (areas 517 and 521); and 3) If we believe that a single stock occurs across the BSAI, then disproportionate harvesting may not be a problem (assuming strong linkages between areas). If we believe that the EBS and AI represent different management units, then disproportionate harvesting becomes an issue.

New information regarding stock structure includes length distributions, age distributions, and size at age. For rougheye rockfish, a comparison of the length and age distributions between the EBS slope surveys and the AI surveys in 2002 and 2004 suggest that rougheye in the EBS slope are younger and smaller the rougheye in the AI region. Additionally, comparison of size at age data and growth curves suggest that rougheye in the EBS slope may have higher rates of growth. For shortraker rockfish, comparison of length distributions between the two areas show relatively more small fish in the EBS slope in 2004, but not 2002. Age data for shortraker rockfish does not yet exist. A statistical analysis for these data has not been completed yet, and will be conducted by Dr. Spencer for the November SAFE. Significant differences and published genetic information may suggest use of a model that separates the stocks.

Rebecca Reuter pointed out that sculpins have similar splitting issues. The biomass and resulting specifications could be an order of magnitude lower in the AI than in the BS. There is no information on stock composition.

The Team discussed the pros/cons of splitting by area and from assemblages. They noted that splitting occurs when: 1) there is separation/unity of stocks; 2) spreading of fishing effort is desirable to avoid localized depletion or unbalanced harvests relative to biomass; 3) small quota management; 4) weak stock protection; 5) cost/benefit risk for potential for a problem. Managers can try to head off a problem by splitting when such action is not controversial (when catch = ABC) or they can wait for a problem to occur and/or risk an ecological problem. We risk closing fisheries when there is no ecological harm. The criteria for sufficient biological information to split may be too high: 1) tagging/movement; 2) genetics; and 3) phenotypic differences (which may provide questionable results). Since our major stocks have not been successfully tagged, we are left with genetics. And the Team is trying to preserve ecological relationships, at least to the degree those are understood. The Team noted that there are many more GOA management areas due to its homogeneity; there are fewer, larger management areas with les homogeneity in the BSAI.

The Team request that authors address these issues, when splitting by areas is an option. With Pacific cod, there are operational and management issues related to splitting the specifications for the BS and AI. The Team is on record as supporting splitting by species, when sufficient information is available to do, while not jeopardizing those species left in the assemblage (i.e., there needs to be at least one "core" species with which to assess the biomass and/or set specifications. **The Team strongly supports acquisition of biological and catch data by species.**

Skates Beth Matta, the new BSAI skate assessment author, summarized plans for the November assessment. There are at least 15 species in three genera in the BSAI. New information on age and growth of GOA big and longnose skates, Observer Program special projects in 2007, length composition bycatch (BS, AI, GOA Pacific cod hook & line – all species), skate nursery investigations, age structure and maturity data for big, longnose, and Aleutian skates; and genetics (species identification; new species identification; and stock structures) will be incorporated into the model. New data has been collected on Alaska skate: maximum size; size at hatching; maturity schedule (age and length); reproductive seasonality; fecundity; growth parameters (von Bertalanffy, Gompertz); longevity; and M. For BS slope species, new information to be collected in the next three years include: age & growth; reproductive biology; feeding ecology; and demography.

Ms. Matta previewed splitting/lumping issues for November. She supported splitting skates from 'Other Species' category in BSAI FMP because they are the highest proportion of 'Other Species' catch; the potential target fishery; and skates as a group have low productivity (late maturity, low fecundity). She will recommend that the Team set specifications by area (BS slope, BS shelf, and AI) to protect rare/endemic species in distinct habitat areas. Skate species composition differs widely by area. Alaska skate dominates the EBS shelf (>90%); Aleutian skate dominates the EBS slope (40%); and whiteblotched (50%), Alaska (20%); Aleutian skates (20%) dominate the AI. Since it would be difficult to manage skates by habitat type, the Team recommended separating out Alaska skate for specifications to protect the slope stock. The Team concurred with the author's recommendation for Tier 5: conservative estimates of M due to probable low productivity; aggregate biomass estimates are reliable. The Team noted that the BS shelf and slope are distinct ecosystems.

The Team recommended that the author examine catch by management area to determine if disproportionate harvest is occurring. Deeper catches occur in turbot and sablefish fisheries, while shallower catches occur in the P. cod fisheries. A previous model applied skate species composition by

area by shelf, slope, and AI trawl survey to bycatch. Identification to species only occurred since 2003 for catch and since 1999 for the trawl surveys.

Industry members noted that some bycatch is retained. The cod longline fishery retains skates for wings. The GOA commercial skate fishery preferred big and long nose skates. **The Team strongly endorsed the need to continue the slope survey.**

Octopus retention for commercial use in the BS and GOA Kodiak pot fishery was noted by the Team. Trawl mortality is near 100% (smaller species and exposure are the causes); pot mortality of octopus is close to 0%; catch is high near the slime bank where industry can segregate the catch and freeze the product.

2006 AI Cooperative Acoustic Survey Study Steve Barbeaux summarized the experimental AI pollock fishery. Roe recovery was 9-12%. They found active spawning, but not post-spawning fish. Pre-spawning aggregations occur, then the fish move to spawning areas. Pollock redistributed by season, but they did not see pollock aggregations in the summer. The Team supported continued investigations into this fishery, encouraged more research, and was particularly impressed with the 3-D displays of data.

Public. Eight members of the public attended.

Adjournment. The Team adjourned at approximately 11 am on Friday, September 22, 2006.

BSAI Plan Team OFL and ABC recommendations for 2007-2008

Species	Area	2006				2007			2008		
		OFL	ABC	TAC	Catch**	OFL	ABC	TAC	OFL	ABC	TAC
Pollock	EBS	2,090,000	1,930,000	1,485,000	1,485,000	1,707,000	1,419,800		1,418,100	1,168,700	
	Aleutian Islands	39,100	29,400	19,000	19,000	39,100	29,400		39,100	29,400	
	Bogoslof District	50,600	5,500	10	0	50,600	5,500		50,600	5,500	
Pacific cod	BSAI	230,000	194,000	188,180	188,180	176,100	148,500		144,900	121,700	
Sablefish	BS	3,680	3,060	2,820	921	6,200	5,200		5,400	4,500	
	AI	3,740	3,100	3,000	1,070						
Yellowfin sole	BSAI	144,000	121,000	95,701	95,701	138,900	117,100		126,200	106,400	
Greenland turbot	Total	14,200	2,740	2,740	2,487	18,300	2,630		17,500	2,630	
	BS	n/a	1,890	1,890	1,890	n/a	1,815		n/a	1,815	
	AI	n/a	850	850	597	n/a	815		n/a	815	
Arrowtooth flounder	BSAI	166,000	136,000	13,000	13,000	172,200	140,500		177,400	144,800	
Rock sole	BSAI	150,000	126,000	41,500	35,098	146,000	122,500		133,100	111,600	
Flathead sole	BSAI	71,800	59,800	19,500	18,528	67,100	55,900		62,700	52,200	
Alaska plaice	BSAI	237,000	188,000	8,000	17,000	227,100	180,200		218,400	173,200	
Other flatfish	BSAI	24,200	18,100	3,500	3,500	24,200	18,100		24,200	18,100	
Pacific ocean perch	BSAI	17,600	14,800	12,600	12,068	17,900	15,100		17,900	15,100	
	BS	n/a	2,960	1,400	868	n/a	3,020		n/a	3,020	
	AI total	n/a	11,840	11,200	11,200	n/a	12,080		n/a	12,080	
	WAI	n/a	5,372	5,085	5,085	n/a	5,481		n/a	5,481	
	CAI	n/a	3,212	3,035	3,035	n/a	3,277		n/a	3,277	
	EAI	n/a	3,256	3,080	3,080	n/a	3,322		n/a	3,322	
Northern rockfish	BSAI	10,100	8,530	4,500	3,887	10,100	8,500		10,000	8,500	
Shortraker rockfish	BSAI	774	580	580	169	774	580		774	580	
Rougheye rockfish	BSAI	299	224	224	183	299	224		299	224	
Other rockfish	BSAI	1,870	1,400	1,050	556	1,870	1,400		1,870	1,400	
	BS	n/a	810	460	251	n/a	810		n/a	810	
	AI	n/a	590	590	305	n/a	590		n/a	590	
Atka mackerel	Total	130,000	110,000	63,000	63,000	107,300	90,900		75,200	65,100	
	WAI	n/a	41,360	15,500	15,500	n/a	34,182		n/a	24,481	
	CAI	n/a	46,860	40,000	40,000	n/a	38,718		n/a	27,728	
	EAI/BS	n/a	21,780	7,500	7,500	n/a	18,000		n/a	12,891	
Squid	BSAI	2,620	1,970	1,275	1,437	2,620	1,970		2,620	1,970	
Other species	BSAI	89,404	58,882	29,000	29,000	89,404	62,950		89,404	62,950	
Total	BSAI	3,476,987	3,013,086	1,994,180	1,989,785	3,003,067	2,426,954		2,615,267	2,094,554	

**2006 catch is based on projected catch and includes CDQ.

Track Record of Previously Forecast BSAI P. Cod Recruitment Failures with Recommendations for More Accurate Assessments

by

Tom Casey

(206) 849-6752 tcasey@att.net

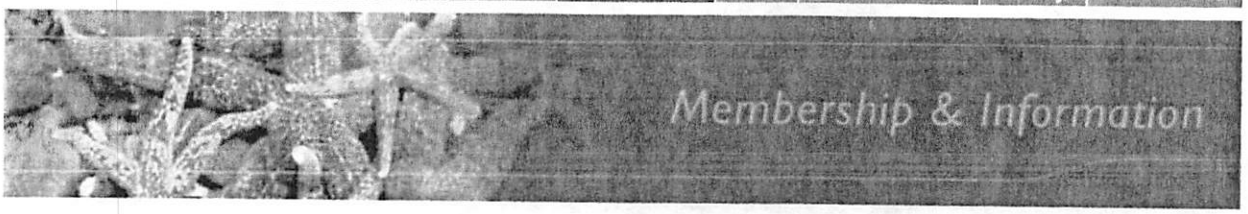
Thomas Bayes

lived from 1702 to 1761

Bayes set out his theory of probability in 1764. His conclusions were accepted by Laplace in 1781, rediscovered by Condorcet, and remained unchallenged until Boole questioned them. Since then Bayes' techniques have been subject to controversy.

Find out more at:
http://www-history.mcs.st-andrews.ac.uk/history/Mathematicians/Bayes.html

(A)



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Plan Teams for BSAI and GOA Groundfish and BSAI Crab

Groundfish Plan Team Meetings. The meeting will be held September 19-22, 2006 at the AFSC in Seattle DRAFT Agenda

September Plan Team Report 10/05

The *Guidelines for Fishery Management Plans (602 Guidelines)* published by the National Marine Fisheries Service (NMFS) require that a stock assessment and fishery evaluation (SAFE) report be prepared and reviewed annually for each fishery management plan (FMP). Stock Assessment and Fishery Evaluation Reports

The Stock Assessment and Fishery Evaluation (SAFE) reports for the groundfish fisheries managed by the North Pacific Fishery Management Council (NPFMC) are compiled by the respective Plan Teams from chapters contributed by scientists at NMFS' Alaska Fisheries Science Center & and the Alaska Department of Fish and Game (ADF&G). These SAFE reports include separate stock assessment and fishery evaluation sections. The stock assessment section includes recommended acceptable biological catch (ABC) levels for each stock and stock complex managed under the FMP. The ABC recommendations, together with social and economic factors, are considered by the Council in determining total allowable catches (TACs) and other management strategies for the fisheries.

Current Membership of the Fishery Management Plan Teams

Scallop	GOA Groundfish	BSAI Groundfish	BSAI Crab
• Jeff Barnhart, Chair (ADF&G) • Gretchen Harrington (NMFS) • Gregg Rosenkrantz (ADF&G) • Herman Savikko (ADF&G) • Jie Zheng (ADF&G) • Diana Stram (NPFMC) • Scott Miller (NMFS)	• Jim Ianelli, Co-Chair (AFSC) • Diana Stram, Co-Chair (NPFMC) • Theresa Tsou (WDFW) • Robert Foy (UAF) • Jeff Fujioka (AFSC/AB) • Sarah Gaichas (AFSC) • Jon Heifetz (AFSC/AB) • Kathy Kuletz (USF&W) • Sandra Lowe (AFSC) • Tory O'Connell (ADF&G) • Thomas Pearson (NMFS/Kodiak) • Nick Sagalkin (ADFG) • Bill Clark (IPHC) • Ward Testa (ASFC MML) • Ken Goldman (ADF&G)	• ~~Loh-lee Low~~, Chair (AFSC) • Mike Sigler, Vice-Chair (AFSC/AB) • Kerim Aydin (AFSC) • David Carlile (ADF&G) • Bill Clark (IPHC) • Theresa Tsou (WDFW) • Jane DiCosimo (NPFMC) • Lowell Fritz (AFSC) • Kathy Kuletz (USF&W) • Dan Lew (AFSC) • Brenda Norcross (UAF) • Andy Smoker (NMFS/RO) • Grant Thompson (AFSC) • Ivan Vining (ADF&G)	• Forrest Bowers (ADF&G/Dutch Harbor) Chairman • Gretchen Harrington (NMFS/RO) • Doug Pengilly, (ADF&G/ Kodiak) • Jack Turnock (AFSC/Seattle) • Ginny Eckert (UAF) • Joshua Greenberg (UAF) • Wayne Donaldson (ADF&G/Kodiak) • Diana Stram (NPFMC) • Shareef Siddeek (ADF&G/Juneau) • Herman Savikko (ADF&G/Juneau) • Lou Rugolo (AFSC/Kodiak)

Thomas Bayes' 300-year old theory in the hands and computers of Dr. Grant Thompson of the NPFMC's Groundfish Plan Team will cost BSAI P.cod fishermen and processors $90-million in 2007.

2006 P. Cod TAC	198,000 tons
2007 P. Cod TAC	144,000 tons
Reduction	54,000 tons
Tonnage @2,000#	108,000,000 pounds
Recovery @ 46%	50,000,000 pounds
Wholesale price @ $1.80	$90,000,000

Given the prevailing real world P. Cod CPUE's in the Bering Sea trawl, pot and longline fisheries, why not ground truth Grant's SS2 P. Cod assessment model before feeding Bering Sea sand fleas 108-million pounds next year of succulent, luscious and expensive white fish fillets for which global demand is currently "sky high"?

C

T. Curry -

Estimating Off-Bottom Distance from Depth-Only Archival Tag Data: Preliminary Evaluation of a Hierarchical Bayesian Methodology

Grant G. Thompson and Daniel G. Nichol

U.S. Department of Commerce
National Oceanic and Atmospheric Administration
U.S. National Marine Fisheries Service
Alaska Fisheries Science Center
7600 Sand Point Way NE., Seattle, WA 98115-6349

Abstract

A Some types of archival tag provide estimates of fish depth but not fish location in latitude-longitude space. This makes it difficult to estimate the distance between the fish and the sea floor. A possible method for resolving this difficulty is presented here. The method uses the Kalman filter to compute a likelihood function, and applies a hierarchical Bayesian approach to stabilize parameter estimates and exploit the full information content of the data. The method is evaluated by applying it to a simulated data set, where the true parameter values are known. Median distributions of fish depth and 95% confidence intervals are estimated and shown to be close to the true values. The next step is to apply the method to existing data for Pacific cod.

B The resulting estimates may prove useful in helping to remove, or at least quantify objectively, some of the uncertainty surrounding survey catchability of Pacific cod.

From: **Tom Casey <tcasey@worldnet.att.net>**
Subject: **Day 1 of BSAI GPT meeting**
Date: **September 20, 2006 10:30:08 AM PDT**
To: **Don Iverson <iverson@w-link.net>**
Cc: **sleipness@comcast.net**

1. Grant Thompson's SS3 P. Cod Assessment Model (which could have reduced our 2007 P. Cod TAC down to 70-90 kmt from 198 kmt in 2006) is dead for now. The moment I entered the GPT meeting room, Grant announced that "Anyone who has come here on the assumption that we'll be using SS3 to determine the 2007 P. Cod TAC can turn around and go home because we won't be." Big victory for us. But don't relax yet.

I then asked him if he'll be sticking with the 148 kmt TAC for P. cod in 2007 which was adopted by the NPFMC last December. He acknowledged that he would be. Plus, Jim Ianelli (who ran the meeting for Low) reminded me that the 148 kmt was published in the Federal Register in March 2006, making it the 2007 P. Cod TAC of record subject to tweaking at the NPFMC's December 2006 TAC setting meeting for 2007 fisheries.

Remember, our experts have characterized the process by which Grant determined the 148 kmt TAC for 2007 as "fictional." Ianelli and Thompson treated it as Gospel. So we still have substantial work ahead of us to assure the preservation of that the 198 kmt P. Cod TAC for 2006 prevails in 2007.

2. NMFS' Bob Lauch (who actually runs the BSAI survey) told us that one of his colleagues, Dan Nichols, will publish a peer reviewed paper in November claiming that half of the BSAI P. Cod that NMFS tries to survey with their on-bottom trawl are off bottom somewhere up in the water column where thee trawl could not possibly reach them. You could have heard a pin drop in that room of forty people for the next 2- minutes. Bottomline: BSAI P. Cod abundance may be 100% greater than NMFS thought it was and the declining abundance trend may well be a myth.

3. NMFS Mark Wilkes admitted that a dedicated P. Cod survey would do a "much better job" of assessing the actual P. Cod abundance in BSAI.

4. Russ Nelson, who took over when Gary Stauffer retired, warned that the 2007 BSAI survey budget may well shrink by 40% in 2007. Low Lee Low issued a call to arms from the industry to prevent that disaster by lobbying key Senators. I reminded people that all Robin had to do was squeal in the Old Man's D.C. office for ten minutes (on behalf of the CDQs) and the lost financing would be restored overnight. I don't think one of the scientists believed me.

E

ESSR Program researcher Dr. Alan Haynie conducted a survey of NMFS economists and other social scientists about their opinions on priority topics for fisheries management. The survey found that NMFS economists have encountered a wide range of topics where marine policy makers have expressed confusion. The survey produced a range of responses, but several common themes emerged:

- Biological and economic planning should happen jointly. A biologically well-managed fishery alone will not generate substantial wealth.
- Opportunity costs matter. Just because we don't pay for something doesn't mean that it is "free" to society.
- Confusion about the nature of community and national economic benefits and impacts is common.

Alan presented this research at the San Francisco NOAA Fisheries Social Scientists Meeting and at the International Symposium on Society and Resource Management (ISSRM) in Vancouver, British Columbia in June. Since Alan's initial survey, Alan has been working with NMFS headquarters economists on a new initiative to promote economic awareness throughout the agency.

By Alan Haynie

Regional Economic Models Review Paper Published

Regional or community economic analysis of proposed fishery management policies is required by the Magnuson-Stevens Fishery Conservation and Management Act, National Environmental Policy Act, and Executive Order 12866, among others. To satisfy these mandates and inform policymakers and the public of the likely regional economic impacts associated with fishery management policies, economists need appropriate economic models. There are many regional economic models available for use in analysis of fishery management. A number of studies have assessed the community economic impacts of fishery management policies in the United States using some of these models. However, there has been no comprehensive review of the regional economic studies of U.S. fisheries in the literature. Recently the paper "A Review of Regional Economic Models for Fisheries Management in the U.S." reviewing these models and studies was published in *Marine Resource Economics*. By first providing a short theoretical overview of the types of regional economic models and then offering a review of the studies that have been conducted for various fisheries throughout the U.S., this paper provides guidance on appropriate model choice in certain instances, and points out which shortcomings, especially data deficiencies, are most crucial to overcome in developing future modeling applications. One of the important conclusions in this paper is that, without reliable data obtained through a comprehensive and mandatory data collection program, it will continue to be very difficult to develop viable regional economic models for U.S. fisheries.

By Ron Felthoven

STATUS OF STOCKS & MULTISPECIES ASSESSMENT PROGRAM

National Stock Assessment Workshop

Martin Dorn and Grant Thompson of the Status of Stocks and Multispecies Assessment (SSMA) Program attended the NMFS National Stock Assessment Workshop in San Francisco, held mid-April 2006. Abstracts from their presentations follow.

POLLOCK IS GREEN! ADVENTURES IN MSC CERTIFICATION OF WALLEYE POLLOCK

In April 2005, Gulf of Alaska walleye pollock became the first federally managed fishery to be certified to meet the Marine Stewardship Council's (MSC) environmental standard for a well managed and sustainable fishery. While certification programs are relatively recent in fisheries, similar programs are well established in forestry and organic farming. The MSC's certification program has expanded rapidly since its inception in 1999, and other federally managed fisheries are likely to enter into MSC assessment in the future. The paper gave an overview of the MSC certification program and discussed some of the issues that proved contentious with the walleye pollock certification. It is hoped that the experience gained will be beneficial as other fisheries undergo the MSC certification process.

For the extended abstract and further information, please contact Martin Dorn at martin.dorn@noaa.gov.

By Martin Dorn

A DECISION-THEORETIC APPROACH TO ECOSYSTEM-BASED FISHERY MANAGEMENT

Our study concerned "ecosystem-based fishery management" in the sense that it included consideration of: 1) both target and nontarget species; 2) both consumptive and nonconsumptive values; 3) both systematic and stochastic (process error) interactions between species; and 4) both biomass estimation and parameter estimation error.

The study was conducted in four stages. Stage 1 assumed purely deterministic dynamics and known true values for all parameters and variables. The level of risk aversion did not affect the optimal fishing mortality rate, because no uncertainty existed. Stages 2 and 3 added process error and biomass estimation error (in the "management strategy evaluation" sense). The objective function was obtained in closed form. The optimal fishing mortality rate varied inversely with the level of risk aversion (the optimal fishing mortality rate for the risk-neutral case was identical to the Stage 1 optimum). Except for the risk-neutral case, the optimal fishing mortality rate was shown to depend not only on the means and variances of state variables (as has previously been shown for single-species applications) but also on covariances between state variables. Stage 4 added parameter estimation error. Parameter values and covariances were estimated via the Kalman filter. Here, it was no longer possible to obtain the objective function in closed form. The results for Stage 4 were not always straightforwardly related to those of the other stages, because parameter estimates differed from the true values.

For the extended abstract and further information, please contact Grant Thompson at grant.thompson@noaa.gov.

By Grant Thompson

Section 7 Consultation

Scientists from the REFM Division responded to a request for assistance on an Endangered Species Act (ESA) Section 7 consultation. In October 2005, the North Pacific Fishery Management Council (Council) recommended that NMFS reinitiate consultation under Section 7 of the ESA. The consultation is on the possible effects of authorizing fisheries pursuant to the Bering Sea-Aleutian Islands (BSAI) and Gulf of Alaska (GOA) groundfish fishery management plans on ESA listed species, such as Steller sea lions, and their critical habitat under jurisdiction of NMFS. In a 29 November 2005 letter to the Council, NMFS agreed with the recommendation and described the process NMFS would follow for the consultation. NMFS plans to provide a draft Biological Opinion (Opinion) on the proposed action by mid-August 2006 and a final Opinion by late 2007.

In preparation for writing the Opinion, a consultation group was formed, consisting of representatives from Sustainable Fisheries Division (Melanie Brown), the Council (Bill Wilson), the Protected Resources Division (Shane Capron) and the AFSC (Lowell Fritz and Libby Logerwell). The consultation group developed a list of important issues related to ESA-listed Steller sea lions and their designated critical habitat and held a workshop in Seattle in February 2006 to refine those issues into a series of requests for information. A memorandum listing these requests for information was sent to AFSC Science and Research Director Doug DeMaster in mid-March 2006. REFM scientists conducted the necessary analyses and syntheses of existing information and prepared detailed responses to all of the requests for information. The responses were completed and sent to DeMaster for review in mid-May and forwarded to Protected Resources personnel responsible for drafting the Opinion.

By Elizabeth Logerwell

Bering Sea Crab Working Group Progress Report

King and Tanner crab stocks of the eastern Bering Sea (EBS) are managed under the aegis of the Bering Sea/Aleutian Islands (BSAI) King and Tanner Crab Fishery Management Plan (FMP) of the North Pacific Fishery Management Council (NPFMC). The plan provides the framework for cooperative management of these stocks between the ADF&G and NMFS. Under this framework, certain management controls such as setting of annual catch quotas and fishery restrictions are deferred to the ADF&G, while NMFS is responsible for making the two annual status determination criteria of overfishing and overfished and for insuring overall plan compliance with the provisions of the Magnuson-Stevens Fishery Conservation Management Act (MSFCMA) and the National Standard Guidelines (NSGs).

Since 1998, four of the ecologically important and economically valuable crab stocks of the EBS have been declared overfished, and fisheries for

Historical BSAI P. Cod Recruitment Failures of Record

1. 1985-87
2. 1993-94

(2)

Table 2.4—History of Pacific cod ABC, TAC, total BSAI catch, and type of stock assessment model used to recommend ABC. Catch for 2005 is current through early October. "SS1" refers to Stock Synthesis 1. Each cell in the "Stock Assessment Model" column lists the type of model used to recommend the ABC in the corresponding row, meaning that the model was produced in the year previous to the one listed in the corresponding row.

Year	ABC	TAC	Catch	Stock assessment model (from previous year)
1980	148,000	70,700	45,947	projection of 1979 survey numbers at age
1981	160,000	78,700	63,941	projection of 1979 survey numbers at age
1982	168,000	78,700	69,501	projection of 1979 survey numbers at age
1983	298,200	120,000	103,231	projection of 1979 survey numbers at age
1984	291,300	210,000	133,084	projection of 1979 survey numbers at age
1985	347,400	220,000	150,384	projection of 1979-1985 survey numbers at age
1986	249,300	229,000	142,511	separable age-structured model
1987	400,000	280,000	163,110	separable age-structured model
1988	385,300	200,000	208,236	separable age-structured model
1989	370,600	230,681	182,865	separable age-structured model
1990	417,000	227,000	179,608	separable age-structured model
1991	229,000	229,000	219,266	separable age-structured model
1992	182,000	182,000	208,046	SS1 model (age-based data)
1993	164,500	164,500	167,389	SS1 model (length-based data)
1994	191,000	191,000	193,802	SS1 model (length-based data)
1995	328,000	250,000	245,029	SS1 model (length-based data)
1996	305,000	270,000	240,673	SS1 model (length-based data)
1997	306,000	270,000	257,762	SS1 model (length-based data)
1998	210,000	210,000	193,253	SS1 model (length-based data)
1999	177,000	177,000	173,995	SS1 model (length-based data)
2000	193,000	193,000	191,056	SS1 model (length-based data)
2001	188,000	188,000	176,659	SS1 model (length-based data)
2002	223,000	200,000	197,352	SS1 model (length-based data)
2003	223,000	207,500	209,114	SS1 model (length-based data)
2004	223,000	215,500	213,810	SS1 model (length-based data)
2005	206,000	206,000	164,404	SS1 model (length- and age-based data)

Table 2.3b—Summary of 1981-2005 catches (t) of Pacific cod in the combined Eastern Bering Sea and Aleutian Islands region by fleet sector and gear type. All catches include discards. LLine = longline, Subt. = sector subtotal. Catches for 2005 are through early October.

Eastern Bering Sea and Aleutian Islands region combined:

	Foreign			Joint Venture		Domestic Annual Processing					
Year	Trawl	LLine	Subt.	Trawl	Subt.	Trawl	LLine	Pot	Other	Subt.	Total
1981	33027	6086	39113	9159	9159	15628	27	0	14	15669	63941
1982	24557	3618	28175	13592	13592	26014	5	0	1715	27734	69501
1983	34659	6847	41506	14362	14362	46769	4	21	569	47363	103231
1984	31065	27446	58511	30772	30772	43588	8	0	205	43801	133084
1985	19606	37571	57177	41272	41272	51885	50	0	0	51935	150384
1986	13297	26563	39860	63942	63942	38430	49	63	167	38709	142511
1987	7718	47028	54746	58157	58157	48701	1417	89	0	50207	163110
1988	0	0	0	109892	109892	95404	2611	329	0	98344	208236
1989	0	0	0	44618	44618	123864	14219	164	0	138247	182865
1990	0	0	0	8078	8078	122425	47716	1389	0	171530	179608
1991	0	0	0	0	0	132806	79937	6523	0	219266	219266
1992	0	0	0	0	0	91818	102282	13829	117	208046	208046
1993	0	0	0	0	0	99102	66155	2098	35	167389	167389
1994	0	0	0	0	0	99313	85575	8184	730	193802	193802
1995	0	0	0	0	0	121530	102600	20299	599	245029	245029
1996	0	0	0	0	0	113089	94701	32617	267	240673	240673
1997	0	0	0	0	0	111273	124159	22068	262	257762	257762
1998	0	0	0	0	0	81310	98094	13657	192	193253	193253
1999	0	0	0	0	0	68339	89337	16150	169	173995	173995
2000	0	0	0	0	0	74177	97823	18956	101	191056	191056
2001	0	0	0	0	0	51482	108177	16929	71	176659	176659
2002	0	0	0	0	0	78994	103134	15058	166	197352	197352
2003	0	0	0	0	0	79059	107941	21959	156	209114	209114
2004	0	0	0	0	0	83550	112790	17239	231	213810	213810
2005	0	0	0	0	0	71078	79609	13600	116	164404	164404

436,005

606,920

↑ 33%

where's the recruitment failure?

4

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1988	0	0	0	109892	109892	95404	2611	329	0	98344	208236
1989	0	0	0	44618	44618	123864	14219	164	0	138247	182865
1990	0	0	0	8078	8078	122425	47716	1389	0	171530	179608
1991	0	0	0	0	0	132806	79937	6523	0	219266	219266
1992	0	0	0	0	0	91818	102282	13829	117	208046	208046
1993	0	0	0	0	0	99102	66155	2098	35	167389	167389
1994	0	0	0	0	0	99313	85575	8184	730	193802	193802
1995	0	0	0	0	0	121530	102600	20299	599	245029	245029
1996	0	0	0	0	0	113089	94701	32617	267	240673	240673
1997	0	0	0	0	0	111273	124159	22068	262	257762	257762
1998	0	0	0	0	0	81310	98094	13657	192	193253	193253
1999	0	0	0	0	0	68339	89337	16150	169	173995	173995
2000	0	0	0	0	0	74177	97823	18956	101	191056	191056
2001	0	0	0	0	0	51482	108177	16929	71	176659	176659
2002	0	0	0	0	0	78994	103134	15058	166	197352	197352
2003	0	0	0	0	0	79059	107941	21959	156	209114	209114
2004	0	0	0	0	0	83550	112790	17239	231	213810	213810
2005	0	0	0	0	0	71078	79609	13600	116	164404	164404

361,1

↑ 17%

Where's the recruitment failure?

Outlook

In anticipation of another "perceived" P. Cod recruitment failure in 2001, 2002 and 2003, the NPFMC and the SOC had published in the Federal Register last March a projected 2007 P. Cod TAC of 148,000 mt, down 25% from the 2006 TAC.

At its December 2006 meeting, the NPFMC will recommend a 2008 P. Cod TAC not much above 100,000 mt, which will constitute an approximately 45% drop from 2006. Most likely the SOC will adopt that recommendation and publish it in the Federal Register during March 2007.

Reality Check

Yet the real world CPUE for lomgliners, pot boats and trawlers in the BSAI P. Cod fishery has shown no sign of declining abundance or catchability. In fact, the Discovery Channel recently documented a late winter 2006 P. Cod trip made by Sig Hansen's FV Northwestern during which they caught and delivered into Akutan approximately 100,000 pounds of round P. Cod from Unimak Island grounds in just 72-hours.

Catch rates of P. Cod in April, especially, from Unimak Pass grounds were even better.

Moral of the Story

1. Who are you going to believe, the "evolving" SS2 model or your lying eyes?

2. He who lives by hypothetical simulation, dies by it.

3. Forego regular, "empirical" reality checks at your own peril and your local economy's expense.

Recommendations

1. Stop or immediately supplement the federal defunding of the annual NMFS BSAI summer trawl survey, projected to take as much as a 40% hit in 2007.

2. Survey BSAI groundfish abundance as densely as the IPHC surveys halibut abundance: four samples, not just one, per 400 square miles.

3. Fast track Dan Nichols' P. Cod pressure tag recovery research so that the GPT can use Dan's results at its November 2006 meeting and so that the peer-reviewed results can be incorporated into the NPFMC's TAC-setting process for 2007.

   Why? Because Dan's preliminary results suggest that 50% of the P. Cod stock is located in the water column above the headrope when NMFS conducts its summer BSAI groundfish survey.

Friday
May 1, 1998

Part II

Department of Commerce

National Oceanic and Atmospheric Administration

50 CFR Part 600

Magnuson-Stevens Act Provisions; National Standard Guidelines; Final Rule

to a Council request, may implement interim measures to reduce overfishing under section 305(c) of the Magnuson-Stevens Act, until such measures can be replaced by an FMP, FMP amendment, or regulations taking remedial action.

(i) These measures may remain in effect for no more than 180 days, but may be extended for an additional 180 days if the public has had an opportunity to comment on the measures and, in the case of Council-recommended measures, the Council is actively preparing an FMP, FMP amendment, or proposed regulations to address overfishing on a permanent basis. Such measures, if otherwise in compliance with the provisions of the Magnuson-Stevens Act, may be implemented even though they are not sufficient by themselves to stop overfishing of a fishery.

(ii) If interim measures are made effective without prior notice and opportunity for comment, they should be reserved for exceptional situations, because they affect fishermen without providing the usual procedural safeguards. A Council recommendation for interim measures without notice-and-comment rulemaking will be considered favorably if the short-term benefits of the measures in reducing overfishing outweigh the value of advance notice, public comment, and deliberative consideration of the impacts on participants in the fishery.

(f) *OY*—(1) *Definitions.* (i) The term "optimum," with respect to the yield from a fishery, means the amount of fish that will provide the greatest overall benefit to the Nation, particularly with respect to food production and recreational opportunities and taking into account the protection of marine ecosystems; that is prescribed on the basis of the MSY from the fishery, as reduced by any relevant economic, social, or ecological factor; and, in the case of an overfished fishery, that provides for rebuilding to a level consistent with producing the MSY in such fishery.

(ii) In national standard 1, use of the phrase "achieving, on a continuing basis, the OY from each fishery" means producing, from each fishery, a long-term series of catches such that the average catch is equal to the average OY and such that status determination criteria are met.

(2) *Values in determination.* In determining the greatest benefit to the Nation, these values that should be weighed are food production, recreational opportunities, and protection afforded to marine ecosystems. They should receive serious attention when considering the economic, social, or ecological factors used in reducing MSY to obtain OY.

(i) The benefits of food production are derived from providing seafood to consumers, maintaining an economically viable fishery together with its attendant contributions to the national, regional, and local economies, and utilizing the capacity of the Nation's fishery resources to meet nutritional needs.

(ii) The benefits of recreational opportunities reflect the quality of both the recreational fishing experience and non-consumptive fishery uses such as ecotourism, fish watching, and recreational diving, and the contribution of recreational fishing to the national, regional, and local economies and food supplies.

(iii) The benefits of protection afforded to marine ecosystems are those resulting from maintaining viable populations (including those of unexploited species), maintaining evolutionary and ecological processes (e.g., disturbance regimes, hydrological processes, nutrient cycles), maintaining the evolutionary potential of species and ecosystems, and accommodating human use.

(3) *Factors relevant to OY.* Because fisheries have finite capacities, any attempt to maximize the measures of benefit described in paragraph (f)(2) of this section will inevitably encounter practical constraints. One of these is MSY. Moreover, various factors can constrain the optimum level of catch to a value less than MSY. The Magnuson-Stevens Act's definition of OY identifies three categories of such factors: Social, economic, and ecological. Not every factor will be relevant in every fishery. For some fisheries, insufficient information may be available with respect to some factors to provide a basis for corresponding reductions in MSY.

(i) *Social factors.* Examples are enjoyment gained from recreational fishing, avoidance of gear conflicts and resulting disputes, preservation of a way of life for fishermen and their families, and dependence of local communities on a fishery. Other factors that may be considered include the cultural place of subsistence fishing, obligations under Indian treaties, and worldwide nutritional needs.

(ii) *Economic factors.* Examples are prudent consideration of the risk of overharvesting when a stock's size or productive capacity is uncertain, satisfaction of consumer and recreational needs, and encouragement of domestic and export markets for U.S.-harvested fish. Other factors that may be considered include the value of fisheries, the level of capitalization, the decrease in cost per unit of catch afforded by an increase in stock size, and the attendant increase in catch per unit of effort, alternate employment opportunities, and economies of coastal areas.

(iii) *Ecological factors.* Examples are stock size and age composition, the vulnerability of incidental or unregulated stocks in a mixed-stock fishery, predator-prey or competitive interactions, and dependence of marine mammals and birds or endangered species on a stock of fish. Also important are ecological or environmental conditions that stress marine organisms, such as natural and manmade changes in wetlands or nursery grounds, and effects of pollutants on habitat and stocks.

(4) *Specification.* (i) The amount of fish that constitutes the OY should be expressed in terms of numbers or weight of fish. However, OY may be expressed as a formula that converts periodic stock assessments into target harvest levels; in terms of an annual harvest of fish or shellfish having a minimum weight, length, or other measurement; or as an amount of fish taken only in certain areas, in certain seasons, with particular gear, or by a specified amount of fishing effort.

(ii) Either a range or a single value may be specified for OY. Specification of a numerical, fixed-value OY does not preclude use of annual target harvest levels that vary with stock size. Such target harvest levels may be prescribed on the basis of an OY control rule similar to the MSY control rule described in paragraph (c)(1)(ii) of this section, but designed to achieve OY on average, rather than MSY. The annual harvest level obtained under an OY control rule must always be less than or equal to the harvest level that would be obtained under the MSY control rule.

(iii) All fishing mortality must be counted against OY, including that resulting from bycatch, scientific research, and any other fishing activities.

(iv) The OY specification should be translatable into an annual numerical estimate for the purposes of establishing any TALFF and analyzing impacts of the management regime. There should be a mechanism in the FMP for periodic reassessment of the OY specification, so that it is responsive to changing circumstances in the fishery.

(v) The determination of OY requires a specification of MSY, which may not always be possible or meaningful. However, even where sufficient scientific data as to the biological characteristics of the stock do not exist,

not an excuse for not taking action. Uncertainty concerning the desirable and undesirable effects of minimizing bycatch and bycatch mortality should be dealt with similarly. (See also the response to comment 35 under national standard 9).

Comment 33. One commenter stated that there are no criteria or methods for establishing criteria for determining how much bycatch is too much.

Response. NMFS disagrees. Section 600.350(d)(3) provides a list of criteria for evaluating the impacts of bycatch. Each Council must determine how much bycatch is too much by balancing the various factors that will maximize the net benefits to the Nation (see also the response to comment 24 under national standard 9). Language that includes the maximization of net benefits to the Nation has been added to § 600.350(d)(3). The legislative history of the SFA includes the following floor statement by Congressman Young: "'Practicable' requires an analysis of the cost of imposing a management action; the Congress does not intend to ...impose costs on fishermen and processors that cannot be reasonably met."

Comment 34. Several commenters stated that Councils should prioritize their actions to address those fisheries that have not only the greatest bycatch rate, but also the greatest amount of bycatch.

Response. NMFS agrees that the Councils will need to prioritize their actions to address those fisheries where actions to reduce bycatch can have the greatest impact. Each Council will have to determine the basis for setting its priorities.

Comment 35. One commenter stated that the final rule must clearly reflect that Councils are not constrained from acting when faced with uncertainty surrounding one or several items included in § 600.350(d)(3).

Response. NMFS agrees. The Councils must take action to ensure the sustainability of the Nation's marine fishery resources. National standard 2 specifically requires that conservation and management measures be based on the best scientific information available. Where there is uncertainty surrounding any of the items in § 600.350(d)(3), Councils should adhere to the precautionary approach stated in the Food and Agriculture Organization of the United Nations (FAO) Code of Conduct for Responsible Fisheries (Article 6.5). The Code specifically states, "The absence of adequate scientific information should not be used as a reason for postponing or failing to take measures to conserve target species, associated or dependent species and non-target species and their environment." Language to that effect has been added to § 600.350(d)(3).

Comment 36. Several commenters noted that requirements to implement monitoring programs in FMPs may prevent approval. Such requirements could be an administrative burden for the Councils and be very costly to implement.

Response. NMFS disagrees. Section 303(a)(11) of the Magnuson-Stevens Act specifically requires the Councils to establish, for each fishery, a "standardized reporting methodology to assess the amount and type of bycatch occurring in the fishery." The statute makes no allowance for the financial or administrative burden of establishing such reporting programs. It is clear that, in order to be able to assess the amount and type of bycatch occurring in various fisheries, monitoring programs must be established.

Comment 37. One commenter stated that data collection from all fishermen must be made a high priority.

Response. NMFS agrees and notes that the uncertainty surrounding estimates of the types and amounts of bycatch cannot be reduced without the cooperation and involvement of all components of the fisheries.

National Standard 10

Nine commenters commented specifically on national standard 10. All were positive and most substantive comments were directed at making the standard more restrictive. Several commenters gave unqualified support to the standard. One commenter urged that NMFS work aggressively with the Councils "to ensure that safety is constantly considered in fishery management."

Comment 1: One commenter noted that no criteria were provided for the phrase "to the extent practicable" in national standard 10, as were provided for national standard 9.

Response: NMFS disagrees. Section 600.355(b)(2) directly addresses these concerns.

Comment 2: One commenter noted "while it is stated clearly in the opening paragraph of the regulatory text (§ 600.355(b)(1)) that this standard [is] not meant to 'give preference to one method of managing a fishery over another,' the suggested mitigation management measures are replete with inappropriate implicit endorsement of ITQs (individual transferrable quotas) that directly undermine that provision." These references include "limiting the number of participants in the fishery," "spreading effort over time and area," and "implementing management measures that reduce the race for fish."

Response: The mitigation measures do not necessarily endorse ITQs. While ITQs may be one way to solve some problems with safety of life at sea and reduce the "race for fish," they are not the only way. Vessel/license limitation systems have been and are being adopted without ITQs, such as in the Alaska crab and groundfish fisheries. In New England, the use of "days at sea" has spread effort over time and area without creating a "race for fish." The term "race for fish" was used in the discussion of the bill that became the SFA, to describe the intensive fisheries that have developed at the expense of safety. As a primary reason for the establishment of this national standard, NMFS believes the term captures the intent of Congress and the legislation.

Comment 3: One commenter recommended that the national standard 10 guidelines require that Councils establish mandatory, standardized, accurate, and complete injury reporting requirements.

Response: NMFS agrees in part. Domestic fishing vessels are already required to report this information to the U.S. Coast Guard (USCG) under provisions at 46 CFR parts 4 and 28. This information can be made available through the USCG, and reports compared against vessels participating in the fisheries. Guidance on contents of SAFE reports at § 600.315(e)(1)(ii) has been revised to include consideration of safety issues.

Comment 4: One commenter recommended that the statement "This standard is not meant to give preference to one method of managing a fishery over another," should be deleted or replaced by, "While this standard is not meant to give preference to one method of managing a fishery over another, it should be considered a significant factor in allocation and other management decisions and the Council should provide rational justification why the safest method is not being used." Common sense would dictate that the safer management regime be used.

Response: NMFS disagrees and believes the guidance, as proposed, is accurate.

Comment 5: One commenter recommended that the term "safety of human life at sea" should be modified to read "safety of human life and limb at sea" to emphasis reduction in injuries as well as loss of life.

Response: NMFS considers the term "safety of human life at sea" to include not only safety of life, but safety of limb and the general operating environment, as well, to the extent that fishery

a given stock size is associated with a given level of fishing mortality and a given level of potential harvest, where the long-term average of these potential harvests provides an estimate of MSY.

(ii) Any MSY values used in determining OY will necessarily be estimates, and these will typically be associated with some level of uncertainty. Such estimates must be based on the best scientific information available (see § 600.315) and must incorporate appropriate consideration of risk (see § 600.335). Beyond these requirements, however, Councils have a reasonable degree of latitude in determining which estimates to use and how these estimates are to be expressed. For example, a point estimate of MSY may be expressed by itself or together with a confidence interval around that estimate.

(iii) In the case of a mixed-stock fishery, MSY should be specified on a stock-by-stock basis. However, where MSY cannot be specified for each stock, then MSY may be specified on the basis of one or more species as an indicator for the mixed stock as a whole or for the fishery as a whole.

(iv) Because MSY is a long-term average, it need not be estimated annually, but it must be based on the best scientific information available, and should be re-estimated as required by changes in environmental or ecological conditions or new scientific information.

(3) *Alternatives to specifying MSY.* When data are insufficient to estimate MSY directly, Councils should adopt other measures of productive capacity that can serve as reasonable proxies for MSY, to the extent possible. Examples include various reference points defined in terms of relative spawning per recruit. For instance, the fishing mortality rate that reduces the long-term average level of spawning per recruit to 30–40 percent of the long-term average that would be expected in the absence of fishing may be a reasonable proxy for the MSY fishing mortality rate. The long-term average stock size obtained by fishing year after year at this rate under average recruitment may be a reasonable proxy for the MSY stock size, and the long-term average catch so obtained may be a reasonable proxy for MSY. The natural mortality rate may also be a reasonable proxy for the MSY fishing mortality rate. If a reliable estimate of pristine stock size (i.e., the long-term average stock size that would be expected in the absence of fishing) is available, a stock size approximately 40 percent of this value may be a reasonable proxy for the MSY stock size, and the product of this stock size and the natural mortality rate may be a reasonable proxy for MSY.

(d) *Overfishing*—(1) *Definitions.* (i) "To overfish" means to fish at a rate or level that jeopardizes the capacity of a stock or stock complex to produce MSY on a continuing basis.

(ii) "Overfishing" occurs whenever a stock or stock complex is subjected to a rate or level of fishing mortality that jeopardizes the capacity of a stock or stock complex to produce MSY on a continuing basis.

(iii) In the Magnuson-Stevens Act, the term "overfished" is used in two senses: First, to describe any stock or stock complex that is subjected to a rate or level of fishing mortality meeting the criterion in paragraph (d)(1)(i) of this section, and second, to describe any stock or stock complex whose size is sufficiently small that a change in management practices is required in order to achieve an appropriate level and rate of rebuilding. To avoid confusion, this section uses "overfished" in the second sense only.

(2) *Specification of status determination criteria.* Each FMP must specify, to the extent possible, objective and measurable status determination criteria for each stock or stock complex covered by that FMP and provide an analysis of how the status determination criteria were chosen and how they relate to reproductive potential. Status determination criteria must be expressed in a way that enables the Council and the Secretary to monitor the stock or stock complex and determine annually whether overfishing is occurring and whether the stock or stock complex is overfished. In all cases, status determination criteria must specify both of the following:

(i) *A maximum fishing mortality threshold or reasonable proxy thereof.* The fishing mortality threshold may be expressed either as a single number or as a function of spawning biomass or other measure of productive capacity. The fishing mortality threshold must not exceed the fishing mortality rate or level associated with the relevant MSY control rule. Exceeding the fishing mortality threshold for a period of 1 year or more constitutes overfishing.

(ii) *A minimum stock size threshold or reasonable proxy thereof.* The stock size threshold should be expressed in terms of spawning biomass or other measure of productive capacity. To the extent possible, the stock size threshold should equal whichever of the following is greater: One-half the MSY stock size, or the minimum stock size at which rebuilding to the MSY level would be expected to occur within 10 years if the stock or stock complex were exploited at the maximum fishing mortality threshold specified under paragraph (d)(2)(i) of this section. Should the actual size of the stock or stock complex in a given year fall below this threshold, the stock or stock complex is considered overfished.

(3) *Relationship of status determination criteria to other national standards*—(i) *National standard 2.* Status determination criteria must be based on the best scientific information available (see § 600.315). When data are insufficient to estimate MSY, Councils should base status determination criteria on reasonable proxies thereof to the extent possible (also see paragraph (c)(3) of this section). In cases where scientific data are severely limited, effort should also be directed to identifying and gathering the needed data.

(ii) *National standard 3.* The requirement to manage interrelated stocks of fish as a unit or in close coordination notwithstanding (see § 600.320), status determination criteria should generally be specified in terms of the level of stock aggregation for which the best scientific information is available (also see paragraph (c)(2)(iii) of this section).

(iii) *National standard 6.* Councils must build into the status determination criteria appropriate consideration of risk, taking into account uncertainties in estimating harvest, stock conditions, life history parameters, or the effects of environmental factors (see § 600.335).

(4) *Relationship of status determination criteria to environmental change.* Some short-term environmental changes can alter the current size of a stock or stock complex without affecting the long-term productive capacity of the stock or stock complex. Other environmental changes affect both the current size of the stock or stock complex and the long-term productive capacity of the stock or stock complex.

(i) If environmental changes cause a stock or stock complex to fall below the minimum stock size threshold without affecting the long-term productive capacity of the stock or stock complex, fishing mortality must be constrained sufficiently to allow rebuilding within an acceptable time frame (also see paragraph (c)(4)(ii) of this section). Status determination criteria need not be respecified.

(ii) If environmental changes affect the long-term productive capacity of the stock or stock complex, one or more components of the status determination criteria must be respecified. Once status determination criteria have been respecified, fishing mortality may or may not have to be reduced, depending

or where the period of exploitation or investigation has not been long enough for adequate understanding of stock dynamics, or where frequent large-scale fluctuations in stock size diminish the meaningfulness of the MSY concept, the OY must still be based on the best scientific information available. When data are insufficient to estimate MSY directly, Councils should adopt other measures of productive capacity that can serve as reasonable proxies for MSY to the extent possible (also see paragraph (c)(3) of this section).

(vi) In a mixed-stock fishery, specification of a fishery-wide OY may be accompanied by management measures establishing separate annual target harvest levels for the individual stocks. In such cases, the sum of the individual target levels should not exceed OY.

(5) *OY and the precautionary approach.* In general, Councils should adopt a precautionary approach to specification of OY. A precautionary approach is characterized by three features:

(i) Target reference points, such as OY, should be set safely below limit reference points, such as the catch level associated with the fishing mortality rate or level defined by the status determination criteria. Because it is a target reference point, OY does not constitute an absolute ceiling, but rather a desired result. An FMP must contain conservation and management measures to achieve OY, and provisions for information collection that are designed to determine the degree to which OY is achieved on a continuing basis—that is, to result in a long-term average catch equal to the long-term average OY, while meeting the status determination criteria. These measures should allow for practical and effective implementation and enforcement of the management regime, so that the harvest is allowed to reach OY, but not to exceed OY by a substantial amount. The Secretary has an obligation to implement and enforce the FMP so that OY is achieved. If management measures prove unenforceable—or too restrictive, or not rigorous enough to realize OY—they should be modified; an alternative is to reexamine the adequacy of the OY specification. Exceeding OY does not necessarily constitute overfishing. However, even if no overfishing resulted from exceeding OY, continual harvest at a level above OY would violate national standard 1, because OY was not achieved on a continuing basis.

(ii) A stock or stock complex that is below the size that would produce MSY should be harvested at a lower rate or level of fishing mortality than if the stock or stock complex were above the size that would produce MSY.

(iii) Criteria used to set target catch levels should be explicitly risk averse, so that greater uncertainty regarding the status or productive capacity of a stock or stock complex corresponds to greater caution in setting target catch levels. Part of the OY may be held as a reserve to allow for factors such as uncertainties in estimates of stock size and DAH. If an OY reserve is established, an adequate mechanism should be included in the FMP to permit timely release of the reserve to domestic or foreign fishermen, if necessary.

(6) *Analysis.* An FMP must contain an assessment of how its OY specification was determined (section 303(a)(3) of the Magnuson-Stevens Act). It should relate the explanation of overfishing in paragraph (d) of this section to conditions in the particular fishery and explain how its choice of OY and conservation and management measures will prevent overfishing in that fishery. A Council must identify those economic, social, and ecological factors relevant to management of a particular fishery, then evaluate them to determine the amount, if any, by which MSY exceeds OY. The choice of a particular OY must be carefully defined and documented to show that the OY selected will produce the greatest benefit to the Nation. If overfishing is permitted under paragraph (d)(6) of this section, the assessment must contain a justification in terms of overall benefits, including a comparison of benefits under alternative management measures, and an analysis of the risk of any species or ecologically significant unit thereof reaching a threatened or endangered status, as well as the risk of any stock or stock complex falling below its minimum stock size threshold.

(7) *OY and foreign fishing.* Section 201(d) of the Magnuson-Stevens Act provides that fishing by foreign nations is limited to that portion of the OY that will not be harvested by vessels of the United States.

(i) *DAH.* Councils must consider the capacity of, and the extent to which, U.S. vessels will harvest the OY on an annual basis. Estimating the amount that U.S. fishing vessels will actually harvest is required to determine the surplus.

(ii) *DAP.* Each FMP must assess the capacity of U.S. processors. It must also assess the amount of DAP, which is the sum of two estimates: The estimated amount of U.S. harvest that domestic processors will process, which may be based on historical performance or on surveys of the expressed intention of manufacturers to process, supported by evidence of contracts, plant expansion, or other relevant information; and the estimated amount of fish that will be harvested by domestic vessels, but not processed (e.g., marketed as fresh whole fish, used for private consumption, or used for bait).

(iii) *JVP.* When DAH exceeds DAP, the surplus is available for JVP. JVP is derived from DAH.

5. In § 600.315, paragraphs (e)(3) and (e)(4) are redesignated as paragraphs (e)(4) and (e)(5), respectively; new paragraph (e)(3) is added; and paragraphs (c)(2), (c)(3), (e)(1) introductory text, (e)(1)(ii), and newly redesignated (e)(4) are revised to read as follows:

§ 600.315 National Standard 2—Scientific Information.

* * * * *

(c) * * *

(2) An FMP should identify scientific information needed from other sources to improve understanding and management of the resource, marine ecosystem, and the fishery (including fishing communities).

(3) The information submitted by various data suppliers should be comparable and compatible, to the maximum extent possible.

* * * * *

(e) * * *

(1) The SAFE report is a document or set of documents that provides Councils with a summary of information concerning the most recent biological condition of stocks and the marine ecosystems in the FMU and the social and economic condition of the recreational and commercial fishing interests, fishing communities, and the fish processing industries. It summarizes, on a periodic basis, the best available scientific information concerning the past, present, and possible future condition of the stocks, marine ecosystems, and fisheries being managed under Federal regulation.

* * * * *

(ii) The SAFE report provides information to the Councils for determining annual harvest levels from each stock, documenting significant trends or changes in the resource, marine ecosystems, and fishery over time, and assessing the relative success of existing state and Federal fishery management programs. Information on bycatch and safety for each fishery should also be summarized. In addition, the SAFE report may be used to update or expand previous environmental and regulatory impact documents, and ecosystem and habitat descriptions.

* * * * *

From: Tom Casey <tcasey@worldnet.att.net>
Subject: **Please revise the 2007 BSAI P. Cod TAC to reflect Dan Nichols' research**
Date: September 22, 2006 5:19:08 AM PDT
To: Jim Balsiger <Jim.Balsiger@noaa.gov>
Cc: Chris Oliver <chris.oliver@noaa.gov>, suesalveson@noaa.gov, David Witherell <david.witherell@noaa.gov>

Jim,

As you know, P. Cod prices are record high in Dutch Harbor and Akutan now, $.56/lb. Some of our guys have earned as much or more from pot-caught P. Cod as they have from Opis this year.

At this week's BSAI Groundfish Plan Team Meeting here in Seattle, NMFS' Bob Lauch and Grant Thompson revealed to us that Dan Nichols' research on P. Cod pressure-sensitive tagging shows that 50-percent of the Cod stock is located in the water column above the survey trawl's headrope during the survey process.

In other words, Q in SS2 should be changed from less than 1.0 to at least 1.8, thereby doubling the 2007 P. Cod ABC and TAC.

Yesterday Grant told us that Dan Nichols has completed decoding 11 of the 252 available pressure-sensitive tags. We request your intervention to assure that Dan has the resources to decode as many more as possible during the next 30-days so that the data can be used by the GPT and SSC to set a "realistic BSAI P. Cod TAC for 2007" based on the best scientific information available.

For the record, Jim, during the first day of the GPT meeting, when I asked how concerned any of the scientists were about the inherent 32,000 to 1 extrapolation process of the annual NMFS survey's area swept abundance estimation process, one of them told me "Look Gallop only surveys a hundred voters in fifty states for his work," implying consensus statistical validity to that huge ration.

So why wouldn't you, Bill, NMFS and the NPFMC consider Dan Nichols' work to be hundreds of times more statistically valid at today's 11 to 252 ratio? And how much more valid could it be made during the next 30-days with direction from NMFS leadership?

We need your help, Jim. For more than 25-years when the chips were down, you saved our asses. We really need your intervention on this one, young man. We sense that "the best scientific information available" is about to be swept under the rug at a huge expense to Alaska, Washington and Oregon families that need it bad.

Regards,
TC

From: Tom Casey <tcasey@worldnet.att.net>
Subject: **Correction for Q if Dan Nichols is right**
Date: September 25, 2006 2:50:42 PM PDT
To: Jim Balsiger <Jim.Balsiger@noaa.gov>
Cc: suesalveson@noaa.gov, Chris Oliver <chris.oliver@noaa.gov>, David Witherell <david.witherell@noaa.gov>

Jim,

If Dan Nichols pressure sensitive tagging estimate that one-half of all BSAI P. Cod are located in the water column above the headrope of the BSAI survey trawl, the corrected value of Q should be half of what it currently is assumes to be, not double, as a mistakenly suggested yesterday. Q = .5, not 1.8.

Regards,
TC

From: iverson@w-link.net
Subject: **[Fwd: RE: [Fwd: Day 1 of BSAI GPT meeting]]**
Date: September 25, 2006 2:46:12 PM PDT
To: tcasey@att.net

---------- Original Message ----------
Subject: RE: [Fwd: Day 1 of BSAI GPT meeting]
From: "Mark Maunder" <mmaunder@iattc.org>
Date: Mon, September 25, 2006 2:20 pm
To: iverson@w-link.net

Don,

Sorry that it took me a while to write this, but I was interpreted half way through.

A

If the catchability of the trawl survey is halved, the estimate of the biomass will approximately double. Since the fishing mortality rate is approximately equal to the catch divided by the abundance and the catch is fixed, the current fishing mortality rate will approximately halve. However, the TAC is basically the product of the abundance and the fishing mortality rate used in the harvest rule. The fishing mortality rate used in the harvest rule is a function of many model parameters including the natural mortality and the age-specific selectivity of the fishing gear. Many of these parameters are estimated by the stock assessment model. The stock assessment model estimates these parameters by fitting to the data (making the model predictions closest to the data). The survey abundance estimates are one type of data the model is fit to. Therefore, if the survey abundance estimates change, the estimates of the fishing mortality rate used in the harvest rule may also change. Because the assessment model is complicated, it is often not possible to guess which way this fishing mortality will change without re-running the assessment model. Therefore, a doubling of the abundance may not necessarily result in a doubling of the TAC.

B

BUT IT SURE AS HELL SHOULDN'T EITHER!

C

If the 11 original archival tags and the additional 32 additional archival tags are a random sample from the total 252 archival tags (i.e. they all had the same chance of being selected for analysis) then results from the 42 tags should be reasonable and unbiased. The main concern is if 42 tags are enough to get enough certainty in the results. The confidence intervals from their paper are 0.37 to 0.81, more tags would reduce this. A problem would occur if the tags were not selected at random (i.e. they have characteristics in common e.g. they all came for one area) and they all had higher or lower depts.

AFSC
GOAL: ANALYZE MAXIMUM NUMBER OF NICHOLS' TAGS BEFORE NOVEMBER GPT MEETING

I would have to take a closer look at the paper to provide more details.

Regards,

Mark

Mark Maunder
Inter-American Tropical Tuna Commission
8604 La Jolla Shores Drive
La Jolla, CA, 92037-1508, USA

Tel: (858) 546-7027
Fax: (858) 546-7133
mmaunder@iattc.org
http://iattc.org/iattc-staffMMaunder.htm

Groundfish Plan Team Meetings

September 19th-21st, 2005

Joint GOA/BSAI Groundfish Plan Team

Introduction

The Bering Sea/Aleutian Island Groundfish Plan Team and the Gulf of Alaska Groundfish Plan Team met jointly on September 19-21, 2005 to review a number of management initiatives, survey results, and new stock assessment models.

Jim Ianelli noted that despite these efforts, the overall level of review for critical assessments for North Pacific groundfish has declined over the past several years due to increasing numbers (and size) of stock assessments and management analyses. The Plan Teams and SSC should continue to strive to improve the level of review for these documents.

pg. 2

BSAI Pacific cod model. Grant Thompson summarized the new Pacific cod model using stock synthesis 2 (SS2). To focus attention on differences between models, no new data were used in the analysis, except for an updated estimate of the maturity schedule (Stark, in review). Overall the model was seen to be an improvement over earlier versions and despite some technical difficulties with implementing SS2 in the long run the conversion will provide a number of benefits for the analyst and reviewers.

The Teams suggested using the longline survey data in the model. Grant noted that he would consider using those data in the future (possibly next year) and has tried to do so in the past, but without much success. The new model framework will facilitate adding these types of data.

pg. 7

So, did he or not?

Chapter 2: Assessment of the Pacific Cod Stock in the Eastern Bering Sea and Aleutian Islands Area

Grant G. Thompson and Martin W. Dorn

U.S. Department of Commerce
National Oceanic and Atmospheric Administration
National Marine Fisheries Service
Alaska Fisheries Science Center
7600 Sand Point Way NE., Seattle, WA 98115-6349

check 2006 version to see if Grant included actual long line data as requested.

EXECUTIVE SUMMARY

Summary of Major Changes

Relative to the November edition of last year's BSAI SAFE report, the following substantive changes have been made in the Pacific cod stock assessment.

Changes in the Input Data

1) Catch data for 1964-1977 were incorporated, catch data for 2004 were updated, and preliminary catch data for 2005 were incorporated.
2) Size composition data from the 1974-1977 commercial fisheries were incorporated, size composition data from the 2004 commercial fisheries were updated, and preliminary size composition data from the 2005 commercial fisheries were incorporated.
3) Size composition data from the 2005 EBS shelf bottom trawl survey were incorporated.
4) The biomass estimate from the 2005 EBS shelf bottom trawl survey was incorporated (the 2005 estimate of 603,788 t was up about 1% from the 2004 estimate).
5) Age composition data from the 1996-1997 EBS shelf bottom trawl surveys were incorporated.
6) Length-at-age data from the 1996-1997 EBS shelf bottom trawl surveys were incorporated.
7) A new maturity-at-length schedule was incorporated.
8) Average bottom temperatures from the 1982-2005 shelf surveys were incorporated.

Changes in the Assessment Model

Three alternative models are presented. Model 1 is identical to last year's model, which was developed using the Stock Synthesis 1 assessment software that has formed the basis of the EBS Pacific cod model since 1993. Models 2 and 3 were developed under the new Stock Synthesis 2 assessment software, which uses automatic differentiation (via the ADMB programming language) to minimize the objective function rather than the finite-difference algorithm used in Stock Synthesis 1. In addition, Stock Synthesis 1 and Stock Synthesis 2 differ with respect to several technical details which are described in the main text of this chapter. The primary difference between Model 2 and Model 3 is that Model 2 fixes the natural mortality rate M and the EBS shelf bottom trawl survey catchability coefficient Q at values of 0.37 and 1.00, respectively (identical to the values assumed in Model 1), whereas Model 3 allows the values of these two parameters to be estimated internally.

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Submitted by T. Smith 10/7/06

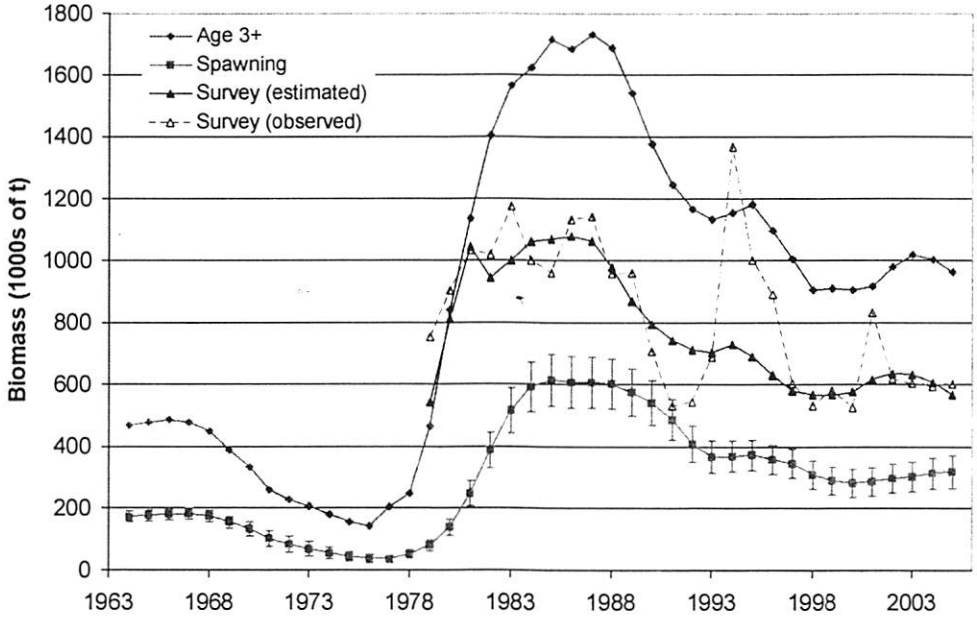

Figure 2.15—Biomass time trends (age 3+ biomass, female spawning biomass, survey biomass) of EBS Pacific cod as estimated by Model 3.

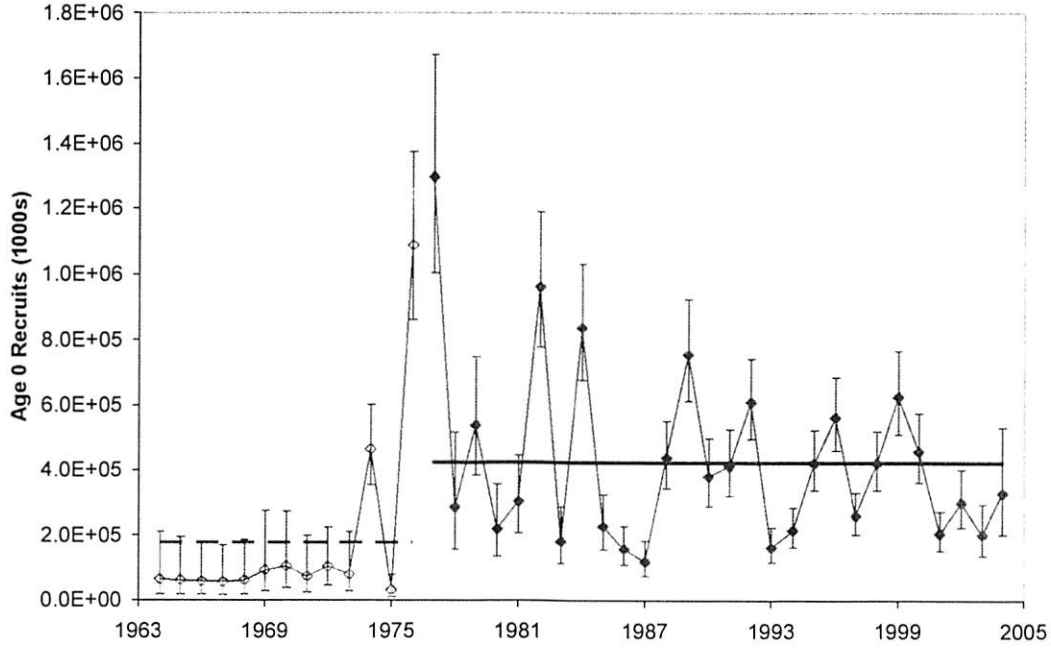

Figure 2.16—Time series of EBS Pacific cod recruitment at age 0, with 95% confidence intervals, as estimated by Model 3.