MEMORANDUM

TO: Council, SSC and AP Members

FROM: Chris Oliver
Acting Executive Director

DATE: November 27, 2000

SUBJECT: Final GOA Groundfish Specifications for 2001

ESTIMATED TIME
10 HOURS
(for all D-1 items)

ACTION REQUIRED

(a) Review 2001 GOA Stock Assessment and Fishery Evaluation (SAFE) document.
(b) Approve final GOA groundfish and bycatch specifications for 2001.
(c) Approve halibut discard mortality rates.

BACKGROUND

At this meeting, the Council sets final recommendations for groundfish and bycatch specifications. The final SAFE report, groundfish OFLs, ABCs and TACs, bycatch apportionments, and halibut discard mortality rates need to be approved. These final specifications will be used for managing the 2001 groundfish fisheries and will supercede the Council's preliminary specifications upon implementation.

(a) GOA SAFE Document

The groundfish Plan Teams met in Seattle during the week of November 6-9 to prepare the final SAFE documents provided at this meeting. During Summer 2000, all of the stock assessment authors were tasked with contributing to the programmatic groundfish SEIS while also preparing the stock assessments. As a result, numerous planned revisions to the various assessments did not occur. For some assessments, this included the addition of 2000 catch data, age composition data, and new age-structured models. Plan Team review of the assessments was also affected for many species. For instance, the pollock and Atka mackerel assessments were distributed during the Plan Team meeting and only a preliminary assessment for Pacific cod is included in this SAFE report. No new assessment will be prepared for thornyheads or "other species" this year; the 1999 assessments should be examined for the methodology that supported the 2001 thornyhead OFL and ABC projections and for determining TAC species apportionment for "other species." However, sufficient data and analyses were available to provide adequate evaluation of trends in stocks for which full assessments could not be conducted.

This SAFE report forms the basis for final groundfish specifications for the 2001 fishing year. The final GOA SAFE contains the Plan Team's estimates of biomass, OFLs, and ABCs for all groundfish species covered under the FMP and information concerning PSC bycatch to provide guidance to the Council in establishing PSC apportionments. The attached tables from the SAFE report lists the Plan Team's recommended 2001 ABCs and corresponding OFLs for each species or species complex. Items D-1(b)(1) and (2) contain the minutes of the GOA Plan Team meeting and Joint BSAI and GOA Plan Team Meeting.

(b) Final ABCs and TACs

At this meeting, the Gulf of Alaska Groundfish Plan Team, SSC, and AP will provide recommendations on ABCs and TACs to the Council. The Council will recommend final catch specifications for the 2001 fisheries. Tables 1-4 from the SAFE summary chapter listing groundfish OFLs and ABCs are attached as Item D-1(b)(3). The Plan Team's sum of recommended ABCs for 2001 is 447,710 mt, only slightly down from the 2000 ABC of 451,000 mt.

Overall, the status of GOA stocks continues to be relatively favorable. The abundances of Pacific cod, northern rockfish, thornyhead, and arrowtooth flounder are above target stock size. The abundances of pollock, Pacific ocean perch, and sablefish are below target stock size. The status of the remaining species is unknown.

The Plan Team recommended an ABC of 105,810 mt for pollock, up slightly from 100,000 mt in 2000. It recommended a lower ABC of 67,800 mt, continuing a decline for Pacific cod, compared to 76,400 mt in 2000 and 84,400 mt in 1999. ABC recommendations for flatfish were the same as in 2000, except for a slight increase for arrowtooth flounder. Rockfish ABCs were also only slightly different than in 2000. The sablefish recommended ABC dropped to 12,800 mt from 13,400 mt in 2000. As of late November, catches totaled approximately 71% of the 2000 TAC.

TAC considerations for State waters Pacific cod fishery

Beginning in 1997, the Council has reduced the GOA Pacific cod TAC to account for removals from the State P. cod fisheries. It has continued to lower the TACs by area as the State fishery increased. In December 1998, the Council reduced the Central area TAC due to the automatic increase in the Kodiak and Chignik subarea GHLs and the Western area TAC due to an increase in the South Alaska Peninsula GHL. In 1999, the 2000 TACs were lowered due to increases in the South Alaska Peninsula and Kodiak GHLs. No State water P. cod GHLs are expected to increase in 2001. The State GHLs may be no more than 25% of the Federal TAC. Using the Plan Team's recommended ABCs for 2001, the federal TAC for P. cod would be adjusted as listed at right (assuming no additional modifications are approved under Agenda C-5).

Proposed 2001 Gulf Pacific cod ABCs, TACs, and State guideline harvest levels (mt).

Specifications	Western	Central	Eastern	Total
ABC	24,400	38,650	4,750	67,800
BOF GHL	6,100	8,400	1,190	15,690
(%)	25	21.75	25	23.1
TAC	18,300	30,250	3,560	52,110
	Cook Inlet	870	2.25%	
	Kodiak	4,830	12.50%	
	Chignik	2,700	7.00%	
	Central	8,400	21.75%	

TAC considerations for sablefish

Since the Southeast Alaska trawl ban was implemented, the Council has reapportioned 5% of the combined Eastern GOA sablefish TAC to trawl gear in the West Yakutat District. Under the ABC derived from using both survey and fishery data (12,840 mt), this could be achieved by reapportioning 180 mt from the SEO ABC to the West Yakutat ABC. This would result in ABCs of 2,010 mt in the Western GOA, 5,410 mt in the Central GOA, 2,055 in the WY District (1,785 mt allocated to hook-and-line gear and 270 mt allocated to trawl gear for bycatch), and 3,365 mt in the SEO District (3,365 mt allocated to HAL gear and 0 mt allocated to trawl gear).

Using only the survey to calculate ABC (12,920 mt), the adjustment would be 165 mt reapportioned from SEO to WY.

Prohibited Species Catch Limits

The following halibut prohibited species catch limits have been in place since 1996.

Trawl gear			**Hook and Line**		
1st quarter	600 mt	(30%)	1st trimester	250 mt	(86%)
2nd quarter	400 mt	(20%)	2nd trimester	15 mt	(5%)
3rd quarter	600 mt	(30%)	3rd trimester	25 mt	(9%)
4th quarter	400 mt	(20%)	DSR	10 mt	
	2,000 mt			300 mt	

Trawl apportionments

Quarter	Shallow water Complex	Deep water Complex	Total
1	500 mt	100 mt	600 mt
2	100 mt	300 mt	400 mt
3	200 mt	400 mt	600 mt
4	No apportionment		400 mt

(c) Halibut Discard Mortality Rates

The GOA and BSAI SAFE reports contain recommendations by IPHC staff for managing halibut bycatch in 2001. Item D-1(b)(4) lists the IPHC recommendations for setting discard mortality rates for the 2001 fishery in the BSAI and GOA. Note the recommendation is to set these rates for the next three years (2001-2003). The CDQ rates would continue to be set annually. Dr. Steven Hare, IPHC staff, will present this report.

In October, the SSC received a report from Gregg Williams of IPHC on the alternative method of estimating halibut discard mortality. The SSC recommended waiting until the Steller sea lion/Pacific cod issue is resolved before moving ahead on this issue because fishing areas, methods, and time frames may change and thus alter the discard mortality rates. The SSC will review the final report at this meeting.

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Draft Minutes
November 6-8, 2000

Pollock. The 2000 winter acoustic survey suggested that the 1999 year class is strong and equal to about half of the biomass of the very strong 1994 year class. The Team approved splitting the time series into two catchability periods to account for the use of a new acoustic system beginning in 1992. The residual pattern is less than desirable for the hydroacoustic and bottom surveys. The Team encouraged efforts to better estimate the trawl survey catchability coefficient in future assessments.

Due to work on the SEIS, an examination requested by the AP of the method of apportioning Alaska pollock TAC by area was not included. However, an Appendix describes the current method required under the revised reasonable and prudent alternative for allocating the TAC by area to minimize fishery interactions with Steller sea lions. The Team requested that a plot of the stock/recruitment relationship be incorporated in the model in future assessments.

In recommending the 2000 ABC, the Team was concerned that the stock was continuing to decline, biomass is at its lowest level with high variability, and there was no new sign of substantial recruitment. This year, there is a sign that the 1999 year class is strong and that the 1998 year class is average based on both the hydroacoustic surveys and the ADFG survey. This has reduced the Team's concerns about the projected short-term declines. The Team therefore recommended the adjusted F40% level for ABC. The Team accepted the author's recommendation of ABC. However, some Plan team members supported rolling over the 95,000 mt ABC. They noted that even with no fishing the biomass trend is down.

In 2001, there will be a Shumagin Islands EIT survey, an ADF&G bottom survey, and the GOA biennial trawl survey. The Team expressed concern over whether the integrity of the biennial survey will be maintained since the number of boats available for the survey will be reduced.

The Team discussed the possible effect on pollock stock structure of the Court-mandated fishing closure of critical habitat. Resultant fishing will concentrate fishing effort on the roughly 15% of the total pollock biomass that occurs in spawning aggregations outside critical habitat. This concentration of fishing effort compounds uncertainty and the unknown nature of stock structure. The Team is concerned that site fidelity outside critical habitat by this portion of the spawning biomass might be impacted. The Team further noted that this would probably occur across all species.

Winter survey. A winter survey to examine pollock fishery interactions with Steller sea lions is planned for 2001 for the Shumagin Islands. A goal of the planned summer survey would be to verify the winter survey results. Three vessels will be chartered. Two vessels will work 2 weeks each in the Bering Sea. One of those vessels will move to Shumagin in critical habitat for 2 ½ weeks. A third vessel will survey the east side of Kodiak in critical habitat for a month. The purpose of the survey is to estimate the abundance of cod to address basic questions of interactions between Pacific cod and Steller sea lions. There is much uncertainty regarding the weather and catches. The target period for the survey is the middle of February to the middle of March. AFSC staff will report on the 2000 pilot survey and the 2001 winter and summer surveys to the Council in September 2001.

Pacific cod. A draft assessment chapter was distributed at the meeting for review. Due to the author's work on the SEIS and groundfish Biological Opinion, and the P. cod/SSL EA, the intended Bayesian analysis of a model under development was not completed.

The approach this year was to fit the same reference model as last year's model and use a multiplier to approximate the risk-averse strategy (involving approximate integration over uncertainty in natural mortality and survey catchability uncertainty). The F multiplier (.87) is assumed to be the same as in the 1999 assessment. New information on recruitment (from size composition information) and updating of the catch is accounted for within the reference model run. The use of the multiplier continues to incorporate the risk

averse strategy that results in a more conservative ABC recommended by the Plan Team and SSC last year given declining spawning stock size. The stock is projected to be below B40% by 2002 due to low recruitment. The Team discussed whether a similar risk averse methodology might be addressed in the pollock or other assessments.

Flatfishes. The author reported that an age-structured model for flathead sole has been delayed by one year due to effort on the programmatic groundfish SEIS. The new model is anticipated for the September 2001 Plan Team meeting. Age-based models for Dover sole and rex sole are planned for 2002. Area apportionments for 2001 were based on the 1999 trawl survey.

Pelagic Shelf Rockfish. The authors will explore the use of an age-structured model for review at the September 2001 Plan Team meeting, similar to that prepared for northern rockfish. The model was planned for this year but was delayed because of contributions to the preparation of the programmatic groundfish SEIS.

Slope rockfish. Since catch is shifting to shore-based fishing, the Team recommended that future assessments examine geographic distribution (Areas 620/630) of each rockfish species/assemblage to determine if localized depletion is occurring. The effect of the single large tow from the 1999 survey on the age estimation in the northern rockfish model also should be examined next year. The covariance estimation should be built into the model to show how the uncertainty propagates through time.

For northern rockfish, the Plan Team recommended that northern rockfish be shifted from Tier 4 to Tier 3a, since it approved the age-structured model as presented and the projected 2001 stock size exceeds the $B_{40\%}$ level. The Team concurred with the authors' ABC recommendation; however it was noted that short term projections are for short term yields to decline. Industry noted that the Council may wish to consider TAC reductions from ABC for interannual catch stability.

Due to work on the SEIS, the following changes to the assessment were not completed:
1. Incorporation of ADModel Builder into the model for POP
2. Preparation of preliminary age-structured models for SR/RE and dusky rockfish for review.

Thornyhead rockfish. Due to the author's involvement in the programmatic SEIS and the Biological Opinion, an updated assessment chapter was not prepared. The only new data included one year of size composition data from the sablefish longline survey. The Team recommended using the 1999 assessment model's projection of the 2001 ABC as a reasonably conservative approach (since the actual catch for 2000 was less than that specified in the projection model).

Other species. The Team reviewed updated 1999 catch data that were incorporated as an appendix to the GOA SAFE Report; more detailed information is included in the 2000 Ecosystem Considerations chapter. The longline fishery concentrates on the continental slope, which was identified as an area with highly concentrated assemblages of a number of species important in the diet of Steller sea lions, particularly squid and octopus.

The GOA FMP mandates that the other species TAC be set equal to 5% of the combined TACs for all other GOA species/assemblages (the GOA FMP does not authorize an ABC for 'other species'). Species have been removed from the other species category over time (Atka mackerel, forage fish species), but the TAC formula has not changed. The Team recognizes that the current formula was not designed with specific overfishing prevention measures in mind. However, the analyses presented last year indicated that the likelihood of overfishing any single species or species group in this category was relatively small.

Tom Pearson presented an approach for partitioning the combined other species TAC to the species assemblage level based on the draft 1999 assessment estimates of assemblage ABCs. The Plan Team endorsed this approach as an interim measure until an FMP amendment can be considered by the Council. The Team also considered another approach to separate sharks and skates into an elasmobranch category (already proposed under Plan Amendment 63), separate squid and octopus into a cephalopod category, and include sculpins and grenadiers as separate categories.

For the following reasons, this interim constraint of TAC for each other species group is important to consider this year.

1. octopus and squid have been identified as preferred prey items of Steller sea lions, and the proposed apportionment provides additional protection for those species.
2. In addition, changes to the distribution of groundfish fisheries (under injunctions, etc.) for 2000 and beyond may result in very different distributions of bycatch than previously observed in the GOA. This may result both from directed fishing on new species to replace lost opportunities for traditional target species, and from inadvertent bycatch due to fishing in nontraditional areas.

To prevent the potential for targeting species groups within this category, the recommended TAC apportionments are: 45% skates, 20% sharks, 30% sculpins, and 5% for octopus and squid. The subgroup ABCs were based on apportioning the recommended ABC for each major taxa by its proportionate share of the sum of ABCs for the major taxa in the assemblage (11,890 mt). The Team noted that Atka mackerel became such a target and ultimately broken out of the other species category.

The Team considered it an interim approach to prevent overfishing of a particular component, in the event that a particular subtaxa became a fishery target. The Team recommends including a revision of the process for setting ABCs and TACs for 'other species' in the final analysis for Amendment 63 (shark/skate analysis).

Harvest Rate Policy. The Team recommended that individual stock assessment authors review the draft West Coast Harvest Rate Policy Workshop Panel Report (Ralston, in prep.) and associated papers to determine its applicability for GOA stock assessments. This issue will be scheduled for the September 2001 Joint Plan team agenda.

Weighting schemes. At the suggestion of the SSC in December 1999, the Team briefly discussed the weighting schemes employed for the Plan Team's recommendations for ABC area apportionments. Jim Ianelli had planned to run simulations for the different approaches used for the different species (e.g., most recent survey for flatfish and arrowtooth flounder, but average of last 3 surveys for most rockfish) but due to his involvement in the programmatic SEIS and the Biological Opinion, this review will be rescheduled for September 2001.

SAFE reports. The Team recommended that the assessment authors provide an executive summary that includes OFL, ABC, and area apportionments, as well as the summary of changes from the previous year's report.

2001 GOA trawl survey. The GOA trawl survey, on a biennial schedule beginning in 1999, likely will be limited in either effort or area (e.g., eliminate coverage of the Eastern Gulf) due to insufficient funding for hiring vessels, gear, and personnel because of the need to also concurrently survey the Eastern Bering Sea and West Coast groundfish. Plans will be finalized by late January due to the timeframe needed to contract with the research vessels.

The Team identified that none of the alternatives adequately address GOA assessment needs. A tradeoff was noted between: 1) continuing the integrity of the time series of the Central and Western Gulf survey estimates

and 2) losing the time trend and biomass continuity for all Eastern Gulf rockfish, the major species being Pacific ocean perch and thornyhead rockfish. The survey could also pare down the number of surveyed species across the whole Gulf. The potential loss of coverage for the Eastern Gulf may only occur for 2001 because the West Coast survey is scheduled to be discontinued after 2001.

Where the opportunities arise, additional survey projects (e.g., samples for enhancing maturity schedules) will be undertaken in cooperation with the RACE Division.

Research priorities.

The GOA Team identified additional research priorities as noted in the attachment.

Attachment

GOA Plan Team Recommendations for Changes to the 2001 Research Priorities

A. Critical Assessment Problems

1. Some of our stocks are disproportionately harvested across large areas of the GOA and BSAI due to area closures, other management actions, or fishery behavior. Additional analysis should be undertaken to examine potential effects of disproportional harvesting.

2. More information is needed on "other species." Observer data should be collected and analyzed for individual species. Better estimates of abundance are needed. Lastly, life history data is limited for many species in this complex. *Stock assessments at the assemblage level (sharks, skates, squid, sculpins, and octopus) are planned in the near future.*

3. Rockfish: There is a general need for better assessment data, particularly investigation of stock structure and biological variables.

   a) Supplement triennial trawl survey biomass estimates with estimates of biomass or indices of biomass obtained from alternative survey designs.
   b) Obtain age and length samples from the commercial fishery, especially for Pacific ocean perch, northern rockfish, and dusky rockfish.
   c) Increase capacity for production ageing of rockfish so that age information from surveys and the fishery can be included in stock assessments in a timely manner.

4. *Pacific cod: Recent research into aging Pacific cod is being completed and looks promising. The next step would be to evaluate its application to production-aging for Pacific cod.*

5. Walleye pollock: There is a continuing need for research on stock structure as it relates to assessments. There is a critical need for a tagging study to focus on stock interactions. We continue to emphasize the need for age-structured assessments of recognized stock units. As the Bering Sea pollock population has declined, the forecasts of future pollock recruitment have undergone greater scrutiny. Research on alternative forecasting methods is needed

   The SSC believes that the magnitude of the catch, size and age structure of the EBS stock harvested in the Russian zone in the vicinity of the transboundary area is needed. It may be necessary to consider fishing removals from the Russian zone and their impact on EBS pollock mortality in the estimates of ABC and TAC.

   Assessment of the status of the Gulf of Alaska resource is critically dependent upon results of resource surveys. Beginning next year, these surveys will be conducted every two years. While this is a positive development, various ways of supplementing the biennial survey data should be evaluated.

   More research should also be conducted on the movement of pollock between the GOA and BSAI and across regions within GOA and BSAI, (e.g., Bogoslof, Donut Hole, PWS, Shelikof, and SE inside).

   More research using acoustic data should be conducted.

6. Crab research: Research should be expanded on handling mortality, stock structure and life history parameters.

7. Age- and length-structured assessments: These assessments integrate several data sources using some weighting scheme. Little research has gone into evaluation of different weighting schemes, although the weight can have a large effect on the assessment results. Research is needed on which weighting schemes are robust to uncertainties among the different data sources. Age structured assessments depend upon age determination techniques and ongoing age validation is needed.

   Correct model specification is critical to stock assessment. Further research is needed on model performance in terms of bias and variability. In particular, computer simulations, sensitivity studies, and retrospective analyses are needed. As models become more complex in terms of parameters, error structure, and data sources, there is a greater need to understand how well they perform.

8. Life history information, e.g., growth and maturity data, is incomplete for a number of stocks. This information is essential for determination of ABC, OFL and preferred fishing mortality rates. Maturity data are lacking for: Pacific cod, Dover sole, other flatfish, sablefish, and many species of rockfish. *An opportunity exists for collecting Pacific cod ovaries and determining maturity during winter surveys scheduled for 2001.* Life history and distributional patterns of Greenland turbot are lacking. To better understand sablefish recruitment variability, additional information on the geographical distributional and movement of juvenile sablefish is needed. *More research should be done on sources of age-specific fish mortality.*

9. Identification of the origin of chum and chinook salmon stocks captured incidentally in the groundfish fisheries is needed. The chum salmon stocks in particular are recognized as a mixture of Asian and North American origin. Resolution of stock origin is important in the consideration of bycatch management.

10. There is need for information about stock structure and movement of walleye pollock, Atka mackerel, Pacific cod, POP, and other rockfish.

11. Further research is needed about management strategies that provide for conservation of aquatic resources. Topics that need attention include: which measure of biomass should be used in biomass-based adjustment of ABC and OFL; what measure of average recruitment to use in $B_{40\%}$; the effect of seasonality in spawning, recruitment, and harvest on optimal harvest rate; adaptive management schemes which are designed to provide understanding of multispecies interactions and spatial population dynamics. One objective is to develop multispecies analysis of stocks.

12. Presentation of uncertainty in stock assessments is often lacking or incomplete. Further research is needed into which methods are most appropriate for capturing uncertainty in the status of populations. The use of Markov Chain-Monte Carlo (MCMC) methods appears to be a promising line of research and its use with AD Model Builder should be further explored.

13. Management measures such as time-area closures and other restrictions are frequently imposed, but rarely rescinded. Studies are needed to evaluate the effectiveness of management measures on conserving populations, achieving management goals and assessing other ecosystem effects.

B. Stock survey concerns

1. Conservation of aquatic resources in the North Pacific is critically dependent on a consistent time series of trawl, hydroacoustic, and longline surveys. The continuity of these series must remain one of the highest priorities of NMFS and the Council. Data analysis should be expanded to include non-target, non-FMP species.

2. Explore ways for inaugurating or improving surveys to assess rockfish (including nearshore pelagics), pollock, squid and Atka mackerel.

3. Expand bottom trawl surveys in the Gulf of Alaska and Bering Sea to include slope areas that encompass the population range of Greenland turbot, rockfish, thornyheads, and sablefish.

4. Conduct surveys of the Aleutian Islands management area to assist in the assessment of groundfish stocks found in this region.

5. Improve surveys for Bering Sea crab complementary to the existing Bering Sea crab/groundfish survey (e.g. Norton Sound, Pribilof Islands, St. Matthew Island, and Bristol Bay).

6. Direct observation (e.g. submersible and dive surveys) offers unique opportunities to directly examine gear performance, fish behavior in the proximity of gear, gear related habitat impacts, and differences of fish density between trawlable and nontrawlable habitat.

7. There is a continuing need to perform gear calibration and fish observation studies to validate indices of abundance (e.g. fishing longline and trawl gear side-by-side, and fishing different baits on longline gear over the same stations).

8. Little scientific sampling has occurred of seamounts within the EEZ for groundfish, halibut, and crab abundance. Surveys that sample these seamounts may improve estimates of total abundance in the EEZ, particularly for sablefish and rockfish stocks.

9. Data from annual ADF&G crab surveys should be examined and their usefulness for assessing groundfish abundance in near-shore areas should be evaluated. Dialogue between ADF&G and NMFS assessment scientists regarding ways of gaining more useful groundfish data from this survey should be encouraged.

C. Expanded Ecosystem Studies

1. Considerable research is being conducted on the effects of climate on the biology and dynamics of marine populations. Research effort is required to develop methods to incorporate climate variability and its influence on processes such as recruitment and growth into our models of population dynamics.

2. There have been considerable recent advances in using naturally occurring stable isotopes in diverse types of studies. Examples include identifying residence times and areas at various life stages; computing trophic levels and food web dynamics; examining ontogenetic changes and patterns of migration. Studies using these natural markers should be encouraged.

3. *Explore the utility of placing trained marine mammal/seabird observers onboard vessels conducting fishery surveys. Such observations may contribute to abundance estimates, or to provide indices of abundance and associations with oceanography and prey distributions. In particular, relationships among oceanographic conditions and animal condition and health should be explored.*
   a) More research should be collected by placing trained marine mammal/seabird biologists on line transect surveys to begin an index of abundance for birds.
   b) Encourage data exchanges between USFWS and NMFS RACE and NMML.

4. Effort is needed on status of stocks and distribution of forage fishes, such as capelin, eulachon, and sand lance. Forage fish are an important part of the ecosystem , yet little is known about these stocks. The Lowell-Wakefield Symposium (October 1996) presented current research on forage fishes.

5. Studies of the effects of harvesting and processing activities on the ecosystem and habitat should be instituted. One example would be a study contrasting species diversity and abundance in the red king crab savings area with that in adjacent regions.

6. Trophic dynamics research should be undertaken on the relationships among critical species, e.g., Pacific cod and its prey (including shrimp and crabs). The feasibility of constructing multispecies models using ongoing collection of gut contents data should be investigated.

7. Groups of species in the rockfish and flatfish families are now managed as "species complexes." Research should be expanded on the question of biological linkages among the components of "species complexes" that justify this management approach. Further, are there other, unidentified groups of species that are ecologically related and could be managed as a unit?

8. Studies are needed to identify essential habitat for groundfish and forage fish species in the Gulf of Alaska and Bering Sea. This identification is required by the MSFCMA and would benefit from field studies conducted across a matrix of spatial, temporal, and life history stages. Mapping of nearshore and shelf habitat should be continued for FMP species.

9. *Expand studies of distribution, abundance, and productivity of seabird populations and ensure that data are collected in ways that provide for rigorous analyses of seabird/marine mammal/oceanographic/fisheries interactions. ~~The majority of~~ Historic data on seabirds in Alaska was collected during the 1970s (through OCSEAP); but the quantity of data collected afterwards has been insufficient to adequately examine trends in these interactions.*

10. *Historic (i.e., OCSEAP) data existing in the USFWS Pelagic Database needs be reformated to update and make the data accessible, to enable analysis on seabird/fishery interactions.*

11. *More recent (1990's - present) data needs be consolidated and added to the pelagic database.*

12. *Seabird diet needs to be described for more areas and species, including winter diet needs of seabirds. Existing and historic diet data needs to be consolidated and put into a format accessible and appropriate for examination of long-term trends. Very little is known about winter diets of birds.*

13. Multivariate statistical analysis of the time series of annual survey data may identify which species regularly occur in assemblages. Mapping these assemblages through space and time may reveal

changes in the distribution and abundance of the species of the Eastern Bering Sea. These mappings and trajectories may be applicable to adaptive management approaches suggested for exploring ecosystem concerns. Although related analyses were started by NMFS in the late 1970's, they have not been conducted in recent years. Recent advances in spatial statistics may prove fruitful tools for re-examining these existing data.

14. Uncertainty about the relationship between the Steller sea lion population and groundfish fisheries has taken an elevated significance. With this uncertainty as to the extent of factors affecting Steller sea lions, it is critically important to investigate the effects of mitigation measures on the sea lions, the fisheries, and the ecosystem. The monitoring must be based on an experimental design that provides information about the interaction of fisheries and Steller sea lions. Five questions are central to future work:

15. What is the distribution of fish in relation to areas used for fishing, and what are the seasonal changes?
    (b) What is the distribution of fish in fishing areas before and after fishing?
    (c) How do Steller sea lions use pollock in relations to pollock distributions?
    (d) How does the Steller sea lion's pollock feeding habits influence sea lion population dynamics?
    (e) Does the fishery effect Steller sea lions in other ways (e.g., behavioral disturbance)?

16. More research should be conducted to estimate jellyfish abundance trends because it may be an ecosystem indicator and acts (it is a habitat for pollock)

D. Social and economic research

There is a critical need for the development and continued maintenance of basic social and economic information databases on the fisheries and fisheries dependent communities of GOA and BS/AI. This information is required for establishing a baseline to be used in the evaluation of the impacts of alternative management measures.

1. There is a need to develop a cross section-time series of data on:

    a) Ex-vessel and wholesale prices (information is needed on actual transactions and sources of variability).
    b) Inventories and exports (greater detail on product form, volume, and transactions prices).
    c) Cost of variable inputs to fishing
    d) Patterns of ownership in fishing and processing operations (concentration, vertical integration, foreign participation).
    e) Employment and earnings for crew and skippers
    f) Patterns of employment/unemployment, earnings, transfer payments in fishery dependent communities, and
    g) The location where goods and services are purchased.

2. There is a need for economic analyses of:

    a) The demand for fisheries products (exvessel, wholesale, international, and retail markets)
    b) Production functions for catch and processing
    c) Regional models of economic activity in fishery dependent communities,

d) An assessment of the cumulative efficiency and equity consequences of management actions that apply time/area closures
e) An assessment of the consequences of the halibut/sablefish IFQ program (changes in product markets, characteristics of quota share markets, changes in distribution of ownership, changes in crew compensation, etc.)
f) Estimates of the net economic benefits of recreation and subsistence harvests, and,
g) Improved representation of fleet behavioral response to alternative fishing opportunities to provide better prediction of how fishing effort will shift in response to time/area closures.

3. Research pertinent to assessment of the social impacts of actions contemplated by the Council include:

a) Fishery/Community Linkages: Field research aimed at capturing the full array of linkages between fisheries and social and economic life in fishery dependent communities.
b) Social Assessments: Selected community and industry assessments should be conducted to establish baseline conditions underlying social problems identified by the Council and the Advisory Panel. As appropriate, these projects can be extended to generate time series information.
c) Social Impacts: Social impact and policy research should be conducted regarding the identification and potential effects of alternative management actions.
d) Develop better methods for determining the social costs and benefits of management actions (e.g. through the use of non-market valuation techniques).

E. Bycatch problems

1. Research on gear modification and other methods for reducing bycatch should be expanded.

2. A better quantification of discard mortality rates is needed, especially for halibut and crab.

3. Data on size/age and sex of crabs taken as bycatch are needed to assess impacts.

4. Comprehensive evaluations are needed of single and multiple time/area closures and other bycatch management measures.

5. Develop better methods for assessing the social costs of bycatch.

6. Identify sources of variability in actual and estimated bycatch rates.

7. Collect bycatch information in the directed halibut fisheries using observer coverage. Current logbook information is inadequate to quantify this bycatch.

F. Fishery Monitoring

1. Inseason management and stock assessment are critically dependent on catch estimates. There is a need to conduct ongoing analyses of the accuracy and precision of catch estimates in all fisheries. An analysis of the utility of fishery logbook information should be conducted. In particular, determine if

it is possible to gain insight into fleet performance from such information. Examine feasibility for developing a representative CPUE index and determine if it is proportional to stock size

2. Evaluate sampling procedures used by observers and various catch estimation procedures. Recent analyses have been conducted on efficient methods of collecting representative biological data from target species. Similar studies should be conducted on the collection of prohibited species biological data.

3. Development of catch and bycatch sampling procedures for individual vessel accountability programs.

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TAC-setting analysis. The Plan Team recommended that the Council add two new alternatives to the analysis:

1. Alternative 3B. Annually set specifications for 2 years, implementing the Plan Team/SSC OFL and ABC recommendations for year 1 and the stock assessment projection to set interim OFLs and ABCs for year 2.

The year 2 fishery would start under the OFL, ABC, TAC, and PSC projections for that year. These would be replaced by the new assessment recommendations. The Plan Team/Council schedule for preliminary (September/October) and final recommendations (November/December) for groundfish specifications would continue unchanged. However, the proposed rule for the specifications and the accompanying EA/RIR/IRFA would be available for more thorough preparation, review, and public comment during the spring, with filing of the final rule by May/June.

The Teams noted that the Pacific Council does not incorporate the current year's survey into its model (because it prepares models every three years tied to triennial survey frequency). The authors determined that not incorporating the current year's survey may have biological impacts on the short-lived individual stocks such as pollock and cod, but may not for longer-lived fish such as rockfish.

2. Alternative 3B, Suboption: Biannually set GOA specifications for three years, implementing the Plan Team/SSC OFL and ABC recommendations for years 1 and 2 (based on the biennial survey results) and the stock assessment projection of OFLs and ABCs for year 3.

The Council would implement the Plan Team OFL and ABC recommendations for years 1 and 2 (based on the biennial survey beginning in 2001) and the stock assessment projection of OFL and ABC for year 3 (until replaced by the new assessment recommendations). Therefore, most GOA stock assessments would be prepared every other year. The Team may convene once instead of twice each year to review: 1) possible assessment model changes, 2) groundfish proposals, 3) ecosystem considerations, or other issues. Some surveys are done annually and those assessments are likely to be prepared annually (sablefish and pollock).

The Plan Teams felt that changing the time of the trawl surveys should not be considered, due to weather hazards and possible temporal changes in fish distribution.

Sablefish. The Team discussed whether to incorporate fishery catch rate indices into the sablefish assessment model. The Teams encouraged the authors to continue to examine this information for estimating abundance trends. Currently, the index based on fishery data is consistent with the model. The Team noted that it should be closely evaluated for bias potential.

The Team discussed whether fishery catch rate information (including voluntary reporting) should be used for area apportionments. The basis for area apportionments is biological. However, using only the longline surveys, only the fishery catch information, or a combination of the two would not constitute a biological problem (since the range of differences is relatively small). The Team suggested that concerns over apportionment levels would be raised if the potential of "overfishing" within an area were approached.

The Team identified the following strengths and weaknesses of including fishery data. Based on recommendations from a report by the National Research Council Committee on Improving the Collection and Use of Fisheries Data (in press), the Teams noted that (1) fishing data are collected across larger areas and longer time periods than independent fishery survey data; (2) the sablefish industry recognized the need for more high quality data and voluntarily implemented a logbook system to provide additional data --inclusion of this data provides greater involvement of the industry in the assessment process; and (3) the NRC study recommended that "Management Councils could and should play a major role in promoting greater use of

fishery-dependent data by including programs for collecting and improving such data in fishery management plans." The same report further recommended that "NMFS should make new efforts to explore more cost-effective ways of obtaining the fisheries data it needs, ... especially, finding ways to improve commercial data to make it more useful for stock assessments." Thus, there is an obligation to develop methods to use these fishery data in the stock assessment process.

Based on results from simulated data sets, another NRC report on "Improving Fish Stock Assessments" (1998) advises stock assessment scientists that "Fishery independent surveys offer the best opportunity for controlling sampling condition over time and are the best choices for achieving a reliable index if they are designed well with respect to location, timing, sampling gear, and other considerations of statistically valid sample design." The NRC committee also wrote, "CPUE data from commercial fisheries, if not properly standardized, do not usually provide the most appropriate index."

A critical assumption that must be met for an index to be proportional to abundance is constant "catchability." Increasing sablefish fishery catch rates and decreasing survey abundance in the West Yakutat provides evidence for time varying catchability. Furthermore, due to apportionment schemes that use fishery catch rates, there are economic incentives to over-value logbook catch rates. This makes the use of fishery catch rates (based on unobserved logbook data) in the sablefish fishery troubling because use of the index may introduce bias into the assessment. Stock assessment scientists have an obligation to use the best available science and to carefully scrutinize data sources that are questionable.

Using only the longline surveys, apportioning the combined 2001 ABC among regions would result in: 1,364 mt for the EBS, 2,614 mt for the AI, and 12,922 mt for the GOA. The apportionment within the GOA would be: 2,236 mt for the WGOA; 5,633 mt for the CGOA; 1,769 mt for the WY; and 3,285 mt for the EY/SE.

In the past the Council has been interested in using fishery data for making area TAC apportionments. Therefore, the Plan Team provided these ABC apportionments as 1,560 mt for the EBS, 2,500 mt for the AI, and 12,840 mt for the GOA. The apportionment within the GOA would be: 2,010 mt for the WGOA; 5,410 mt for the CGOA; 1,880 mt for the WY; and 3,540 mt for the EY/SE.

The Teams requested that the authors examine the voluntary logbook (once additional logbooks are entered) vs. observer reports for fishery catch rates in the next assessment. About 60% of the fishery will be covered by the mandatory logbook program in the 2000 sablefish fishery and that data will be incorporated into the model.

The Team noted that fishery interactions (identified as fishing within 7 days and 5 miles of survey stations) with the NMFS sablefish longline survey returned to previous levels in 2000, after dropping in 1999. The authors said they will continue to work with fisheries organizations to minimize interactions. The Team noted that they did not have a biological concern since the level of interactions has been fairly consistent since the IFQ fishery started in 1995.

Due to the authors' work on the programmatic SEIS, the following was unable to be incorporated into the model: small gillnet sampling in 2000, and analyses of bottom trawl survey results.

2000 Pacific Halibut Stock Assessment. The IPHC model is based on adult halibut, but juvenile halibut affect the groundfish fishery. The Teams suggested that abundance estimates down to age 2 (that are intercepted by the groundfish fisheries) from the abundance at age matrix be presented in the SAFE report. The Teams discussed whether the halibut stock assessment should continue to be included in the Final SAFE Report since a new halibut assessment is generally released within weeks of SAFE distribution. The Team wanted to keep

the Appendix, but noted that the website address for the new IPHC model could be added to the Appendix cover page. The Appendix is the only summary that converts the halibut numbers to metric tons and is a convenient document for federal managers.

Halibut discard mortality rate report. The Teams expressed concern that the Observer Database continues to not allow the data user to identify whether halibut were discarded or retained on observed hauls. Prior to IFQs, it was assumed that all halibut were discarded. However, halibut are retained on mixed target IFQ trips and data recorded for observed hauls do not allow for the separation of retained or discarded fish.

The Teams endorsed the staff proposal to set triennial groundfish DMRs. If a fishery redistributes geographically, such as the Pacific cod fishery due to the injunction, halibut bycatch and discard mortality rates may be affected. IPHC staff will continue to examine the fishery each year, and will report to the Council if there is a significant change compared with the long term average.

Ecosystem Considerations. The Teams reviewed the chapter with Pat Livingston and provided comments for sections to be included for next year. Updates on marine mammal and seabird abundances were briefly discussed. GOA shark research will be included next year. The Teams encouraged NMML to direct efforts for population estimate for killer whales such as a line transect survey.

Tamra Faris raised the federal requirements to assess fishery impacts on ecosystem considerations (marine mammals, seabirds, etc.) in the environmental analysis that supports the annual specifications and encouraged the Teams to include assessments of the data included in the ecosystem chapter. The Teams acknowledged the purpose of the ecosystem chapter is to provide the baseline information for assessing ecosystem impacts from fishing and the difficulty in reaching consensus on assessing "impacts." The scientific information with which to make such evaluations is currently not available.

Economic SAFE Report. The Teams recommended expanding the economic tables by one significant digit for totals for fisheries with low catches (e.g., sablefish). Council staff also requested that additional text that summarizes the economic data by FMP area, species, gear, and sector (e.g., X number of vessels using trawl gear harvested Y pounds of pollock in the BSAI fishery) be provided in the introductory text that could be used for the regulatory impact reviews and initial regulatory flexibility analyses. Industry suggested adding text that explicitly states that discards are counted against the quota.

September 2001 Joint Plan Team Meeting Agenda. The teams identified the following topics to be added to the agenda for September 2001:

1. West Coast Groundfish Harvest Rate Policy Workshop Panel Draft Report
2. National Resource Council Committee on Improving the Collection and Use of Fisheries Data report (in press).
3. Programmatic SEIS recommendations.

Table 1. Gulf of Alaska groundfish 1999 and 2000 ABCs, 1999 TACs, and 1999 catches reported through October 28, 2000. MSY is unknown for all species.

SPECIES		ABC (mt) 2001		ABC (mt) 2000	TAC 2000	CATCH 2000
Pollock	W (61)	35,240	W (61)	29,290	29,290	21,418
	C (62)	14,260	C (62)	17,430	17,430	286
	C (63)	26,650	C (63)	22,930	22,930	21,229
	Shelikof	20,680		21,550	21,550	26,384
	WYAK	2,520	E	2,340	2,340	2,096
	EYAK/SEO	6,460		6,460	6,460	4
	TOTAL	105,810	**TOTAL**	100,000	100,000	71,417
Pacific Cod	W	24,400	W	27,500	20,625	21,661
	C	38,650	C	43,550	34,080	31,949
	E	4,750	E	5,350	4,010	416
	TOTAL	67,800	**TOTAL**	76,400	58,715	54,026
Deep water flatfish[1]	W	280	W	280	280	26
	C	2,710	C	2,710	2,710	797
	WYAK	1,240	E	1,240	1,240	116
	EYAK/SEO	1,070		1,070	1,070	26
	TOTAL	5,300	**TOTAL**	5,300	5,300	965
Rex sole	W	1,230	W	1,230	1,230	866
	C	5,660	C	5,660	5,660	2,623
	WYAK	1,540	E	1,540	1,540	4
	EYAK/SEO	1,010		1,010	1,010	0
	TOTAL	9,440	**TOTAL**	9,440	9,440	3,493
Shallow water flatfish[2]	W	19,510	W	19,510	4,500	564
	C	16,400	C	16,400	12,950	5,872
	WYAK	790	E	790	790	5
	EYAK/SEO	1,160		1,160	1,160	2
	TOTAL	37,860	**TOTAL**	37,860	19,400	6,443
Flathead sole	W	8,490	W	8,490	2,000	274
	C	15,720	C	15,720	5,000	1,214
	WYAK	1,440	E	1,440	1,440	9
	EYAK/SEO	620		620	620	0
	TOTAL	26,270	**TOTAL**	26,270	9,060	1,497
Arrowtooth flounder	W	16,480	W	16,160	5,000	6,159
	C	99,590	C	97,710	25,000	17,508
	WYAK	24,220	E	23,770	2,500	133
	EYAK/SEO	7,860		7,720	2,500	256
	TOTAL	148,150	**TOTAL**	145,360	35,000	24,056
Sablefish	W	2,010	W	1,840	1,840	1,578
	C	5,410	C	5,730	5,730	6,102
	WYAK	1,880	WYK	2,207	2,207	2,059
	SEO	3,540	SEO	3,553	3,553	3,832
	TOTAL	12,840	**TOTAL**	13,330	13,330	13,571
Other Slope rockfish	W	20	W	20	20	49
	C	740	C	740	740	361
	WYAK	250[3]	E	250	250	117
	EYAK/SEO	3,890		3,890	3,890	45
	TOTAL	4,900	**TOTAL**	4,900	4,900	572

(Table 1 continued)

SPECIES		ABC (mt) 2001		ABC (mt) 2000	TAC 2000	CATCH 2000
Northern rockfish	W	600	W	630	630	747
	C	4,280	C	4,490	4,490	2,578
	E	0 [3]	E			0
	TOTAL	4,880	**TOTAL**	5,120	5,120	3,325
Pacific ocean perch	W	1,280	W	1,240	1,240	1,161
	C	9,610	C	9,240	9,240	8,359
	WYAK		E	840	840	616
	SEO			1,700	1,700	2
	E	2,620				0
	TOTAL	13,510	**TOTAL**	13,020	13,020	10,138
Shortraker/rougheye	W	210	W	210	210	138
	C	930	C	930	930	882
	E	590	E	590	590	707
	TOTAL	1,730	**TOTAL**	1,730	1,730	1,727
Pelagic shelf rockfish	W	550	W	550	550	189
	C	4,080	C Inshore	4,080	4,080	3,073
	WYAK	580	C Offshore	580	580	445
	EYAK/SEO	770	E	770	770	20
	TOTAL	5,980	**TOTAL**	5,980	5,980	3,727
Demersal Shelf Rockfish		330		340	340	253
Atka Mackerel	GW	600	GW	600	600	170
Thornyhead rockfish		420	Western	430	430	333
		970	Central	990	990	546
		920	Eastern	940	940	403
	TOTAL	2,310	**TOTAL**	2,360	2,360	1,282
Other Species	GW	NA	GW	NA	14,215	5,606
TOTAL		447,710		448,010	298,510	202,268

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 5 mt for northern rockfish has been included in the WYAK ABC for other slope rockfish.
NOTE:
ABCs and TACs are rounded to nearest 10 mt.
GW means Gulfwide.
Catch data source: NMFS Blend Reports.

Table 2. Gulf of Alaska 2001 ABCs, biomass, overfishing levels, and estimated trends (mt) for Western, Central, Eastern, Gulfwide, West Yakutat, and Southeast Outside regulatory areas.

		2001			
SPECIES		ABC	Biomass	Overfishing Level	Abundance,[2] Trend
Pollock	W (61)	35,240	(W/C + WYAK)		Below,
	C (62)	14,260	699,00	117,750	Increasing
	C (63)	26,650			
	Shelikof	20,680			
	WYAK	2,520	(EYAK/SEO)		
	EYAK/SEO	6,460	28,710	8,610	
	TOTAL	105,810		126,360	
Pacific Cod	W	24,400			Above,
	C	38,650			Declining
	E	4,750			
	TOTAL	67,800	526,000	91,200	
Deep water flatfish	W	280			Unknown,
	C	2,710			Unknown
	WYAK	1,240			
	EYAK/SEO	1,070			
	TOTAL	5,300	74,460 [4]	6,980	
Rex sole	W	1,230			Unknown,[3]
	C	5,660			Stable
	WYAK	1,540			
	EYAK/SEO	1,010			
	TOTAL	9,440	81,020	12,300	
Shallow water flatfish	W	19,510			Unknown,[3]
	C	16,400			Stable
	WYAK	790			
	EYAK/SEO	1,160			
	TOTAL	37,860	299,100	45,330	
Flathead sole	W	8,490			Unknown,[3]
	C	15,720			Stable
	WYAK	1,440			
	EYAK/SEO	620			
	TOTAL	26,270	207,520	34,210	
Arrowtooth flounder	W	16,480			Above,
	C	99,590			Declining
	WYAK	24,220			
	EYAK/SEO	7,860			
	TOTAL	148,150	1,586,530	173,550	
Sablefish	W	2,010			Low,
	C	5,410			Stable
	WYAK	1,880			
	EY/SEO	3,540			
	TOTAL	12,840	188,000	15,720	
Other Slope rockfish	W	20			Unknown,
	C	740			Unknown
	WYAK	250 [1]			
	EYAK/SEO	3,890			
	TOTAL	4,900	102,510	6,390	

(Table 2 continued)

SPECIES		2001 ABC		Overfishing Level	Abundance,[2] Trend
Northern rockfish	W	600			Above,
	C	4,280			Declining
	E	0 [1]			
	TOTAL	4,880	93,850	5,780	
Pacific ocean perch	W	1,280		1,520	Below,
	C	9,610		11,350	Increasing
	WYAK				
	EY/SEO			3,090	
	WY/EY/SEO	2,620			
	TOTAL	13,510	211,160	15,960	
Shortraker/ rougheye	W	210			Unknown,
	C	930			Unknown
	E	590			
	TOTAL	1,730	70,890	2,510	
Pelagic shelf rockfish	W	550			Unknown,
	C	4,080			Unknown
	WYAK	580			
	EY/SEO	770			
	TOTAL	5,980	66,440	9,040	
Demersal shelf rockfish	SEO	330	14,695	410	Unknown, Unknown
Atka mackerel	GW	600	Unknown	6,200	Unkown, Unknown
Thornyhead rockfish	Western	420			Above,
	Central	970			Stable
	Eastern	920		2,770	
	Total	2,310	52,100		
Other species					TAC = 5% of the sum of TACs.
TOTAL		447,710		554,710	

1/ The EGOA ABC of 5 mt for northern rockfish has been included in the WYAK ABC for other slope rockfish.

2/ Abundance relative to target stock size as specified in SAFE documents.

3/ Historically lightly exploited therefore expected to be above the specified reference point.

4/ Biomass of Dover sole; biomass of Greenland turbot and deep-sea sole is unknown.

NOTE:

ABCs are rounded to nearest 10.

Overfishing is defined Gulf-wide, except for pollock and POP.

Table 3. Summary of fishing mortality rates and overfishing levels for the Gulf of Alaska, 2000.

Species	Tier	F_{ABC}[1]	Strategy	F_{OFL}[2]	Strategy
Pollock	3b	0.28	$F_{40\% \text{ adjusted}}$	0.34	$F_{35\% \text{ adjusted}}$
Pacific cod	3a	0.33	F_{ABC}	0.46	$F_{35\%}$
Deepwater flatfish	5,6[3]	0.075	F_{ABC}[3]	NA	F_{OFL}[4]
Rex sole	5	0.15	F=.75M	0.20	F=M
Flathead sole	5	0.15	F=.75M	0.20	F=M
Shallow water flatfish	4,5[5]	0.15-0.17	F=.75M, $F_{40\%}$[5]	.2-.21	$F_{35\%}$, F=M[6]
Arrowtooth	3a	0.134	$F_{40\%}$	0.159	$F_{35\%}$
Sablefish	3b	0.1	$F_{40\% \text{ adjusted}}$	0.124	$F_{35\% \text{adjusted}}$
Pacific ocean perch	3b	0.067	$F_{40\% \text{ adjusted}}$	0.078	$F_{35\% \text{ adjusted}}$
Shortraker/rougheye	4,5[7]	0.023/0.025	F=.75M, F=M[7]	0.03/.038	F=M, $F_{35\%}$[8]
Rockfish (other slope)	4,5[9]	0.03-0.75	F=.75M, F=M[9]	0.04-0.10	$F_{35\%}$, F=M[10]
Northern rockfish	3a	0.055	$F_{40\%}$	0.065	$F_{35\%}$
Pelagic Shelf Rockfish	4	0.09	F=M	0.136	$F_{35\%}$
Demersal Shelf Rockfish	4	0.02	F=M	0.028	$F_{35\%}$
Thornyhead rockfish	3a	0.077	$F_{40\%}$	0.092	$F_{35\%}$
Atka mackerel	6	NA	F_{ABC}[11]	NA	F_{OFL}[12]

1/ Fishing mortality rate corresponding to acceptable biological catch.
2/ Maximum fishing mortality rate allowable under overfishing definition.
3/ F_{ABC}=.75M for Dover sole (Tier 5), ABC=.75 x average catch (1978-1995) for other deepwater flatfish (Tier 6).
4/ F=M for Dover sole, average catch (1978-1995) for other deepwater flatfish.
5/ $F_{40\%}$ for rocksole (Tier 4), F=.75M for remaining shallowater flatfish (Tier 5).
6/ $F_{35\%}$ for rocksole, F=M for remaining shallow water flatfish.
7/ F=.75M for shortraker (Tier 5), F=M for rougheye (Tier4).
8/ F=M for shortraker, $F_{35\%}$ for rougheye.
9/ F=M for sharpchin rockfish (Tier 4), F=.75M for other species (Tier 5).
10/ $F_{35\%}$ for sharpchin, F=M for other species.
11/ ABC for Atka mackerel is 600 mt for bycatch in other target fisheries.
12/ OFL for Atka mackerel is equal to average catch from 1978 to 1995.

Table 4. Maximum permissible fishing mortality rates and ABCs as defined in Amendment 56 to the GOA and BSAI Groundfish FMPs, and the 2001 Plan Team recommended fishing mortality rates and ABCs, for those species whose recommendations were below the maximum.

Gulf of Alaska

Species	Tier	2001 Max. Permissible F_{ABC}	2001 Max. Permissible ABC	2001 F_{ABC}	2001 ABC
Pacific cod	3a	0.37	76,700	0.33	67,800
Rougheye rockfish	4	0.032	1,550	0.025	1,210
Shortraker rockfish	5	0.023	520	0.023	520
Total Shortraker/Rougheye	4,5		2,070		1,730
Other slope rockfish (sharpchin)	3a	0.055	1,980	0.050	1,800
Other slope rockfish (redstripe)	5	0.075	1,240	0.075	1,240
Other slope rockfish (harlequin)	5	0.045	560	0.045	560
Other slope rockfish (silvergrey)	5	0.030	780	0.030	780
Other slope rockfish (redbanded)	5	0.045	290	0.045	290
Other slope rockfish (minor species)	5	0.045	220	0.045	220
Total other slope rockfish	4,5		5,070		4,900
Pelagic shelf rockfish	4	0.110	7,310	0.090	5,980
Demersal shelf rockfish	4	0.025	420	0.020	330
Atka mackerel	6	NA	4,700	NA	600

Table 9. Summary of halibut discard mortality rates (DMRs) in the Bering Sea/Aleutian Islands (BSAI) groundfish fisheries during 1990-1999 and recommendations for Preseason Assumed DMRs in monitoring halibut bycatch mortality in 2001-2003 for the open access fisheries and in the 2001 CDQ fisheries.

Gear/Target	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	Long-Term Mean DMR	Basis
Trawl												
Atka mackerel	66	77	71	69	73	73	83	85	77	81	75	1990-1999
Bottom pollock	68	74	78	78	80	73	79	72	80	74	76	1990-1999
Pacific cod	68	64	69	67	64	71	70	67	66	69	67	1990-1999
Other Flatfish	80	75	76	69	61	68	67	71	78	63	71	1990-1999
Rockfish	65	67	69	69	75	68	72	71	56	81	69	1990-1999
Flathead sole	-	-	-	-	67	62	66	57	70	79	67	1994-1999
Other species	-	-	-	-	-	-	-	-	-	-	67	Pcod fishery
Pelagic pollock	85	82	85	85	80	79	83	87	86	87	84	1990-1999
Rock sole	64	79	78	76	76	73	74	77	79	81	76	1990-1999
Sablefish	46	66	-	26	20	-	-	-	-	90	50	1990-1999
Turbot	69	55	-	-	58	75	70	75	86	70	70	1990-1999
Yellowfin sole	83	88	83	80	81	77	76	80	82	78	81	1990-1999
Pot												
Pacific cod	12	4	12	4	10	10	7	4	13	9	8	1990-1999
Other species	-	-	-	-	-	-	-	-	-	-	8	Pcod fishery
Longline												
Pacific cod	19	23	21	17	15	14	12	11	11	12	12	1996-1999
Rockfish	17	55	-	6	23	-	20	4	52	-	25	1990-1998
Other species	-	-	-	-	-	-	-	-	-	-	12	Pcod fishery
Sablefish	14	32	14	13	38	-	-	-	-	-	22	1990-1994
Turbot	15	30	11	10	14	9	15	22	18	17	18	1990-1999
CDQ Trawl												
Atka mackerel	-	-	-	-	-	-	-	-	-	82	82	Latest year
Bottom pollock	-	-	-	-	-	-	-	-	90	88	88	Latest year
Pelagic pollock	-	-	-	-	-	-	-	-	90	90	90	Latest year
Rockfish	-	-	-	-	-	-	-	-	-	88	88	Latest year
Yellowfin sole	-	-	-	-	-	-	-	-	-	83	83	Latest year
CDQ Longline												
Pacific cod	-	-	-	-	-	-	-	-	10	10	10	Latest year

Table 10. Summary of halibut discard mortality rates (DMRs) in the Gulf of Alaska (GOA) groundfish fisheries during 1990-1999 and recommendations for Preseason Assumed DMRs in monitoring halibut bycatch mortality in 2001-2003.

Gear and Target	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	Long Term Mean DMR	Basis
Trawl												
Atka mackerel	67	89	81	67	53	-	60	-	-	-	70	1990-1996
Bottom pollock	51	62	66	57	48	66	79	66	55	55	61	1990-1999
Pacific cod	60	62	66	59	53	64	70	62	64	54	61	1990-1999
Deep wtr flats	61	58	70	59	60	56	71	61	51	51	60	1990-1999
Shallow wtr flats	66	71	69	65	62	70	71	71	67	81	69	1990-1999
Rockfish	65	75	79	75	58	71	65	63	68	74	69	1990-1999
Flathead sole	-	-	-	-	54	64	67	74	39	51	58	1994-1999
Other species	-	-	-	-	-	-	-	-	-	-	61	Pcod fishery
Pelagic pollock	71	82	72	63	61	51	81	70	80	86	72	1990-1999
Sablefish	70	60	68	59	67	58	80	61	-	68	66	1990-1999
Arrowtooth fldr	-	-	-	-	-	-	66	48	62	73	62	1996-1999
Rex sole	-	-	-	-	56	76	63	47	58	70	61	1994-1999
Pot												
Pacific cod	12	7	16	24	17	21	7	11	16	13	14	1990-1999
Other species	-	-	-	-	-	-	-	-	-	-	14	Pcod fishery
Longline												
Pacific cod	15	18	13	7	11	13	11	22	11	17	14	1990-1999
Rockfish	6	-	-	7	-	4	13	-	9	-	8	1990-1998
Other species	-	-	-	-	-	-	-	-	-	-	14	Pcod fishery
Sablefish	17	27	28	30	22	-	-	-	-	-	24	1990-1994

Preseason assumed discard mortality rates used by NMFS for monitoring halibut bycatch mortality in 2000 in the Alaskan groundfish fisheries.

Bering Sea/Aleutians Fishery	2000 Preseason Assumed DMR	Gulf of Alaska Fishery	2000 Preseason Assumed DMR
Trawls		***Trawls***	
Atka mackerel	81	Atka mackerel	57
Bottom trawl pollock	76	Bottom trawl pollock	61
Pacific cod	66	Pacific cod	63
Other flatfish	75	Deep water flatfish	56
Rockfish	64	Shallow water flatfish	69
Flathead sole	64	Rockfish	66
Other species	66	Flathead sole	57
Midwater pollock	87	Other species	66
Rock sole	79	Midwater pollock	75
Sablefish	23	Sablefish	71
Turbot	81	Arrowtooth flounder	55
Yellowfin sole	81	Rex sole	53
Pots		***Pots***	
Pacific cod	9	Pacific cod	14
Other species	9	Other species	14
Hook & Line		***Hook & Line***	
Pacific cod	11	Pacific cod	17
Rockfish	28	Rockfish	11
Other species	11	Other species	17
Turbot	20		

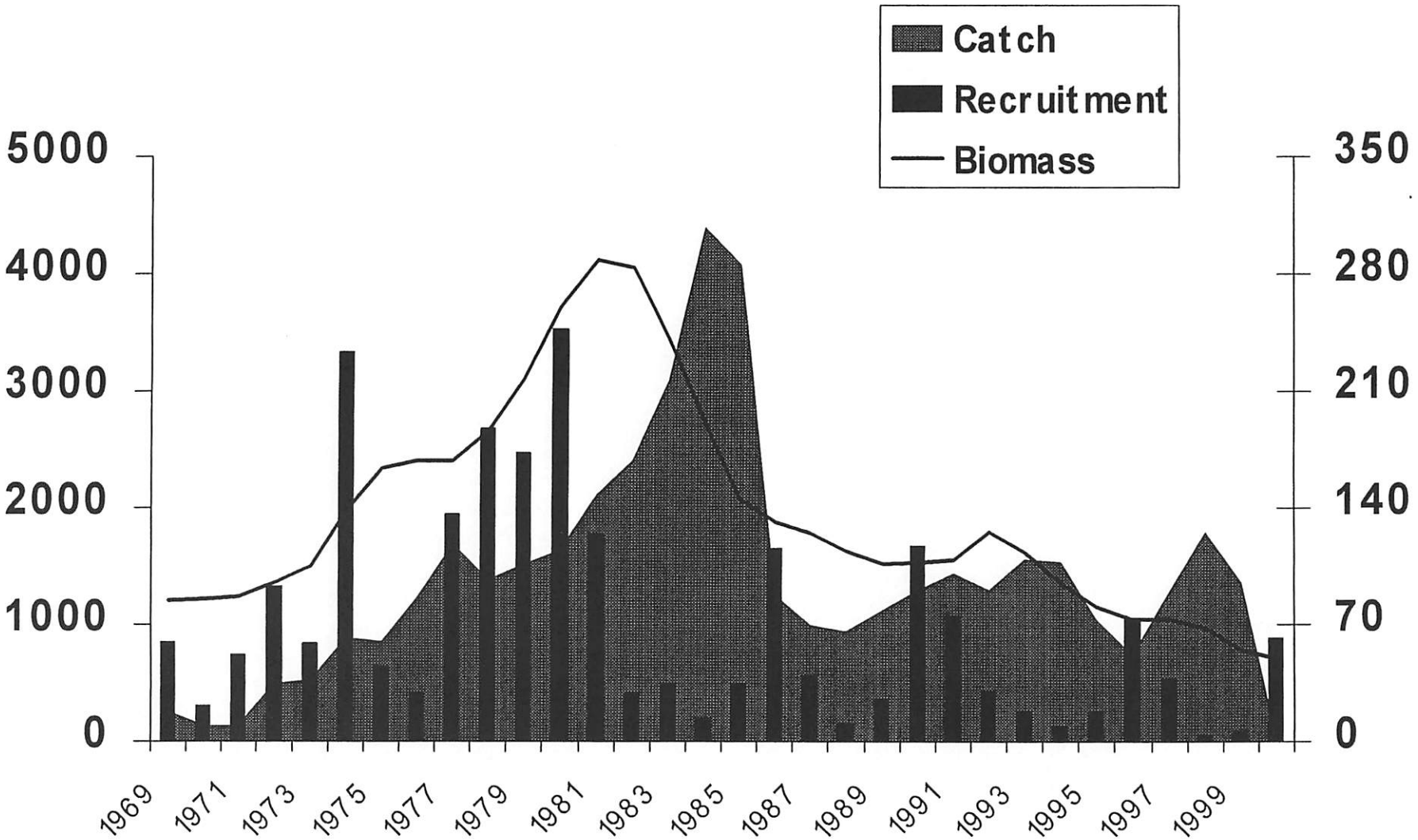
Gulf of Alaska Groundfish Plan Team

Update on groundfish stock trends for the Gulf of Alaska

James N. Ianelli
Gulf of Alaska Groundfish
Plan Team

Gulf of Alaska Groundfish Plan Team

Pollock



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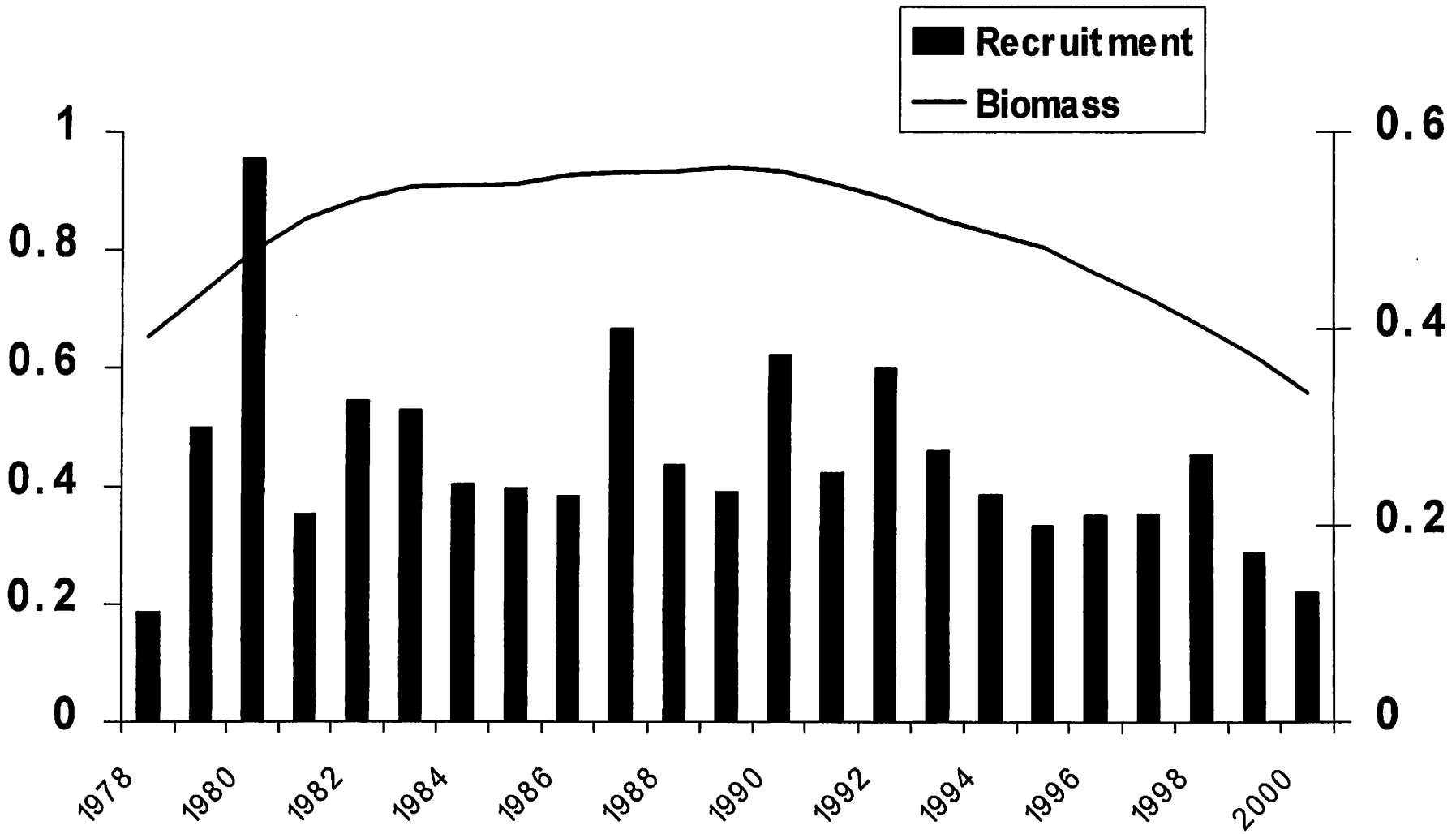
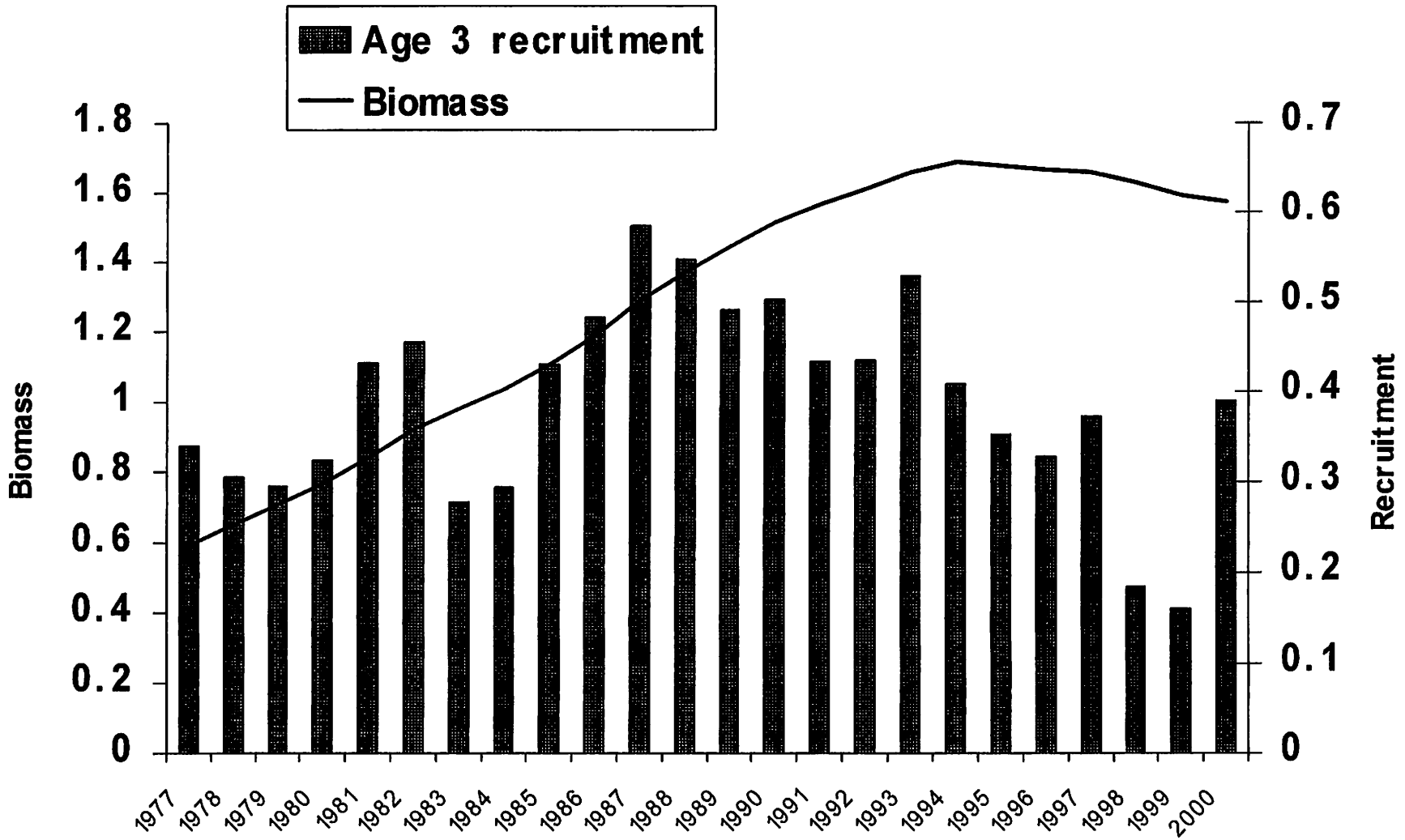
Pacific cod



Arrowtooth flounder



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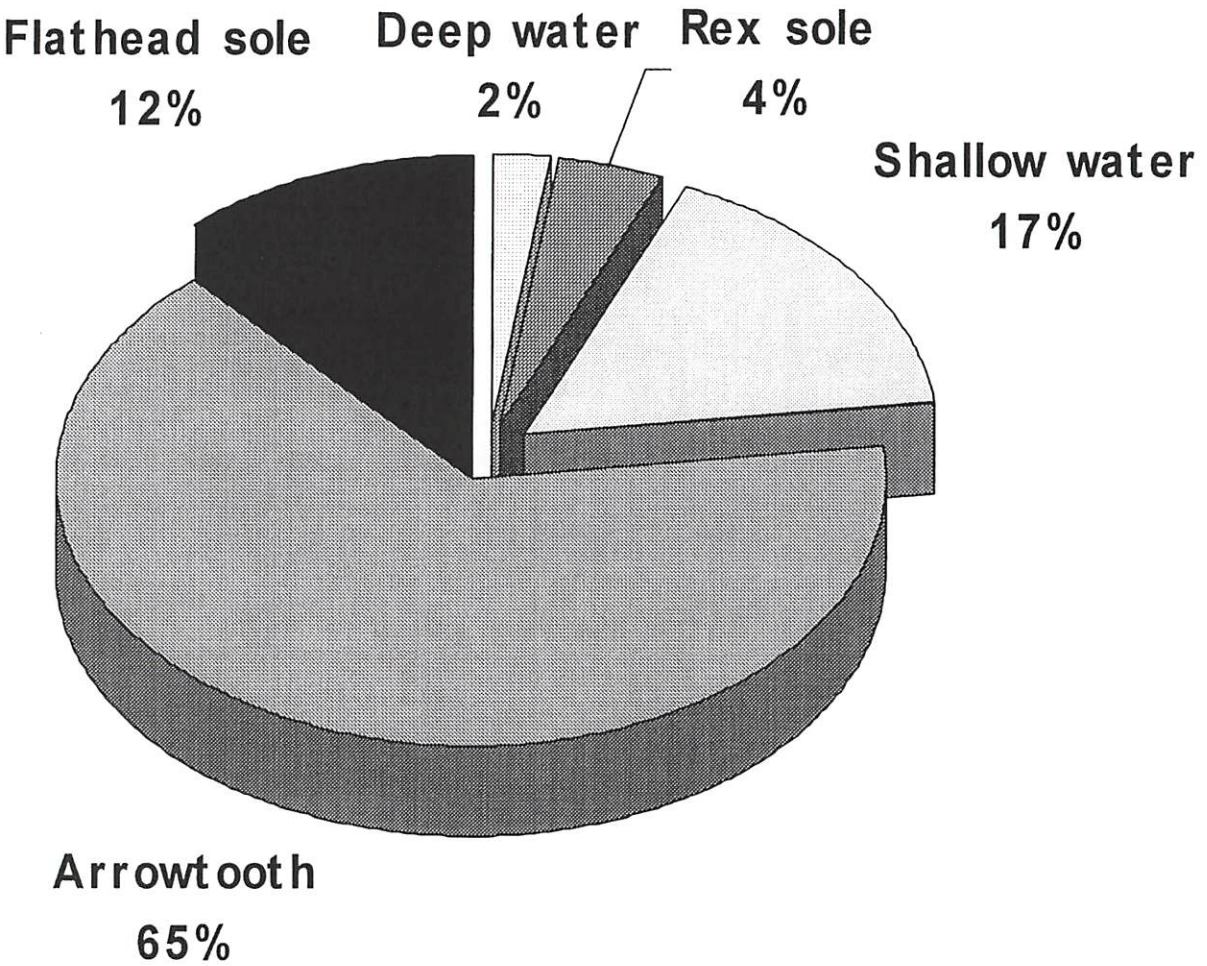
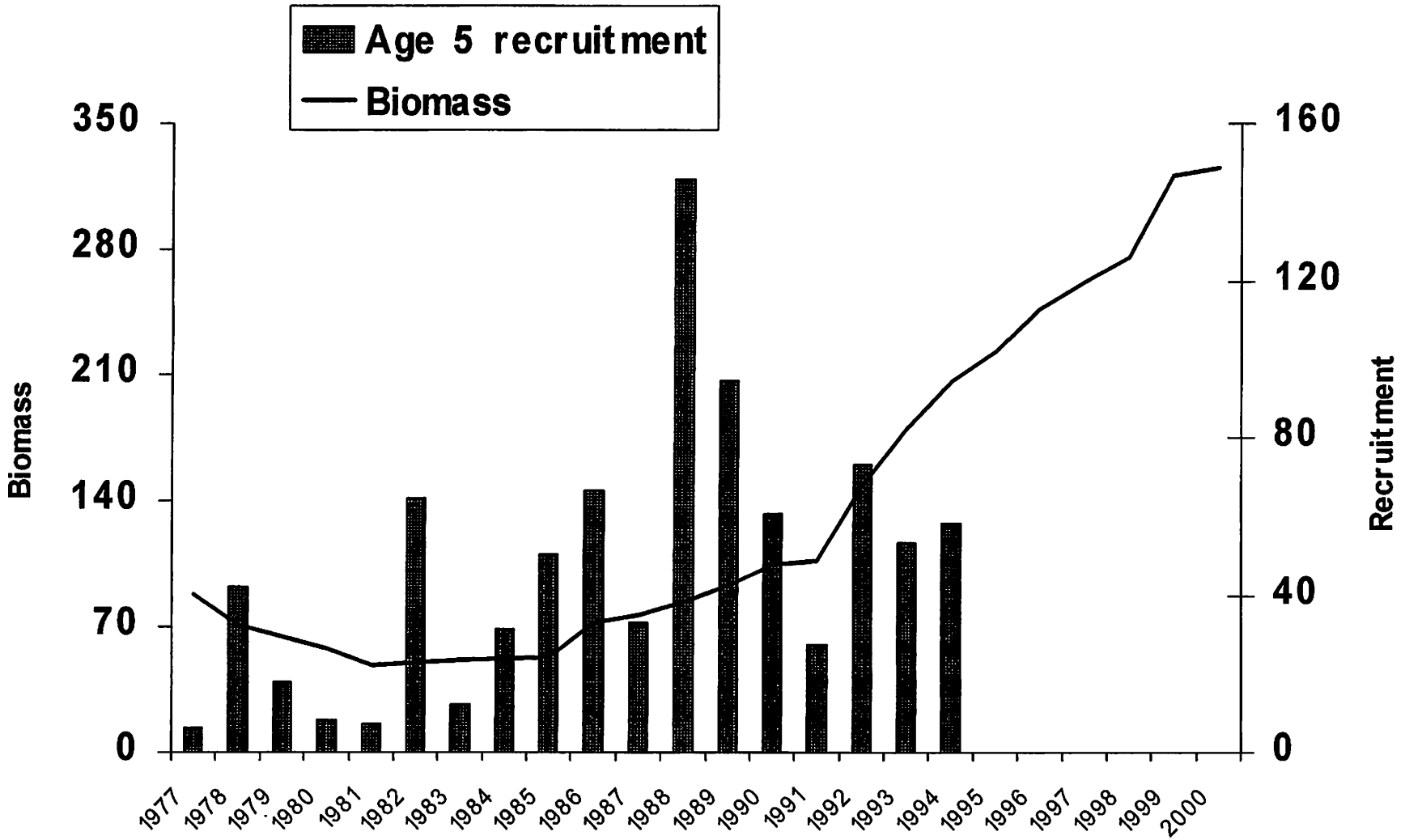
Flatfish 2001 ABC's

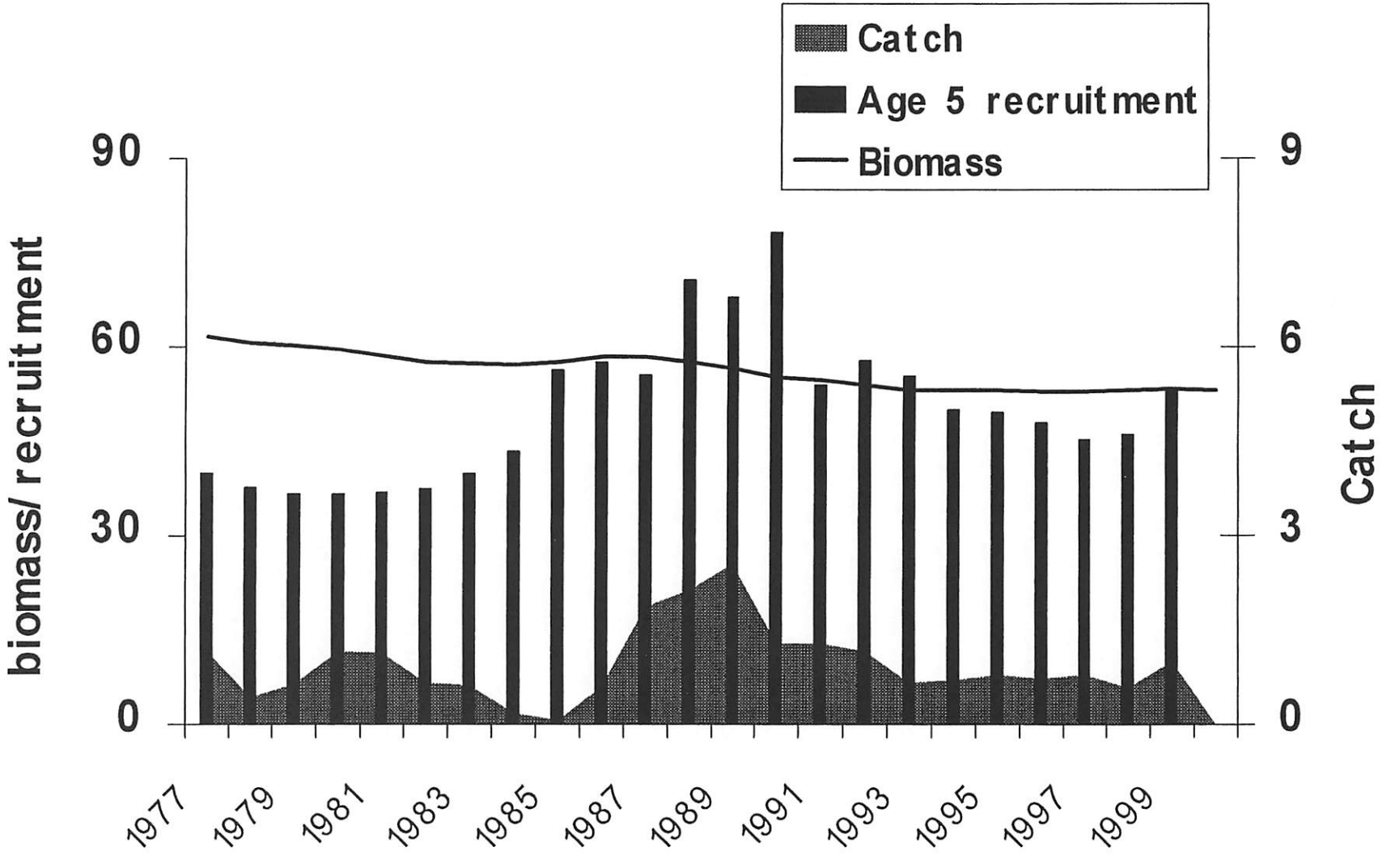
78,870 TONS TOTAL



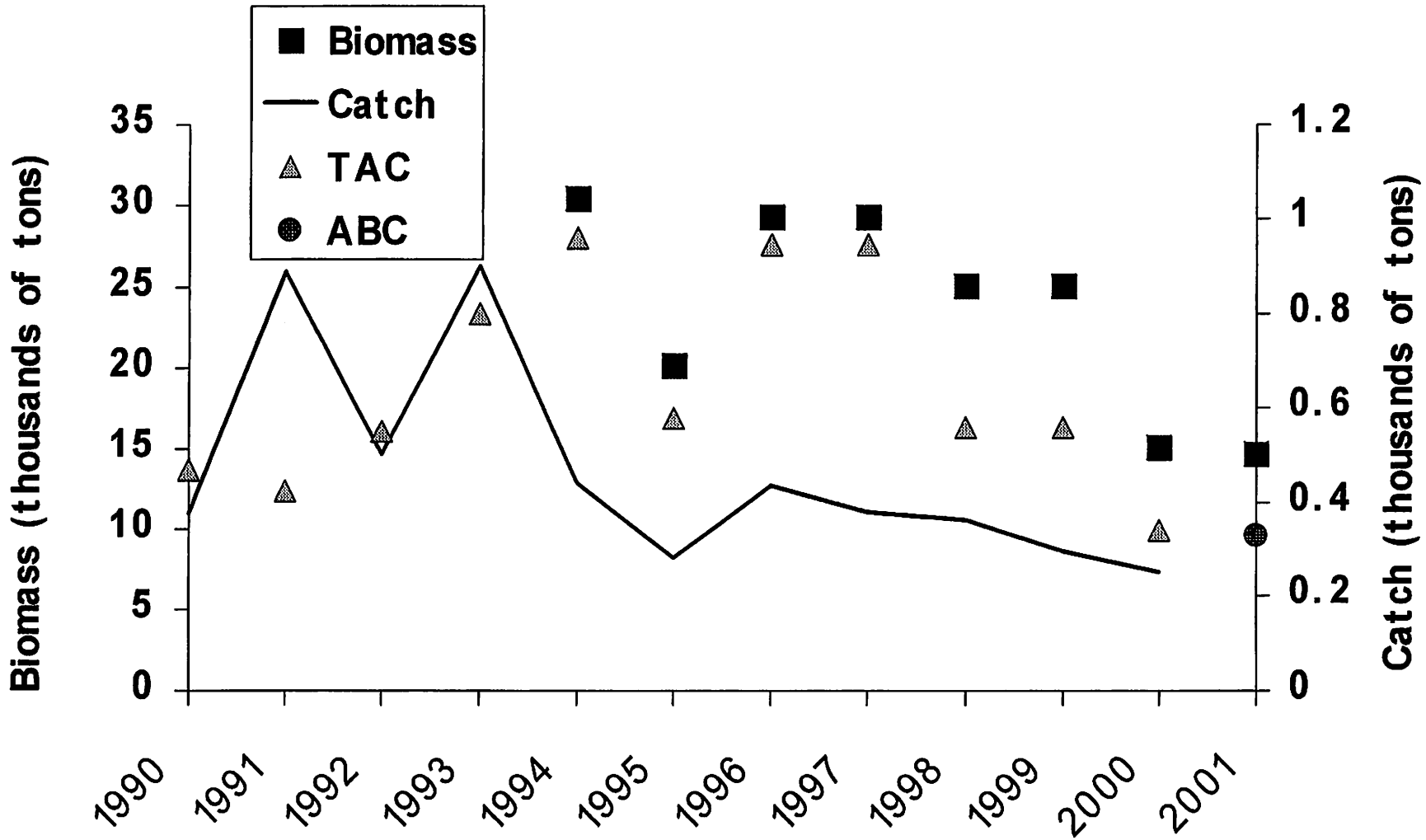
Pacific ocean perch



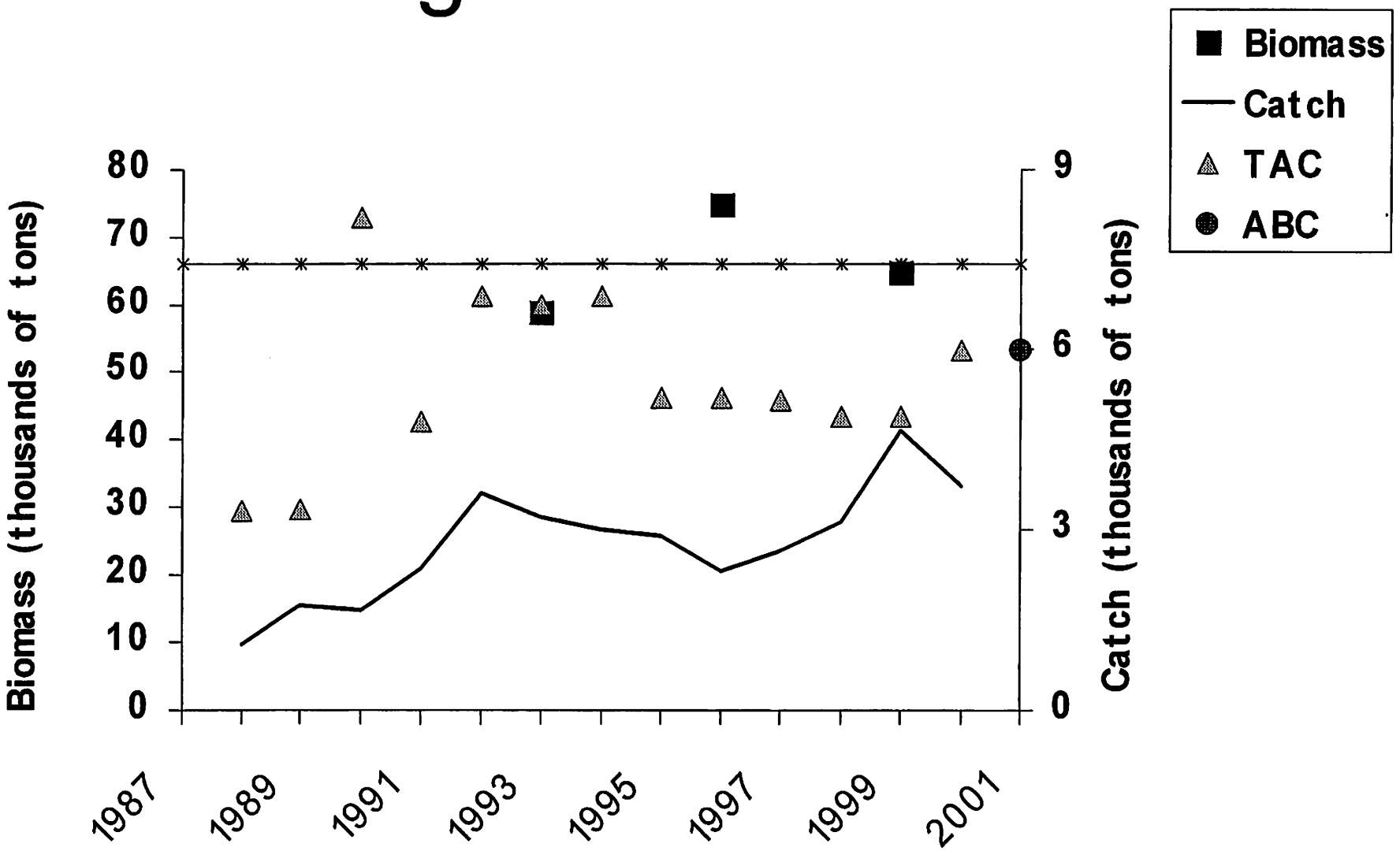
Thornyheads



Demersal shelf rockfish

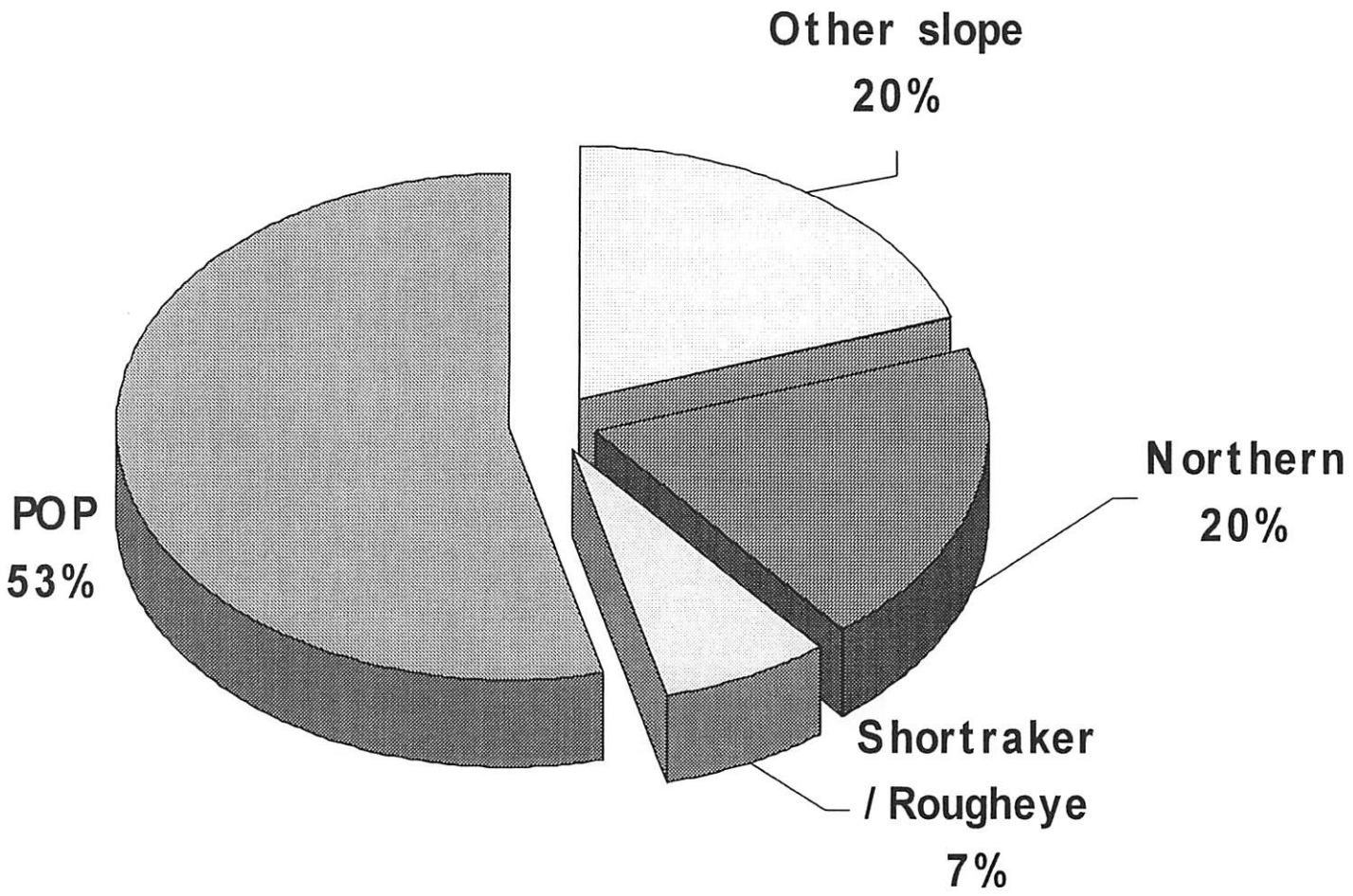


Pelagic shelf rockfish



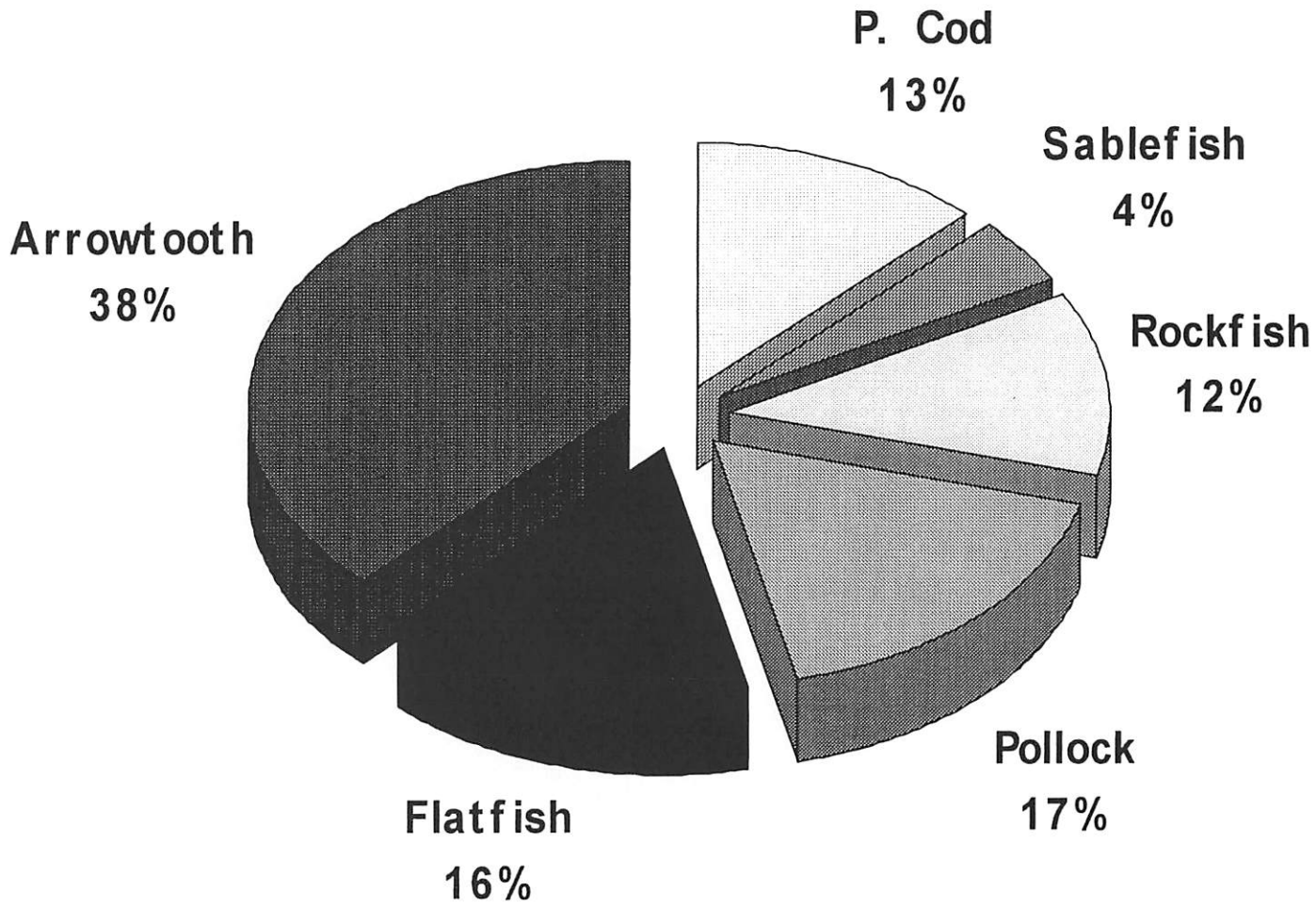
Dusky, widow, & yellowtail

Slope Rockfish 2001 ABC's



Projected biomass by species

5.03 million tons total



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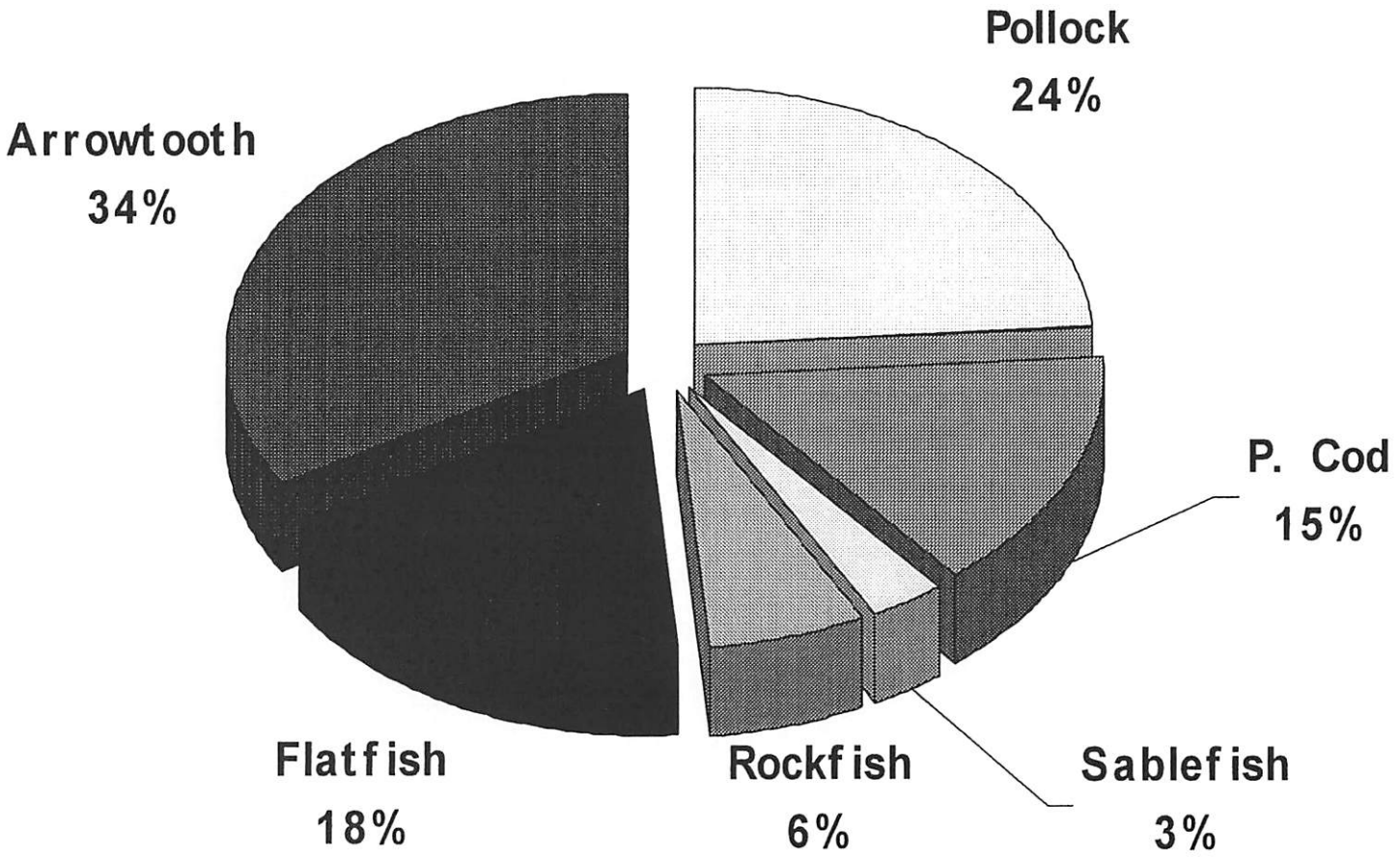
Projected ABC's by species

448 thousand tons total



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ABC Summary

Species	2001 ABC	Change from 2000
Pollock	105,810	Up 5,810 (6%)
Pacific Cod	67,800	Down 8,600 (11%)
Flatfish	78,870	Same
Arrowtooth flounder	148,150	Up 2,790 (2%)
Sablefish	12,840	Down 490 (4%)
POP	13,510	Up 490 (4%)
Other slope rockfish	4,900	Same
Pelagic shelf rockfish	5,980	Same
Demersal shelf rockfish	330	Same
Thornyheads	2,310	Down 50 (2%)
Atka Mackerel	600	Same
Total	441,100	Same