

MEMORANDUM

TO: Council, SSC and AP Members

FROM: Clarence G. Pautzke  
Executive Director



ESTIMATED TIME  
0.5 HOURS

DATE: December 3, 1997

SUBJECT: Research Priorities

**ACTION REQUIRED**

Initial review of research priorities for submission to NMFS.

**BACKGROUND**

During their November meetings, the Groundfish Plan Teams recommended the research priorities as listed in Item C-4(a). The 1997 list of research priorities is attached as Item C-4(b), as amended. After receiving comments from NMFS and the SSC in February, the Council will forward the priorities to NOAA for use in preparing its annual budget.

## **GULF OF ALASKA GROUND FISH PLAN TEAM RESEARCH PRIORITIES**

The following research projects were prioritized based on two agency needs: improving stock assessments, and improving ecosystem management. The feasibility of each project is ranked as: easy, moderately difficult, or difficult. These should be added to the current research list (Item C-4(b)).

All Species Studies of the response of fish to survey bottom trawling (catchability/selectivity). (Moderately difficult to difficult)

Pollock The top two research projects that would improve the Gulf of Alaska pollock assessment were:

1. Feasibility study to evaluate the possibility of conducting a Gulfwide hydroacoustic survey in conjunction with the triennial bottom trawl survey. (Moderately difficult)
2. Examination of the response of pollock to survey vessel noise and survey trawling. (Moderately difficult)

The top three research projects that would address ecosystem concerns related to harvesting Gulf of Alaska pollock are:

1. Predator response to varying prey concentrations and seasonal food supply. (Difficult)
2. Collections of food habits, daily ration on seasonal basis. (Easy to moderately difficult)
3. Response of fish to commercial trawling (part of a marine mammal fishery interaction study). (Moderately difficult to difficult)

Demersal Shelf Rockfish. Habitat mapping of the continental shelf and slope is needed to adequately assess species such as DSR, Atka Mackerel and Shorthead/Rougheye that are habitat-specific in their distribution.

Atka Mackerel. Conduct a pilot survey utilizing commercial fishing techniques to explore Atka mackerel school dynamics and behavior and links to prey, tides, and habitat.

## **Bering Sea/Aleutian Islands Groundfish Plan Team Research Priorities**

The Bering Sea plan team concurs with the research priorities identified last year by the Scientific and Statistical Committee (Item C-4(b)). However, there are several research needs that the team would like to see addressed in the short term.

1. Collect and analyze flatfish maturity data, particularly for flathead sole. The intent is to provide other information to estimate natural mortality, to calculate B40% (spawning biomass), and to improve synthesis modeling. Arrowtooth flounder and flathead sole are pointed out as species where information should be relatively easy to collect since they spawn during the winter when the fishery occurs. Alaska plaice are summer spawners and information could be collected during a summer survey.
2. Determine if there is differential growth and natural mortality for male and female Atka mackerel.
3. Otoliths of Greenland turbot have been collected but not analyzed. Aging these samples would improve the stock assessment.
4. Analyze the distribution of POP in the Bering Sea. In previous years, the fishery has occurred west of

North Pacific Fishery Management Council  
Research Priorities (Excerpted from February 1997 SSC Minutes)

\*Amended to include additional Plan Team recommendations for rockfish (additions in italics)

**Research Priorities**

The SSC reviewed Plan Team recommendations for additional research and updated the January 1996 SSC research recommendations. The SSC emphasizes that this list is not inclusive of all needed research nor is it prioritized; rather it represents a compilation of research ideas recognized by the SSC as deserving attention by NMFS, ADF&G, IPHC, other agencies, and institutions of higher learning. The SSC chair will provide the executive director with a list of appropriate institutions. We request that this portion of the minutes be distributed appropriately. Finally, it would also be helpful if the Council solicited from these institutions a list of ongoing research activities which may be related to groundfish and crab management. In this way, these institutions and the Council can become aware of ongoing research as well as mutual interests and needs.

Given the potential expansion of state-water fisheries, the need for understanding the relationships between groundfish in state and federal managed waters, and limited programmatic resources, the SSC encourages close coordination of resource assessment and research efforts.

**A. Critical Assessment Problems**

1. **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 age structures so that age information from surveys and the fishery can be included in stock assessments in a timely manner.*
2. **Walleye pollock:** There is a continuing need for research on stock structure as it relates to assessment. 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 methodologies is needed

The SSC believes that research should be undertaken to determine 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. 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. Currently, these surveys are conducted every three years. Various ways of supplementing the triennial survey data should be evaluated. The relationship between fish in Prince William Sound to those in the Gulf of Alaska needs to be elucidated.

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

4. **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 are incumbent upon age determination techniques, and ongoing age validation is needed. The Lowell-Wakefield Symposium in October 1997 will address the implementation and improvement of age-structured models.

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.

5. There is incomplete life history information, e.g., growth and maturity data, for a number of stocks. This information is essential for determination of ABC, OFL and preferred fishing mortality rates. Maturity data are lacking on the following: Pacific cod, Dover sole, other flatfish, sablefish, and many species of rockfish. Life history and distributional patterns of Greenland turbot are lacking and require additional research. To better understand sablefish recruitment variability, additional information on the geographical distributional and movement of juvenile sablefish is needed.
6. 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.
7. There is need for information about stock structure and movement of walleye pollock, Atka mackerel, Pacific cod, POP, and other rockfish. With such information, a combined BSAI/GOA assessment might provide better information, especially for Atka mackerel and Pacific cod.
8. Further research is needed about management strategies which provide for conservation of aquatic resources. Some topics which 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.
9. 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.
10. 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 this series must remain one of the highest priorities of NMFS and the Council.

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 complimentary 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. Within the EEZ are seamounts which are unsampled for groundfish, halibut, and crab abundance. Surveys which 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. Because of the importance of marine mammal and seabird considerations in fisheries management, further studies are needed on interactions among fisheries, marine mammals, and seabird populations. In particular relationships among oceanographic conditions, conditions and animal condition and health should be explored. Research should be done on sources of age-specific fish mortality.
2. 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.
3. Studies of the effects of harvesting and processing activities on the ecosystem and habitat should be instituted. For example, studies contrasting species diversity and abundance in the red king crab savings area with that in adjacent regions.
4. 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.

5. 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?
6. 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.
7. 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 data on seabirds in Alaska was collected during the 1970s (through OCSEAP); the quantity of data collected afterwards has been insufficient to adequately examine these interactions.
8. 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 reexamining these existing data.

D. Socioeconomic research

1. There is a critical need for the development and continued maintenance of basic economic information databases on the fisheries 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. At a minimum there is a need for reliable information on:
  - a) the cost and revenues of fishing and processing operations,
  - b) the location where goods and services are purchased,
  - c) the characteristics of markets for fish products,
  - d) patterns of ownership in fishing and processing operations,
  - e) the relationships between harvesting and processing sectors,
  - f) unemployment rates by community over time, labor wage rates in alternative occupations (to fishing) by community over time, and assessment of the opportunity costs of labor,
  - g) the cumulative efficiency and equity consequences of management actions that apply time/area closures,
  - h) the transfer of halibut and sablefish IQ's (transactions price, volume, changes in distribution of ownership, etc.),
  - D) comprehensive method for managing catch and bycatch,

- j) net economic benefits of commercial and recreational harvests, in particular, for halibut, and
  - k) needed to estimate regional and community impacts.
2. Research pertinent to assessment of the social impacts of actions contemplated by the Council include:
- a) **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.
  - b) **Social Impacts:** Social impact and policy research should be conducted regarding the identification and potential effects of alternative management actions.
  - c) Develop better methods for determining the social costs and benefits of management actions (e.g. through the use of non-market valuation techniques).
3. Analysis of anticipated impacts of proposed management changes would benefit from improved understanding of fleet behavioral response to alternative fishing opportunities and restructure the Bering Sea bycatch allocation model to provide better predictions of how fishing effort will shift in response to time/area closures,

**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.
- 4. Data on size/age and sex of crabs taken as bycatch are needed to assess impacts.
- 5. Develop methods for performing comprehensive evaluations of single and multiple time/area closures and other bycatch management measures.
- 6. Develop better methods for assessing the social costs of bycatch.
- 7. Identify sources of variability in actual and estimated bycatch rates.

**F. Alaska Fishery Monitoring**

- 1. 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.
- 3. Development of catch and bycatch sampling procedures for individual vessel accountability programs.