

Research Priorities for 2008—2009

I. Fisheries

A. Fish and Fishery Monitoring

1. Continuation of State and Federal annual and biennial surveys in the GOA, AI and EBS, including BASIS surveys, are a critical aspect of fishery management in Alaska. It is important to prioritize these surveys in light of recent proposed federal budgets in which funding may not be sufficient to conduct these surveys. These surveys provide baseline distribution, abundance and life history data that form the foundation for stock assessments and the development of ecosystem approaches to management. These surveys are considered the highest priority research activity contributing to assessment of Alaskan groundfish fisheries.
2. The expansion of routine surveys into the northern Bering Sea and baseline surveys of the Arctic Ocean will become increasingly important under ongoing warming ocean temperatures and range expansions of harvested fishery resources.
3. Continuation and expansion of cooperative research efforts to supplement existing surveys to provide seasonal or species-specific information for use in improved assessment and management.
4. For groundfish in general, continue and expand research on trawlable and untrawlable habitat to improve resource assessment surveys.
5. Continue research on the design and implementation of appropriate survey and analyses to aid the Council in developing mechanisms to assess species that are locally aggregated in their distribution and are thus not adequately represented (either over or under estimated) in the annual or biannual groundfish surveys.
6. Identification and recovery of archived data (e.g., historical agency groundfish and shellfish surveys) should be pursued.
7. There are needs to improve biological data collection (e.g. age, size and sex) of some bycatch species (e.g. sharks, skates, octopus, squid, sculpins, and grenadiers) to better quantify potential effects of bycatch on these stocks.

B. Stock Assessment

1. Improved stock assessment of “other species”, non-target rockfish, and data-poor stocks of crab. Highest priority research tasks include: (1) alternative indices of abundance (and biomass) and fishing mortality are necessary for species for which standard surveys are inadequate; and (2) life history information (specifically, natural mortality, size at maturity, and other basic indicators of stock production) for “other species” and data-poor stocks of crab to allow application of Tier 5 or Tier 4 assessment criteria. Little information is available especially for sculpins, skates, octopuses, squids, grenadiers and some sharks.
2. Studies on the effects of climate variability and climate change on recruitment and growth could include the development of standard environmental scenarios for future variability based on observed patterns. There is also a clear need for information that covers a wider range of seasons than presently available.
3. There is a need for the development of advanced stock assessment modeling techniques. Specifically there is a pressing need to develop techniques for linking uncertainty into stock assessments, including both scientific uncertainty (measurement error, process error or model misspecification) and implementation error (enforcement and catch monitoring).
4. There is a growing need for the development of stock assessment techniques that address seasonal and climate related shifts in the spatial distribution of fish and shellfish.

5. There is a growing need for information on stock boundaries. Specific issues include the potential creation of a separate Aleutian Island management area and stock delineation of salmon bycatch.
6. There is a need to investigate whether scallop beds coincide with retention zones, as determined by circulation patterns, and how this relates to stock structure. There is also a need to investigate movement of scallops within beds to determine whether scallops can and do fill in areas that have been previously harvested.
7. Improved surveys are needed to better assess GOA Pacific Ocean perch stocks. Encourage hydro-acoustic surveys to better quantify these pelagic species that are largely missed in bottom trawl surveys.

C. Fishery Management

1. Evaluate the effectiveness (e.g., potential for overharvest or unnecessarily limiting other fisheries) of setting ABC and OFL levels for data poor stocks (Tier 5 and 6 for groundfish and Tiers 4 and 5 for crab) (e.g., squid, octopus, skates, and crab).
2. Development of forecasting tools that incorporate ecosystem indicators into single or multispecies stock assessments to conduct management strategy evaluations under differing assumptions regarding climate and market demands. Standardization of “future scenarios” will help to promote comparability of model outputs.
3. Evaluation of economic effects from recently adopted crab rationalization program on Gulf of Alaska coastal communities, including Kodiak. This includes understanding the economic impacts (both direct and indirect impacts) and how the impacts are distributed among communities and economic sectors, conducting qualitative research to assess changes in community participation and effort in fisheries, and estimating net economic benefits.
4. As Kodiak is likely to be at the center of controversy over the likely consequences of Gulf rationalization, research should be designed to use Kodiak in addition to other Gulf communities as case studies in prospective analyses of the potential effects of Gulf rationalization options on fishing behavior and participation and economic impacts.

II. **Fisheries Interactions**

A. Bycatch and Observer Issues

1. Improved estimation of total bycatch for marine mammals, seabirds, non-target groundfish and crab and protected species. At present, it is clear that observer coverage in some fisheries is insufficient for estimation of total bycatch. Further, observer coverage must be analyzed to compare, to the extent possible, the total catch, bycatch, and fishing behavior between observed and unobserved fishing vessels. Examples include the CV trawl fisheries, sablefish longline fishery, Pacific cod pot and longline fishery, halibut longline fishery, and sport fisheries. Improved accuracy of identifications and enumerations of bycatch species is necessary. The current program results in imprecise bycatch (mortality) estimates for species, such as skates, sharks, yelloweye rockfish, and sablefish in halibut longline fisheries and discards in sport fisheries. Improved methods should include direct and alternative monitoring options (e.g., electronic logbooks, video monitoring) particularly on smaller groundfish, halibut, and sport vessels.
2. Gear technology. Further research is needed on gear modifications and fishing practices for reducing bycatch, particularly for PSC species (e.g., salmon).

B. Expanded Ecosystem Studies

1. Environmental influences on ecosystem processes

- a) Climate variability: Changes in ocean temperature may affect managed species, upper level predators, and lower trophic levels.
 - (i) Sea ice: If recent changes in ice cover and temperatures in the Bering Sea persist, they may have profound effects on marine communities. Development and maintenance of a database of the spatial extent and characteristics of sea ice as well as indices of the timing and extent of the spring bloom is a high priority. For this, maintenance of moorings, especially M-2, is essential.
 - (ii) Zooplankton production: Apparent declines in zooplankton wet weight over the shelf measured by the Oshoro Maru could imply the loss of critical copepod and euphausiid prey of important species, such as pollock. Development of a time series of zooplankton species composition and abundance for the Eastern Bering Sea is a high priority. Evaluate the potential of collaborative research with Japanese and Russian investigators to assess species composition and abundance in samples archived abroad.
 - (iii) Fish composition: Existing data sets (bottom trawl surveys, BASIS surveys) can be used to quantify changes in relative species composition of commercial and non-commercial species, identify and map assemblages, and monitor changes in the distribution of individual species and assemblages. Additional monitoring may be necessary in the Aleutian Islands and other areas of the Gulf of Alaska.
 - (iv) Fish movement: Studies to assess the movement of fish to understand the spatial importance of predator-prey interactions in response to environmental variability.

2. Trophic interactions.

- a) Temporal and spatial data collection: Diet information from seasons in addition to summer is needed to assess spatial and temporal changes in predator-prey interactions, including marine mammals and seabirds. The diet information should be collected on the appropriate spatial scales for key predators and prey to determine how food webs may be changing in response to shifts in the range of crab and groundfish.
- b) Ecosystem structure studies: Studies are needed on the implications of food web interactions of global warming, ocean acidification, and selective fishing. For instance, studies are needed to fully evaluate selective removal of some components of the ecosystem (e.g., Pacific cod, pollock) relative to others (e.g., arrowtooth flounder).

C. Protected Species Interactions

1. Population dynamics, life history and assessment of protected species, particularly Steller sea lions, and northern fur seals is a high priority. In particular, investigation of factors contributing to changes in natality of Steller sea lions is an important area of research.
2. Local fishery interaction studies. Whereas global fishery control rules may generally prevent overfishing on a broad regional basis, non-random patterns of fishing may cause high rates of removals in local areas important to apex predators such as Steller sea lions, ice seals, northern fur seals, spectacled eider, Steller's eider, and short-tailed albatross. More studies are needed to fully evaluate potential local effects of fishing on other components of the ecosystem (e.g., marine mammals, seabirds, and the impact on benthic habitat and fauna by bottom contact gear).

III. Habitat

A. Habitat Mapping

1. Improved habitat maps (especially benthic habitats) are required to identify essential fish habitat and distributions of various substrates and habitat types, including habitat-forming biota, infauna and epifauna.
2. Evaluate habitats of particular concern:
 - a) Bering Sea canyons
 - b) Assessment of the extent, distribution, and abundance of important skate nursery areas in the EBS to support of future HAPC.
 - c) Assessment of the extent of the distribution of Primnoa corals in the GOA.
3. Begin to develop a GIS relational database for habitat including development of a historical time series of the spatial intensity of interactions between commercial fisheries and habitat, which will be needed to evaluate impacts of changes in EFH on the growth, reproduction and distribution of fish and shellfish.