

# West Coast Groundfish Research Plan

## Executive Summary

Prepared by National Marine Fisheries Service

### INTRODUCTION

This research plan for west coast groundfish represents the results of discussions with many diverse organizations and people involved with this fishery and resource. The plan is a living document that will be reviewed and updated periodically to reflect progress and new issues.

The West Coast groundfish fishery is in crisis. The fishery is overcapitalized and at least several stocks have been depleted by a combination of natural and manmade factors, pushing their allowable catches down to levels that cannot economically sustain present fishery harvest levels. These declines increase concerns that our limited ability to forecast groundfish production from single species investigations is missing important natural and fishery-induced changes in the ecosystem. The status of many of the stocks is unknown and some of these stocks may also be depleted. Finally, the system in which groundfish live is undergoing natural climate cycles that affect groundfish productivity and complicate our ability to measure human impacts. Solutions in West Coast groundfish stocks and fisheries will require a long-term commitment to rebuilding stocks and wise use of all our resources because the problems are severe and will take years to resolve.

A key element in restoring stocks and a sustainable fishery, protecting the marine environment, and evaluating socioeconomic issues is a research program that can provide the needed scientific information and advice for fishery management decisions. Today, research and monitoring for West Coast groundfish is done through complementary efforts of the three West Coast NMFS centers, the three coastal state fishery agencies, the Pacific States Marine Fisheries Commission, and several academic institutions. Together, these agencies monitor the landed fishery catch; track abundance of key stocks primarily through triennial trawl and acoustic surveys; provide key biological data such as the age and maturity of harvested fish; and analyze these catch, abundance and biological data using stock assessment models to determine the status of each species and its sustainable harvest level. Additional significant areas of research include socioeconomic studies, essential fish habitat, and ecosystem/climate studies. The NMFS and PSMFC federally-funded research and monitoring efforts account for expenditures of near \$6M in 1999 and more in triennial years with major surveys, but major gaps in information remain. Typically six stocks are assessed/reassessed each year, and 26 of the 82 groundfish species have had some stock

assessment analysis. Only 16 of the assessments have had enough data and analysis to allow determination of the species status. Of these 16 species, 5 were listed as overfished by January 2000. Shortcomings in the data (only landed catch monitored, only triennial surveys that do not cover all species, etc.) results in much uncertainty and associated controversy in these assessments. The “unknown” status of the majority of the species leaves a significant possibility that many of these are overfished also.

Clearly more frequent and more precise assessments will be necessary to rebuild stocks and guide a sustainable fishery. Although we provide some of the scientific information needed for management with current funding and staffing levels, progress is too slow. Without additional funding for research such as annual coast-wide surveys, it may be necessary to realign current research and management to bring the management approach in line with the level of information we actually have. This realignment would likely result in reduced information on some of the species currently assessed. This will reduce the ability to maintain even the current low level of certainty for management decisions regarding these species.

Significant additional investment in West Coast groundfish research and monitoring will substantially improve the scientific basis for management decisions. To help lead the groundfish fishery toward an economically viable future, NMFS and others must seek additional resources and other approaches, including cooperative work with constituents, to obtain more information.

This research plan is designed to identify scientific information needed to achieve healthy stocks and optimum value from fisheries while safeguarding the ecosystem. It is designed to provide a comprehensive framework for West Coast groundfish research, to identify some of the greatest information gaps, and to provide guidance for prioritizing work to fill these gaps. These priorities are focused on major immediate needs. Many of these are critical building blocks for broad-scale understanding of the ecosystem in which this fishery occurs, and each will be undertaken with an ecosystem perspective.

The thinking that went into development of this plan comes from the entire West Coast groundfish community and its recent planning efforts including the PFMC’s Research and Data Needs, Working Together for West Coast Groundfish, and the Rockfish Forum. The present version of the plan has been developed by the National Marine Fisheries Service. NMFS wants to continue to work together with other agencies and constituents involved with West Coast groundfish to make this into a better plan that can serve as a focus and foundation for all future work on West Coast groundfish.

## SUMMARY OF PRIORITY RESEARCH TOPICS IN ACTION PLAN

We have identified six areas of research:

1. Status of Stocks
2. Socioeconomics
3. Manmade Stress
4. Ecosystem and Climate
5. Technological Innovations
6. Management Support

Research in these areas is designed to meet immediate needs for scientific information for fishery decision-making, develop a broader understanding of the ecosystem, as well as to provide new tools and options to improve management in the future. Within these areas, two tiers of research and monitoring priorities are identified. These are based on the most critical information gaps, on feasible technology and timeframe, and on the possibility of obtaining the greatest degree of improvement in management. These items also provide critical building blocks for a broader understanding of the ecosystem and habitat in which these groundfish fisheries occur. For example, we cannot understand well the interaction between two species if we do not have reasonable information about each of these two species. Thus, the focus on these priorities is a reflection on the poor state of our current knowledge and the need for this basic information in order to make progress on a broader perspective.

*Body of the Plan* provides an overview of each of the six research areas. First-tier or second-tier priority topics for dealing with the problems of the groundfish fishery are identified.

*Appendix A* lays out the detailed long term research plan, including information on the current programs and research areas where additional research is critically needed.

The sections below and the following summary table describe, by research area, the first-tier and second-tier priorities in the research plan.

### I. STATUS OF STOCKS

*Priorities:*

*a. Conduct baseline assessments for managed groundfish species (even those with weak databases).*

*B. Improve the level of certainty and confidence in assessments, particularly for stocks in rebuilding plans and intensively fished and managed species.*

The status of 66 of the 82 groundfish species is designated as “unknown.” There is great concern that some of these species are overfished. Hence, at a minimum, baseline assessments of these unassessed groundfish species are necessary to determine which stocks are healthy and which are at risk. Although these data-poor baselines will have high uncertainty, they will be a starting point to guide short-term management and assist in prioritizing future research. A multi-species approach will be utilized, especially so that information from more data-rich species can guide understanding of the data-poor species.

Reducing assessment uncertainty requires more data: we need to increase the frequency and areal coverage of resource surveys, improve survey technology, expand biological studies, increase use of fishery data, and improve information on bycatch and total fishing mortality. With reduced uncertainty in assessments, we will be able to better monitor and forecast rebuilding of overfished stocks, and be able to obtain a larger fraction of the potential biological yield from each species. To ensure that we manage with an appropriate level of precaution, we must more completely describe the uncertainty in both data-rich and data-poor assessments.

At current funding levels we can conduct the following activities during the next three to five years: maintain current survey effort; monitor rebuilding plans; conduct and review about six to eight stock assessments annually; conduct some critical biological studies; improve assessment models; and communicate assessment results. However, for these activities to be fully conducted will require at least moderate growth in the groundfish program. Without some growth, we will need to reassess research priorities in order to best address long-term information needs.

To significantly improve the timeliness and accuracy of stock assessments requires a significant increase in the program. An expanded program would require improved monitoring of commercial and recreational fisheries (including an at-sea observer program), deployment of electronic logbooks, more frequent surveys and improved survey coverage, increased biological studies, and increased database and analytical staff.

## II. SOCIOECONOMIC INVESTIGATIONS

*Priority: Improve socioeconomic analyses of the impacts of management options.*

Socioeconomic investigations provide information on the social and economic impacts of fishery management. This will help guide fair distribution of socioeconomic impacts and development of an economically viable fishery. At current levels of funding and staffing for socioeconomic research, NMFS cannot make progress toward improving these analyses for West Coast groundfish. Instead, we can only assist in conducting the mandatory Regulatory Flexibility Analyses, and provide technical guidance for implementing trip limits and other management actions.

In the short term, an expanded program would undertake a bio-economic analysis of the merits and shortcomings of the current trip limit approach to achieving a near year-round fishery. In the long term, an expanded program would provide scientific information to guide use of market-based fishery management tools such as individual quotas, and bycatch management programs.

## III. MANMADE STRESS

*Priority: Improve understanding of the ecological effects of fishing, including determinations of whether significant impacts are already occurring in marine ecosystems, which habitats and populations are most susceptible to such impacts, and ways to reduce adverse impacts including marine protected areas, modifications to fishing gear, and bycatch survival information.*

Ecological effects of fishing include gear impacts on habitat and bycatch of non-groundfish species. Other manmade stresses may include contaminants, exotic species and non-fishing impacts on habitat. These stresses can degrade the health and biodiversity of the marine

ecosystem, and the system's ability to support productive groundfish populations. With present efforts, we can analyze limited existing data on benthic habitats, fish distribution, and fishing activities. We can make limited progress on identifying habitat areas of particular concern and fishing impacts.

We need to develop more comprehensive and detailed maps of benthic habitat, develop technologies to determine fish associations with particular seafloor features, more fully identify habitat areas of particular concern, and evaluate the potential benefit of marine protected areas. Another series of investigations should be directed towards determining the impact of fishing gear on benthic habitat and bycatch, determining the mortality of discarded bycatch, and testing modified fishing gear to reduce fishing impacts.

#### IV. ECOSYSTEM AND CLIMATE STUDIES

*Priority: Improve understanding of the effects of decadal-scale ocean climate fluctuations on fish productivity in order to improve forecasts of available yield, improve forecasts of the time needed to rebuild overfished stocks, and improve our ability to understand past trends.*

We are beginning to understand that there are decadal shifts in the ocean climate that have a dramatic effect on fish productivity as evidenced by the decline in recruitment of many groundfish species in the 1980s and 1990s. With current efforts we are able to review existing information on climate and groundfish productivity, and evaluate the possibility of using it to refine estimates of rebuilding rates for overfished stocks.

A greatly enhanced program is needed to understand the role of between climate and species interactions in modifying groundfish productivity. We believe that the immediate priority is to enhance oceanographic monitoring programs to collect data on recruitment and survival; explore relationships between climate and patterns of fish recruitment; and conduct field studies to validate these relationships. A longer term priority is enhanced research on ecosystem functions and species interactions. However all shorter term monitoring of managed species and climate effects on these species will be conducted with the intention of facilitating ecosystem and multispecies work.

#### V. TECHNOLOGICAL INNOVATIONS

*Priority: Develop cost-effective technological improvements in survey methods.*

Research on technological innovations will span a wide range of topics, including improved methods for more accurate and cost-effective surveys, gear research on bycatch and habitat impacts, and evaluation of feasibility of environmentally safe and cost-effective methods for stock enhancement. We currently are only able to analyze existing data, with some possibility to refine the statistical design of existing trawl surveys.

With expanded research efforts on survey methods, we could evaluate feasibility of egg and larval surveys and develop visual, acoustic and laser systems to directly measure abundance and distribution of groundfish.

## VI. MANAGEMENT SUPPORT

*Priority: Develop alternative management systems that achieve optimal benefits in a cost effective manner.*

Present capabilities in this area will be saturated by the need to provide technical support to current management processes, particularly the information needed to adjust inseason management in order to slow the cumulative catch of the fleets so that there can be year-round fishing without exceeding quotas. Research by other groups on marine reserves, individual quotas and fish culture is likely to continue, but we will have little ability to evaluate its applicability for West Coast groundfish.

An expanded management systems research team would examine biological, technical, and economic possibilities for developing alternative management approaches and for more complete evaluation of information currently used by fishery managers.

## CONCLUSION

The intent of this research plan is to characterize a comprehensive research program for West Coast groundfish and to identify priority topics that need immediate attention. Many of these topics provide important building blocks for understanding the ecosystem in which this fishery occurs. Particularly relevant topics in this regard are a better monitoring of trends in key species abundance, studies of the effects of fishing on habitat, and investigation of the effects of climate on groundfish productivity. The thinking that went into development of this plan comes from the entire West Coast groundfish community and its recent planning efforts including the PFMC's Research and Data Needs, Working Together for West Coast Groundfish, and the Rockfish Forum. The present version of the plan has been developed by the National Marine Fisheries Service. NMFS wants to work together with other agencies and constituents involved with West Coast groundfish to make this into an ongoing planning process that can serve to efficiently coordinate research and monitoring activities, direct resources to the most critical research needs, and demonstrate the potential benefits from additional research.

**SUMMARY OF PRIORITY RESEARCH AREAS  
AND COSTS OF EXPANDED PROGRAMS<sup>1</sup>**

HIGHEST PRIORITY

I. STATUS OF STOCKS

Status Quo

- maintain current survey schedule
- minimal monitoring of rebuilding of overfished stocks
- analyze and evaluate past fishery observer data
- conduct and review 6-8 assessments per year
- fill critical gaps in biological knowledge for assessments
- improve communication of results from assessment models

Additional Critical Research

Improved survey frequency and coverage	\$3,500,000
Improved biological studies and stock assessments	\$2,000,000
Enhanced fishery sampling and electronic data collection	\$1,500,000
Fishery observer program	\$4,700,000

II. SOCIOECONOMIC

Status Quo

- Assist in mandatory Regulatory Flexibility Analyses
- Provide technical guidance for proposed management actions

Additional Critical Research

Collect economics data	\$700,000
Build socioeconomic analysis capability	\$500,000

---

<sup>1</sup>These costs are in addition to the current expenditures of near \$6M in 1999 by NMFS and the PacFIN program. However, the \$3.5M costs for the enhanced survey program has some overlap with current expenditures because this level of increased funding would allow the Alaska Fisheries Science Center to phase out of its current west coast survey activities.

## SECOND LEVEL OF PRIORITY

### III. MANMADE STRESS (ecological effects of fishing)

#### Status Quo

Analyze existing data on benthic habitats and fish distribution

Determine habitat areas of particular concern

Additional Research Need \$1,000,000

Associate distribution of fish life stages with detailed maps of seafloor

Evaluate potential benefits of marine protected areas

Develop modified fishing methods to reduce bycatch mortality and habitat impact

### IV. ECOSYSTEM AND CLIMATE

#### Status Quo

Review climate patterns relevant to groundfish

Incorporate climate information, where possible, in rebuilding plans

Additional Research Needs \$1,000,000

Develop and calibrate relationships of climate and fish recruitment

Improve relevant monitoring of ocean climate

Validate statistical relationships through field studies of recruitment

### V. TECHNOLOGICAL INNOVATIONS (improve survey methods)

#### Status Quo

Review statistical accuracy of current survey coverage

Improve survey interpretation through incorporation of habitat and fishery data

Assess alternatives to trawl surveys for better coverage of all habitat

Additional Research Needs \$900,000

Develop visual and laser systems to measure abundance and distribution

Evaluate egg and larval methods

### VI. MANAGEMENT SUPPORT

#### Status Quo

Routine technical support for evaluation of management options

Additional Research Needs \$250,000

Bio-socio-economic examination of long-range management alternatives

User-friendly, comprehensive decision-support models for technical management teams.