# Executive Director's Report

Ecosystems Committee

We definitely were going to have a formal Ecosystems Committee meeting to review the essential fish habitat guidelines if they were available. Unfortunately, they will not be ready for about a week or two. The proposed rule now is scheduled to be published the week of April 21. There will be an informal session of the Ecosystems Committee on Wednesday evening to discuss general activities of the Committee.

June Meeting

This is just a reminder that the June meeting will be in Kodiak the week of June 16th. The AP and SSC will start on Monday, and the Council will begin Wednesday. Several final actions may be on the agenda:

IFQ amendment package
Halibut sport charter management
Halibut seabird avoidance
Halibut catchsharing plan for Area 4
GOA IR/IU
Two percent Atka Mackerel allocation to jig gear

We will also need to firm up the inshore-offshore alternatives, review observer program structures, and possibly start considering halibut use restrictions for Sitka Sound. So, I definitely think that the Council meeting will go through Sunday.

CAPT O'Shea would like to know if we want any special tours of the Coast Guard Base or the North Pacific Fisheries Training Center. We'll need to let him know ahead of time so they can be scheduled.

Regional Council Chairmen's Meeting

In early June the Council chairmen from around the nation will meet in Puerto Rico. An agenda is under B-1(a). Much of the meeting will have to do with Magnuson-Stevens Act tasking and budgets. We are hoping to get Lisa Lindeman down there to explain proposed recusal regulations to all the Councils. Then we will have that topic on our Council's June agenda. We will report to you on the chairmen's meeting in June.

Magnuson-Stevens Act Tasking

Under item B-1(b) is a set of worksheets track Magnuson-Stevens Act tasking as assigned to the Council. I would like to go over those activities sometime this week, maybe toward the end of the week to let you know where we are in complying with the schedules mandated in the Act. We also will need to decide whether we have met the intent of some of them, such as bycatch reduction and enumeration, without taking further action. Then we will need to see if Congress agrees.

Build Sustainable Fisheries Initiative

NOAA has developed a five-year, FY99-03, implementation plan for its goal to Build Sustainable Fisheries. The draft plan and a survey form are under B-1(c). Comments were due April 10, but I think they would still pay some attention to comments received late this week or early next week.

NMFS Bycatch Program

A draft of sections of the National Marine Fisheries Service's Managing the Nation's Bycatch: Priorities, Programs, and Actions is under B-1(d). Comments are due by May 19, 1997. I only have one complete copy of the plan, but perhaps NMFS could furnish complete copies to those that desire them.

Board-Council Interactions

In February the Council approved the joint protocol with the Board of Fisheries. The final version is under B-1(e). I will be working with committee chairman Kevin O'Leary and the Board members to arrange a committee meeting in May. We need to review the protocol and schedules of the Board and Council, and how to define "impacts" and "mutual concerns" when selecting proposals for each others review. The annual cycle with the Board would start this fall, according to the proposed schedule shown in B-1(e). The committee should be able to report back to you in June.

AP Officers

The AP is electing a chair and vice chair this meeting and we will need to confirm them.

UAA Symposium Thursday Night

The University Alaska Anchorage will hold a panel discussion entitled "The Bering Sea: The World's Last Great Fishery?" It begins at 7:30 p.m. on Thursday night, April 17. Flyers are on the back table for those that may be interested and have the transportation.

# CHAIRS AND EXECUTIVE DIRECTORS MEETING
# REGIONAL FISHERY MANAGEMENT COUNCILS
**Hyatt Regency Cerromar Beach Hotel**
**Dorado, Puerto Rico**
**June 5-6, 1997**

## TENTATIVE AGENDA

**June 5, 1997**

**PLENARY SESSION**

8:30 a.m. **A.** Opening Remarks — Jose L. Campos

**B.** Approval of Agenda

**C.** Magnuson-Stevens Act Implementation

1. EFH FMP Amendment Process

10:00 a.m. Coffee Break

10:15 a.m. **D.** Coast Guard Activities

1. Enforcement of Fishery Regulations

11:00 a.m. **E.** International Fishery Issues

1. Management of Highly Migratory Species in the Pacific

12:00 noon Lunch Break

1:30 p.m. **F.** Budget

a. Status of Appropriations
b. Council Allocations
c. Multiple Year Award Period
d. Other

3:30 p.m. Coffee Break

3:45 p.m. **G.** NMFS Actions and Activities

1. Implementation of Regulations for the Reduced Fleets
2. NOAA Penalty Schedule

5:00 p.m. Recess

June 6, 1997

**PLENARY SESSION (cont.)**

8:30 a.m. **G.** NMFS Actions and Activities (cont.)

3. Revision of Council Rules and Guidelines

a. Legal Status of Council Operation and Administration Handbook
b. Council's Sick Leave Retirement Benefits

4. Interpretation of the Definition of Individual Quotas

5. NMFS Request for and Councils' Response Time

12:00 noon Lunch Break

1:30 p.m. Reauthorization of the Marine Mammals Protection Act

3:00 p.m. Coffee Break

3:15 p.m. Other Business

4:30 p.m. Next Meeting

5:00 p.m. Adjourn

**Add New Definitions to FMPs**

1. Activity: **DEFINITIONS: Amend FMPs and FMP regulations for consistency with SFA Section 102 definitions**

2. Completion date: **October 11, 1998**

3. Product(s): **Amended FMPs and FMP regulations**

4. Overview and scope of task and sub-tasks:

**A. need to review definitions in FMPs and FMP regulations for consistency with SFA Sec. 102 and amend FMPs and FMP regulations as necessary, and**

**B. need to incorporate SFA definitions in new FMPs or FMP amendments where appropriate:**

**(1) Bycatch [Sec 102(2); p.6]**
**(2) Recreational, charter and commercial fisheries [Sec. 102(3),(4),(32); pp.7, 10]**
**(3) Economic and regulatory discards [Sec 102(9),(33); p.7, 10]**
**(4) Essential fish habitat [Sec. 102(10); pp. 7-8]**
**(5) Fishing communities [Sec. 102(16); p.8]**
**(6) Individual fishing quota [Sec. 102(21); p.8]**
**(7) "Optimum" [Sec. 102(28); p.9]**
**(8) "Overfishing" and "overfished" [Sec. 102(29); pp.9-10]**

5. Project timeline (dates/milestones):

**October 11, 1998: FMPs amended as appropriate and amendments submitted to the Secretary**

**December 31, 1998: Amended FMP regulations published in the Federal Register**

**October 11, 1996: Definitions incorporated, as appropriate, in all new FMPs, FMP amendments and FMP regulations submitted for Secretarial review after October 11, 1996**

6. Status: (As of February 24, 1997)

**Council informed by Alaska Regional Administrator by letter on February 20, 1997 that all definitions were in compliance with SFA. Therefore, action is complete on this activity.**

Required Provisions for FMPs

1. Activity: **FISHERY MANAGEMENT PLANS: Required provisions in FMPs [Sec. 108(a); pp. 40-42]**

2. Completion date: **October 11, 1998 ***

3. Product(s): **All FMPs and FMP regulations contain the required provisions**

4. Overview and scope of task and sub-tasks:

**A. Existing FMPs and FMP regulations must be amended, as appropriate, by October 11, 1998, and**

**B. new FMPs, FMP amendments and FMP regulations must include the following provisions, as appropriate:**

**(1) Bycatch reports: Standardized reporting methods to assess the type and amount of bycatch in a fishery [Sec. 108(a)(7); p.41]**

**(2) Bycatch measures: Develop management measure to minimize bycatch or mortality of bycatch [Sec. 108(a)(7); p. 41]**

**(3) Commercial, recreational, and charter fishing: FMPs must specify data for each sector [Sec. 108(a)(2); p.40]**

**(4) Commercial, recreational, and charter fishing: FMPs must describe these sectors and quantify trends in landings [Sec. 108(a)(7); p. 42]**

**(5) Essential fish habitat: FMPs must describe and identify essential fish habitat; identify adverse effects on such habitat; minimize, to the extent practicable, adverse impacts from fishing; and identify other actions to encourage the conservation of such habitat [Sec. 108(a)(3); p. 40]**

**(6) Fishing communities: FMPs must include fishery impact statements which assess the likely effects of measures on fishing communities [Sec. 108(a)(5); p. 40]**

**(7) Overfishing: FMPs must specify objective and measurable criteria for identifying whether a fishery is overfished, and include measures to prevent overfishing [Sec. 108(a)(7); p. 41]**

**(8) Overfishing: FMPs must rebuild overfished stocks [Sec. 108(a)(1); p. 40]**

**(9) Overfishing: If re-building requires reduced harvests, restrictions and recovery benefits must be**

**fairly allocated among harvesters [Sec. 108(a)(7); p.42]**

**(10) Overfishing: FMPs with recreational catch-and-release programs must include measures to minimize mortality [Sec. 108(a)(7); pp. 41-42]**

5. Project timeline (dates/milestones):

**October 11, 1998: Existing FMPs amended as necessary and amendments submitted to the Secretary**

**December 31, 1998: Amended FMP regulations published in the Federal Register by October 11, 1998**

**October 11, 1996: FMP amendments, and FMP regulations developed after October 11, 1996 will contain the required provisions**

6. Status: (as of February 24, 1997)

**1. These and other SFA requirements were reviewed at December 1996 Council meeting. The plan teams are working on a major rewriting of the groundfish and crab FMPs, due in September 1997 for initial review, and final review in February 1998. It is believed that most of the tasks and sub-tasks listed in Section 5. B. have been addressed already with previous plan amendments. Direction from the Regional Administrator will be needed to identify which of the ten sub-tasks have been completed through previous action.**

Revise Council SOPPs

1. Activity: **COUNCIL SOPPs: Revise to reflect SFA requirements**

2. Group leader: **North Pacific Fishery Management Council**
   Tel: 907/271-2809 FAX: 907/271-2817

3. Completion date: **October 11, 1998**

4. Product(s): **Revised SOPPs**

5. Overview and scope of task and sub-tasks:

   **A. Revise SOPPs to reflect the following SFA requirements:**

   **(1) Roll call vote [Sec. 107(d); p. 33]**

   **(2) Agenda for meetings [Sec. 107(h)(4); p. 35]**

   **(3) Background information to be provided by persons appearing before or submitting information to Councils [Sec. 107(h)(5); p. 35]**

   **(4) Minutes of meetings [Sec. 107(h)(6); p. 35-36]**

   **(5) Recusal of Council members [Sec. 107(i)(8); pp. 38-39]**

6. Project timeline (dates/milestones):

   **October 11, 1998: Completed**

7. Status: (as of February 24, 1997)

   1. **The Council's SOPP was updated and approved by the Council at their February 1997 meeting. The revised SOPP was forwarded to NMFS DC on February 12, 1997 for publication in the FR.**

**Bycatch Reduction**

1. Activity: **NORTH PACIFIC BYCATCH REDUCTION: Prepare conservation and management measures to lower economic discards [Sec .117(a)(3); p.113]**

2. Group leader: **North Pacific Fishery Management Council**
   Tel: 907/271-2809 FAX: 907/271-2817

3. Completion date: **October 1, 1997 ***

4. Product(s): **Conservation and management measures to lower, on an annual basis over four years, economic discards**

5. Status: (as of April 2, 1997)

   1. **Council made a final decision in September 1996 to require full retention of pollock and Pacific cod in all BSAI groundfish fisheries beginning in January 1998. Rock sole and yellowfin sole retention will be required beginning in five years, 2003.**

   2. **Council is scheduled for initial review of similar full retention and utilization plan for Gulf of Alaska groundfish fisheries in April 1997, with a final decision due in June 1997. Implementation of this program in the GOA would be scheduled to be concurrent with BSAI provisions in January 1998.**

   3. **The Council believes these actions will fulfill the intent of Congress in the SFA. The one outstanding question is whether the Council needs to do anything with the crab fishery, since the fishery management plan is deferred to the State of Alaska. NMFS will need to provide an assessment of the extent of economic discards in the crab fisheries to determine if there is indeed a problem.**

## Russian Fishing Report

1. Activity: **RUSSIAN FISHING IN THE BERING SEA: Prepare a report to Congress [Sec. 105(g); p. 27-28]**

2. Group leader: **North Pacific Fishery Management Council**

3. Completion date: **September 30, 1997 ***

4. Product(s): **Report to Congress on the institutional structures in Russia pertaining to stock assessment, management, and enforcement for fishery harvests in the Bering Sea, and recommendations for improving coordination between the US and Russia for managing and conserving Bering Sea fishery resources of mutual concern**

5. Status: (As of February 24, 1997)

   1. **A Council committee has been established to develop information for this report. We have developed a preliminary description of Russian Far east fishery management, monitoring, enforcement and allocations. It is being revised and augmented as new information becomes available. A contract has been signed with Northern Forum to provide further information on the Russian Far East fishery management structure. We are on target for reporting to Congress in September.**

North Pacific Loan Program

1. Activity: **NORTH PACIFIC LOAN PROGRAM: Prepare recommendation on uses of fees in the halibut-sablefish fisheries [Sec. 108(g); pp. 53-54]**

2. Group leader: **North Pacific Fishery Management Council**

3. Completion date: **September 30, 1997 ***

4. Product(s): **Recommend to the Secretary a program which uses fees authorized under Magnuson Act Section 303(d)(4), as amended, to guarantee obligations in accordance with the Section**

5. Status: (as of April 2, 1997)

   1. **Letter sent from Council to Rollie Schmitten on February 21, 1997 seeking help from some expert within Commerce, perhaps Mike Grable, to help in developing the loan program. We have no one on our staff with that expertise. We have requested an initial discussion paper by our April 1997 meeting, so that a more structured proposal could be reviewed by the Council in June, and a final decision could be made by the Council in September 1997. Even though funds from the fee program would not be available until sometime in 1999, Congress could appropriate funds for the loan program before then. The loan program will be a discussion item at our April meeting under agenda item C-3(b).**

## North Pacific Catch Measurement

1. Activity: **NORTH PACIFIC CATCH MEASUREMENT: Prepare management procedures and regulations for measurement of entire catch [Sec. 117(a)(3); p. 115]**

2. Group leader: **North Pacific Fishery Management Council**

3. Completion date: **June 1, 1997 ***

4. Product(s): **Recommend to the Secretary management procedures and regulations for measurement of entire catch**

5. Status: (as of February 24, 1997)

   1. **The Council's current catch reporting system using observers, weekly processor reports, and the blend system, likely fulfills the Congress's expectations on this provision, but direction is needed from NMFS on whether this is true. Also see Activity sheet for more on weighing of fish.**

## Total Weight Measurement

1. Activity: **NORTH PACIFIC CATCH MEASUREMENT: Submit a plan to Congress for weighing catch by processors and processing vessels [Sec. 117(a)(3); p. 115]**

2. Group leader: **North Pacific Fishery Management Council**

3. Completion date: **January 1, 1998 ***

4. Product(s): **If the Council determines that weighing of catch is a necessary measure, submit, with the Secretary, a plan to allow for weighing.**

5. Status: (As of April 2, 1997)

   1. **In October 1994, the Council approved a requirement for all processors in the directed pollock fishery to weigh all pollock harvest on a scale. The intent was a pilot program for pollock only to be implemented within two years. NMFS published an advanced notice of proposed rule-making at 61FR6337 on 2/20/96, but there has been little further action on this matter because of technical problems with finding scales that work at sea despite ship movement, and lack of funds for certified scale inspectors. NMFS has required that certified scales be used in all CDQ operations beginning in 1998 for the new CDQ programs. The Chairman of the Council, at the Council's direction in February, wrote a letter to the head of NOAA on February 13, 1997 urging that funding be made available for the certified scale program so that the new CDQ program could be implemented by 1998. As far as other groundfish fisheries are concerned, the application of scale measurements of total weight will depend on finding a scale that works accurately and consistently at sea. Until such a scale is found and certified for use, and a certification program is established, the current approaches for measuring fish weight through volumetrics will have to suffice, unless we are informed otherwise by NMFS.**

## Full Retention and Utilization

1. Activity: **NORTH PACIFIC FULL RETENTION AND UTILIZATION OF CATCH: Submit a report to the Secretary on advisability of full catch retention by vessels and full utilization of landings by processors [Sec. 117(a)(3); p. 115-116]**

2. Group leader: **North Pacific Fishery Management Council**

3. Completion date: **October 1, 1998 ***

4. Product(s): **Report to the Secretary**

5. Status: (as of February 24, 1997)

   1. **As noted in Activity sheet C-07.04, full retention and utilization programs should be implemented in the BSAI and GOA groundfish fisheries beginning in January 1998 if approved by the Secretary. This should allow the report required by October 1998 to be filed complete with a review of the first year's implementation.**

Community Development Program

1. Activity: **ALASKA COMMUNITY DEVELOPMENT PROGRAM: Establish western Alaska CDQ programs for all M-SFCMA fisheries [Sec. 111(a)(1); pp. 85-89]**

2. Group leader: **North Pacific Fishery Management Council**

3. Completion date: **October 1, 1997 ***

4. Product(s): **Prepare amended Western Alaska CDQ program**

5. Status: (As of February 24, 1997)

   1. **The Council made a final decision on groundfish and crab CDQs at their June 1995 meeting. For Secretarial review and approval purposes, the program is non-severable from the license limitation program approved also at that meeting. Regulations have been under development by NMFS Alaska Region and a review of the proposed rule is now scheduled for April 1997. The Council discussed implementation schedules in February 1997 and urged NMFS to implement the CDQ portion in 1998 even if the license portion could not be implemented until 1999. This message was sent to NOAA's James Baker by letter on February 13, 1997. Therefore, for all practicable purposes, this tasking by the SFA has been completed by the Council and we are awaiting Secretarial approval and implementation.**

AGENDA B-1(c)
APRIL 1997

Dear Colleague:

We are soliciting a broad-based reviewof the enclosed National Oceanic and Atmospheric Administration (NOAA) FY99-03 Implementation Plan for its goal to Build Sustainable Fisheries (BSF). Your knowledge of the fisheries industry, marine conservation and management experience makes your input important to this review. We would like to hear your views on the direction of NOAA as outlined in the Plan to help us shape our program priorities. As Team Leader for the Build Sustainable Fisheries goal, I have prepared this short survey to help facilitate the process.

NOAA's vision for BSF is to increase the Nation's wealth and quality of life for Americans by ensuring sustainable fisheries that provide safe seafood, a healthy fishing industry and recreational opportunities. Achieving this vision requires societal and economic decisions that are coupled strongly with a comprehensive understanding of the environment. NOAA's Strategic Plan has identified strategic gaps in our Environmental Stewardship programs. The attached five year implementation plan focuses on how to achieve the objectives defined in the strategic plan and indicates the direction we need to go to address those priorities in FY99 and beyond through new initiatives.

For FY99 the BSF team identified six new themes, which are described in the attached implementation plan narrative and tables. We would like you to rank the themes from 1 to 6, with 1 being the theme you would consider the most important of the six. The themes and the proposed FY99 budget amouts are:

| **RANK** | **THEME** |
|---|---|
| _____ | Magnuson-Stevens Act Implementation/Essential Fish Habitat ($4.8 M) |
| _____ | Fisheries Statistics and Economics Analysis ($3.8 M) |
| _____ | Fisheries Oceanography ($2.49 M) |
| _____ | Bycatch Research ($1.92 M) |
| _____ | Aquaculture Research ($1.92 M) |
| _____ | Harmful Algal Bloom Research ($1.0 M) |

Given the guidance from NOAA to not exceed $16 million in new activities, would you change the amounts allocated to any of the themes? If so, which ones, and by how much?

| **PROPOSED BUDGET** | **THEME** |
|---|---|
| _____ | Magnuson-Stevens Act Implementation/Essential Fish Habitat ($4.8 M) |
| _____ | Fisheries Statistics and Economics Analysis ($3.8 M) |
| _____ | Fisheries Oceanography ($2.49 M) |
| _____ | Bycatch Research ($1.92 M) |
| _____ | Aquaculture Research ($1.92 M) |
| _____ | Harmful Algal Bloom Research ($1.0 M) |

Are there themes that you feel have been omitted? If so, what are they, and at what level should they be funded (please indicate which existing themes would be reduced or eliminated to accomodate the new theme(s))?
Please return this survey to me by April 10, 1997, by FAX, mail or email as follows:

Dr. Mark Holliday
F/ST1- Fisheries Statistics and Economics Division
1315 East-West Highway
Silver Spring, MD 20910-3282
(301) 713-4137 FAX
bsf@shark.ssp.nmfs.gov

I look forward to hearing your comments and sharing them with NOAA leadership.

Sincerely,

Mark Holliday, Ph.D.
Team Leader
*Build Sustainable Fisheries*

**Five Year Implementation Plan for**
**Build Sustainable Fisheries (BSF)**
**FY 1999-2003**
**March 17, 1997**

*Goal Statement:* NOAA's vision for the next decade is to increase the Nation's wealth and quality of life for Americans by ensuring sustainable fisheries that provide safe seafood, a healthy fishing industry and recreational opportunities.

Five objectives have been derived to support accomplishment of this goal. The BSF Implementation Plan provides information on the sequence and content of steps that will move NOAA closer to its stated objectives. The steps in achieving sustainable fisheries identified in the original NMFS strategic plan have become commonplace in NOAA and NMFS vernacular, and are captured as the BSF objectives in the NOAA strategic and implementation plans:

1) Assess the Status of Fishery Resources
2) Advance Fishery Predictions
3) Manage for Economic Growth
4) Ensure Adequate Compliance
5) Provide Research and Services for Fishery-Dependent Industries

The BSF objectives are based on stewarding resources by making prudent investments and policies to generate the highest possible return on this investment through healthy, efficient and productive fisheries. The total FY99 request for new programmatic initiatives in BSF is $15.9 million. There is an additional $5.2 million requested for completion of a NOAA facility in Santa Cruz, and a $42 million Capital Asset Acquisition request for construction of the first of six new fishery research vessels to replace the aging NOAA fleet.

There is a direct link between BSF and the President's Council on Sustainable Development. The recommendations set forth in the Council's report "Sustainable America" are mirrored by the BSF initiatives: e.g., to improve the precision of science used for decision-making; quantitatively assess the social and economic effects associated with fisheries; encourage mitigation efforts by private and public stakeholders; reduce bycatch; and improve and reinforce partnerships between NOAA, other federal and state agencies, private industry and other stakeholders.

Past BSF Implementation Plans have emphasized the need for improvement in our knowledge of the biological status of stocks and their dynamics. While stock assessment still remains critical to the success of attaining sustainable fisheries, the FY99-03 Implementation Plan attempts to balance this assessment emphasis with strategies that collect and analyze information needed to understand the magnitude, causes of, and solutions to overfishing. Further, the plan highlights the significance of understanding the role that habitat and ecosystem dynamics play in building sustainable fisheries. The majority of the new funding is allocated among initiatives supporting the objectives of managing for economic sustainability and advancing fisheries predictions.

To help achieve economic sustainability NOAA needs to:

Make major improvements in predicting and monitoring impacts from implementing management strategies that eliminate overfishing and reduce overcapitalization. This requires re-engineering NOAA's fishery-dependent data systems, developing integrated information management systems to deliver the data when and where needed, and using this information in the assessment of which fisheries are overfished, the extent to which they are overfished, the rate of progress made towards eliminating overfishing in all FMPs, and which methods will preclude re-entry of capital through use of market-based incentives. The next generation of decisions in rationalizing fisheries will be largely economic and social in nature. Therefore, NOAA must complement its world-class biological assessment capabilities with a significant investment in analytical capabilities in the economic and social science disciplines. In so doing, NOAA will be able to estimate the costs and benefits of reducing overfishing and overcapitalization and evaluate different allocation alternatives. This will enable NOAA to choose those policies that will successfully reduce overfishing by modeling the behavior of fishermen's responses to fishery management options. The science and management components of NOAA's organizations must complement each other to ensure success of the rationalization effort. More cooperative efforts among Line Offices within NOAA, and significant expansion of relationships with external partners, such as MOUs with states, commissions, and universities, will be undertaken to make best use of limited federal employees to ensure the attainment of the strategic plan goals.

To help achieve advances in fisheries predictions NOAA needs to:

Research multi-trophic level interactions and environmental factors that affect fisheries on a broad ecosystem scale. This will help us to understand the processes that effect long-term changes in community structure and species composition in large marine ecosystems. Much of NOAA's fisheries research has focused on small-scale processes within large marine ecosystems, with the goal of understanding inter-annual variability. The fundamental changes that many U.S. fisheries have undergone indicate that much longer time scales are involved and the spatial and temporal processes that are involved in biological and physical regime shifts are poorly understood. Research on these larger-scale phenomena as part of regional coastal ecosystems studies will provide information that will help separate anthropogenic stress from the background of natural variability. The proposed research will include broad-scale field studies, fine-scale process studies, modeling, and retrospective analysis. The goal is to develop predictive circulation and species-interaction models to assess alternative management strategies for target fishery species, and the effects of proposed management actions on both target and non-target species. The results of this research will support better management of living marine resources by focusing attention on critical oceanographic processes and biological mechanisms that regulate populations within fisheries.

The BSF team is proposing the following themes for development of its programs from 1999-2003 (with FY99 proposed funding levels in parentheses).

- **Magnuson-Stevens Act Implementation/Essential Fish Habitat ($4.8 M)** -- The 1996

reauthorization of the Magnuson-Stevens Fishery Conservation and Management Act requires that NOAA implement a broad program of research, analyses, and management and regulatory actions to improve stewardship of U.S. fishery resources. This initiative supports many of these new unfunded requirements, especially the formal designation of critical or essential habitat for each fishery under management. This includes the collection and analysis of scientifically-defensible data and information to support management decisions that will promote healthy aquatic habitats. Key elements of the initiative are (1) establishment of a baseline that characterizes the quantity and quality of aquatic habitat; and (2) development of a series of analytic tools that link the quantity and quality of aquatic habitat with the sustainability of fish populations.

- **Fisheries Statistics and Economics Analysis ($3.8 M)** -- NOAA has a comprehensive plan for fisheries data collection and economic analysis that will (1) improve the quantity, quality and collection frequency of fisheries data used in management policy decisions; and (2) fill gaps in the current data collection systems with respect to economic and social data. As a result NOAA will improve the analytical capability to predict and monitor the economic and social consequences of its management decisions. Many of these analyses are required by statute or Executive Order. Development of this capability relies on an external supply of economic and social science expertise through the creation of cooperative institutes and the utilization of Sea Grant and other university partnerships, as well as on existing expertise within NOAA.

- **Fisheries Oceanography ($2.49 M)** -- This effort seeks to improve our understanding of the oceanographic factors that influence fisheries productivity. The proposed studies will provide new models of the factors governing resource changes in abundance and sustainability to provide a context for managers making fishery management decisions. This theme is an expansion of past efforts that focused on high priority regions [e.g., leveraged funding of GLOBEC joint venture between NOAA and NSF] and includes examining regime shifts and refugia.

- **Bycatch Research ($1.92 M)** -- Problems attributed to bycatch include loss of economic opportunity, overfishing, waste of resources, impediments to the recovery of depleted stocks, and negative impacts on marine mammals and endangered and threatened species. This initiative will support data collection and research on the underlying biological relationships associated with bycatch, predict the consequences of proposed mitigation options for dealing with bycatch, and develop technological and fishery solutions to eliminate/mitigate economic and regulatory bycatch.

- **Aquaculture Research ($1.92 M)** -- Marine aquaculture (mariculture) is economically and biologically important to the U.S. Significant increases in marine species production are possible if new offshore culture systems are adapted to North American conditions. This initiative will develop new technology and methods to raise native commercially fished marine species in an environmentally safe manner in their natural environments; study potential impacts of such farming on local ecosystems; identify and develop guidelines for siting of

mariculture operations, including a review of permitting, licensing and regulatory requirements; and provide financial assistance for environmentally sound aquaculture ventures. The ability to raise these valuable species will increase their market availability, reduce the pressure to overfish natural stocks, and may provide the opportunity to augment wild stocks through release of hatchery-raised individuals.

- **Harmful Algal Bloom Research ($1.0 M)** -- Increasingly frequent blooms of harmful algae in the U.S. impact fish and shellfish stocks, commercial harvests, distributions and recruitment. This initiative will expand HAB ecosystem studies with eventual development of predictive models and mitigation strategies for HABs in all U.S. coastal areas.

**Table 3**
**Section II:** FY 1999 - 2003 **New Initiative** Implementation Tables
**Goal:** Build Sustainable Fisheries
**Objective:** Manage for Economic Growth

New Initiative: Magnuson-Stevens Act Implementation/Essential Fish Habitat

| | | FY99 ($4.8 M) | FY00 ($5.04 M) | ( |
|---|---|---|---|---|
| **PERFORMANCE MEASURE** Implement research, analyses and management and regulatory actions as required by Magnuson-Stevens Act | | 20% completion | 40% completion | c |
| **MILESTONES** | LO/PO/SO | | | |
| Identify and describe essential fish habitat for 39 Fishery Management Plans | | | | |
| Improve data collection and analysis techniques and systems | | x | x | |
| Develop baseline status reports that characterize living marine resource habitat quality and quantity | | x | x | |
| Provide each Fishery Management Council with scientifically sound recommendations for describing and identifying essential fish habitat for each FMP | | | x | |
| Establish active role and institutional presence with agencies and stakeholders for restoring impaired fishery habitat | | | | |

**Table 3**
**Section II:** FY 1999 - 2003 **New Initiative** Implementation Tables
**Goal:** Build Sustainable Fisheries
**Objective:** Manage for Economic Growth

New Initiative: Fishery Statistics and Economics Analyses

| | | FY99 ($3.8 M) | FY00 ($3.99 M) | FY01 ($4.19 M |
|---|---|---|---|---|
| **PERFORMANCE MEASURE** % of fisheries for which economic and social data are collected | | 10 | 15 | 30 |
| **MILESTONES** | LO/PO/ SO | | | |
| Implement critical economic and social data collection programs by fishery for commercial, recreational and processing sectors | | x | x | x |
| **PERFORMANCE MEASURE** % completion of data collection system reengineering | | 15 | 25 | 40 |
| **MILESTONES** | LO/PO/ SO | | | |
| Identify & implement survey methods & procedures for collection of essential commercial and recreational data | | x | x | x |
| Develop and implement Regional Information and Data Base Management Systems | | x | x | x |
| **PERFORMANCE MEASURES** % FMPs for which net economic benefits are calculated | | 10 | 20 | 50 |
| % FMPs for which current and optimal level of capitalization is assessed | | 10 | 20 | 50 |
| **MILESTONES** | LO/PO/ SO | | | |
| Systematic analyses of cost-earnings data by US fishery | | x | x | x |
| Systematic calculation of actual current and optimal levels of capitalization | | x | x | x |

| | | | | |
|---|---|---|---|---|
| Establish and implement standard methodology for evaluating economic rents | | x | x | x |
| Develop systematic process for conducting extramural research, and developing joint institutes; evaluating and using results. | | x | x | x |
| Provide economic and social impact assessments of fishery management actions | | x | x | x |

**Table 3**
**Section II:** FY 1999 - 2003 **New Initiative** Implementation Table
**Goal**: Build Sustainable Fisheries
**Objective**: Advance Fisheries Prediction
**Base Program:** Fisheries Oceanography (modeling and prediction)

| PERFORMANCE MEASURES | | FY 99 $2.5M | FY 00 $2.6M |
|---|---|---|---|
| Produce a new class of integrated models and assessments/syntheses of living marine resources for management use by building the effects of variable oceanographic and climate conditions into existing resource assessments (# models or syntheses developed) | | | |
| **MILESTONES** | **LO/PO** | **Quarter** | **Quarter** |
| Initiate study | | 2nd (2) | 2nd (2) |
| Preliminary model results | | | |
| Produce synthesis and recommendations for Fishery Management Council | | | |
| Complete model and check skill of forecast | | | |

**Table 3**
**Section II:** FY 1999 - 2003 **New Initiative** Implementation Tables
**Goal:** Build Sustainable Fisheries
**Objective:** Assess the Status of Fishery Resources

New Initiative: Bycatch Research

| | | FY99 ($1.92 M) | FY00 ($2.02 M) | ( |
|---|---|---|---|---|
| **PERFORMANCE MEASURE** Minimize bycatch to the maximum extent possible; minimize mortality of such bycatch where unavoidable | | AK groundfish | Northeast groundfish | N g |
| **MILESTONES** | LO/PO/SO | | | |
| Improve bycatch data collection and data management to assess total fishing mortality | | x | x | |
| Evaluate effectiveness of gear and fishing methods in reducing bycatch | | x | x | |
| Evaluate implemented conservation and management measures to minimize bycatch | | | x | |
| Develop new resource assessment and management techniques, including multi-spp. and limited access approaches | | | | |
| Develop models to describe bycatch effects, including interactions among multi-spp. fisheries and other stocks | | | | |
| Establish cooperative partnerships with industry to identify/implement new ways to reduce or utilize bycatch | | | | |

**Table 3:**
**Section II:** FY 1998 - 2003 New Initiative Implementation Tables
**Goal:** Sustainable Fisheries
**Objective:** Provide Research and Services for Fishery Dependent Industries

New Initiative: Marine Aquaculture and Enhancement

| PERFORMANCE MEASURES | LO/PO | FY98 | FY99 | FY00 |
|---|---|---|---|---|
| Develop technology for the offshore production and enhancement of local marine fish species in five ecological regions | | | Conduct trial of marine fish enhancemen and offshore production in one region ($1.9M) | Conduct trials of marine fish enhanceme and offshore production in all five regions ($2.0M) |
| **MILESTONES** | **LO/PO** | **Quarter** | **Quarter** | **Quarter** |
| Hold workshops and develop list of goals and priorities for research. Identify partners | | 4th | | |
| Engineer and test systems for culture and enhancement through pilot scale studies | | | 4th | 4th |
| Develop ecological models for interaction between enhanced, wild and culttured populations | | | | |
| Evaluate systems and models | | | | |
| Identify and designate ocean zones for mariculture | | | 3rd | |
| Develop guidelines, regulations and licenses for offshore aquaculture and enhancements | | | | |
| Identify and develop financial assistance programs for offshore aquaculture and enhancements | | | | |

**Table 3**
**Section II:** FY 1999 - 2003 **New Initiative** Implementation Table
**Goal:** Build Sustainable Fisheries
**Objective:** Advance Fisheries Prediction

**Initiative:** Harmful Algal Bloom (HAB) Research Program

| PERFORMANCE MEASURES | | FY99 $0.96M | FY00 $1.00M |
|---|---|---|---|
| Produce integrated models and assess-ments/syntheses to predict occurrences and impacts of HABs in regions with similar physics<br><br>Produce recommendations for mitigating HAB impacts in specific regions and 'globally' | | | 33 |
| **MILESTONES** | **LO/PO** | **Quarter** | **Quarter** |
| Prepare final report for HAB ecosystem studies | | | |
| Produce final report on potential for 'global' application of regional HAB results to other similar US coastal systems | | | 4th |
| Plan and convene workshops to summarize national understanding of HABs (ecology, oceanography, prediction, mitigation) | | | 1st,2nd |

UNITED STATES DEPARTMENT
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
Silver Spring, Maryland 20910



April 2, 1997


Mr. Richard B. Lauber, Chairman
North Pacific Fishery Management Council
605 West 4th Ave.
Rm. 306
Anchorage, AK 99501

Dear Mr. Lauber:

Please find enclosed a draft of the National Marine Fisheries Service's *Managing the Nation's Bycatch: Priorities, Programs, and Actions for the National Marine Fisheries Service*. In early 1996, NOAA's Assistant Administrator for Fisheries created the NMFS Bycatch Team and charged the team with development of a plan to guide NMFS' diverse national program of bycatch-related research and management. The team, consisting of senior staff from the Regions, the Science Centers and Headquarters, undertook a survey of what is known about bycatch in the nation's fisheries and used this survey as the basis for development of a set of research and management recommendations.

The plan is divided into three major parts. Part I contains the introduction, background, definitions, goals and objectives, the national bycatch assessment and recommendations. Part II contains an in-depth region-by-region review of bycatch issues as they affect marine fisheries management and resources in the regions and includes a summary of case studies on the economic effects of bycatch in three fisheries. Part III contains a glossary of terms, references and two appendices, including the bycatch information matrix.

Any comments that you may have on this draft plan will be extremely valuable. We are seeking public comment through a notice of availability which was published in the Federal Register on April 2, 1997. Due to your involvement in the bycatch issue and your contribution to the development of the plan, we wanted to ensure that you received a copy. Copies are also being sent to each of the regional fishery management councils, the interstate fishery commissions, state fishery management agencies, and parties from industry and the academic and conservation sectors. Comments will be accepted at the following address through May 19, 1997. At that time, we intend to prepare and distribute the final plan. Please send your comments to me at:

John F. Witzig
National Marine Fisheries Service
Office of Science and Technology
1315 East-West Highway
Silver Spring, MD 20910

Thank you.

Sincerely,

John F. Witzig, Ph.D.
Research Analyst
Office of Science and Technology

Enclosure

# MANAGING THE NATION'S BYCATCH:

## PRIORITIES, PROGRAMS AND ACTIONS FOR THE NATIONAL MARINE FISHERIES SERVICE

NATIONAL MARINE FISHERIES SERVICE
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
U.S. DEPARTMENT OF COMMERCE
WASHINGTON, D.C.

MARCH 20, 1997
DRAFT

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# CONTENTS

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# EXECUTIVE SUMMARY

Bycatch — defined as fishery discards, retained incidental catches, and unobserved mortalities resulting from fishing operations — has become a central concern of fishing industries, resource managers, scientists and the public, both nationally and globally. Bycatch concerns stem from the apparent waste that discards represent when so many of the world's marine resources are either utilized to their full potential or are overexploited. These issues apply to fishery resources as well as marine mammals, sea turtles, seabirds and other components of ecosystems for which there are no commercial or recreational uses.

Congress has responded to the increased concern with bycatch by increasing requirements under provisions of the Marine Mammal Protection Act, the Endangered Species Act, and most recently, the Magnuson-Stevens Fishery Conservation and Management Act of 1996. The Magnuson-Stevens Act highlighted the need for bycatch management in fishery management plans by requiring that *conservation and management measures shall, to the extent practicable, minimize bycatch and to the extent that bycatch cannot be avoided, minimize the mortality of such bycatch*. Globally, the United Nations Code of Conduct for Responsible Fisheries, to which the United States is a signatory, also emphasizes bycatch reduction.

Responding to these issues and increasing regulatory requirements, the U.S. fishing industries initiated, in 1992, a series of workshops to develop strategies to reduce bycatches and to increase understanding of bycatch issues by the industry and the public. Their recommendations, as well as those from environmental groups and the public, have prompted the National Marine Fisheries Service to prepare this plan, clearly articulating the agency's objectives, priorities and strategies regarding bycatch. This plan was compiled by agency experts with experience in fisheries management, stock assessment and social sciences. It includes proposed national bycatch objectives, specific recommendations concerning data collection, evaluation and management actions necessary to attain the objectives, and a comprehensive assessment of the state of bycatch in the nation's marine fisheries. The latter is intended to serve as a benchmark from which progress in bycatch reduction can be measured.

The assessment of fishery bycatch focuses on the availability of quantitative discard estimates from the nation's fisheries, the significance of those discards to the health of fishery and protected stocks, and progress in addressing bycatch issues associated with each of the 159 fisheries evaluated. A total of 149 species or species groups are identified as bycatch in the nation's fisheries. Of these species, 63% are finfish, crustaceans or mollusks, and 37% are protected marine

mammals, turtles or seabirds. Some quantitative information on finfish discards was available for about one-half of the species or species groups; the availability of such estimates is disproportionate among regions of the country and among fisheries within regions. Protected resources constitute 75% of cases where bycatches are sufficiently high to warrant concern for the population status of the stock.

Review of bycatch reduction efforts completed or under way indicates that successful programs share seven characteristics that are proposed as national objectives:

1. Determine the magnitude of bycatch and bycatch mortality.

2. Determine the population, ecosystem and socio-economic impacts of bycatch and bycatch mortality.

3. Determine whether current conservation and management measures minimize bycatch *to the extent practicable* and, if not, select measures that will.

4. Implement and monitor selected bycatch management measures.

5. Improve public understanding of the issues concerning bycatch.

6. Improve the effectiveness of partnerships with groups and individuals external to the National Marine Fisheries Service.

7. Develop NMFS' infrastructure to effectively implement this Bycatch Plan.

To accomplish these objectives, specific actions in the following six areas are recommended.

1. Bycatch monitoring and data collection programs.

2. Research to increase the selectivity of fishing gear and to increase the survival of fish and protected species that are inadvertently encountered by fishing gear.

3. Research on the population, ecosystem, and socio-economic effects of bycatches.

4. Incentive programs for fishermen to improve bycatch performance.

5. Analysis of the implications of conservation and management measures for bycatch.

6. Exchange of information and development of cooperative management approaches.

Recommended actions in the six areas range from developing strategies for long-term collection of reliable, scientifically valid data to providing information that will clearly define the benefits and costs associated with managing bycatches.

The development of this plan has brought into sharp focus the fact that bycatch is indeed a multifaceted and complex set of problems that affect nearly all aspects of fishing operations. Regionally, the causes and implications of bycatches share some characteristics, but often differ since the status of exploitation of resources and the way fisheries are prosecuted and managed can vary substantially. Bycatch management can be accomplished with a wide variety of measures, depending on the specific characteristics of fisheries. As a result, no single solution to the "bycatch problem" exists. Rather, fishermen, managers, scientists, conservationists and other interest groups must work together to craft a balanced approach to addressing bycatch — one that will promote the sustainability of our nation's living marine resources.

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## PURPOSE OF THE NATIONAL MARINE FISHERIES SERVICE BYCATCH PLAN

This Bycatch Plan is intended to serve as a guide to the National Marine Fisheries Service (NMFS) and its cooperators — the fishery management councils,[1] states, commissions,[2] fishing industry, the conservation community and other special interest groups — regarding current programs and future efforts to reduce bycatch and bycatch mortality of marine resources. These programs represent a whole spectrum of research, management, and enforcement activities that include fisheries under the jurisdiction of the Magnuson-Stevens Fishery Conservation and Management Act of 1996 as well as all marine mammals, "threatened" and "endangered" species, seabirds and other living resources of the marine ecosystem.

While NMFS is already involved in reducing bycatch in many of the nation's fisheries through gear research, technology transfer workshops and exploration of new management techniques, these efforts are not currently coordinated by an overall long-term strategy. Such a strategy will lend structure to NMFS' highly diverse national program of bycatch-related research and management. The Bycatch Plan will help NMFS meet congressional bycatch mandates and is essential to the "build sustainable fisheries" objective in the National Oceanic and Atmospheric Administration's *NOAA Strategic Plan: A Vision for 2005* (NOAA 1996). The Bycatch Plan can help guide the regional fishery management councils and will be a stable platform from which industry-government bycatch coordination can take place.

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*[1] Refers to the eight fishery management councils established in 1976 by Congress as part of the Magnuson Fishery Conservation and Management Act. They are (1) the North Pacific Fishery Management Council; (2) Western Pacific Fishery Management Council; (3) Pacific Fishery Management Council; (4) Gulf of Mexico Fishery Management Council; (5) Caribbean Fishery Management Council; (6) South Atlantic Fishery Management Council; (7) Mid-Atlantic Fishery Management Council; and (8) New England Fishery Management Council.*

*[2] Refers to the three interstate fisheries commissions established by Congress. They are the Pacific States Marine Fisheries Commission, the Atlantic States Marine Fisheries Commission, and the Gulf States Marine Fisheries Commission. The commissions work to promote and encourage cooperative management of interjurisdictional marine resources.*

## THE ROLE OF THE NATIONAL MARINE FISHERIES SERVICE IN ADDRESSING BYCATCH

As stewards of the nation's living marine resources, the National Marine Fisheries Service and its parent organization, the National Oceanic and Atmospheric Administration, have a particular responsibility to lead and coordinate the nation's collaborative effort to reduce bycatch. NMFS carries out its charge under many laws and Congressional mandates. Most of its responsibilities that bear on bycatch emanate from three statutes: (1) the Magnuson-Stevens Fishery Conservation and Management Act of 1996, which regulates fisheries within the U.S. exclusive economic zone; (2) the Endangered Species Act of 1973, which protects species determined to be threatened or endangered; and (3) the Marine Mammal Protection Act of 1972 (as amended in 1994), which regulates taking or importing marine mammals. International conventions and treaties also play a significant role with respect to bycatch and discarding.

### National Statutes

Since 1976, the Magnuson-Stevens Act (Magnuson Fishery Conservation and Management Act reauthorized October 11, 1996, as the Magnuson-Stevens Fishery Conservation and Management Act) has provided for conservation and management of marine fishes through federal fishery management plans and amendments. The "national standards," which are identified in the act, set standards for management that must be met in each fishery management plan. The 104th Congress included in the Magnuson-Stevens Act a new national standard to address bycatch as a potential impediment to maintaining sustainable fisheries. The new National Standard 9 states: *Conservation and management measures shall, to the extent practicable, (A) minimize bycatch and (B) to the extent bycatch cannot be avoided, minimize the mortality of such bycatch.* This standard constitutes the overall guidance and direction on bycatch for the nation and was used as the foundation policy in the development of this NMFS Bycatch Plan. The Magnuson-Stevens Act also contains many specific regional bycatch management requirements, especially in the North Pacific and Southeast regions, that have required implementation dates in 1997 and 1998.

Since fishery resources and protected species are interactive members of the same ecosystems, the nation's concern about bycatch is also considered through the Marine Mammal Protection Act, the Endangered Species Act, and the Migratory Bird Treaty Act. Living marine resources that are afforded protection under these acts are known as "protected species" and NMFS has legislative mandates to conserve, manage and protect these resources as well as fishery stocks.

The Endangered Species Act of 1973 (ESA) mandates the protection and conservation of species and populations that are endangered, or threatened with

extinction, and the conservation of the ecosystems on which these species depend, by the federal government. Some of these threatened and endangered species, including sea turtles; some Pacific salmon, marine birds and marine mammals; and some whales and dolphins, are captured as bycatch in the nation's fisheries. Under the ESA's protection process, after a species is identified as threatened or endangered, a recovery plan that outlines actions to improve the species' status is prepared and implemented. Recovery plans for marine species generally include a requirement to reduce incidental capture of protected species in commercial fishing operations. In some cases, fisheries can be terminated because they impose mortality rates on protected species that impede the recovery of the listed population. Other provisions of the Endangered Species Act ensure that sources of mortality for protected species are identified and minimized or mitigated through conservation plans.

The 1994 amendments to the 1972 Marine Mammal Protection Act (MMPA) seek to maintain populations of marine mammals at optimum sustainable levels, principally by reducing the rate of mortality or serious injury to them. This includes fishing-related mortality and injury. All commercial fishermen are prohibited from incidentally taking marine mammals without specific federal authorization for the taking in the form of a "marine mammal authorization" certificate. The MMPA requires that NMFS classify each U.S. fishery according to whether there is a frequent (Category I), occasional (Category II), or remote (Category III) likelihood of incidental mortality and serious injury to marine mammals. It also establishes take reduction teams (TRTs) to develop take reduction plans for those fisheries with the greatest impact on marine mammal stocks (Category I and Category II).

Migratory seabirds are also known to be incidentally caught in fisheries. The taking of migratory seabirds is governed by the Migratory Bird Treaty Act, administered by the Department of Interior. Several species, such as the marbled murrelet and short-tailed albatross (excluding U.S. populations), are listed under the Endangered Species Act. In cooperation with Interior's U.S. Fish and Wildlife Service, NMFS monitors and reports the bycatch of seabirds.

**International Agreements**

Recent United Nations Food and Agriculture Organization (FAO) agreements to which the United States is a party also specifically identify bycatch reduction as a major goal. The two key agreements are:

A. *Code of Conduct for Responsible Fisheries* (September 1995). The code's *General Principles*, Section 6.2., pertains to bycatch management: "...Management measures should not only ensure the conservation of target species but also of species belonging to the same ecosystem or associated with or dependent upon the target species." Section 6.6 states, "...States

and users of aquatic ecosystems should minimize waste, catch of non-target species, both fish and non-fish species, and impacts on associated or dependent species."

B. *Agreement Relating to the Conservation and Management of Straddling Fish Stocks and Highly Migratory Fish Stocks* (September 1995) contains bycatch management principles for these resources similar to those in the Code of Conduct.

There are, however, other international agreements and commissions that may require bycatch management measures to ensure conservation of transboundary resources. Some of the most important are the Inter-American Tropical Tuna Commission, Atlantic Tunas Convention Act, Convention for the Conservation of Anadromous Stocks in the North Pacific, International Pacific Halibut Commission, and the Pacific Salmon Commission.

## INPUT FROM CONSTITUENTS IN THE DEVELOPMENT OF THE BYCATCH PLAN

In developing this plan, the National Marine Fisheries Service worked extensively with the fishing industry, the conservation community and the academic community to increase information-sharing and to expand the web of people and institutions that are interested in a well-integrated national approach to addressing bycatch. The workshops and symposia listed in Table 1 established the framework for a constructive dialogue on bycatch management between government, fishery management councils, industry and the conservation community. One of the striking similarities among all of the conferences and workshops is the recognition that effective bycatch management requires collaborative work among these groups, each contributing from its own talents and strengths.

As Table 1 indicates, there is considerable national consensus on what the major bycatch issues are and what measures should be adopted to address them. For instance, nearly every workshop and conference pointed out that there is a dearth of credible scientific information to frame bycatch issues and, in the absence of information, the issue is frequently driven by misconceptions, mistrust and inaccuracies. Each of these workshops made increased data collection one of its top recommendations; NMFS reached the same conclusion. In assessing the nation's bycatch, the agency recognized that in many fisheries there is simply not enough information to know the character and magnitude of the bycatch or the population, ecosystem and socio-economic effects of that bycatch or its mitigation.

The conferences and workshops also repeatedly stressed that NMFS should avoid adopting a "top-down" national solution to bycatch. Fishermen, processors,

scientists and managers voiced their concern that a national strategy for bycatch could remove decision-making authority from the persons best-acquainted with the bycatch issues of a particular region or fishery. NMFS scientists and managers shared this concern, and the entire approach to the development of the Bycatch Plan was driven by the recognition that, while there might be common themes among regions, there is no single national solution that can be applied to every fishery in the country. Rather, after identifying some common issues, termed "national objectives," the Bycatch Plan leaves further identification of the issues to regional experts.

Table 1. National bycatch workshops, symposia and reports, 1992-1996, with key findings and recommendations.

| Source | Findings |
|---|---|
| February 1992<br>National Industry Bycatch Workshop<br>Newport, OR | - Stressed the importance of open communication, industry accountability and responsibility, and increasing knowledge about bycatch and its effects |
| December 1994<br>Win-Win Bycatch Solutions/ FISH EXPO<br>National Fisheries Conservation Center<br>Seattle, WA | - User groups need to focus on common goals in addressing bycatch<br>- Advised managers to avoid blanket solutions<br>- Called for building problem-solving capacity within and between industry, government, and conservation groups |
| April 1995<br>New England Bycatch Workshop<br>Rhode Island Sea Grant College Program<br>Newport, RI | - Encouraged information-sharing and standardization of data collection.<br>- Emphasized need for cooperation between all user groups. |
| September 1995<br>Solving Bycatch: Considerations for Today and Tomorrow<br>Alaska Sea Grant College Program<br>Seattle, WA | - Updated national dialogue on progress and expectations in bycatch management following 1992 workshop<br>- Provided forum for extensive information-sharing amongst fishermen, processors, managers, and scientists on bycatch-reducing gear design and deployment |
| November 1995<br>An Industry Workshop Addressing Bycatch Issues in Southeastern U.S. Fisheries<br>Gulf and South Atlantic Foundation<br>Atlanta, GA | - Bycatch issues are frequently driven by perception problems, not scientific concerns<br>- Recommended increased data collection as a way to decrease misinformation<br>- Called for effective information transfer among all groups<br>- Advised managers to explore alternative management strategies |

Table 1. Continued.

| Source | Findings |
|---|---|
| February 1996<br>Building a Bycatch Strategy in the North Pacific: Western Alaska - a Matter of Cultural and Community Survival<br>Alaska Fisheries Development Foundation<br>Western Alaska | - Stressed the importance of multi-species ecosystem management and an ecosystem conservation perspective<br>- Recommended increased observer coverage and collection of bycatch data<br>- Bycatch is a conservation and sociological problem as well as an economic one and should be viewed as such<br>- Urged NMFS to increase participation by Western Alaskans in bycatch reduction |
| February 1996<br>Building a Bycatch Strategy in the North Pacific<br>Alaska Fisheries Development Foundation<br>Sitka, AK<br>Kodiak, AK | - Stressed the need for a national bycatch strategy which draws on the talents and abilities of government, industry, and the non-profit community<br>- Identified the following national goals:<br>A. Promote cures over closures<br>B. Meet or exceed legal conservation & discard standards<br>C. Build capacity to deal with bycatch and sustainability challenges<br>D. Improve knowledge of bycatch character, solutions, consequences.<br>E. Concentrate efforts on problems that are most urgent<br>F. Promote actions adapted to specific fishery and ecosystem needs<br>G. Build a team that can handle the whole job<br>H. Promote constructive public discourse on bycatch<br>I. Anticipate and prevent future crises<br>K. Seek a more supportive role for NOAA General Counsel in industry's efforts to address bycatch. |
| February 1996<br>Market-Based Incentives to Reduce Fisheries Bycatch<br>Marine Policy Center - Woods Hole Oceanographic Institute<br>Woods Hole, MA | - Avoid a blanket national solution<br>- Market-based incentives can increase industry flexibility in addressing bycatch<br>- Need to:<br>A. Collect long-term bycatch data by fishery<br>B. Develop bioeconomic models to estimate economic effects of bycatch<br>C. Develop risk assessment-like framework on bycatch rates and effects<br>D. Identify regulatory/legal determinants of bycatch |

Table 1. Continued.

| Source | Findings |
|---|---|
| May 1996<br>Outreach Strategy to Promote a Constructive Public Discourse on Bycatch<br>Center for Marine Conservation<br>Washington, D.C. | - Identified roles for industry, government, managers, academics, environmental groups and the media based on differing abilities and roles<br>- Recommended the development of "tool kits" that are used to provide a consistent message<br>- Emphasized that success will be built on cooperation and consistency. |
| August 1996<br>The Consequences and Management of Fisheries Bycatch<br>American Fisheries Society Annual Meeting Symposium (proceedings in press)<br>Dearborn, MI | - Highlighted bycatch management success stories where industry, scientists and managers shared same goals<br>- Emphasized that different approaches are needed in different fisheries |

## TERMS AND DEFINITIONS USED IN THE BYCATCH PLAN

In developing the Bycatch Plan, NMFS surveyed the recent literature on bycatch and the definitions used in each publication. This survey included the 1996 Magnuson-Stevens Fishery Conservation and Management Act; *Solving Bycatch: Considerations for Today and Tomorrow* (Alaska Sea Grant College Program 1996); the Food and Agriculture Organization report *A Global Assessment of Fisheries Bycatch and Discards* (Alverson et al. 1994); the *Proceedings from the 1992 Industry Bycatch Workshop* (McCaughran 1992); the United Nations Conference on Straddling Fish Stocks and Highly Migratory Fish Stocks (UN 1995); and the Food and Agriculture Organization *Code of Conduct for Responsible Fisheries* (FAO 1995). The review also included a more informal survey of usage of the term "bycatch" in reports and publications from the government, industry and conservation sectors. NMFS was unable to identify a universal definition of bycatch that adequately considered the span of living marine resources harvested or encountered in U.S. fisheries.

After careful review of the various definitions of bycatch and associated terms, NMFS used the definitions contained in the 1996 Magnuson-Stevens Act as the basis for development of an inclusive definition of bycatch that would meet the agency's conservation and management responsibilities for the large number of marine species subject to fishing-related mortality. The Magnuson-Stevens Act defines bycatch as "fish which are harvested in a fishery, but which are not sold or

kept for personal use..." NMFS expanded this definition in two ways. First, living marine resources other than "fish," as defined in the Magnuson-Stevens Act, (i.e., marine mammals and seabirds) were included to consider all species taken or encountered in marine fisheries that require conservation and protection. Second, the retained catch of non-target species was included because this use of living marine resources is a byproduct that precludes some other uses of these resources.

The following definitions of the major terms used in this plan is consistent with definitions in existing statutes and those resulting from many public workshops, conferences, symposia and studies on bycatch research and management. A more extensive glossary of terms also appears at the end of this document. The use of the term "mortality" refers to numbers or an amount rather than a rate.

**Bycatch** — Discarded catch plus retained incidental catch and unobserved mortality.

**Discarded catch** — The term discard refers only to the discard of whole fish at sea or elsewhere.

**Incidental catch** — Catch that is not a part of a target catch. Two examples are finfish catch in a shrimp fishery and seabird catch in the longline tuna/swordfish fishery.

**Target catch** — Catch of a species, a particular size or sex, or an assemblage of species' that is primarily sought in a fishery, such as shrimp in a shrimp fishery or mature female fish in a roe fishery.

**Unobserved mortality** — Mortality of a marine species due to a direct encounter with fishing gear that does not result in capture of that species by a fisherman. This includes mortality due to lost or discarded fishing gear.

**Total catch** — Retained catch plus discarded catch.

**Total fishing-related mortality** — Mortality of living marine resources due to an encounter with fishing gear.

**Bycatch mortality** — All mortality associated with discarded catch plus unobserved mortality and retained incidental catch.

**Regulatory discards** — Catch that is required by regulation to be discarded.

**Discretionary discards** — All other catch that is discarded because of undesirable species, size, sex, or quality, or for other reasons. This includes economic discards as defined in the Magnuson-Stevens Act.

**Prohibited species** — A species for which retention is prohibited in a specific fishery.

**Protected species** — Any species that is subject to special conservation and management measures (e.g., Marine Mammal Protection Act, Endangered Species Act, and the Migratory Bird Treaty Act).

**Living marine resources** — Any animal or plant life that spends part of its life in coastal or ocean waters.

**Waste** — In the context of the use of living marine resources, waste is the difference between potential and actual contribution of those resources to the well-being of the nation.

These definitions can be used as a basis for clear accounting of the impact of fishing operations on living marine resources. Information on all components of total fishing-related mortality, including bycatch, is essential for obtaining a comprehensive view of the status of a species or assemblage of species. Developing a long-term, stable information base on catch and bycatch promotes ecosystem-oriented conservation and management as a species' designation as "target" or "non-target" changes due to management actions or to changes in economic or social conditions.

*Total fishing-related mortality* is defined as the retained *target catch* plus any retained catch of non-target species (*incidental catch*), the fishing mortality associated with the catch that is discarded (*discarded catch*), and the fishing mortality of living marine resources due to an encounter with fishing gear that does not result in the capture of that species by fishermen (*unobserved mortality*). Considerable effort has been made to quantify catch and, to date, it has been the major indicator of total fishing mortality. The estimates of retained catch typically are based on reports of landed weights submitted by fishermen, fish processors or port samplers.

*Bycatch* is the byproduct of fishing activities that results in the retention of target species. In a commercial or subsistence fishery, bycatch mortality is a byproduct of catching specific fish that are retained. In a recreational fishery, bycatch mortality is the byproduct either of catching fish that are retained or of catching and releasing fish. Therefore, it includes *discarded catch*, the retained catch of non-target species (*incidental catch*), and *unobserved mortality*. *Discarded catch* includes *protected* and *prohibited species*, other catch that by regulation cannot be retained, and catch that is discarded at the discretion of the fisherman (*discretionary discards*). Alverson and Hughes (1996) and Hall (1996) point out that until recently, bycatch was largely an unaccountable part of fishing-related mortality. However, with the advent of at-sea observer programs to account for catches of protected and prohibited species, some information has

become available. While unobserved mortality is known to occur, little information is available on this component of total fishing mortality. Mortality resulting from marine debris entanglement and "ghost fishing" can contribute significantly to total fishing mortality (Laist 1995) as can other unobserved mortality.

The definition of bycatch in this plan is clearly more inclusive than that in the Magnuson-Stevens Act, but is appropriate given NMFS' broad responsibility to conserve and manage the nation's living marine resources. The two definitions address different purposes — the NMFS Bycatch Plan's definition is intended to provide a basis for bycatch research, management and planning for NMFS while the definition in the Magnuson-Stevens Act is that which will be used in fishery management plans to support National Standard 9 for bycatch. The inclusion of all incidental catch in the NMFS Bycatch Plan definition is in keeping with many recent bycatch conferences and workshops, and is widely accepted by the industry, managers, scientists and the conservation community. The inclusion of both incidental catch and unobserved mortality is essential to assessing total fishing mortality and to meeting NMFS' responsibility to assess total fishing mortality and to base management decisions on the best scientific information available.

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# II. NATIONAL BYCATCH ASSESSMENT

During the development of this plan, regional experts familiar with data sources and fisheries for the Northeast, Atlantic highly migratory pelagic species, Southeast, Western Pacific and pelagics, Pacific Coast, and Alaska conducted a survey of fishery catches and discards. The purpose of the survey was to collate the most recent information available on discards throughout the nation. These data were analyzed to determine the importance of discarding in the nation's fisheries; summary results of the analyses are presented. Factors that affect the amount of discards and the significance of discard mortalities on resources and fisheries are also presented as is the status of data collection and discard mitigation programs. Data developed in the survey are presented in detail in Appendix A.

For these analyses, distinct fisheries were defined by gear type, area and target species or target species group. A total of 159 fisheries were identified throughout the nation — 36 in the Northeast, 6 for Atlantic highly migratory pelagic species, 44 in the Southeast, 6 in the Western Pacific and pelagics, 13 on the Pacific Coast, and 54 in Alaska. The primary focus of the survey and subsequent analyses was on fisheries that are regulated under the Magnuson-Stevens Act, the Marine Mammal Protection Act (MMPA) and the Endangered Species Act. However, fisheries in state waters that are regulated under inter-jurisdictional plans (e.g., Atlantic States Marine Fisheries Commission) and fisheries where there was a significant overlap with fisheries for the same stocks in federal waters were also included in the survey.

The fisheries were grouped into 31 major fishery units. Most of these units correspond to the those presented in the NOAA document *Our Living Oceans* (NMFS 1996a; e.g., Northeast Demersal, and Pacific Coast Salmon), or to categories specified in the list of fisheries developed under the Marine Mammal Protection Act. Several additional fishery units were made by dividing some units based on unique characteristics of either the bycatch in the fisheries or of the fishing industry in particular areas. For example, the Alaska groundfish fishery was divided into two units — the Gulf of Alaska groundfish fishery, and the Bering Sea and Aleutian Islands area groundfish fishery. In addition, classification of fisheries as required by the MMPA also served as a guide in developing fishery categories. Under the MMPA, a fishery is classified as a Category I if it may take more than 50% of the "potential biological removals" of a protected marine mammal stock. A Category II fishery may take from 1% to 50% of the potential biological removals, and a Category III fishery may take less than 1% of the potential biological removals. Of the 159 fisheries identified in the survey and classified under the MMPA, 13 (8%) were determined to be in Category I, 13 (8%) in Category II, and 118 (74%) in Category III. Fifteen of the fisheries (9%)

were classified as Category II, III; this was due to the inclusion of several fisheries with different MMPA categories in a single classification in the survey. Over 90% of the Category I fisheries were in the Northeast. The Atlantic highly migratory pelagic species, Southeast, Northeast, and Alaska accounted for all of the Category II fisheries. Most Category I fisheries used fixed gear, either gill nets or longlines.

For each defined fishery, recent (1995 unless otherwise indicated) landings, ex-vessel value (ex-vessel value is the amount paid to a vessel's owner or operator for its catch) and numbers of vessels participating in each fishery were compiled. Where actual participation could not be determined, the number of permitted vessels in the fishery was used. The purpose of compiling these statistics was to quantify the biological, economic and social significance of each fishery. Where available, the most recent estimates of discards of each species or species group were used for each fishery. Discards for a species or species group were not estimated if there was no statistically reliable information available.

A total of 149 unique species or species groups were identified as discards associated with the 159 fisheries defined nationwide. Of these species or species groups, 94 (63%) were finfish, crustaceans or molluscs and 55 (37%) were "protected" species (e.g., marine mammals, turtles or birds). The disproportionate representation of protected species is due to the level of resolution possible for these species in data collection programs. For the most part, protected species were not included in the survey unless positive identification, frequently to the species level, and exact enumeration was possible. Thus information on discards of protected species is available in much greater detail than for fish, and caution must be exercised when comparing species or species group counts. Some protected species are represented by a single occurrence whereas the resolution for fish was in terms of metric tons or thousands of animals. A species or species group was frequently identified as discard in more than one fishery. For example, snow crab was listed as a discard species in 25 of the 54 fisheries in Alaska and pelagic species were listed as discards in 11 of the 44 fisheries in the Southeast. Overall, 585 species or species groups were identified as discards associated with the 159 fisheries defined nationwide.

The amount of information on bycatch species or species groups varied considerably among the regions. Regions with large data collection programs were able to provide information at a much finer level of resolution, frequently at the species level, than were regions that either had minimal or no quantitative information on discards in the region's fisheries. When no quantitative information on discards for a fishery was available, general descriptive categories, such as groundfish, were created; when quantitative information was available, individual species were listed separately. Interpretation of analyses that combined data across regions focused on overall distributional patterns rather than on specific comparisons. Similarly, simple classification of fisheries based on targeted species

and gear results in all fisheries being equivalent and can mask the importance of a fishery and potential impact of discards on the fishery. Thus, analyses were conducted at the regional level and considered the volume of the discards in the fishery when available.

Quantitative estimates of finfish discards were available for 52% (49 of 94) of unique discard species or species groups in the nation's fisheries. The fractions of discarded species for which quantitative estimates were available were disproportionate among regions: Northeast — 22% (5 of 23); Atlantic highly migratory pelagic species —71% (5 of 7); Southeast — 30% (3 of 10); Western Pacific and pelagics — 60% (9 of 15); Pacific Coast — 30% (3 of 10); and Alaska — 83% (24 of 29). These numbers do not imply that precise or accurate measures for 52% of the species bycatch are available. Only in Alaska groundfish and some shellfish fisheries is there sufficient information to estimate total fish discards for some fisheries. If protected species bycatch are included, then some quantitative data are available for 62% of the species or species groups.

Information on the current status of target and discard species was obtained from *Our Living Oceans* (NMFS 1996a) and appropriate updates. Two measures of stock status were specified: (1) the rate of utilization (over, fully or underutilized), and (2) the current stock size relative to that which is necessary to produce the maximum long-term potential yield (below, near, above). These criteria are important when considering the effects discards may have in contributing to the exploitation status of stocks. For fishery resources, Table 2 describes each discarded fish species/group according to its status of utilization (over, fully or underfished) in relation to its long-term potential yield nationally and regionally. Nationally, using both criteria, the majority (57%) of discarded fish species or species groups are classified as fully or overutilized and at or below their long-term potential yield. Taken together, these two criteria indicate that the magnitude of fishery discards of these species or species groups may be important in determining the health of these species. Regionally, the status of bycatch species or species groups varies with 78% of the discard species or species groups in the Northeast, 72% of Atlantic highly migratory pelagic species, 90% in the Southeast, 14% in the Western Pacific, 60% on the Pacific Coast, and 47% in Alaska classified as fully or overutilized and at or below their long-term potential yield. However, the status of 60% of the species or species groups in the Western Pacific is unknown with respect to either of these criteria.

## SIGNIFICANCE OF DISCARDS IN THE NATION'S FISHERIES

The significance of discards to resource populations, economic and social dimensions of fisheries, and the structure and functioning of ecosystems was evaluated for each fishery considered. Significance of discards was evaluated through the use of two measures — *level* and *nature*. The *level* of discards

describes in relative terms the importance discards have for one or more of the following attributes: population status of the discarded species, the economic and social status of fisheries that may target the discarded species, or the effects on the ecosystem from which the discarded species is taken. This metric is not a measure of the absolute magnitude of the discards for a species or species group. Three categories of discard level used were high, moderate and low. Regional data on discard levels for all fisheries are compiled in Figure 1; information for protected species was not used in this analysis. Note that the same discard stock may be counted more than once if it occurs in more than one fishery (hence there was a total of 452 cases). The Southeast Region had the greatest proportion of high and moderate discard level stocks (84%), followed by the Northeast (56%), the Atlantic highly migratory pelagic species (50%), the Pacific Coast (44%), the Western Pacific and pelagics (33%), and Alaska (25%).

The relationship between discard *level* and *utilization rate* for fishery resources is also given in Table 3. Overall there is a tendency for overutilized and fully utilized resources to have high or moderate levels of bycatch, although the relationship is variable by region. For protected resources (marine mammals, turtles and birds), the vast majority of discard levels (79%) are considered high or moderate.

The *nature* of discards elaborates on why specific determinations of the significance of discards were made. Four options were given to classify the nature of discards — population status (of the discarded species), socio-economic concerns, ecosystem concerns, or public concerns. Determinations of the primary nature of these concerns are compiled in Figure 2. Population status was the dominant factor determining the significance of discards for fish species or species groups for Atlantic highly migratory pelagic species (67%) and in the Northeast (44%), while socio-economic concerns dominated in the Western Pacific and pelagics (60%), the Southeast (60%), and Alaska (59%). Socio-economic and population concerns were about equal in the Pacific Coast (40%). Population concern was the overwhelming factor (60-100% of the cases) determining the significance of bycatch on protected species in all regions except Alaska, where public concern regarding the impacts of bycatch on marine mammals and birds was the primary factor in 100% of the cases. In the survey, population effects of bycatch was listed as the primary concern if bycatch contributed significantly to the current status of a species or species group. Thus public concern was frequently listed as the primary determinant when bycatch of a species or species group is low relative to other sources of mortality.

Discards may be problematic for more than one reason. For example, uncertainty regarding the effects of discards on population status may generate public concerns and have economic consequences for the industry wherein the discards occur. In these cases, multiple causes for concern are ranked by priority in the survey, and the most important factor in determining the nature of discarding

is used for the purposes of statistical comparison (Figure 2). In Alaska, when quantitative information on the amount of discards is taken into account, public concern over the amount of discards was the leading factor in determining the significance of discards in the Bering Sea and Aleutian Islands, and Gulf of Alaska groundfish fisheries, whereas socio-economic concerns are the primary factors in the salmon and crab fisheries.

The *reasons* for discards elaborate on specific causes of discarding. Four choices were specified as potential reasons for discarding: (1) protected species; (2) regulatory-induced, which includes quota, trip limit, prohibited species, size or sex, minimum size limit, etc.; (3) discretionary, which may occur for example when no market exists for a particular species; and (4) catch-and-release discards, as in recreational fisheries. Analyses of the reasons for discarding can be affected by the degree of classification of the species discarded. Thus this assessment was conducted using both nominal counts of the reasons for discarding species or species groups and quantitative measures (weight or numbers) where available. A compilation of the reasons for discarding, based on the nominal occurrence of species or species groups, is illustrated in Figure 3. Clearly, when only the occurrence of a species/group is considered, regulatory-induced discards are dominant nationwide, with the highest proportions of regulatory discards being in the Southeast (58%), the Northeast (57%), Alaska (53%), and the Pacific Coast (50%) regions. Discretionary discards were most prevalent in the Western Pacific (57% of the cases). Protected species discards occurred in all regions. Catch and release was not the dominant factor influencing discards in any specific fishery bycatch case in the nation. The high occurrence of regulatory discards in some fisheries, such as the Alaska groundfish fisheries, primarily reflects the mandatory discard of prohibited species, which can comprise a relatively small percentage of the total amount of species or species groups discarded. Where sufficient quantitative information was available and included in the analyses, most of the discard in terms of total tonnage is discretionary in the Alaska groundfish and the Atlantic highly migratory pelagic species fisheries.

## ADEQUACY OF INFORMATION FOR MITIGATING DISCARDS

The survey also addressed the adequacy of information and progress in solving identified discarding problems. A hierarchical description of data quality and progress of mitigation efforts was used to assess the National Marine Fisheries Service's current capabilities for addressing bycatch issues. The hierarchy was comprised of seven steps that could typically be used to identify problems, evaluate potential solutions, and implement effective management programs. The seven steps, described in detail in Appendix A, include (1) quality of information on magnitude of discards; (2) evaluation of the impacts of current discarding practices on populations, fisheries and ecosystems; (3) evaluation of the effectiveness of current measures; (4) identification of potential alternatives; (5) evaluation of the

population, ecosystem and socio-economic effects of each alternative; (6) choice and implementation of an alternative; and (7) evaluation of the effectiveness of the implemented measures. Information relating to regional progress in addressing these seven steps is given in Figure 4. Briefly, results are as follows.

*Information on magnitude of bycatch.* Overall, the quality of information available on bycatch is greatest in Alaska and in Atlantic highly migratory pelagic species, and poorest for the Southeast, Northeast and Pacific Coast regions. Nationwide the quality of information averages (2.12 out of 4.00) slightly better than isolated snapshots. Clearly, there is a need to improve sampling programs to meet minimum acceptable standards associated with providing adequate estimates of discards for management and monitoring in most regions.

*Impact analyses of discards.* The best information on impacts of bycatch exists for populations, followed by socio-economic considerations of fisheries, and ecosystem impacts. The average score for population impacts (1.33 out of 4.00) indicates that some quantitative information on impacts is available, mixed with qualitative information. The average population score was highest for Alaska and the Southeast, and lowest for the Pacific Coast. For economic and social impacts, the average score was 1.1 (slightly better than qualitative information), again with Alaska and Southeast having the highest regional ratings. Ecosystem impacts were the poorest evaluated and no region has yet completed quantitative evaluations of the impacts of discarding on ecosystems.

*Effectiveness of current measures.* The adequacy of current bycatch mitigation measures was evaluated in terms of their bycatch, population, ecosystem, and socio-economic effects. It was also determined if alternative measures had been identified. The evaluation indicated that most fisheries required identification of additional alternatives. Specific cases where current measures were deemed adequate include the northern shrimp fishery in the Gulf of Maine; billfish taken in recreational marlin fishing in the Atlantic; chinook salmon bycatch in the Pacific whiting fishery; and some herring, crab, salmon and halibut bycatches in Alaska and on the Pacific Coast.

*Identification of potential alternatives.* Evaluation of progress in identifying management alternatives was evaluated to determine if the practicality of proposed alternatives had been assessed in terms of industry acceptability and council policy. Nationally, major factors influencing discards have been identified, and input in terms of management alternatives is being sought in many cases. Progress in identifying alternatives is greatest in Atlantic highly migratory pelagic species and Alaska. Within regions, progress is quite variable, as highest priority discard problems have received greater attention than others.

*Evaluation of impacts of discard mitigation alternatives.* The evaluation of population and socio-economic impacts of alternatives has been assessed most completely in Alaska and the Northeast. In general, population and socio-economic evaluations are based on qualitative information and either no evaluations have been made, or in some cases, qualitative judgements on ecosystem impacts of mitigation alternatives have been made.

*Implementation of alternative management measures.* Nationwide there has been little progress in developing the regulatory, enforcement or monitoring infrastructure necessary to implement effective discard reduction programs. Progress in implementation has been greatest in Alaska, but even there the average score is 1.6 of 4, indicating that significant steps still need to be taken toward implementing effective bycatch reduction programs.

*Adequacy of monitoring programs.* Results from the survey indicate that monitoring programs are quite variable around the country, and best developed in Alaska. Monitoring programs in the Southeast, Western Pacific and Northeast are generally not capable of routine monitoring of the effectiveness of bycatch reduction measures, although programs may be in place for selected high-profile fisheries. Significant upgrading of discard monitoring programs and other data collection and analysis programs is necessary if NMFS is to determine the effectiveness of discard reduction programs mandated in the Magnuson-Stevens Act, the Marine Mammal Protection Act and the Endangered Species Act.

## CONCLUSIONS

These analyses indicate that although data collection programs are very uneven nationwide, there is considerable evidence available concerning the magnitude, causes and significance of marine fishery discards, particularly in Alaska, for Atlantic highly migratory pelagic species, and for protected species. Regionally, high-priority discard situations for protected species or fishery resources have been assessed through industry- or government-funded observer programs, or by other indirect methods of data collection.

Some quantitative information on the amount of discards is available for 52% of the nation's important fish species or species groups. More information is available for protected species, however, even with these species, fleetwide estimates of discards for many species are lacking. Outside of Alaska, there is a substantial number of fisheries for which such estimates are not possible. Not surprisingly, in those cases where discard information is most complete, managers have made the most progress in identifying the reasons for discards and assessing options reducing discards. Each region of the country has some critical discard

problems; the most pressing of these have been the subject of specific monitoring, assessment and management efforts.

The amount of progress in evaluating discard impacts has been greatest for situations where discards are deemed to have implications for population status. Less progress has been made in understanding the socio-economic and ecosystem effects of discards, primarily due to a lack of required information. The same situation applies to the evaluation of the potential effects of alternative management measures.

Protected resources constitute about 20% of all discard situations evaluated, but nearly 75% of cases where the significance of discards are considered high. National resources have been directed by NMFS to evaluate the significance of these discards and to develop management strategies for the most critical protected species issues. However, no similar national resource has been mobilized to evaluate important fishery resource discard issues. Rather, the regions have been forced to compete for resources with which to address their individual problems.

It was not possible to classify the significance of discards in about 8% of the fisheries examined. The lack of data for these fisheries may indicate no significant discard problems exist, but this is highly unlikely. It is clear, based upon the experiences in other fisheries, that the lack of data may eventually result in unexpected resource and management problems. A national strategy to assess discards in all fisheries and to maintain surveillance, even at low levels, is preferable to the current situation.

Even though the level of significance of discards could, in most cases, be evaluated, there are major concerns regarding data quality, as indicated by summary statistics on the "magnitude of discards" (Figures 2 and 4). Clearly, there is a need to improve the accuracy and precision of discard sampling programs. Enhanced data quality will improve the basis for discard reduction activities in all fisheries. The improvement in data quality and coverage of fisheries should be a priority in all regions.

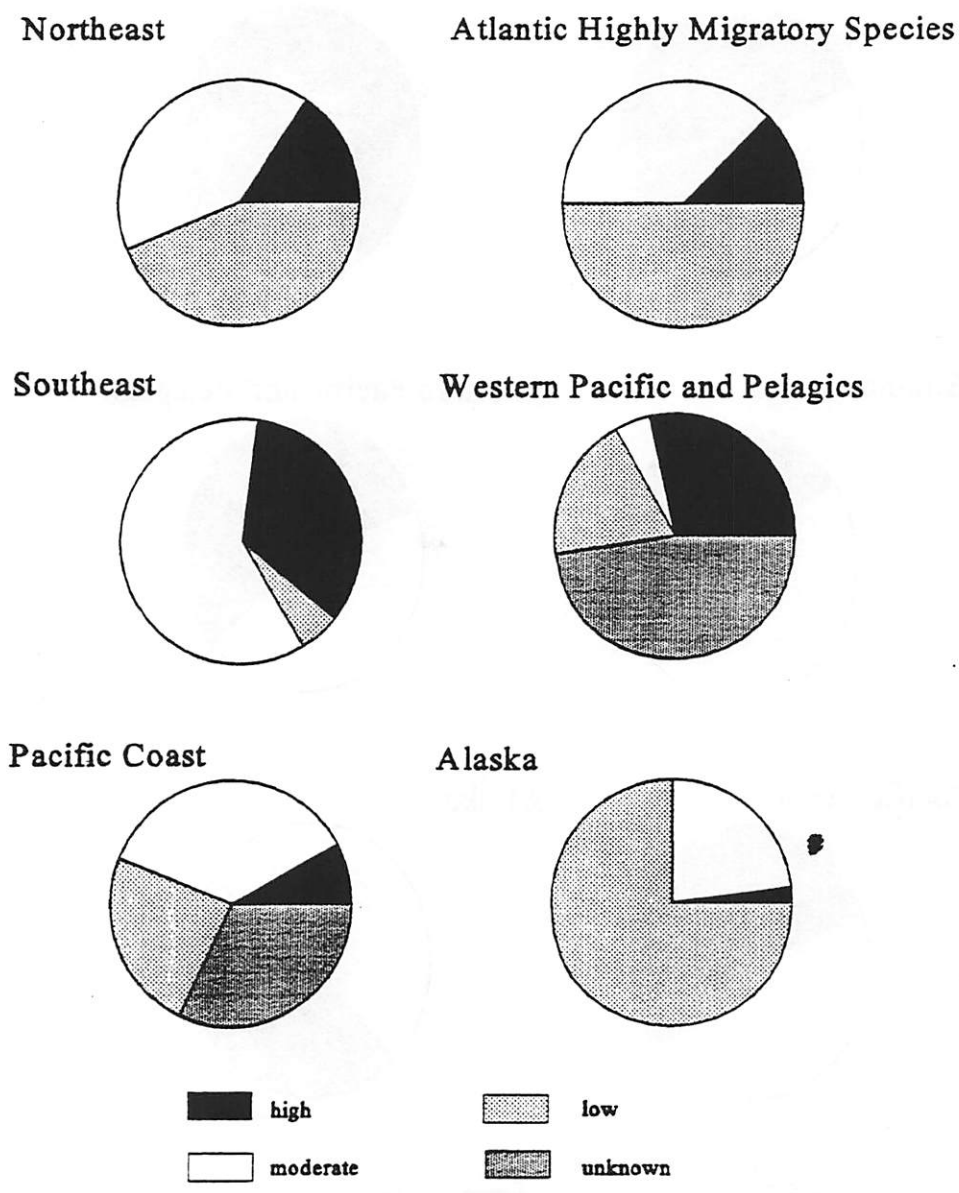


**Figure 1**. Level of concern for impacts of discards on species or species groups.

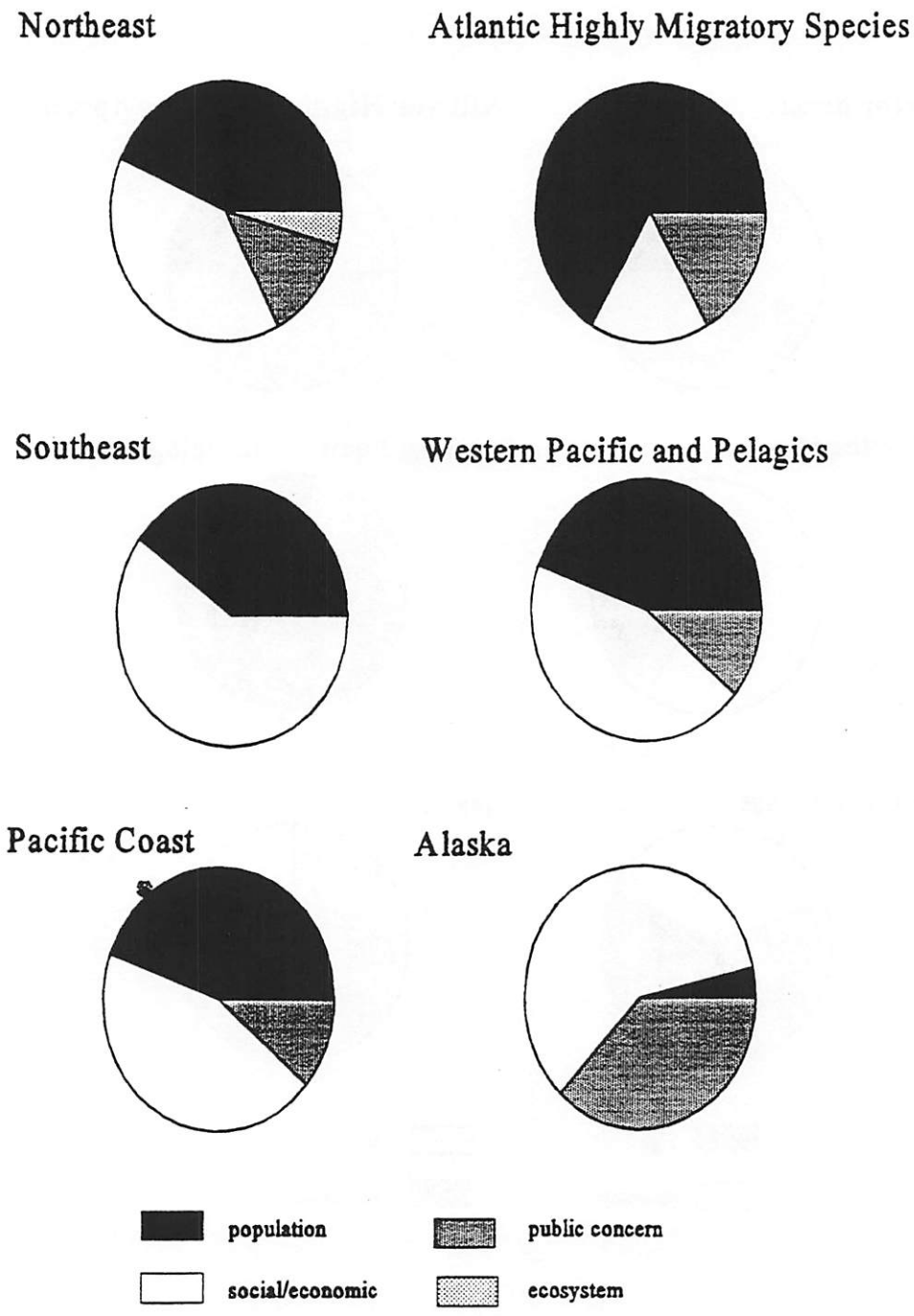


**Figure 2**. Primary nature of concern affecting the determination of the significance of discards for species or species groups.

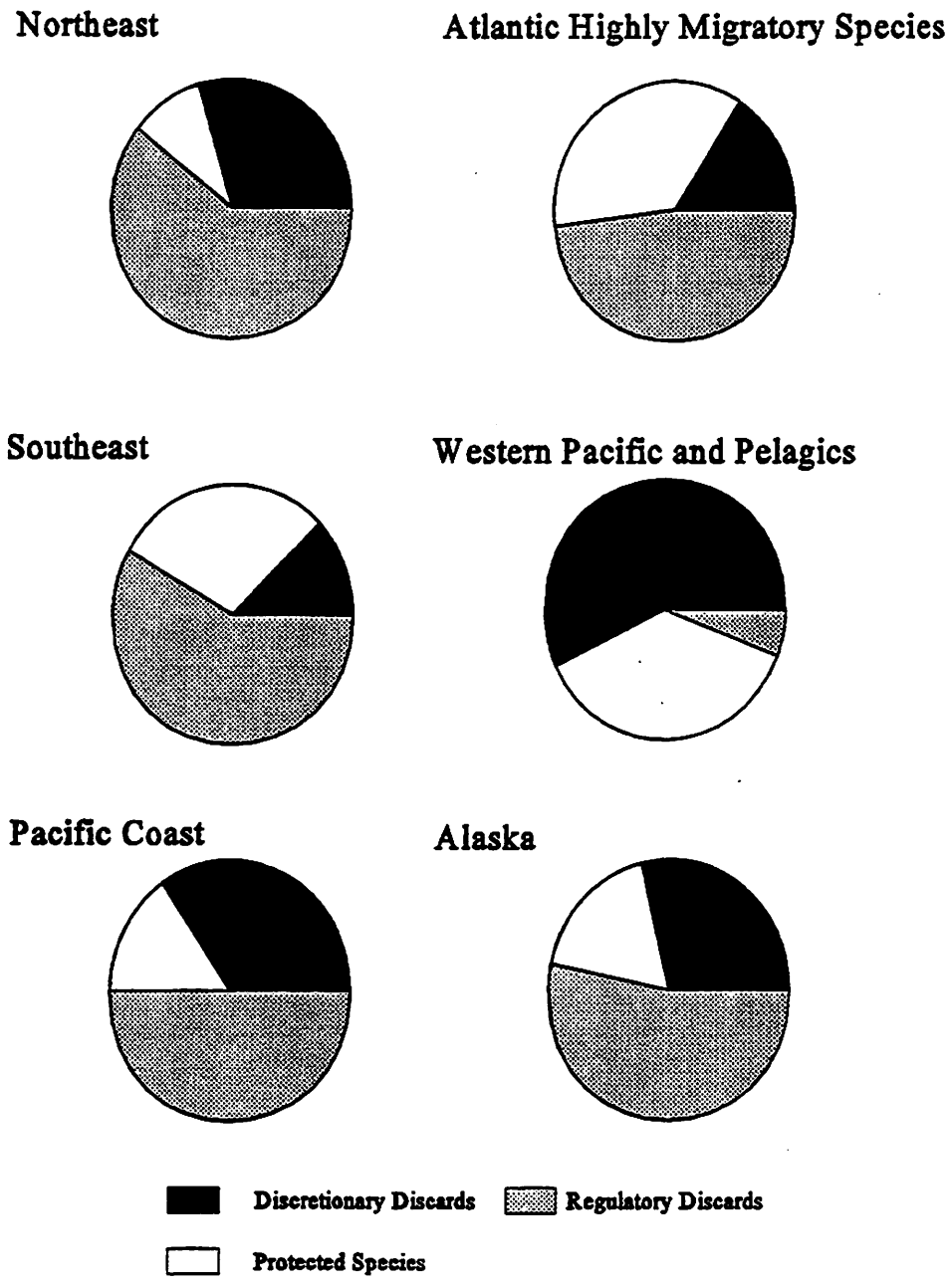


**Figure 3.** Reasons for discarding species or species groups. Classification reflects occurrence, not amount, of each type of discard.

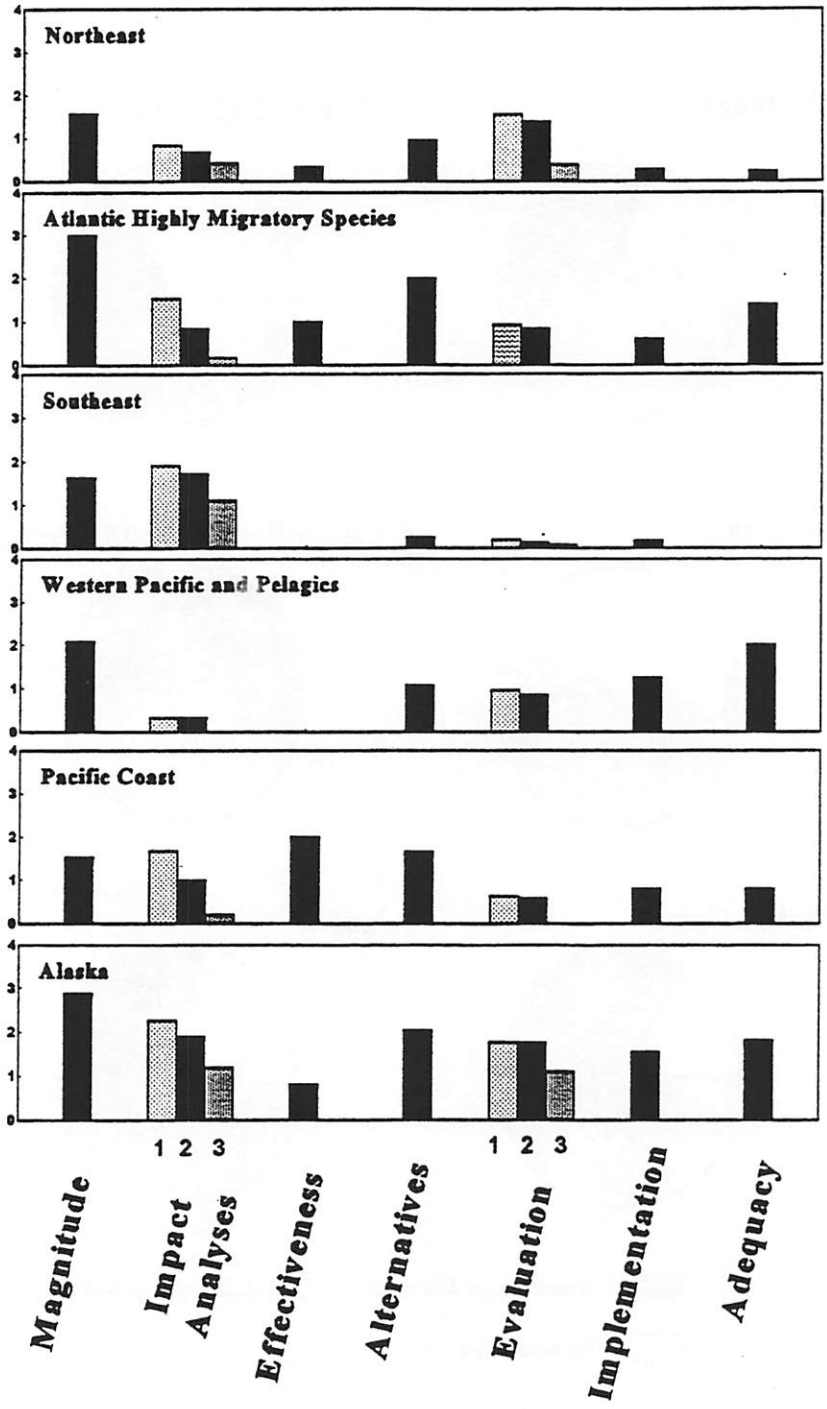


**Figure 4**. Average scores for seven steps used to evaluate bycatch mitigation efforts. Three factors used in the impact analyses and the evaluation of alternatives were: 1 = population, 2 = socio-economic and 3 = ecosystem. Scores for Step 3 (effectiveness) were rescaled to match the scales for the other steps.

Table 2. Classification of status of stocks of fish discard species or species groups (percent of all species or species groups identified as discards, cell percentages may not add to row and column totals due to rounding).

**All Regions**

| Long-Term Potential Yield | | | | | |
|---|---|---|---|---|---|
| Level of Utilization | % below | % near | % above | % unknown | % Total |
| over | 25 | 0 | 1 | 0 | 26 |
| full | 16 | 16 | 4 | 0 | 36 |
| under | 3 | 6 | 7 | 0 | 17 |
| unknown | 0 | 3 | 0 | 18 | 21 |
| Total | 44 | 25 | 13 | 18 | 100 |

**Northeast Region**

| Long-Term Potential Yield | | | | | |
|---|---|---|---|---|---|
| Level of Utilization | % below | % near | % above | % unknown | % Total |
| over | 52 | 0 | 4 | 0 | 57 |
| full | 9 | 17 | 4 | 0 | 30 |
| under | 0 | 4 | 4 | 0 | 9 |
| unknown | 0 | 0 | 0 | 4 | 4 |
| Total | 61 | 22 | 13 | 4 | 100 |

**Atlantic Highly Migratory Species**

| Long-Term Potential Yield | | | | | |
|---|---|---|---|---|---|
| Level of Utilization | % below | % near | % above | % unknown | % Total |
| over | 43 | 0 | 0 | 0 | 43 |
| full | 0 | 29 | 0 | 0 | 29 |
| under | 0 | 0 | 0 | 0 | 0 |
| unknown | 0 | 0 | 0 | 29 | 29 |
| Total | 43 | 29 | 0 | 29 | 100 |

**Southeast Region**

| Long-Term Potential Yield | | | | | |
|---|---|---|---|---|---|
| Level of Utilization | % below | % near | % above | % unknown | % Total |
| over | 60 | 0 | 0 | 0 | 60 |
| full | 10 | 20 | 0 | 0 | 30 |
| under | 0 | 0 | 0 | 0 | 0 |
| unknown | 0 | 0 | 0 | 10 | 10 |
| Total | 70 | 20 | 0 | 10 | 100 |

**Western Pacific and Pelagics**

| Long-Term Potential Yield | | | | | |
|---|---|---|---|---|---|
| Level of Utilization | % below | % near | % above | % unknown | % Total |
| over | 7 | 0 | 0 | 0 | 7 |
| full | 0 | 7 | 0 | 0 | 7 |
| under | 0 | 7 | 0 | 0 | 7 |
| unknown | 0 | 20 | 0 | 60 | 80 |
| Total | 7 | 33 | 0 | 60 | 100 |

## Pacific Coast

| Long-Term Potential Yield | | | | | |
|---|---|---|---|---|---|
| Level of Utilization | % below | % near | % above | % unknown | % Total |
| over | 20 | 0 | 0 | 0 | 20 |
| full | 30 | 10 | 0 | 0 | 40 |
| under | 20 | 10 | 0 | 0 | 30 |
| unknown | 0 | 0 | 0 | 10 | 10 |
| Total | 70 | 20 | 0 | 10 | 100 |

## Alaska

| Long-Term Potential Yield | | | | | |
|---|---|---|---|---|---|
| Level of Utilization | % below | % near | % above | % unknown | % Total |
| over | 0 | 0 | 0 | 0 | 0 |
| full | 30 | 17 | 10 | 0 | 57 |
| under | 3 | 10 | 20 | 0 | 33 |
| unknown | 0 | 0 | 0 | 10 | 10 |
| Total | 33 | 27 | 30 | 10 | 100 |

Table 3. Classification fish discard species or species groups according to the relative level of importance of discards to the population status of the stock, the socio-economic status of fisheries that target the discarded species, or the effects on the ecosystem from which the discarded species is taken. Percent of all species or species groups are identified as discards (cell percentages may not add to row and column totals due to rounding).

### Northeast Region

| Level of Discard Importance | | | | | |
|---|---|---|---|---|---|
| Level of Utilization | % high | % mod | % low | % unknown | % Total |
| over | 9 | 27 | 33 | 0 | 69 |
| full | 5 | 11 | 7 | 0 | 22 |
| under | 2 | 3 | 3 | 0 | 8 |
| unknown | 0 | 0 | 2 | 0 | 2 |
| Total | 16 | 41 | 44 | 0 | 100 |

### Atlantic Highly Migratory Species

| Level of Discard Importance | | | | | |
|---|---|---|---|---|---|
| Level of Utilization | % high | % mod | % low | % unknown | % Total |
| over | 13 | 19 | 13 | 0 | 44 |
| full | 0 | 6 | 31 | 0 | 38 |
| under | 0 | 13 | 6 | 0 | 19 |
| unknown | 0 | 0 | 0 | 0 | 0 |
| Total | 13 | 38 | 50 | 0 | 100 |

### Southeast Region

| Level of Discard Importance | | | | | |
|---|---|---|---|---|---|
| Level of Utilization | % high | % mod | % low | % unknown | % Total |
| over | 22 | 29 | 3 | 0 | 54 |
| full | 0 | 30 | 3 | 0 | 32 |
| under | 0 | 1 | 0 | 0 | 1 |
| unknown | 1 | 0 | 0 | 11 | 12 |
| Total | 23 | 60 | 5 | 11 | 100 |

### Western Pacific and Pelagics

| Level of Discard Importance | | | | | |
|---|---|---|---|---|---|
| Level of Utilization | % high | % mod | % low | % unknown | % Total |
| over | 0 | 5 | 0 | 0 | 5 |
| full | 0 | 0 | 0 | 5 | 5 |
| under | 5 | 0 | 0 | 0 | 5 |
| unknown | 24 | 0 | 19 | 43 | 86 |
| Total | 29 | 5 | 19 | 48 | 100 |

### Pacific Coast

| Level of Discard Importance | | | | | |
|---|---|---|---|---|---|
| Level of Utilization | % high | % mod | % low | % unknown | % Total |
| over | 0 | 20 | 8 | 4 | 32 |
| full | 8 | 4 | 12 | 8 | 32 |
| under | 0 | 12 | 4 | 16 | 32 |
| unknown | 0 | 0 | 0 | 4 | 4 |
| Total | 8 | 36 | 24 | 32 | 100 |

### Alaska

| Level of Discard Importance | | | | | |
|---|---|---|---|---|---|
| Level of Utilization | % high | % mod | % low | % unknown | % Total |
| over | 0 | 0 | 0 | 0 | 0 |
| full | 2 | 20 | 58 | 0 | 80 |
| under | 0 | 3 | 16 | 0 | 19 |
| unknown | 0 | 0 | 0 | 1 | 1 |
| Total | 2 | 23 | 74 | 1 | 100 |

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# III. NATIONAL BYCATCH GOAL AND OBJECTIVES

This plan reflects the aggregate knowledge and experience of the National Marine Fisheries Service and its many partners, including contributions from many regional and national bycatch workshops held from 1992 through 1995. The national bycatch goal and objectives described below were developed after consideration of these perspectives, as well as the regional perspectives provided in Chapter V of this plan. Future bycatch planning must continue to incorporate information and views from all these sources. The plan, however, does not propose to direct activities of non-federal sectors, but rather to prioritize national and regional bycatch research and management needs for the National Marine Fisheries Service.

## NATIONAL GOAL

The fundamental national goal of NMFS' bycatch-related activities is to implement conservation and management measures for living marine resources that will minimize, to the extent practicable, bycatch and the mortality of bycatch that cannot be avoided. This goal reflects the essential bycatch management purpose of the major marine resource statutes (the Magnuson-Stevens Fishery Conservation and Management Act, the Marine Mammal Protection Act and the Endangered Species Act) to reduce bycatch and bycatch mortality for species managed under the acts. It also reflects the commitment to cooperate with the U.S. Fish and Wildlife Service in monitoring and reporting the bycatch of seabirds listed under the Endangered Species Act and those protected under the Migratory Bird Treaty Act.

Despite this similarity of purpose, the acts, and thus bycatch management of the appropriate species, have several important differences. In the case of the Marine Mammal Protection Act, the immediate goal is to reduce bycatch "to insignificant levels approaching zero mortality and serious injury rate [by April 30, 2001]" rather than "to the extent practicable" [Sec. 118 (b) (1) 16 U.S.C. 1387]. The Endangered Species Act contains provisions that proscribe the taking of listed species based upon the biological status of the species (16 U.S.C. 1531 *et seq*). The incidental catch of protected species such as marine mammals and ESA-listed salmon, turtles and seabirds is managed extensively and effectively by take reduction teams and recovery plans, respectively. The Migratory Bird Treaty Act governs any taking of seabirds in addition to the ESA-listed species (16 U.S.C. 703 *et seq*). The new National Standard 9 for bycatch, included in the 1996 Magnuson-Stevens Act, highlighted the need for the statement of a similar management goal for living marine resources managed under fishery management

plans. While the bycatch management measures employed to manage protected species differ from those for other species, it is the intention of this plan to lay the groundwork for an integrated, comprehensive approach to all aspects of the bycatch problem. This will allow NMFS to build on successful existing bycatch management programs, such as the take reduction teams, while identifying areas where further research and management are needed to address bycatch. Priorities generated by the workshops, Congressional directives, and the NMFS Bycatch Team support the achievement of the fundamental national goal and have been cast as objectives for this NMFS Bycatch Plan. Achievement of these objectives will require different actions in different regions and fisheries.

## OBJECTIVES

### Objective 1. Determine the Magnitude of Bycatch

Determining the magnitude and character of the bycatch in a given fishery is critical to the effective conservation and management of the stocks in question. As pointed out in many of the recent bycatch workshops and symposia, the current debate on bycatch is often driven by the lack of information on how much, where, when and what type of bycatch is occurring.

*Strategy 1.* Review and, where necessary, improve collection methods, data sources and applications of data to determining the magnitude of bycatch.

A. Identify required data elements for estimation of bycatch mortality.

B. Conduct a review of observer programs. Ensure coordination and communication among observer programs within NMFS and beyond.

C. Develop estimates of unobserved mortality.

D. Conduct an annual review of the available data on the character and magnitude of bycatch.

E. Solicit the input and agreement of fishery scientists, managers, industry representatives and conservation groups on methods to assess the quantity and type of bycatch.

*Strategy 2.* Standardize the collection of bycatch data.

A. Ensure that estimates of bycatch are comparable across programs through coordination among pilot programs.

B. Evaluate the accuracy and precision of the data and their usefulness in estimating the magnitude of the bycatch.

C. Make the collection of bycatch data part of the NMFS core statistics program.

D. Assess bycatch mortality in recreational fisheries.

E. Design and test sampling protocols to provide precision and accuracy of data at the lowest cost.

**Objective 2. Determine the Population, Ecosystem, and Socio-Economic Impacts of Bycatch and Bycatch Mortality**

National concern about bycatch is prompted by concerns about the population, ecosystem and socio-economic impacts bycatch may have. The current state of knowledge on the impacts of bycatch is varied. For instance, in some fisheries there is a substantial amount of information on the population effects of the bycatch, while in others there is very little data on population impacts. Generally, there is very little good information available on the ecosystem impacts of bycatch. To articulate management and research priorities and to use limited resources most effectively, NMFS must determine what the impacts of bycatch are and, subsequently, where these impacts require a research or management response.

*Strategy 1.* Identify fisheries where such analyses will have the greatest effectiveness in reaching the bycatch goal.

*Strategy 2.* Identify the type and quality of the information that currently exists. Consider the availability of expertise and information from industry, the councils, conservation groups and the commissions.

*Strategy 3.* Assess the impacts of bycatch.

A. Use bycatch statistics programs to help determine the population impacts of bycatch.

B. Consider the benefits foregone due to bycatch.

C. Assess the impact of bycatch mortality on fishing communities.

D. Develop models for assessing the indirect impacts of bycatch mortality.

E. Include analyses of single-species and multispecies impacts.

F. Identify gear impacts on species.

G. Select analyses that will support the achievement of regional bycatch management and research priorities.

H. Build partnerships and increase information-sharing with government and non-government scientists, particularly of ecosystem impacts of bycatch and other sources of fishing mortality.

I. Identify ecosystemwide issues that can be addressed through a well-coordinated research program.

**Objective 3. Determine Whether Current Conservation and Management Measures Minimize Bycatch to the Extent Practicable and, if Necessary, Choose New Alternatives**

Conservation and management measures to minimize bycatch to the extent practicable will be executed primarily at the regional level. It is generally the responsibility of NMFS and the respective fishery councils to evaluate current and proposed management measures.

*Strategy 1.* Evaluate current management measures.

A. Assess the precision and accuracy of quantitative and qualitative information used in the evaluation process. Include evaluation of user conflicts and competition, harvester response, and unintended effects.

B. Identify similarities between bycatch and other management problems.

C. Assess the contribution of current management schemes and regulations to bycatch problems.

D. Ensure that decision-makers and stakeholders are informed of the relative precision and accuracy of information used in the evaluation.

E. Consider fisherman response to bycatch regulations.

*Strategy 2.* If existing measures do not adequately address defined management goals, develop and evaluate potential alternatives (prioritize as necessary).

A. For each alternative, identify factors that affect bycatch; bycatch mortality; species population levels; and socio-economic and ecosystem effects.

B. Identify information requirements and availability to successfully implement alternative management measures.

C. If applicable, (1) develop alternatives that involve incentives/disincentives or other market-based or individual responsibility approaches; (2) seek information on pertinent solutions from other regions; and (3) identify opportunities to increase compliance with mitigation measures.

D. Identify legal or jurisdictional constraints.

E. Ensure that all pertinent stakeholder groups are provided opportunities to become involved in developing and evaluating alternatives, and not merely comment on proposed plans.

F. Ensure that alternatives consider industry acceptability and agency/council policy.

*Strategy 3.* Based upon an analysis of current management measures and alternatives, select a preferred alternative that, to the extent practicable, minimizes bycatch and bycatch mortality. Develop an implementation plan, including monitoring, enforcement and compliance alternatives.

*Strategy 4.* Expand the capacity of individual fishing operations to reduce bycatch.

A. Examine incentives to develop technologies, fishing practices and monitoring methods to reduce bycatch and bycatch mortality or convert currently unused bycatch to a marketable product.

B. Encourage mechanisms to fund, share and transfer new and improved technologies and fishing practices, and involve stakeholders in their design, testing and monitoring.

**Objective 4. Implement and Monitor the Selected Alternative**

Obtaining good data and selecting an appropriate management alternative may be quite difficult, but implementing the selected alternative may prove to be the most demanding task. Effective monitoring programs require assessment of bycatch and the population, ecosystem and socio-economic effects of the measure. Effective implementation will not only require that the selected alternative is supported by concerned interests, but requires an especially high level of cooperation and coordination among the involved fishing sectors, managers, enforcement, and fishery scientists.

*Strategy 1.* Ensure the necessary coordination with domestic and international organizations.

A. Identify opportunities for cooperative planning to eliminate inconsistencies among state, federal, tribal and international bycatch management organizations.

B. Promote international agreements for effective bycatch management of transboundary or straddling stocks and highly migratory stocks.

*Strategy 2.* Implement monitoring system.

A. Identify opportunities for cooperative data collection, especially with fishermen and processors.

B. Determine optimal monitoring and enforcement duration and intensity, and explore options for funding these programs.

C. Evaluate monitoring alternatives for practicality and effectiveness.

D. Identify opportunities for coordinating data management for cost-efficiency and to avoid duplication of effort.

E. Provide for timely communication among fishermen and managers of fisheries data that can help achieve identified bycatch goals.

F. Routinely evaluate monitoring effectiveness; incorporate results into research and management planning.

*Strategy 3.* Establish an enforcement and compliance system, and begin operations.

A. Identify opportunities for cooperative enforcement with other involved agencies (e.g., U.S. Coast Guard, state, territorial, tribal).

B. Identify opportunities for cooperative compliance efforts with the fishing industry (e.g., self-reporting, dealer reporting, etc.).

C. Ensure that on-board observer programs are able to provide services in a timely manner.

D. Evaluate new enforcement technologies that can be used to improve or reduce the costs of compliance.

E. Routinely evaluate factors contributing to non-compliance; incorporate results into research and management planning.

## Objective 5. Improve Public Understanding of Bycatch Issues

Priority attention must be given to improving communication with constituents on bycatch issues and achievements, and providing opportunities for effective interaction of the concerned groups. Media and other portrayals of bycatch are often misleading and do not accurately convey the population, ecosystem and socio-economic effects either of bycatch or bycatch reduction measures. Too few public education efforts have been made to create a better understanding of these effects.

*Strategy 1.* Develop outreach contacts for bycatch-related information and events.

A. Develop, update and distribute lists of government, industry, conservation, professional and other organizations interested in bycatch, including contacts at each.

B Coordinate with the NOAA office of public affairs to develop, update and distribute a list of media contacts (trade publications, general new media, and conservation newsletters).

*Strategy 2.* Provide accurate and timely information on bycatch-related information issues, regulations and activities.

A. Distribute timely reports on the status of U.S. bycatch, and on progress in reducing bycatch.

B. Distribute timely and accurate information on regional bycatch regulations in easy-to-understand formats.

*Strategy 3.* Establish partnerships to prepare and distribute bycatch information.

A. Work with partners to develop regional and national information bycatch "media kits," including a glossary of terms, pertinent laws and regulations, visuals, NMFS contacts, Web sites, etc.

B. Work with partners to compile and update a computerized bibliography of bycatch literature.

C. Prepare articles for non-technical audiences.

D. Sponsor, in cooperation with Sea Grant and industry associations, technology-transfer workshops to introduce gear innovations and new fishing practices.

E. Prepare school-targeted materials on bycatch for selected grades, including videos and "how-to" sheets on gear innovations (construction, installation, "fine-tuning," use) and new fishing methods. Present issues and progress in reducing bycatch at national educators' conferences.

F. Prepare national and regional bycatch exhibits for trade and boat shows, professional society meetings, and other general public and industry displays.

G. Archive bycatch-related informational materials produced by external organizations.

**Objective 6. Improve the Effectiveness of External Partnerships**

It is goal of NMFS to work closely on research and management planning with its partners in states, industry, indigenous peoples groups, academia and non-government organizations. This principle recognizes that each coastal state and probably every fisherman has a unique understanding of regional resources. However, the Magnuson-Stevens Act does not provide for additional funding for any of the assigned new responsibilities, including bycatch. Thus NMFS must use existing resources, encourage partnerships that can help realize the new mandates, and facilitate development of individual fishermen's capacity to reduce bycatch.

*Strategy 1.* Create opportunities for partner involvement in planning and monitoring bycatch reduction.

A. Promote a cooperative network of partners in the coordination of bycatch planning and research.

B. Develop infrastructure for long-term, continuous working relationships on bycatch with partners.

C. Sponsor symposia and conferences for partners to exchange information and identify needs on bycatch technology and management.

D. Solicit partners' views on bycatch research needs in federal publications and through Web sites.

E. Inform partners of Saltonstall-Kennedy,[3] MARFIN[4] and other solicitations for bycatch grants and contracts, through Web sites, public and trade media, and special bulletins.

*Strategy 2.* Provide easy access to NMFS bycatch databases.

A. Establish and maintain Web sites for bycatch data.

B. Provide NOAA libraries with data summaries and electronic access information.

**Objective 7. Develop a NMFS Infrastructure to Implement Bycatch Plan**

Limited resources will be available to NMFS to successfully carry out research and management activities under direction of the bycatch plan. Effective communication, planning, and coordination among NMFS program offices and other NOAA units is required to make the best use of available fiscal and human resources, avoid duplication of effort and programmatic activities, and enhance overall efficiency of the agency to implement bycatch research and management initiatives.

*Strategy 1.* Develop a coordinated bycatch planning structure that includes all NOAA and NMFS units concerned with bycatch to integrate bycatch management needs and programs.

A. Provide for NMFS offices of Protected Resources and Enforcement, NOAA General Counsel for Fisheries, and NOAA Sea Grant representation in the bycatch planning system.

B. Update bycatch information assessment and the strategic plan to include protected resources objectives and strategies.

C. Develop a coordinated system to oversee development and award of all NOAA contracts and grants involving bycatch issues.

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*[3]The Saltonstall-Kennedy (S-K) Grant Program is a competitive program that provides grants for research and development projects to benefit the U.S. fishing industry. The S-K Act, as amended [15 U.S.C. 713 (c) (3)] is the program's statutory authority.*

*[4]The Marine Fisheries Initiative, or MARFIN program, brings together scientific, technical, industry, resource conservation, and management talents to conduct cooperative programs to facilitate and enhance the management of the marine fishery resources of the Gulf of Mexico and South Atlantic.*

*Strategy 2.* Develop an internal NOAA/NMFS bycatch management infrastructure.

A. Identify positions and task responsibilities for implementing the Bycatch Plan.

B. Task assignments at the national and regional levels.

C. Establish a coordinating mechanism for implementation.

*Strategy 3.* Develop and update budget initiatives.

A. Develop cost estimates and human resource needs for bycatch-related research, development, management, coordination and outreach activities.

B. Develop management options for phased initiatives.

C. Coordinate proposed activities with NMFS strategic planning system.

# IV. RECOMMENDATIONS

The following list comprises NMFS' bycatch management recommendations.

## MONITORING PROGRAMS AND DATA COLLECTION

A. Develop strategies for the long-term collection of reliable, scientifically valid data that provide fishery-specific and species-specific estimates of total catch as well as spatial and temporal variabilities in bycatch and bycatch mortality. Strategies could include, but are not limited to, at-sea observer programs, satellite or other at-sea monitoring technologies, logbooks, fish tickets or industry surveys.

B. Where appropriate, increase the level and broaden the scope of observer programs sufficiently to allow quantitative estimates of total catch, discards and incidental takes of living marine resources, with acceptable levels of precision and accuracy, for inclusion in stock assessments. A review of observer coverage levels as well as observer data collection methods and associated catch estimation procedures should be initiated to ensure that observer programs meet expectations of scientists, managers, and the industry in a cost-effective manner.

C. Develop strategies to distribute observer capability among the various fisheries requiring coverage with the goal of completing basic quantification of bycatch for all sizeable fisheries and providing continuous coverage in those fisheries deemed to exert significant impact on populations of species taken in the bycatch. In cooperation with appropriate fishery management councils and industry representatives, develop and implement at-sea observer programs in fisheries where coverage is required.

D. Integrate collection of total catch and bycatch statistics into the National Marine Fisheries Service core statistics program.

E. Develop adequate funding and staff resources for a long-term fishery observer capability. In several regions, federal funding of some observer programs is contingent on "pass through" funding from several sources. This approach is not acceptable for programs that are so fundamental to the federal management of living marine resources.

F. Collaborate with the fishing industry to better utilize industry resources to collect bycatch information.

G. Pursue options for the procurement of observer services that would reduce the potential for conflicts of interest and provide incentives for quality observers to remain with the program.

H. Develop methods to assess unobserved mortality.

I. Evaluate effectiveness of bycatch monitoring and data collection methods. Incorporate results into research and management planning.

## GEAR TECHNOLOGY AND SELECTIVITY RESEARCH

A. Increase regional conservation engineering programs to develop, test and certify species- and size-selective fishing gears to address critical conservation programs in the region (e.g., groundfish, scallops, protected species). This program should make maximum use of existing expertise in states, universities and in the industry.

B. Allocate additional observer sea-days to evaluate new or existing technologies or to certify modifications to existing gear to allow fisheries to proceed under the bycatch constraints or potential biological removal (PBR) limits.

C. Provide adequate funding for research and development capabilities in gear technology. A strong internal base will enhance NMFS' ability to work cooperatively with experts in gear technology spread among other agencies, universities, and industry — providing rapid innovation and development of bycatch management tools.

D. Develop and implement methods for assessing the response of fish to fishing gear to aid in the design of more selective fishing gear and to promote high survival of bycatch.

## EFFECTS OF BYCATCH

A. Increase ability to assess the population, ecosystem and socio-economic effects of bycatch, and the effects of management alternatives developed to reduce bycatch. Bycatch estimation is of little value without a population context to evaluate impacts. Stock assessment provides that context at the population level; multispecies modeling provides that context at higher levels of organization.

B. Increase research on immediate and long-term mortalities of animals encountering fishing gears, but not retained. This research should improve estimates of bycatch mortality and assist with identifying better gear and handling methods to improve bycatch survival. Specifically, such research should include evaluations of the fate of animals that escape capture, particularly through net meshes and effects of bottom-tending mobile fishing gears on benthic communities.

C. Increase research on hook encounter and hooking mortality rates in selective fisheries.

D. Assess bycatch mortality in recreational, commercial and subsistence fisheries.

## INCENTIVE PROGRAMS

A. Pursue bycatch solutions that increase incentives to minimize bycatch to the extent practicable.

B. Initiate legal research to pursue means of more effectively monitoring and enforcing incentive programs within both judicial and constitutional standards or constraints.

C. Encourage research on market-based incentive programs that could be effectively monitored and enforced without undue costs to the agency or industry.

## CONSERVATION AND MANAGEMENT MEASURES

A. Assess current management measures with respect to minimizing bycatch to the extent practicable.

B. Develop clearly articulated objectives for proposed conservation and management measures and associated criteria that may be used to assess the potential bycatch population, ecosystem and socio-economic effects of these measures.

C. Identify and implement more effective management measures to more effectively reduce bycatch.

D. Establish monitoring and enforcement compliance programs to implement and evaluate management measures in terms of expected bycatch population, ecosystem and socio-economic effects.

E. Develop a coordinated bycatch management planning and structure that includes all NOAA and NMFS units concerned with bycatch.

## INFORMATION EXCHANGE AND COOPERATIVE MANAGEMENT

A. Provide information that will help the public recognize the costs and benefits of managing bycatch.

B. Increase the ability of industry to access and use observer data to control bycatch.

C. Develop effective information exchange and distribution programs to communicate with the industry, regulators and the general public concerning the magnitude of bycatch and efforts to reduce it.

D. Build partnerships and increase information-sharing with government and non-government scientists.

E. Develop infrastructure for long-term cooperative working relationships on bycatch management with industry, conservation groups, fishery management councils, interstate commissions, tribal organizations, and other agencies and organizations.

## ALASKA

### Description of Fisheries

The groundfish fisheries have been the focus of the bycatch problem off Alaska. Bycatch concerns recently have expanded from prohibited-species bycatch to bycatch discard of all species, including groundfish. Most of the groundfish harvest is taken with trawl gear, although harvest amounts with hook-and-line, pot, and jig gear are increasing. The selectivity of these gear types in the multispecies groundfish fisheries varies by target species, area, and time of year.

The groundfish resource was harvested primarily by foreign nations until the mid-1980s. The foreign catches were replaced in the late 1980s by joint venture harvests by domestic fishermen delivering to foreign processors. Fully domestic operations developed rapidly in the late 1980s and by 1991 were the only form of operation.

Groundfish stocks generally are in a healthy and stable condition. All Alaska groundfish stocks have fluctuated in abundance over the years, but no widespread trend toward decline is evident (NPFMC 1996a, 1996b). The annual harvest of Alaska groundfish approaches 2.3 million metric tons (mt). Management of the Alaska groundfish fisheries is directed to maintain total harvest amounts within annually specified total-allowable-catch amounts. An extensive program that includes monitoring by NMFS-certified observers and an industry catch-reporting requirement is used to estimate total fishing mortality. Management tries to account for all sources of fishing mortality; estimated discard amounts of groundfish are charged against the annual total-allowable-catch amounts. When NMFS determines that the allowable harvest level for a species has been taken, the fishery is closed for the year. In 1995, the total harvest of Alaska groundfish species (2.14 million mt) accounted for only about 64% of the total acceptable biological catch (3.33 million mt; NPFMC 1996a, 1996b).

Overall, the groundfish fishery is not exceptional with respect to bycatch and discard rates compared to other major fisheries in the world (Alverson et al. 1994). For example, the Bering Sea midwater pollock fishery annually harvests almost 1 million mt of fish, yet has one of the lowest observed bycatch rates. The 1994 and 1995 total discard rates in this fishery ranged between 2% and 4% (NMFS 1996c). The Bering Sea rock sole, flathead sole, and other flatfish trawl fisheries typically experience high discard rates relative to other Alaska groundfish fisheries (about 55% of the total catch in 1995), although discard rates in other small-scale trawl and hook-and-line fisheries have exceeded this rate. Overall, the 1995 discard rates in the Alaska trawl and hook-and-line fisheries were 14% and 18%, respectively. By volume, however, discard amounts in the trawl fisheries accounted for 91% of the total 1995 discard amount in the Alaska groundfish fisheries (NMFS 1996c)

Although the overall discard rates in the Alaska groundfish fisheries are not exceptional compared to other trawl fisheries in the world, hundreds of millions of dollars have been lost or expended due to efforts to reduce bycatch rates; bycatch closures and the associated foregone harvest opportunity; and the use of fish as bycatch, which has precluded higher valued uses. Large administrative costs also have been incurred by management agencies and the industry to address bycatch concerns. While the bycatch rates in most segments of the fishery may not be exceptional, the 2.3-million-mt fishery is so immense that the absolute volume of discards and the foregone opportunity they represent have raised national and industry consciousness, and pose a significant concern to other fisheries dependent on some of the bycatch species.

The NMFS Alaska Region catch reports for 1995 estimate that total discard amounts in the groundfish fisheries include about 285,000 mt of groundfish, 7,190 mt of dead halibut, 123,300 salmon, 1,020 mt of herring, and almost 8 million crab (mostly Tanner crab). Most groundfish discard reflects discretionary decisions on the part of industry (i.e., undersize fish, no market, male fish in roe fisheries). Pacific halibut, salmon, herring and crab are prohibited species in the groundfish fisheries and must be discarded under existing regulations. Regulations also limit the amount of a groundfish species that may be retained on board a vessel if the species is closed to directed fishing. Catch amounts of these species that exceed the maximum retainable bycatch amount must be returned to the sea.

**Bycatch Issues**

*Groundfish*

Since the late 1980s, a dramatic increase in harvesting and processing capacity in the domestic open-access groundfish fisheries has resulted in an extremely competitive race for fish with every vessel pressured to catch its share of the quotas before the fleet harvests the groundfish quotas or prohibited species bycatch restrictions close the fishery. This situation frustrates any inclination vessel operators may have to alter fishing practices to reduce bycatch if such action puts them at a competitive disadvantage relative to other participants in the fishery.

In response to concerns about bycatch in the Bering Sea/Aleutian Islands area and Gulf of Alaska groundfish fisheries, the North Pacific Fishery Management Council (NPFMC) has recommended, and the Secretary of Commerce has approved and implemented, a variety of management measures that, in part, were intended to help control the bycatch of Pacific halibut, crab, Pacific herring, and Pacific salmon in the groundfish fisheries. Recently, the bycatch of groundfish in the groundfish fisheries and the bycatch of crab in the Bering Sea/Aleutian Islands area crab fisheries have also received increased attention. Of the more than 40 amendments to the *Fishery Management Plan for the Groundfish Fishery of the Bering Sea and Aleutian Islands Area* (NPFMC 1997) that have been considered

by the NPFMC since 1982, about a third addressed primarily bycatch issues and about another fourth of the amendments addressed some aspect of bycatch management.

In spite of numerous management measures implemented to limit or reduce prohibited species bycatch, the incidental bycatch mortality of these species in the groundfish fisheries continues to be of major concern. Although stocks of some prohibited species have declined, particularly some crab stocks, management agencies do not assert that bycatch mortality in the groundfish fisheries has been a major contributor to such declines. Nonetheless, political pressure to address the allocative implications of bycatch mortality of these fully utilized species, as well as concerns about the potential impact of trawling on crab habitat, have propelled the NPFMC to recommend numerous management measures to address these concerns and mitigate potentially adverse impacts on declining stocks of prohibited species. Foremost among these measures is the establishment of prohibited species bycatch limits that, when reached, result in groundfish fishery closures.

Bycatch limits, area closures, and other bycatch mitigation measures have created barriers to harvesting groundfish total-allowable-catch amounts, as well as generated tremendous allocative controversy among various users of species taken as bycatch in the groundfish fisheries. Furthermore, the multispecies nature of the bycatch problem in the groundfish fisheries creates a situation where a solution for one species' bycatch problem often increases the bycatch problem for a different species.

Bycatch mortality of marine mammals in the Alaska groundfish fisheries generally is not of concern sufficient to categorize these fisheries other than a Category III under the Marine Mammal Protection Act. Nonetheless, concerns still do exist, particularly for killer whale interactions in the hook-and-line gear fisheries. The mortality of marine birds (including the short-tailed albatross, an endangered species) also is of concern, particularly in the hook-and-line gear fisheries. Agency guidelines have been provided to the industry to reduce the bycatch mortality of these birds; the industry is taking independent, voluntary action to accommodate these guidelines. At its December 1996 meeting, the NPFMC adopted management measures to reduce the incidental mortality of seabirds in the groundfish and Pacific halibut hook-and-line gear fisheries. These measures include mandatory use of bird avoidance gear and fishing methods. If approved by NMFS, these measures are expected to be implemented early in the 1997 fishing year.

Research and monitoring programs to address the bycatch problem off Alaska primarily are based on data collected from an industry-funded mandatory observer program. Research is focused on (1) how bycatch operates within various fisheries and gear types, (2) gear modification to reduce bycatch rates, (3) mortality associated with discards by gear and fishery, and (4) the relationship of bycatch in

terms of abundance to the stock status of bycatch species and the effect of bycatch on other fisheries. Implemented or proposed regulatory approaches include bycatch limits for prohibited species, gear restrictions, season delays or time/area closures, a vessel incentive program, an individual fishing quota program for hook-and-line sablefish and halibut, mandatory retention and increased utilization of pollock and Pacific cod (proposed program that would be expanded to include rock sole and yellowfin sole within five years), and voluntary industry initiatives.

The biggest problem in developing an effective bycatch management program off Alaska is the lack of an adequate incentive for individual vessel operators participating in open-access fisheries to reduce bycatch. The NPFMC strives to evaluate bycatch reduction proposals on their ability to reduce bycatch and increase catch utilization to levels to which further changes would increase costs more than they would increase benefits, where both costs and benefits are defined from the national perspective. This may be best achieved through a combination of traditional bycatch reduction measures with a program that provides individual fishermen with incentives to develop and use cost-effective methods of controlling bycatch to socially acceptable levels.

*Other Fisheries*

The management of the crab and scallop fisheries off Alaska is deferred either explicitly or implicitly to the state of Alaska. The state has implemented observer programs for the crab and scallop fisheries, and federal regulations mirror these requirements to the extent required under federal fishery management plans for these species. Observer data are used by the state to monitor regulatory compliance with size and sex restrictions, target-species catch, and crab bycatch and discard mortality. The management of the crab and scallop fisheries generally is geared to minimize crab discard mortality through gear restrictions, season closures, bycatch limits, and area closures.

The Pacific halibut fishery does not have an observer program to monitor the discard mortality of undersized halibut or other species in the halibut fishery. Halibut bycatch discard mortality that occurs in the groundfish fishery is accounted for when establishing annual setline quotas for the halibut fishery.

The bycatch problem in the state-managed Alaska salmon fisheries centers around the interception of other salmon species or runs. This interception creates allocation issues. In some cases, interception of salmon also gives rise to conservation concerns.

Definitive information on bycatch in Alaska fisheries other than groundfish, crab, scallops and, to some extent, salmon is lacking. As such, management programs to address any bycatch problem that may exist also is lacking.

The impact of non-groundfish fisheries on marine mammals or other protected species is unknown because of the lack of data on interactions. To date, an Alaska take reduction team has not been formed because reliable information regarding take levels of marine mammals in non-observed Alaska commercial fisheries is not available to make a determination as to whether a take reduction team is warranted.

**Description of Programs**

*Bycatch Monitoring and Assessment Strategies*

Groundfish Observer Program

An important element in determining the magnitude and character of the bycatch problem in the Alaska groundfish fisheries is the monitoring program that has been implemented for the domestic fishery since 1990. Observer catch data are submitted to NMFS on a weekly (or daily, if necessary) basis. Observer data on groundfish catch and bycatch rates of halibut, salmon, crab and herring are blended with industry-reported groundfish catch to derive a "blend" estimate (based on an established "blend algorithm") of groundfish catch and associated prohibited-species bycatch amounts. This information is used for inseason monitoring of groundfish catch and prohibited-species bycatch amounts, and for analysis of present and future management measures.

The observer data on species catch composition and amount in the groundfish fisheries provide substantial, but not complete, information on the characteristics of bycatch. In recent years, other observer priorities have prevented the collection of adequate size and sex composition data for crab bycatch. Stock identification information is relatively limited and considerable uncertainty exists concerning the handling mortality rates for bycatch that is returned to the sea. The observer program does not provide estimates of the bycatch mortality that occurs when fish and shellfish come in contact with fishing gear, but are not brought up with the gear. This bycatch mortality includes fishing mortality caused by lost gear and fish that escape the gear, but not without incurring fatal injuries.

The mandatory groundfish observer program has an annual cost of more than $8 million, of which more than $6 million is paid by the vessels and processing plants that are required to have observers. To fish, vessels 125 feet long or longer must have an observer on board at all times. Vessels 60-124 feet long must have an observer on board 30% of the days that fishing gear is retrieved and groundfish are retained. Mothership and shoreside processors receiving less than 1,000 mt of groundfish during a month must have an observer present 30% of the days groundfish are received or processed; those processors that receive greater amounts of groundfish must have an observer present each day of operation.

An extensive industry recordkeeping and reporting program complements the observer program and requires mandatory logbooks and processor reports. NMFS is developing a program that would require "real time" catch information exchange through satellite transmission of observer reports and industry catch statistics.

Alaska State Shellfish Observer Program

At-sea observers are required by Alaska state regulation on all vessels processing king or Tanner crab at sea throughout Alaska and on all vessels participating in the brown king crab fishery in the Aleutian Islands area. At-sea observers are required as a special permit condition for all vessels participating in other crab fisheries. Alaska state regulations also require 100% observer coverage on vessels fishing for scallops, although certain exemptions exist for the small boat fleet fishing in Cook Inlet. Federal regulations implementing the *Fishery Management Plan for the Alaska Scallop Fishery* (NPFMC 1996c) mirror the state's observer coverage requirements.

Data collection by shellfish observers is essential to the Alaska Department of Fish and Game (ADFG) as a primary means for gathering the data that are used for research, inseason management, and development of management measures, as well as for enforcement of regulations. Shellfish observers currently collect data to assess the magnitude of bycatch and bycatch discard in the crab and scallop fisheries. ADFG believes the mortality of crab discarded in the shellfish fisheries is significantly less than 100%, although the actual mortality rate can vary among fisheries and vessel types.

Currently, crab and scallop vessel owners/operators must pay for observers. The state is exploring alternative cost-recovery programs to nullify the issue of costs to vessel operators. Alternative programs could provide more management flexibility to deploy observers in a manner appropriate to meet the changing needs for shellfish resource management and research.

Other Observer Programs

Presently, no other observer programs exist other than for the groundfish and shellfish fisheries. NMFS is developing a proposal for the implementation of a marine mammal interaction monitoring program for commercial fisheries off Alaska. The proposed program is based on a feasibility study conducted in 1995 through a contract with Marine Mammal Protection Act funds (Wynne and Merklein 1996). The intent of the proposed program would be to achieve a basic understanding of the rate of mortality and serious injuries occurring to marine mammals in Alaska Category I and II fisheries.

The initial proposal is intended to be the start-up phase for a long-term monitoring program to assess the impact of commercial fisheries on marine

mammal stocks, and collect information on the level and types of interactions. To date, logbooks have been the primary source of information on marine mammal/commercial fisheries interactions in Alaska because only two of the current 13 Category II fisheries in Alaska have been observed. Under the proposed observer program, 10 previously unobserved fisheries would be monitored for one fishing season each over the next three years to obtain an initial, reliable estimation of mortality and serious injury levels. All 10 fisheries target salmon and are Alaska state-managed fisheries.

Catch Reporting

A comprehensive recordkeeping and reporting program has been established for the Alaska groundfish fisheries that supplements the data collected by observers. Processor vessels are required to maintain daily cumulative production logbooks that record the amount of discards, and the amount and type of product produced from retained catch. This information is submitted to NMFS weekly, although monitoring requirements for a fast-paced fishery may require that this information be submitted daily. Shoreside processors record landed weight of each species and associated discard amounts. This information also is reported to NMFS on a weekly or daily basis. NMFS estimates total groundfish catch based on a combination of observer data and weekly catch reports from processors. Observer and industry catch data from at-sea processing operations are input to the NMFS "blend" system, which produces weekly total estimates of the groundfish catch based on an established "blend algorithm."

For shoreside processors, weekly catch reports are considered to be the best source of data for estimating retained groundfish landings. All fish delivered to shoreside processors are weighed on scales, and these weights are used to account for retained catch. Observer data from catcher vessels provide the best data on at-sea discards of groundfish by vessels delivering to shoreside processors. Discard rates from these observer data are applied to the shoreside groundfish landings to estimate total at-sea discards from both observed and unobserved vessels.

NMFS has contracted a study to assess the above process for estimating catch in the pollock and yellowfin sole fisheries. Final results of this assessment are not yet available.

The principal objective of the groundfish observer program is to provide adequate estimates of total catch by species and not to differentiate between retained and discarded catch. For at-sea processors, the observers generally estimate total groundfish catch directly, as opposed to estimating retained catch and discarded catch separately and adding the two estimates. However, the total catch estimate for shoreside processors is the sum of observer estimates of at-sea discards by catcher vessels and the catch that is delivered to shoreside processors and reported in the processors' weekly reports.

Voluntary Industry Information Systems

Participants in the Bering Sea bottom trawl fisheries for flatfish voluntarily have developed an information system to distribute to the fishing fleet timely data on prohibited-species bycatch rates and bycatch hot spots so that vessel operators may use this information to attempt to reduce bycatch rates (Gauvin et al. 1996). In the program, observer data on catch and bycatch are electronically transmitted from each participating vessel to Sea State, a private contractor located in Seattle. Sea State conducts statistical expansions from observer data to calculate an average bycatch rate per vessel for each 24-hour period. Daily bycatch rates are then placed in a format where the relationship between bycatch rates and locations is accessible to vessel operators and vessel companies. Sea State relays this information to participants every 24 hours via fax or by a computer file loaded into a plotting program provided to the vessel. The goal of the program is to allow the fleet to rapidly respond (both individually and collectively) to high bycatch rates and to reduce bycatch rates of prohibited species. Preliminary assessments of observed vessel bycatch rates in the yellowfin sole fishery indicate that vessels participating under the Sea State program experience significantly reduced bycatch rates compared to non-participating vessels.

A separate information system has been voluntarily developed for vessels participating in the Bering Sea hook-and-line fishery for Pacific cod (Smith 1996). Participants in this fishery developed a careful release procedure to decrease the mortality of Pacific halibut incidentally taken while targeting Pacific cod. This procedure ultimately was incorporated into regulations implemented by NMFS. Working with Fisheries Information Services (FIS), a private consultant, the freezer-longline fleet organized an industry monitoring program for halibut bycatch mortality. Each week, vessels fax preliminary observer data on the physical condition of released halibut to FIS. FIS calculates the halibut mortality for each vessel and faxes it back to the vessel operator. In this way, the vessel operator learns immediately if he is fishing in a high bycatch area or if his crew is mishandling halibut. Two-thirds of the fleet participated in the program during 1995, which is credited by the fleet to have reduced halibut discard mortality substantially.

*Summary of Bycatch Management Programs*

A. *Time/Area Closures.* Time/area trawl closures are implemented around Kodiak Island, around the Pribilof Islands, and in the Bristol Bay area of the southeastern Bering Sea to protect sensitive king and Tanner crab habitat areas and to avoid bycatch of crab during the molting season. Some of these closures are year-round, others are seasonal. Time/area closures are also implemented to reduce the bycatch rates of chum salmon in the Bering Sea pollock fishery.

B. *Bycatch Limits.* Bycatch limits for Pacific halibut, *C. bairdi* Tanner crab, red king crab, herring, chinook salmon, and chum salmon are established for the Bering Sea and Aleutian Islands management area (BSAI) trawl fisheries. Bycatch limits for *C. opilio* Tanner crab have been approved by the North Pacific Fishery Management Council. Halibut bycatch limits also are established for the BSAI non-trawl fisheries (hook-and-line, jig, and pot gear) and for all Gulf of Alaska groundfish fisheries. These bycatch limits generally are apportioned among fisheries as bycatch allowances. When a fishery reaches its bycatch allowance, it is closed, regardless of whether available groundfish quotas have been harvested. With the exception of the halibut bycatch limits, the attainment of a fishery bycatch allowance triggers a time/area closure. The attainment of a fishery bycatch allowance for halibut in the BSAI or Gulf of Alaska closes the entire BSAI or gulf to that fishery.

C. *Vessel Incentive Program.* A vessel incentive program (VIP) was implemented in 1991 to reduce halibut and red king crab bycatch rates in the Bering Sea and Gulf of Alaska groundfish trawl fisheries. Under the VIP, halibut and red king crab bycatch rate standards are established semiannually. Vessel operators and owners that exceed this standard are subject to prosecution. To date, four notices of violation have been issued. Three of these cases have been brought before an administrative law judge and were ruled in favor of the National Marine Fisheries Service. The fourth case was settled out of court.

D. *Comprehensive Data Collection Program.* (See above under Alaska Groundfish Fisheries, *Catch Reporting*)

E. *Gear Restrictions:*

*Pelagic Trawl Gear.* Regulations specify a configuration for pelagic trawl gear to more effectively meet the intent of pelagic trawl gear restrictions (i.e., fish in a manner that minimizes the incidental take of halibut and crab). Performance standards also are established for pelagic trawl gear that limit the number of crab that may be on board a vessel at any time. The intent of this performance standard is to encourage vessel operators to fish pelagic trawl gear off the bottom when NMFS has closed fishing with non-pelagic trawl gear.

*Mandatory Procedures for Careful Release of Halibut in the Hook-and-Line Gear Fisheries.* Regulations require vessels using hook-and-line gear to release halibut in a manner that minimizes handling mortality. The intent of this measure is to reduce mortality rates in the hook-and-line fisheries and potentially reduce the amount of halibut required by these fisheries to harvest available amounts of groundfish under halibut bycatch restrictions.

Pacific halibut discard mortality rates in the Alaskan groundfish fisheries are routinely estimated from viability data collected by at-sea observers. These data are analyzed by staff of the International Pacific Halibut Commission and NMFS, which result in recommendations to the North Pacific Fishery Management Council for managing halibut bycatch limits in the upcoming fishing year.

*Pot Gear*. Regulations require that groundfish pot gear be fitted with halibut excluder devices and biodegradable escape panels.

F. *Season Delays or Seasonal Apportionments of Total Allowable Catches (TACs)*. Fishing seasons for specified groundfish species are delayed to avoid high bycatch rates of halibut. Similarly, annual total allowable catch amounts and/or prohibited species bycatch allowances may be seasonally apportioned to minimize fishing operations when prohibited species bycatch rates are high.

G. *Allocation of Bering Sea Pacific Cod Among Gear Types*. Regulations establish the allocation of Bering Sea/Aleutian Islands Pacific cod among vessels using trawl and fixed gear. Although this management provision is not solely based on bycatch considerations, it is thought to reduce halibut bycatch mortality in the cod fishery by (1) allocating more of the total allowable catch amount to the fixed-gear fishery, which has a lower halibut bycatch mortality rate; and (2) allowing the fixed-gear fishery an increased opportunity to fish in ways that further reduce halibut bycatch mortality rates.

Regulations also authorize the seasonal apportionment of the amount of Pacific cod allocated to vessels using fixed gear. The intent of the seasonal apportionment is to avoid significant harvests of Pacific cod during summer months when halibut bycatch rates are highest.

H. *Individual Fishing Quota Program*. An individual fishing quota (IFQ) program for the Alaska sablefish and halibut fisheries was implemented in 1995. The program is expected to reduce halibut bycatch mortality in part by slowing the pace of the sablefish hook-and-line gear fisheries. Until a fisherman has used all of his halibut IFQ, legal-sized halibut taken in the sablefish fishery must be retained rather than discarded. The total catch of halibut is assumed to be more effectively monitored as a result. NMFS estimates that the total halibut discard mortality in the 1995 Alaska hook-and-line sablefish fishery was 148 mt. This level reflects a significant reduction in discard mortality compared to the 1994 sablefish hook-and-line gear fisheries (615 mt total discard mortality; NMFS, Alaska Region, unpublished data).

I. *Voluntary Industry Initiatives to Reduce Prohibited-Species Bycatch.* Several voluntary programs have been developed by trawl industry members to reduce halibut bycatch in the yellowfin sole and Pacific cod fisheries. Industry initiatives also resulted in the publication of analyses of historical observer data on fishery-specific bycatch rates of halibut and other prohibited species, and in rulemaking that authorizes the release of observer data on vessel bycatch or bycatch rates of prohibited species. This information is used by the industry to identify sensitive times and areas of prohibited-species bycatch and to provide an initial assessment of proposed management measures to address the halibut bycatch problem. More recently, participants in the Bering Sea flatfish fisheries have developed an inseason information system to reduce prohibited species bycatch rates (see above, Alaska Groundfish Fishery, *Voluntary Industry Information Systems*).

In 1993, the industry formed the Salmon Research Foundation to address the chinook salmon bycatch problem in the Bering Sea trawl fisheries. Vessels volunteering to participate in the foundation's program agreed to pay a $20 fee for each chinook salmon taken during trawl operations. Monies collected from the voluntary fee programs were intended to fund selected research projects designed to address the salmon bycatch problem. Subsequent action by the North Pacific Fishery Management Council and NMFS to establish salmon bycatch restrictions and associated time/area closures greatly diminished industry initiative to continue the voluntary fee collection program and fulfill the intent of the foundation. Nonetheless, fees collected in 1993-94 were used by the foundation to fund extra observer coverage in 1995-96 to collect tissue samples necessary to enhance chum salmon stock identification research under way by NMFS.

J. *Salmon Donation Program.* At the urging of the industry and the North Pacific Fishery Management Council, together with the experience gained under an experimental donation program, NMFS has implemented a program authorizing the voluntary retention, processing, and donation of salmon incidentally taken in the groundfish fisheries to economically disadvantaged individuals through a NMFS-authorized distributor. Currently, a single authorized distributor, Northwest Food Strategies, successfully administers donations from almost 25 processors and numerous associated catcher vessels under the salmon donation program.

K. *Improved Retention and Utilization Program.* The North Pacific Fishery Management Council has approved an improved retention and utilization program for Bering Sea/Aleutian Islands (BSAI) groundfish fisheries. At its September 1996 meeting, the council voted unanimously to require 100% retention of pollock and Pacific cod in all BSAI fisheries. Rock sole and yellowfin sole retention requirements will follow, but would be delayed

for a period of five years to allow for development of markets and gear technology necessary for vessels to effectively comply with this requirement. The council adopted a minimum product recovery rate of 15% for pollock and Pacific cod. The council's target date for implementation of this program is January 1, 1998. NMFS is proceeding to prepare proposed rulemaking that, if approved by the Secretary of Commerce, would implement the council's action. The council is proceeding to develop a similar program for the Gulf of Alaska groundfish fisheries.

L. *Seabird Avoidance Program*. At its December 1996 meeting, the North Pacific Fishery Management Council adopted mandatory seabird avoidance measures for the hook-and-line groundfish and Pacific halibut fisheries. These measures require vessels using hook-and-line gear to conduct fishing operations in a specified manner and to employ specified measures intended to reduce seabird bycatch and incidental seabird mortality. If approved by NMFS, these measures are intended by the council to be implemented in 1997.

**Research Initiatives to Reduce Bycatch in the Alaska Fisheries**

Gear research to reduce bycatch in the Alaska fisheries has focused on changes in gear technology and fishing methods to improve gear selectivity. However, the competitive nature of the open-access groundfish fisheries is not conducive to voluntary technical adjustments in trawl gear design to reduce bycatch, especially if changes necessary to achieve lower bycatch also result in lower catch rates of target species.

The Alaska Fisheries Development Foundation initiated a project supported by Saltonstall-Kennedy program funding to assess the effectiveness of experimental separator panels in trawl nets to reduce the bycatch of Pacific halibut in the Pacific cod fishery (Stone and Bublitz 1996). Although preliminary results were promising, the competitive nature of the open-access Pacific cod fishery reduces the incentive of individual fishermen to take the initiative toward improving the selectivity of their fishing gear. Fishermen who experiment with new devices to reduce bycatch potentially risk incurring operational costs and losing valuable fishing time while other competing vessels continue to use non-selective nets.

Other research has been conducted on the behavior of fish encountering commercial trawl gear in the North Pacific (Rose 1996). Species-specific differences in fish behavior have been observed using underwater video, some of which have applications for improving trawl selectivity. The information provided by video observations allows iterative development and testing of gear modifications and fishing techniques to find effective ways to reduce bycatch.

Industry members, as well has the NPFMC, have considered limiting the harvest of Alaska pollock to midwater trawl operations to reduce halibut and crab bycatch. However, the open-access nature of the groundfish fishery again frustrates this approach by aggravating the trade off between gains associated with a reduction in bycatch with increased allocation and operation costs that would ensue from restrictions on the use of non-pelagic trawl gear in the pollock fishery (Pereyra 1996).

A great deal of attention has been focused on the use of trawl mesh restrictions to reduce the catch of undersized fish in the Alaska groundfish trawl fisheries. Bublitz (1996) conducted research on the development and use of behavior selection curves to provide a predictive capability to assess mesh selectivity needs in the Alaska pollock fishery. Other researchers (Pikitch et al. 1996) pose a cautionary note on the effectiveness of trawl mesh restriction to reduce bycatch mortality, particularly in high-volume fisheries. In these fisheries, escapement decreases as catch volume increases, regardless of mesh size or configuration. The deleterious result of "blocking" of codend meshes may be reduced or eliminated by using sorting devices that permit the escapement of undersized fish before they reach the codend.

Other researchers have proposed an alternative type of codend with very small mesh size to reduce relative water velocity and enhance the ability of fish to escape through various bycatch reduction devices (Loverich 1996). The concept of codends made of very small mesh size or even impermeable material runs contrary to traditional thinking on codend selectivity and escapement associated with codends made of large-sized mesh.

Efforts also have been expanded to research ways to reduce crab bycatch in the crab fisheries or to reduce the mortality of crab associated with ghost fishing of "derelict" pots. The Alaska Department of Fish and Game has implemented minimum mesh size restrictions to encourage the escape of female and undersized male crabs, as well as mandatory use of cotton thread sewn into the bottom of all crab pots to minimize ghost fishing in lost pots. King crab excluder devices also are required to reduce tunnel height openings in the Tanner crab fisheries. Research is ongoing to address factors affecting crab entry into pots, improving mortality escapement of small crab, reducing discard mortality due to damage while sorting unwanted catch, and reducing mortality associated with ghost fishing of lost pots (Stevens 1996, Wyman 1996).

With the exception of regulatory gear restrictions to reduce bycatch that may be applied fleetwide, little incentive exists for individual fishermen to voluntarily take action to change fishing gear or practices to reduce bycatch. As stated by Stone and Bublitz (1996), "Unless there becomes an economic advantage to fish cleanly, such as in the case of individual bycatch accountability, there is not likely to be any large-scale trend toward the use of improved fishing methods."

## Frequency of Re-Assessment of the Bycatch Problem in the Alaska Fisheries

The observer program established for the Alaska groundfish, crab, and scallop fisheries provides routine feedback on the magnitude of bycatch mortality in these fisheries. Although levels of observer coverage may vary, the use of observer data for purposes of total catch accounting is an integral component of the management system and is unlikely to change.

A more difficult task is to assess the effectiveness of various bycatch reduction measures that have been implemented. The domestic Alaska groundfish fisheries are relatively new and dynamic. The evolving nature of these multispecies fisheries, together with the matrix of different management programs governing them that may affect the spatial or temporal distribution of fishing effort and associated bycatch rates, creates a situation where impacts of specific management measures on bycatch rates may be cumulative and difficult to assess individually. An assessment of overall progress toward reducing bycatch can be attained through observer data on catch composition and discard.

## Regional Priorities, Goals and Objectives

Monitoring total catch, including discards, and decreasing bycatch mortality in the Alaska groundfish fisheries have been priorities of the NPFMC ever since it was established in 1976. An extensive at-sea observer program and a comprehensive catch reporting program generally are thought to provide adequate estimates of total catch by species for the groundfish fishery as a whole. However, the array of management measures that has been used in whole or in part to decrease bycatch has not eliminated the following three-part bycatch problem: (1) the bycatch levels are unnecessarily high; (2) the cost of controlling bycatch is unnecessarily high; and (3) the distribution of the cost of bycatch is highly inequitable.

The difficulty in eliminating this problem has resulted in an increasing awareness of the necessity for better bycatch decisions by fishermen, fishery managers, and the public. Improved decisions require better information concerning (1) the levels of bycatch; (2) the fishing practices and techniques that can decrease bycatch mortality; and (3) the population, ecosystem and socio-economic effects of bycatch and of bycatch management measures. In addition, improved decisions require increased efforts to ensure that fishermen, fishery managers, and the public more fully consider all the benefits and costs associated with their bycatch decisions.

**Recommendations**

*Observer Programs*

A. Pursue federal funding. Baseline funding must be pursued for the North Pacific groundfish observer program as well as additional staff resources. Currently, federal funding of this program is contingent totally on "pass through" funding from several sources. This approach is not acceptable for a program that is so fundamental to the management of the North Pacific fishery resources.

B. Pursue procurement of observer services. Options must be pursued for the procurement of observer services that would reduce the potential for conflicts of interest, encourage the best observers to remain with the program, and improve the connection between observers and NMFS. The expected resulting increase in the cost of the observer program will need to be balanced against the expected increases in the ability of the observer program to support management, science and compliance activities.

C. Improve data collection and catch estimation procedures. A review of observer coverage levels as well as observer data collection methods and associated catch estimation procedures should be initiated to assure that observer programs meet expectations of scientists, managers, and the industry in a cost-effective manner.

*Improvement of Information for Setting Priorities and Selecting and Implementing Preferred Alternatives*

A. Improve the information concerning the population, ecosystem, and socio-economic effects of bycatch and of bycatch management measures

B. Require clearer statements concerning the objectives of proposed bycatch management measures.

C. Develop fishing operations behavior models to assess the probable fleet response to alternative bycatch management measures.

D. Support efforts to establish international guidelines for managing bycatch

*Improvement of Information on Fishing Practices and Techniques that Decrease Bycatch Mortality*

A. Facilitate analyses of observer data and oceanographic data to identify factors that affect bycatch rates by funding such analyses and by making the

observer data more readily available to the industry, the academic community, and others interested in conducting such research.

B. Determine survivability (acute and chronic mortality) and recovery of the dominant groundfish bycatch species from stresses imposed during simulated fish capture processes over a broad range of environmental factors in a controlled seawater laboratory.

C. Facilitate industry's development and testing of methods to reduce bycatch mortality: research and analysis of fish behavior and provision of field equipment and personnel.

D. Facilitate technology transfer of bycatch reduction methods through reports, videos and port meetings.

*Individual Incentive Programs*

A. Improve incentives to fishermen. Develop bycatch programs that improve incentives to fishermen to consider the full costs and benefits of their bycatch decisions and that allow fishermen to use the most cost-effective methods for reducing bycatch.

B. Facilitate legal research to explore ways to decrease the monitoring and enforcement costs of bycatch management programs that can provide catch and bycatch accountability for individual fishing operations. The research topics would include the nature of the programs, the adequacy of the catch and bycatch monitoring programs, and possible changes to the Magnuson-Stevens Act and other applicable federal laws.

# Comparison of Council and Board Annual Groundfish Cycles 1997 - 1998

| 1997 | Council | Board |
|---|---|---|
| April | | Board deadline for proposals is April 10 |
| June | Solicit proposals in newsletter following June 18-22 Council meeting in Kodiak | |
| August | Deadline for proposals: August 15. (47 were received in 1996.) Plan teams meet August 25-29 to rank proposals and prepare preliminary stock assessment documents (SAFEs). | |
| September | Council meets September 24-28 in Seattle. Reviews proposals and selects those to be analyzed. (In 1996, this review was postponed until December.) Council highlights those proposals that should be brought to the Board's attention. Council also approves preliminary SAFEs for public review. | |
| October | | Board holds work session October 21-23 in Girdwood. Receives Council staff briefing on management activities, proposals, and stock assessments, and also may hold Board-Council committee meeting to inform each other of activities. Board also highlights those proposals that should be brought to the Council's attention. |
| November | Public review of initial harvest specifications. Teams meet to update SAFEs. Analysts begin to lay out proposal alternatives and analysis. | Board meets November 4-14 in King Salmon on Bristol Bay finfish. |

| | | |
|---|---|---|
| December | Council meets December 10-14 in Anchorage and makes final decision on harvest levels. Council also discusses proposals and other information forwarded by Board and directs staff to develop impact information by February meeting. | |
| 1998 | | |
| January | Council-Board committee meets to consider cross-jurisdictional issues and highlighted proposals. | Board meets January 6-19 in Anchorage on Alaska Pen & Aleutian Islands finfish. |
| February | Council meets with Board on February 2-3 and then continues alone on February 4-8 in Anchorage. Amendment analysis continues. | Board meets with Council on February 2-3 in Anchorage and then continues alone on February 4-15 on statewide finfish regulations. |
| March | Advance review of analyses by SSC and AP. | Final Board decisions become effective for 1998 season. Their approved findings are forwarded to the Council. |
| April | Council meets April 22-26 in Anchorage and reviews analyses. Approves for public review. | |
| May | Public review of amendment packages. | |
| June | Council meets June 17-21 in Dutch Harbor and considers final approval of amendments. | |
| July + | Amendment packages sent to Secretary for review. Intent is to have effective at the beginning of the coming year, thus completing the amendment cycle of about 18 months from call for proposals. | |

**1999**

| | |
|---|---|
| January | Final Council decisions from June take effect for 1999 if all goes according to schedule. |

JOINT PROTOCOL

BETWEEN

NORTH PACIFIC FISHERY MANAGEMENT COUNCIL (NPFMC)
ANCHORAGE, ALASKA

and

ALASKA BOARD OF FISHERIES (BOF)
JUNEAU, ALASKA

ON

MANAGEMENT OF FISHERIES
OFF ALASKA

Recognizing that NPFMC has a legal responsibility for reviewing and recommending to the Secretary of Commerce measures for the conservation and management of the fisheries of the Arctic Ocean, Bering Sea, and Pacific Ocean seaward of Alaska, with particular emphasis on the consistency of those measures with the National Standards of the Magnuson-Stevens Fishery Conservation and Management Act (Magnuson-Stevens Act); and

Recognizing that the State of Alaska has a legal responsibility for conservation and management of fisheries within State waters; and further, that the State system centers around BOF policy, regulations, and procedures which provide for extensive public input; is sufficiently structured to ensure annual revisions; is flexible enough to accommodate resource and resource utilization emergencies; and is understood and familiar to the users of North Pacific fisheries resources; and

Recognizing that many of the fish populations in the Gulf of Alaska and the Bering Sea and Aleutian Islands migrate freely between or spend some of the year in both Federal and State waters; and

Recognizing that State and Federal governmental agencies are limited in fiscal resources, and that the optimal use of these monies for North Pacific fisheries management, research, and enforcement occurs through a clear definition of agency roles and division of responsibilities.

Therefore, NPFMC and BOF enter into this Joint Protocol to achieve coordinated, compatible, and sustainable management of fisheries within each organization's jurisdiction in the Gulf of Alaska and the Bering Sea and Aleutians.

I. Applicable Fisheries

This Joint Protocol applies to all fisheries off Alaska of mutual concern.

II. Duration of the Agreement

This agreement shall be reviewed by both NPFMC and the BOF and revised as necessary.

III. NPFMC and BOF shall undertake the following activities:

A. NPFMC and BOF shall jointly agree upon and implement an annual management cycle that provides for coordinated, compatible, and sustainable fisheries management in State and Federal waters. Management measures shall be consistent with the national standards of the Magnuson-Stevens Act, with the laws of the State of Alaska, and with all other applicable laws.

B. With regard to groundfish, the annual management cycle shall have the following elements:

1. The NPFMC and BOF will endeavor to coordinate their proposal schedules to the greatest extent practicable.

2. The NPFMC will provide the BOF with the latest stock assessment information shortly after the NPFMC's September meeting, noting any special management or conservation concerns with individual groundfish fisheries. The NPFMC will also review fisheries management proposals that it receives that could have impacts on State programs and forward such proposals to the BOF for consideration at an appropriate BOF meeting. The NPFMC will provide all available information concerning such proposals and will identify particular issues that should be analyzed before taking final action.

3. The BOF at its fall meeting will review groundfish proposals. Those proposals identified as being of mutual concern to both the BOF and NPFMC, will be forwarded to the NPFMC for consideration at its December meeting. The BOF will provide any information available concerning the proposals, and will identify particular issues that should be analysed before taking final action.

4. In December the NPFMC will review stock assessments, set acceptable biological catch and harvest limits, consider proposals and other information received from the BOF, and task staff with developing a discussion paper on potential impacts of the proposals if adopted.

5. Final action by the BOF will occur at their next groundfish meeting following the February joint meeting with the NPFMC. After a BOF final decision, the BOF shall adopt findings explaining the basis for the regulation. This provision shall not apply to emergency regulations, however, justification should be provided to the NPFMC in a timely manner, not less than ten days after the emergency action.

C. A joint NPFMC-BOF committee, not to exceed three members from each body, will be formed and meet in January and at other times as necessary to review available analyses, proposals, and any other matters of mutual concern, and to provide recommendations to the joint NPFMC and BOF.

D. The NPFMC and BOF will meet jointly in Anchorage each February to consider proposals, committee recommendations, the analysis, and any other issues of mutual concern. All interested persons and agencies shall have the opportunity to submit comments to the NPFMC and BOF at these meetings on proposals identified as being of mutual concern, and other matters as appropriate.

E. NPFMC and BOF shall encourage ADF&G and NMFS, in carrying out their responsibilities, to consult actively with each other, with NPFMC and BOF, and other agencies as appropriate, in order to prevent duplication of research, management, and enforcement effort and to make optimum use of the resources available for management of the fisheries.

F. The intent of this protocol is to provide long term cooperative, compatible management systems that maintain the sustainability of the fisheries resources in State and Federal waters.

Approved:

For the North Pacific Fishery Management Council

Council Chairman

Date

For the Alaska Board of Fisheries

Board of Fisheries Chairman

Date