

The National Marine Fisheries Service's National Bycatch Strategy

LEE R. BENAKA and TANYA J. DOBRZYNSKI

Introduction

Minimizing bycatch has become an increasingly important priority for the National Oceanic and Atmospheric Administration's National Marine Fisheries Service (NMFS) over the past several years and remains a central fishery management challenge for the agency. Reduction of marine fisheries bycatch is central to several of the NMFS's

Lee R. Benaka is with the Office of Sustainable Fisheries, National Marine Fisheries Service (NMFS), NOAA, 1315 East-West Highway, Room 13437, Silver Spring, MD 20910, and Tanya J. Dobrzynski is with the NMFS Office of Protected Resources, 1315 East-West Highway, Room 13758, Silver Spring, MD 20910.

ABSTRACT—The National Marine Fisheries Service (NMFS) launched its National Bycatch Strategy (NBS) in March 2003 in response to the continued fisheries management challenge posed by fisheries bycatch. NMFS has several strong mandates for fish and protected species bycatch reduction, including the Magnuson-Stevens Fishery Conservation and Management Act, the Endangered Species Act, and the Marine Mammal Protection Act. Despite efforts to address bycatch during the 1990's, NMFS was petitioned in 2002 to count, cap, and control bycatch. The NBS initiated as part of NMFS's response to the petition for rulemaking contained six components: 1) assess bycatch progress, 2) develop an approach to standardized bycatch reporting methodology, 3) develop bycatch implementation plans, 4) undertake education and outreach, 5) develop new international approaches to bycatch, and 6) identify new funding requirements. The definition of bycatch for the purposes of the NBS proved to be a contentious issue for NMFS, but steady progress is being made by the agency and its partners to minimize bycatch to the extent practicable.

governing statutes, including the Magnuson-Stevens Fishery Conservation and Management Act (MSFCMA), the Endangered Species Act (ESA), and the Marine Mammal Protection Act (MMPA).

In recent years, NMFS's constituents have shined a bright spotlight on the issue of bycatch and the agency's handling of its various mandates to monitor and reduce bycatch. In March 2003, NMFS launched its National Bycatch Strategy (NBS), which was aimed at building upon previous efforts to address bycatch to forge new ground in the areas of bycatch monitoring and reduction. This article reviews the major components of the NBS and discusses its progress to date.

Mandates for Bycatch Reduction

The NMFS has several strong mandates for fish and protected species bycatch reduction, including the MSFCMA, ESA, and MMPA. These mandates are discussed in the following subsections.

Magnuson-Stevens Act

In 1996, Congress amended the Magnuson Fishery Conservation and Management Act (becoming the MSFCMA) in part to define the term "bycatch" as well as to require that bycatch be minimized to the extent practicable. Bycatch, as defined by the MSFCMA (16 U.S.C. § 1802 (2)), "means fish which are harvested in a fishery, but which are not sold or kept for personal use, and includes economic discards and regulatory discards. The term does not include fish released alive under a recreational catch and release fishery management program." "Economic discards" are "fish which are the target of a fishery, but which are not retained because of an

undesirable size, sex, or quality, or other economic reason." The term "regulatory discards" means "fish harvested in a fishery which fishermen are required by regulation to discard whenever caught, or are required by regulation to retain but not sell." Note that because the definition of "fish" refers to "finfish, mollusks, crustaceans, and all other living forms of animal and plant life other than marine mammals and birds," the bycatch reduction requirements in the MSFCMA do not apply to all living marine resources under NMFS's jurisdiction.

National standard 9 of the MSFCMA requires that "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" (16 U.S.C. § 1851(9)). Sec. 303 of the MSFCMA expands on this requirement somewhat, stating that fishery management plans are required to "establish a standardized reporting methodology to assess the amount and type of bycatch occurring in the fishery, and include conservation and management measures that, to the extent practicable and in the following priority (A) minimize bycatch and (B) minimize the mortality of bycatch which cannot be avoided" (16 U.S.C. § 1853(11)).

Endangered Species Act

The ESA requires the Federal government to protect and conserve species and populations that are endangered, or threatened with extinction, and to conserve the ecosystems on which these species depend. Some of these threatened and endangered species, including certain species of sea turtles (for example, the leatherback turtle, *Dermochelys coriacea*), Pacific salmon (for example,

some evolutionarily significant units of chum salmon, *Oncorhynchus keta*, and marine mammals (for example, the northern right whale, *Eubalaena glacialis*), are captured or taken as bycatch in the nation's fisheries. The bycatch reduction requirements of the ESA follow from Section 9(a)(1)(B) and 9(a)(1)(C) of the ESA, which prohibit the take of endangered species within the United States or the territorial sea of the United States, and on the high seas, respectively. "Take" is defined by the ESA as "to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or attempt to engage in any such conduct" (16 U.S.C. 1536(18)). ESA Sections 4, 6, 7, and 10 provide mechanisms for the limited take of ESA-listed species. Of particular relevance for fisheries bycatch is Section 7, which provides that "Each Federal agency shall...insure that any action authorized, funded, or carried out by such agency ... is not likely to jeopardize the continued existence of any endangered species or threatened species or result in the destruction or adverse modification of habitat of such species ..." (16 U.S.C. §1536(a)(2)). For example, Section 7 consultations and resulting biological opinions and reasonable and prudent alternatives have resulted in fishery regulations to prevent bycatch of endangered and threatened sea turtles in the Atlantic and Pacific Oceans.

Several seabird species, such as the marbled murrelet, *Brachyramphus marmoratus*, and short-tailed albatross, *Phoebastria albatrus* (excluding U.S. populations), are protected under the ESA as well. In cooperation with the Department of the Interior's U.S. Fish and Wildlife Service, the NMFS monitors and reports the bycatch of these and other seabirds. Additionally, international conventions and treaties also play a significant role in the national approach to bycatch management. For example, the Food and Agriculture Organization of the United Nations, Committee on Fisheries, developed the International Plan of Action for Reducing Incidental Catch of Seabirds in Longline Fisheries. This plan is being implemented by NMFS and other fishing countries via corresponding National Plans of Action.

Marine Mammal Protection Act

The MMPA seeks to maintain populations of marine mammals at optimum sustainable population levels, principally by regulating the take of marine mammals. Under the MMPA, "take" is defined as "to harass, hurt, capture, or kill, or attempt to harass, hurt, capture, or kill any marine mammal." This includes fishing-related mortality and serious injury. Although the MMPA prohibits the take of marine mammals, it provides exceptions to the prohibition for incidental mortality and serious injury in the process of commercial fishing activities. Section 118 of the MMPA requires that NMFS classify each U.S. fishery according to whether it has a frequent (Category I), occasional (Category II), or remote (Category III) likelihood of incidental mortality and serious injury to marine mammals. It also establishes a process for take reduction teams to develop take reduction plans (TRP's) for fisheries that result in frequent or occasional incidental mortality or serious injury of "strategic" marine mammal stocks.¹ Participants in Category I or II fisheries are required to register with NMFS, take on board an observer if requested by NMFS to do so, and to comply with all applicable TRP regulations. All fishermen, including those participating in Category III fisheries, are required to report the incidental mortality and serious injury of a marine mammal should it occur. Take reduction plans currently are in effect for the harbor porpoise, *Phocoena phocoena*, in the Mid Atlantic and Gulf of Maine regions; large whales (*Eubalaena glacialis*, *Megaptera novaeangliae*, and *Balaenoptera physalis*) in the Atlantic; and the pilot whale, *Globicephala macrorhynchus*; pygmy sperm whale, *Kogia breviceps*; sperm whale, *Physeter macrocephalus*; humpback whale,

¹The term "strategic stock" means a marine mammal stock 1) for which the level of direct human-caused mortality exceeds the potential biological removal level, 2) that, based on the best available scientific information, is declining and is likely to be listed as a threatened species under the ESA of 1973 within the foreseeable future, or 3) that is listed as a threatened species or endangered species under the ESA of 1973, or is designated as depleted under the MMPA (16 U.S.C. 1362(19)).

Megaptera novaeangliae; and beaked whales (*Berardius bairdii*, *Mesoplodon* spp., *Ziphius cavirostris*) in the Pacific. A TRP for the coastal bottlenose dolphin, *Tursiops truncatus*, in the western North Atlantic is near completion.

Efforts to Evaluate and Address Bycatch

Following the enactment of the MSFCMA in 1996, the NMFS established a national team that produced the 1998 report "Managing the Nation's Bycatch" (NMFS, 1998). This comprehensive report identifies a number of high-priority needs in the area of gear technology and selectivity and fish behavior research. "Managing the Nation's Bycatch" adopts a broad definition of bycatch that takes into consideration all of NMFS's bycatch reduction responsibilities under the MSFCMA, ESA, and MMPA. The report defines bycatch as, "Discarded catch of any living resource plus retained incidental catch and unobserved mortality due to a direct encounter with fishing gear."

Seven national objectives are listed in the report as supporting achievement of the NMFS's national bycatch goal which 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." These seven objectives include:

- 1) Determine the magnitude of bycatch,
- 2) Determine the population, ecosystem, social, and economic impacts,
- 3) Determine whether current conservation and management measures minimize bycatch,
- 4) Implement and monitor the preferred alternative,
- 5) Improve communications on bycatch issues,
- 6) Improve the effectiveness of external partnerships, and
- 7) Coordinate NMFS activities to effectively implement the bycatch plan.

The seven objectives are broken down into 22 individual strategies consisting

of 69 individual, substantive components. The report also listed a series of regional recommendations.

During the mid 1990's, at least 10 bycatch workshops were convened around the country (some of which resulted in proceedings volumes (Warren, 1994; Castro et al., 1996; University of Alaska Sea Grant Program, 1996)) to address the bycatch problem. NMFS bycatch reduction and minimization efforts continued through various management actions and policy activities after the publication of "Managing the Nation's Bycatch" and the flurry of workshops and meetings during the mid 1990's, but NMFS did not publish a follow-up to the 1998 report or actively organize or sponsor many high-profile bycatch workshops or fora in the years following the 1998 report. The lack of any sort of institutional "feedback loop" regarding the NMFS's progress in implementing the objectives in "Managing the Nation's Bycatch" made it impossible for the agency to systematically assess how effectively it had been reducing bycatch.

Petition for Bycatch Rulemaking

On 28 February 2002, Oceana, a non-governmental environmental organization, petitioned the U.S. Department of Commerce to promulgate immediately a rule to establish a program to count, cap, and control bycatch in U.S. fisheries. The Oceana petition asserted that NMFS was not complying with its statutory obligations to monitor and minimize bycatch under the MSFCMA, ESA, and MMPA. The petition sought a regulatory program that included a workplan for observer coverage sufficient to provide statistically reliable bycatch estimates in all fisheries, the incorporation of bycatch estimates into restrictions on fishing, the placing of limits on directed catch and bycatch in each fishery with provision for closure upon attainment of either limit, and bycatch assessment and reduction plans as a requirement for all commercial and recreational fisheries. The NMFS published a notice of receipt of petition for rulemaking in the 18 April 2002 issue of the Federal Register (USDOC, 2003a) and invited public comments. In response, NMFS received 31 letters

from different interest groups including regional fishery management councils, the Commonwealth of the Northern Mariana Islands, various commercial fishermen and fisheries organizations, environmental groups, and other interested individuals. Also, NMFS received tens of thousands of letters of similar content and petitions from interested members of the general public.

In its response to the petition, on 11 March 2003, NMFS published in the Federal Register (USDOC, 2003b) its decision not to initiate rulemaking immediately but instead to update and renew its commitment to a National Bycatch Strategy, which might eventually result in rulemaking for some fisheries. After carefully considering all public comment, the Assistant Administrator for Fisheries determined that the four-part program requested by the petition did not warrant specific rulemaking at this time. The NMFS recognized that the agency must continue to address bycatch in many domestic and international fisheries. However, given the diverse nature of U.S. fisheries (including gear type and deployment, fishing conditions, and other factors) and ongoing bycatch reduction initiatives, NMFS did not feel that global/national rulemaking as requested by Oceana was appropriate. Instead, NMFS emphasized the need for a regional approach working through the existing regulatory processes of the appropriate legal authorities and committed to continuing to work with regional fishery management councils (FMC's), regional fishery management organizations, states, and other partners and constituents to address bycatch and implement the agency's new strategy to combat bycatch both domestically and worldwide.

National Bycatch Strategy

The 11 March 2003, Federal Register notice responding to the Oceana petition outlined the agency's new National Bycatch Strategy. The Strategy includes six components that are described in more detail in the following subsections:

1) Assess progress toward meeting the national bycatch goal, its supporting

objectives and strategies, and regional recommendations (as set forth in "Managing the Nation's Bycatch") which includes meeting the bycatch reduction requirements of relevant statutes, including national standard 9 of the MSFCMA, Section 118 of the MMPA, and the take prohibitions of the ESA.

- 2) Develop a national approach to a standardized bycatch reporting methodology.
- 3) Implement the national bycatch goal through regional implementation plans.
- 4) Undertake education and outreach involving cooperative efforts, at the regional level (and other levels as appropriate), by fishery managers, scientists, fishermen, and other stakeholders to develop effective and efficient methods for reducing bycatch.
- 5) Utilize existing partnerships and develop new international approaches to reducing bycatch of living marine resources including fish stocks, sea turtles, marine mammals, and migratory birds, where appropriate.
- 6) Identify new funding requirements to effectively support the NMFS National Bycatch Strategy on an ongoing basis.

Assessing Bycatch Progress

Shortly after publication of the National Bycatch Strategy, NMFS formed six regional bycatch teams (Northeast, Southeast, Southwest, Northwest, Alaska, and Pacific Islands) and one for the Atlantic Highly Migratory Species (HMS) Division within the NMFS Office of Sustainable Fisheries. These teams typically were comprised of managers, scientists, and observer program representatives, although one team included staff from regional FMC's, a marine fisheries commission, and a Sea Grant program. The teams were requested to assess their region's progress toward implementation of the objectives, strategies, and regional recommendations published in the 1998 report "Managing the Nation's Bycatch." For each of the 18 bycatch strategies (see below) described in "Managing the Nation's Bycatch," the

teams were asked to rate the degree to which their region had responded overall (rather than on a fishery-by-fishery basis) on a scale of 1 to 5:

- 1 = We have not been able to do anything at all with this element.
- 2 = We have attempted to address this element but have had limited success.
- 3 = We have addressed this element with some success, but we think much more could be done.
- 4 = We have done a lot to successfully address this element, but we could probably do a few more things.
- 5 = We have successfully addressed this element and can't think of a lot more that we could do.

Based on their responses, the teams were asked to provide reasons why the strategies had not been addressed fully or examples of how the strategies had been successfully addressed. In addition to the 18 strategies, the teams were asked to rate their responses to the various region-specific recommendations that were contained in "Managing the Nation's Bycatch." The 18 strategies, along with scores averaged over the six Regions and the Atlantic HMS Division, are listed below:

- 1) Review and, where necessary, improve collection methods, data sources, and applications of data to determine the magnitude of bycatch-3.3
- 2) Standardize the collection of bycatch data-3.0
- 3) Identify the type and quality of the information that currently exists-2.9
- 4) Establish research and management priorities on a fishery-by-fishery basis-3.4
- 5) Develop a fully integrated data collection system which includes biological, economic, and social information-2.6
- 6) Identify ecosystem-wide issues that can be addressed through a well-coordinated research program-2.8
- 7) Assess the impacts of bycatch-2.4
- 8) Evaluate current management measures-3.2

- 9) If existing measures do not adequately address defined management goals, develop, evaluate, and prioritize potential alternatives-3.4
- 10) Develop an implementation plan based upon a preferred alternative that includes monitoring and enforcement measures-3.4
- 11) Expand the capacity of individual fishing operations to reduce bycatch-3.1
- 12) Ensure coordination with domestic and international organizations-3.1
- 13) Implement monitoring systems-3.6
- 14) Implement an enforcement and compliance system-3.3
- 15) Identify outreach contacts for the exchange of bycatch-related information-3.1
- 16) Provide accurate and timely information on bycatch-related information issues, regulations, and activities-3.8
- 17) Establish partnerships to prepare and distribute bycatch information-2.9
- 18) Create opportunities for partner involvement in planning and monitoring bycatch reduction-3.3

The assessment also asked the regions and Atlantic HMS Division, on a fishery-by-fishery basis, to describe ways (if any) that the fishery could be strengthened in relation to the bycatch-related requirements of the MSFCMA, ESA, MMPA, and National Plan of Action for Reducing the Incidental Catch of Seabirds in Longline Fisheries. Information provided in response to the various questions in the assessment form was to support the creation of regional implementation plans in the third part of the National Bycatch Strategy.

Developing an Approach to Standardized Bycatch Reporting Methodology

Following the publication of the National Bycatch Strategy, a National Working Group on Bycatch (Working Group) was formed to, among other things, accomplish the following goals:

- 1) Make recommendations on the applicability of methods other than observer programs (e.g. video monitoring) for estimating the amount of bycatch.
- 2) Recommend standards of precision to be achieved for bycatch estimates.
- 3) Recommend criteria for identifying "vulnerability" of bycatch species to adverse impacts.

The Working Group submitted a draft report to the NOAA Assistant Administrator for Fisheries in July 2003, which was reviewed by NMFS's Regional Offices and Science Centers. The final report, "Evaluating Bycatch: A National Approach to Standardized Bycatch Monitoring Programs" (Evaluating Bycatch) (NMFS, 2004), recommends the following precision goals for estimates of bycatch, which are defined in terms of the coefficient of variation (CV) of each estimate:

- 1) Protected Species-For marine mammals and other protected species, including seabirds and sea turtles, the recommended precision goal is a 20-30% CV for estimates of bycatch for each species/stock taken by a fishery.
- 2) Fishery Resources-For fishery resources, excluding protected species, caught as bycatch in a fishery, the recommended precision goal is a 20-30% CV for estimates of total discards (aggregated over all species) for the fishery; or if total catch cannot be divided into discards and retained catch then the recommended goal for estimates of total catch is a CV of 20-30%.

However, "Evaluating Bycatch" also lists several caveats to the preceding precision goals, such as, that the goals may in some instances exceed minimum statutory requirements, that there are intermediate steps in increasing precision that may not immediately achieve goals but that represent progress nonetheless, and that there are circumstances in which higher levels of precision may be desired.

"Evaluating Bycatch" also includes an evaluation of over 80 fisheries na-

tionwide for bycatch monitoring. These fisheries are classified into one of five categories: no at-sea sampling program (none), baseline, pilot, developing, and mature. Table 1 provides definitions of these categories.

Additionally, all of these fisheries are rated as to their vulnerability (High, Moderate, or Low) to bycatch of fishery resources, marine mammals, and other protected species including seabirds and sea turtles. Of these fisheries, 5% have a “mature” observation program, 20% are “developing” programs (25% were either mature or developing), 10% have a “pilot” program, 29% have a “baseline” program, and 37% did not have a program, “none.” Thirty-one percent of these fisheries are rated “High” for bycatch vulnerability of one or more of the three resource types: fishery resources, marine mammals, or other protected species (thus, 69% are rated “Moderate” or “Low” for all three resources); 6% of these fisheries are rated “High” for bycatch of one or more of the three resource types and are recommended for establishment of baseline or pilot observation programs.

“Evaluating Bycatch” also establishes three NMFS standardized bycatch reporting methodology (SBRM) objectives, keeping in mind that the MSFCMA requires an SBRM for each fishery management plan:

- 1) The development and documentation of an effective and efficient SBRM for each federally managed fishery, other state fisheries that take ESA-listed species that are under NMFS jurisdiction, and each MMPA Category I and II fishery, where the documentation of an SBRM includes the responsibilities of each entity involved in collecting and using data to estimate bycatch and total catch, as well as well-defined goals and objectives with associated performance criteria.
- 2) The periodic review of the SBRM for each of these fisheries.
- 3) The development of more effective and efficient methods, including electronic monitoring, for estimating bycatch or total catch.

Table 1.—Developmental stages for observation programs.

Observer Program Level	Definition
None	No systematic program exists for bycatch data collection
Baseline	An initial effort including at-sea monitoring to assess whether a systematic program is needed to estimate bycatch is completed.
Pilot	An initial at-sea monitoring program that obtains information from relevant strata (time, area, gear) for design of a systematic program to estimate bycatch with the ability to calculate variance estimates has been done.
Developing	A program in which an established stratification design has been implemented and alternative allocation schemes are being evaluated to optimize sample allocations by strata to achieve the recommended goals of precision of bycatch estimates for the major species of concern.
Mature	A program in which some form of an optimal sampling allocation scheme has been implemented. The program is flexible enough to achieve the recommended goals of precision of bycatch estimates for the major species of concern considering changes in the fishery over time.

To assist in meeting these objectives, “Evaluating Bycatch” establishes the following protocol for SBRM’s:

- 1) Deploy at-sea observers in most cases as part of the preferred method for collecting bycatch data due to the effectiveness of at-sea observer programs.
- 2) Use other at-sea observation technologies (e.g. electronic monitoring) as appropriate to complement observer programs.
- 3) Use the appropriate sampling design as determined by the objectives of and the level and sources of funding for the observer program and other monitoring programs, where the objectives include providing a scientific and statistically valid basis for estimating bycatch or total catch.
- 4) Use the appropriate models for combining observer data with effort, landings, and/or other data to obtain accurate estimates of total bycatch or total catch.
- 5) Use appropriate methods to identify and decrease sources of bias.
- 6) Address the goal of achieving recommended levels of precision (20–30% CV) in estimating bycatch from observer data.
- 7) Adhere to standards established by NMFS to ensure the integrity and quality of the data collected in NMFS-approved observer programs, other data that are used in estimating bycatch or total catch, and the resulting estimates of bycatch or total catch.
- 8) Where appropriate, use other monitoring methods for estimating by-

catch (e.g. using data from experimental tows, fishery-independent survey data, data from electronic monitoring technology, strandings data, or self-reported data) instead of at-sea observers.

- 9) Emphasize outreach to industry and other constituents and encourage their participation in the development of SBRM goals, objectives, and implementation plans.

Developing Implementation Plans

In December 2003, the Regional and Atlantic HMS bycatch implementation teams submitted bycatch implementation plans to the NOAA Assistant Administrator for Fisheries. Based on guidance from the NMFS Office of Sustainable Fisheries, these plans were to include the following elements:

- 1) The plans must cover Fiscal Years (FY) 2004 and 2005.
- 2) Every item rated as 1 or 2 in the bycatch assessments must be addressed in the implementation plans.
- 3) The plans should include action items addressing:
 - A) standardization and enhancement of bycatch reporting methodologies,
 - B) prioritization of top research needs,
 - C) possible new bycatch management measures that should be considered on a fishery-by-fishery basis, and
 - D) enhancement of education and outreach efforts, including technology transfer.

The seven bycatch implementation plans submitted contained a variety of ambitious and innovative action items, including the following:

- 1) Reducing fishing capacity in the Gulf of Mexico shrimp fishery.
- 2) Determining the effects of removals by U.S. fishing vessels of adult and sub-adult leatherback and loggerhead turtles on the reproductive capacity of the respective populations in the Pacific Ocean.
- 3) Promoting the use of electronic logbooks to facilitate identification and correction of bias in estimating bycatch for unobserved vessels in the Alaska Region.
- 4) Integrating 2002–2003 West Coast Groundfish Observer Program (WCGOP) data into the groundfish bycatch model and revising non-trawl/fixed gear 2004 groundfish landings limits based on early-2004 analysis of 2002–2003 WCGOP data.
- 5) Studying animal behavior as it relates to development of gear to reduce bycatch in Northeast priority fisheries.
- 6) Identifying, developing, and implementing new logbook data elements for Pacific Islands fisheries to capture any long-term effects from modified fishing practices.
- 7) Evaluating Atlantic HMS Headboat mandatory observer coverage and baseline program.

The NOAA Assistant Administrator for Fisheries will work with the NMFS Regional Administrators and Office of Sustainable Fisheries throughout 2004 and 2005 to ensure that the action items contained in the bycatch implementation plans are carried out to the extent practicable.

Undertaking Education and Outreach

Prior to the March 2003 publication of the Federal Register notice (USDOC, 2003b) responding to the Oceana petition for rulemaking, NMFS created a bycatch website linked to its homepage. This website (<http://www.nmfs.noaa.gov/bycatch.htm>) has grown considerably since and is updated at least weekly with

new information about recent regulatory actions affecting fisheries and protected resources bycatch, international activities, bycatch reports and data sets, and updates on the National Bycatch Strategy, including all of the bycatch implementation plans discussed above.

NMFS also sponsored a 3-day international bycatch symposium at the American Fisheries Society's 2003 annual meeting in Quebec City. The symposium featured presentations by scientists and managers from inside and outside NMFS, as well as Canadian researchers and commercial fishermen. The symposium included several presentations on bycatch management in longline fisheries as well as bycatch data collection and uses.

As mentioned above, the Regional and Atlantic HMS bycatch implementation plans were required to address education and outreach topics. As a result, the plans contain a variety of education and outreach initiatives, including bycatch workshops, skipper training, development of additional online resources, and distribution of species identification guides.

Developing New International Approaches

The fifth component of the National Bycatch Strategy calls for the utilization of existing partnerships and development of new international approaches to reduce bycatch of living marine resources including fish stocks, sea turtles, marine mammals, and migratory birds, where appropriate. The objectives identified in this component of the National Bycatch Strategy include examination of the following:

- 1) International approaches to reduce bycatch of living marine resources extending beyond U.S. waters;
- 2) International agreements for potential broadening and for progress in implementation; and
- 3) Regional fishery management organizations and other fora for effectiveness of bycatch provisions.

NMFS's International Bycatch Reduction Task Force, which includes

members from the U.S. Department of State, has been identified as the lead body in ongoing efforts to achieve these goals.

The tasks being undertaken to implement the U.S. strategy for international bycatch reduction are broken up into two categories: 1) international sea turtle workshops, and 2) international communications relating to sea turtles, sharks, and seabirds. Task Force members and NMFS staff have been engaged in a number of activities in support of international sea turtle workshops recently. Such activities have included the following:

- 1) NMFS presented research results from sea turtle–fishing experiments with the Atlantic pelagic longline fleet at the Inter-American Tropical Tuna Commission Bycatch Working Group in January 2004 in Kobe, Japan.
- 2) NMFS sponsored a workshop in Costa Rica in February 2004 that focused on providing information on safe turtle release to participants from nations with longline fleets.
- 3) Beginning in March 2004, NMFS, in collaboration with several partners, provided hooks, dehookers, and technical assistance to Ecuador for the testing of circle hooks to reduce turtle catches.
- 4) NMFS staff conducted longline mitigation training and workshops in Peru in June 2004.
- 5) NMFS sponsored workshops in August 2004 in Panama and Guatemala on the use of turtle dehookers and safe handling and release techniques.

Task Force members also have participated in the drafting and transmission of several diplomatic cables to flag states with significant longline fleets (and Taiwan):

- 1) A diplomatic demarche (cable) relating to sea turtles was sent that emphasized the international nature of the sea turtle bycatch problem in longline fisheries, described steps that the United States is taking to address it, and requested that recipients

provide information relative to sea turtle bycatch in longline fisheries.

- 2) A diplomatic demarche was sent to flag states with significant longline fleets (and Taiwan) that requested information on the status of implementing the Food and Agriculture Organization (FAO) International Plan of Action (IPOA) Relating to the Conservation and Management of Sharks.
- 3) A diplomatic demarche was sent to flag states with significant longline fleets (and Taiwan) that requested information on the status of implementing the FAO IPOA's for Seabirds.

Identifying New Funding Requirements

The NMFS National Bycatch Strategy encompasses a wide variety of new initiatives, both regional and national, over FY 2004 and 2005 and beyond. These initiatives include innovations in fishing gear, efforts to increase the understanding of fish and protected species behavior, bycatch monitoring via traditional and alternative means, and other groundbreaking research. However, the list of potential research suggested in bycatch implementation plans and suggested by the National Bycatch Working Group's report is extensive and would be costly to carry out. As the National Bycatch Strategy matures over the coming months and years, funding needs and priorities will be revisited. The attainment of adequate funding is essential to the success of the National Bycatch Strategy.

Some positive funding signs have already emerged regarding bycatch. The FY 2004 Department of Commerce budget passed by Congress contained \$3.8 million in new "reducing bycatch" funding. Of this total, \$1.3 million was used to carry out critical gear research and bycatch coordination efforts. Projects funded include:

- 1) Development and transfer of gear modifications and fishing practices to reduce turtle takes in pelagic longline fisheries, including evaluating 18/0 circle hooks and bait types

(sardines and herring) in the directed tuna fishery,

- 2) Development of halibut excluders for the Gulf of Alaska groundfish fisheries and salmon excluders for pollock trawlers,
- 3) Use of underwater infrared video and imaging sonar to document and categorize groundfish behavior in front of and in the mouth of a bottom trawl, and
- 4) Development and testing of a system to allow observers to report protected species interactions from the high seas.

The remaining \$2.5 million of the FY 2004 new reducing bycatch funding was used to contract with fisheries observers to board fishing vessels and report on catch and bycatch. These funded observer coverage projects, which should contribute to the minimization of bycatch for red snapper, Gulf and south Atlantic grouper species, west coast groundfish, and New England groundfish, include the following:

- 1) South Atlantic/Gulf of Mexico shrimp otter trawl fisheries observer program,
- 2) California longline fishery observer program,
- 3) California coastal purse seine fishery observer program,
- 4) Video-based electronic monitoring of hook and line bycatch, and
- 5) Analysis of Atlantic and Gulf of Mexico shrimp trawl bycatch data.

The Definition of Bycatch

As mentioned previously, the 1998 NMFS report "Managing the Nation's Bycatch" (NMFS, 1998) defined bycatch as "discarded catch of any living marine resource plus retained incidental catch and unobserved mortality due to a direct encounter with fishing gear." This definition expanded the scope of the definition of bycatch found in the MSFCMA, which does not specify retained incidental catch or unobserved mortality in its definition. The expanded definition of bycatch was designed to allow scientists and managers the opportunity to examine the full spectrum of total fishing-related

mortality within the context of a national policy, consistent with NMFS's mission to build sustainable fisheries. "Managing the Nation's Bycatch" was meant to be a strategic document to assist the agency in meeting its goals not only under the MSFCMA, but also under the MMPA, the ESA, other domestic statutes, and international agreements.

In the summer of 2004, as the National Bycatch Strategy was implemented, some Chairs of regional FMC's expressed concern about including retained incidental catch in the definition of bycatch, because in some fisheries, retained incidental catch is a secondary catch that nonetheless constitutes an important component of a fishery's overall landings. For example, in the Hawaii longline fishery, vessels that target swordfish or tunas operate in the expectation that they also will catch a wide range of other marketable pelagic species. According to the regional FMC Chairs, requiring the Councils to minimize this incidental catch in accordance with the MSFCMA's National standard 9 could have catastrophic economic effects on some fisheries.

In response to such concerns, the NMFS policy definition of bycatch, published in "Evaluating Bycatch" (NMFS, 2004) is "the discarded catch of any living marine resource due to a direct encounter with fishing gear." Although this definition does not include retained incidental catch, it will assist NMFS with addressing bycatch problems regardless of whether the bycatch is discards, retained incidental catch, or protected species interactions. "Evaluating Bycatch" states NMFS's position that requiring retention of all species caught does not necessarily eliminate the problem of bycatch, and that it is critical to account for all catch—including target catch, bycatch, and retained incidental catch—and institute catch restraints as necessary to alleviate problems caused by excessive catch.

Conclusion

Bycatch is an important issue facing NMFS today. The requirements in current law to reduce bycatch underscore the value of living marine resources to

the nation as well as the commitment to ensure that these resources are protected and sustained for future generations. The NMFS National Bycatch Strategy has to date served as an effective vehicle to elevate the profile of bycatch in the agency and inspire a renewed commitment to bycatch reduction and minimization agency-wide. The attainment of adequate funding and other support is essential to the success of the National Bycatch Strategy. Although positive signs have already materialized in the form of increased Congressional attention to and funding of bycatch reduction efforts, making progress on

bycatch reduction will require continued support and attention to this important issue from all of NMFS's partners, including the fishing industry, state fishery managers, scientists, environmental organizations, and Federal lawmakers.

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