



SECTION 1

Introduction

Photo on previous page: Preparing a sonar-equipped net off the Oregon coast. Credit: NMFS.

SECTION 1 Introduction

1.1 Overview

Effective management of living marine resources depends on understanding the population dynamics of target and bycatch species and related ecosystem processes. Reliable quantitative information about bycatch is essential to the assessment and management process. The goal of this report is to determine the extent to which reliable quantitative bycatch information exists for federally managed fisheries and for fisheries with relevant Federal data-collection programs, and to document bycatch estimates and bycatch estimation methods for all fisheries for which this information was available in 2005.¹ In addition to describing the “state of bycatch reporting and estimation,” this report will be used to address and to prioritize sampling and estimation concerns.

Bycatch has long been recognized as a global issue (Alverson 1994; Hall 1996). Bycatch occurs because fishing methods are not perfectly selective for the target species (including targeted size range and/or sex), or because incidental take of marine mammals, sea turtles, or seabirds may occur as a result of fishing activities. Bycatch may also occur when regulatory restrictions prohibit retention of particular species, sexes, or size ranges. Therefore, some bycatch occurs in commercial fisheries, and higher rates of bycatch occur in fisheries with less selective fishing methods and practices.

Bycatch should be examined in the context of biological, ecological, economic, and social impacts to provide a comprehensive evaluation of its overall significance. Biological impacts of bycatch have been demonstrated at the species, population, and ecosystem levels (Hall et al. 2000; Kelleher 2004; Lewison et al. 2004; Read et al. 2006). Economic impacts may be substantial when current or potential future exploitable biomass is not available for harvest (Pascoe 1997; Larson et al. 1998; Kelleher 2004). When bycatch results in the mortality of endangered or protected species,² it is clearly of concern. Other issues arise when mortality of living marine resources results in lost productivity of commercially or recreationally important stocks, or when the public perceives bycatch as a waste. Costs for monitoring and mitigating bycatch may also be high, and some of these costs may be borne directly by the fishing industry (e.g., observer or other monitoring costs, costs of gear modification,

and reduced target catch rates when bycatch mitigation devices are deployed).

Overall fishing mortality can be determined only if reliable, quantitative information on retained catch and bycatch (or total catch, from which bycatch estimates can be subtracted) is available. In some cases, even very low overall bycatch levels may be of concern, especially if the bycaught species are endangered or protected. When reliable bycatch estimates are available they can be factored into stock assessments. Management measures have been implemented in many U.S. fisheries to reduce bycatch; these include regulatory measures that place limits on bycatch quantities or close target fisheries when bycatch limits are reached. In some cases, other mitigation measures such as gear modifications have also been required.

This U.S. National Bycatch Report provides the first national compilation of bycatch estimates in commercial U.S. fisheries. It also provides comprehensive information on sampling and estimation methods and provides an objective framework for evaluating the quality of bycatch estimates. This report is the first in what is envisioned to be a series. Over time, the U.S. National Bycatch Report will improve the ability of the National Oceanic and Atmospheric Administration’s (NOAA’s) National Marine Fisheries Service (NMFS) to monitor bycatch trends. It is designed to assist NMFS in meeting legislative mandates for bycatch reduction, guiding policy, and setting priorities.

1.2 U.S. Laws and Regulations to Address Bycatch

The primary authorities for monitoring and reducing bycatch are contained in three statutes: the Magnuson-Stevens Fishery Conservation and Management Act (MSA), 16 U.S.C. 1801 et seq.; the Marine Mammal Protection Act (MMPA), 16 U.S.C. 1361 et seq.; and the Endangered Species Act (ESA), 16 U.S.C. 1531 et seq.

Under the MSA, all fishery management plans (FMPs) and their implementing regulations must be consistent with ten “National Standards.” National Standard 9 requires that bycatch be avoided to the extent practicable or, where it cannot be avoided, that bycatch mortality be minimized; 16 U.S.C. 1851(a) (9). NMFS regulations implementing MSA bycatch provisions require that the following factors be considered in determining the practicability of a particular management action to minimize bycatch or bycatch mortality:

- Population effects for bycaught species
- Ecological effects due to changes in the bycatch of a species (effects on other species in the ecosystem)
- Changes in the bycatch of other species of fish and the resulting population and ecosystem effects

¹ The year 2005 was selected during the report’s development in 2006, as the most recent year for which complete information was available. The National Marine Fisheries Service intends to publish updated information in future editions of this report.

² All species (fish, invertebrates, plants, seabirds, sea turtles, and marine mammals) protected under the Marine Mammal Protection Act and Endangered Species Act and managed by the National Marine Fisheries Service.

- Effects on marine mammals and birds
- Changes in fishing, processing, disposal, and marketing costs
- Changes in fishing practices and behavior of fishermen
- Changes in research, administration, and enforcement costs and management effectiveness
- Changes in the economic, social, or cultural value of fishing activities and non-consumptive uses of fishery resources
- Changes in the distribution of benefits and costs
- Social effects

The MSA also requires all FMPs to include a Standardized Bycatch Reporting Methodology (SBRM) to assess the amount and type of bycatch in managed fisheries; 16 U.S.C. 1853(a)(11). These reporting methods are intended to improve the collection and estimation of bycatch, and to support the development of effective conservation and management strategies and mitigation measures.

The MMPA seeks to maintain marine mammal stocks at optimum sustainable population levels, principally by prohibiting take of marine mammals. The MMPA defines *take* as harassment, hunting, capture, and killing, as well as attempts to harass, hunt, capture, or kill. The MMPA allows limited exceptions to the take prohibition, including one for commercial fishing operations. The MMPA requires that each U.S. commercial fishery be classified according to whether there is frequent (Category I), occasional (Category II), or a remote (Category III) likelihood of incidental mortality and serious injury of marine mammals. It also has provisions for the establishment of take-reduction teams (TRTs) to develop take-reduction plans (TRPs) for those fisheries with the greatest impact on marine mammal stocks (Categories I and II).

The ESA mandates protection and conservation of threatened and endangered species, and conservation of the ecosystems on which these species depend. A species is considered endangered if it is in danger of extinction throughout all or a significant portion of its range. A species is considered threatened if it is likely to become endangered in the future. Some threatened and endangered species, including all species of sea turtles found in the U.S. and certain species of salmon, seabirds, and marine mammals, are captured as bycatch in the Nation's fisheries. The ESA requires development of recovery plans that identify criteria and actions to recover listed species.

Further information on these, as well as other statutes and international agreements pertaining to bycatch, is provided in Appendix B of this report.

1.3 The U.S. Bycatch Strategy

To address its legislative mandates, NMFS has developed a national approach to bycatch. This approach, as first articulated in *Managing the Nation's Bycatch* (NMFS 1998), expands on the MSA mandate "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." Benaka and Dobrzynski (2004) provided guidance on implementation of this goal. They considered bycatch concerns in four categories: 1) population concerns in cases where bycatch contributes significantly to the status of the fish population; 2) social and economic concerns; 3) ecological concerns; and 4) public concerns. The article made recommendations in several areas, including bycatch monitoring and data-collection programs. The need for improved bycatch data collection and assessment was further discussed in *Evaluating Bycatch: A National Approach to Standardized Bycatch Monitoring Programs* (NMFS 2004b), which also provided details on implementation of NMFS' SBRM for all federally managed fisheries.³

1.4 Definition of Bycatch

There are currently no universally accepted definitions for the terms *bycatch* and *discard*, and these terms are often used interchangeably. *Bycatch* for the purposes of this report is defined as discarded catch of any living marine resource plus unobserved mortality⁴ due to a direct encounter with fishing gear (Figure 1.1). Since information on unobserved mortality of fish is rarely available, it is not included in this report. Unobserved mortality is included in bycatch estimates for protected species where the data permits.

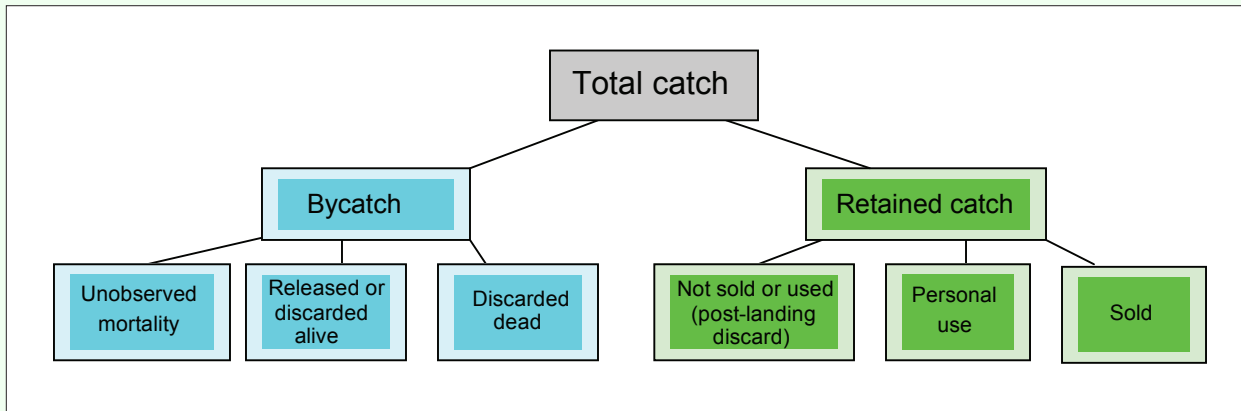
The definition used here is similar to the definition of bycatch in the MSA, where bycatch is defined as "fish which are harvested in a fishery, but which are not sold or kept for personal use, and includes economic and regulatory discards," but not marine mammals, seabirds, or fish released alive under a recreational catch-and-release fish-

³ The combination of data collection and analysis used to estimate bycatch in a fishery constitutes the SBRM for that fishery. Regional SBRM implementation plans are developed on an annual basis. Their action items are listed in Appendix C of this report.

⁴ Unobserved mortality: mortality of living marine resources due to a direct encounter with fishing gear that does not result in the capture of the species. This includes mortality due to lost or discarded fishing gear, as well as fish and other species that escape from fishing gear before it is retrieved but die due to the stress or injury resulting from the encounter (NMFS 2004b).

INTRODUCTION

Figure 1.1
Definitions used in the U.S. National Bycatch Report.



ery management program. The MSA does not specifically define the term *discard*. The definition of discards used in this report is “living marine resources returned unprocessed to sea or elsewhere, including those released alive” (Figure 1.1). While the issue is not addressed in this report, NMFS is also concerned about post-landing discards (i.e., fish discarded after landing). Post-landing discards are not

included as a component of bycatch mortality estimated in this report since they are typically included in the landings data. Even though they differ slightly from those used in the MSA, the definitions in this report were selected to provide consistency with previous NMFS reports, including the 1998 and 2004 NMFS bycatch reports referenced above.

