

**NOAA Fisheries Objectives, Protocol, and Recommended Precision Goals
for Standardized Bycatch Reporting Methodologies
[final draft version]**

In 1996, Congress amended the Magnuson-Stevens Fishery Conservation and Management Act (MSA) in part to define the term “bycatch” as well as to require that it be minimized to the extent practicable. National Standard 9 of the MSA 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)). Section 303 of the MSA expands on this requirement somewhat, stating that fishery management plans (FMPs) are required to “establish a standardized reporting methodology to assess the amount and type of bycatch occurring in the fishery” (16 U.S.C. § 1853(11)). The MSA requirement for a standardized bycatch reporting methodology (SBRM) for each FMP fishery is intended to address only the bycatch of fish, where “fish” is defined to include all living marine resources, including sea turtles but excluding marine mammals and seabirds.

Based on its stewardship responsibilities defined elsewhere in the MSA and in the Marine Mammal Protection Act (MMPA), the Endangered Species Act (ESA), and the National Environmental Policy Act (NEPA), NOAA Fisheries believes that: (1) the SBRM for each FMP fishery should address the bycatch of marine mammals and seabirds, as well as fish and sea turtles, and (2) an effective and efficient SBRM should be established for each federally managed fishery and for each MMPA Category I and II fishery¹. Such an SBRM will improve the bycatch estimates for each fishery, which will improve both the estimates of total catch and the scientific basis for making the often interdependent decisions concerning the reductions in bycatch to be attained and the methods to be used to attain those reductions.

This document identifies the SBRM objectives, protocol, and recommended precision goals that NOAA Fisheries has established to meet its stewardship responsibilities for monitoring bycatch. The actions that are being taken by the agency and the Fishery Management Councils to further reduce bycatch are addressed elsewhere.

NOAA Fisheries has established the following SBRM objectives:

- The development and documentation of an effective and efficient SBRM for each federally managed fishery and each MMPA Category I and II fishery.
- The periodic review of the SBRM for each of these fisheries.
- The development of more effective and efficient methods for estimating bycatch or total catch.

The combination of data collection and analyses that is used to estimate bycatch in a fishery constitutes the SBRM for that fishery. For example, an at-sea observer program, effort and landings data collection, and analyses to estimate overall bycatch can constitute an SBRM. NOAA Fisheries,

¹ Category I and II fisheries include both federally and state managed fisheries.

working with the Fishery Management Councils, has implemented some or all of the elements of an SBRM for each federally managed fishery and each MMPA Category I and II fishery.

To assist in meeting these objectives, NOAA Fisheries has established the following protocol for SBRMs:

- The deployment of at-sea observers in most cases as the preferred method for collecting bycatch data.
- The use of appropriate sampling design as determined by the objectives of the observer program, which include providing a scientific and statistically valid basis for estimating bycatch or total catch.
- The use of appropriate models for combining observer data with effort, landings, and/or other data to obtain accurate estimates of total bycatch or total catch.
- The use of additional appropriate methods to identify and decrease sources of bias.
- The goal of achieving recommended levels of precision (20-30% CV) in estimating bycatch from observer data.
- The adherence to standards established by NOAA Fisheries to ensure the integrity and quality of the data collected in NOAA Fisheries-approved observer programs.
- Where appropriate, the use of other monitoring methods for estimating bycatch (e.g., using data from experimental tows, fishery-independent survey data, data from electronic monitoring technology, strandings data, or self-reported data).

At-sea observer program sampling designs should be formulated to achieve precision goals for the least amount of observation effort, while also striving to increase accuracy. These designs require the development of appropriate sampling strata and sampling allocation procedures. The overall design of a bycatch monitoring program should address the potential for observer effect bias. An observer effect bias exists either if fishing practices change for trips or sets that are observed or if crew members take actions to prevent accurate catch or bycatch estimates for observed sets. In some cases, a compliance program will be needed to decrease the latter source of bias.

Observer sampling programs are driven by recommended precision goals that address management needs for estimating management quantities such as allowable catches through a stock assessment, for evaluating bycatch relative to a management standard such as allowable take, and for developing mitigation mechanisms. The recommended precision goals for estimates of bycatch are defined in terms of the coefficient of variation (CV) of each estimate. The recommended precision goals for estimates of bycatch, in general, are as follows:

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.

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%.

These *CV* goals are levels of precision to which NOAA Fisheries strives to achieve. However, it is important to recognize that (1) there are intermediate steps in increasing precision which may not immediately achieve the goals; (2) there are circumstances in which higher levels of precision may be desired, particularly when management is needed on fine spatial or temporal scales; (3) there are circumstances under which meeting the precision goal would not be an efficient use of public resources; and (4) there may be significant logistical constraints to achieving the goal. However, a decision to accept lower precision should be based on analyses and understanding of the implications of that decision. Therefore, flexibility should be considered when setting *CV* targets. For example, the rare-event nature of encounters with some protected species might mean that *CV*'s of 20-30% cannot be attained and that precision in absolute numbers be considered. In such cases more adaptive management-observation systems may be needed. Also, if *CV*'s of 20-30% for *individual* fishery species can be obtained and are needed for management, then this precision should be encouraged.

NOAA Fisheries recognizes that when there are multiple objectives for an observer program, the objective of better estimates of bycatch or total catch needs to be balanced with other program objectives to obtain an optimal sampling design.

To assist both in establishing an effective and efficient SBRM for each federally managed fishery and each MMPA Category I and II fishery and in periodically reviewing the SBRM for each of these fisheries, NOAA Fisheries will work cooperatively with stakeholders to:

- Identify the appropriate mix of methods to be used to estimate bycatch or total catch;
- Develop the sample design for at-sea observation programs;
- Estimate the precision of the estimates of bycatch or total catch;
- Identify and decrease sources of bias, including the observer effect bias; and
- Identify the appropriate sample size(s).

NOAA Fisheries recognizes that many of the characteristics of an appropriate SBRM will be determined by a variety of factors that are both fishery and time-specific. Therefore, the SBRMs that result from these cooperative efforts often will differ by fishery and vary over time.

In many instances, NOAA Fisheries will establish, review and improve SBRMs collaboratively with the Regional Fishery Management Councils, MMPA Take Reduction Teams, other fishery management agencies, the fishing industry, the environmental community, university or private sector researchers, and other stakeholders. In most cases, a NOAA Fisheries Regional Office or Science Center will take the lead and be principally responsible for implementing the SBRM objectives and protocol for specific fisheries.

The ability of NOAA Fisheries to improve the SBRMs by implementing its SBRM objectives, protocol and precision goals will depend on the funding and staffing resources that will be available. Therefore, it will pursue adequate, stable and equitable sources of funding for the following: (1) enhanced bycatch monitoring programs; (2) if necessary, additional monitoring methods or a compliance program to address the observer effect bias; and (3) the research and analysis that are necessary to implement a more effective and efficient SBRM for each fishery, and to periodically evaluate each SBRM and determine how to improve it in a cost-effective manner.

In general, NOAA Fisheries should be expected to use funds appropriated by Congress or collected from the fishing industry to pay for standard bycatch collection as required under its MSA, MMPA, and ESA mandates to monitor bycatch. For bycatch data collection during fishing activities that NOAA Fisheries might otherwise not allow (e.g., experimental or exempted fishing permits), fishing vessel operators or grantees may be required to fund the observers or other data-collection mechanism, following the SBRM protocol.

It is unlikely that adequate funding will be available to immediately assess the need to enhance the SBRM for each fishery, and to make the necessary enhancements. Therefore, NOAA Fisheries will use an efficient and equitable mechanism for allocating the funds that are made available, on a discretionary basis, through the Federal budget process. The ability of NOAA Fisheries to implement these objectives will also depend on how effectively it can use outreach programs to develop better methods for estimating bycatch or total catch and to obtain the assistance of fishermen and other stakeholders in improving the bycatch estimates.

In summary, the establishment of these objectives, protocol and recommended precision goals for SBRMs will improve the bycatch or total catch estimates for each federally managed fishery and each MMPA Category I and II fishery, in accordance with the requirements of the MSA and the other stewardship responsibilities of NOAA Fisheries, while taking into account the substantial differences that occur among fisheries and over time.

[This document is based on the final draft report “Evaluating Bycatch: A National Approach to Standardized Bycatch Monitoring Programs]