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How Many Eyes Do We Need on the Ocean?
Oceana Releases New Science for Fishery Observer Programs

Our nation's fisheries are in trouble. Many of our most valuable commercial fisheries are facing hardships, endangered species are in peril, and the fish we like to eat are becoming increasingly scarce. "Dirty-Fishing" – the catch and discard of unwanted marine life -- is depleting America's fish populations and unnecessarily killing endangered and threatened species. A major contributing factor to these declines is the U.S. government's failure to collect the information it needs to make fisheries sustainable.

The Solution: Fishery Observers

One of the best ways to collect important information is to put observers on fishing boats. Fishery observers are independent scientists who collect important information about fishing practices by accompanying fishermen at sea. Because fishermen do not bring everything they catch back to port, observers are the best way to sufficiently estimate how much marine life is caught and discarded at sea.

A "How-To" Guide for Fishery Observer Programs

An innovative new study* published by Oceana in November 2003 shows fishery managers how to design and run effective observer programs. The study was authored by premier fishery assessment scientists Elizabeth Babcock and Ellen Pikitch, formerly of the Wildlife Conservation Society and now with the Pew Institute for Ocean Science, along with Charlotte Gray Hudson, a marine wildlife scientist at Oceana.

A critical issue for managers is determining how to produce reliable and accurate results from observer programs in many different fisheries, each with unique characteristics. Another important issue is how fishery observer programs can account for the bias created by a change in behavior by fishermen when observers are present. This study provides specific guidelines of how to address these challenges.

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The study also provides recommendations of how to determine how much observer coverage is needed to suitably estimate the catch and discard of unwanted fish, marine mammals, sea turtles, and other ocean wildlife. Generally, if a particular species is routinely caught in a fishery, lower observer coverage levels are needed than if the species is rarely caught. The report determined that to initially construct a good observer program, at least 50 percent coverage is needed where the catch of rare species is a concern, and there should be at least 20 percent coverage where the catch is of more common species.

* Babcock, Elizabeth,. Pikitch, Ellen,. & Charlotte Hudson, 2003. "How much observer coverage is enough to adequately estimate bycatch?" Oceana, Washington, DC.

For more information, including a full copy of the report, visit
http://www.oceana.org/dirtyfishing_press

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10/29/03

HOW MANY EYES DO WE NEED ON THE OCEAN?

GUIDELINES FOR FISHERY OBSERVER PROGRAMS

Our nation's fisheries are in trouble. Many of our most valuable commercial fisheries are facing hardships, endangered species are in peril, and the fish we like to eat are becoming more scarce.

Why?
Poor management is one reason. A major contributing factor is the failure of the U.S. government to collect the information it needs to make fisheries sustainable. Because much of the marine life killed in the course of fishing each year is not counted, the real amount of marine life killed is usually greater than the official estimates, and fish populations can collapse.

The result?
Fewer fish in the ocean and the fish market, and less money in fishermen's pockets.

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DISCARDED CATCH: THE UNNECESSARY WASTE OF MARINE LIFE

We particularly lack information on the marine life that is incidentally caught during fishing and is thrown back, either dead or dying, because it is a protected species, or because fishermen do not want it or are not allowed to keep it. Examples may include whales, sea turtles, birds and other protected species, as well as undersized fish that are not marketable or are prohibited through regulations. Laws require the federal government to count, cap, and control this unnecessary waste, which results from dirty fishing practices. To comply with these requirements, managers must account for all marine life caught at sea.

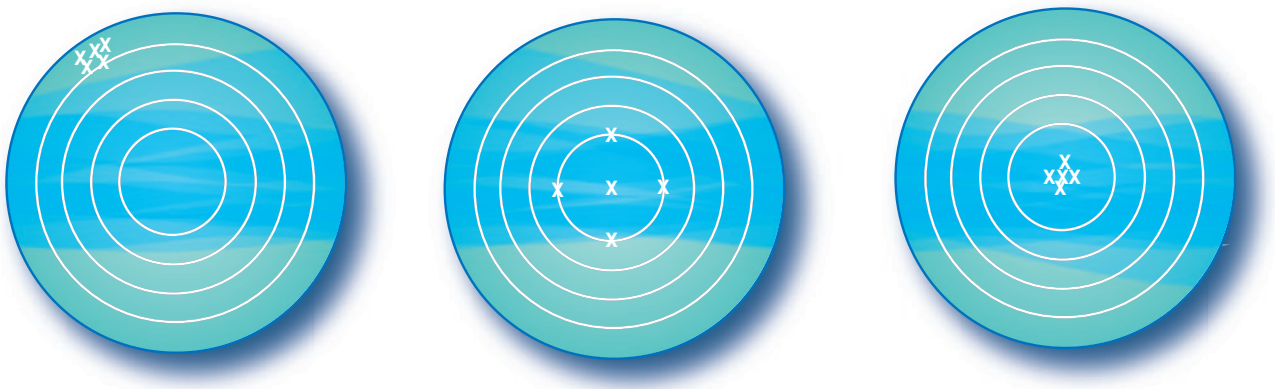
OBSERVERS: GATHERING IMPORTANT SCIENTIFIC INFORMATION

One of the best ways to collect information is to put observers on fishing boats. Fishery observers are scientists who collect important information about fishing practices by accompanying fishermen at sea. Observers don't work for the fishermen on a vessel—their only job is to count and classify the fish and other marine life that are caught. Their job can include weighing or measuring fish, identifying birds or mammals, or sampling what comes on board. Because fishermen do not bring everything they catch back to port, observers are the best way to adequately estimate how much marine life is caught and discarded at sea.

WHAT MAKES A GOOD OBSERVER PROGRAM?

In an ideal world, the entire catch of every fishing boat would be accurately recorded. Unfortunately, that's not possible for many fisheries. When boats do not carry observers, scientists need to estimate what those boats caught, based on the catch of the boats that did carry observers--a method referred to as extrapolation. For the information to be useful for managers, the design of the observer program must ensure that the extrapolated estimates of catch are both accurate and precise.

Precision and Accuracy



Precise, but inaccurate | Accurate, but not precise | Precise and Accurate

Accuracy and precision are statistical measures of how close estimated numbers are to the real number. If we have several estimates of total bycatch, accuracy measures how close the average of the estimates is to the actual total bycatch, while precision gauges how close the estimates are to each other. For example, picture a group of arrows hitting a target; accurate estimates may be distributed all over the target, but would be centered around the bulls-eye. Precise estimates are a group of arrows clustered closely together, wherever they are on the target. An ideal estimate is both precise and accurate (all the arrows close together, centered on the bulls-eye). Fishery managers must account for both accuracy and precision to ensure that their estimates are close enough to the real values to be useful.

Larger numbers of observations usually result in more precise estimates. Determining how precise an estimate needs to be for a specific fishery depends on many different aspects of the fishery. For example, if a species is extremely unlikely to be caught, as may be the case for rare or endangered sea turtles or marine mammals which already are few in number, many more vessels will need to carry observers to properly estimate the bycatch.

What Causes Bias and How Can It Be Reduced?

Scientists try to obtain accurate estimates of fisheries information--such as how many turtles are caught by a specific fishery each year--without bias, so that the extrapolated number is close to the true value. If estimates of fish discards, for example, are biased low, more fish are being killed than managers believe, and the fish populations could be at risk from too much fishing. On the other hand, if estimates are biased high, the fishing industry may be unnecessarily restrained from catching fish. "Observer effect" bias can be a problem any time observed fishing trips are not typical or representative of the fishery.

For example:

- Fishing boats that carry an observer may fish in different places or target different species to avoid unwanted species when an observer is present. They may keep fish that they otherwise would have thrown overboard or operate their gear differently.

- Where participation in an observer program is voluntary, bias can result if the volunteers fish differently from those who do not volunteer. If, for example, the volunteers fish more cleanly, discard estimates for the whole fishery would be biased low, because the trips with higher discard rates wouldn't be represented.

- Observed fishing trips may not be representative for logistical reasons. Observers may only be accommodated on boats over a certain size, certain ports may be harder to reach, or it may be harder to find observers for enough trips in the winter.

- Finally, bias can result simply because too few fishing trips are observed, leading to underestimates of discards for purely statistical reasons.

- Fishery managers often assume that the observer data are unbiased, even when the observers are being placed on vessels that have volunteered to carry observers (presumably not the boats that fish dirty). To get unbiased data, scientists should compare the landings from boats with observers to landings from boats without observers to see whether vessels with observers fish differently. If the observer data are biased, the most effective solution is simply to increase the number of fishing trips that are observed, while ensuring that the fishery is sampled randomly.

HOW MUCH OBSERVER COVERAGE IS NEEDED FOR PRECISE ESTIMATES OF DISCARDS?

Generally, if fisheries routinely catch and discard a species, lower observer coverage levels are needed than if the species is rarely caught. For example, in simulated fisheries that differed only in the rarity of the bycatch species, the observer coverage needed to adequately estimate total discards was 17 percent for commonly caught species and 50 percent for rarely caught species. Species that are "clumped" instead of being evenly distributed across the ocean also require higher levels of coverage. Finally, fisheries with many gear types and fishing methods require higher levels of coverage. Bias may also be introduced if some areas, gear and seasons of a fishery are not well sampled. For these reasons, the exact level of coverage required for a particular fishery would depend on the distribution of the fishery, and the discard and catch species.

Two Fishery Case Studies

Two specific fisheries were examined to show how adequate observer coverage levels can be determined.

The first example modeled the Pacific groundfish bottom trawl fishery. In this fishery, fishermen sometimes keep and sometimes discard some species of fish that routinely appear in their catches. Catches were simulated of two common species in this fishery -- Dover sole and sablefish, which are commonly found in deep-water catches, even when untargeted. The results indicated that approximately 30 to 40 percent of the fishing effort needed to be observed to achieve adequate estimates of total catches of these common species.

The second example modeled the Atlantic coastal gillnet fishery, which occasionally entangles and drowns bottlenose dolphins. This fishery is a good example of one where a species is caught very infrequently, but every instance is significant because the species is protected under U.S. law. This simulation indicated that more than 50 percent of fishing trips should be observed to achieve adequate estimates.

Although the simulations are a simplification, the results clearly indicate that the fisheries needed substantially higher observer coverage than is currently allocated to provide precise and accurate estimates of catch.

GUIDELINES AND RECOMMENDATIONS FOR OBSERVER PROGRAMS

This report outlines steps that fishery managers can take to develop an effective observer program. The analyses suggest that certain guidelines be followed when setting up observer programs.

Each observer program should:

- Simulate observer samples from actual data to find coverage levels that estimate discards with an appropriate level of precision for assessment and management. Unless managers can show that the lower levels of coverage give sufficient precision and accuracy, from our simulated data applications, we suggest that if the bycatch species is rare, observer programs should adopt coverage levels of at least 50 percent, and if the bycatch species is common, observer programs should adopt coverage levels of at least 20 percent.

- Compare landings and other characteristics of observed and non-observed trips to determine whether there is evidence of observer effect bias. If bias exists, the sampling design must either improve randomization or increase sample size, or both.

- Determine the level of precision required for discard estimates by examining how the data will be used in scientific assessment of the status of bycatch species, and in fishery management.

- Sample the fishery randomly or systematically and cover all components of the fishery, allocating observer coverage levels high enough to adequately sample all gears, areas and seasons of the fishery.

The information provided in this document is based on a study by Babcock, Elizabeth,. Pikitch, Ellen,. & Charlotte Hudson, 2003. "How much observer coverage is enough to adequately estimate bycatch?" Oceana, Washington, DC.

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We Need More Eyes on the Ocean: Congress Proposes Additional Funding for Fishery Observer Programs

Fishery observer programs are the critical first step in developing scientifically-based management plans for America's fisheries. The data they provide is essential to manage valuable fish stocks, rebuild vulnerable populations and avert fisheries collapse – yet there are only about 20 observer programs that provide coverage in very few of the approximately 300 federally-managed fisheries. Additional funding is needed to improve and expand these programs.

What are Fishery Observers?

Fishery observers are independent scientists who work alongside fishermen at sea. Observers collect important information about what is actually caught, as compared to landings data, which only records what is brought to port. Observers are critical in addressing bycatch or what fishermen often call "dirty-fishing." Dirty-fishing includes the catch and subsequent destruction of unwanted fish and marine life – fish that are the wrong type, size, sex, or quality as well as marine mammals, sea turtles, and seabirds.

The Need for Increased Federal Funding for Fishery Observer Programs

Unpublished agency estimates of the costs to fully fund a national observer program for fisheries of highest concern range from $50 to $100 million annually. Since the mid-1990s there has been a slight increase in federal funding for fishery observer programs, with support from both political parties. While this represents some progress, increased investment is still critically needed.

Proposed New Federal Funding for Fishery Observers

Both Congress and the Bush Administration have proposed funding increases for fishery observer programs in the National Marine Fisheries Service (NMFS) FY04 budget. NMFS is the federal agency responsible for the management of marine fisheries in U.S. waters.

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The following table highlights the current and proposed funding for observer programs

Program	FY 03 Enacted	FY 04 Bush Request	FY 04 Senate Committee	FY 04 House Floor
National observer program	$745,125	$7.0 million	$0	$3.944 million
Atlantic Coast	$3.328 million	$3.35 million	$3.35 million	$3.328 million
East Coast	$347,725	$350,000	$350,000	$400,000
Hawaii Longline	$2.908 million	$3.0 million	$4.0 million	$2.981 million
New England Groundfish	--	--	$7.5 million	see report language*
North Pacific Marine Resources	$1.863 million	$1.875 million	$1.875 million	$1.875 million
North Pacific	$794,800	$650,000	$800,000	$650,000
West Coast	$3.706 million	$3.730 million	$5.0 million	$3.85 million
Total	**$13.765 million**	**$22.955 million**	**$22.875 million**	**$17.028 million**

*No specific line item. However, Report language says, "The Committee is concerned that NMFS has not provided adequate observer coverage for the New England groundfish fishery and recommends $17,028,000, which is $3,262,000 above current year, for fishery observers. The Committee expects NMFS to allocate sufficient funds to achieve 10 percent observer coverage in the directed fishery, and the non-directed fishery to the extent practicable, by no later than May 1, 2004.

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