

Turning A BLIND EYE

The 'See No Evil' Approach
to Wasteful Fishing



Acknowledgements




Cover Images:

Top Right Photograph: Separating shrimp from bycatch. Photo Courtesy of: NOAA/Department of Commerce

Center Left Photograph: Sea turtle caught as bycatch. Photo Courtesy of: Dr. Terry Maas

Bottom Right Photograph: Shrimp fishery bycatch. Photo Courtesy of: NOAA/Department of Commerce

This report was prepared by Steward and Associates, with information provided by staff and members of the Marine Fish Conservation Network.

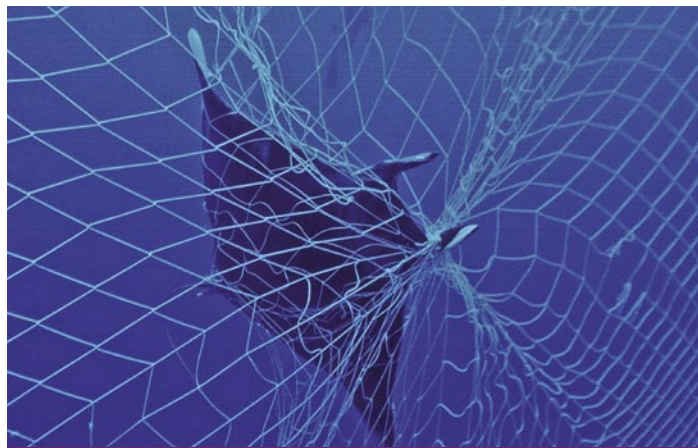


Executive Summary

Every year, the vast fleet of trawlers, seiners, longliners, charter and private sportfishing boats, and other vessels that catch fish in our nation's waters discard a large proportion of their catch, often dead or dying. Virtually all fisheries, no matter how selective the equipment used or area fished, catch and subsequently discard significant numbers of non-targeted species, referred to in fisheries jargon as "bycatch." Fishermen often throw these organisms overboard because they are either too small or have little or no economic value. In the majority of fisheries, however, most discards are mandatory; federal regulations require that bycatch be returned to the ocean, as unharmed as possible. This action is intended to prevent the wanton overexploitation and potential decimation of populations of fish and other marine life, including not only finfish, shellfish, and crustaceans, but also birds, turtles, and marine mammals. Unfortunately, bycatch restrictions are often not implemented or enforced, and even if they are, a high percentage of the fish and other species that are caught and returned to the ocean do not survive.

The sheer number and amount of fish and other marine life that are unintentionally caught by hooks, traps, or in fishing nets each year is staggering. In 2002, the bycatch in twenty-seven of the nation's most important fisheries totaled more than 2 billion pounds, the equivalent by weight of over 270,000 Hummer H2 sport-utility vehicles, more than fifteen QE2 luxury liners, or 7 billion fish fillet sandwiches. The full magnitude of the problem is unknown since, with few exceptions, fisheries managers have failed to monitor bycatch, despite being required to by federal law. In order to manage our fisheries effectively, fisheries managers must account for the additional fish and other ocean wildlife killed as bycatch, so that healthy fish populations are not overfished, sensitive or depressed populations are not driven to levels below which they cannot recover, and marine ecosystems are not degraded. Without good bycatch data, we are steering blind.

High rates of bycatch – and the fishing practices that cause them – can have profound ecological effects, such as the alteration of food webs, shifting predator-prey dynamics, and habitat destruction. But bycatch is not just an ecological problem. Because it often comprises younger individuals of commercially valuable species that have



Mobula ray caught as bycatch.

not yet reproduced, if not controlled and accounted for, bycatch can lead to overfishing, reduced productivity and, therefore, reduced catch level over the long term. The economic consequences for fishermen, processors, and consumers are enormous.

Ten years ago, Congress amended the Magnuson-Stevens Fishery Conservation and Management Act (MSA) – the cornerstone federal fisheries management law – in part to acknowledge that bycatch is a major problem with severe ecological and socio-economic consequences. Among other things, the 1996 amendments to the MSA require that federal fisheries managers minimize bycatch, minimize the mortality of bycatch that can not be avoided, and establish bycatch reporting plans for each fishery they manage.

This report updates our 2001 assessment of bycatch in fisheries managed under the MSA, focusing on the last five years (2001-2006). We report on the efforts of each council to address bycatch in the nation's "dirtiest" fisheries. These include fisheries that account for the largest quantities of fish and other marine life discarded each year (discards), and those that feature the highest rates of discards relative to the amount of catch retained (landings). In some cases, the same fisheries that discard the most fish have the lowest discard-to-landings ratios. In the worst cases, the poundage of fish discarded and discard-to-landings ratio are both high; it is in these, the dirtiest fisheries, that the failures of fisheries management are most glaring. While we found promising developments in some fisheries, the lack of progress overall toward reducing or eliminating bycatch



Loggerhead turtle caught as bycatch.

remains poor. Given the livelihoods and resources at stake, after ten years of expense and effort, we expect better. Here is a summary of our major findings.

Only one council out of eight has established a bycatch reporting plan for its fisheries that meets the requirements of the MSA. Standardized reporting is a cornerstone of information-driven, science-based management. Development of the most effective solutions to the problem requires reliable information. It is no surprise that the North Pacific Council has applied some of the most effective management measures to combat bycatch: the council has the information to back it up. Just as importantly, transparent reporting shines a light on a council's action or inaction for stakeholders and the public to see. Without reporting, there is little incentive for councils to address the bycatch problem in a proactive way.

Bycatch data collection is grossly inadequate in most fisheries. A standardized bycatch reporting methodology doesn't help if there is no data to report. Currently, only 42 of roughly 300 federally managed



Scallop fishery bycatch.

fisheries have observer coverage of any kind. NMFS and the councils share responsibility for the failure to secure adequate observer coverage in most of the nation's dirtiest fisheries. In many cases, observer coverage is less than one percent and is reliant on voluntary coverage, with few fisheries meeting the 20 percent standard recommended by scientists. NMFS' own analysis shows the current, deplorable state of observer coverage in the nation's fisheries and estimates the level of effort and expenditure required to correct it. Addressing this shortcoming should be priority number one for every council and NMFS region.

Most councils fail to adequately incorporate quantitative bycatch estimates into management plans. This failure is a major cause of overfishing for several priority species. For fish stocks that are caught in large numbers as bycatch, this amounts to a form of off-the-books accounting where major losses are not reported as part of the bottom line. This in turn leads to rosier estimates of stock status and subsequent higher catch levels, until the fishery collapses and draconian measures are the only ones left in the toolbox. In fisheries where quantitative bycatch data are not yet being collected at a sufficient rate to permit estimates that are both accurate and precise, managers should apply a precautionary approach by assuming high rates of bycatch and adjusting target catch levels accordingly.

It is possible to reduce bycatch significantly. So why are so few councils doing it? Most of the councils rely on measures to address overfishing and habitat damage - such as gear restrictions and closed areas during certain times of the year - to reduce bycatch indirectly. While these actions may well be beneficial, bycatch must be addressed head-on through directed management measures. These include modifications to existing fishing gear and development of new technologies. Managers should also create direct incentives to reduce bycatch through other measures, such as species-specific quotas on the amount of allowable bycatch, with triggers for the immediate closure of fishing seasons in affected areas. The North Pacific Council has shown that it can be done. Not all management measures will work in all contexts, but ten years after the passage of the MSA amendments, real action is long overdue.

Introduction

Every year, the vast fleet of trawlers, seiners, longliners, charter and private sportfishing boats, and other vessels that catch fish in our nation's waters return a large proportion of their catch to the sea. Virtually all fisheries, no matter how selective the equipment used or area fished, catch and subsequently discard, often dead or dying, significant numbers of non-targeted species, referred to in fisheries jargon as "bycatch." Fishermen often throw these organisms overboard because they are either too small or have little or no economic value. In the majority of fisheries, however, most discards are mandatory; federal regulations require that bycatch be returned to the ocean, as unharmed as possible. This action is intended to prevent the wanton overexploitation and potential decimation of populations of fish and other marine life, including not only finfish, shellfish, and crustaceans, but also birds, turtles, and marine mammals. Unfortunately, bycatch restrictions are often not implemented or enforced, and even if they are, a high percentage of the fish and other species that are caught and returned to the ocean die. The sheer number and amount of fish and other marine life that are unintentionally caught by hooks, traps, or in fishing nets each year is staggering. In 2002, the bycatch in twenty-seven of the nation's most important fisheries totaled more than 2 billion pounds,¹ the equivalent by weight of over 270,000 Hummer H2 sport-utility vehicles, more than fifteen QE2 luxury liners, or 7 billion fish fillet sandwiches. The full magnitude of the problem is unknown since, with few exceptions, fisheries managers have failed to monitor bycatch, despite being required to by federal law. In order to manage our fisheries effectively, fisheries managers must account for the additional amounts of fish and other wildlife that are killed due to bycatch, so that healthy fish populations are not overfished, sensitive or depressed populations are not driven to levels

Economic discards: fish that are discarded due to their undesirable quality, size, sex, or other economic reason. In other words, the term refers to the discard of fish or other ocean wildlife for voluntary, non-regulatory reasons.

Regulatory discards: fish that must be discarded according to a specific regulation, or are required by regulation to be kept, but not sold.

below which they cannot recover, and marine ecosystems are not degraded. Without good bycatch data, we are steering blind.

High rates of bycatch – and the fishing practices that cause them – can have profound ecological effects, such as the alteration of food webs, shifting predator-prey dynamics, and habitat destruction. But bycatch is not just an ecological problem. Because it often comprises younger individuals of commercially valuable species that have not yet reproduced, if not controlled and accounted for, bycatch can lead to overfishing, reduced productivity, and therefore, reduced catch levels over the long term. The economic consequences for fishermen, processors, and consumers are enormous.

Ten years ago, Congress amended the Magnuson-Stevens Fishery Conservation and Management Act (MSA) – the cornerstone federal fisheries management law – in part to acknowledge that bycatch is a major problem with severe ecological and socio-economic consequences. Among other things, the 1996 amendments to the MSA require that federal fisheries managers minimize bycatch, minimize the mortality of bycatch that can not be avoided, and establish bycatch reporting plans for each fishery they manage. In 2001, the Marine Fish Conservation Network (Network) evaluated the first five years of post-1996 implementation of the MSA amendments.² With respect to bycatch, we found that fishery managers made very little progress toward meeting any of the key requirements of the MSA. The MSA created eight regional fishery councils to assist the National Marine Fisheries Service (NMFS) in managing the fisheries within the Exclusive Economic Zone (EEZ), which extends generally from 3 to 200 miles from our coasts. Council members are charged with developing fishery management plans (FMPs) for different fisheries within each of the eight regions. Catch quotas and restrictions specified in the FMPs are supposed to be based on the best available scientific information on affected species and associated ecosystems, with special consideration given to marine mammals, sea turtles, and other protected resources. The FMPs are also supposed to identify and initiate measures designed to reduce or eliminate the incidence of bycatch.

The 2001 Network report found that the councils had done little to evaluate the extent or impact of bycatch on the fisheries and other marine resources under their stewardship. Nor had the councils, in most cases, identified and implemented substantive bycatch reduction measures. Five years after it was supposed to be one of the focal points of sustainable fisheries management, bycatch was largely being ignored. The few promising bycatch reduction initiatives that the councils had proposed were proceeding at a glacial pace. Moreover, NMFS continued to sign off on management plans that were inadequate with respect to bycatch which, together with other management failings, constituted a clear violation of the MSA.

This report updates our earlier assessment of bycatch in fisheries managed under the MSA, focusing on the last five years (2001-2006). We report on the efforts of each council to address bycatch in the nation's "dirtiest" fisheries. These include fisheries that account for the largest quantities of fish and other marine life discarded each year (discards), and those that feature the highest rates of discards relative to the amount of catch retained (landings). In some cases, the same fisheries that discard the most fish have the lowest discard-to-landings ratios. In the worst cases, the poundage of fish discarded and discard-to-landings ratio are both high; it is in these, the dirtiest fisheries, that the failures of fisheries management are most glaring. While we found promising developments under way in some fisheries, the lack of progress overall toward reducing or eliminating bycatch remains poor. Given the livelihoods and resources at stake, after ten years of expense and effort, we expect better.

Bycatch and the Magnuson-Stevens Act

The 1996 MSA amendments defined "bycatch" to mean "fish which are harvested in a fishery, but which are not sold or kept for personal use, and includes economic discards and regulatory discards. Such a term does not include fish released alive under a recreational catch and release fishery management program."³ Importantly, the term "fish" in the MSA refers not only to fish, but also to mollusks, crustaceans, sea turtles, and all other forms of living animal and plant life except for marine mammals and birds. The effects of fishing on marine mammals and

birds are considered under other provisions of the MSA as well as other laws, such as the Endangered Species Act. The MSA requires that federal fishery managers minimize bycatch and – to the extent that bycatch cannot be avoided – minimize bycatch mortality.⁴ FMPs must specify how fishery managers plan to avoid bycatch and its associated mortality in each fishery. They must also establish a "standardized bycatch reporting methodology" (bycatch reporting plan) to assess the amount and type of bycatch occurring.⁵ Several other federal statutes contain provisions affecting the type and degree of bycatch of certain species, notably the prohibitions against killing or harassing animals protected by the Endangered Species Act and the Marine Mammal Protection Act, and the migratory bird protection provisions of the Migratory Bird Treaty Act. In some fisheries, these provisions exert a greater influence over management decisions, and therefore over bycatch, than does the MSA.

Birds and marine mammals are also frequently caught as bycatch in the nation's fisheries, often at alarming rates. Though we touch on efforts to reduce bird and marine mammal bycatch, a full treatment of the subject is beyond the scope of this report.

The value of a bycatch reporting plan depends on both the quality and amount of available data. In most fisheries, the best way to collect reliable data on bycatch is through an observer program. Observers are independent field biologists who are certified by NMFS to collect data while aboard fishing vessels. Observers collect and report data on landings, bycatch, fishing effort, marine mammal interactions, and other important information. Like any other data gathering exercise, the usefulness of observer data depends on having an adequate sample size so that results can be extrapolated with confidence. Seven of the councils currently have observer coverage and the fisheries, which they collect and report data on, are included in Table 1.

Throughout our report we refer to the observer "coverage level" in different fisheries. The coverage level is expressed as a percentage, and denotes the percentage of time that an observer is on board while a vessel is fishing. Scientists who have studied the use of observer data in fisheries management argue that at least 20 percent observer coverage is required to make estimates both accurate and precise in most fisheries, whereas 50 percent coverage is

Table 1. Target Fishery Observer Coverage for Select Fisheries in 2006.

REGION	FISHERY	TARGET % COVERAGE
New England	Small Mesh Trawl (Includes whiting, red hake)	<1%
	Large Mesh Trawl (monkfish)	<1%
	Groundfish (Includes Atlantic cod, haddock)	<5%
Mid-Atlantic	Gillnet (Includes mackerel, monkfish, bluefish)	<1%
	Trawl (includes squid, mackerel, summer flounder)	<1%
South Atlantic	Shrimp Trawl	<1%
	Commercial Reef Fish (Includes snappers and groupers)	<1%
	Pelagic Longline (Includes Atlantic tunas, swordfish)	<5-8%
	Shark Driftnet	Nov.-Mar. 100% Apr.-Nov. 53%
Gulf of Mexico	Shrimp Trawl	<1%
Western Pacific	Shark Bottom Longline	3.90%
	Hawaii Longline (Includes tuna, swordfish, mahi-mahi)	20%
Pacific	California Coastal Purse Seine (Including sardines, anchovies, mackerel)	10%
	Southern California Tuna Purse Seine	33%
	Southern California Set Gillnet (Includes swordfish and thresher sharks)	20%
	Groundfish (Includes rockfish, flatfish, sharks)	10-20%
	Pelagic Longline (Includes tunas, sharks, billfish)	100%
North Pacific	Alaska Salmon Drift Gillnet	1%
	Albacore Tuna Troll	1%
	Groundfish (Includes pollock, Pacific cod, sablefish)	Vessels >125ft.=100%, Vessels 60-124ft.= 30%

All target percentage coverage data is from the National Marine Fisheries Service of the National Oceanic and Atmospheric Administration.

necessary in some cases.⁶ The current level of observer coverage is abysmal in most fisheries. Many have no observer coverage, while some of the dirtiest fisheries have coverage levels of one to five percent. In contrast, the largest fishing vessels in the North Pacific are required to have observers on board at all times.

The deployment of fishery observers is costly. In the North Pacific, the cost of a single observer-day is estimated at \$350,⁷ while NMFS estimates the cost of an observer for the Gulf reef fish fishery at \$1,200 per day.⁸ However, without sufficient resources devoted to data collection, other efforts to combat bycatch will have limited effect.



The Dirtiest Fisheries

Some fisheries are considered “dirty” by virtue of the total poundage of discards, while other fisheries may have much higher rates of discards, expressed in this report as the ratio of discards to landings. We refer to this ratio as the “waste index.” For example, a waste index of 2.0 means that for every pound of fish that is landed at the dock, two pounds of fish (and other organisms) are thrown back. The report by Harrington et al., also known as the Oceana Report, summarized the total landings and discards for twenty-seven of the nation’s most important fisheries based in 2002 data.⁹ For our analysis, we selected the twelve worst performing fisheries in each category and reviewed the actions of the council responsible for their management. Nine fisheries made the “Worst Offenders” list for both the total poundage and the waste index categories. Another six fisheries landed on one of the two lists, bringing the total number to fifteen (Table 2).

We discuss the Bering Sea – Aleutian Islands king and Tanner crab fishery and the weathervane scallop fishery in the North Pacific Council section of the report, even though most management authority rests with the state of Alaska. Similarly, because the Atlantic highly migratory species (HMS) pelagic longline fishery is managed directly by NMFS rather than by a regional council, we evaluate bycatch associated with that fishery in a separate section. Primary management authority over the Pacific halibut fishery rests with the International Pacific Halibut Commission, and not with NMFS or the councils. Thus, we have omitted a discussion of the halibut fishery in this report.

As Table 2 clearly shows, shrimp fisheries dominate the bycatch list in both categories. The Gulf shrimp fishery, in particular, dwarfs all other fisheries in total discard

Table 2. Fifteen fisheries with significant bycatch problems, arranged in descending order by the discard/landings ratio, based on 2002 data (adapted from Harrington et al. 2005.¹⁰)

FISHERY	DISCARD (IN POUNDS) ¹	WASTE INDEX ¹	COUNCIL
Gulf of Mexico shrimp	1,041,999,450	4.56	Gulf
South Atlantic shrimp	77,615,944	2.95	South Atlantic
Northeast multispecies groundfish	215,365,175	1.79	New England
Squid, mackerel, butterfish	113,390,355	1.23	Mid-Atlantic
BSAI ² king and Tanner crab	49,315,203	1.03	**North Pacific/state of AK
Pacific Coast groundfish	51,361,093	0.88	Pacific
Monkfish	38,303,113	0.84	New England / Mid-Atlantic
Pacific halibut	46,140,547	0.8	*IPHC
Atlantic HMS ³ : pelagic longline	8,406,226	0.67	*NMFS
Summer flounder, scup, black sea bass	25,295,840	0.61	Mid-Atlantic
Weathervane scallop	2,198,009	0.56	**North Pacific/state of AK
Gulf of Mexico reef fish	15,895,329	0.41	Gulf
Gulf of Alaska groundfish	104,241,171	0.33	North Pacific
Atlantic scallop	122,528,516	0.26	New England
BSAI ² groundfish	353,001,970	0.09	North Pacific

¹ **Bold** indicates that the fishery is within the top 12 for the category (discard poundage or waste index)

² BSAI: Bering Sea – Aleutian Islands

³ HMS: Highly Migratory Species

* Fishery not managed primarily by council

** Co-managed by North Pacific Council and state of Alaska

poundage and waste index. More than four and a half pounds of non-target ocean wildlife are discarded for every pound retained. In trawl fisheries like these, the vast majority of discards are killed or severely injured.

While the eight fisheries with the highest waste index values are also on the total discards list, there are exceptions to the rule. For example, the Bering Sea – Aleutian Islands (BSAI) groundfish fishery is second only to the Gulf shrimp fishery in total discards, but it also has the lowest waste index.

In the following sections, we describe the actions taken by each council to meet the MSA bycatch provisions for the fisheries highlighted in Table 2. Note that the Caribbean and Western Pacific Councils are not among those listed; we nevertheless provide a discussion of the bycatch problems faced by those councils and the efforts made to address them.

Are the Councils Doing Their Job?

Our analysis begins in the Gulf of Mexico and proceeds geographically counterclockwise through each regional council, followed by a brief discussion of the NMFS-managed Atlantic HMS fishery. While we were tempted to rank the councils from best to worst, we have not done so. Each fishery and management context is fairly unique, making a relative evaluation very subjective, although many of the management deficiencies are shared by most councils in one form or another. Only the North Pacific Fishery Management Council stands out above the rest for its efforts to address bycatch through a variety of management measures supported by intensive bycatch data collection. Not all is rosy in the North Pacific, but many of the measures applied there can and should be applied elsewhere.

Gulf of Mexico Fishery Management Council

Given the massive amount of waste in its fisheries, the Gulf Council should have been working diligently on its bycatch problems for many years. With the possible exception of turtle bycatch, the council has not done enough to reduce bycatch, relying mainly on incremental modifications to fishing gear. Recent efforts at establishing a bycatch reporting plan are promising but under funded, and nearly 10 years overdue.

The Gulf Council is responsible for the management of two fisheries on our list, the shrimp and reef fish fisheries. As described above, the shrimp fishery tops the list in both discard categories. In contrast, the reef fish fishery does not rank in the top twelve for total discards, but the waste index, though at the bottom of the top twelve, is a fairly high 0.41. The Gulf Council's efforts to address bycatch in these fisheries are described in the following sections.

Gulf Shrimp Fishery

The Gulf shrimp fishery accounts for roughly 75 percent of U.S. shrimp production and generates the highest revenues in the Southeast region and sometimes nationally.^{11,12} The fishery is primarily a bottom trawl fishery where nets are dragged along the seafloor, capturing a broad mixture of target and non-target species, including finfish, crabs, and sea turtles. In general, bycatch in trawl fisheries have very high mortality rates, in some cases approaching 100 percent for many species. Among finfish, the highly prized red snapper – which has been overfished since at least 1988 – is common in shrimp trawl bycatch, a significant factor in the poor health of red snapper stocks in the Gulf. Other commonly caught non-target species include other snappers, mackerel, Atlantic croaker, and porgies. Discards in this fishery are primarily regulatory rather than economic.

Turtle bycatch in the shrimp fishery caught the attention of the public and regulators in the 1980s and early 1990s. Since 1991, shrimp trawl nets in the Gulf have been required to use turtle excluder devices (TEDs) year-round, although implementation of the TED requirement did

not cover all inshore areas until 1994.¹³ These guided openings in the net are intended to allow turtles to escape the trawl net while retaining shrimp, with a stated goal of releasing at least 97 percent of trapped turtles. In recent years, efforts by NMFS to further reduce turtle bycatch have focused primarily on the modification of design requirements to ensure that TED openings are large enough to allow larger leatherback, loggerhead, and other species of turtles to escape.¹⁴

Catch regulations in the fishery include a variety of closures based on areas or time of the year, which could be a good bycatch reduction tool if the council had adequate bycatch data to guide establishment of the closures. However, these closures are designed primarily to protect small shrimp and to eliminate conflicts with other fisheries, such as the crab trap fishery, and are not designed specifically toward reducing bycatch.

In the last five years, the Gulf Council has taken some promising steps toward reducing finfish bycatch by providing authority to increase fishery observer coverage, and toward establishing a bycatch reporting plan, which are long overdue. Shrimp Amendment 11, implemented in October of 2002, required owners and operators of all vessels catching shrimp from federal waters in the Gulf to obtain a federal commercial vessel permit. While requiring a permit may not seem like a major advance in a fishery that has a staggering level of bycatch, it brings a large percentage of the shrimp fishermen under the purview of the federal management system where other measures will be incorporated over time. It will also for the first time provide managers with an accurate count of the number of fishermen in the fishery.

Shrimp Amendment 9, implemented in 1998, required the use of NMFS certified bycatch reduction devices (BRD) in the EEZ from Cape San Blas, Florida to the Texas/Mexico border, and provided for the certification of the “Fisheye BRD.” The goal was to reduce bycatch mortality of juvenile red snapper by 44 percent. While this Amendment occurred during the first of our five-year MSA-implementation review periods, Amendment 10 more recently followed it in 2004, which extended the coverage of the BRD requirement to the eastern Gulf, and required that BRDs demonstrate a 30 percent decrease in finfish bycatch by weight.

Unfortunately, the effectiveness of BRDs has not lived up to the promise. While a 1998 study that investigated the effectiveness of BRDs gave an average finfish bycatch reduction rate of 42 percent, a more recent report showed that the actual bycatch reduction rate is much lower.¹⁵ The Fisheye BRD, which is preferred because it leads to only a small reduction in shrimp catch compared to other BRDs, produces only a 16.5 percent reduction in finfish bycatch.¹⁶

In May 2005, the Gulf Council approved Shrimp Amendment 13, but it has not yet been approved by the Secretary of Commerce. The Amendment includes a suite of reporting requirements regarding the types of gear used aboard shrimp vessels and for total landings. It also requires completion of electronic log books by a portion of shrimp vessels participating in the fishery. Currently, no log books are required. Log book data, which include data on the amount and type of bycatch, can be somewhat informative, though the reliability of self-reported data is far lower than that collected by third parties, such as fishery observers.

The most important action in the Amendment is the establishment of a bycatch reporting plan that includes the authority for higher rates of observer coverage on randomly selected vessels. The observer-collected data will be used to estimate total annual finfish and invertebrate bycatch. Vessels that do not carry observers in accordance with this process will not have their permits renewed. Observer coverage rates are sorely inadequate in this fishery given the severity of the bycatch problem. The current level is less than 1 percent.

The recent amendments are promising developments that are long overdue. However, given the massive scale of the bycatch problem in this fishery, much more must be done. For example, the red snapper fishery is unlikely to recover until bycatch in the shrimp fishery is significantly reduced. This seems unlikely, however, given the council’s unwillingness to take meaningful steps to reduce bycatch. Instead the council continues to rely on dubious statistical assumptions to maintain status quo management. For example, the council continues to assume that bycatch will be reduced by the demonstrably ineffective BRDs and an assumption that 30-50 percent of the shrimp fleet will go out of business for macroeconomic reasons. Meanwhile, the council maintains unsustainably high red snapper catch limits.¹⁷

NMFS currently incorporates bycatch data – where available – into the red snapper stock assessment, but currently no bycatch quotas or other similar management tools have been incorporated into the management plan by the council, though such tools have been applied elsewhere (see North Pacific Council section).¹⁸ A substantial reduction in finfish bycatch through enforcement of BRD requirements is a worthy objective, but even if the reduction is achieved, this fishery would still remain at the top of the list of dirty fisheries by a wide margin.

Gulf Reef Fishery

The Gulf reef fishery targets a variety of species of snapper and grouper, as well as greater amberjack and triggerfish. The fishery operates primarily using hook and line gear and longlines, but pots and traps are also used. Bycatch is composed primarily of regulatory discards of target species, as well as skates, toadfish, barracudas, and sharks. Discards of red grouper by the longline, vertical line, and trap fisheries are a major problem, as well as regulatory discards of undersized or out-of-season red snapper. In addition to finfish, according to “Every Fish Counts” – a report from the Gulf Restoration Network – several species of sea turtles and whales are killed by longlines in the fishery.¹⁹

Recreational marine fisheries are much more prevalent in the Gulf and the rest of the Southeast region compared to other regions nationally, with more than 44 million recreational marine fishing trips per year.²⁰ In the reef fish fishery, recreational and commercial landings were roughly equal in 2002. However, the recreational fishery has a much higher waste index, estimated as 0.8, while the commercial fleet index is estimated as 0.09. Bycatch mortality rates may differ substantially between the two sectors due to the differences in gear types.

Currently, reef fish fishery data is collected through logbooks and voluntary observer coverage in the commercial fishery, while data for the recreational fishery is based on information gathered through the Marine Recreational Fisheries Statistics Survey (MRFSS). The MRFSS includes dock or boat ramp surveys of recreational fishermen as well as telephone surveys that collect information on catch, effort, and discards at the end of the fishing season. The efficacy of the MRFSS as a

reliable survey tool has been questioned since its inception more than 20 years ago. A recent study by the National Research Council found that MRFSS data is largely flawed and that the MRFSS is in need of a “major overhaul of the design, implementation, and analysis.”²¹

Recently, Reef Fish Amendment 22 created a bycatch reporting plan for this fishery. The Amendment established a NOAA administered observer program for the commercial and recreational charter boat fleets and added headboats (vessels that carry individual recreational anglers for hire) to the MRFSS survey system. Current observer coverage levels in this fishery are less than 1 percent. An expanded observer program is desperately needed in this fishery and will require the commitment of significant and reliable funding.

Secretarial Amendment 1, implemented in 2005, is a concrete catch management measure that can potentially reduce bycatch levels. The Amendment separates shallow water grouper species from deep-water grouper species with separate total allowable catch (TAC) levels and – in an effort to reduce bycatch of red grouper – allows the shallow water grouper fishery to close when the red grouper catch limit is met. Its effectiveness is contingent on three main factors: 1) the availability of accurate, near real-time data to enable a timely fishery closure; 2) the setting of a conservative (low) catch limit that provides for the opportunity to rebuild the stock; and 3) the political will to apply the measure consistently in the face of likely opposition. Also, catch limit-based closures should not be limited to a single species, but applied much more broadly to address many of the most critical bycatch problems for both target and non-target species. These types of management measures depend heavily on accurate reporting – typically by observers – and high levels of observer coverage. Unfortunately, the incentives for fishermen to under-report bycatch increases when it serves as a direct trigger for fishery closures. So, as catch limit measures grow more restrictive, the reliability of self-reported data decreases, and the need for more observer coverage increases.

In 2003, NMFS evaluated bycatch programs in fisheries across the nation and reported on the current levels of observer programs and the investments required to develop more mature and reliable observer-based data collection

and reporting methodologies.²² According to the report, the Gulf shrimp fishery would require an additional \$8 million per year to move from the current “pilot” phase to a “developed” phase (still short of the “mature” phase), while the reef fishery would require approximately \$2 million per year to advance from the current “baseline” phase to the “pilot” level.

The council has taken modest steps to reduce bycatch mortality in this fishery. For example, the council recently approved Amendment 18a that requires all reef fish vessels to follow protocols and possess approved tools to improve the survival of released sea turtles and smalltooth sawfish. The Amendment also makes it illegal to use undersized reef fish as bait.²³

One action that the council should take is to require – rather than simply recommend – the use of circle hooks in the fishery. NMFS has identified the mandatory use of circle hooks as a measure for decreasing bycatch mortality in the reef fish longline and hook and line fisheries. The primary difference between circle hooks and the more typical “J” hooks is that circle hooks are less likely to be swallowed and more likely to lodge in the mouth, leading to a higher rate of live release in some fisheries.²⁴

South Atlantic Fishery Management Council

The South Atlantic Council manages the other shrimp fishery on our list. Like all fisheries dominated by bottom trawls, bycatch rates are high due to the indiscriminate nature of the gear. The council needs to do more to reduce bycatch. The council only recently established a bycatch reporting plan, and its effectiveness will depend on increased observer coverage.

South Atlantic Shrimp Fishery

The South Atlantic Council manages the shrimp fishery along the coasts of North Carolina, South Carolina, Georgia, and the east coast of Florida. This fishery ranks second in the country for the amount of bycatch produced for each pound of catch. Its waste index is only exceeded by that of the Gulf shrimp fishery. However, the fishery is much smaller, with approximately one-tenth the total landings of the Gulf fishery. The fishery is substantially

co-managed by the coastal states from North Carolina to Florida. Thus, the council is not the only management entity responsible for bycatch problems in the fishery.

The management plan for this fishery regulates fishing for pink, white, brown, and rock shrimp. Crabs, menhaden, croaker, and other finfish dominate the bycatch. Bycatch of sea turtles was very high historically, prior to the requirements for TEDs.²⁵

Catch regulations for the South Atlantic shrimp fishery are more stringent than regulations for the Gulf of Mexico shrimp fishery.²⁶ TEDs have been required on all vessels since 1991 while BRDs for finfish were first required in 1997. Though properly installed TEDs appear to be fairly efficient in reducing turtle bycatch, the success of BRDs is much lower. Unfortunately, the council has done little to further reduce the amount or mortality of finfish bycatch. Although a large proportion of the fishery occurs within state waters, all states in the South Atlantic are required to use federally approved TEDs and BRDs, and some states have opted for more stringent measures than those applied in the federally-managed waters. The coastal states have applied a variety of management measures that help to reduce bycatch, albeit indirectly, such as closures of certain areas during certain times of the year, minimum mesh sizes for trawl gear, maximum net sizes, and minimum sizes for some species of shrimp.²⁷

The council has finally taken steps to address the need for a bycatch reporting plan. Amendment 6 to the South Atlantic Shrimp FMP, which was approved in 2005, calls for the adoption of the Atlantic Coastal Cooperative Statistics Program (ACCSP) Release, Discard, and Protected Species Module. The ACCSP program is a mandatory, trip-based reporting system required of all fishermen and dealers. The bycatch portion of the program includes mandatory at-sea observers and both mandatory and voluntary reporting of releases and discards through the catch and effort “trip ticket” system, where fishermen must fill out data forms about their previous fishing trips in order to renew their fishing licenses. The program also includes sea turtle and marine mammal stranding and entanglement reporting networks, beach bird surveys, and port sampling of vessels to verify reporting on trip tickets.²⁸ The ACCSP program holds great promise, but its effectiveness rests on the availability

of adequate observer coverage, which, in turn, depends on the availability of reliable funding.

While the South Atlantic shrimp fishery is more tightly controlled than its Gulf counterpart – in large part due to the management efforts of the coastal states – the South Atlantic Council does not establish bycatch limits for closing fisheries when the limits are reached or other such methods to reduce bycatch, even though the discard rate remains high even after requirements for BRDs were put in place. The implementation of better bycatch monitoring and reporting is a necessary requirement for such actions to be effective, but funding will need to be secured for the long-term. NMFS estimates that an additional 4,000 “observer sea-days” per year are required to elevate the shrimp trawl program from the current “pilot” level to the “developing” phase, with observer costs ranging from \$300-1000 per day.²⁹

The South Atlantic Reef Fishery

Even though the shrimp fishery is the only fishery in the South Atlantic to make it onto the national “top twelve” list for most bycatch landed and highest bycatch ratio, bycatch has a tremendous impact on the health of the reef fish fisheries of the South Atlantic.

The deep-water grouper fishery tells a grim story. Some thirty years ago, speckled hind and warsaw grouper populations were fished down to such scarcity that the directed fisheries for these deep-water species essentially closed. These once-abundant target species are now only encountered as bycatch in more abundant fisheries such as that of snowy grouper and golden tilefish (which ironically are now both severely overfished as well). Thirteen years ago when the council wrote a rebuilding plan for speckled hind and warsaw grouper, they relied on a one fish per trip retention limit as the only management measure to rebuild these species. As a result, both of these grouper populations are still at abysmally low levels. There has been little or no effort to track, record, or limit the mortality of these species. Since the discard mortality rate for any fish from the deep-water reef fish complex is nearly 100 percent, any speckled hind or warsaw grouper that are caught will likely die, though only the one-fish bag limit that is brought to the dock will be counted.

Mid-Atlantic Fishery Management Council

The Mid-Atlantic Council manages two of the fisheries on our list: the squid, mackerel, and butterfish fishery, as well as the summer flounder, scup, and black sea bass fishery. Both are included in the dirtiest dozen fisheries under both categories, with waste index values of 1.23 and 0.61, respectively. The council has taken limited, incremental steps to reduce bycatch, primarily through gear and area restrictions. But ten years after the bycatch amendments to the MSA, the council has still not met the standards for bycatch reduction or for the development of a credible bycatch reporting plan. Failing to curtail bycatch has contributed to the overfished status of at least one of its stocks being overfished, and one other stock in particular will require 20 years before it is rebuilt.

While fishermen are required to record this information, NMFS does not report how many of these fish are being caught and discarded. Discards and bycatch mortality numbers are “accounted for” in the stock assessment process, and thus management outputs like a one-fish retention limit are not re-visited for their effectiveness. NMFS and the council seem to be taking a “wait and see” approach to rebuilding these species, but so far this approach has not been successful. While warsaw grouper and speckled hind are no longer targeted directly, fishermen are killing enough as bycatch that neither species has recovered in the past thirteen years. We can only guess what impact bycatch has had on the numerous other deep-water snapper and grouper species in this complex.

It is no wonder that the South Atlantic Council has struggled to curtail overfishing in the snapper-grouper complex for more than a decade, when they are not fully accounting for the amount of bycatch and subsequent discard mortality in these fisheries. Knowing how many fish are being killed – not just how many are brought to shore – is an essential part of ending overfishing and allowing depleted fish stocks to rebuild.

Squid, Mackerel, and Butterfish

The Mid-Atlantic Council manages Illex squid, Loligo squid, Atlantic mackerel, and butterfish together in one management plan. However, unlike most multi-species plans, these species are not targeted in the same seasons. They are grouped together because many boats fish for all four species in different seasons.³⁰ The squid and butterfish fisheries rely primarily on bottom trawl gear, while the mackerel fishery uses bottom trawl as well as mid-water trawl gear. Bycatch in the squid fishery is primarily regulatory, consisting of all three species under this management plan as well as assorted hake species and John dory. Similarly, in the butterfish fishery, discards include each of the other species in the management plan, as well as economic discards of butterfish itself. According to estimates that are based on 35 observer trips in 2002, 18 species groups representing 92 different species were discarded as bycatch in the Loligo squid fishery. Butterfish, currently listed as overfished, led all finfish stocks, sometimes with discards of more than twice the annual landings of both squid types (Loligo and Illex), and in some cases 40 times the landed squid catch.

The mackerel fishery has somewhat lower discard rates than the other species, though they are often caught by mid-water trawls in schools where they are mixed with herring. The herring are retained, however, and thus not counted as discards. Striped bass, a staple of the recreational fishing community, accounted for 52 percent of the discarded catch from the anchored sink gillnet fishery targeting Atlantic mackerel. In 2002, an estimated 8,443 pounds of striped bass were discarded in the sink gillnet and otter trawl fisheries. Spiny dogfish also make up a large portion of bycatch, especially in the otter trawl gear group.

The council is currently developing an amendment to the management plan that will address bycatch reduction to some degree through additional gear modifications and the establishment of gear restricted areas. Unfortunately, at the council meeting in March 2006, the council voted to reject a proposal to increase the “cod,” or rear, end net mesh size from 1^{7/8} to 3 inches because some council members argued that targeted Loligo squid would escape and that previous efforts to address butterfish bycatch, such as changes to the areas where scup gear are restricted, should soon bear fruit.

The council may have missed another opportunity to reduce butterfish bycatch when it voted to support the Squid, Mackerel, and Butterfish Committee’s recommendation for no butterfish gear restricted areas as the preferred alternative in the public hearing document. The council may still include measures to reduce butterfish discarding, but committee recommendations often set the stage for a likely outcome.³¹ With respect to Loligo squid, the amendment may provide for an increase in the possession limit of Loligo in the Illex squid fishery during Loligo closure periods, which is expected to decrease regulatory discarding, but not non-selective fishing.³² The council does not have a bycatch reporting plan for this or any other fishery under its jurisdiction that meets the requirements of the MSA. However, in concert with the New England Council and NMFS, the council is finally developing an omnibus amendment for a Northeast Region Standardized Bycatch Reporting Methodology. This is sorely needed, but it must also be accompanied by substantially higher observer coverage level than the current level of less than one percent.

Summer Flounder, Scup, and Black Sea Bass

The commercial summer flounder and scup fisheries are primarily bottom trawl fisheries, although a fair share of scup harvest comes from hand lines, pots, and traps. The black sea bass fishery is primarily a pot and trap fishery, with trawling contributing approximately one third of the catch.

All three fisheries catch a wide array of non-target species as bycatch, including skates, crabs, sea bass, bonito, butterfish, and many others. Bycatch reduction is achieved mainly through a combination of gear restrictions (such as minimum mesh sizes) and minimum size limits for retention. All three fisheries have a substantial recreational component. In the case of black sea bass, the recreational quota for 2004 was slightly higher than the commercial quota.³³ One gear modification that ought to help to reduce bycatch in the black sea bass fishery is the council’s decision to follow the Monitoring Committee’s recommendation to require two escape vents in the inner portion of the trap³⁴ (current regulations require only one) and to increase the minimum circular vent size to 2.5 inches. Vents allow smaller fish to escape the trap while retaining large fish. This measure is effective January 1, 2007.³⁵

During 2002-2004, scup discard in the recreational fishery was relatively low at 308,647 pounds with about 15 percent of the fish assumed to subsequently die. In contrast, the commercial fishery landed about 8.6 million pounds, and discarded approximately 6.4 million pounds. In recent years, the trawl fishery has accounted for about 50 percent of the annual commercial discard and managers assume that 100 percent of the commercially discarded scup die.

Improving sampling design and increasing observer coverage in the scup fishery will greatly improve the reliability of estimates for commercial discards. Two other developments that should benefit scup are the council's decision to increase the mesh size in 2004 from 4.5 to 5 inches and its pending development of a bycatch reporting plan, both of which should lead to a reduction in bycatch. Even before the new mesh size was put in place, bycatch in both the commercial and recreational sectors decreased between 2003 and 2004.

One of the problems plaguing bycatch assessment is inconsistency between self-reported and observer-reported bycatch data. For example, summer flounder discard data from observer reports from 2003 to 2004 showed an increase of summer flounder discards of 5 percent, while data from vessel trip reports for the same time period indicates a nearly 20 percent reduction. Many experts refer to this disparity as the "observer effect," where reporting and/or fishing behavior are affected by the presence of an observer. The council's recent bycatch reporting plan amendment, nine years overdue, should prove to be a very valuable tool in rebuilding and managing rebuilt stocks, although it required three successful lawsuits to compel the parties to do so (as described in the New England Council section).

Still, there is a long way to go before one can conclude the council is employing the full suite of management measures that it has available to correct many of the problems with bycatch. The fact that butterfish is overfished, largely due to bycatch mortality, demonstrates the need for improvement. The low market value of butterfish is no excuse for permitting high butterfish discards and not doing more to help the stock recover.

The council can take action to address high discards in both the mackerel and squid fisheries as it continues

developing Amendment 9 to the Squid, Mackerel, and Butterfish FMP. Finally, more resources need to be allocated to the observer program. For those stocks with an existing observer program, the coverage levels are low, generally less than one percent. The council needs to greatly increase the amount of observer coverage, and NMFS needs to appropriate more observer coverage dollars, especially for those stocks that are in jeopardy. Increasing observer coverage will ultimately lead to more accurate and reliable bycatch results that can be checked against other data sources.

New England Fishery Management Council

The New England Council has presided over the dramatic collapse of numerous fish stocks and has a rich history of resisting long-term reform in favor of short-term expediency. After several successful lawsuits brought by conservation groups, the council is at last making measured progress toward meeting the requirements of the MSA.

On our list of dirty fisheries, the council manages the Northeast multispecies groundfish fishery, the Atlantic scallop fishery, and takes the lead in managing the monkfish fishery, which is co-managed by the Mid-Atlantic Council.

Northeast Multispecies Groundfish Fishery

The Northeast multispecies groundfish fleet is by far the largest bycatch offender in the region, with nearly 220,000 pounds of estimated discards in 2002 and a waste index of 1.8, ranking third on our list in both categories. Trawl gear dominate the fishery, followed by gillnets and to a lesser extent, longlines. The target species for the fishery include cod, haddock, several species of flounder, white hake, and assorted other species, most of which have been severely overexploited.³⁶ Catch regulations for the Northeast groundfish management plan are complex as regulators attempt to control fishing mortality through restrictions on the number of days fishermen are allowed to fish, called "days-at-sea" (DAS), trip limits, minimum fish sizes, gear, and area closures.³⁷ However, in most cases where daily trip limits are low due to overfishing, the council rarely imposes concomitant gear restrictions to prevent fishermen

from using fishing gears capable of catching significantly higher amounts of fish than the daily trip limit. As a result, high levels of discards are common for overfished species, since fishermen must throw back all fish once they reach their trip limit.

The high levels of bycatch in this fishery continue to threaten already overexploited groundfish stocks like Georges Bank and Gulf of Maine cod, which hover on the brink of collapse at only 10 and 23 percent of the minimum for healthy and sustainable populations, respectively. Trip limits contribute to the discards of some targeted species, since fishermen must throw back all fish caught once they reach their trip limit.³⁸ A related problem is “high-grading,” where fishermen continue to fish once they hit the trip limit and throw back, usually dead, less valuable smaller fish in favor of larger fish as they seek to stay within the trip limit.³⁹ Non-target bycatch of commercially valuable species is largely composed of spiny dogfish, skates, butterfly, monkfish, and white hake. Most discards are regulatory in nature.

The council has implemented few direct measures to reduce bycatch. Instead, the council relies on the incidental benefits of its effort control measures to address bycatch,

Although a separate fishery, bycatch of groundfish, especially juvenile groundfish, in the mid-water trawl herring fishery is a problem. Herring vessels use small mesh nets to fish and, though it is characterized as a mid-water fishery, these nets are equipped with gear that allow them to fish all the way to the bottom. Thus, as some groundfish stocks have begun to recover, bycatch of juvenile groundfish by the herring mid-water trawl fleet has been significant. In 2004 several herring vessels were subject to enforcement actions for attempting to land thousands of pounds of juvenile haddock in Maine and Massachusetts. In response, the New England council and NMFS implemented measures to increase observer coverage in the herring fishery and to establish bycatch caps for haddock in this fishery. Still, bycatch rates remain very high, and recently proposed budget cuts to the observer program in New England would reduce observer coverage in the herring fishery from approximately 20 percent to less than 3 percent of herring fishing trips.

i.e., less fishing will lead to less bycatch. However, in many cases, these benefits are not quantifiable, or have not been verified as such, due to inadequate observer coverage.

Bycatch data in the fishery is collected primarily through the Fishery Observer Program of the Northeast Fisheries Science Center, but some data are also collected through a Vessel Trip Report (VTR) system that requires each permitted vessel to report both catch and landings in VTRs submitted on a periodic basis. However, VTR data are considered reliable only for landings, not for bycatch. Recreational data are collected through the Marine Recreational Fisheries Statistics Survey (MRFSS).^{40,41} Prior to a 2001 federal district court ruling, observer coverage in the Northeast hovered at less than 1 percent, but as a result of this ruling, observer coverage has increased to about 5 percent.⁴² Unfortunately, this is still well short of the 20 percent level that is needed in most fisheries.⁴³ The New England Fishery Management Council in its most recent fishery management plan amendment stated its desire to increase observer coverage to at least 10 percent in the fishery. However, NMFS has failed to increase coverage, and now even the inadequate 5 percent level of coverage is threatened by recently proposed budget cuts to the observer program. While the council acknowledges that bycatch estimates ought to be incorporated explicitly into its management plans and is accounted for generally in management measures, bycatch is not accounted for in the most recent stock assessments for several key groundfish, including Georges Bank cod, American plaice, witch flounder, and windowpane flounder.^{44,45}

The greatest long-term failure of the council and NMFS is their inability to develop a credible bycatch reporting plan, coupled with a lack of commitment toward securing adequate observer coverage. Fishery managers acknowledge the need to reduce bycatch and bycatch mortality, but consistently fail to 1) develop a plan that holds up to judicial review and 2) utilize bycatch estimates when assessing stock status and making fishery management decisions in some of the most important fisheries, such as Georges Bank cod. NMFS has lost court decisions three times in the past five years: in 2001, and twice in 2005 for its failure to establish a bycatch reporting plan. Throughout the litigation processes, the council and NMFS maintained that they were already doing enough to prevent bycatch, but these claims were rejected by

the court, clearly demonstrating that they have not lived up to their responsibilities under the MSA. The Federal Court ordered NMFS and the council to evaluate their bycatch reporting and assessment program, establish a standardized reporting methodology, and address other demonstrated shortcomings in their observer program.⁴⁶ In response, the council and NMFS recently formed a committee to begin developing a bycatch reporting plan, in conjunction with the Mid-Atlantic Council, with the first meeting held on April 3, 2006.

Atlantic Sea Scallop Fishery

The Atlantic sea scallop fishery is managed as one stock complex extending from the east coast of Maine to North Carolina. On our list of dirty fisheries, it ranks in the top twelve for total discards but has the lowest waste index outside of the North Pacific.

Scallops are caught primarily with dredges. Like other bottom-oriented gear types, dredges are very indiscriminate and cause a high level of non-target bycatch and habitat destruction. Bycatch in this fishery is largely composed of skates, monkfish, undersized scallops, flounders, and other groundfish. As of 2006, there has been no serious attempt to determine total amounts of bycatch in this fishery, and NMFS just recently began to require higher levels of observer coverage. Killing of threatened and endangered sea turtles is also a continuing problem for the scallop fishery. Turtle bycatch in the fishery is mainly composed of Endangered Species Act-listed loggerhead sea turtles. In 2003, according to NOAA scientists, the fishery caught over 700 loggerhead sea turtles, of which over 60 percent were seriously injured or killed. In 2004, the fishery interacted with an estimated 180 loggerhead sea turtles. In 2004, the council adopted a management system where areas were open in rotation that is primarily intended to allow localized juvenile scallop populations to grow through short-term closures. Unfortunately, the council imposed no measures to adjust rotational management to specifically avoid scallop dredging in certain times and areas when bycatch rates are higher. Also in 2004, the council implemented an amendment to the scallop management plan that enhanced the reporting requirements for certain vessels, established a quota for yellowtail flounder caught as bycatch in Georges Bank closed areas, changed finfish possession limits, enhanced

rates of at-sea sampling to improve precision of bycatch estimates, as well as other measures regarding monitoring, enforcement, and gear restrictions. The council has also recently proposed another amendment, which would include the first measure specifically designed to protect sea turtles from interactions with scallop dredges in the Mid-Atlantic portion of the fishery.

Like all the other fisheries under its jurisdiction, the council's greatest failure in the management of this fishery is the gross inadequacy of observer coverage. The current FMP requires that fishermen accept and pay for observers if asked, and vessels that do so are allowed to catch more scallops as compensation for the additional costs. In most catch areas, observer coverage has been in the 0-2 percent range in recent years, with only the Hudson Canyon area reaching levels from 6-11 percent, still well short of the recommended 20 percent level.

As described above for the groundfish fishery, the council has rested its hopes on the development of an omnibus bycatch reporting plan that will cover all of the key fisheries under its jurisdiction.

Monkfish Fishery

The monkfish, also known as goosefish, is often associated with the New England multispecies groundfish fishery, though it has its own FMP. It qualifies for our list of dirty fisheries on both counts due to high overall discards and a high waste index. Monkfish are caught with trawl gear or large-mesh gillnets. The primary regulations for monkfish are limitations on DAS, area closures, gear restrictions, landing limits, and minimum fish sizes. Though targeting monkfish with dredges is not permitted, a substantial amount of monkfish is landed by the scallop dredge fishery.⁴⁷ Discards in this fishery include both regulatory and economic discards, with undersized monkfish representing a substantial share of total discards. Discards of high numbers of sea turtles and marine mammals are common in this fishery, but rarely reported, due to minimal levels of observer coverage. No estimates of total non-target discards have been attempted. There is little to no bycatch data collected in the fishery and what is collected is highly unreliable. The fishery has woefully inadequate levels of observer coverage and no established bycatch reporting plan. While the council acknowledges that

“reliable quantitative estimates of the magnitude and scope of bycatch in monkfish fisheries, either of monkfish or other species, are not available,” it nevertheless has failed to address the problem.⁴⁸ The omnibus bycatch reporting plan currently under development is intended to serve as the primary bycatch reporting framework for all fisheries managed by the council, including monkfish.

North Pacific Fishery Management Council

The North Pacific Council manages the largest fisheries in the nation by volume. The total landings of the Bering Sea – Aleutian Islands (BSAI) groundfish fishery alone are 4.4 billion pounds per year. The council has addressed bycatch issues more aggressively than its counterparts through a variety of management strategies, informed by the most comprehensive observer program in the country. The total amount of waste remains very high, however, with over 300 million pounds of discards per year. Still, the council’s efforts demonstrate that bycatch management can be improved substantially through council action, a lesson that can and should be applied elsewhere.

The North Pacific Council manages groundfish fisheries in the Gulf of Alaska (GOA) and the BSAI management areas. In addition, the council co-manages the weathervane scallop and BSAI king and Tanner crab fishery with the state of Alaska. Efforts to meet the requirements of the MSA for addressing bycatch are described next.

BSAI and GOA Groundfish

Both the BSAI and GOA groundfish fisheries are on the list of the dirtiest fisheries for total bycatch poundage, but neither feature an exceptionally high waste index relative to other fisheries on our list due in large part to the high volume of fish landed in these fisheries. In fact, the waste index in the BSAI fishery is the lowest of any on our list at less than 0.1, while the GOA has a much higher index value of 0.33. The sheer poundage of bycatch is troubling; when the Gulf and South Atlantic shrimp fisheries are removed from the data, the North Pacific groundfish fisheries account for nearly 40 percent of all remaining discards nationwide.

These fisheries target a wide array of species, with pollock accounting for roughly 75 percent of the BSAI fishery, followed by Pacific cod, a variety of flatfish, sablefish, several rockfish species, and Atka mackerel. Target species are similar in the GOA, but Pacific cod is the dominant species and landings of several flatfish and rockfish species exceed those of pollock. The GOA fishery also catches a wider array of rockfish and flatfish.

Non-pollock fisheries utilize bottom trawls, longlines, and pots in both the BSAI and GOA fishery with attendant higher rates of bycatch of both target and non-target species. For example, the Atka mackerel bottom trawl fishery discarded 35.3 million pounds in 2003 with a discard rate of 28 percent, including over 13.2 million pounds of rockfish.

More than any other council, the North Pacific Council has employed a variety of measures to reduce bycatch in the groundfish fisheries. They include a large observer program, groundfish quotas that are set and monitored in near real time, time and area closures, gear restrictions, prohibitions on the retention of some species, bycatch limits for some non-groundfish species, careful release requirements for halibut bycatch in the longline fisheries, bird bycatch avoidance regulations for the longline fisheries, and fishery closures when groundfish or non-groundfish quotas are met.⁴⁹ Most importantly, unlike many fisheries managed by other councils, projected bycatch amounts are explicitly incorporated into annual quotas, thus greatly reducing “off-the-books” mortality.

The ability to reduce bycatch in these fisheries is driven in part by the realities of catch allocation rather than by conservation motives. In the case of highly prized species – such as salmon, halibut, king crab, snow crab, and herring – the resource is fully allocated, so that unintentional bycatch by the groundfish sector has a direct economic impact on other target fisheries for those species. As a result, across much of the management area, these species are forbidden to be retained by the groundfish fishery. Bycatch caps are used in selected areas to shut down groundfish fisheries when such caps are reached. This is particularly true for halibut bycatch in groundfish fisheries.

Through a combination of these and other actions, groundfish discards decreased by 50 percent from 1996 to 2002, despite a 2.5 percent increase in groundfish catch. At the same time halibut bycatch mortality decreased by 8 percent, herring bycatch decreased by 92 percent and crab bycatch decreased by 52 percent. Salmon bycatch in groundfish fisheries has fluctuated year to year. In 1996 groundfish fisheries discarded approximately 161,000 fish followed by an improved trend. In 2004, however, salmon bycatch skyrocketed to an all time high of over 500,000 fish.

A major factor in the dramatic decrease of bycatch from 1996 to 2002 was the Improved Retention/Improved Utilization Program for pollock, Pacific cod, and Gulf of Alaska shallow water flatfish, which substantially increased the requirement to retain species that previously would have been discarded for economic reasons.⁵⁰ In other words, many low value fish are retained instead of discarded, and are utilized for fish meal production. So, a formerly significant category of discards has been converted into a mandatory, low-value “target” fishery product. However, finding a market for bycatch is not a long-term solution, and more selective gear must be promoted. Although the fisheries may look “cleaner” on paper, the ecological effects of removing so many fish from the ecosystem must also be weighed.

The council also focuses on rationalization programs (such as individual fishing quotas) and cooperatives to reduce bycatch, though such programs may increase some types of bycatch while decreasing others. For example, higher rates of target species bycatch due to high-grading (keeping the most economically valuable fish) is currently a concern in the recently implemented crab rationalization program, where barnacle-encrusted crabs are rejected because they are less valuable than crabs with clean shells.⁵¹

The council and NMFS have supported numerous research initiatives to find ways to reduce bycatch. These have included halibut and salmon excluder devices in trawl gear, trawl gear modifications to avoid crab bycatch and incidental mortality, and gear configuration and deployment modification to avoid gear interactions with seabirds, research on non-target species to determine bycatch effect, and ecosystem impacts of bycatch.

To prevent seabird bycatch, fishermen have modified gear to avoid unwanted catch. The first seabird avoidance regulations were implemented in 1997. The regulations require most longline vessels and fisheries to use streamer lines to help reduce and avoid seabird bycatch. In 2002, the total seabird bycatch fell to just over 4,000 birds.⁵² Many of the most effective management measures are made possible by the observer program, which is far and away the most sophisticated in the nation. In 2002, there were approximately 35,000 “observer deployment days” in the groundfish fisheries. Observer coverage is based on the length of the vessel and a special allocation program for Bering Sea pollack. Coverage ranges from 0 to 200 percent (two observers on board at one time) in the case of unique legal requirements for some vessels.

There are remaining gaps within the North Pacific observer system that compromise data quality in certain catch sectors. For example, in the case of some areas and gear types, the large majority of vessels are in the less than 60 foot size class so that observer data is largely absent. Also, for vessel size classes requiring less than 100 percent coverage, the ability to deploy observers randomly is limited by the logistical difficulties and coordination required to ensure that observer coverage arrangements do not unduly delay vessel deployment. This means that the data collected may not be a truly random sample, and its quality for statistical analysis is limited.

Also, by lumping all of the discard statistics in the groundfish fisheries into a single value, both the Oceana report and our analysis masks highly variable bycatch rates within subsets of the fishery. Bycatch patterns also change over time. Since 2002, herring and salmon bycatch have increased substantially. Starting in August 2006, salmon bycatch in the pollock fishery will be managed primarily through voluntary “hot spot” closures, whereas previously, salmon bycatch was managed through Salmon Savings Areas, which closed important salmon habitat to all trawling when a salmon bycatch limit was reached. If rates of salmon bycatch continue to rise, reliance on the voluntary method must be reevaluated.

In managing the BSAI and GOA groundfish fisheries, the council has taken robust steps over time to address bycatch reduction as well as standardized reporting, with the expansive observer program as its centerpiece. This would

be more difficult to implement if not for the high economic value of the fisheries, since observer costs are typically passed on in part to fishermen. Still, the sheer magnitude of bycatch is alarming, and certain types of bycatch – such as those of habitat-forming species like corals – have been largely ignored by the council and by NMFS. Nevertheless, many of the approaches developed in these fisheries can and should be applied by other councils to other fisheries where bycatch problems are in many cases more severe than in the North Pacific.

Weathervane Scallop Fishery and BSAI King and Tanner Crab Fishery

The weathervane scallop and BSAI king and Tanner crab fisheries are co-managed by the council and the state of Alaska. The scallop fishery is very small relative to the rest of our list with total landings of only 3.9 million pounds in 2002, but the waste index is quite high at 0.56. Scallop catch has fluctuated wildly in recent decades, with catch reaching only 1.7 million pounds in 1992. Like its Atlantic counterpart, the fishery uses scallop dredges to scrape the seafloor, consequently capturing not only scallops but also sea stars, skates, flatfish, crabs, and other bottom-dwelling organisms.

Nearly all management is delegated to the state of Alaska. The management plan allows for state regulations to prohibit vessels from retaining certain species, including salmon, halibut, king crab, Tanner crab, and herring. These species must be avoided while fishing and must be immediately returned to the sea with a minimum of injury. Currently, the state requires 100 percent observer coverage on scallop vessels and has established a standardized bycatch reporting methodology.

The BSAI king and Tanner crab fisheries use pot gear. Though catch levels fluctuate substantially over time, this is a major, high-value fishery with a high waste index of 1.03. Most of bycatch in the crab fishery is composed of females of the target species, which may not be retained and are generally released alive and in good condition.

Similar to the scallop fishery, the majority of management responsibility rests with the state of Alaska. Currently, observers monitor catch and bycatch in three of the major

Alaskan crab fisheries, including Bristol Bay red king crab, Bering Sea snow crab, and Aleutian Islands golden king crab.⁵³

In both the scallop and crab fisheries, the biological management authority rests with the state and is thus not a direct responsibility of the council. Fortunately, through both federal and state initiatives, data collection is occurring at a fairly high level via observer programs and reporting requirements.

Pacific Fishery Management Council

The Pacific Council has consistently failed to take meaningful steps to address bycatch reduction, minimize bycatch mortality, and develop reporting methodologies. NMFS did not develop a West Coast groundfish observer program until 2001 and since then observer coverage has hovered between 10-20 percent. Meanwhile the council has presided over painful shutdowns of once flourishing fisheries.

Pacific Coast Groundfish

The council manages the Pacific Coast groundfish fishery along the coasts of Washington, Oregon, and California. The fishery is divided into two major components: the multispecies groundfish fishery and the Pacific whiting fishery. It ranks as the sixth dirtiest fishery in terms of the waste index at 0.88 and total discards exceeded 50.7 million pounds in 2002. When the whiting fishery is removed from the data, the waste index rises to 0.93.

The whiting fishery is composed of large mid-water trawlers and catcher/processor vessels and has an extremely low waste index (0.004). This high volume fishery had a catch level of more than 593 million pounds in 2005. The whiting fishery is similar to the pollock fishery in the North Pacific in that the fishery is naturally a fairly “clean” one due to schooling behavior of the fish, their location in the middle of the water column, and the high volume of target fish caught. However, even the modest bycatch rate of overfished species like widow rockfish, darkblotched rockfish, and canary rockfish takes up a significant portion of the specified catch level amounts established for those species. The fishery also catches Chinook salmon, a prohibited species. In 2005, the fishery caught 11,961 Chinook salmon.

The remainder of this discussion focuses on the multispecies groundfish fishery. The fishery targets a large assortment of 89 species, including lingcod, sablefish, spiny dogfish, Pacific cod, numerous rockfish and flatfish species. Primary gear types include bottom trawl and longline, as well as limited amounts of handlines and pot fishing. Major groups of discarded species include sharks, skates, halibut, whiting, and groundfish, with the vast majority of the bycatch occurring in the commercial bottom trawl fishery. Discards occur for both regulatory and economic reasons. The bottom trawl fishery discarded 52 million pounds of fish in 2003.⁵⁴ The primary reason for this waste is that bottom trawl gear is unselective and catches everything in its path whether it is a targeted species or not.

Until 2001, the Pacific Council did not formally monitor bycatch in groundfish fishery. Instead, the council relied on estimates from one study to estimate bycatch and continued to do so despite the declining numbers of multiple species caught as bycatch. Observer data collected after 2000 revealed that the council had been vastly underestimating bycatch. This failure to adequately account for bycatch, combined with over-optimistic annual quotas and a failure to control catch resulted in the decline of several species of rockfish below sustainable levels. In 2000, the Secretary of Commerce formally declared the fishery a disaster when nine species were listed as overfished. Since 2001, the council has primarily relied on closures of certain areas at certain times of the year to reduce catch of overfished rockfish species. The council has adopted limited gear restrictions as well, but has not released data showing whether or not those restrictions have led to reductions in bycatch.

Although the council developed a bycatch minimization plan in 1997, a federal judge found that it was grossly inadequate in 2000 and returned it to the council for revision. It took five years for the council to develop a new plan that is also inadequate. It does not specify new measures for reducing bycatch or a timeline for implementing measures. Furthermore, it does not include steps to develop a bycatch reporting plan. The council is instead relying on the development of an individual fishing quota program, which is currently expected to begin in 2009 or 2010, to reduce bycatch in the fishery through market mechanisms. No quantification of bycatch

reduction has yet been demonstrated in the program design elements of the plan that have been drafted and analyzed.

The council's failure to adequately account for bycatch in the 1980s and 1990s in the groundfish fishery played a large role in the decline of many species and consequently the draconian curtailment of fishing in 2002. Its lack of aggressive action to resolve the issues through strong leadership will continue to plague fish populations and coastal communities for the next several years as overfished populations slowly rebuild and commercial and recreational opportunities continue to be limited. Finally, since August 2001, observers have collected at-sea data as part of the West Coast Groundfish Observer Program. The target coverage rate for 2006 is 10-20 percent.

Pacific Coast Highly Migratory Species

Although an analysis of the Pacific Coast Highly Migratory Species was not included in the Oceana report and thus did not make our list of the dirtiest fisheries in the country, recent bycatch trends and management actions in this fishery deserve attention.

The Pacific Council manages thirteen highly migratory species, including swordfish and common thresher shark. The council authorizes a coast wide drift gillnet fishery for these two species. These mile-long nets are deployed and left in the water overnight, catching most everything that swims into them. Since 2001, NMFS has closed the northern portion of the fishery to protect endangered leatherback sea turtles. A review of the catch composition based on observer data for the southern portion of the fishery for the years 1997-2005 reveals a waste index of 1.76.⁵⁵ In addition to finfish bycatch, the drift gillnets also entangle the bodies, flippers, and fins of a variety of marine mammals and sea turtles, particularly endangered leatherback turtles. Most animals observed in the nets are not alive when the nets are hauled in hours later.⁵⁶ Despite these high bycatch rates, in March 2006 the council approved a permit to reopen the closed area, which will result in increased bycatch of finfish, marine mammals, and sea turtles. The council also preliminarily approved a permit to allow longline fishing for bigeye tuna and swordfish off California, a fishery that has been closed due to its bycatch of endangered sea turtles.

This is a very important step toward establishing a credible information base that can serve as the foundation for better management. It will have to be coupled with firm commitments to bycatch reduction (such as more selective gear types) and to scientifically-driven management where the recommendations of the advisory Scientific and Statistical Committee are no longer ignored in favor of the vested interests represented on the council.

Western Pacific Fishery Management Council

The two major fisheries managed by the Western Pacific Council are the bottomfish and seamount groundfish fishery and the pelagics fishery, which primarily utilize hand-line and longline gear, respectively. Neither fishery makes our list of the dirtiest fisheries as total discards are fairly low relative to other regions, and the waste index is estimated at approximately 0.2.⁵⁷ The pelagics fishery is by far the larger fishery with more than 110 million pounds in total landings, while the bottomfish fishery only caught less than 662,000 pounds in 2002.

Fisheries management regulations are highly variable by area, ranging from stringent regulations in Hawaii to minimal in the Northern Marina Islands. The majority of management measures are aimed at minimizing fishery interactions with, and the mortality of, protected sea turtles, seabirds, and marine mammals, as well as preserving the traditional island fisheries from the encroachment of large longline vessels.⁵⁸ The council submitted bycatch amendments to NMFS in 1998, but many of them were rejected due to their inadequacy. It was not until 2002 that NMFS approved the council's new bycatch amendments.

Bottomfish fisheries occur throughout the western Pacific region. The largest is in the Northwest Hawaiian Islands (NWHI). Target species include a variety of snapper, trevally, and grouper species. Bycatch consists mostly of three carangid fish (narrow-bodied tropical fish) and sharks, all of which are discarded for economic reasons. The carangid species that make up most of the bycatch are usually released alive. Efforts to reduce bycatch in the bottomfish fishery include prohibition of the use of bottom trawls, bottom gillnets, explosives, and poisons. The

interaction among protected species of sea turtles, marine mammals, and seabirds with the fishery is minimal.

Bycatch of sea turtles, seabirds, and sharks are a major problem in the surface longline fisheries, which target tunas, swordfish, mahi mahi, and other high-value species. The proximity of the seabirds' nesting grounds to some of the longline fishing grounds contributes to their incidental capture in the fishery. Seabirds follow longline vessels and dive on baited hooks being deployed or retrieved. Bird bycatch mitigation measures in the surface longline fisheries include streamer lines, dyeing bait blue, underwater hook-setting chutes, and side setting (deploying longline gear from the side instead of the stern). In an effort to decrease bycatch mortality, pelagic longline fishermen are required to carry specific seabird dehooking and handling tools, attend seabird education classes, and follow required handling and reporting procedures.

Finding methods to reduce sea turtle bycatch has proven difficult for the council. Longliners bait thousands of hooks that can extend for over fifty miles. Sea turtles often get caught in the lines or bite the baited hooks and are pulled on board. The effects of longliners targeting high-valued species, such as swordfish, have biologists worried that the leatherback turtle may be ten years away from extinction. An article published in the scientific journal *Nature* in June 2000 warned about imminent leatherback turtle extinction and cited longline fishing around Hawaii as a leading cause.

After nearly four years of closure due to litigation over sea turtle interactions, the swordfish fishery reopened in April 2004 after the inclusion of new circle hook technology and a strict set of protected species management regulations, including an allowable interaction (or capture) limit of 17 loggerhead turtles and 16 leatherback turtles. Loggerhead turtles are listed as threatened and leatherback turtles are listed as endangered under the Endangered Species Act. The fishery operated in 2005 without reaching the bycatch cap. But in the first quarter of 2006, fishermen have already captured 15 loggerheads and 1 leatherback turtle.

The council has taken some steps to reduce sea turtle bycatch in fisheries where there is interaction, although they are far from solving the problem. Several techniques have been applied, including the use of circle hooks in combination with bait that is less attractive to turtles,

removal of longline gear from the upper 40 meters of the water column by employing deep sets rather than shallow ones, observer coverage on 100 percent of shallow sets (swordfish) and 20 percent deep sets (tuna), and mandatory gear restrictions and configurations for deep-set fisheries.⁵⁹ There is also a growing interest in expanding the at-sea data collection programs, which would give managers more information about the bycatch problem throughout the region.⁶⁰

The return of swordfishing in the previously closed fishery will most likely not only increase sea turtle bycatch but also the amount of blue shark bycatch. In the past sharks compromised about 50 percent of the catch in the swordfish fishery.⁶¹ The council claims to be investing in ways to reduce bycatch, and it encourages the use of dehooking devices to release sharks, but the council needs to take more significant steps to reduce shark bycatch. The blue shark stock was assessed in 2004; however, the council claims that it needs to wait until stock assessments are complete on other commonly encountered bycatch before it can decide what to do about shark bycatch.⁶²

Sharks and other finfish are discarded for both economic and regulatory reasons. In the past, many sharks were captured only for their fins with the rest of the carcass discarded at sea. The fins sell for a high price in Asia where they are used in shark fin soup, a dish considered an Asian delicacy. Shark finning reached its peak in 1999, when about 65 percent of all captured sharks were finned. The majority came from blue sharks, representing 95 percent of all finned sharks.⁶³ Despite pressure from environmental activists and NMFS, the council refused to address this issue. Many believe that the council's stonewalling was due to the fact that a key council member allowed his longline vessels to engage in this practice. It took the passage of a federal law in 2000 to prohibit shark finning. The prohibition greatly reduced the retention rate of sharks, but they continue to be caught and released as bycatch.

Bycatch and protected species interactions are assessed and reported in the Hawaii-based longline fishery through a logbook program and a recently expanded vessel observer program. Bycatch in American Samoa is measured through "creel surveys" that quantify the fish landings at public piers and docks, federal logbook programs, and vessel observer coverage. There is 20 percent observer coverage in the Hawaiian longline fishery and 7 percent

coverage in the American Samoa longline fishery.⁶⁴ Bycatch in other pelagic fisheries are monitored through local catch reports and creel surveys.

The lack of adequate bycatch data collection and reporting in some segments of the Western Pacific is a major ongoing issue. The current Stock Assessment and Fishery Evaluation (SAFE)⁶⁵ reports produced by the council contain limited bycatch data. Currently, they include limited information from Guam and American Samoa troll fisheries and the American Samoa longline fishery. The pelagic annual report will reportedly be revised to include bycatch information from the Hawaii longline fishery and Hawaiian recreational fishing.⁶⁶

Caribbean Fishery Management Council

Both the Oceana and NMFS reports find that there are no fisheries in the Caribbean with notable amounts of bycatch.⁶⁷ This is largely a function of the nature of the Caribbean fisheries, where the vast majority of fish caught are either sold or kept for personal use, with the exception of a small number of species, which are discarded for economic reasons. Also, there are few regulations in the Caribbean that necessitate regulatory discards, aside from the outright prohibition on retaining Nassau and goliath groupers, sub-adult yellowtail snappers, spiny lobster, and species caught in areas that are closed during certain times of the year. Moreover, the regulatory requirements forcing fishermen to discard these species are difficult to enforce because regulations are generally less restrictive in waters surrounding U.S. territories, and funding for enforcement is scarce. So it is fair to assume that even fish that should be discarded due to regulatory restrictions are often kept and consumed.

While it may be tempting to say that bycatch is not a major cause of fishing mortality in the Caribbean, the lack of accurate and sufficient data compromises the validity of this assertion. A study conducted in 1993 using survey data collected off the west coast of Puerto Rico estimated that about 14 percent by number and 17 percent by weight of the fish caught in the commercial hook and line fishery are species with low market value, including squirrel fishes, butterfly fishes, doctor fishes, puffers, filefish, and scorpion fish, and therefore may be discarded for economic reasons.

The council sent its proposed amendments implementing the 1996 MSA amendments, including its bycatch provisions, to the Secretary of Commerce for approval on May 3, 2005. This is nearly seven years late, since the original deadline for compliance was October 1998. In response to the proposed rule, the Network commented that the rule “fails to establish a standardized bycatch reporting methodology. The proposed actions depend, in part, on MRFSS data, which is widely known to be flawed and inconclusive. Other alternatives could include observers, dockside interviews, or at-sea intercepts. One of the preferred alternatives only states that the council will consult with Puerto Rico and the U.S. Virgin Islands to modify trip tickets into a standardized reporting mechanism. NMFS should require the council to modify and update the trip ticket system to provide credible data.”⁶⁸

Without correcting these shortcomings, the Secretary approved the council’s amendments. On October 28, 2005, NOAA published its final rule for the “Fisheries of the Caribbean, Gulf of Mexico, and South Atlantic; Comprehensive Amendment to the Fishery Management Plans of the U.S. Caribbean” which officially implemented the amendments on November 28, 2005.⁶⁹

NMFS and the council acknowledged that there are data collection limitations in the Caribbean, but they disagree that the Marine Recreational Fisheries Statistics Survey (MRFSS) data is flawed, despite the fact that the National Research Council found that MRFSS data is flawed and in need of a major overhaul.⁷⁰

The council maintains that a bycatch reporting plan has been established through the amendments, even though they admit that “the final rule does not directly impose any new reporting or recordkeeping requirements.”⁷¹

Like many of its counterparts, the council is relying on the assumption that bycatch and bycatch mortality reduction benefits will accrue through other actions in the amendments that are designed to prevent overfishing, rebuild stocks, and protect habitat.

The only gear modification considered in the council’s amendment process was to amend existing regulations on trap construction to require one escape panel instead of maintaining the existing two-panel requirement. NMFS

approved this modification, stating that by requiring only one escape panel compliance would increase, since fishermen tended to disable both escape panels on their traps to guard against losing their catch when retrieving their traps. This is a clear case of lowering the bar in an effort to improve the “success” rate.

Prior to the passage of the amendments, the data collection system in the U.S. Caribbean did not account for bycatch in any way. While the current trip ticket system, based on monthly catch reports that fishermen must complete to renew their fishing licenses, does not account for bycatch, there is hope. Both the Department of Natural Resources in Puerto Rico and the Division of Fish and Wildlife in the U.S. Virgin Islands have agreed to collect bycatch data by adding additional bycatch specific data field to the reports fishermen fill out to renew their fishing licenses. While this was an item of discussion at the April 2006 council meeting, implementation is not expected for at least a year. NMFS currently contributes only \$78,900 and \$73,000 to commercial fisheries data gathering in Puerto Rico and the U.S. Virgin Islands, respectively. The data collection is particularly ineffective from a management perspective in that most of the data comes from the MRFSS database, port sampling, and reports that fishermen are required to fill out to renew their licenses. There are very few, if any, data available to accurately estimate the sizes of the stocks, let alone bycatch rates. Not surprisingly, anecdotal evidence suggests that these reports are filled out at the last minute rather than as part of an ongoing process, therefore the data are suspect.

Atlantic HMS Pelagic Longline Fishery

As noted earlier in the report, the Atlantic highly migratory species (HMS) pelagic longline fishery is managed directly by NMFS. This section provides a brief review of NMFS’ efforts to meet MSA bycatch requirements in the fishery.

The pelagic longline fishery targets primarily tunas and swordfish. While this is not one of the largest fisheries in total poundage, the waste index is high at 0.67. Bycatch is generally composed of undersized target species, marine mammals, seabirds, sea turtles and non-target finfish.

NMFS developed the Atlantic HMS bycatch reduction program in 1999. The plan “includes an evaluation of

current data collection programs, implementation of bycatch reduction measures, such as gear modifications and closures of certain areas at certain times of the year, and continued support of data collection and research relating to bycatch.”⁷² Bycatch reduction regulations include closures of certain areas at certain times, observer coverage, requirements for vessel monitoring systems (VMS) for pelagic longline vessels, reporting requirements, dead discard accounting, and bycatch limits already in place for U.S. fishermen.

NMFS has also begun a new research program to evaluate methodologies to reduce sea turtle bycatch and bycatch mortality in the fishery using commercial vessels as research platforms in the Atlantic Ocean and Gulf of Mexico. The experiment is testing fishing protocols using a variety of bait and hook types.⁷³

All U.S. permitted vessels, or those with pelagic longline gear onboard are required to be permitted for Atlantic HMS, and must possess and maintain line cutters and dipnets meeting newly revised design and performance standards. They must also carry additional equipment, in compliance with safe release protocols, to remove fishing gear from incidentally captured sea turtles. NMFS produced a training video on release and disentanglement techniques. NMFS also conducted eight workshops throughout the Atlantic and Gulf of Mexico for bottom longline fishermen to demonstrate the proper release and handling protocols for sea turtles and sawfish.⁷⁴

Effective January 1, 2005, NMFS implemented an annual area closure in the mid-Atlantic Bight for directed shark fishermen using bottom longline gear.⁷⁵ This closure is designed to reduce bycatch and bycatch mortality of juvenile sandbar and prohibited dusky sharks. In an effort to better monitor marine mammal interactions, directed shark vessels with gillnet gear onboard, regardless of location, are required to have satellite vessel tracking devices installed and operating during right whale calving season (November 15–March 31).

NMFS continues to place observers on pelagic longline fishing vessels with a target of 8 percent observer coverage for this fishery. Observer coverage for 2004 was 7.8 percent by set for the entire fishery, with the exception of the experimental fishery, which enjoyed 100 percent coverage.

NMFS continues to place observers aboard shark bottom longline fishing vessels, while also expanding observer coverage in the directed shark gillnet fisheries.⁷⁶

Where Do We Go From Here?

Bycatch is a massive problem in our nation’s fisheries. In 1996, Congress recognized the ecological and economic importance of the issue and called on NMFS and the regional councils to act. Ten years later, most of the councils are still floundering, having failed to make substantive progress toward meeting the mandates of the MSA in the nation’s dirtiest fisheries. Here is a summary of the major findings of this report.

Only one council out of eight has established a bycatch reporting plan for its fisheries that meets the requirements of the MSA. Standardized reporting is a cornerstone of information-driven, science-based management. Development of the most effective solutions to the problem requires reliable information. It is no surprise that the North Pacific Council has applied some of the most effective management measures to combat bycatch: the council has the information to back it up. Just as importantly, transparent reporting shines a light on a council’s action or inaction for stakeholders and the public to see. Without reporting, there is little incentive for councils to address the bycatch problem in a proactive way.

Bycatch data collection is grossly inadequate in most fisheries. A standardized bycatch reporting methodology does not help if there are no data to report. Currently, only 42 of roughly 300 federally-managed fisheries have observer coverage of any kind. NMFS and the councils share responsibility for the failure to secure adequate observer coverage in most of the nation’s dirtiest fisheries. In many cases, observer coverage is less than one percent and is reliant on voluntary coverage, with few fisheries meeting the 20 percent standard recommended by scientists. NMFS’ own analysis shows the current, deplorable state of observer coverage in the nation’s fisheries and estimates the level of effort and expenditure required to correct it.⁷⁷ Addressing this shortcoming should be priority number one for every council and NMFS.

Most councils fail to adequately incorporate quantitative bycatch estimates into management plans.

This failure is a major cause of overfishing for several priority species. For fish stocks that are caught in large numbers as bycatch, this amounts to a form of off-the-books accounting where major losses are not reported as part of the bottom line. This in turn leads to rosier estimates of stock status and subsequent higher catch quotas, until the fishery collapses and draconian measures are the only ones left in the toolbox. In fisheries where quantitative bycatch data are not yet being collected at a sufficient rate to permit estimates that are both accurate and precise, managers should apply a precautionary approach by assuming high rates of bycatch and adjusting targeted catch levels accordingly.

It is possible to reduce bycatch significantly. So why are so few councils doing it? Most of the councils rely on measures to address overfishing and habitat damage – such as gear restrictions and closures of certain areas at certain times – to reduce bycatch indirectly. While these actions may well be beneficial, bycatch must be addressed head-on through directed management measures.

These include modifications to existing fishing gear and development of new technologies. Managers should also create direct incentives to reduce bycatch through other measures, such as species-specific quotas on the amount of allowable bycatch, with triggers for the immediate closure of fishing seasons in affected areas. The North Pacific Council has shown that it can be done. Not all management measures will work in all contexts, but ten years after the passage of the MSA amendments, real action is long overdue.

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- ⁶¹ Ibid
- ⁶² Ibid
- ⁶³ Ibid
- ⁶⁴ National Marine Fisheries Service, 2003. *Evaluating bycatch: a national approach to standardized bycatch monitoring programs*. NOAA, NMFS, Silver Spring, MD. 88 p.
- ⁶⁵ The SAFE reports are a document or set of documents that provides Councils with a summary of the most recent biological condition of species in the fishery management unit, and the social and economic condition of the recreational and commercial fishing interests and the fish processing industries. It summarizes, on a periodic basis, the best available scientific information concerning the past, present, and possible future condition of the stocks and fisheries being managed under federal regulation.
- ⁶⁶ National Oceanic and Atmospheric Administration. 2004b. *Pacific Islands Region Bycatch Reduction Plan FY04-FY05*.
- ⁶⁷ National Marine Fisheries Service, 2003. *Evaluating bycatch: a national approach to standardized bycatch monitoring programs*. NOAA, NMFS, Silver Spring, MD. 88 p.

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Photo Credits

Page 1: Mobula ray caught as bycatch.

Photo Courtesy of: Dr. Terry Maas

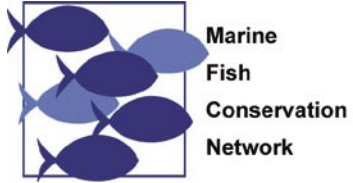
Page 2: Loggerhead turtle caught as bycatch.

Photo Courtesy of: NOAA/Department of Commerce

Page 3: Scallop fishery bycatch.

Photo Courtesy of: New England Aquarium





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