

GAO

Report to the Ranking Member,
Subcommittee on Oceans, Atmosphere,
Fisheries and Coast Guard, Committee
on Commerce, Science, and
Transportation, U.S. Senate

July 2007

NATIONAL MARINE FISHERIES SERVICE

Improved Economic Analysis and Evaluation Strategies Needed for Proposed Changes to Atlantic Large Whale Protection Plan





Highlights of [GAO-07-881](#), a report to the Ranking Member, Subcommittee on Oceans, Atmosphere, Fisheries and Coast Guard, Committee on Commerce, Science, and Transportation, U.S. Senate

Why GAO Did This Study

The National Marine Fisheries Service (NMFS) developed the Atlantic Large Whale Take Reduction (ALWTR) plan to protect endangered large whales from entanglements in commercial fishing gear, which can cause injury or death. Because whales continued to die after the ALWTR plan went into effect, NMFS proposed revisions in 2005. GAO was asked to review these proposed revisions, including (1) their scientific basis and uncertainties regarding their effectiveness, (2) NMFS's plans to address concerns about the feasibility of implementing them, (3) the extent to which NMFS fully assessed the costs to the fishing industry and impacts on fishing communities, and (4) the extent to which NMFS developed strategies for fully evaluating their effectiveness. GAO reviewed the proposed changes to the ALWTR plan and obtained the views of NMFS officials, industry representatives, scientists, and conservationists.

What GAO Recommends

GAO recommends that NMFS revise its economic analysis to present a range of possible costs, expand its proposed gear-marking requirements, and develop a strategy to assess industry compliance. The agency reviewed a draft of this report and did not agree to revise its economic analysis or expand gear markings but did agree to develop a strategy to assess industry compliance.

www.gao.gov/cgi-bin/getrpt?GAO-07-881.

To view the full product, including the scope and methodology, click on the link above. For more information, contact Anu K. Mittal at (202) 512-3841 or mittala@gao.gov.

NATIONAL MARINE FISHERIES SERVICE

Improved Economic Analysis and Evaluation Strategies Needed for Proposed Changes to Atlantic Large Whale Protection Plan

What GAO Found

NMFS used scientific data on whale entanglements, scarification, and sightings as support for its proposed changes to the ALWTR plan. These data indicate that right and humpback whales are being injured and killed by entanglements in commercial fishing gear at a rate that limits the species' ability to recover. One of the key proposed changes to the ALWTR plan involves replacing floating groundline, which forms arcs in the water that can entangle whales, with sinking groundline that lies on the ocean bottom. While there is a consensus among whale experts that using sinking groundline will reduce risks to whales, uncertainties remain regarding how many fewer serious injuries and mortalities will occur as a result of this requirement.

NMFS has not yet resolved implementation issues associated with using sinking groundline in rocky bottom areas, particularly off the coast of Maine. While NMFS believes that it is operationally feasible to use sinking groundline in all areas, it recognizes that fishermen may have to modify their fishing practices to use this type of gear effectively. Maine lobster industry representatives told GAO that fishermen who operate in rocky bottom areas will not be able to use sinking groundline because it will wear away and create safety hazards if the line snaps when it is hauled.

NMFS's economic assessment of the costs of the proposed gear modifications did not reflect the significant uncertainties associated with the assessment, and the extent to which these costs to the fishing industry could be higher or lower than reported is unclear. Because NMFS lacked verifiable data for some of the key cost variables, it used estimates and assumptions that introduced a significant amount of uncertainty into the cost calculations, which the agency acknowledged. However, instead of presenting a range of costs to account for these uncertainties, NMFS produced a single estimate of compliance costs—about \$14 million annually. Moreover, because it lacked key data on fishermen's ability to absorb these costs without going out of business, NMFS could not fully assess the impacts that the cost of gear modifications would have on fishing communities. For example, without knowing which specific fishermen would go out of business, NMFS could not determine the impact lost jobs would have on the communities in which they lived.

NMFS has not developed strategies for fully evaluating the effectiveness of the proposed regulatory changes. Specifically, NMFS's gear-marking requirements may not be adequate for effectively assessing future whale entanglements because they do not include comprehensive markings that researchers could use to assess the type of rope involved in entanglements. Additionally, NMFS does not yet have a strategy to monitor the level of industry compliance and therefore lacks a means to determine whether any future entanglements are due to industry noncompliance with the regulatory requirements or the ineffectiveness of the gear modifications.

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Abbreviations

ALWTR	Atlantic Large Whale Take Reduction
DAM	Dynamic Area Management
DEIS	Draft Environmental Impact Statement
ESA	Endangered Species Act
FEIS	Final Environmental Impact Statement
MLA	Maine Lobstermen's Association
MMPA	Marine Mammal Protection Act
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration
SAM	Seasonal Area Management

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United States Government Accountability Office
Washington, DC 20548

July 20, 2007

The Honorable Olympia J. Snowe
Ranking Member, Subcommittee on Oceans,
Atmosphere, Fisheries and Coast Guard
Committee on Commerce, Science, and Transportation
United States Senate

Dear Senator Snowe:

Despite regulatory actions designed to ensure their safety and survival, endangered large Atlantic whales continue to become entangled in commercial fishing gear, sometimes resulting in death or severe injury. Right, humpback, and fin whales are three species of Atlantic large whales that are protected under the Endangered Species Act (ESA) and Marine Mammal Protection Act (MMPA), under the administration of the National Marine Fisheries Service (NMFS).¹ NMFS is particularly concerned about the North Atlantic right whale because scientists estimate that there are only about 300 of these whales in existence. NMFS has determined that with a population reduced to such a low number, the death or serious injury of even one right whale from human-related causes, such as fishing gear entanglement, would limit the ability of the species to recover.

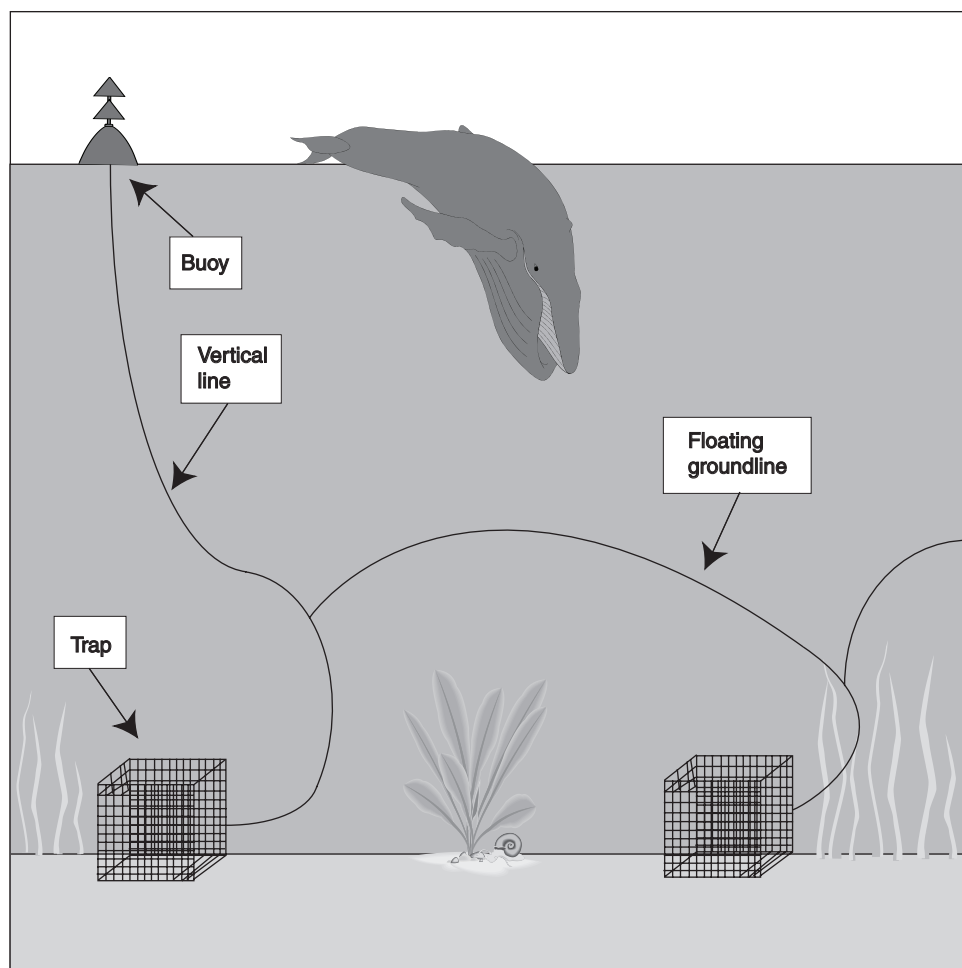
Atlantic large whales are at risk of entanglement in fishing gear because they feed, travel, and breed in areas where commercial fishermen leave traps and gillnets.² Fishermen set lobster and other traps either singly, or in strings of multiple traps linked together with rope known as groundline, as shown in figure 1. A buoy at the surface, which fishermen use to locate their gear, is connected to a vertical rope linked to the traps. Fishermen use the vertical rope to haul traps into their boats. Gillnet fisheries, which

¹This report addresses the western North Atlantic stock of right whales, the Gulf of Maine stock of humpback whales, and the western North Atlantic stock of fin whales. NMFS is an agency of the Department of Commerce's National Oceanic and Atmospheric Administration.

²Traps are also referred to as pots.

catch fish such as sharks and groundfish, use some of the same gear components, but use nets instead of traps.³

Figure 1: Commercial Gear Configurations for Trap Fisheries



Source: GAO.

When whales become entangled in fishing gear, they can sometimes free themselves without serious injury. However, in other cases, entanglement can impede the whale's normal breathing and movement, causing it to

³There are many different types of bottom-dwelling Atlantic groundfish, including haddock, cod, and various flounder.

drown. Even if the whale is eventually able to break free, part of the gear may remain attached to its body, sometimes making it more difficult to breathe, feed, and travel, and possibly leading to an early death.

In 1997, under the MMPA, NMFS developed the Atlantic Large Whale Take Reduction (ALWTR) Plan to reduce the risk of serious injury and mortality to right, humpback, and fin whales from entanglement in commercial fishing gear.⁴ This plan included several gear modifications that apply to lobster and certain gillnet fisheries—such as prohibiting floating vertical line at the surface—as well as season-specific requirements that are in effect when whales are expected in certain areas. Due to the continued serious injury and mortality of large whales after the ALWTR plan was implemented, NMFS established additional measures. For example, in 2002, NMFS established measures (1) restricting commercial fishing gear in areas where right whales are known to feed and (2) allowing the agency to temporarily restrict or prohibit gear in specific areas of the north Atlantic if three or more right whales were observed within 75 square nautical miles.

Despite NMFS's efforts, whale entanglements and deaths continued. At the end of 2002, NMFS determined, after an independent peer review, that a right whale had been entangled in gear consistent with U.S. fishing gear. Due to this and other fatal and nonfatal entanglements of right, humpback and fin whales, NMFS filed a notice of intent in the June 30, 2003, *Federal Register* that it planned to prepare an environmental impact statement to analyze the impacts of revising the ALWTR plan and stated that it would hold meetings with stakeholders to collect information on strategies to reduce whale entanglements. Between 2003 and 2004, after the stakeholder meetings, the agency developed proposed modifications to the ALWTR plan and conducted an analysis on the effects these modifications would have on whales, the fishing industry, and fishing communities. In February 2005, the agency issued a draft environmental impact statement (DEIS) that identified six alternative sets of proposed modifications to the existing ALWTR plan.⁵ NMFS designated two of these as “preferred” alternatives with the goal of selecting one in the final environmental

⁴In this report, we will refer to the Atlantic Large Whale Take Reduction Plan as the ALWTR plan.

⁵NMFS. *Draft Environmental Impact Statement for Amending the Atlantic Large Whale Take Reduction Plan: Broad-Based Gear Modifications*. (Washington, D.C.: February 2005).

impact statement. The preferred alternatives outlined a broader approach to whale protection by incorporating additional fisheries into the ALWTR plan and requiring year-round and seasonal gear modifications in the North Atlantic. One of the key proposed changes requires fishermen to replace floating groundline, which creates arcs in the water that can entangle whales, with sinking groundline, which lies on the ocean bottom.⁶ However, there are concerns that the cost of the gear modifications, particularly sinking groundline, may threaten the livelihood of fishermen, especially lobstermen. In the DEIS, NMFS estimated that the total cost to the fishing industry would be about \$14 million annually and that the lobster industry would incur more than \$12.8 million of these projected costs.

In June 2005, NMFS published a proposed rule to amend the regulations implementing the ALWTR plan.⁷ In February 2007, after an interagency review, NMFS withdrew the rule. According to a NMFS official, the interagency review raised concerns that NMFS had not fully addressed issues raised by the state of Maine and the Maine lobster industry, such as which areas along the Maine coast should be exempt from the proposed gear modifications. NMFS is currently reevaluating the proposed regulation to determine if any revisions are needed. The agency hopes to complete its review and have a final regulation in place by year-end 2007. In the meantime, the current regulations remain in effect, and endangered large whales continue to be at risk of entanglement in commercial fishing gear.

Since NMFS has not issued a final environmental impact statement or regulation, you asked us to review the proposed changes to the ALWTR plan outlined in the DEIS. Specifically, you asked us to (1) describe the scientific basis for the proposed changes to the ALWTR plan and the extent to which uncertainties exist regarding how effectively they will protect large whales; (2) describe how the agency plans to address implementation issues, particularly in the rocky bottom areas of the North Atlantic coast; (3) evaluate the extent to which NMFS fully assessed costs to the fishing industry and the economic impacts on fishing communities; and (4) evaluate the extent to which NMFS has developed strategies for fully assessing the effectiveness of and industry compliance with the proposed changes.

⁶Sinking groundline is also referred to as neutrally buoyant groundline.

⁷70 *Fed. Reg.* 35893 (June 21, 2005).

To address our objectives, we reviewed the DEIS, public comments on the DEIS, and scientific literature on right, humpback, and fin whales. We also obtained the views of a wide range of stakeholders on the proposed changes to the ALWTR plan, such as marine mammal scientists, including those at the Woods Hole Oceanographic Institution and the Provincetown Center for Coastal Studies;⁸ federal regulators, including officials at NMFS's Northeast Regional Office who participated in developing the proposed changes to the plan; state fisheries management officials in Maine and Massachusetts; industry groups, including the Maine Lobstermen's Association; a conservation group, the Humane Society of the United States; and the Marine Mammal Commission, an independent U.S. agency responsible for providing oversight of the marine mammal conservation policies and programs carried out by federal regulatory agencies. We also met with officials from Industrial Economics Inc., who conducted the economic analysis for NMFS that was included in the DEIS. Finally, we reviewed documentation of federal and state compliance efforts related to the current ALWTR plan. A more detailed description of our scope and methodology is presented in appendix I. We performed our work between August 2006 and June 2007 in accordance with generally accepted government auditing standards.

Results in Brief

NMFS based its proposed changes to the ALWTR plan on scientific research that indicated that whales are becoming entangled in commercial fishing gear and that sinking groundline will almost certainly reduce entanglements; however, the agency cannot determine the overall extent to which the proposed gear modifications will reduce serious injury or mortality to whales. To support the need for the proposed changes to the ALWTR plan, NMFS used its scientific stock assessments and entanglement reports, which showed that—despite current regulatory measures—right and humpback whales are being seriously injured or killed by entanglements in commercial fishing gear at a rate that limits the species' ability to recover. NMFS also relied on scientific research that showed that about three-quarters of the right whale population and one-half of the humpback whale population had scars caused by entanglement with commercial fishing gear. NMFS developed the specific proposed gear modifications based, in part, on a study of gear found on entangled right and humpback whales that indicated that all parts of commercial fishing

⁸NMFS has authorized the Provincetown Center for Coastal Studies as the lead organization on the east coast to disentangle large whales.

gear create a risk of entanglement for these whales. However, the study did not provide information regarding the extent to which each component of fishing gear poses a risk to whales. Therefore, NMFS could not estimate how many fewer serious injuries and mortalities will occur as a result of its proposed changes. While scientists believe that sinking groundline—one of the key features of the proposal—will reduce risks to whales, they are uncertain if it will eliminate all serious injuries or mortalities from entanglements in groundline. In addition, the study of gear found on entangled right and humpback whales indicated that other parts of the gear, including vertical line, also posed an entanglement risk. Although NMFS has taken some actions to mitigate this risk, such as implementing weak link requirements, the agency acknowledges that more needs to be done, and it plans to further address vertical line in the future.

NMFS has not resolved challenges associated with implementing the proposed fishing gear modifications in the rocky bottom areas of the North Atlantic coast. NMFS maintains that it is operationally feasible to use sinking groundline in all areas, but the agency told us that fishermen may have to modify their fishing practices. For example, fishermen may need to modify the way they retrieve their gear so that sinking groundline does not become caught on rocks, causing gear loss. However, Maine lobster fishermen contend that it is not operationally feasible for them to use sinking groundline in rocky bottom areas because the rocks will cause abrasion—wearing away or weakening the rope—which could require them to replace their rope too frequently or cause gear loss. Fishermen are also concerned that sinking groundline poses safety risks to them. For example, if sinking groundline abrades along the rocky bottom and breaks when fishermen retrieve their gear, the line could strike and injure them. A NMFS official maintained that fishermen need to be vigilant about the condition of their rope—whether it is floating groundline or sinking groundline—and replace it, as needed, to reduce the risk of injury and avoid gear loss. In January 2007, the Maine Department of Marine Resources submitted a proposal to NMFS that would allow fishermen to use “low-profile” groundline—a rope that floats on average about 3 feet above the ocean bottom—as an alternative to the use of sinking groundline along rocky bottom areas of Maine’s coast. The state believes low-profile groundline will both benefit the lobster industry and protect whales. NMFS and the scientists with whom we spoke are unsure if low-profile groundline will reduce the risk of whale entanglement because it could form an arc similar to that of floating groundline creating an entanglement risk for large whales.

NMFS's economic assessment of the proposed fishing gear modifications did not (1) adequately represent the uncertainties of its cost estimates, which could result in higher or lower costs to the fishing industry than reported in the DEIS and (2) fully assess the impacts of the increased costs on affected fishing communities. NMFS included key variables, such as the cost of rope replacement and expected increases in gear loss, in its estimate of the costs of the proposed changes on the fishing industry. However, NMFS did not have verifiable data to estimate the costs of these variables. For example, NMFS's estimates of the costs of gear loss were based on expert opinions, not on data that had been verified through field testing. The use of estimates and lack of verifiable data introduced a significant amount of uncertainty into NMFS's calculations of the cost of the proposed gear modifications on fishermen. Although the agency acknowledged these uncertainties in the DEIS, it produced a single estimate of compliance costs—about \$14 million annually, most of which would be incurred by the lobster industry—rather than a range of possible costs. Presenting a range of costs would have better represented the significant uncertainty that exists in NMFS's estimate and would have better demonstrated the extent to which total costs to fishermen and the fishing industry could be different than what NMFS estimated. In addition, because NMFS did not have data on fishermen's ability to absorb the costs of the proposed gear modifications, the agency used revenue estimates and made arbitrary assumptions to estimate the number of fisherman that would go out of business because of the increased costs. However, because fishermen's revenues and their ability to absorb additional costs could be noticeably different than what NMFS assumed, the number of fisherman that would go out of business could be lower or higher than NMFS estimated. Furthermore, because NMFS lacked information about which specific fishermen, living in which communities, would go out of business, it could not identify exactly which communities would lose jobs or determine the impact any lost jobs and income would have on these fishing communities.

NMFS has not developed strategies for fully evaluating the effectiveness of the proposed regulatory changes. Specifically, NMFS could require comprehensive markings on commercial fishing gear that would enable researchers to assess the type of rope involved in entanglements. Although NMFS's proposed modifications to the ALWTR plan include new gear marking requirements—such as marking vertical lines—it has not proposed marking sinking groundline because it believes that the use of sinking groundline will be completely effective in protecting whales. However, scientists with whom we spoke, including NMFS's scientists, said that while they believe sinking groundline will reduce risk of whale

entanglements, they also believe its success cannot be guaranteed; and therefore, it should be marked so that its performance can be evaluated. To assess the effectiveness of its proposed regulatory requirements, NMFS also needs to be able to determine whether any future entanglements are due to noncompliance by industry with the regulatory requirements or the ineffectiveness of the gear modifications. However, NMFS has not yet developed a strategy for monitoring the level of industry compliance.

Given the need to fully disclose the potential cost burden on fishermen and to assess the proposed measures to protect endangered large whales, we are recommending that when NMFS finalizes the proposed changes to the ALWTR plan it revises its economic analysis to present a range of possible costs, expands its proposed gear-marking requirements, and develops a strategy to assess industry compliance. In commenting on a draft of the report, the National Oceanic and Atmospheric Administration (NOAA) did not agree with our first two recommendations but did agree to develop a strategy for assessing industry compliance. NOAA believes that the uncertainty of the data was adequately represented in the DEIS and therefore did not agree that the agency needs to present a range of possible costs in its final economic analysis. Nonetheless, NOAA said that it is planning to clarify the variations and uncertainties within its analysis in the Final Environmental Impact Statement. With regard to our recommendation on markings for sinking groundline and gear in exempted areas, NOAA stated that such markings are not feasible or practical at this time. It is unclear to us why NOAA would make such a statement given that in the DEIS, NMFS has proposed similar marking requirements for vertical line. Although NOAA agreed with our recommendation to develop a strategy for assessing industry compliance with the gear modification requirements, it did not believe that the recommendation could be implemented before NMFS finalizes the proposed regulations. We believe that if NOAA is unable to complete its strategy prior to finalizing its proposed regulations, the strategy should be in place by the effective date of the final regulations. The full text of NOAA's comments and our responses appears in appendix II.

Background

Right, humpback, and fin whales were hunted by commercial whalers. The right whale, in particular, was targeted by whalers because it is a slow-moving animal that floats when it is killed, due to its high blubber content. Accordingly, whalers gave the right whale its name because it was the "right" whale to hunt. In 1949, the International Convention for the Regulation of Whaling protected right whales from commercial whaling. In 1970, the species was listed as endangered under the Endangered Species

Conservation Act, the precursor to the ESA. Right whales were subsequently listed as endangered under the ESA in 1973. Despite several decades of conservation efforts, the right whale has struggled to recover due to low reproductive rates and accidental human-caused mortality. The North Atlantic right whale is among the most endangered large whale species in the world. A 1999 study estimated that the species will be extinct within 200 years if mortality rates continue.⁹ Humpback and fin whales were hunted for oil, meat, and materials for utilitarian products (e.g., corset stays, umbrella ribs, buggy whips, etc.) until the 20th century. The International Whaling Commission banned commercial whaling of North Atlantic humpback whales in 1955. Commercial whaling of the fin whale was banned in the North Atlantic in 1987.¹⁰ Both humpback and fin whales have been listed as endangered under the ESA since its passage in 1973.

Atlantic large whales are at risk for entanglement in commercial fishing gear when they are traveling, feeding, and breeding. For example, right whales feed with their mouths open for extended periods of time using their baleen—a substance that grows in comb-like rows from the upper jaws of toothless whales—to filter plankton from seawater. Much about the movements and habitats of right whales remains unknown. However, it is generally thought that some right whales winter in the lower latitudes—off the southeast U.S. Atlantic coast, where calving takes place—then migrate to higher latitudes, near Massachusetts and Maine for the summer, following concentrations of copepods, their principal food source.¹¹ Right whales primarily use the mid-Atlantic region to migrate to and from the calving grounds in the south. Like right whales, humpback whales also feed off the coasts of Massachusetts and Maine, however, they winter farther south. Humpback whales employ a variety of feeding techniques that differ from right whale feeding techniques. For example, one way that humpback whales feed is by lunging into a patch of small fish with their mouth wide-open for a short period of time. Like right and humpback whales, scientists believe that fin whales use northern waters primarily for feeding and southern waters primarily for calving. Fin whales also engage in lunge feeding.

⁹Caswell, H.; Fujiwara, M.; Brault, S. “Declining survival threatens the North Atlantic right whale,” *Proceedings of the National Academy of Sciences*, vol. 96, no. 6 (1999).

¹⁰Fin whales were rarely hunted in U.S. waters, except near the shores of Provincetown, Massachusetts in the late 1800s.

¹¹Copepods are small crustaceans.

Under the MMPA, NMFS must develop a plan to protect Atlantic large whales from entanglements that cause serious injury or mortality.¹² The MMPA was enacted in 1972 to provide protection for all marine mammals. Section 118, enacted in the 1994 amendments to the MMPA, specifically outlines a process for reducing serious injury and mortality incidental to commercial fishing operations.¹³ Under that process, if NMFS determines that a species' ability to recover has become diminished by commercial fishing activities, the agency must develop and implement a plan—known as a take reduction plan¹⁴—to reduce serious injury and mortality to the species. The MMPA requires a take reduction team to be involved in developing a take reduction plan. Members of the team are required to have either biological/conservation expertise relevant to the marine mammal species addressed in the take reduction plan or the fishing practices that result in the incidental mortality and serious injury of the species. Team members must include representatives of federal agencies, state agencies, Regional Fishery Management Councils,¹⁵ interstate fishery commissions, academic and scientific organizations, environmental groups, and fishery groups that use gear that could harm the species.

The immediate goal of a take reduction plan is to reduce, within 6 months, mortality and serious injury below the potential biological removal level—meaning the maximum number of human-related mortalities that can occur annually without limiting the species' ability to recover.¹⁶ The long-term goal of a take reduction plan is to, within 5 years, reduce fishery-related mortality and serious injury to insignificant levels approaching

¹²NOAA delegated its MMPA responsibilities to NMFS.

¹³16 U.S.C. § 1387.

¹⁴As defined in the MMPA, the term “take” means to harass, hunt, capture, or kill or to attempt to harass, hunt, capture or kill a marine mammal. 16 U.S.C. § 1362(13). Take reduction plans must be developed to mitigate the effects of Category I and II fisheries, defined as fisheries that have frequent incidental mortality and serious injury of marine mammals (Category I) and fisheries that have occasional incidental mortality and serious injury of marine mammals (Category II). 16 U.S.C. § 1387(c)(1)(A).

¹⁵The Magnuson Fishery Conservation and Management Act of 1976 (since renamed the Magnuson-Stevens Act) created eight regional councils to manage fishery resources within federal waters (from 3 to 200 miles off the coast).

¹⁶As defined in the MMPA, potential biological removal is the maximum number of animals, not including natural mortalities that may be removed from a marine mammal stock annually while allowing that stock to reach or maintain its optimal sustainable population.

zero.¹⁷ The take reduction plan must include recommended regulatory and voluntary measures aimed at reducing mortality and serious injury, such as requiring the use of alternative commercial fishing gear or techniques.

The current ALWTR plan, originally developed in 1997, includes both universal gear modifications that apply to all lobster traps and anchored gillnets as well as area- and season-specific requirements. The universal requirements prohibit floating vertical line at the surface, require gear to be hauled out of the water at least once every 30 days, and encourage fishermen to maintain knot-free vertical lines. In particular areas, such as Cape Cod Bay, fishermen are required to use sinking groundline, which poses less of an entanglement risk because it sinks to the ocean floor rather than creating loops in the water. Fishermen in certain areas are also required to attach weak links—devices that are designed to break if a particular amount of pressure is applied—to their vertical lines or gillnet panels and place marks on their gear so researchers may be able to identify the fishery involved and the location where the gear was set if it is later recovered from an entangled whale. In addition, certain restricted areas are closed to lobster trap fishing or anchored gillnetting during particular seasons when whales are likely to be in the area. When these areas are open, fishermen are limited to using gear that meets particular requirements, such as weak links.

While NMFS has developed the ALWTR plan pursuant to its responsibilities under the MMPA, NMFS also has responsibilities under the ESA. The ESA directs all federal agencies to utilize their authorities to conserve threatened and endangered species. In addition, such species and their habitats must be protected against adverse effects of federal activities such as operating hydroelectric dams, thinning vegetation to prevent wildfires, and—as in this case—permitting fishing, so that the continued existence of protected species is not jeopardized. The right, humpback, and fin whale species are all listed as endangered under the ESA. Section 7 of the ESA directs federal agencies that are taking actions that may affect protected species—referred to as action agencies—to initiate a “consultation” to assess the impacts of their actions on threatened and endangered species. Federal action agencies consult with either NMFS or the U.S. Fish and Wildlife Service within the Department

¹⁷The MMPA does not define “insignificant” mortality and serious injury rates approaching zero. NMFS has established a “zero mortality rate goal” as no more than 10 percent of the potential biological removal level for each stock.

of the Interior, depending on which species their actions may affect.¹⁸ These agencies are referred to as the consulting agencies. For example, because NMFS regulates commercial fishing and the activities of the fishing industry have seriously injured or killed endangered whales, NMFS must consult on its proposed fishery regulation that may affect endangered whales. Consequently, in this case, NMFS acts as both the action agency and the consulting agency. Action agencies submit biological assessments to the consulting agencies that discuss their proposed activities and their likely effects on protected species and their habitat. The consulting agency completes the formal consultation process by issuing a biological opinion. If the consulting agency concludes that the proposed activities are likely to jeopardize the species' continued existence or adversely modify its habitat, the biological opinion will include reasonable and prudent alternatives that are necessary or appropriate to minimize impacts to protected species. If any "take" of a species is expected to occur, the biological opinion also must contain terms and conditions designed to reduce take and address adverse modification of designated critical habitat. For example, NMFS has prepared biological opinions to assess the impact of continuing to permit the multispecies, spiny dogfish, monkfish, and lobster fisheries on protected marine species.¹⁹ In the most recent opinion, NMFS identified the fishing gear modifications contained in the ALWTR plan as a reasonable and prudent alternative to protect right whales from fishing gear entanglements.

In 2000, after new whale entanglements caused serious injuries to right whales, as well as at least one right whale fatality in gillnet gear, NMFS reinitiated a section 7 consultation for the multispecies, spiny dogfish, monkfish, and lobster fisheries. NMFS's biological opinion found that its administration of these fisheries was likely to jeopardize the continued existence of the right whale. Consequently, NMFS developed the Seasonal Area Management (SAM) and Dynamic Area Management (DAM) programs as reasonable and prudent alternatives to avoid further jeopardizing the existence of the right whale. The SAM program imposes seasonal restrictions on lobster and gillnet fishermen to protect

¹⁸The Department of Interior administers the ESA for freshwater and land species and the Department of Commerce through NMFS administers the act for marine species.

¹⁹A fisherman with a multispecies permit is able to target more than one species of groundfish, such as haddock, yellowtail flounder, winter flounder, Atlantic cod, white hake, and American plaice.

predictable aggregations of right whales that annually feed in waters north and east of Cape Cod. Gear set in the SAM zone during designated times must be low-risk gear, which is defined as gear that is highly unlikely to cause death or serious injury to large whales. For example, lobster and gillnet fishermen are prohibited from using floating groundline in the western part of the SAM area from March 1 to April 30 and in the eastern part of the SAM area from May 1 to July 31, when whales are expected to be in the area. The DAM program, on the other hand, requires temporary gear restrictions in areas that experience an unexpected aggregation of right whales. If three or more right whales are spotted within 75 square nautical miles, NMFS can restrict fishing by taking one or all of the following actions: (1) requiring lobster and gillnet fishermen to remove their gear and prohibiting them from setting additional gear within the area, (2) limiting the type of gear that can be used in the area, or (3) encouraging fishermen to voluntarily stop fishing and remove their gear from the area. DAM zone restrictions remain in effect for 15 days and can be extended if three right whales continue to be sighted in the area within 75 nautical miles of each other.

Because whale entanglements that led to serious injury or mortality continued to occur after the SAM and DAM programs went into effect, in 2003, NMFS began a process of revising the ALWTR plan to require additional fishing gear modifications that apply to trap and gillnet fisheries throughout the U.S. Atlantic coast. These fisheries were selected because gear associated with them was found on entangled whales. In February 2005, NMFS issued a draft environmental impact statement under the National Environmental Policy Act that outlined its proposed regulatory changes to the ALWTR plan and the associated costs and impacts to those affected by the regulation. The DEIS identified six regulatory alternatives, two of which were identified as preferred alternatives. Some of the elements of the proposed changes were to (1) replace floating groundline with sinking groundline, (2) alter the requirements for weak links, and (3) change the gear marking requirements. Regarding weak links, NMFS proposed that lobster and other trap fisheries in some areas be required to use weak links of a lower breaking strength—making it easier for whales to break them—and that gillnet fisheries in some areas be required to use more weak links per net panel than called for in the current requirements. Regarding gear marking, NMFS proposed expanding the frequency of gear marking to one 4-inch mark every 60 feet on the vertical line, among other things.

NMFS also proposed applying these gear modifications more broadly than previous regulations. First, NMFS proposed incorporating additional trap

and gillnet fisheries in to the ALWTR plan because these fisheries also use gear that poses a risk to whales.²⁰ Second, NMFS proposed year-round gear modifications in the North Atlantic, because whales are always present there, and seasonal gear modifications in the Mid-Atlantic and the South Atlantic regions at times when right, humpback, and fin whales sightings primarily occur.

In anticipation of increased gear costs to fishermen as a result of the proposed gear modifications, NMFS and nonprofit organizations have provided funding for fishermen to make initial replacements of floating groundline with sinking groundline. NMFS officials told us the agency recently funded a \$600,000 rope buyback and recycling program for the Mid-Atlantic trap fishermen. NMFS officials also told us that the agency recently provided \$2 million to the Gulf of Maine Lobster Foundation to fund a rope buyback program to assist Maine lobster fishermen. The foundation began disbursing the funds to fishermen in May 2007. In addition, NMFS officials told us the agency provided \$660,000 to the International Fund for Animal Welfare, which matched the federal funding, to finance a Massachusetts rope buyback and recycling program for the lobster industry.

While fishing gear entanglement is a significant source of risk for Atlantic large whales, so are collisions with ships. For example, from 2000 to 2004, NMFS reported that one right whale and 0.6 humpback whale serious injuries or mortalities per year were attributable to collisions with ships in U.S. waters.²¹ NMFS has proposed a regulation to reduce the risk of ship strikes to North Atlantic right whales, which would restrict ship speed along certain areas of the east coast during certain times of the year. NMFS expects to issue the regulation in 2007. In addition to this regulation, NMFS has also recommended changes to shipping routes off four major ports where high densities of ships and right whales overlap.

²⁰Additional fisheries include black sea bass, scup, conch/whelk, shrimp, red crab, hagfish, Jonah crab, Northeast driftnet and Northeast anchored float gillnet.

²¹Waring, G.T; Josephson, E.; Fairfied, C.P.; Maze-Foley, K. *U.S. Atlantic and Gulf of Mexico Marine Mammal Stock Assessments—2006*. (Woods Hole, MA: 2007).

NMFS Based Proposed Gear Modifications on Scientific Research, but It Cannot Estimate the Extent to Which Risks to Whales Will Be Reduced

Based on its scientific stock assessments of whale populations, NMFS determined that right and humpback whales are being seriously injured or killed at a rate that limits the species' ability to recover. NMFS also analyzed scientific data on whale entanglements, scarification caused by entanglement, and sightings, which supported the need to propose changes to the ALWTR plan. These data indicate that whales travel widely up and down the Atlantic coast and encounter and become entangled in commercial fishing gear. NMFS then developed the specific proposed gear modifications based, in part, on a study of the gear involved in entanglements of right and humpback whales that indicated that all parts of commercial fishing gear pose a risk to whales. While there is general agreement among scientists, conservationists, federal and state regulators, and industry groups that requiring certain commercial fisheries to use sinking groundline—one of the key features of NMFS's proposed modifications to the ALWTR plan—will reduce risks to whales, uncertainties remain regarding how many fewer serious injuries and mortalities will occur. There is also uncertainty over whether other proposed changes to the ALWTR plan will effectively protect large whales.

NMFS Based Its Proposed Gear Modifications on Scientific Studies of Whale Entanglement, Scarification, and Sightings

To support the need to propose changes to the ALWTR plan, NMFS used its annual stock assessment reports of endangered large whale populations and entanglement reports, which showed that—despite current regulatory measures—right and humpback whales were being seriously injured or killed by entanglements in commercial gear at a rate that limits the species' ability to recover to their maximum sustainable population.²² In the 2003 stock assessment report, the agency determined—based on the size of the right whale population—that the maximum annual number of human-related mortalities that can occur without limiting the species' ability to recover is zero.²³ However, this stock assessment report showed that from 1997 to 2001, there were about 1.2 documented serious injuries and mortalities annually to right whales from fishing-gear entanglements.²⁴ The 2003 stock assessment report also

²²The stock assessment report uses the term “potential biological removal” to refer to the maximum number of human-related mortalities that can occur annually while allowing a stock to reach or maintain its optimum sustainable population.

²³Waring, G.T; Pace, R.M.; Quintal, J.M.; Fairfied, C.P.; Maze-Foley, K. *U.S. Atlantic and Gulf of Mexico Marine Mammal Stock Assessments—2003*. (Woods Hole, MA: 2004).

²⁴NMFS is required under the MMPA to prepare stock assessment reports of marine mammals, including large whales, in order to monitor their population status. 16 U.S.C. § 1386.

indicated that humpback whales were being seriously injured or killed from fishing-gear entanglements at a rate that limits the species' ability to recover. The most recent stock assessment report (2006) indicates that right and humpback continue to be seriously injured or killed from fishing-gear entanglements at a rate that limits their ability to recover.²⁵ In contrast, NMFS determined that fin whales are not being seriously injured or killed at a rate that limits their ability to recover based on their population size and the number of serious injuries and mortalities that occur annually. Table 1 shows the data that NMFS used to assess the ability of the three species to recover based on their population size and the number of annual serious injuries and mortalities from entanglements.

Table 1: Number of Injuries and Mortalities to Large Whale Species and Impact on Their Ability to Recover

Large whale species	Estimated population size	Average number of serious injuries and mortalities due to entanglement annually (1997-2001) ^a	Maximum number to deaths before limiting species' ability to recover
Right	291	1.2	0
Humpback	647 to 902	2.2	1.3
Fin	2,362 to 2,814	0.6	4.7

Source: NMFS data.

^aThese data include whales found in Canadian waters.

However, NMFS's annual stock assessment reports are likely to understate the full extent of whale entanglements in commercial fishing gear, as the reports only include confirmed entanglements in commercial fishing gear that have caused serious injury or mortality to whales. Additional serious entanglements may occur, but either because researchers do not recover the corpses or there is not enough evidence to determine that entanglement in commercial fishing gear caused the whales' deaths, these incidents are not captured in the stock assessment reports. A NMFS scientist with whom we spoke believes that it is likely that the agency documents only a small to modest fraction of large whale entanglements that result in serious injury or mortality. Although NMFS's stock assessment reports include data on seriously injured or dead whales found

²⁵Waring, G.T; Josephson, E.; Fairfield, C.P.; Maze-Foley, K. *U.S. Atlantic and Gulf of Mexico Marine Mammal Stock Assessments—2006*. (Woods Hole, MA: 2007).

in Canadian waters, whether these whales were entangled in U.S. or Canadian gear is generally not known.²⁶

In addition to the serious injuries and mortalities from entanglements documented in NMFS's stock assessment reports, NMFS also used information from scarification studies developed by various scientific institutions to demonstrate a need to revise the ALWTR plan. These studies analyzed the rate of scarring on large whales due to entanglement in fishing rope—thereby identifying the percentage of the right and humpback whale populations that experience entanglement. For these studies researchers identified individual whales using a photographic database and determined the percent that have physical evidence indicative of entanglement.²⁷ For example, in a 2005 report, researchers from the New England Aquarium found that approximately 75 percent of right whales had scars indicating that they had survived an entanglement in fishing rope.²⁸ Similarly, a 2004 report by scientists at the Provincetown Center for Coastal Studies found that approximately half of the humpback whale population also had entanglement scars.²⁹ However, according to a scientist with whom we spoke, these scarification studies may actually underestimate the percentage of whales that have experienced entanglement because whales that die of entanglement may not be found; researchers only count scars that they believe, based on their professional judgment, are highly likely to be from entanglement in fishing gear; and some scars may fade over time.

²⁶While NMFS can develop regulations in response to recovering gear of unknown origin from entangled whales, according to a NMFS official, all the regulatory actions the agency has taken in the past have been in response to entanglements in U.S. gear, or gear consistent with U.S. fisheries.

²⁷The New England Aquarium maintains a photo identification database, funded by NMFS, which includes all known photographed sightings of right whales since 1935. NMFS's aerial surveys, research groups, whale watch vessels, and others have contributed to the database.

²⁸Knowlton, A.R.; Marx, M.K.; Pettis, H.M.; Hamilton, P.K.; Kraus, S.D. *Analysis of Scarring on North Atlantic Right Whales (Eubaleana glacialis): Monitoring Rates of Entanglement Interaction 1980-2002*. Final report to NMFS submitted by The New England Aquarium (2005).

²⁹Robbins, J. and Mattila, D. *Estimating Humpback Whale (Megaptera novaeangliae) Entanglement Rates on the Basis of Scar Evidence*. Report to the Northeast Fisheries Science Center submitted by The Center for Coastal Studies (2004).

To determine the specific gear-modification requirements to be included in the revised ALWTR plan, NMFS relied, in part, on a study of the fishing gear found on entangled right and humpback whales conducted by NMFS researchers and gear specialists as well as researchers from the Provincetown Center for Coastal Studies and the New England Aquarium.³⁰ This study found that any fishing rope from trap and gillnet fisheries presents an entanglement risk to large whales because all parts of the rope, such as vertical line and groundline, have been found on entangled whales.³¹

To determine when and where to implement the proposed gear modifications, NMFS used data from the North Atlantic Right Whale Sightings Database, supplemented by additional data on humpback and fin whale sightings.³² Using these data, researchers can identify where large whales are at risk of entanglement based on where they congregate during certain times of the year. For example, NMFS determined that right and humpback whales are sighted in the South Atlantic region from late November through early April, but are typically not present there the rest of the year. NMFS acknowledges that large whales can be found throughout the year in the Mid-Atlantic but notes that sightings occur primarily between September and May. As a result, in its preferred alternatives, the agency proposed seasonal, as opposed to year-round, gear modifications in the Mid- and South Atlantic. NMFS also used the sightings data to modify the exempted areas—those areas where commercial fishermen are not subject to the gear modifications outlined in the ALWTR plan because whales rarely, if ever, venture there.

³⁰When whales are discovered entangled, NMFS sends a team that may attempt to disentangle the whale, depending on the nature of the entanglement. The team attempts to obtain information about the gear involved in the entanglement, such as whether it is vertical line or groundline.

³¹Johnson, A.; Salvador, G.; Kenney, J.; Robbins, J.; Kraus, S.; Landry, S.; Clapham, P. "Fishing Gear Involved in Entanglements of Right and Humpback Whales," *Marine Mammal Science*, vol. 21, no. 4, (2005).

³²The North Atlantic Right Whale Consortium Sighting Database, maintained by the University of Rhode Island, includes sightings from NMFS's aerial survey as well as other sightings along the eastern seaboard. It does not include photographs, like the database maintained by the New England Aquarium, as researchers and others are not able to photograph each whale that is spotted.

Uncertainties Exist Regarding the Extent to Which the Proposed Gear Modifications Will Protect Large Whales

There is general agreement among scientists, conservationists, federal and state regulators, and industry groups that requiring the use of sinking groundline will reduce risks to whales. However, uncertainties remain regarding how many fewer serious injuries and mortalities will occur. NMFS was unable to quantify how much the risk of whale entanglement will be reduced by sinking groundline because researchers cannot quantify the extent to which each component of fishing gear poses a risk to whales. In addition, the scientists with whom we spoke stated that the proposed modifications to the ALWTR plan will not eliminate all entanglements because NMFS has not fully addressed the risks posed by vertical line. Although NMFS has taken some actions to mitigate the risk associated with vertical line, the agency recognizes that more needs to be done because whales continue to become entangled in this line. The agency stated that it will further address vertical line after conducting additional research and consulting with the ALWTR Team.

The scientists and conservationists with whom we spoke or who provided written comments to NMFS on the DEIS are also uncertain about the effectiveness of other aspects of the proposed changes to the ALWTR plan. Specifically, they were uncertain about whether the use of weak links will reduce risks to whales because whales have been found entangled in fishing rope that had weak links, but the links failed to break apart. A NMFS official acknowledged that weak links are not effective for all types of entanglements. For example, if the whale thrashes around in response to the entanglement and becomes wrapped in the gear, the weak link will not disengage. However, NMFS officials noted that weak links were designed for mouth entanglements, and there have been no documented cases of weak links malfunctioning in a mouth entanglement. Rather, the entanglements with weak links that failed to break apart were entanglements that involved the whale's tail. Even though weak links may not enable whales to free themselves each time they encounter gear, some scientists told us that weak links should be required because they may prevent certain entanglements and are inexpensive and easy for fishermen to use. In fact, two of the three fishing industry association groups with whom we spoke support the use of weak links. The third group, while supportive of using weak links, wanted the breaking strength of weak links to be maintained at its current level during the fall and winter months because if the breaking strength was any weaker, rough tides and weather in offshore waters may cause the buoy to break from the vertical line at the weak link.

Despite their general support of weak links, some of the scientists and conservationists with whom we spoke or who provided written comments

to NMFS on the DEIS remain concerned that the breaking strengths of weak links established by NMFS were based on fishing industry needs and not whale protection. According to NMFS scientists, the tests the agency conducted to determine the appropriate breaking strength of weak links were designed to ensure the line does not break when fishermen haul their gear. NMFS officials stated that the agency also considered what was needed to protect whales when developing the breaking strength for weak links. However, research by a scientist at the Stellwagen Bank National Marine Sanctuary and members of the fishing industry suggests that gillnet fishermen could operate successfully using weak links that would be easier for whales to break, specifically a 600-pound breaking strength rather than the current 1,100-pound strength.³³ NMFS officials stated that despite what the report said, the lower breaking strength may not be operationally feasible because after the report was released a fisherman involved in the study experienced failures on some of the weak links in his gear. NMFS officials also questioned whether larger gillnet vessels in deeper water would be able to successfully operate with 600-pound weak links.

Similarly, some of the scientists and conservationists with whom we spoke or who provided written comments to NMFS on the DEIS expressed concern about the areas NMFS proposed for exemption from the gear modifications.³⁴ Some cautioned that there are risks associated with any exemption area because it only takes one whale traveling within exempted waters for a fatal entanglement to occur—and for right whales one death limits the ability of the species to recover. In addition, some scientists told us that they were concerned that the sightings data used to draw the exemption line may not reflect the actual long-term distribution of whales, as there have been limited efforts to survey the whale population outside of known calving and feeding grounds. In addition, some conservationists note that there have been whale sightings within the exempted areas. However, NMFS officials stated that the agency conducts broad-scale aerial surveys of whales from the Maine-Canada border to New York and has aerial survey coverage in other areas along the east coast as well. In addition, NMFS said in the DEIS that it plans to monitor whale sightings in

³³Mackintosh, W. and Wiley, D. *The Development and Operational Testing of Gillnet Fishing Gear Equipped with Five 600 lb Weak Links*. Report to the International Wildlife Coalition and the Northeast Consortium. (May 6, 2005).

³⁴NMFS opened a formal public comment period on the DEIS during which any stakeholder could submit comments.

exempted areas and assess if gear modifications are necessary in these areas.

NMFS Has Not Resolved Potential Implementation Challenges with Using Modified Fishing Gear in Rocky Ocean Bottom Areas

A controversial aspect of the proposed changes to the ALWTR plan that has yet to be resolved is whether sinking groundline is operationally feasible in rocky ocean bottom areas. NMFS told us that it is operationally feasible to use sinking groundline in all areas, but that fishermen may have to modify their fishing practices. For example, the Massachusetts Lobstermen's Association stated that while fishermen have experienced problems operating in rocky bottom areas off the coast of Massachusetts, they have been able to adapt to using sinking groundline. In contrast, officials from the Maine Lobstermen's Association (MLA) told us that fishermen who operate in rocky ocean bottom areas will not be able to use sinking groundline because it will abrade on the rocky bottom—requiring them to replace their rope too frequently and causing gear loss—and may create safety hazards for fishermen.

To assess the feasibility of using sinking groundline, NMFS gear specialists distributed it to 55 fishermen in Northeast states, including Maine, in 2000.³⁵ NMFS then formally surveyed these fishermen to assess the performance of the sinking groundline in 2003.³⁶ The 25 fishermen who responded to the survey reported mixed views on the performance of the sinking groundline, with the greatest amount of negative feedback coming from fishermen who operate in eastern Maine. Fishing industry representatives told us that the waters off the coast of eastern Maine consist of rocky bottom. Some of the fishermen who responded to the survey reported experiencing rope abrasion when using sinking groundline in rocky ocean bottom areas. NMFS gear specialists stated that there was a wide range in the length of time that fishermen used the line that was distributed to them in 2000—while some stopped using it after 1 week due to abrasion, others are still using the line today, including some in the rocky bottom areas of Maine. The agency maintains that while

³⁵In addition to the field testing of sinking groundline with fishermen described in this report, NMFS conducted additional testing of sinking groundline, including using a line testing machine that simulates some of the long-term wear and tear that lines experience in the field. NMFS gear specialists are former fishermen or boat captains who test fishing gear and conduct outreach with fishermen.

³⁶While the formal survey was conducted in 2003, NMFS gear specialists told us that they interviewed fishermen throughout the duration of the test and still informally check in with fishermen who continue to use the line today.

fishermen will experience different rates of abrasion in different areas, overall, abrasion will not be a significant problem because fishermen move around and operate in multiple bottom types, instead of exclusively fishing in one area. In addition, NMFS officials noted that rope abrasion is not a problem exclusively associated with the use of sinking groundline; fishermen who use floating groundline also experience rope abrasion.

In addition, NMFS gear specialists maintain that fishermen will be able to use sinking groundline once they gain experience using it. NMFS gear specialists attributed the increased negative feedback regarding using sinking groundline in the rocky areas of Maine to the fact that fishermen in these areas are less likely than fishermen elsewhere to have experience using sinking groundline. The gear specialists told us that fishermen may have to modify their fishing practices in order to successfully use sinking groundline, although NMFS did not discuss this in the DEIS. For example, when using sinking groundline, fishermen will have to be more precise when positioning their boat to haul up their traps. According to these gear specialists, one technique that fishermen could use is to set their boats directly above the traps, so that the fishermen can haul the line straight up and prevent it from getting caught on rocks. However, NMFS maintains that there is no one answer to successfully fishing with sinking groundline on rocky bottom, and it will take fishermen several attempts and techniques to adjust to using sinking groundline.

In contrast, the MLA conducted some limited testing of experimental sinking groundline³⁷ under contract with the Consortium for Wildlife Bycatch Reduction³⁸ and concluded that it was not feasible to use in all areas. According to an MLA official, some Maine fishermen reported that sinking groundline performed well, but fishermen who fish in rocky areas generally reported negative experiences. An MLA official told us that, due to abrasion, sinking groundline does not last longer than 1 month in the rockiest areas of Maine, where fishermen experienced such bad abrasion that they stopped using the line to avoid losing their traps. At best, in areas

³⁷Experimental sinking groundline refers to rope that is under development. It is being tested because it is made with different materials or coatings than rope currently on the market.

³⁸The Consortium for Wildlife Bycatch Reduction is a NMFS-funded partnership between scientists and industry to design, field test, and promote fishing gear that minimizes incidental harm to marine life. Founding members include the University of New Hampshire, Duke University, the Maine Lobstermen's Association, and the New England Aquarium.

of Maine that are not as rocky, the MLA official told us that sinking groundline would last 1 year—5 years less than NMFS’s estimate in the DEIS.³⁹ However, the MLA acknowledged that sinking groundline was only tested for a short period of time and therefore recommends additional testing to get a better understanding of its durability.

Fishermen are also concerned that rope abrasion from using sinking groundline in rocky bottom areas will cause gear loss. Based on his professional experience, an MLA official told us that Maine fishermen who fish in rocky bottom areas will experience more gear loss than NMFS estimated because the weakened rope will cause the traps to easily separate. NMFS recognizes that gear loss will be higher, in certain areas, if sinking groundline is required, but a NMFS official told us that rope abrasion will not cause more gear loss than fishermen currently experience because fishermen have the ability to recognize when their rope should be replaced. The NMFS official maintained that fishermen need to be vigilant about the condition of their rope—whether it is floating groundline or sinking groundline—and replace it, as needed, in order to avoid gear loss. However, the agency recognizes that sinking groundline could contribute to increased gear loss as a result of line wrapping around rocks or other marine debris on the ocean floor. If the line becomes caught on the ocean floor, it may break as it hauled to the surface, causing the traps to become separated from the vertical line. When traps become separated from the vertical line, NMFS officials told us that it may be more difficult for fishermen to retrieve their gear if they are using sinking groundline. For Maine inshore fishermen, lost traps will also be more difficult to retrieve because (1) these fishermen are more likely to use shorter trawls than fishermen in other areas—which can be more challenging to locate than a longer trawl that covers more area—and (2) the hook used to retrieve lost gear can bounce off of the rocky bottom, instead of grasping the gear. While an MLA official did not dispute that the factors NMFS cited will contribute to gear loss, he maintained that rope abrasion will also cause gear loss.

MLA officials told us that the Association also has concerns about hauling gear in the manner NMFS described and indicated that there are safety issues with using sinking groundline in rocky bottom areas. Due to rough tidal and weather conditions, an MLA official told us that it is not possible for fishermen to haul their traps from a precise location, as NMFS

³⁹NMFS’s estimate for the lifespan of 3/8” sinking groundline is 6 years.

described. The MLA also is concerned that using sinking groundline in the rocky bottom areas of Maine poses safety issues. For example, if fishermen attempt to haul line that is caught on a rock, their boat could tip, potentially causing injury. Also, if the line snaps when being hauled because it has been weakened due to abrasion, it could strike and injure people on the boat. The Atlantic Offshore Lobstermen's Association also expressed concern about the safety hazards associated with hauling traps using an abraded line that may break. In the DEIS, NMFS acknowledged that there are potential safety hazards associated with the use of sinking groundline. However, an agency official told us that floating groundline can also pose a similar type of safety hazard.

To overcome the operational difficulties associated with using sinking groundline in rocky bottom areas, the Maine Department of Marine Resources submitted a proposal to NMFS in January 2007 that outlined an alternative to the use of sinking groundline along rocky areas of Maine's coast. One of the most prominent features of this proposal involves using low-profile groundline instead of sinking groundline in Maine's rocky bottom areas. Low-profile groundline is still in development, but to reduce abrasion, the Department of Marine Resources tested a line that floats, on average, about 3 feet above the ocean bottom instead of sinking to the bottom. Maine officials acknowledge that whales are present in the waters where they proposed using low-profile line, but maintain that it is a better alternative to using sinking groundline in rocky bottom areas. The state believes that low-profile groundline will be beneficial for fishermen in these areas, while also protecting whales from entanglement. The scientists with whom we spoke were not willing to support low-profile groundline until further research is conducted because they were unsure if it would reduce the risk of entanglement. NMFS is also concerned because although the low-profile groundline tested by the Maine Department of Marine Resources may on average float 3 feet above the ocean floor, in reality the rope moves constantly in the water, sometimes higher than 3 feet and sometimes lower. When it moves above the average height it could form an arc similar to that of floating groundline creating an entanglement risk for large whales. A NMFS official told us that the agency plans to compile proposals on issues related to overcoming the operational difficulties associated with using sinking groundline, including the Maine Department of Marine Resources' low-profile groundline proposal, and will circulate them to the ALWTR Team for comment and discussion.

NMFS Did Not Adequately Represent Uncertainties Associated With Proposed Gear Modifications Cost and Could Not Fully Assess Impacts on Potentially Affected Fishing Communities

NMFS did not have verifiable data for some of the key variables used in its assessment of the fishing industry's costs of complying with the proposed gear modifications.⁴⁰ In lieu of such data, NMFS relied on data that contained significant uncertainties about the compliance costs. NMFS acknowledged these uncertainties but, by not analyzing and presenting a range of possible costs, did not adequately represent them in the cost assessment included in the DEIS. As a result, the extent to which the fishing industry's actual costs to comply with the proposed gear modifications could be lower or higher than the amount reported in the DEIS is unclear. In addition, NMFS could not fully assess the impacts of these costs on fishing communities because it lacked data to estimate the affected fishermen's ability to absorb additional compliance costs as well as which specific communities would have to absorb any loss in jobs. Without such data, the agency could not adequately determine how many fishermen would be forced out of business or what impact this would have on communities whose economies are closely tied to the fishing industry.

Significant Uncertainties Exist Regarding NMFS's Cost Estimates of Complying with the Proposed Gear Modifications

NMFS estimated that the total cost to the fishing industry of complying with the proposed gear modifications would be about \$14 million annually.⁴¹ NMFS estimated that the lobster industry would incur more than \$12.8 million of the projected \$14 million costs. To estimate these costs, NMFS analyzed important differences between fishermen such as their location of operation, number of months of operation, and what they catch. This approach allowed the agency to capture variations in the gear configurations and operating characteristics of different types of fishermen and their associated differences in expected compliance costs. NMFS also identified and analyzed the key variables that are responsible for the total cost of complying with the proposed gear modifications, such as the lifespan of groundline, price of groundline, amount of gear loss, and the number of fishermen that would incur these costs. However, there were significant uncertainties associated with the data used to develop these cost estimates, which were not fully represented in NMFS's single cost estimate.

⁴⁰NMFS's analysis was based on vessels, but in this report we will refer to vessels as fishermen because they are affected by the regulation and would incur the costs.

⁴¹NMFS estimated the total cost to the fishing industry from the gear modifications outlined in each of its six proposed alternatives to revising the ALWTR plan in 2003 dollars. In this report, we discuss the costs of the two preferred alternatives, both of which NMFS estimated would cost the fishing industry about \$14 million annually.

First, NMFS determined the lifespan of both floating and sinking groundline based on undocumented estimates from fishermen and commercial marine suppliers it interviewed, rather than data that could be verified from field tests of groundline. Knowing the lifespan of groundline is important because replacing it more frequently results in higher costs to fishermen. Though NMFS tested sinking groundline to determine if it was operationally feasible to use throughout the northeast coast, it did not use the results of these tests to determine its lifespan. The agency believes that field testing would not have provided better information than the interviews it conducted on the lifespan of groundline because its use varies from fisherman to fisherman. Based on its interviews, NMFS reported in the DEIS that sinking groundline, depending on its diameter, would last between 1 and 3 years less—a 17 to 33 percent shorter lifespan—than the corresponding diameter of floating groundline.⁴² However, NMFS could not provide documentation of its interviews or details on how the lifespan—as reported by those interviewed—varied. According to the MLA, the lifespan of sinking groundline can range substantially and could be much shorter than the average NMFS reported in the DEIS. In the DEIS, NMFS acknowledged that the lifespan of groundline is extremely uncertain due to variations in where it is used, such as water temperature and bottom conditions, and the specific operating practices of fishermen. NMFS does not expect that all fishermen’s groundline would have the same lifespan as the estimates reported in the DEIS and acknowledges that actual costs to replace groundline could be higher or lower than estimated. Nonetheless, the agency believes that its estimates of the lifespan of sinking groundline are accurate and reflect what fishermen would experience in typical operating conditions. However, by using an average lifespan of groundline in its cost estimate, rather than the range of data collected from fishermen, NMFS did not fully address the concern that the useful life of groundline can vary significantly, depending on a fisherman’s practices and fishing location.

Second, while the price of groundline can vary substantially, NMFS did not use a range of prices in its analysis to account for these differences. In 2003, NMFS contacted four commercial marine suppliers and dealers to obtain prices of both sinking and floating groundline. The agency used the median reported price to estimate the costs of replacing floating groundline with sinking groundline. However, the agency does not have documentation of the prices collected and could not describe how these

⁴²Lifespan percentages are GAO’s analysis of NMFS lifespan data.

prices varied. We contacted the same suppliers and dealers and found that the price of groundline can range substantially. For example, in February and April 2007 the price of 3/8" sinking groundline—the most commonly used groundline by fishermen and within NMFS's cost analysis—ranged from almost 1 percent to almost 34 percent higher than the price reported in the DEIS.⁴³ NMFS acknowledges that the price of groundline could be higher or lower than reported in the DEIS but did not analyze and report the range of groundline prices it collected from suppliers and dealers.

Third, NMFS's estimates of the costs of gear loss were based on expert opinion because data from field tests were not available. In the DEIS, NMFS generally reported that fishermen that comply with the proposed gear modifications would experience greater gear loss than they do currently. For example, sinking groundline could lead to greater gear loss because the groundline can get caught on rocks and break as gear is hauled up. However, due to a lack of data, NMFS cannot estimate with confidence how much gear loss would increase for fishermen complying with the proposed gear modifications. The agency did not believe it would be practical to conduct field testing to determine what gear loss could be throughout the Atlantic because it can vary greatly, depending on how and where the gear is used. Instead, NMFS relied on the expert opinions of its gear research team, composed of ex-fishermen who are experienced with fishing gear, and the contractor that prepared the DEIS to estimate gear loss. The research team and the contractor assumed that gear loss attributable to the proposed gear modifications would be approximately double what the fishing industry currently loses in most areas. They estimated that gear loss would be even higher—approximately three times as much as they currently lose—for fishermen operating in areas near the coast of Maine due to difficulties with retrieving gear in rocky bottom areas. While NMFS believes its estimates were reasonable, the MLA believes that these gear-loss estimates are inaccurate and likely to be too low in Maine's rocky bottom areas. The agency does acknowledge that actual gear-loss costs could be higher or lower than it estimated in the DEIS. However, by not analyzing and reporting a range of possible gear-loss costs, NMFS did not fully represent the uncertainty of its gear-loss assumptions, even though it recognized that gear loss can vary, depending on the conditions of use.

⁴³The prices reported for rope in the DEIS were adjusted to 2007 dollars to account for inflation.

Fourth, NMFS may have underestimated the number of Maine lobster fishermen that would be required to comply with the proposed gear modifications. While all fishermen that operate in northern federal waters would be subject to gear modification requirements, all fishermen that operate in state waters along the east coast would not share these requirements because NMFS proposed that some areas be exempted from the regulation.⁴⁴ However, NMFS lacked data to effectively determine where state-permitted fishermen operate throughout the year and specifically how many would operate in waters exempted from the new requirements because Maine does not require fishermen to report where they operate.⁴⁵ Without this information, NMFS assumed that the percentage of fishermen who would operate in areas exempt from the proposed regulation would correspond to the percentage of state waters that are exempt. For example, NMFS reported in the DEIS that approximately 50 percent of Maine's state waters would be exempted from the gear-modification requirements. The agency also assumed that fishermen would operate in the same areas year-round so those operating in exempted waters would not be affected by the proposed gear modifications. NMFS made this assumption because it believes that lobster fishing in Maine is extremely territorial, and therefore the distance that fishermen move their gear is limited by traditional fishing area boundaries. Consequently, the agency assumed that approximately 50 percent of Maine's lobster fishermen, or approximately 1,853 fishermen, would operate exclusively in exempted waters and would not be affected by the gear-modification requirements.⁴⁶ However, a Maine state official and a MLA representative told us that it was unreasonable to assume that lobster fishermen would operate in only one area throughout the year. In fact, they said that fishermen operate wherever lobsters are, which may be in or out of exempted waters. If so, NMFS may not have captured the costs of the proposed gear modifications for an unknown number of Maine fishermen, and therefore may have underestimated how many would be affected by the proposed ALWTR plan changes and thus the total associated costs to the fishing industry.

⁴⁴Federal waters, that is, waters under the jurisdiction of the United States, extend from 3 nautical miles to 200 nautical miles offshore. State waters extend from the shore to 3 nautical miles offshore.

⁴⁵State-permitted fishermen are those that operate in state waters and are required to obtain a permit from the state.

⁴⁶This estimate only includes state-permitted fishermen, not those that may also have a federal permit.

NMFS acknowledges that there were uncertainties with the data used in its analysis of the costs to the fishing industry and that actual costs could be higher or lower than presented in the DEIS. However, NMFS did not determine the extent to which changes in the lifespan of groundline, price of groundline, amount of gear loss, or the number of fishermen who would have to comply with these requirements would impact the overall \$14 million cost estimate. By reporting a single estimate rather than a range of the fishermen's compliance costs, the DEIS did not adequately represent the uncertainties of these key variables in NMFS's assessment. Furthermore, without reporting such a range to account for these uncertainties, the extent to which the total estimated cost of complying with the proposed gear modifications could be different than the \$14 million estimate reported in the DEIS is unclear.

NMFS Could Not Fully Assess the Impacts of the Proposed Changes on Fishing Communities Because It Lacked Data on Fishermen's Ability to Absorb Additional Costs and Remain in Business

In addition to assessing the cost of the proposed gear modifications to the fishing industry, NMFS analyzed the effects of the costs of complying with the proposed gear modifications on both fishermen and fishing communities. Conducting an analysis of the effects on fishing communities first requires determining fishermen's ability to absorb additional costs and remain in business and may also include an estimate of changes in regional employment and income directly and indirectly related to the cost of complying with the proposed regulation.⁴⁷ However, NMFS could not fully conduct these analyses due to a lack of data.

Specifically, NMFS lacked data on fishermen's costs and revenue in a way that it could estimate their ability to absorb the increased costs of complying with the proposed gear modifications without going out of business. Instead, NMFS estimated fishermen's average annual revenue and then made an arbitrary assumption about the level of increased costs that would cause a fisherman to go out of business. First, NMFS estimated fishermen's annual revenue based on a limited number of fishermen because comprehensive revenue data do not exist. For example, NMFS used data from 9 lobster fishermen to estimate the revenue of 284 northern lobster fishermen that operate vessels less than 28 feet long. However, without fishermen-specific revenue data for all fishermen, the agency was unsure how well its estimates would compare with their actual revenue. Regarding small lobster vessels, NMFS said that it is possible that its

⁴⁷NOAA guidance, which NMFS followed to conduct the economic assessment within the DEIS, does not require the agency to estimate changes in regional employment and income.

analysis in the DEIS systematically underestimates their revenue. NMFS then made an arbitrary assumption that if gear-modification costs were greater than 15 percent of a fisherman's estimated annual revenue, then the fisherman could not absorb the additional costs and would go out of business. NMFS reported in the DEIS that it made this assumption because there is no clearly defined threshold of additional costs that would cause a fisherman to go out of business. Using this assumption, NMFS estimated that approximately 379 fishermen would go out of business, including many that operate smaller vessels for which NMFS lacked actual revenue data. However, because fishermen's actual revenues, as well as their ability to absorb additional costs, could be noticeably different from what NMFS assumed, the number of fisherman that would go out of business could be lower or higher than NMFS estimated.

Furthermore, because NMFS lacked information about which specific fishermen, living in which communities, would go out of business, it could not predict the extent to which specific communities would be affected. That is, NMFS could not identify exactly which communities would lose jobs or quantify any loss of regional income as the result of complying with the regulation. NMFS officials stated that associating any impact to a particular fishing community is particularly difficult because fishermen can sell their fish in one town, harbor their boat in a different town, and reside in a neighboring town. As an alternative, the agency identified potentially affected counties that had (1) over 100 fishermen that would be subject to the ALWTR plan requirements and (2) reported annual landings—seafood caught by fishermen—over 2 million pounds by vessels using ALWTR plan regulated gear.⁴⁸ The agency identified 15 counties that met these criteria, many of which were in Maine and economically dependent on the fishing industry.⁴⁹ The agency reported a general description of possible employment effects on these counties, but could not quantify and specifically associate the impact of lost income and

⁴⁸NMFS identified over 100 vessels within each county to determine if they would be at-risk of being affected; however, in this report we refer to them as fishermen.

⁴⁹The Magnuson-Stevens Act requires that NMFS consider impacts on "communities." The act defines "fishing community" as "a community which is substantially dependent on or substantially engaged in the harvest or processing of fishery resources to meet social and economic needs and includes fishing vessel owners, operators, and crew and United States fish processors that are based in such community." 16 U.S.C. § 1802(16). NMFS used counties as a proxy for communities because fishermen may reside in an area different from where they port their vessel. In addition, much of the landings data was county specific.

employment to any specific community. Consequently, it is not clear how significant the potential economic impacts on these communities would be and how well these communities could withstand the potential loss of fishing jobs and related income.

NMFS Has Not Developed Strategies for Fully Evaluating the Effectiveness of the Proposed Gear Modifications

Although NMFS's proposed modifications to the ALWTR plan contain some revisions to the current gear-marking requirements, such as increased marking of the vertical line, the agency has not developed a comprehensive approach to gear marking that would provide more complete information about the gear involved in future whale entanglements. Markings on commercial fishing gear can enable researchers to assess the type of rope involved in an entanglement, thereby providing critical information to assess the effectiveness of current whale protection measures and insights into needed changes. In addition, NMFS has not developed a strategy for determining whether future entanglements are due to industry noncompliance with the gear modification requirements or the ineffectiveness of the gear modifications themselves.

Lack of Comprehensive Gear-Marking Requirements Could Hamper Assessment of Proposed Gear Modifications

Research on the nature and source of whale entanglements is challenging in that entanglements are not directly observed when they occur. Instead, NMFS's gear research team is forced to rely on the gear it retrieves from entangled whales and/or photographs taken of the entanglement, if any. Even when gear is recovered, the gear research team may have only a rope fragment to evaluate. Therefore, markings on gear can play a critical role in informing scientists about the nature of the entanglement. Gear markings can potentially indicate whether a whale became entangled in groundline or vertical line, whether the gear was from the lobster fishery or some other fishery, and the geographic area where the gear was set. Currently, gear markings, such as vessel or permit numbers on buoys, can identify the name of the fisherman who set the gear so that NMFS officials can obtain specific information from the fisherman, such as the exact location where the gear was set.

Under the current regulation, NMFS requires some trap and gillnet fishermen to place one color-coded, 4-inch mark on the vertical line midway through its length, which fishermen typically paint on or tape to the rope. The color-coding scheme provides information about the location and fishery involved in the entanglement. For example, lobster fishermen in the Cape Cod Bay Restricted Area in federal waters—an area NMFS has designated as a critical habitat for large whales—are required to use a red

mark. Other colors are used to indicate other fisheries and areas. However, according to a NMFS official, the current gear-marking scheme has not been effective in assisting researchers because only rarely have fragments of vertical line been recovered that included the required mark.

NMFS proposed a new requirement for marking vertical line because the agency recognized that markings would be useful as the agency and the ALWTR Team further evaluate vertical line for future regulatory action. For example, if the agency recovered a rope that was marked, it would be better able to determine that it was vertical line and how frequently vertical line was involved with entanglements. Specifically, NMFS proposed expanding the frequency of gear marking—to one 4-inch mark every 60 feet on the vertical line.⁵⁰ A NMFS official with whom we spoke said the agency based the 60-foot requirement on the average length of rope found on entangled whales. The official explained that the 60-foot requirement would increase the likelihood of recovering marked rope from an entangled whale and would also minimize the burden on fishermen by not requiring them to mark rope even more frequently.

However, we believe NMFS's proposed gear-marking requirement may not be adequate in assisting researchers in identifying the gear that is recovered from an entangled whale because it is not comprehensive. First, even with increased markings on vertical lines, researchers may still not retrieve the marked portion of the rope. For example, some of the rope recovered from entangled whales has been only 6 feet long. Some stakeholders, including scientists at the Provincetown Center for Coastal Studies, recommended that NMFS require continuous marking throughout the length of the rope through the use of tracer lines—colored threads of line throughout the length of the rope. However, according to a NMFS official, continuous marking throughout the length of the rope is not practical because, among other reasons, it would limit fishermen's ability to move between different fishing areas that require different color markings.

Second, NMFS has not proposed marking sinking groundline. NMFS did not provide a rationale in the DEIS for not requiring the marking of sinking groundline. However, a NMFS official told us that the agency believed that sinking groundline would be completely effective at reducing groundline

⁵⁰For vertical lines that are less than 60 feet, fishermen would be required to place one 4-inch mark in the center of the line.

entanglements, and therefore there was no need to burden fishermen with a marking requirement on such line. However, scientists with whom we spoke believe that while sinking groundline will reduce entanglement risk, they do not believe that its complete success can be guaranteed. For example, scientists have observed endangered whales with mud on their heads, which scientists believe whales acquired scraping the ocean floor as they feed. Based on this information, scientists are concerned that endangered whales could become entangled in sinking groundline. Consequently, several scientists with whom we spoke, including several NMFS scientists, told us that sinking groundline should be marked so its performance can be evaluated.

Third, NMFS did not require gear markings in areas that have been exempted from the proposed gear modifications. NMFS developed exempted areas because the agency determined, based on whale sighting data, that certain waters pose a relatively low risk of entanglement because they are not as frequently traveled by endangered whales as others. However, because some of these areas are dense with commercial fishing gear, they nevertheless pose some risk. Consequently, we believe that any assessment of the new regulations would benefit from gear markings on the gear used by fishermen in exempted areas, even if they are not required to use modified gear.

Various stakeholders with whom we spoke or who submitted comments on the DEIS expressed concern about NMFS's proposed gear-marking scheme. Industry representatives were concerned about the burden the requirement would place on fishermen who would have to mark rope more frequently and the impracticality of marking rope every 60 feet. According to the Massachusetts Lobstermen's Association, painted marks can fade or become covered by algae and therefore must be maintained to retain their visibility—a problem that would be exacerbated with additional marking requirements. Also, maintaining a 60-foot space between marks is difficult because commercial fishermen must routinely cut and splice fishing lines. For example, fishermen may find their ropes inadvertently cut due to commercial and recreational vessel traffic and need to splice rope together. Fishermen may also change the length of their ropes when moving gear into and out of deep water. Given the impracticality of marking rope every 60 feet, the Cetacean Society International stated that NMFS should consider requiring rope that was marked continuously through the length of the rope by the manufacturer.

Stakeholders with whom we spoke observed that markings that were specific to individual fishermen could be useful to researchers because

they would enable researchers to obtain information from fishermen, specifically on how and where they set their gear. The Maine Lobstermen's Association and the Provincetown Center for Coastal Studies noted that new technology, such as microchips embedded in fishing rope, could potentially provide fishermen-specific information and that they would favor its use if the technology was feasible in the commercial fishing environment. NMFS's gear research team is aware of this technology, but believes that it is not yet suited to commercial fishing conditions because microchips embedded in rope may pop out as the rope moves through hauling devices used to pull gear out of the water.

NMFS Lacks a Strategy for Assessing Industry Compliance with the Proposed Gear Modifications

NMFS has not developed a strategy that will allow it to determine whether any future whale entanglements are due to noncompliance with the proposed new gear requirements by fishermen or the ineffectiveness of the gear modifications. NMFS did not specify in the DEIS how it plans to monitor industry compliance with its proposed rule and has not developed such a plan outside of the DEIS. Stakeholders with whom we spoke or who submitted comments on the DEIS have expressed concern that the DEIS did not include a plan for monitoring compliance with the proposed rule. According to the Whale Center of New England, the lack of monitoring plans in the past have made it difficult to evaluate the effectiveness of previous actions, and as a new regulation goes into effect, a monitoring plan would be critical in assessing the success or failure of the proposed actions.⁵¹ A Provincetown Center for Coastal Studies scientist observed that a plan for monitoring the proposed rule is as important to effectively protecting whales as the gear modifications themselves. A NMFS official told us that the agency understands the importance of having a compliance strategy and plans to develop one.

Regarding the current regulatory requirements, NMFS has not conducted a systematic survey of industry compliance and therefore, does not know the extent of industry compliance along the east coast. Maine is the only state to have conducted even limited compliance surveys of its state-permitted vessels. Since 2002, Maine has conducted annual compliance surveys over a 30-day period in both state and federal waters off the coast of Maine, according to a Maine Department of Marine Resources official.⁵²

⁵¹The Whale Center of New England is a nonprofit organization that conducts research, conservation, and education.

⁵²The lack of federal funding in 2006 prevented Maine from conducting the survey that year, but the state plans to resume the survey in 2007.

During the survey, enforcement officers in patrol boats target large concentrations of gear and randomly pull gear out of the water. The enforcement officers document information about the type and location of gear, the owner, and what species the fishermen were targeting. This effort is conducted separately from routine enforcement patrols during which enforcement officers complete logs that record only violations. According to a Department of Marine Resources official, the state can conduct this compliance survey because it has vessels that are equipped to haul commercial fishing gear, even from deep water areas and because NMFS has provided funding to support this effort. Although Maine's annual compliance survey indicates a high rate of compliance, it is subject to a number of limitations. The survey is not conducted using scientific sampling of gear, so the results cannot be generalized to all gear, and it does not incorporate all segments of Maine's fishing industry, so it is not comprehensive.

Effective January 2007, Massachusetts required that sinking groundline be used throughout state waters—a requirement similar to what NMFS proposed along the north Atlantic coast. Officials with the Massachusetts Office of Law Enforcement Environmental Police stated that they are exploring the use of a vessel equipped with sonar to assess whether fishermen are complying with the state's sinking groundline requirement. Through sonar, the department can detect if fishermen are using floating or sinking groundline without hauling the gear out of the water. They explained that sonar could be an efficient method for conducting a systematic survey because hauling gear is time consuming, particularly since the gear must be placed back carefully where the fisherman had the gear set.

Conclusion

NMFS has a challenging mandate of reducing the risks posed to the survival of Atlantic large whales by entanglements in commercial fishing gear, while also taking into account the economic interests of commercial fishermen. In its continuing efforts to protect endangered whales, including the right whale which is critically endangered, NMFS is considering various revisions to the existing regulations which include certain gear modifications for the fishing industry. However, the economic analysis that NMFS developed to support its actions does not disclose the full range of possible costs that the proposed gear modifications may impose on fishermen although it acknowledges that costs could be higher or lower than it presented. While we believe the approach that NMFS used to estimate compliance costs is reasonable, we are concerned that the presentation of costs did not fully reflect the uncertainty of the analysis.

Moreover, given the concerns raised by scientists and other experts regarding the effectiveness of the proposed gear modifications in eliminating whale entanglements, it is important for NMFS to develop strategies that will allow it to assess the effectiveness of these changes as well as monitor industry compliance. However, NMFS has neither developed a comprehensive strategy to help it assess whether its proposed gear modifications are effective in eliminating whale entanglements nor has it developed a program to monitor industry compliance.

Recommendations

Before NMFS finalizes its proposed regulations for the ALWTR plan, we recommend that the Secretary of Commerce direct the Administrator of National Oceanic and Atmospheric Administration to direct the Assistant Administrator for NMFS to take the following three actions:

- adequately represent the uncertainty in data that the agency used to determine the costs of the proposed fishing gear modifications, by presenting a range of possible costs in the economic analysis section of the final environmental impact statement;
- revise the proposed gear-marking requirements to include markings on sinking groundline and gear marking requirements in exempted areas; and
- develop a strategy for assessing the extent of industry compliance with the gear modification requirements.

Agency Comments and Our Evaluation

We provided a draft of this report to the Department of Commerce for review and comment. In its comments, the Department of Commerce's NOAA questioned whether we had obtained input from a broad range of stakeholders, felt the report appeared to focus solely on the impacts to the Maine fishing community, and disagreed with two of our recommendations.

We disagree with NOAA's comment that we did not obtain and reflect a range of stakeholders' views in this report. As described in detail in our objectives, scope, and methodology, included in appendix I, we conducted interviews, reviewed documents, and took other steps to ensure that our work adequately portrays a wide range of stakeholders' views and appropriately addresses the complexities of these issues. In addition to NMFS officials, the stakeholders we contacted include state marine fishery management agency officials from Maine and Massachusetts; fishing industry representatives from the Massachusetts Lobstermen's

Association, Maine Lobstermen's Association, and the Atlantic Offshore Lobstermen's Association; a representative from the Humane Society of the United States; and scientists from the Provincetown Center for Coastal Studies, the New England Aquarium, the Woods Hole Oceanographic Institution, and the Marine Mammal Commission. We also reviewed all of the stakeholders' comments submitted to NMFS on the DEIS and attended a meeting of the ALWTR Team—composed of fishermen, scientists, conservationists, and state and federal officials who are tasked with monitoring the status of the ALWTR plan and advising NMFS as it develops revisions to the plan.

In its general comments, NOAA also stated that, in its view, the draft report appears to focus solely on the impacts to the Maine fishing community. We do not agree with this characterization of the report. Although the report clearly places some emphasis on issues of concern to the Maine lobster industry, we believe this is appropriate given the objectives we were asked to address in this review. Two of our objectives specifically focus on how NMFS plans to address issues related to implementing the proposed changes to the ALWTR plan, particularly in the rocky bottom areas of the north Atlantic coast, and to evaluate the extent to which NMFS fully assessed costs to the fishing industry and economic impacts on fishermen. The rocky bottom areas of concern are located primarily off the coast of Maine; and as a result, the report describes concerns raised by Maine lobstermen regarding the implementation challenges they believe they will face. In addition, according to NMFS's analysis contained in the DEIS, the lobster industry will bear \$12.8 million of the approximately \$14 million annual cost of complying with the proposed regulatory changes, and this industry is primarily centered in Maine and Massachusetts. Consequently, the report appropriately includes concerns raised by Maine lobstermen about NMFS's analysis of the costs of complying with the proposed regulatory changes.

With regard to our recommendations, NOAA believes that the uncertainty of the data was adequately represented in the DEIS and therefore did not agree with our recommendation that the agency present a range of possible costs in its final economic analysis to represent the uncertainty in the data. Nonetheless, NOAA said that it is planning to clarify the variations and uncertainties within its analysis in the Final Environmental Impact Statement (FEIS). NOAA said that this clarification would discuss potential differences in total compliance cost from variations in several of the assumptions that we had identified in our report. By recognizing that the treatment of uncertainty in the DEIS can be improved and by taking additional steps to explain the effect of uncertainty on compliance costs,

the agency appears to be taking a step in the direction we recommended. However, we continue to believe that unless NMFS includes a range of possible costs facing the fishing industry in the FEIS, the agency will not have clearly and thoroughly represented the uncertainties in its analysis.

NOAA also did not agree with our recommendation that the agency revise the proposed gear-marking requirements to include markings on sinking groundline and gear marking in exempted areas. Although NOAA concurred that methods are needed for identifying sinking groundline and gear from exempted areas, it stated that such markings are not feasible or practical at this time. It is unclear to us why NOAA would make such a statement given that in the DEIS, NMFS has proposed marking requirements for vertical line. We believe that if such marking is feasible and practical for vertical line, similar marking should also be feasible and practical for sinking groundline. Without such comprehensive gear-marking requirements, we believe that NMFS will not be in a position to evaluate whether or not its regulations, including the use of sinking groundline, will be effective in protecting Atlantic large whales from entanglement.

NOAA did agree with our recommendation that NMFS should develop a strategy for assessing industry compliance with the gear-modification requirements. However, NOAA stated that the recommendation cannot be implemented before NMFS finalizes its proposed regulations for the ALWTR plan, as we recommended. This is because NMFS is currently working on the strategy and plans to continue discussions with the ALWTR team at its next meeting, tentatively scheduled for early 2008, which is beyond the time the FEIS and final regulation will be issued. If NOAA is unable to complete its strategy for assessing industry compliance prior to finalizing its proposed regulations, we believe the agency should have the strategy in place by the effective date of the final regulations so that NMFS can be in a position to evaluate the effectiveness of its regulatory changes from their inception.

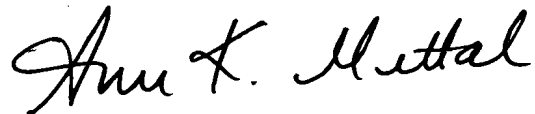
NOAA also provided technical comments, which we have incorporated in this report as appropriate. NOAA's comments and our detailed responses are presented in appendix II.

We are sending copies of this report to the Secretary of Commerce, appropriate congressional committees, and other interested Members of Congress. We also will make copies available to others upon request. In

addition, the report will be available at no charge on the GAO Web site at <http://www.gao.gov>.

If you or your staff have any questions about this report, please contact me at (202) 512-3841 or mittala@gao.gov. Contact points for our Offices of Congressional Relations and Public Affairs may be found on the last page of this report. GAO staff who made major contributions to this report are listed in appendix III.

Sincerely yours,

A handwritten signature in black ink that reads "Anu K. Mittal". The signature is written in a cursive, flowing style.

Anu K. Mittal
Director, Natural Resources
and Environment

Appendix I: Objectives, Scope, and Methodology

Since the National Marine Fisheries Service (NMFS) has not issued a final environmental impact statement or regulation, we have reviewed the proposed changes to the Atlantic Large Whale Take Reduction (ALWTR) plan outlined in the draft environmental impact statement (DEIS). Specifically we (1) described the scientific basis for the proposed changes to the ALWTR plan and the extent to which uncertainties exist regarding how effectively they will protect large whales; (2) described how the agency plans to address implementation issues, particularly in the rocky bottom areas of the North Atlantic coast; (3) evaluated the extent to which NMFS fully assessed costs to the fishing industry and economic impacts on fishermen; and (4) evaluated the extent to which NMFS has developed strategies for fully assessing the effectiveness of and industry compliance with the proposed changes.

To address all four objectives, we reviewed the DEIS and the public comments made in response to the issuance of the DEIS. We interviewed officials at NMFS's Northeast Regional Office who participated in developing the proposed changes to the plan outlined in the DEIS. We interviewed state marine fishery management agency officials from the Maine Department of Marine Resources and the Massachusetts Division of Marine Fisheries. We also interviewed fishing industry representatives from the Massachusetts Lobstermen's Association, Maine Lobstermen's Association, and the Atlantic Offshore Lobstermen's Association. We interviewed a representative from the Humane Society of the United States, a conservation group. Finally, we attended a meeting of the ALWTR Team—composed of fishermen, scientists, conservationists, and state and federal officials who are tasked with monitoring the status of the ALWTR plan and advising NMFS as it develops revisions to the plan—held in December 2006. At this meeting, we observed presentations on the status of endangered whales, new strategies to reduce the entanglement risk of vertical line, and experimental whale safe rope that could be used in rocky bottom areas.

To obtain information on the scientific basis for the proposed changes to the ALWTR plan outlined in the DEIS and any uncertainties regarding how effectively they will protect large whales, we interviewed NMFS scientists at its Northeast Fisheries Science Center and officials that developed the proposed changes to the ALWTR plan. In addition, we interviewed marine mammal scientists from the Provincetown Center for Coastal Studies, the New England Aquarium, the Woods Hole Oceanographic Institution, and the Marine Mammal Commission to obtain expert opinions on the need for regulatory action and the effectiveness of the actions proposed by NMFS. We also reviewed scientific literature on right, humpback, and fin whale

behaviors and entanglements in commercial fishing gear. Additionally, we attended the annual meeting of the North Atlantic Right Whale Consortium, a group composed of a number of both nongovernmental and governmental organizations and individuals, including marine mammal scientists, who study and work to conserve North Atlantic right whales. At this meeting, we observed presentations on recent scientific research on right whales, including their migratory behaviors and entanglement risks.

To obtain information on how NMFS plans to address issues with implementing its proposed changes to the ALWTR plan, especially in rocky bottom areas of the North Atlantic coast, we obtained the opinions of representatives from fishing industry associations on the challenges posed by the proposed gear modifications. We also interviewed NMFS officials from its gear research team—former fishermen who develop whale safe gear and provide educational outreach to fishermen—to obtain information on how fishermen could overcome these challenges. In addition, we interviewed officials from the Maine Department of Marine Resources and the Massachusetts Division of Marine Fisheries to obtain their views on how these challenges could impact fishermen. Finally, we reviewed the results from NMFS’s testing of sinking groundline throughout the east coast as well as the results of the Maine Lobstermen’s Association’s tests of sinking groundline.

To evaluate the extent to which NMFS fully assessed the costs to the fishing industry and impacts to fishing communities, we interviewed representatives of Industrial Economics Inc., the contractor who conducted the economic analysis that is included in the DEIS. We also interviewed officials from NMFS’s Northeast Regional Office, including the gear research team, that contributed to the economic assessment. In addition, we interviewed economists from NMFS’s Northeast Fisheries Science Center. We also interviewed fishing industry representatives to get their views on the data and assumptions used within the DEIS analysis. We also contacted commercial marine suppliers in February and April of 2007 to obtain the price of sinking groundline.

To evaluate the extent to which NMFS has developed strategies for assessing the effectiveness of and industry compliance with the proposed ALWTR plan changes, we interviewed officials from NMFS’s Northeast Regional Office on NMFS’s current and planned evaluation strategies. We interviewed NMFS’s gear research team and officials from the Northeast Regional Office that developed the gear-marking scheme on the proposed gear-marking requirements and how they were developed. We interviewed scientists from the Provincetown Center for Coastal Studies, the New

England Aquarium, and the Woods Hole Oceanographic Institution to obtain their views on the proposed gear-marking requirements and which markings would be most beneficial to assessing the effectiveness of gear modifications. We also interviewed representatives from the Maine Lobstermen's Association to obtain their views on gear-marking requirements. Finally, we interviewed marine fisheries law enforcement officials from the Massachusetts Executive Office of Environmental Affairs and the Maine Department of Marine Resources on gear-marking requirements and their current compliance evaluation strategies.

We conducted our review from August 2006 through June 2007 in accordance with generally accepted government auditing standards.

Appendix II: Comments from the Department of Commerce

Note: GAO comments supplementing those in the report text appear at the end of this appendix.



THE DEPUTY SECRETARY OF COMMERCE
Washington, D.C. 20230

July 5, 2007

Ms. Anu K. Mittal
Director, Natural Resources
and Environment
U.S. Government Accountability Office
441 G Street, NW
Washington, D.C. 20548

Dear Ms. Mittal:

Thank you for the opportunity to review and comment on the Government Accountability Office's draft report entitled *National Marine Fisheries Service: Improved Economic Analysis and Evaluation Strategies Needed for Proposed Changes to Atlantic Large Whale Protection Plan* (GAO-07-881). On behalf of the Department of Commerce, I enclose the National Oceanic and Atmospheric Administration's programmatic comments to the draft report.

Sincerely,

A handwritten signature in black ink, appearing to read "David A. Sampson", with a large, sweeping flourish extending to the right.

David A. Sampson

Enclosure

Department of Commerce
National Oceanic and Atmospheric Administration
Comments on the Draft GAO Report Entitled
“National Marine Fisheries Service: Improved Economic Analysis and Evaluation
Strategies Needed for Proposed Changes to Atlantic Large Whale Protection Plan”
(GAO-07-881/June 2007)

General Comments

The Department of Commerce’s National Oceanic and Atmospheric Administration (NOAA) acknowledges GAO’s efforts in addressing previous comments provided on the Statement of Facts and recognizes GAO staff for its hard work toward understanding the issues and complexities of managing these high profile protected species.

NOAA has three general comments on the report’s content.

1. In considering issues surrounding the conservation of Atlantic large whales, NOAA takes into account a variety of input from diverse stakeholders. In developing the proposed alternatives, for example, NOAA weighed input from the Atlantic Large Whale Take Reduction Team (ALWTRT), which includes:
 - seventeen individuals representing fishing organizations and groups that utilize trap/pot gear;
 - twelve individuals representing fishing organizations and groups that utilize gillnet gear;
 - five individuals representing conservation/environmental groups;
 - thirteen individuals representing state agencies;
 - eight Federal Government and fishery management organizations; and
 - eight academic/scientific organizations.

In addition, NOAA has discussed many of the management concepts contained in the Draft Environmental Impact Statement (DEIS) at several public forums including:

- six scoping meetings held prior to the development of the DEIS;
- several ALWTRT meetings; and
- thirteen public hearings in which extensive public testimony was provided.

NOAA also received 81 letters providing comments on the DEIS and received approximately 25,000 additional form letters via e-mail and regular mail.

NOAA balanced the input received with all of the various legal mandates to which it is required to adhere. NOAA encourages the GAO to ensure the report adequately portrays the various stakeholder views and the complexities involved in addressing these complicated issues.

2. The Atlantic Large Whale Take Reduction Plan (ALWTRP) proposes changes that affect commercial fishing operations from Maine to Florida; however, the GAO draft report appears to focus solely on the impacts to the Maine fishing community, which is only one

See comment 1.

See comment 2.

See comment 3.

See comment 4.

See comment 5.

See comment 6.

See comment 7.

See comment 8.

sector of the stakeholders affected by this rulemaking. If the intent of the report is to focus on primarily one sector affected by the ALWTRP, the report and its title should be revised to clarify this. However, if the intent is to provide a more comprehensive assessment, other stakeholder views should be included. In addition to the Maine Lobstermen's Association (MLA), whose views seem to have been heavily relied upon by GAO in developing its findings and conclusions, there are other industry-based organizations within the state of Maine. The Downeast Lobstermen's Association, Southern Maine Lobstermen's Association, and Maine Offshore Lobstermen's Alliance are also prominent industry-based organizations within the state of Maine. In addition, the MLA and the other industry-based groups in Maine do not always share the same viewpoint. NOAA notes GAO should have more equally reflected the wide extent of the plan, including geographic extent, range of fisheries affected, conservation interests and other aspects of the plan outside of select stakeholders from Maine. For example, the report would have benefited from input from other industry-based organizations such as the Massachusetts Lobstermen's Association, the Atlantic Offshore Lobstermen's Association, the Garden State Seafood Association, and the North Carolina Fisheries Association. In addition, input from conservation interests like the Humane Society of the United States, the Ocean Conservancy and the International Wildlife Coalition, as well as right whale research organizations like the New England Aquarium would have provided a wider viewpoint, allowing perspectives from other stakeholders affected by the ALWTRP.

3. The report provides numerous statements indicating NOAA's National Marine Fisheries Service (NMFS) did not provide data to support some of its important caveats and estimates used in its DEIS analysis. For example, the report states, "Based on its interviews, NMFS reported in the DEIS that sinking groundline, depending on its diameter, would last between one to three years less—a 17 to 33 percent shorter lifespan—than the corresponding diameter of floating groundline. However, NMFS could not provide documentation of its interviews or details on how the lifespan—as reported by those interviewed—varied." To support the author's claim, the report states, "According to MLA, the lifespan of sinking groundline can range substantially and could be much shorter than the average NMFS reported in the DEIS." NOAA believes this is the opinion of the MLA (with no documentation of how the MLA arrived at its conclusion provided in the GAO report). Consistent with general comments 1 and 2 above, NOAA believes that GAO should have included views from other stakeholders, particularly those who, unlike the MLA, are not proposed to be regulated under this action. Examples of such stakeholders would be those in the environmental and science communities.

NOAA Response to GAO Recommendations

The draft GAO report states, “Before NMFS finalizes its proposed regulations for the ALWTR plan, we recommend that the Secretary of Commerce direct the Administrator of NOAA to direct the Assistant Administrator for NMFS to take the following three actions:”

NOAA Response: NOAA does not believe actions to fully address the recommendations can be implemented “before NMFS finalizes its proposed regulations for the ALWTR plan.” NOAA has evaluated the recommendations and has provided details below.

Recommendation 1: “Adequately represent the uncertainty in the data the agency used to determine the costs of the proposed fishing gear modifications by presenting a range of possible costs in the economic analysis section of the final environmental impact statement.”

NOAA Response: NOAA believes that it has adequately represented the uncertainty in the data the agency used to determine the costs of the proposed fishing gear modifications. Thus, NOAA does not agree with the recommendation to present a range of possible costs in the economic analysis section of the final environmental impact statement. Given the proposed regulations vary depending on fishery, location of fishing activity, time of year, and the variety of fishing habitats and practices, data are not available to assess differences in gear loss, wear, and replacement rates specific to each vessel or to develop probability distributions. The economic analysis contained in the DEIS relies on the best professional judgment to estimate the average rate of gear usage, replacement, and loss under varying conditions for varying fishing locations.

GAO reports MLA anticipated different rates of gear loss and replacement. Similarly, NOAA anticipates and acknowledges in the DEIS that certain vessels will experience higher rates of gear loss and replacement and, as a result, higher compliance costs. NOAA also anticipates other vessels will experience lower rates of gear loss and replacement and, as a result, lower compliance costs. As such, NOAA believes application of higher gear loss and replacement rates to the entire fishing industry would be misleading.

The report also cites discussions with MLA stating that vessels fishing on rocky bottom within Maine state waters will experience higher rates of gear loss, wear, and replacement than assumed in the analysis. It is important to note, however, that a significant portion of Maine’s state waters would be exempt from the provision, including areas of rocky bottom. For vessels fishing in the proposed regulated portions of Maine state waters, the analysis also assumes a higher rate of gear loss than in other waters. As a result, NOAA anticipates the uncertainty in gear loss and replacement within Maine state waters is less than suggested by GAO.

NOAA is planning to clarify the variations and uncertainties within its analysis contained in the Final Environmental Impact Statement. This clarification would discuss potential differences in total compliance costs from variations in several of the assumptions identified in the report.

See comment 9.

See comment 10.

See comment 11.

See comment 12.

Recommendation 2: “Revise the proposed gear marking requirements to include markings on the sinking groundline and gear marking requirements in exempted areas.”

NOAA Response: NOAA does not agree with this recommendation. While NOAA agrees a method for identifying sinking groundline and gear in exempted areas is needed, NOAA does not believe revising the proposed gear marking requirements to include markings on the sinking groundline and gear marking requirements in exempted areas would be feasible or practical at this time. NOAA discussed marking sinking groundline and gear in exempted areas during the development phase of the DEIS and proposed rule. Commenters objected to this gear marking scheme for the following reasons:

1. It would be impossible to adhere to in deep water;
2. Tape will not stick to wet rope, nor will paint;
3. Marking techniques lose their visibility within a few weeks in the water due to basic wear and tear and the accumulation of algal growth on the ropes making the marks hard to discern;
4. Gear marking would be difficult to implement as line is spliced or fouled over the course of its useful life;
5. There would be a problem in trying to figure out whether the space between marks is the exact length;
6. It will be tough to mark at sea, especially given temperature, sea state, and safety considerations;
7. The marking scheme is generic and limited marks will not provide much information. For instance, the scheme would only identify a buoy line or groundline, but not a fishery or even a region where the gear was fished (i.e., no unique identifier); so this limits the amount of information that can be tracked and evaluated;
8. It is too time consuming, costly, impractical, and unworkable;
9. Too many areas will not have marking requirements (e.g., exempted areas, recreational gear, Canadian waters);
10. Gear loss would be too much using the new gear marking;
11. It will be a financial burden to fishermen, without much chance for results that are useful;
12. Buoys and traps are already marked under current lobster fishing rules; and
13. It would be hard to enforce given the large number of recreational lobstermen.

See comment 13.

GAO should note NOAA has tested alternative gear marking schemes to address the concerns raised by the industry and is currently working on a chip technology that can be inserted into the line and coded with fishermen identification for the entire eastern seaboard. NOAA anticipates this will help to more easily identify gear in the water. NOAA will be discussing this technology with the ALWTRT in the future. However, NOAA believes it would be premature to propose this technology or any other specific method as a requirement.

See comment 14.

Recommendation 3: “Develop a strategy for assessing the extent of industry compliance with the gear modification requirements.”

NOAA Response: NOAA agrees with this recommendation. A strategy should be developed for assessing the extent of industry compliance with the gear modification requirements. However, a strategy cannot be developed prior to NMFS finalizing its proposed regulations for the ALWTRP.

NOAA is currently working on developing a monitoring/compliance strategy with the ALWTRT and other stakeholders. NOAA has discussed this strategy with the ALWTRT on several occasions. However, the results of these discussions were not conducive to development of a meaningful strategy. At its April 2003 meeting, the ALWTRT recommended that NOAA establish a Compliance Committee to discuss issues such as evaluating, monitoring, and improving ALWTRP compliance. The plan development includes working through the Atlantic States Marine Fisheries Commission and Joint Enforcement Agreement (JEA) contacts and involves stakeholder groups on the ALWTRT. As noted in the report, NOAA has made some progress regarding this issue, particularly with NOAA and state enforcement offices through the JEA process. However, NOAA acknowledges more work is needed in this area. At its 2004 and 2005 meetings, the ALWTRT also discussed separating monitoring issues from the Compliance Committee and addressing these through a Status Report Subcommittee. The discussion focused on the interpretations of the annual right whale and humpback whale scarification analysis. Specifically, the ALWTRT discussed whether the scarification analysis was the best method for evaluating the ALWTRP. NOAA intends to continue this discussion with the ALWTRT at its next meeting, tentatively scheduled for early 2008.

The following are GAO's comments on the Deputy Secretary of Commerce letter dated July 5, 2007.

GAO Comments

1. We believe that the report reflects a wide variety of input from a diverse group of stakeholders. For this reason, we did not revise the report based on this comment. As discussed in appendix I of the report, we obtained input from stakeholders through interviews, a review of relevant documents, and attendance at meetings. We interviewed fishing industry representatives from the Maine Lobstermen's Association (MLA), the Massachusetts Lobstermen's Association, and the Atlantic Offshore Lobstermen's Association. We obtained the views of the Garden State Seafood Association and the Downeast Lobstermen's Association through the written comments they submitted on the DEIS. We also interviewed officials from Maine's and Massachusetts' state marine agencies because 10 of the 15 communities that the DEIS identified as "at-risk" as a result of the projected economic impacts of the ALWTR plan modifications are located in these two states. We also interviewed a representative of the Humane Society of the United States and marine mammal scientists at the New England Aquarium, Woods Hole Oceanographic Institution, the Provincetown Center for Coastal Studies, and the Marine Mammal Commission. Moreover, we obtained views from scientists at the NMFS Northeast Fisheries Science Center as well as the views of the NMFS gear research team. We attended the annual meeting of the North Atlantic Right Whale Consortium, a group that studies and works to conserve North Atlantic Right Whales. We also attended the December 2006 ALWTR Team meeting, which included representatives from a wide range of groups including trap and gillnet fishing groups, conservation groups, federal and state agencies, and academic/scientific organizations. Finally, we reviewed all of the public comments submitted to NMFS on the DEIS, which included comments from a wide variety of government, scientific, industry, and environmental groups.
2. We do not agree with National Oceanic and Atmospheric Administration's (NOAA) contention that the report appears to focus solely on the impacts to the Maine fishing community. In addressing the first and fourth objectives of the report, we broadly describe the scientific basis for the proposed changes to the ALWTR plan and evaluate the extent to which NMFS has developed strategies for fully assessing the effectiveness of and industry compliance with the proposed changes. Our second objective was to describe how NMFS plans to address issues related to implementing the proposed changes

to the ALWTR plan, particularly in the rocky bottom areas of the North Atlantic coast. These rocky bottom areas are located primarily off of the coast of Maine; and as a result, the report describes concerns raised by Maine lobstermen regarding the implementation challenges they believe they will face. Finally, our third objective was to evaluate the extent to which NMFS fully assessed costs to the fishing industry and economic impacts on fishermen. As NMFS stated in the DEIS, the lobster industry is expected to bear more than \$12.8 million of the approximately \$14 million annual cost of complying with the proposed regulatory changes, and the Atlantic lobster industry is primarily centered in Maine and Massachusetts. Consequently, the report includes concerns raised by Maine lobstermen about NMFS's analysis of the costs of complying with the proposed regulatory changes. For the reasons stated above, we did not revise the report.

3. As stated in comment two, we do not believe that the report focuses on one industry sector affected by the ALWTR plan. Because we believe that the report title is accurate and appropriate we did not revise the report in response to this comment.
4. We did not rely heavily on the views of the MLA in developing our finding and conclusions as NOAA contends. As we stated in comment one, we made use of information from a wide range of stakeholders in developing our findings. Although the report clearly places some emphasis on issues of concern to the Maine lobster industry, we believe this is appropriate given the objectives we were asked to address in the report. As a result, we did not revise the report in response to this comment.
5. We believe that the report adequately describes the geographic extent of the proposed changes to the ALWTR plan and the range of fisheries affected. In addition, we reviewed comments on the DEIS submitted by the Garden State Seafood Association and obtained input from the Massachusetts Lobstermen's Association and the Atlantic Offshore Lobstermen's Association through interviews with their representatives. We have revised the report to include specific comments from the latter two groups.
6. As we noted in comment one, we interviewed a representative from the Humane Society of the United States and scientists from the New England Aquarium. We also reviewed comments on the DEIS submitted by the Ocean Conservancy and the International Wildlife Coalition. Consequently, we did not revise the report in response to this comment.

7. NOAA correctly states that our report identifies instances in which NMFS could not provide documentation for some of the estimates it used in the economic analysis in the DEIS, including how the lifespan of sinking groundline varied based on interviews NMFS conducted. However, NOAA then erroneously claims that we used statements from the MLA to support the fact that the lifespan of sinking groundline varied. We reported NMFS's contention that the lifespan of sinking groundline varied, despite the fact that it could not provide documentation of the interviews it conducted. We also reported the MLA's view that, based on its experience, the lifespan of sinking groundline can range substantially and could be shorter than the average NMFS reported in the DEIS. For these reasons, we did not revise the report in response to this comment.
8. As stated in comment one, we made use of information from a wide range of stakeholders in developing our findings, including those in the science and environmental communities. However, regarding the costs and economic impacts of gear modifications, we relied on the views of the affected fishermen because they have direct experience in this area, whereas scientists and conversation groups generally do not. Consequently, we did not revise the report in response to this comment.
9. We do not agree that NOAA has adequately represented the uncertainty in the data the agency used to determine the costs of the proposed fishing gear modifications. We believe that presenting its estimates as single point values (for example, \$14 million) rather than showing the range of possible costs, implies a degree of preciseness that is misleading and not supportable by the limitations and sometimes lack of available data. Moreover, while, on one hand, NOAA claims that it has adequately addressed uncertainty, on the other hand, it goes on to say that it is planning to clarify the variations and uncertainties within its analysis contained in the Final Environmental Impact Statement. This clarification would discuss potential differences in total compliance costs from variations in several of the assumptions identified in our report. We believe such clarification is needed and continue to believe that presenting a range of possible costs would be the best way to represent the uncertainty in the analysis. For these reasons, we did not revise the report in response to this comment.
10. We agree that gear loss and replacement and the associated compliance costs could be higher or lower than the average cost that NMFS reported in the DEIS and that is why we recommended that

NMFS represent this uncertainty by presenting a range of possible costs in its economic analysis. We did not recommend applying higher gear loss and replacement rates to the entire fishing industry as NOAA seems to suggest in its comments. Therefore, we did not revise the report in response to this comment.

11. We recognize that portions of Maine's state waters are proposed to be exempt from the changes to the ALWTR plan. This does not change the fact that NMFS's gear research team estimated that gear loss would vary by area of fishing operation and that, according to the MLA, NMFS's estimates are likely to be too low in Maine's rocky bottom areas that will be subject to the new regulation. Furthermore, the report does not attempt to identify a particular level of uncertainty related to gear loss as NOAA contends. For these reasons, we did not revise the report in response to this comment.
12. We do not agree with NOAA's comment that markings for identifying sinking groundline and gear in exempted areas are not feasible or practical at this time. In the DEIS, NOAA proposed requiring that vertical line be marked. If such marking is feasible and practical for vertical line, the same type of marking should be feasible and practical for sinking groundline. Many scientists we spoke to indicated that sinking groundline should be marked. Consequently, we did not revise the report in response to this comment.
13. Because the draft report already included a paragraph which discusses the status of efforts to use "chip technology" to identify fishing gear, including that NMFS believes that it is not yet ready to be implemented, we made no changes in response to this comment.
14. If NOAA is unable to complete its strategy for assessing industry compliance prior to finalizing its proposed regulations, we believe the agency should have the strategy in place by the effective date of the final regulations so that it is in a position to evaluate the effectiveness of its regulatory changes from their inception. We did not revise the report in response to this comment.

Appendix III: GAO Contact and Staff Acknowledgments

GAO Contact

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Staff Acknowledgments

In addition to the contact named above, Stephen D. Secrist, Assistant Director; John W. Delicath; Doreen S. Feldman; Nancy A. Hess; Justin M. Jaynes; Gregory A. Marchand, Mehrzad Nadji; Kelly Agnese Richburg; and Bruce Skud made key contributions to this report.

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