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A MODEL FOR CONFLICT RESOLUTION IN MARINE MAMMAL / FISHERIES INTERACTIONS: THE NEW ENGLAND HARBOR PORPOISE WORKING GROUP

Ronald Joel Smolowitz
Coonamessett Farm
East Falmouth, Massachusetts, 02536 USA

David N. Wiley
International Wildlife Coalition
Box 388
North Falmouth, MA 02556 USA

Abstract

Marine mammal/fishery interactions are a continuing social, economic and ecological problem. The incidental catch of harbor porpoise (Phocoena phocoena) in the Gulf of Maine sink gill net fishery represents one of the most serious current conflicts in United States waters. To facilitate resolution of this conflict, a coalition of fishermen, scientists, environmental advocates and resource managers formed the New England Harbor Porpoise Working Group (HPWG). The primary goal of the HPWG is "to define the extent of the problem and identify solutions pertaining to harbor porpoise and commercial fisheries interactions in the Gulf of Maine and, more specifically, to reduce the incidental take of harbor porpoise in gill nets while minimizing impacts on the fishery."

Work is underway by the group to identify gear modifications and changes in operational practices that may accomplish these goals. Additionally, the group is lobbying governmental and private agencies for funding required to effect these actions. While the HPWG is still working to achieve its goals, it may serve as a model for conflict resolution in other areas and fisheries.

Introduction

In 1991 there were 276 sink gill net vessels landing in Massachusetts, New Hampshire, and Maine. During the last five years the average annual landings of this fleet was 17,000 mt worth about $16 million at the dock (Walden, NMFS, PC). This fleet also has a bycatch of marine mammals.

Marine mammals, for a variety of reasons, enjoy special emotional and legal status throughout the United States. There is widespread support for the philosophy that marine mammals should not be killed, directly or indirectly, by human activity. This philosophy is codified in the Marine Mammal Protection Act (MMPA) of 1972. The MMPA established as an immediate goal that "the incidental kill or incidental serious injury of marine mammals permitted in the course of commercial fishing operations be reduced to insignificant levels approaching "0" mortality" (MMC 1990).

As a result of pressure to determine the degree to which various fisheries interact with marine mammals, and to avoid shutting down segments of the industry that have not developed methods to avoid killing marine mammals, Congress enacted a five year exemption from the Act's prohibitions.

This exemption program will end in 1993. During this exemption period Congress anticipated that progress towards the goals of the MMPA would be achieved through education programs and the development of alternative fishing gear and techniques (NMFS 1989). In fact, one of the terms of the exemption is that "the fishing industry seeks to reduce the incidental take of marine mammals to insignificant levels approaching zero mortality..."(MMC 1990).

As a result of public opinion and in anticipation of potential regulations, leaders of the sink gill net industry recognize that they must identify and implement changes in fishing gear and practices to avoid or significantly reduce the incidental take of harbor porpoise. However, they have little knowledge of how to approach the problem or motivate other fishermen within the industry to change. Unfortunately, the traditional practice of government imposition of regulations provides almost no incentive for fisherman to change. Fishermen perceive most regulations as detrimental and easily defeated at sea. In addition, fishermen are well aware that enforcement of regulations is often insufficient or completely lacking. Transferring conservation technologies to fishermen so that they actually want to use them, is the most important aspect of solving gear related problems (Smolowitz and Edwards 1983).

Overview

Harbor Porpoise Life History:

The harbor porpoise is one of the smallest cetaceans, with an average adult body weight of 45-60 kg and length of 1.5-1.6 m (Gaskin 1984). Populations of this species can be found in cool waters over the continental shelf of the Northern Hemisphere, including bays and esturine waters (Ibid). Along the east coast of North America, harbor porpoise occur from North Carolina to the Davis straits (Ibid). This population may actually include three regional sub-populations, known as the Newfoundland, St Lawrence and Gulf of Maine-Bay of Fundy sub-populations (NOAA 1992). This paper will focus on the Gulf of Maine-Bay of Fundy sub-population. For a detailed review of harbor porpoise in the Northwest Atlantic see Prescott and Fiorelli (1980) and Gaskin (1984). The overview of life history presented here includes primarily factors that may relate to mitigation strategies.

The Gulf of Maine-Bay of Fundy sub-population exhibits seasonal migrations that may be closely related to their food supply, which is primarily herring (Clupea sp.)and mackerel (Scomber scombrus) (Recchia and Read, 1989). The northern Gulf of Maine, Bay of Fundy and waters around Nova Scotia may support the vast majority of the population during summer months (NOAA, 1992). During this period, sightings are rare in the southern Gulf of Maine. Although few winter sightings exist, distribution apparently shifts into southern coastal waters and perhaps offshore, with strandings recorded as far south as Florida (Polacheck, 1989). Harbor porpoise usually travel singly, or in groups of 2-10 animals. They are shy and avoid vessels (Polacheck and Thorpe 1990).

The species has a well developed sense of hearing, echolocation and eyesight, although the latter may be useful only in relatively clear water (Van Kreveld, 1987). Taste and touch may also play a role in the animal's behavior (Ibid). Harbor porpoise have been reported to feed during the day, when their prey species are near the bottom. Porpoise seem to be largely inactive at night (Read, PC).

Female harbor porpoise in the Bay of Fundy-Gulf of Maine population reach sexual maturity between 3-4 years of

age (Read 1990). Gestation lasts approximately 10-11 months, after which a single calf is born (Gaskin 1984). The maximum life span for harbor porpoise in European and North Atlantic waters is 14 years.

These life history parameters indicate that the species may be vulnerable to mortality incidental to fishery activity. This lack of reproductive flexibility may not allow the species to compensate for increased mortality associated with incidental take by the gill net fishery (Woodley and Read 1991).

Gill Net Fishing:

Gill nets are a category of fishing gear that captures fish by enmeshing them as they swim into netting. Simple gill nets consist of a single wall of netting. Complex gill nets, such as a trammel net, consist of several layers of netting. Nets that are not attached to the bottom are known as drift nets; those anchored are set nets. Nets can be placed in a straight run or may be set to encircle a school of fish. Nets are usually tied together into what are known as strings or fleets. The method employed by the New England coastal gill net fishery is to set nets on or near the bottom, where they are fixed by anchors. These sets are known as sink gill nets and are primarily used to catch groundfish such as gadids or flounders.

Gill netting is a traditional New England fishery introduced from Norway in 1880 (Collins 1882). Its lack of dependence on bait and tendency to catch larger fish resulted in its becoming a major component in the fishery. However, a number of factors, including the costs of maintaining natural fiber nets, caused this method to be gradually replaced by otter trawling by the 1950's.

The gill net fishery that exists in the Gulf of Maine today has had a resurgence since the early 1970's primarily due to the introduction of low cost monofilament netting. The fishery consists mostly of small vessels, 10-15 m in length, that operate out of numerous ports. Many of the gill net vessels are also employed in other fisheries during the year.

Each vessel may fish between 40-100 nets. Nets are 50 fathoms (91.5 m) long and are tied together in strings of 10-30 nets; the highest portion of the net may extend nearly four meters above the seabed. The inshore fishery is conducted in water depths of 10-50 fathoms and the offshore fishery in depths of 100-150 fathoms. Most vessel tend gear every 24-48 hours.

Gill netting, in its various forms, is a simple fishing method that can be performed by one person in a small boat without the benefit of deck handling equipment. The nets can be fished virtually anywhere geographically and within the water column (surface to bottom). It is an efficient method of capturing either schooling or dispersed fish. As a result, the method is used worldwide, particularly in developing areas.

Gill net fishing also has significant drawbacks. The gear is relatively non-selective in the species it catches. Depending on the area fished, unwanted by-catch may consist of other fish, turtles, sea-birds and marine mammals. The gear is prone to being lost because of snagging on the bottom, storm damage, or interaction with other gear/vessels. In this lost condition, the gear is still capable of capturing ("ghost fishing") to some degree.

Harbor Porpoise/Fishery Interaction:

Harbor porpoise feed on aggregations of small, fatty fish. Such fish schools also attract large fish predators, such as cod, which in turn are sought by fishermen. The combination of near

shore habitat, small body size and feeding behavior make harbor porpoise vulnerable to entanglement (Recchia and Read 1989).

The New England sink gill net fishery is classified as a Category I fishery under the MMPA Exemption, which means that there is an expected frequent "take" of marine mammals. This classification allows the government to place observers onboard fishing vessels to document marine mammal interactions. In this fishery, observers are placed onboard in a voluntary manner (i.e., with the consent of the vessel) and non-marine mammal fishery data are also recorded. This existing sea sampling program may provide a means to judge the results of mitigation efforts.

Results of the NMFS sea sampling program and dedicated shipboard surveys have estimated the population size in 1991 for the Gulf of Maine/Bay of Fundy stock to be 45,000 (95 percent CI 19,000 to 80,000) and the best estimate of take for that year as 1,700 (95 percent CI 1,100 to 2,500) (NMFS 1992).

Harbor Porpoise Working Group

Many marine mammal researchers have grown to understand that commercial fisheries represent peoples' livelihoods and ways of life (Polacheck 1989). The fishing industry has begun to realize that the American public will not accept products that harm marine mammals, as evidenced by the tuna/dolphin controversy and resulting dolphin-safe tuna movement. It is evident from an overall ecological and social standpoint, that a major research effort is needed to determine appropriate means of harvesting coastal groundfish without entangling marine mammals and other non-target species. However, the New England sink gill net fleet is primarily a small scale owner-operated fishery that has limited ability to conduct research. In response to this situation, and with fishing industry encouragement, the HPWG was initiated in the fall of 1990 by the International Wildlife Coalition, a conservation/environmental advocacy organization.

Initial meetings occurred informally and consisted of representative environmental advocates, fishermen and non-governmental scientists. Government scientists and managers were excluded from these initial meetings to facilitate an open exchange among the parties involved.

It was determined that harbor porpoise by-catch constituted a threat to the vitality of the sink gill net fishery, in terms of regulation under the Marine Mammal Protection Act (MMPA) and potentially under the Endangered Species Act (ESA). It was further determined that the needs of both those sympathetic to harbor porpoise and to the fishery would be better met by formalizing the group and involving governmental agencies.

Initial interest in the group was high, resulting in a membership deemed too large to be effective. Therefore, the number of people with vested interests (eg. fishermen and environmental advocates) was restricted, but kept representative of those interest groups. While not all groups or individuals were invited to attend regular meetings, all received minutes and other information generated by the HPWG and had input to meetings through their representatives. It should be noted that working within the HPWG did not curtail an individual's/group's special interest activities independent of the HPWG.

An initial task of the HPWG was to educate fishermen as to the reality/scope of the interaction problem. For example, most fishermen were unable to differentiate between harbor porpoise and other small cetaceans frequenting the area. This

possibly lead to the fishermens' perception that there was no problem. A placard was designed by the HPWG and distributed to the industry, thereby allowing proper identification of animals captured in nets or observed around vessels.

Considerable effort was expended to identify common goals held by all interest groups (fishermen and environmental advocates). The group agreed the take be reduced regardless of population size or numbers of animals being killed. Environmental advocates agreed because of the negative impact on populations and/or individual animals and fishermen because of lost time, negative publicity and potentially restrictive regulations.

Additionally, the group was aware that marine mammal/gill net interactions are global in scope and that successful resolution of the conflict in New England waters could have worldwide implications for marine mammals and fishermen. Therefore, the focus of the group was to identify and advocate the development of technologies that would reduce capture of harbor porpoise, while allowing the fishery to continue.

The identification of such common ground was a major achievement by the group. Although the MMPA advocates working towards a "zero" mortality goal, current NMFS policy towards incidental take is to generate abundance figures and, as a result, determine an "acceptable" level of kill.

Since reliable abundance estimates are extremely difficult to generate and population trends take many years to validate (Barlow in press), such data leave both the species and industry vulnerable to mismanagement. Such a policy also places interest groups in adversarial positions, as each group attempts to undermine the other's position, emotionally and scientifically. The end is often neither species protection nor industry viability, but lengthy court battles.

The identification of a mutual goal enabled the HPWG to develop an action plan that was acceptable to all members. This action plan outlines strategies for mitigation, reviews relevant biological information on harbor porpoise/fishery interactions and recommends avenues for public education. Emphasis is placed on two principle areas: mitigation and cooperative efforts. This emphasis is illustrated by the following excerpts from the action plan:

1) Mitigation: research on mitigation strategies is critical to the long-term health of the harbor porpoise population and the fisheries with which they interact. Although assessments of the population size and the impacts of porpoise by-catch are ongoing, no alternatives to current fishing practices have been explored. The HPWG strongly recommends that work to reduce porpoise kills in gill nets begin immediately since potential solutions will require field testing for several seasons.

2) Cooperative efforts: mitigation research must involve a consortium of fishermen, scientists, engineers, environmentalists and resource managers. To effectively provide a long-term solution, the value of diverse experience in addressing the incidental take issue is essential. The HPWG recommends strongly a multidisciplinary approach to all mitigation research concerning harbor porpoise/fishery interactions.

Goals were identified within each area of concern: mitigation, biology and education. In the area of mitigation, for example, the following goals were outlined:

· Review the worldwide literature describing marine mammal/fishing gear

interactions to identify potential measures which could mitigate harbor porpoise take.

· Review and summarize NMFS data collected through its sea sampling program.

· Determine seasonal and geographic patterns of harbor porpoise interactions with sink gill nets.

· Investigate behavioral, environmental and ecological factors that may predispose harbor porpoise to entanglement.

· Initiate research to assess the behavior of harbor porpoise immediately prior to encounters with nets and escape responses.

· Examine the technical, economic, ecological and social benefits and impacts on fishery resources relative to gill nets and other gear types that target groundfish.

· Undertake a series of field trials to test the effects of various gill net modifications and operational strategies on fish catch and harbor porpoise take.

· Perform tank tests of scaled gill net models to support the field work.

· Evaluate the use of closed areas when harbor porpoise are known to be present.

Experiments with untried fishing technologies can be costly to individual fishermen and are rarely undertaken. Thus, we learn little regarding the possibilities of lowering marine mammal mortality through innovative technologies or changes in fishing practices. A well designed program of field gear trials can evaluate gear design, strategy adjustments, alternative gears, behavioral factors which predispose marine mammals to entanglement, and ecological and environmental factors influencing entrapment related behavior.

When considering mitigation strategies, many characteristics of the potential alternatives need to be compared to those of the existing gear. For example, while an obvious solution to the interaction problem might be to ban gill nets, there may be ecological and commercial advantages associated with their use (ie, energy efficiency, cost efficiency, size-selectivity, lack of habitat damage, etc). In addition, the banning of gill nets in United States waters will not affect their global use and resulting worldwide impact on marine mammals. Thus, it is important that technical, economic, ecological and social consequences be examined when considering changes in fisheries technology.

Conclusion

Experience has shown that it is advantageous to involve fishermen in the development of solutions to fisheries problems. Both the improvement of existing fisheries technology and the introduction of new technology have the greatest chance of succeeding if fishermen themselves are directly involved in the process. Many fishermen have valuable knowledge and expertise with fishing technology and techniques that may be vital when attempting to solve interaction problems. Changes deemed appropriate by the industry however, may be deemed inadequate by the environmental community.

The HPWG is a vehicle for bringing together the various interest groups and disciplines needed to solve interaction problems. It must be emphasized that activities within the group were not consistently harmonious nor was progress linear. Discussions were at times heated and personal.

However, the mutual goals and common ground enabled the group to continue a regular schedule of meetings and dialogue. This effort culminated in June 1992 when an unprecedented coalition of fishermen and conservation/environmental advocates approached congressional delegations in search of funds for mitigating the take of harbor porpoise in the New England sink gill net fishery. As the HPWG continues to work to accomplish its goals, it may serve as a model for conflict resolution in other areas and other fisheries.

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