

Fishery Management: Relationship of the resource to other species being exploited simultaneously

By Herbert W. Graham

The objective of management of a renewable resource is production at a high level year after year, that is, a maximum sustained yield. To accomplish this objective the annual crop of the resource must be carefully adjusted to its natural rate of replacement. In a fishery man's share plus Nature's (fish dying from natural causes) should just balance replacement by growth and reproduction.

To crop the population at the most efficient level it is necessary to know the growth rate, natural mortality rate and reproductive potential of the resource in question. The most advantageous "take" for man can then be computed.

To obtain the greatest yield a species should be taken at an age when loss by natural mortality begins to exceed gain by growth. Ideally when the species has reached this optimum size all individuals should be taken immediately except those to remain as brood stock. This procedure is practiced in animal husbandry, but obviously is not applicable to wild resources such as a stock of marine fishes.

In a marine fishery it is impossible to catch all fish above a certain size. Furthermore the population of a particular species is usually composed of fish of many ages, frequently immature as well as mature individuals. One may, however, compute an optimum age of first capture and prevent the taking of fish under that age. Fishing pressure on greater ages can then be allowed to proceed at an intense rate.

The foregoing principles have been reviewed in order to point up the background necessary for the proper management of a single species of fish. The application of these principles in actual management is

complicated by the fact that species rarely occur alone in the ocean. It is the purpose of this paper to point up some of the difficulties brought about by the mixed nature of many of our fisheries.

There are, indeed, some "pure fisheries" in which management could be applied without interference with other lucrative fisheries. Pelagic fish such as the California Pilchard, the East Coast Menhaden, and the tunas occur in almost species pure schools. Management in such cases can concern itself with a single species.

On New England offshore banks more than ten species of great commercial importance plus others of lesser importance are found on the same grounds. Management under these circumstances can present difficulties. Whether a fisherman is baiting hooks for cod or dragging a net for haddock or whiting he will certainly catch other species as well.

The same is true for inshore waters. Pound nets are notoriously non selective. They may be set for shad but catch striped bass to the alarm of the sports fishermen. In some areas whiting (Silver Hake) and makeral are the principle species caught in pound nets yet large quantities of tuna at certain seasons of the year will fill the trap and constitute an important part of the annual catch. The operator comes to depend upon these seasonal species for his annual earnings. Any management of the tuna resource would have to take into account the trap fisherman who might reasonably object to restrictions on the grounds that tuna are an incidental catch for them.

The lobster and crab fisheries are similarly intertwined in some areas. There is little fundamental difference between a lobster trap and

a crab trap although a particular fisherman may fish essentially for one or the other species. Any regulation of season or type of gear such as width of opening between slats designed to allow the escape of lobsters would release crabs as well. Fortunately, in this case, the species concerned are not usually injured in capture, so that the fisherman can return to the ocean smaller sizes or berried females or females or whatever has been selected for protection.

The groundfish probably present the greatest problem. Although there is some species segregation on the banks and the migratory habits vary from species to species, by and large the important commercial species occupy essentially the same areas so that mixed catches are the rule rather than the exception.

Management of the Georges Bank haddock fishery has brought us face to face with some of these problems. Of the total landings from Georges Bank ⁵⁴ percent was taken by the Boston Fleet of large otter trawlers. Since a very small mesh net was used by these vessels large quantities of immature and unmarketable haddock were caught and destroyed on the banks annually. This unnecessary waste of the resource was eliminated by the introduction of a minimum mesh regulation which was brought into force in June 1953. Although haddock is the mainstay of the Boston fleet some other species caught incidentally are also marketed. These other incidental species such as cod and pollock are also large fish and can be caught adequately with a large mesh net. Therefore, the minimum mesh regulation offers no problem to the Boston haddock fleet in respect to secondary species. In fact, large mesh is an advantage as it allows quantities of small unwanted "trash" fish to

escape and thus eliminates culling the catch. Added to this is the great efficiency of the large mesh net.

The other New England Vessels fishing the Georges Bank haddock stock are less specialized in their operations. Smaller vessels tend to be more diversified in their fishing than the large Boston trawlers. Thus, many New Bedford vessels land both flounders and haddock as well as other "round fish". Since a large mesh has always been used for flounder fishing these vessels present no problem in the management of haddock.

Silver Hake or whiting is a comparatively small round fish and cannot be fished profitably with a regulation haddock net. Whiting boats are small but they do land an incidental catch of haddock. Since their landings per trip are usually less than 5000 pounds an exemption was written into the mesh regulation allowing catches of haddock with a small mesh if the landing was under 5000 pounds. This exemption has successfully prevented hardship to the whiting fishermen.

Redfish is another species which is normally taken with a small mesh net. These fish are marketable down to sizes which would escape through the regulation haddock net. Most of the redfish landed in the United States are taken by large vessels fishing distant banks. Although redfish normally occur in deeper water than haddock, some haddock are taken along with the redfish. Although the amount per trip is usually less than 10 percent, the actual weight may be greater than 5000 pounds because of the large size of catches. Accordingly a second exemption was incorporated into the mesh regulation allowing a catch

of more than 5000 pounds if the amount represented less than 10% of the catch. This exemption has resulted in the large redfish boats being unaffected by the haddock regulation.

A particularly knotty problem has arisen in the Gulf of Maine where some vessels depend upon both redfish and haddock for their annual catch. It is contended, probably correctly, that paying quantities of redfish cannot be taken with the regulation haddock net. It is further contended that these vessels must catch quantities of haddock, a much more valuable fish, in order to show a profit at the end of the year. Haddock in the Gulf of Maine are seasonal and erratic in their occurrence. Consequently, the fisherman alleges that he must be equipped for either haddock fishing or redfish fishing when he leaves port. He first seeks haddock. Not finding this species he then moves to redfish grounds and "makes a trip" of redfish. On the other hand, if he finds haddock he lands more than 5000 pounds, with small mesh gear aboard, which is in violation of the international mesh regulation. Although single trips may consist predominantly of haddock, the annual catch of haddock does not exceed ten percent of the total catch.

The mesh regulation was designed only to save small haddock. Enforcement of the regulation on all haddock fishing is necessary as a practical consideration. Application of a size limit is not practical as it might only lead to culling and discarding of undersized fish at sea. The only practical way to save the small fish is to apply the large mesh regulation to all vessels taking haddock intentionally.

The Gulf of Maine vessels probably destroy comparatively small quantities of unmarketable haddock. Even so, how can one exempt these

vessels when they do, on many trips., fish intentionally for this protected species.

This is the kind of problem which faces anyone attempting to manage a species which occurs with or nearby other important species and which is fished by the same persons catching these other species.

Sometimes a change in fishing habits is called for. In the Gulf of Maine the fisherman's income might actually be greater if he fished for haddock with large mesh nets during the fall and winter when haddock are most available in the Gulf, and then converted to small mesh for redfish fishing the rest of the year. Large meshes in the cod end of trawls as used in the regulation nets result in more efficient gear for larger fish. Use of this net by the Maine vessels might be very favorable to the annual catch. Studies are now underway to find a solution to this problem. Perhaps through an educational program a slight change in fishing habits can be effected which would not only allow conformity to the haddock regulation but increase the livelihood of the fishermen concerned.

Management of a mixed fishery must always be directed toward the most important species concerned and must take into account the historical pattern of fishing. To be successful a management program must produce higher yields and must not interfere appreciably with the conduct of fisheries for other valuable species.

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