FISHING IN THE EXCLUSIVE ECONOMIC ZONE: THE POTENTIAL FOR ISLAND-RELATED RESOURCES

Dr. George W. Boehlert

Dr. George Boehlert has served as Chief of the Insular Resources Investigation division in the Southwest Fisheries Center Honolulu Laboratory of the National Marine Fisheries Service (NMFS) since 1983. He is concurrently teaching at the University of Hawaii as an affiliate graduate faculty with the Department of Oceanography. Prior to Dr. Boehlert's work in Hawaii, he served as assistant professor at Oregon State University. Dr. Boehlert has published several articles on marine biology. He received his Ph.D from the Sripps Institution of Oceanography in 1977.

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The series of discussions on fishing in the EEZ which follow will distinguish among several types of resources. They differ in biological make-up, magnitude, and commercial value as one goes from region to region. A basic biological distinction of resources exploited in island areas is that of pelagic versus insular. Pelagic resources occur throughout the EEZ irrespective of water depth, although they are frequently encountered near thermal fronts or other oceanographic features. Insular resources are concentrated in very narrow bands around islands, seamounts, or shallow banks. Unlike pelagic resources, they are typically nonmigratory.

In this paper, I cover island-related resources, which are less controversial than migratory species, but nonetheless quite important locally. I briefly address the types of resources, their relationship to the habitat, their potential magnitude, and finally the importance of managing these insular resources.

Types of Insular Resources

Insular resources consist of both shallow reef species and deep slope species. Shallow reef resources include reef fishes, crustaceans (lobster, crab, and shrimp), mollusks (octopus, and clams), and echinoderms (Beche-de-Mer). In most islands, the majority of these resources are already exploited and many are important for artisanal and subsistence fishing. There is little potential for fisheries expansion, save the uncertain potential of aquaculture. Therefore, I will concentrate

this paper on the slope resources, which hold greater potential in most island areas.

Generally, the slope resources occur in the 20 to 500 fathom depth range and are less well known than reef resources, especially in unpopulated regions. Throughout the Pacific island areas, several ongoing projects are directed at determining the magnitude and potential management regimes for the resources. The types of resources available include precious corals, bottom fishes, and crustaceans.

Precious corals typically occur in deeper waters and are most heavily exploited on banks and seamounts in international waters. Further exploitation potential does exist, as indicated by recent discoveries of new resources. A fisheries management plan has been developed for precious corals in the Hawaiian Archipelago and other waters under the purview of the WESPAC (see Grigg, 1982).

Bottom fish represent a real multispecies fishery in the most tropical regions. Accordingly, the resulting high species diversity is exploited. The techniques for harvesting this resource are labor intensive relative to some of the large scale fisheries in temperate and artic regions and generally involve handlines, longlines, or fish traps. The species involved include several families. The snappers (family Lutjanidea) are commercially important and include onaga, ehu, opakapaka, and several others. Snappers occur in a range of sizes, but are generally of high value. The groupers (family Serranidea) include only the hapuupuu in Hawaii, but have several other representatives in other parts of the Pacific. Other families include the jacks (family Carangidae), emperors (family Lethrinidae), and a suite of less common varieties.

Crustacean fisheries are typically conducted with traps. In tropical island areas, lobster and shrimp have considerable economic potential. In the Hawaiian Archipelago, the lobster fishery captures spiny and slipper lobsters, both now subject to a fishery management plan to regulate the harvest. With the exception of precious corals, deep sea shrimps (Heterocarpus, spp.) are the deepest slope resource taken in the tropical Pacific. The magnitude of the resource is apparently extensive in Hawaii, but there is not a significant fishery at the present time.

In general, the majority of insular stocks are characterized by a low biomass, fairly low turnover rate, and a very limited habitat. Managing the stocks

will require managing not only the fishery, but also the habitat. Island types range from volcanic islands to coral atolls, to very large limestone islands. A common feature of most of the islands is the relatively steep profile underwater. An extensive shelf, as occurs on continents, is not present. For this reason, the fisheries are referred to as slope fisheries. As opposed to the resources on continental shelves, which are often quantified per square nautical mile, the resources on steep slopes are generally quantified per linear mile of isobath at a given depth. In the rather rare cases where moderately flat bottom occurs, the productivity may be low. A good example is the Penguin Bank region off the Island of Molokai. Productive fishing occurs only around the margin of the bank where bottom relief is high. Thus, the type of habitat and its interactions with currents play an important role in determining the fisheries' productivity.

The Magnitude of Insular Resource

The magnitude of insular resources is not great. As examples, I will provide data from two large, extensive, archipelagoes. First, the Hawaiian Archipelago consists of the main islands with a long history of fisheries exploitation and the Northwestern Hawaiian Islands with a much shorter period of exploitation. The latter area was the subject of a multiagency program evaluating the resources, and the results have been described in a fishery resource atlas (Uchida and Uchiyama, 1986). Although the EEZ of the Hawaiian Archipelago is quite extensive, the realized and potential yields of the current insular fisheries are surprisingly small. Bottom fish are presently harvested at an annual rate of some 780 metric tons (t) worth about $4.5 million. The lobster catch in the past few years has approached 1,000 t and a value of $6 million. The maximum sustainable yield of this resource over the long-term will probably be somewhat lower than the current yield. Another major insular resource is the deep-sea shrimp which had an annual yield of 160 t in 1984 before ending. Assessment research conducted at the Southwest Fisheries Center Honolulu Laboratory of the NMFS suggests that the resource could annually support a fishery on the order of 300 to 500 t, worth an estimated $3-4 million. This is a trap fishery in deep water, and the fishing technology is not simple. Cessation of the fishery was related to difficulty in harvesting the shrimp, but it is probable that the fishery will develop anew.

The second example is the Mariana Archipelago. From 1982 to 1985, the Honolulu Laboratory conducted

the Resource Assessment Investigation of the Marina Archipelago program (RAIOMA). The goals of this several year field study were assess and map the deep slope resources of this island group. Here, as opposed to the Hawaiian Archipelago, the lobster potential was very low, and the emphasis was instead on bottom fish and deep-sea shrimp. The magnitude of the resources was significantly less, with an estimated annual yield of 109 t of bottom fish and 30-60 t of deep-sea shrimp. The resources are distributed throughout the archipelago. The potential annual yield of bottom fish ranges from <1 to >5 t at different islands or banks. Obviously, the appropriate fisheries here would be small-scale, continuous operations, as opposed to large scale fisheries able to harvest large amounts of the resource at any one time. The RAIOMA program is described further in Polovina et al (1985).

New Fisheries Resources

A valid question about insular resources of the Pacific Basin concerns the potential discovery of new resources. The deep water nature of the resources such as precious corals and deep-sea shrimps makes them likely to occur in areas not yet surveyed. For example, large discoveries of precious coral beds occur from time to time, as recently happened around Palmyra Atoll. There may also be unanticipated resources. An example of this type is provided by the discovery of seamount resources in the central North Pacific, of which only some 10% occurred within the EEZ waters, and the remainder in international waters. In the southern Emperor Seamount chain and the northern Hawaiian Ridge, several seamount summits rise to within a few hundred meters of the ocean surface. Similar to islands, the habitat that could support fisheries is very limited, and seamounts were thus ignored as sites for fisheries development. However, in 1968, a Soviet trawler discovered dense concentrations of a fish called pelagic armorhead.

Over the next ten years, Soviet and Japanese fishermen took a total catch of approximately 1 million metric tons of this species. Catch rates were as high as 90 t per hour on the Southeast Hancock Seamount, which occurs within the U.S. EEZ; extreme declines in the resource followed this rapid exploitation, until little exploitable biomass remains. The seamounts in the EEZ are presently closed to foreign fishing under the Bottom Fish and Seamount Groundfish Fisheries Management Plan, and research is under way to monitor the recovery of the stock. It has been estimated that the fishery could maintain an annual yield on the order of 50,000 to 80,000 t, which is quite significant

relative to the insular resources described earlier in the paper. At the peak of this fishery, a large factory trawler could capture from a single seamount in the EEZ the amount of bottom fish that the entire Hawaiian Archipelago might support over an entire year (Uchida et al. 1986).

In this short paper, I have tried to point out the relatively delicate nature of the island-related fisheries resources in the Pacific Basin. It is critical that managers, politicians, and potential fisheries developers understand the limits of the resources. Resource managers also must have a basic understanding of the biology and exploitation potential for the resources. As opposed to the large scale fisheries of the temperate areas, where catches may be in the thousands of metric tons, these tropical island resources may support fisheries on the order of tens or hundreds of metric tons per year. It is most important to assess these resources in advance of initiating fisheries, even if done in only a cursory fashion. This can have a number of benefits, particularly avoiding the depletion of the resource and over-capitalization by an island nation that cannot afford the investment.

Despite their limited nature, insular resources of the deep slope still play an important role in the Pacific island region. First, such resources are an important source of protein in island areas and may serve to supplement the over fished inshore reef fisheries. Second, the deep slope resources typically have a fairly high market value. At the Honolulu fish auction, one sees bottom fish shipped by air from other islands, so the potential for export markets for foreign exchange does exist. It should be kept in mind, however, that although renewable, these resource can be depleted rapidly.

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