Proposed Fishery Management of Spiny Lobster (*Panulirus argus*) for the Southeastern United States

J. CONNOR DAVIS
Gulf of Mexico Fishery Management Council
Tampa, Florida 33609

RESUMEN

Se describira y discutira el plan administrativo que se propone para la población de la langosta espinosa dentro de la jurisdicción de los Estados Unidos frente al estado de la Florida, en relación a la pesca histórica y a los planes administrativos que se proponen para la pesquería en Puerto Rico e Islas Vírgenes.

Se describirán los problemas particulares y las controversias que se susciten en la pesquería de la Florida. Se presentarán las medidas administrativas que se proponen así como su explicación racional. Se discutirán las interrelaciones entre la administración histórica por el estado de la Florida, la administración biologica óptima, y los factores socioeconómicos que existen en las pesquerías.

Se senalarán las diferencias entre los planes administrativos que se proponen para la pesquería en la Florida y los de Puerto Rico e Islas Vírgenes. La discusión se centralizará en las diferencias biológicas, sociales y económicas entre las dos regiones que dischaminen estrategias administrativas diferentes.

INTRODUCTION

In 1976, the United States extended its jurisdiction over fishery resources to 200 miles. Under the same law, Fishery Management Councils were set up to plan for rational management of the fishery resources in the 200-mile zone. Management plans for many species, including lobster, are being developed by the Councils. The Spiny Lobster Management Plan is a joint effort with two councils participating, the Gulf of Mexico Council and the South Atlantic Council. The lobster plan should become effective within 1 year or less.

Spiny lobster are found in abundance along the southeast coast of Florida. The population is centered in the Florida Keys and has supported an important fishery in that area since the late 1800's. It is the primary or "core" fishery in the Keys. Most fishermen in that area consider themselves lobster fishermen first, although they may fish for three or four different species with various types of gear during different seasons. The commercial fishery is almost entirely a trap fishery, using wooden traps specifically designed for lobster. Vessels range in length from 23 to 65 ft, with most being 30 to 40 ft. Most are fast, diesel powered, and constructed of fiberglass. There is an active recreational fishery by skindivers who come from all over Florida and other parts of the southeastern United States. Recreational divers account for approximately 10% of the total harvest.

The reported commercial harvest from U.S. waters is relatively stable, averaging 2.5 million kg (5.4 million lb) per year. Unreported landings by commercial and recreational users, illegal harvest of undersize lobster, and mortality due to harvest practices may be equally as large. The fishery is extremely intensive and has greatly reduced the age and size distribution of the lobster population. Total mortality approaches 95% per year (Gulf of Mexico Fishery Management Council, 1981).

Each year essentially all legal sized animals in the population are harvested. Historical management of the fishery by the State of Florida has relied on a minimum size limit of 76 mm (3 in) carapace length and a closed season during the spawning period.

PROBLEMS IN THE FISHERY

There are several serious problems in this fishery. One major problem is too much fishing effort. At present, there are three to five times more traps being used than are needed to harvest the available yield. Illegal harvest of undersized lobster is another serious problem. The magnitude of this illegal harvest is large. No precise figures exist, but it has been variously estimated as 20 to 50% of the recorded legal harvest. A third problem is mortality and other losses due to harvest practices. Live, undersized lobster are used as attractants in lobster traps. Transporting undersized lobster between traps, normal practice in the fishery, may cause substantial mortality (Lyons, 1981). Other losses result from injury to sublegal lobster by both recreational and commercial users (Davis, in press; Lyons et al., 1981).

COUNCILS' APPROACH TO MANAGEMENT

The councils' approach to management of this fishery has been to accommodate the existing social and economic structure of the fishery while protecting the long-term biological yield. The basic management measures are a size limit and a closed season during the spawning period. The selected size limit was intentionally set at slightly less than the size necessary for maximum yield in weight because of social and economic factors in the fishery.

As an alternative approach to management of this fishery, limited entry was considered. Such an approach would reduce fishing effort, offer substantial economic advantages to a limited number of fishermen, and may be biologically advantageous if mortality of lobster from harvest practices is substantial.

The councils rejected this approach for philosophical and practical reasons. Limited entry inherently excludes some people and confers property rights to others on a resource which has always been common property, available to any citizen. This would be a very basic change in management philosophy. The councils consider limited entry as a last resort, to be used when other measures have been ineffective and the fishery is in danger of collapse.

In practical terms, the mechanics of limited entry are extremely complex. Who gets a license; who does not? How should licenses be transferred? How should the economic and social problems caused by inflated license values be solved? Should the increasing value of the licenses be taxed and returned to the public? If so, how can it be done fairly? How will limited entry in this fishery affect the development of associated fisheries? None of the questions has been adequately answered. Any solutions will involve trade-offs which will have substantial negative impacts on some members of the public. In addition, the cost of administering a limited entry fishery is much higher than for an open access fishery. In the councils' view, the problems associated with practical application of limited entry are, in most cases, greater than the benefits.

PROPOSED MANAGEMENT MEASURES

The councils are proposing a series of restrictions to protect the resource. A

minimum size limit of 76 mm carapace length, or 140 mm tail length is proposed. This is the same limit presently enforced by the State of Florida. Fishing practices and markets are adjusted to this size limit. It results in harvest at the size of maximum price per pound but does not result in the highest total yield in weight. According to the best available information, the 76 mm limit will provide between 84 and 89% of the maximum possible yield in weight at the present level of fishing effort (Gulf of Mexico Fishery Management Council, 1981). Enforcement of this limit will be improved through the addition of federal support for existing state enforcement personnel and through imposition of federal penalties which are much more severe than those of the state. Effective enforcement can substantially increase yield by reducing or eliminating harvest of sublegal lobsters.

Increasing the size limit to 90 mm carapace length in order to increase the total yield and increase spawning activity was suggested, discussed, and rejected by the councils. Increasing the size limit would increase the total yield in weight, but it would also cause a reduction in the average price per pound. Restaurants are the primary market for lobster. The highest value results from serving lobster as whole split lobster, or lobster tails. For this purpose, smaller lobster are preferred because the high price makes larger portions too expensive to compete with other meal selections. Based on the difference in lobster tail prices at the wholesale level, increasing the size limit to 90 mm will decrease the price per pound by approximately 7%. The gain in total yield was estimated as 12 to 17%, leaving a net gain in gross revenue of only 5 to 10% (Gulf of Mexico Fishery Management Council, 1981).

Another consideration in choosing an appropriate size limit is recruitment and spawning of the stock. The existing size limit enforced by the state has resulted in a large decline in spawning of the Florida lobster population because most lobster are harvested before they are able to spawn. This reduction does not appear to have had any effect on recruitment. Limited population estimates in juvenile nursery areas show large year-to-year fluctuations, but are not extensive enough to indicate any long-term trend in recruitment.

Because the fishery harvests essentially all legal size animals each year, the annual harvest is a good indicator of recruitment. Annual commercial production has remained stable at an average of approximately 5.4 million lb since 1970, the year in which the number of traps increased to the number needed to harvest all of the available yield. Unreported harvest, both legal and illegal, is believed to have increased during the same period. The councils concluded that the 76 mm minimum size and associated reduction in spawning has had no adverse effect on recruitment and that continuing with that size limit is not likely to result in any future reduction in recruitment.

Increasing the size limit would cause substantial disruption in the fishery. The present fishing area is about evenly divided between the adult habitat in offshore reef areas and the shallow water juvenile habitat. Some major fishing communities, such as Marathon, are heavily dependent on fishing areas in the juvenile habitat. Increasing the size limit would effectively eliminate those fishing grounds because few lobster larger than 90 mm are found there. This would force the many fishermen to move to other communities or shift their effort to other species. In addition, it would greatly increase effort on the already overcrowded offshore reefs.

The councils rejected the suggested increase in size limit, reasoning that such an increase did not appear to be necessary to provide adequate recruitment. Further, the small gain in gross value of the catch is not worth a substantial disruption in fishing practices and economic hardship on some producers which would result from increasing the limit.

A closed season from 1 April to 25 July is proposed. Also proposed is a 5-day soak period to begin setting traps from 21 July to 24 July and a 5-day grace period from 1 April to 5 April to remove traps from the water. This closed season corresponds with the majority of the spawning period in Florida.

This measure is beneficial both biologically and economically. Given the 76 mm size limit and intense fishing effort, the closed season is required if any significant amount of spawning is to take place. Under present conditions, most spawners reach maturity during the closed season or the last few months of the open season. Very few have more than one opportunity to spawn. Without a season nearly all of the present spawners would be harvested before reaching maturity. Economically the measure benefits the fishery by allowing the lobster population to rebuild each year to a level of abundance that is economically profitable to harvest and by limiting fishing effort and costs while still allowing sufficient time to harvest all of the available yield.

Prohibition of the harvest of females carrying external eggs is proposed. This measure is consistent with the present Florida law and provides additional protection to spawning animals while having very little adverse affect on the fishermen.

Use of undersized lobsters as attractants will be allowed within limitations. Transport of not more than 200 live sublegal lobster, or three per trap carried aboard a vessel, will be allowed. Lobsters must be protected in a shaded container.

It is a very common practice in the fishery for each fisherman to keep three to five undersized lobster in each of his traps. In this process, he will carry a box of undersized lobster aboard while pulling traps. This practice has both positive and negative aspects. The presence of undersized lobster in a trap is highly effective in increasing the catch rate of legal lobsters. One study indicated that undersized lobster are three and one-half times more effective than cowhide, the most commonly used form of dead bait (W.G. Lyons, unpublished). At the present time, there is no economically viable substitute bait which is as effective as undersized lobster.

Research by Florida Department of Natural Resources indicates that there can be a substantial mortality of sublegal lobster exposed to air for more than a few minutes. Additionally, low rates of escapement from the traps result in weight loss and slowed growth rate. Because of the extremely large number of sublegal lobster used as attractants, this mortality and reduced growth rate may be significantly reducing the potential yield (Lyons, 1981).

The councils recognized both the large positive and possibly large negative aspects of this practice. They proposed to allow it under limitation to reduce mortality to a minimum. At the same time, research to find an economical substitute for undersized lobster is being promoted.

There are two proposed measures which deal primarily with the recreational fishery. Taking of lobster by spear, gig or hook will be prohibited. Primary rationale for this measure is the difficulty most recreational divers have in determining the size

of lobster before capture. Without this provision a large number of sublegal animals would be accidentally injured or killed.

A special 2-day season is proposed primarily for recreational divers. No trapping will be allowed during this period. The season is set for the weekend prior to 21 July, the start of the trap soak period. This provides a special opportunity for the recreational divers. It recognizes and promotes the large economic benefits to south Florida and social value to the many divers who participate. The timing of the measure assures maximum access of recreationalists and eliminates any possible conflict with commercial fishermen.

The State of Florida presently allows a 2-day special season on the first two days of the trap soak period. The councils are recommending that the State change the date to that proposed by the plan.

COMPARISON WITH PROPOSED MANAGEMENT IN PUERTO RICO AND THE U.S. VIRGIN ISLANDS

The management strategy outlined above differs substantially from that proposed by the Caribbean Council for U.S. waters of Puerto Rico and the Virgin Islands. The differences are a response to entirely different social and economic conditions in the two areas.

In Puerto Rico and the Virgin Islands most of the lobster harvest is a bycatch of finfish traps which are used during the entire year. Fishing mortality rates are much lower than in Florida, and the lobster are larger, averaging 94 mm carapace length in Puerto Rico and 114 mm carapace length in the Virgin Islands. Markets and fishing practices in this area are adapted for large lobster which are the bulk of the harvest. These conditions contrast sharply with the intense directed fishery and small average size in Florida. The incidental nature of the Caribbean harvest makes a seasonal closure economic nonsense, whereas in Florida the season is economically and biologically advantageous. Lacking a season, a larger minimum size is needed in the Caribbean plan to assure spawning and recruitment adequate to maintain the population. Because of the larger average size, a 90 mm size limit has no economic or social disadvantages in the Caribbean area. Additionally it allows for the maximum yield in weight. In Florida, increasing the size limit for 76 mm to 90 mm would cause substantial social and economic disruption. In that area maximum yield in weight is considered to be of lesser importance.

These two plans are good examples of differing management strategies for the same species which were developed to meet differing economic and social conditions. Other areas of the Caribbean may require management strategies entirely different from these. A major challenge to fishery managers from each area is to find a management strategy which will answer the social and economic needs in their area, and which is still consistent with the basic biology of the species.

LITERATURE CITED

Davis, Gary E.
In press. Effects of injuries on spiny lobsters, *Panulirus argus* and implications for fishery management. Fish. Bull. 78(4).

Gulf of Mexico Fishery Management Council
1981. Fishery management plan for spiny lobster in the Gulf of Mexico and South Atlantic (17 sections, paginated separately).

Lyons, William G.
1981. Effects of harvest techniques on sublegal spiny lobsters and on subsequent fishery yields. Gulf Carib. Fish. Inst. 33: 253-266.

Lyons, William G., D.G. Barber, S.M. Foster, F.S. Kennedy, Jr., and G.R. Milano
1981. The spiny lobster, *Panulirus argus*, in the middle and upper Florida Keys: population structure, seasonal dynamics, and reproduction. Fla. Mar. Res. Publ. No. 38. 38 pp.