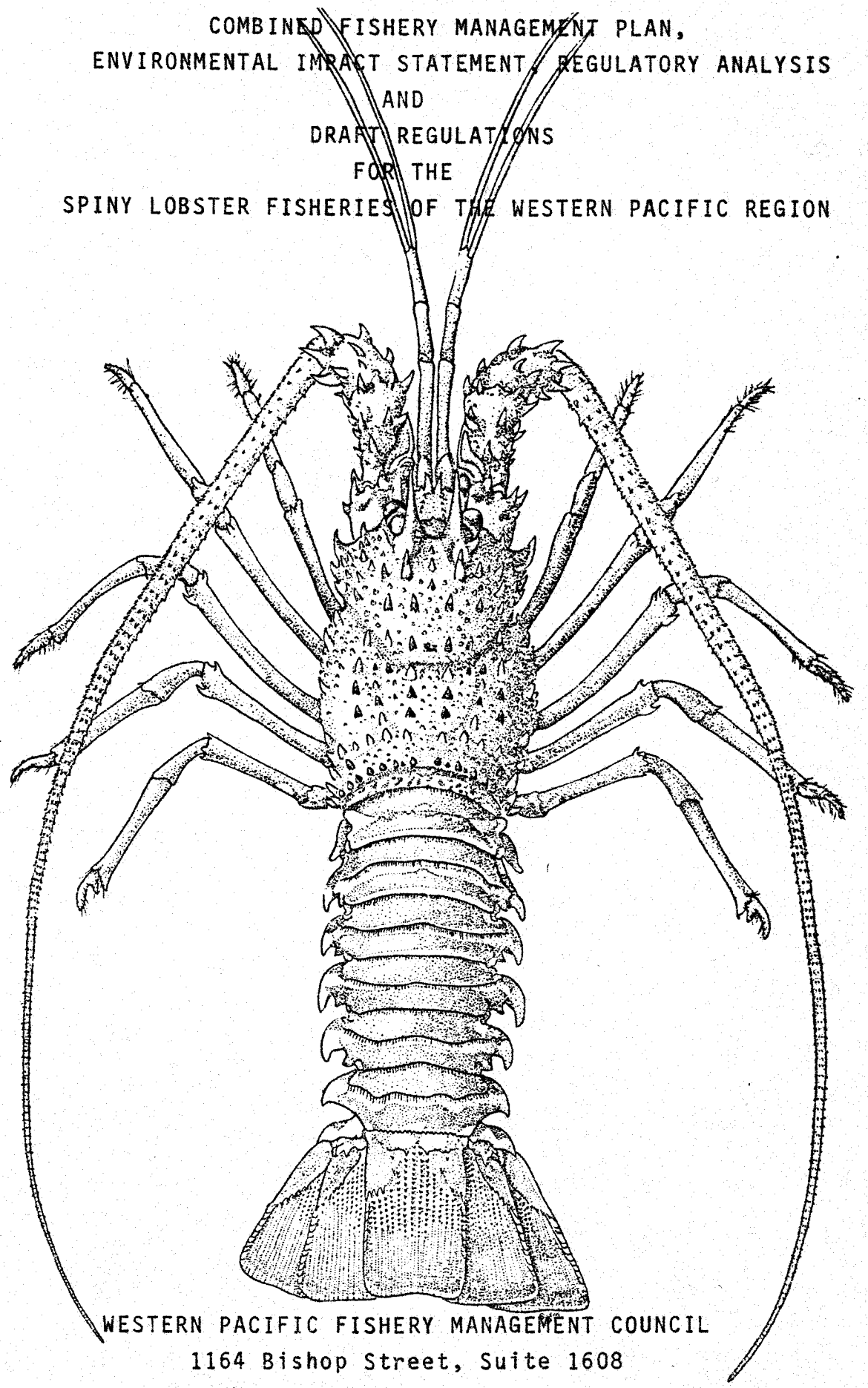
FINAL
COMBINED FISHERY MANAGEMENT PLAN, ENVIRONMENTAL IMPACT STATEMENT, REGULATORY ANALYSIS AND DRAFT REGULATIONS FOR THE SPINY LOBSTER FISHERIES OF THE WESTERN PACIFIC REGION



WESTERN PACIFIC FISHERY MANAGEMENT COUNCIL
1164 Bishop Street, Suite 1608
Honolulu, Hawaii 96813

FINAL

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MAY 1981

Proposed for Approval and Implementation
by the Secretary of Commerce

WESTERN PACIFIC FISHERY MANAGEMENT COUNCIL

1164 Bishop Street, Suite 1608

Honolulu, Hawaii 96813

SPINY LOBSTER FISHERIES OF THE WESTERN PACIFIC

Section 1.0 PREFACE TO COMBINED FMP/EIS/RA

1.1 TITLE AND LOCATION OF PROPOSED ACTION

The Fishery Management Plan for the Spiny Lobster Fisheries of the Western Pacific Region (FMP) is the Council's design for conservation and management of spiny lobster stocks in the Fishery Conservation Zone (FCZ) of American Samoa, Guam, and Hawaii. The FMP proposes conservation and management measures for the fishery around the Northwestern Hawaiian Islands (NWHI) and establishes only permit and data reporting requirements for commercial fishing in the FCZ waters around the main Hawaiian Islands, Guam and American Samoa. After approval by the Secretary of Commerce, the National Marine Fisheries Service and the U.S. Coast Guard, in cooperation with state, territorial and other federal agencies, are responsible for implementing the FMP.

The Magnuson Fishery Conservation and Management Act (FCMA) established a fishery conservation zone (FCZ) extending seaward from the territorial sea to a distance of 200 nautical miles offshore. Except for highly migratory species, the FCMA establishes exclusive U.S. jurisdiction over all living marine resources within the FCZ of the United States. The Western Pacific Fishery Management Council (the Council) is responsible for developing fishery management plans (FMPs) for the FCZ of American Samoa, Guam and Hawaii.

1.2 RESPONSIBLE AGENCIES

The responsible agencies for planning and for implementing spiny lobster fisheries management measures are the Western Pacific Fishery Management

Council and U.S. Department of Commerce, National Oceanic and Atmospheric Administration, National Marine Fisheries Service (NMFS). For further information, contact:

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Honolulu, Hawaii 96813
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1.3 COMMENTS AND DISTRIBUTION

The draft Spiny Lobster FMP was distributed to a large number of governmental agencies, environmental organizations, and fishing industry enterprises.

Public comments on the draft FMP were extensive and numerous. A summary of the comments and list of reviewers are provided in Section 16 of this document. The Council acknowledges and appreciates the comments received; this final FMP is considerably improved as a result of the constructive reviews made by public and private entities. The bulk of comments received (37 reviews; 100 pages of comments) precludes reproduction of all letters. A full summary of comments with responses by the Council is included in the Source Document to this FMP. Copies of the final FMP and the Source Document are being sent to all reviewers as well as to a large number of Federal, State, Territorial, and regional agencies; fishing firms and organizations; environmental groups and organizations; and individuals. Copies of the final FMP and the Source Document are also available from the Council and from the National Marine Fisheries

Service.

1.4 RELATIONSHIP TO PROCEDURAL REQUIREMENTS OF OTHER PLANNING LAWS AND POLICIES

This FMP presents biological, environmental, economic and social information relevant to the spiny lobster fishery management problems faced by the Council. The information and analyses are presented to satisfy FCMA requirements as well as requirements of other laws and policies. Section 5 presents the problems addressed and the need for action through the FMP. Section 6 presents the objectives of the plan. Section 7 describes the fisheries for spiny lobster, including a description of the stocks and their habitat (i.e., the physical environment) and a description of the domestic fisheries for these stocks in the FCZ (i.e., the social and economic environment). Present stock and habitat management programs are also described in Section 7. Section 8 presents alternative conservation and management measures. Section 9 discusses the relative advantages and disadvantages of these alternatives, while Section 10 provides an analysis and comparison of combinations of measures for meeting the Council's objectives. Section 10 sets forth the proposed management program for each area of the Western Pacific region under the Council's authority and defines the optimum yield (OY), expected domestic annual harvest (DAH), joint venture processing (JVP), and total allowable levels of foreign fishing (TALFF) for spiny lobster in the FCZ around the NWHI. Section 11 discusses ongoing management and research needs. Section 12 contains appendices for the FMP. Section 13 contains draft regulations. Section 14 has additional Regulatory Analysis information, while Section 15 has additional Environmental Impact Statement information.

The Spiny Lobster FMP has been prepared to reduce duplication by including all statutory and administrative requirements within one document. The bulk of the document is reduced to facilitate public review and understanding by limiting much of the background and technical information and analysis to a "Source Document". The Source Document contains detailed discussion, tables, figures and appendices not necessary to understand the FMP but important for detailed review. The Source Document also includes several related analyses required by laws other than the FCMA (see below).

The National Environmental Policy Act of 1969 (NEPA) and associated regulations of the Council on Environmental Quality (CEQ) require that environmental impact statements (EISs) be prepared for major Federal actions significantly affecting the quality of the human environment. The FMP contains the information required for an EIS, including: the need for and purpose of the proposed action (Sections 5 and 6); a description of the affected environment (Section 7); the alternatives considered, the impacts of the alternatives, and the rationale for accepting and rejecting alternatives (Sections 8 through 11); and listings of preparers and of agencies, organizations and individuals to whom copies of the plan were sent for review (Section 16.0). A complete summary of the public comments and detailed Council responses are included in the Source Document. Procedural requirements of NEPA were satisfied in distribution, scheduling the public review, and holding public hearings on the draft plan.

The Administrative Procedures Act (APA), Executive Order 12291, the Regulatory Flexibility Act, and NOAA Directive 21-24 establish requirements applicable to regulations to implement a FMP. These requirements call for analysis of benefits and costs prior to implementation of the regulations. The

FMP contains the information and analyses necessary for this purpose, including a description of the problems addressed (Section 5); a description, evaluation, and comparison of the impacts of the major alternative ways to address those problems (Sections 8 through 10); and an explanation of the rationale for choosing the proposed action (Section 10). The FMP includes draft language for Federal regulations which would ultimately be published to implement the FMP as approved by the Secretary of Commerce (Section 13).

The Coastal Zone Management Act of 1972 (CZMA) requires that Federal actions be consistent to the maximum extent practicable with approved State Coastal Zone Management Plans. Section 7.3.4 outlines these issues and the Source Document contains proposed determinations of consistency with the CZM programs of Hawaii, Guam, and American Samoa. Copies of the final plan are being sent to the relevant State and Territorial CZM agencies with requests for concurrence on these determinations.

The Endangered Species Act of 1973 (ESA), as amended, requires Federal agencies to insure that actions undertaken or authorized by them will not adversely affect endangered species or their critical habitat. Under Section 7 of the ESA, the Council initiated consultations with the NMFS concerning possible impacts of the fishery on Hawaiian monk seals, green and leatherback sea turtles, and any other endangered or threatened species in the Council's area. The NMFS Biological Opinion prepared pursuant to the consultation is included in the Source Document and reviewed in Section 7.3.3 of the FMP.

1.5 LIST OF PREPARERS

The Spiny Lobster Planning Team, Council Staff, and the Southwest Regional NMFS Staff have made the primary contributions to writing and editing this document.

The members of the Spiny Lobster Planning Team are:

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Council staff working on the FMP were Executive Director, Svein Fougner, natural resources administrator, and Sam Pooley, economist.

The Council was also assisted by former Planning Team members Dr. Tim Smith, NMFS, Southwest Fisheries Center, La Jolla, California, previous chairperson of the Planning Team; and Dr. Roy Mendelssohn, University of

California-Santa Cruz, formerly an Operations Research Analyst with the Honolulu Laboratory, NMFS.

Section 2.0 EXECUTIVE SUMMARY: SPINY LOBSTER FMP FOR THE WESTERN PACIFIC

The Fishery Management Plan for Spiny Lobster Fisheries of the Western Pacific Region establishes a conservation and management program for the fishery throughout the range of the species. Under this plan, there will be uniformity of management between the FCZ and adjacent NWHI waters under State of Hawaii jurisdiction; and State and Territorial regulations will continue to apply to vessels from those respective jurisdictions in the FCZ around Hawaii, Guam, and American Samoa. This management program is necessary to prevent overfishing while achieving optimum yield (OY) from the fishery on a continuing basis.

2.1 Proposed Action

The FMP establishes new conservation and management measures for the fishery in the Northwestern Hawaiian Islands (NWHI). The NWHI contain spiny lobster stocks known to have current commercial potential in the areas under Council jurisdiction. Conservation and management measures include a minimum size limit of 7.7 cm carapace length (CL); requiring that only traps may be used to harvest lobsters; requiring release of all sub-legal and egg bearing (berried) lobsters with a minimum of injury; prohibiting lobster fishing in FCZ waters less than 10 fathoms deep throughout the NWHI and in FCZ waters less than 20 miles from Laysan Island; and requiring commercial operators to obtain permits and submit reports on catch and effort.

The lobster fisheries in the FCZ of the main Hawaiian Islands, Guam, and American Samoa do not require any new conservation and management measures at this time. The FMP proposes that measures in the FCZ for these areas be limited to permit and data reporting requirements for commercial vessels. The

Council will analyze these fisheries to address management concerns in these areas in the near future.

2.2 Need for the Plan

Sections 5 and 6 of the plan identify the problems and issues addressed by the Council and the objectives of the plan. Problems include the risk of overfishing in the NWHI; potential economic instability; the need for additional information; and the need to prevent adverse impacts on endangered and threatened species. The Council has also recognized the need for consistency between Federal and State/Territorial management programs.

2.3 Rationale for Proposed Action

The proposed approach to management of the spiny lobster fisheries is most suitable to achieve a balance between maintaining the long-term productivity of the stocks, providing an opportunity for a growing fishery to realize its potential and protecting endangered and threatened species in the NWHI. Size limits, area closures, and requiring release of berried lobsters will protect against overfishing; area closures and gear restrictions will mitigate the potential for harm to endangered and threatened species; and permit and reporting requirements will provide a basis to record and analyze the progress of the fishery and the effectiveness of the plan. These measures will provide the basis for a productive, efficient fishery. The size limit allows fishers to target on the preferred size of lobsters for the international market in frozen lobster tails, and for which catch rates are expected to be higher than with a larger minimum size limit. Production costs should not be adversely affected. Permit and reporting requirements are sufficient for monitoring the fishery but

are not onerous to the commercial fishers. Area restrictions essentially formalize ongoing fishery practices. Release of berried lobsters and juveniles will not require any addition to current sorting time and is generally observed in all lobster fisheries.

Permit and data reporting requirments for commercial fishing are included for both the NWHI and the other areas of the Western Pacific region.

2.4 Alternatives Considered

Sections 8 through 10 provide substantial detail on alternatives considered by the Council. In general, it was concluded that less restrictive programs (no action; minimal restrictions on gear; license requirements or condition of catch requirements) would not protect the long-term productivity of the stocks and would not reduce to acceptable levels the risk of adverse impacts on endangered and threatened species. On the other hand, more restrictive programs (limited entry with size limits and area closures, or quotas with size limits and area closures) would be too difficult to set up, administer and enforce, and there is little reason to believe that such programs would contribute to efficient allocation of capacity in the developing NWHI fishery.

Specific management measures considered for the NWHI but not selected include larger size limits (not necessary for stock protection, potentially adverse economic effects); larger area closures (not necessary for stock protection or for protection of endangered and threatened species and would potentially remove a large portion of the stock from economic use); seasonal closures (too difficult to justify and to enforce); island-by-island quotas (insufficient data to develop rational quotas, too costly to enforce); and requiring the use

of rot-out panels and escape gaps (unable to demonstrate benefits associated with cost of modifying traps now in use).

The Council has concluded that the FCMA and the ESA provide adequate authority for the Secretary of Commerce to take emergency action to protect fishery resources and endangered and threatened species in the NWHI. Emergencies are not anticipated in this fishery and additional emergency provisions are not included under this FMP.

The Council was not able to demonstrate the need for establishing new management programs in other areas of the Western Pacific region at this time.

2.5 Determinations in the FMP

There are insufficient data to determine a precise estimate of maximum sustainable yield (MSY) for the stock(s) of lobsters in the NWHI and other portions of the FCZ. The Council has concluded that the maximum sustainable yield for the stock in the NWHI with a size limit of 7.7 cm CL is likely to be in the range of 200,000 to 435,000 lobsters per year.

The Council has concluded that a non-numerical definition of optimum yield (OY) for the fishery is appropriate under this plan. OY is defined as "the greatest catch of non-berried lobsters with a carapace length of 7.7 cm or larger which can be taken from the waters of the FCZ which are deeper than 10 fathoms throughout the NWHI and more than 20 miles from Laysan Island." In the long-term, the OY will likely be less than the MSY for the stock because area closures, release of berried lobsters, and occasional low densities of "legal" lobsters will effectively prevent exploitation of all portions of the stock. In

the short-run, harvests will likely exceed MSY levels as the "surplus" of large lobsters accumulated over time is harvested. The OY approach does not establish a quota system. For purposes of monitoring and plan evaluation, however, the Council estimates that OY will be within the following ranges in the future:

First year	356,000 to 772,000 lobsters
Second year	281,000 to 609,000 lobsters
Third and future years	168,000 to 420,000 lobsters

Deviation from this range in any single year will not be cause for concern given the unknowns about stock abundance, population dynamics, natural environmental fluctuations, and the cost and earning structure of domestic fishery participants.

Domestic vessels currently in the fishery have the capability to harvest the OY. The total allowable level of foreign fishing (TALFF) is zero. Most lobsters are expected to be processed on board fishing vessels. There is no "surplus" of domestic harvest capacity over processing capacity and the amount available for joint venture processing (JVP) is zero.

2.6 Monitoring and Enforcement

The FMP sets forth permit and data reporting requirements for monitoring the commercial fishery. State and Territorial programs and NMFS and Coast Guard programs should be coordinated to insure effective monitoring without duplication of effort. It is possible that State and Territorial licensing, for example, may satisfy the permit requirement. Enforcement can be

carried out by current NMFS and Coast Guard resources. Size limits can be enforced through landings inspections. Overflights (already scheduled) for other purposes can provide observation of compliance with area closures. The plan provides authority for NMFS to place observers on vessels to collect detailed catch and effort data if necessary. No significant new enforcement costs are anticipated under this management program.

Compliance with the plan does not pose substantial new burdens on fishery participants. There are relatively few vessels in the fishery at this time, and they are familiar with the rationale for and background of this plan. Permit and data reporting requirements are similar to existing State and Territorial requirements in most respects. The logbook to record catch and effort should be simple and be designed by NMFS in consultation with fishery participants. There is no special need for different reporting for "large" and "small" businesses. The reporting requirements are consistent with current fishing practices and are the minimum necessary to monitor the fishery to evaluate the plan's effectiveness. Data will be managed as confidential in compliance with the FCMA.

SPINY LOBSTER FISHERY MANAGEMENT PLAN FOR THE WESTERN PACIFIC REGION

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Section 4.0 FISHERY MANAGEMENT UNIT

The FCMA defines a "fishery" as

> (A) one or more stocks of fish which can be treated as a unit for purposes of conservation and management and which are identified on the basis of geographical, scientific, technical, recreational, and economic characteristics; and
> (B) any fishing for such stocks (Sec. 3(7)).

The spiny lobster fishery management unit in broad terms includes commercial, recreational, and subsistence fishing for all spiny lobsters as well as slipper lobster and Kona crab species which are harvested incidentally in the FCZ around Hawaii, Guam, and American Samoa. This unit can be split into four distinct components.

4.1 Northwestern Hawaiian Islands Commercial Fishery

The NWHI are an essentially uninhabited string of islets, islands and reefs running Northwest from the island of Kauai, northern-most of the main Hawaiian islands. The fishery lies between 500 and 1500 miles from Honolulu.

The NWHI fishery is entirely commercial, and the fishery occurs predominately in the FCZ. Some recreational fishing occurs nearshore at Midway Islands and Kure Atoll, but such fishing does not occur in the FCZ so far as is known.

This is a developing fishery. The dominant species in the catch in *Panulirus marginatus* (Figure 4.1). Another species of spiny lobster *P. penicillatus* (Figure 4.2) is caught in small quantities, but for practical purposes, the NWHI is a single species fishery at this time. The management unit includes the second species, however, because of the possible inter-

specific relationships that may occur. The NWHI fishery also incidentally harvests slipper lobster, family Scyllaridae, and the Kona crab, family Raninidae. These species are included in the management unit for purposes of recording catch and effort data for future stock assessment and possible management.

The spiny lobsters in the NWHI are the only known stocks in the Council's area with significant fishing potential. The active management program in this plan focuses on the NWHI because of the need for management to assure realization of the potential of the fishery and to assure protection of associated endangered and threatened species.

4.2 Main Hawaiian Islands

P. marginatus and P. penicillatus are taken in approximately equal quantities in trap samples around Oahu. The species distribution of recreational, subsistence, and commercial catches is unknown. Most fishing around the main Hawaiian Islands occurs within waters under State jurisdiction. The management unit for the main islands includes commercial, recreational and subsistence harvesting of all spiny lobster species, slipper lobster and Kona crab.

4.3 Guam and American Samoa

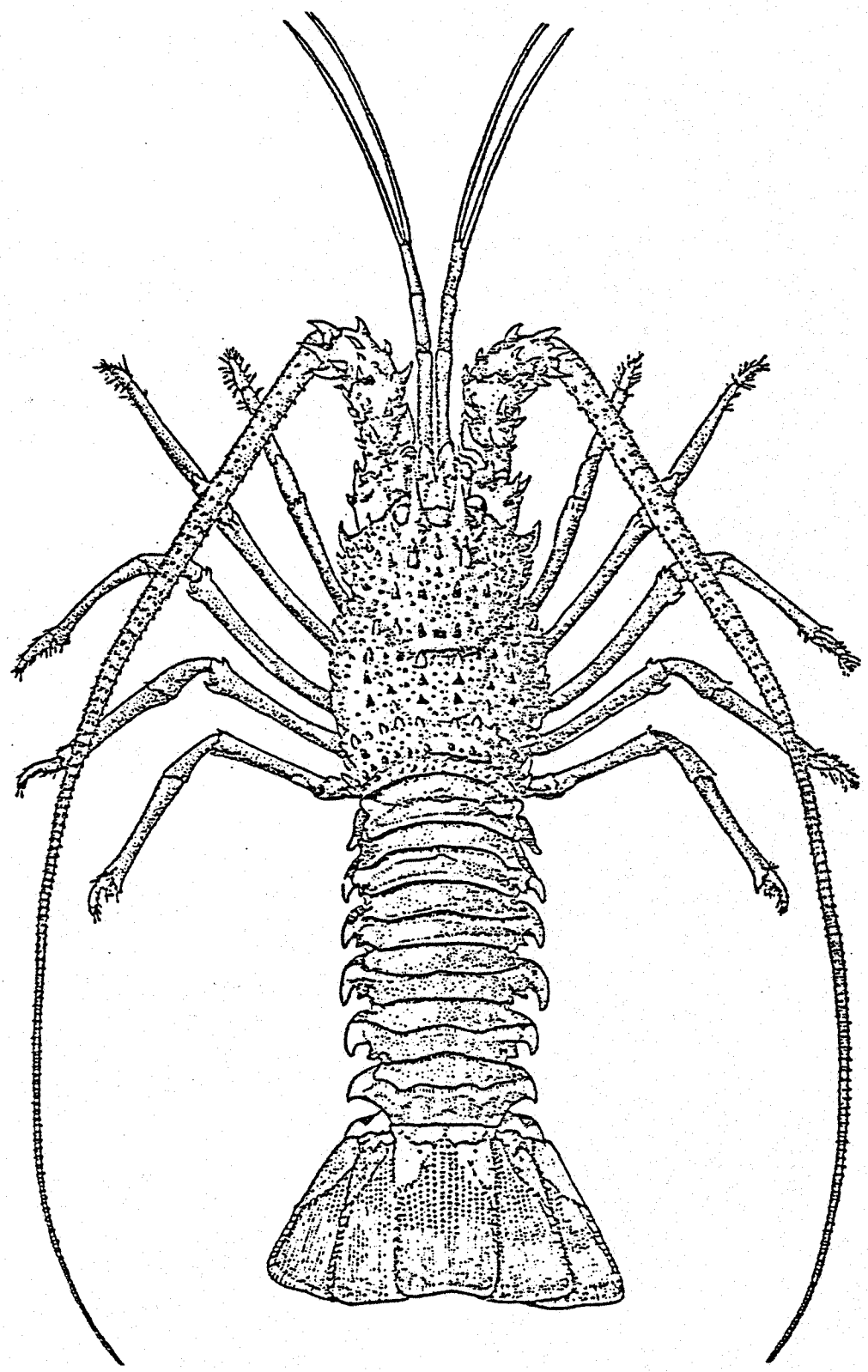
The quantity and species composition of spiny lobster, slipper lobster and Kona crab landings of the commercial, recreational, and subsistence harvesters in Guam and American Samoa are unknown. Similarly, the division of harvest areas between FCZ and waters under Territorial management is unknown. These two components of the overall management unit comprise all harvesters of

spiny and slipper lobster and Kona crab.

4.4 Scope of Management

This FMP proposes active management, under Federal regulations, of the NWHI fishery. As noted, there is significant development potential in that part of the FCZ, as demonstrated by catches in the past five years. For the other three geographic components, this FMP would only establish permit and data reporting requirements for commercial operators. State and Territorial agencies and NMFS should coordinate their programs so that a commercial fishing license issued by a State or Territorial government in the Council's area of concern will satisfy the permit requirement of this plan. State and Territorial management programs continue to be in effect in the waters of the main Hawaiian Islands, American Samoa and Guam. State of Hawaii and Federal regulations will be complementary in waters around the NWHI. The commercial permit and reporting requirements proposed by this FMP will not pre-empt fishing regulations and landing laws of the State or Territories.

FIGURE 4.1 Spiny lobster species within the jurisdiction of the Western Pacific Regional Fishery Management Council. Panulirus marginatus.



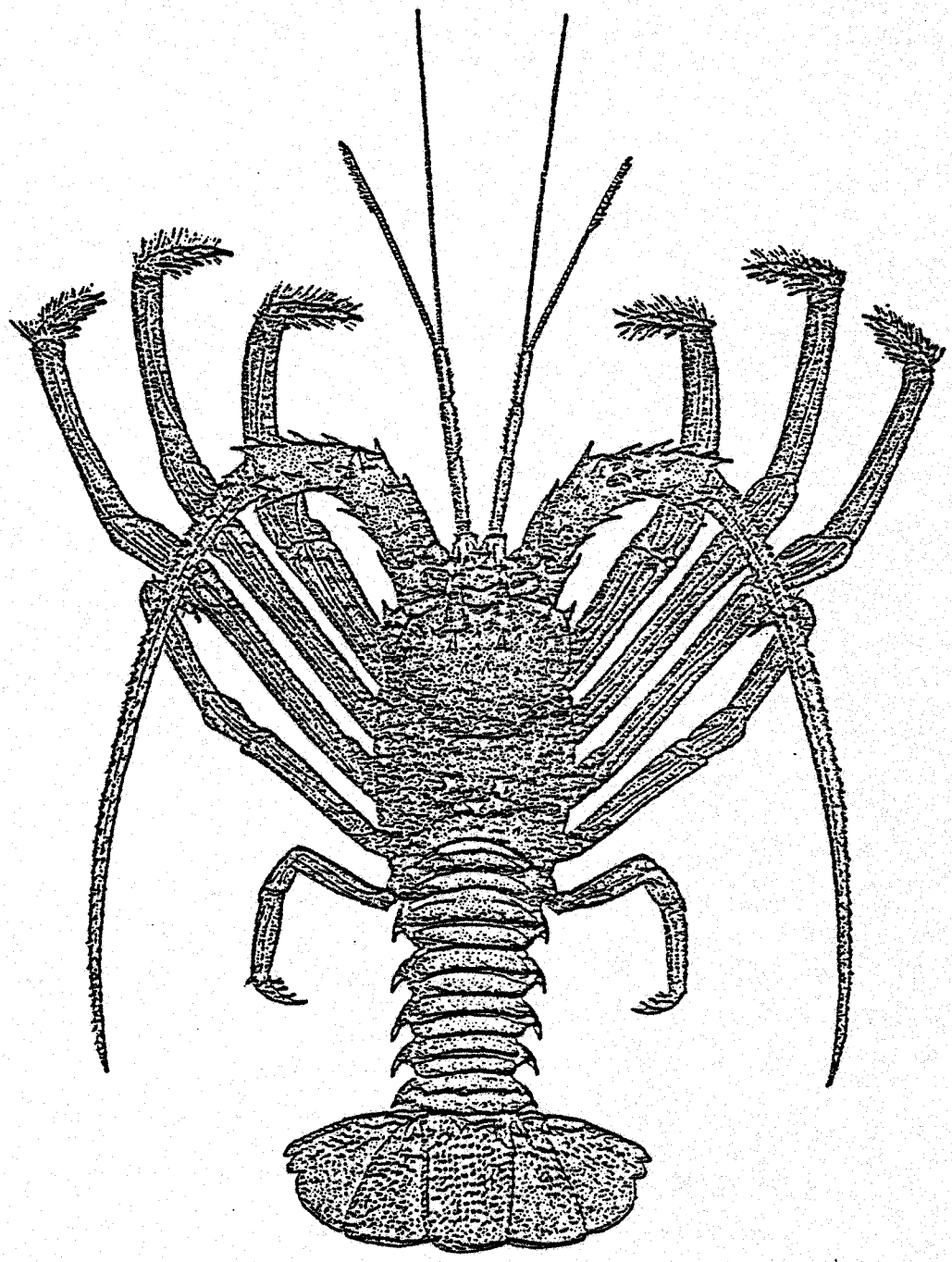


FIGURE 4.2 <u>Panulirus penicillatus</u>

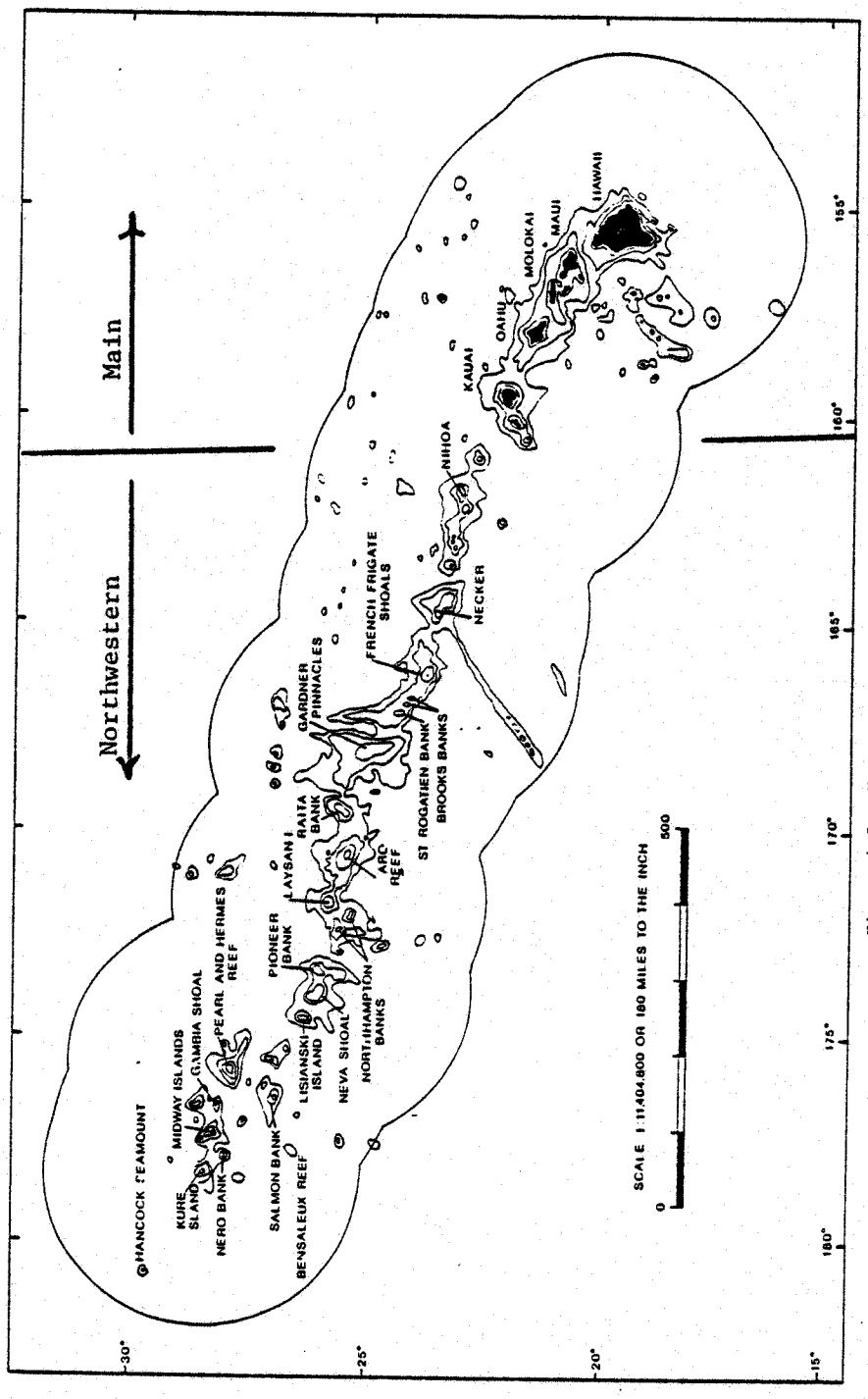


Figure 4.3a Hawaiian Archipelago
(Detailed maps of the NWHI appear in the Source Document.)

FIGURE 4.3a Hawaiian Archipelago

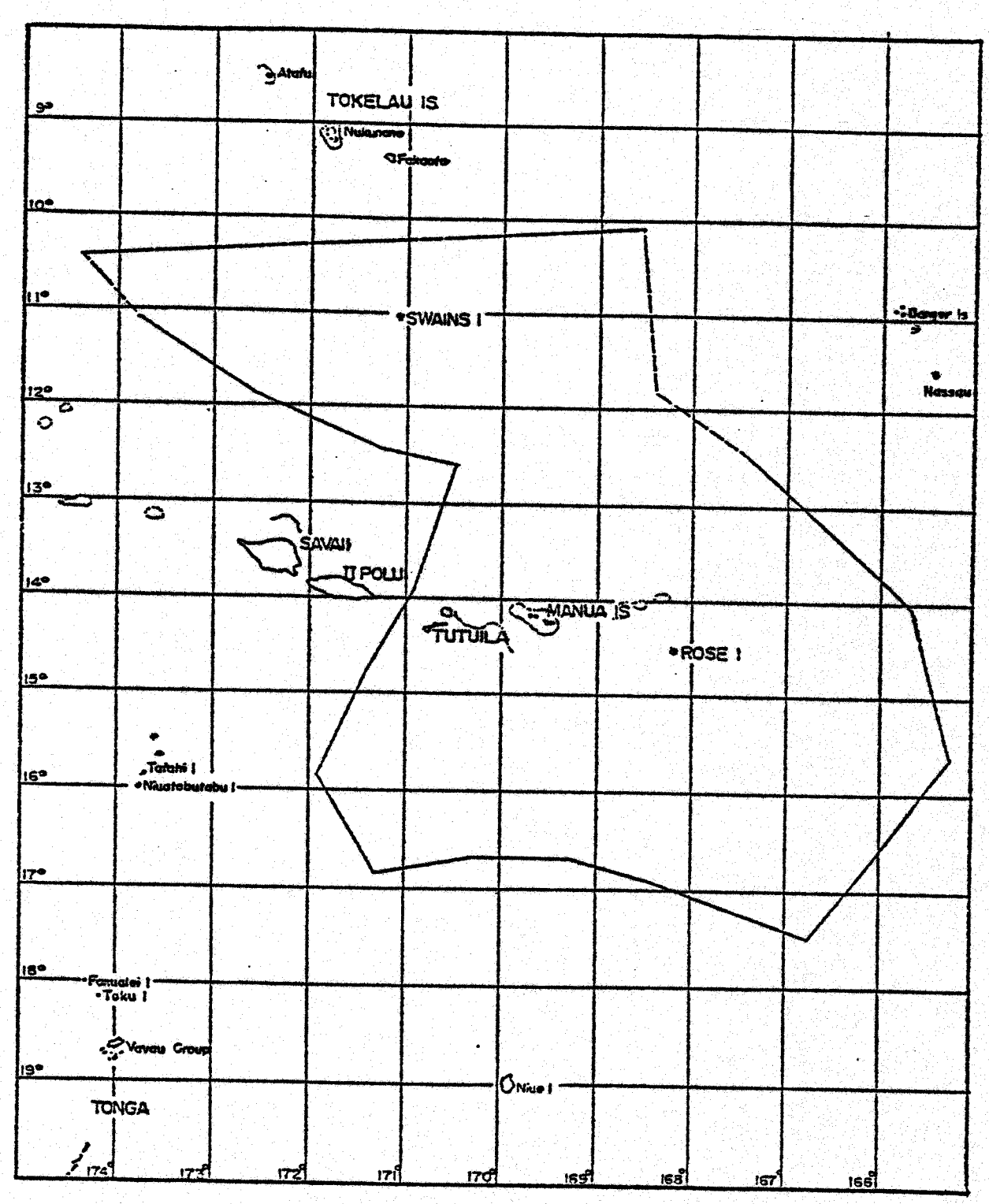


FIGURE 4.3b American Samoa
(The U.S. fishery enforcement line around Swains Island is not yet defined pending negotiations.)

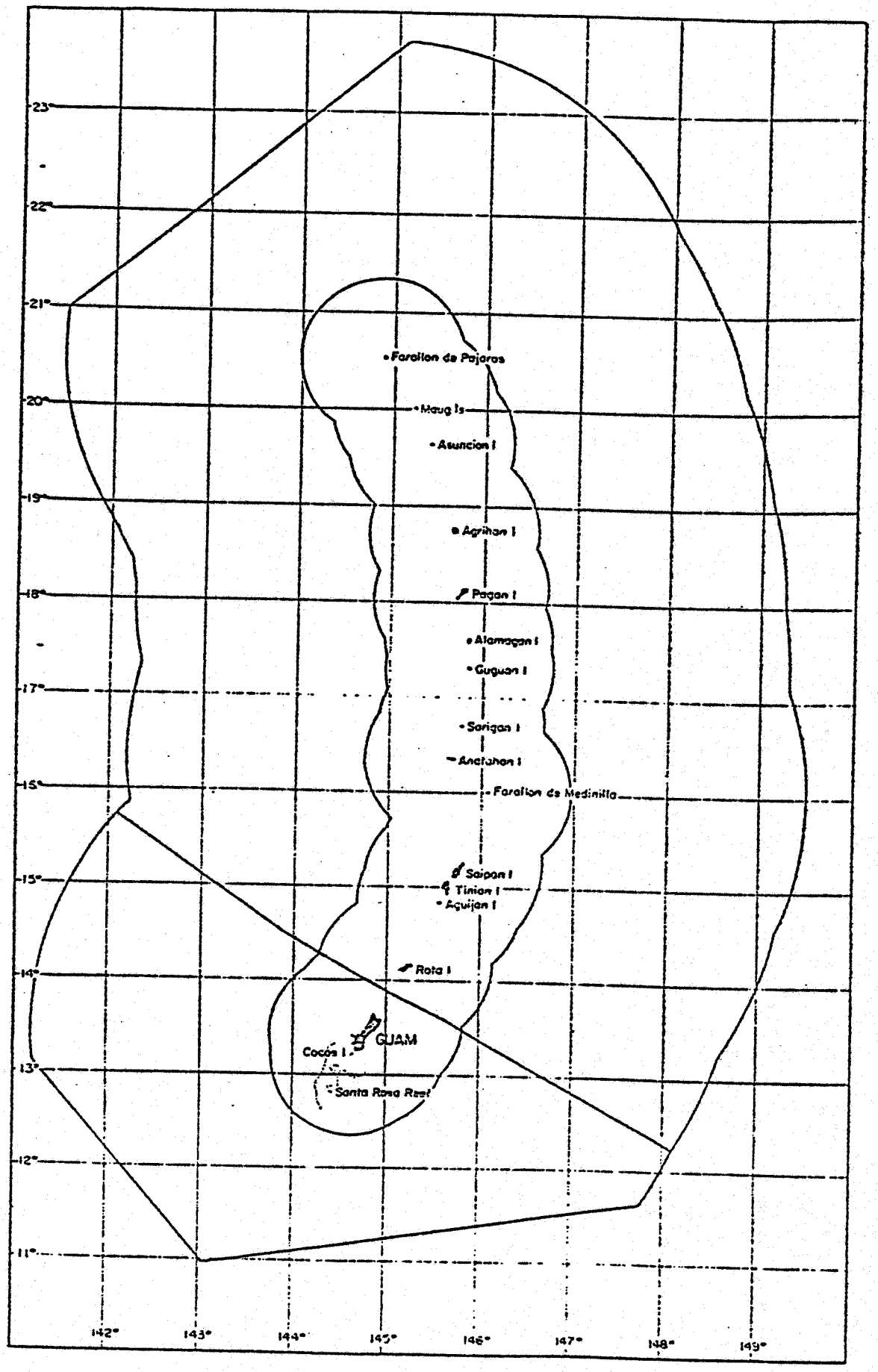


FIGURE 4.3c Guam

Section 5.0 PROBLEMS AND ISSUES

The FMP has been prepared to address conservation and management problems which probably would not be resolved in the absence of the plan. These management and conservation problems include:

a) overfishing through taking of small-sized lobsters on a short-term basis;

b) potential economic instability in relation to Hawaii's overall fishery development plans;

c) inadequate information base for future decisions; and,

d) unknown effects on threatened or endangered species.

In developing this FMP, the Council has been sensitive to the need to achieve consistency of Federal and State management programs.

5.1 Overfishing

The spiny lobster catches from the NWHI in the past several years (1976-80) have not been high enough to significantly affect the overall stocks. Nonetheless, there is considerable interest in development of the spiny lobster fishery and the NWHI fishing grounds for tuna, bottomfish and shrimp. There has been a substantial increase in fishing capacity so that biological overfishing of the lobster stocks is a real possibility. There are several vessels in Hawaii equipped to fish for the live lobster market, as well as three large, multi-fishery vessels with a combined hold capacity of 340,000 pounds and the capability to carry 2,500 traps (Section 7.5.2). These three vessels have equipment to process and freeze lobster tails for the international market and other vessels are expected to enter the fishery. Vessels from the mainland U.S. have also explored the NWHI and Northern Pacific fisheries and are capable of

exploiting the lobster resource on a short-term basis. If this fishing power were applied fully and all at one time, the lobster resource might be overfished on a localized basis, unless controls are instituted.

Current State of Hawaii management measures do not address this concern. Hawaii regulations provide that, with an import license commercial fishers may take any and all lobsters they catch in the FCZ waters of NWHI. It is estimated that the bulk of NWHI lobster catches occur in the FCZ. These landings are categorized as "imports" by the State of Hawaii and are not subject to State size or season limitations. Also, regulations applicable to State-registered vessels are not applicable to vessels from other States, e.g., Alaska crab fishery vessels. The Council and the State have received several telephone and written inquiries in the past year from potential entrants to the spiny lobster fishery, including inquiries from states other than Hawaii.

In summary, there is a significant potential for biological overfishing in the absence of a FMP for the NWHI stocks of spiny lobster. With a FMP, the base is set for complementary State regulations for waters under State jurisdiction.

There is no known immediate risk of biological overfishing in the FCZ around the main Hawaiian Islands, Guam, or American Samoa. State and Territorial management programs in those respective portions of the FCZ appears sufficient at this time.

5.2 Potential Economic Instability

When the Council initiated development of this FMP in 1976 and 1977

there was considerable concern that the immediate pursuit of short-term profits from the fishery might lead to overcapitalization and/or economic instability. The existence or prospect of high profits as the "surplus" or accumulation of large lobsters was harvested would lead to investment of new, single-fishery lobster fishing vessels. There also was concern there might be transfers of vessels from other fisheries (e.g., Alaska crab fisheries). It was feared that short-term biological overfishing might result; with stock depletion and low catch rates, the single-fishery vessels would be idled for a period of time until the stock was replenished. Subsequent rebuilding of the stock might then generate a new cycle of investment, transfers, and overfishing. Given the uncertainties as to yield potentials and the desire to provide for long-term productivity of the lobster resource, the Council initially considered a very conservative management approach with a relatively large (9.0 cm [3.6 in.]) carapace length size limit. There was consideration also of limited entry as a means to prevent overcapitalization.

As the fishery has evolved, however, the potential for overcapitalization and economic instability has decreased. First, while there has been a large increase in fishery capacity, most of the new capacity is in vessels capable of operating in several fisheries on a single trip. There are a few vessels equipped to fish for the whole lobster market, but others, to the extent they fish for lobster, intend to catch and process lobsters on-board for the frozen lobster tail market. So far as is known, no vessels now are wholly dependent on the lobster fishery, and vessels have come in and gone out of the fishery in the recent past.

Second, new information on lobster populations and life history

characteristics became available, such that the Council has been able to achieve a better balance between economic and biological objectives. That is, it became apparent in 1979 and 1980 that the reproductive potential of the lobster stock would most likely be protected with a much smaller size limit than orginally thought. The Council has concluded that the interests of lobster fishers to harvest lobsters of a size suitable for the frozen tail market and in large enough volume to justify the prosecution of the fishery, are compatible with the biological parameters of the stock.

Third, it became clear that a limited entry approach would neither be necessary nor appropriate for the fishery. There have been no short-term transfers of vessels from other areas, and there does not appear to be much risk under this plan that there will be a "boom-and-bust" cycle to the fishery. Under this management regime, each multiple-fishery vessel will be free to apply the level of effort to the lobster fishery that is suited to its own cost structure, revenue requirements, and alternative fishing opportunities. The Council sees no need to establish effort limits; these are unnecessary for the lobster fishery and could adversely affect development in other NWHI fisheries such as bottomfish and shrimp. Inasmuch as there are insufficient data to determine the level of effort which would maximize net economic yield for the lobster fishery, the Council's approach is especially appropriate.

The Council believes that the FMP will provide the basis for long-term, sustained productivity from the fishery. By protecting the reproductive potential of the stock, the FMP will enhance the prospect for a stable fishery with minimal enforcement cost. There would be no need for sudden corrective actions with resultant economic dislocation. While the fishery could continue

to expand beyond current harvest levels, expansion would likely be at a more reasonable pace as the abundance and yield potential of the lobster stocks are determined.

5.3 Data Limitations

The data base is inadequate to determine a precise numerical estimate of maximum sustainable yield (MSY) for the stock or a numerical optimum yield (OY) for the fishery. Harvests in the NWHI have been erratic, and most effort until 1980 was expended only at Necker Island. There appears to be considerable variation in the density of lobsters, and possibly in sex ratio, size and weight classes, at different islands. Sampling has not been sustained over a sufficiently long time period to assess long-term population dynamics changes (if any) attributable to harvesting. Information is limited on reproductive potentials, the response of the stock to fishing pressure, natural mortality rates at various life stages, and growth rates at different islands. The relationship between egg production, larval settling, and recruitment into the stock and the fishery; density dependence factors; and the extent of interaction between the two principal species of spiny lobster, are all unknown. It also is unknown whether there is interaction between slipper lobster and spiny lobster, Kona crab, or whether slipper lobster and Kona crab might have a distinct commercial potential.

Present and planned resource survey and assessment work in the NWHI will provide some but not all needed information concerning the impacts of commercial fishing on the stocks. Catch and effort data from the fishery will be vital to fill some of the data gaps previously noted. In the absence of this FMP, such data probably would not be available in the quantity and time desired.

The NMFS has placed observers on some commercial vessels through the operator's voluntary cooperation, and the plan urges that this be continued. The data submission requirements for commercial fishing under the plan will generate information which would otherwise not be collected.

5.4 Ecological Relationships

The NWHI contain several endangered and threatened species, and most of the land area was designated a bird refuge in 1909. The Hawaiian monk seal (*Monachus schauinslandi*) is listed as an endangered species, as is the leatherback turtles. Potential problems for the monk seal arising from the fishery include the risk of injury or mortality from gear entanglement, harrassment from increased fishing activity, or depletion of lobster as a seal food source by an unregulated fishery. Possible injury to leatherback and green sea turtles also is of concern to the Council. The ecological relationships of monk seals and sea turtles are not known.

The Endangered Species Act of 1973 (ESA) requires that Federal agencies promote the recovery of and protect threatened and endangered species from adverse impacts, including fishing. It is the Council's view that a FMP can be positive mechanism for protection of the species, especially compared to possible conditions in the fishery without a FMP. The FMP is a product of a multi-disciplinary, systematic planning effort with several levels of public input. A FMP prepared by a Council will be understandable to and supportable by fishing interests because they have contributed to its development. Further, the data submission and monitoring requirements of a FMP will provide a basis for better stock assessment and determinations of ecological relationships.

In summary, the Council believes that this FMP will promote achievement of the goals of the ESA as well as the FCMA.

5.5 Jurisdiction

The waters under State and Territorial jurisdiction do not fall within the management control of the Council under the FCMA. It is important, however, to note that there is undoubtedly an inter-relationship of lobsters (especially in the larval and juvenile stages) between the territorial seas and the FCZ. Thus the management measures that the State of Hawaii already has and/or may additionally take in the NWHI will have a direct impact on the effectiveness of the policies adopted by the Council.

The State of Hawaii has indicated that complementary rules are being developed to insure consistent management measures for waters under State jurisdiction around the NWHI. Thus, all vessels, regardless of State of registration, will be subject to consistent regulations. Such consistency of management might not occur in the absence of an FMP.

Section 6.0 OBJECTIVES

The primary goal of the FCMA and this management plan is to encourage optimal use of the spiny lobster resources in the Western Pacific region and achieve the optimum yield from the fishery.

The first management objective is to assure the long-term productivity of the stock and prevent overfishing. This means:

a) maintain sufficient numbers of adult lobsters to insure adequate reproduction and recruitment of the population;

b) prevent the harvest and incidental mortality of small or juvenile lobsters, which is biologically and economically wasteful; and

c) minimize the risk of depletion of the stock.

The second management objective is to promote the efficient contribution of the spiny lobster resource to the United States economy. This means:

a) promote the optimal economic return from the fishery on a stable, long-term basis;

b) promote development of fishing enterprises, within the constraints of sustainable biological yield, general socio-cultural conditions, and multispecies fisheries; and

c) encourage U.S. production in harvesting and processing spiny lobsters.

The third objective is to collect and analyze biological and economic information about the spiny lobster fishery and improve the basis for conservation and management in the future.

The fourth objective is to prevent unfavorable impacts of the fishery on the Hawaiian monk seal and other endangered and threatened species.

Perspective for Decision Making

To a limited degree, these objectives are mutually exclusive. For example, prevention of incidental mortality of juvenile lobsters or minimizing the risk of localized stock depletion (objective 1) could impose such high costs on producers (for compliance) or government (for enforcement) as to render the FMP inefficient from an investor's or taxpayer's perspective. On the other hand, maximizing the profitability of fishing firms could result in adverse impacts on the long-term productivity of the stocks. This is especially true at times when high discount rates enhance the value of immediate or short-term profits relative to long-term productivity. The Council has attempted to achieve a balance between such potential conflicts.

The Council also acknowledges that there is an element of risk in making the decisions proposed in this FMP. That is, these decisions are made with uncertainty due to limited information. On the one hand is the risk of foregoing national and local economic benefits associated with harvesting a valuable renewable resource because of concern about the yield potential of the stocks or impacts on other species. On the other hand is the risk of reduced long-term productivity or adverse ecological impacts associated with too generous a strategy for resource exploitation in the short-term. There is no

single "right" decision to be arrived at by a mathematical formula or other means. Rather, the Council (and ultimately NMFS) must review the available facts and arrive at decisions concerning the acceptability of the risks. It is the Council's view that this FMP achieves an acceptable balance between long and short-term interests and between biological, ecological, economic, and social objectives. Emergencies are not anticipated in this fishery but the FMP recognizes that the FCMA and the ESA provide authority for the Secretary of Commerce to adopt emergency measures should they be necessary to protect fishing resources or endangered and threatened species.

Section 7.0 DESCRIPTION OF THE FISHERY

7.1 Description of the Stocks

7.1.1 Species Identity

The target species taken in the spiny lobster fishery are:

Spiny Lobsters

Panulirus marginatus - (local name - ula)	NWHI, main Hawaiian Islands
Panulirus penicillatus -	NWHI, main Hawaiian Islands, Guam
Panulirus sp. -	American Samoa, Guam

The incidental species taken by lobster trapping are slipper lobsters and kona crab.

Slipper Lobsters

Scyllaridae sp. - (local name - ula papapa)	NWHI; possibly other areas

Kona Crab

Ranina ranina	NWHI and other areas

7.1.2 Morphology

Spiny lobsters are non-clawed, decapod crustaceans with two horns and antennae projected forward of the eyes. The walking legs are slender and about equal in size. Spiny lobsters have a large, spiny

carapace covering the anterior part of the body, and a powerful abdomen or tail which terminates in a flexible fan (see Figures 4.1 and 4.2).

7.1.3 Incidental Species

Slipper lobsters (family Scyllaridae) are caught in association with spiny lobsters. Their appearance is markedly different, but their similarity as a food item suggests that commercial use may expand in the future. Despite the absence of biological information on this species, slipper lobsters are included in the management unit so that reports of incidental catches in the lobster fishery will be assured. However, no restrictions on catch of slipper lobsters is proposed.

Kona crab (family Raninidae) are also caught in association with spiny lobsters. They are included in the management unit as incidental species to provide catch information which may be used for future management considerations.

7.1.4 Distribution

Spiny lobster species occur throughout the Pacific islands. P. marginatus is endemic to Johnston Island and the NWHI, and is the dominant species in the NWHI fishery to date. In the NWHI, this species generally occurs in waters between 5-100 fathoms (fm) in depth in the NWHI. Around Oahu, P. penicillatus are found in greater relative abundance in waters deeper than 5 meters. Spiny lobsters of both species have been found within the lagoons of atolls in the NWHI as well

as on the seaward side of the reefs. Distribution by species around Guam and American Samoa is unknown, but various species occur in both areas.

Spiny lobsters are nocturnal predators which occupy dens or crevices during the day. The range and availability of spiny lobsters vary greatly throughout the NWHI. Variation also occurs within the main islands of Hawaii. Table 7.1 shows density figures obtained from research cruises prior to commercial exploitation in the NWHI.

Size variation within the spiny lobster population occurs throughout the NWHI chain, with the major difference occurring at Necker Island (Table 7.2). Comparative biological data are also available on lobsters from Oahu, Midway and Kure Islands (Morris; McGinnis; MacDonald & Thompson).

7.1.5 Relative Abundance

P. marginatus is more abundant in catches than *P. penicillatus* in the Midway Islands, composing about 98% of the diver-caught lobsters. However, the two species were caught in approximately equal numbers in Oahu trap samples. Because *P. marginatus* is the preponderant species in the NWHI fishery, biological information in the FMP concentrates on this species. (Brock; MacDonald & Thompson).

TABLE 7.1 THE POSITION OF THE ISLANDS, BANKS, AND REEFS, TOTAL NUMBER OF LOBSTERS CAUGHT, NUMBER OF TRAP-NIGHTS OF EFFORT EXPENDED, AND CATCH/TRAP-NIGHT OF ALL LOBSTERS INCLUDING LEGALS (8.25 CM OR MORE IN CARAPACE LENGTH), SUBLEGALS, AND BERRIED FEMALES IN THE NORTHWESTERN HAWAIIAN ISLANDS. CATCH DATA ARE FOR OCTOBER 1976-NOVEMBER 1978.

	Position		Total Catch (No.)		
	Latitude (N)	Longitude (W)	Catch	Trap-Night	Catch/Trap-Night
Middle Bank	22°42'	161°02'	0	40	0.00
Nihoa	23°03'	161°55'	255	178	1.43
Nihoa (west bank)	22°58'	162°14'	161	218	0.74
Necker Island	23°34'	164°42'	7,937	1,680	4.72
French Frigate Shoals	23°46'	166°18'	140	359	0.39
St. Rogatien Bank	24°25'	167°15'	41	59	0.69
Gardner Pinnacles	25°01'	167°59'	307	209	1.47
Raita Bank	25°35'	169°35'	169	92	1.84
Maro Reef	25°29'	170°35'	2,684	663	4.04
Laysan Island	25°42'	171°44'	575	341	1.69
Pioneer Bank	26°00'	173°25'	0	24	0.00
Lisianski Island	26°02'	174°00'	9	179	0.05
No-name Bank #8	26°17'	174°34'	0	24	0.00
Salmon Bank	26°56'	176°28'	2	48	0.04
Pearl and Hermes Reef	27°48'	175°51'	232	236	0.98
Midway Islands	28°12'	177°22'	576	280	2.06
Kure Island	28°25'	178°25'	158	240	0.66
Total			13,214	4,835	2.73

It is quite evident that spiny lobsters are distributed throughout the entire NWHI chain from Nihoa to Kure. The data also show that the shelves surrounding Necker and Maro Reef were the most productive during the survey period. Necker, because of its proximity to Oahu where the lobster fleet is based, received considerable trapping effort from the commercial boats only months after the Cromwell obtained catch rates as high as 17.80 lobsters/trap-night in some areas around the island during the October-November 1976 cruise. During our surveys, we expended 1,680 trap-nights at Necker and caught 7,937 lobsters or an average of 4.72 lobsters/trap-night.

Maro Reef, which was found to be almost as productive as Necker, was first visited and fished with significant amounts of effort during cruise TC-77-02 (Part III) in May-June 1977. In the course of our surveys, we expended 663 trap-nights and caught 2,684 spiny lobster or an average of 4.04 lobsters/trap-night (Table 1). Curiously, Maro Reef is unlike Necker with respect to bottom conditions. Dives made at Maro Reef during TC-77-02 (Part III) indicated that the bottom there was mostly sand and coral rubble and had virtually none of the habitat features usually associated with lobsters. The substrate at Necker, on the other hand, is largely coral with portions of it consisting of sandstone and sandy patches.

Source: Uchida et. al.

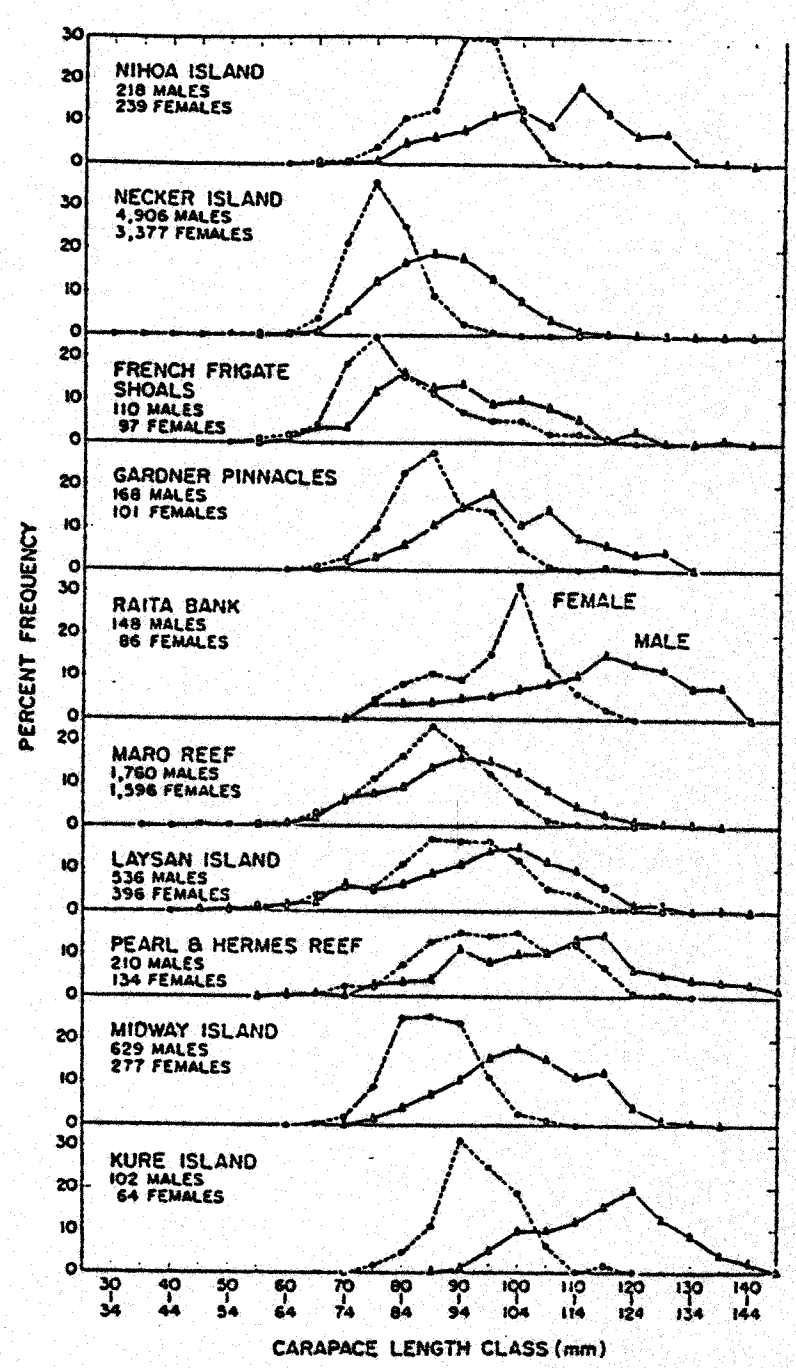


TABLE 7.2 Percentage frequency distributions of carapace lengths of male and female spiny lobsters sampled in waters of the Northwestern Hawaiian Islands, October 1976-November 1978. This data is presented for comparative purposes. There may be a sampling bias against smaller sized lobsters.

Source: Uchida, et.al.

There are certain unknowns about the lobster populations of the NWHI that are quite important. First, there is almost no information on density dependence factors. That is, it is unknown whether or to what degree fishery removals of lobsters will generate changes in egg production, larvae survival, growth rates, or juvenile survival. Also, we do not know whether a change in the density of P. marginatus may result in increased relative abundance of P. penicillatus, which apparently is less catchable by traps (MacDonald); and if this occurred, the extent to which changes in reproductive capacity and yield per recruit might result is unknown. Also unknown is the extent to which density rates derived from samples are representative of actual density for the full amount of lobster habitat (i.e., 0-100 fm.) at the respective islands. Finally, we do not know the extent of migration undertaken by lobsters from shallow to deep waters as they grow from year to year, or even in a season, as appears to occur in the Gulf of Mexico and South Atlantic (South Atlantic FMP); or from lagoons to seaward sides of reefs. Section 11.1 identifies high priority research needs so these factors can be determined.

7.1.6 Life History

In the genus Panulirus, the mature male spiny lobster deposits a spermatophoric mass on the mature female's thorax. The viable spermatozoa are released when the female scratches and breaks the mass. The ova are released from the oviduct, fertilized, and attached to the setae of the female's pleopods. The female spiny

lobster is then technically termed ovigerous or "berried".

Spiny lobsters are considered to be very fecund. A female P. marginatus may release from 150,000 to 575,000 ova per spawn, and may spawn four or five times a year around the main Hawaiian Islands; and may release from 91,000 to 852,000 ova two or three times a year around Midway Islands.

Lobsters in the warmer waters of the NWHI south of Maro Reef and throughout the main islands of Hawaii are found to be "berried" year-round, and reproduction is apparently continuous. On the other hand, in the cooler waters at the northern end of the chain, a distinct seasonality occurs, with reproduction apparently occurring mostly in the summer months.

After hatching, the larvae (or phyllosoma) float to the surface and are planktonic. The duration of the planktonic stage differs between species and areas of the world. The mechanisms by which larvae are retained within the various areas of the Hawaiian Archipelago are not yet understood. One study indicates, however, that no genetic differences could be determined between lobsters at different islands, suggesting that there is a single stock in the NWHI (Shaklee).

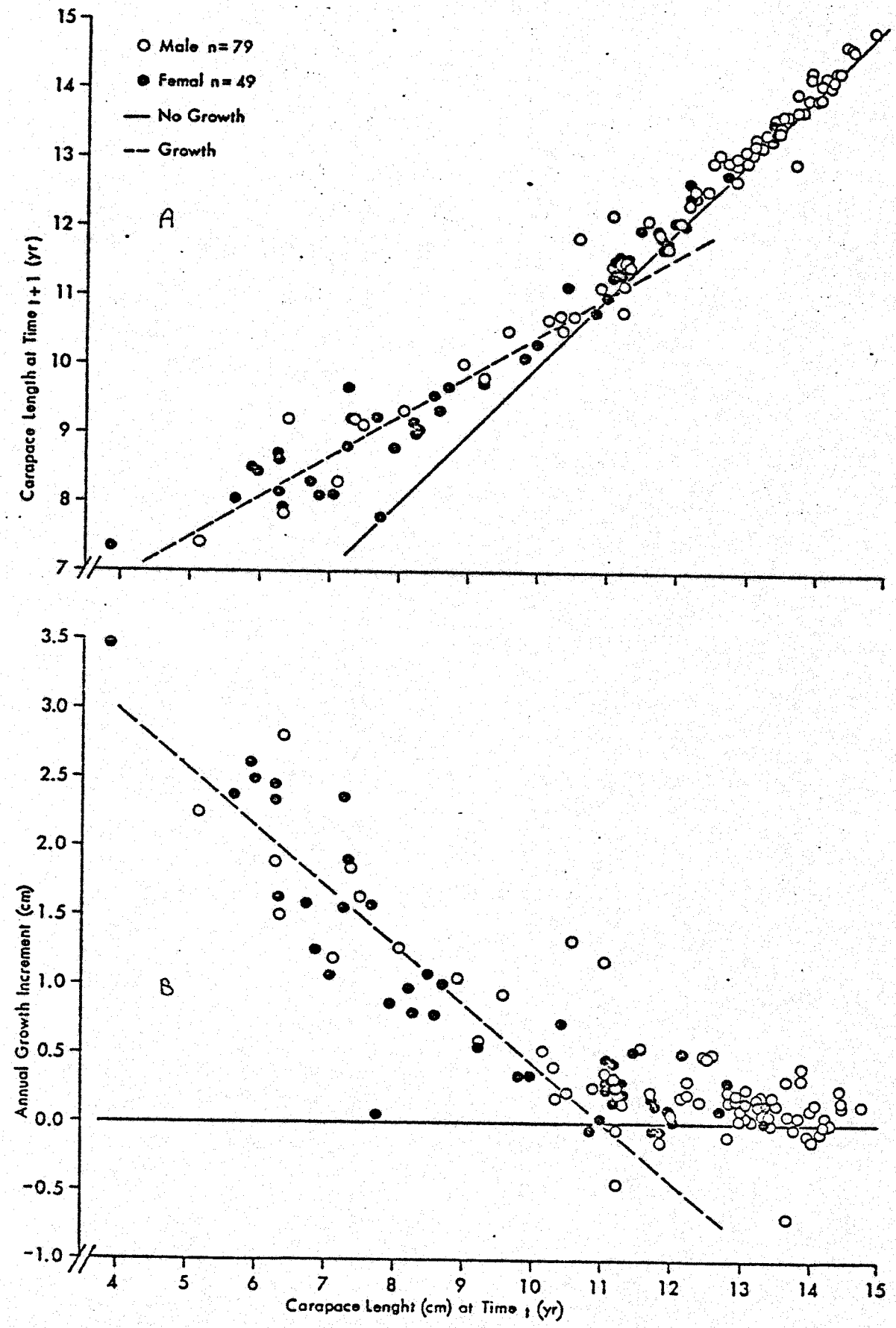
The phyllosoma stage is followed by the puerulus stage when the lobster can swim horizontally, apparently allowing the animal to enter near-shore areas for subsequent settling. The animals settle to the bottom in sheltered areas and begin to take on their adult form. The relationships concerning egg production, larval survival and

settling, and mortality are unknown (McGinnis; MacDonald & Thompson).

The planktonic larval stage can take up to one year from hatching of the eggs. The puerulus stage may take less than six months, after which growth slows. Although some female lobsters are sexually mature as early as 5 cm (2 in.) CL, it may take two years from the settling out process for most lobsters to become reproductively active. Lobsters are thought to live up to ages of 20-30 years, with some reaching a carapace length of 14 cm (5.5 in).

Recent evidence indicates that growth up to 7.0 cm (2.75 in.) CL can occur within 2 years of the onset of the puerile stage which is more rapid than in a variety of other lobster fisheries. Figure 7.1 provides information on growth rates of tagged lobsters at Kure Island (MacDonald, 1980).

FIGURE 7.1 PRELIMINARY RESULTS OF ANNUAL GROWTH.
Craig D. MacDonald, Zoology Department, University of Hawaii.
Panulirus marginatus-Kure Atoll



7.1.7 Reproductive Potential

Earlier studies of spiny lobster reproductive potential in the NWHI used the frequencies cited in Table 7.2, combined with data on the relative weight of the egg mass in each size class, to estimate the population's reproductive potential. These studies suggested that the majority of reproductive effort occurred in size classes above 8.5 cm CL at Oahu and 9.5 cm CL at Midway. Therefore it was thought that lower carapace length restrictions might imperil the reproductive potential of the population (Thompson and MacDonald).

However, a recent NMFS Honolulu Laboratory study shows a different relationship between size frequencies and reproductive potential. The key difference derives from the method by which the number of female lobsters in the population at each size class is estimated. New information on growth rates recently provided by MacDonald was used to "back calculate" an estimate of the population size distribution from the sampling frequencies. The study estimates a much larger contribution to total reproductive potential for size classes below 8.25 cm CL than had previously been estimated.

The reason for the difference lies in problems with sampling small sized lobsters, which do not enter or do not remain in traps with the same frequencies as larger animals, and with the rapid growth of smaller lobsters.

Based on a revised estimate of population size frequencies, the relative contribution of egg production as a function of female

carapace length at three levels of natural mortality is indicated in Figure 7.2. It is estimated that 30%-40% of the eggs produced by all females come from females with a CL less than 7.7 cm (Polovina).

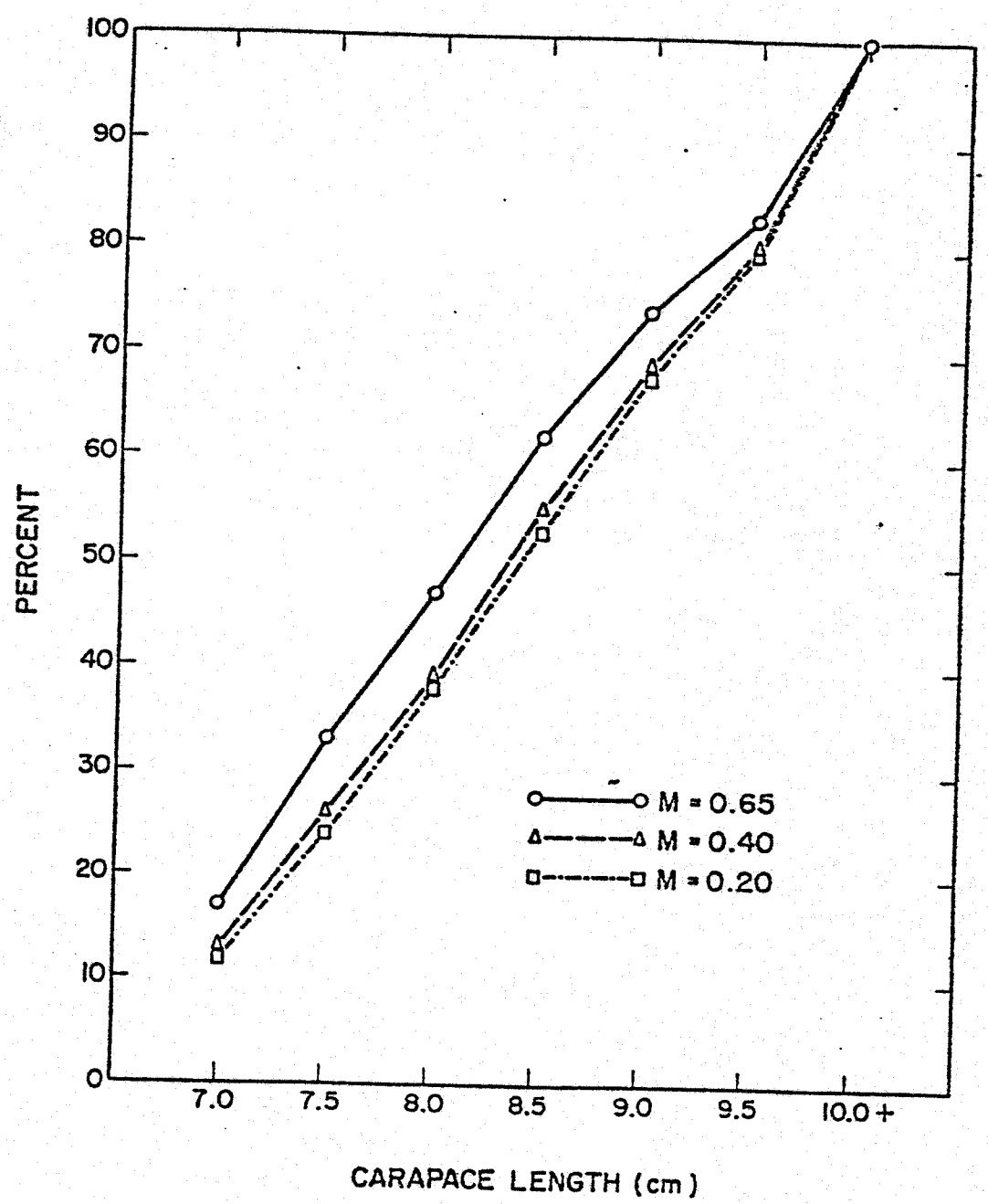
Given information on larval mixing throughout the archipelago and the highly fecund characteristics of lobsters, a minimal carapace length between 7.5-8.5 cm is considered an adequate protection of the lobsters' reproductive potential (see SSC Report, Section 12.3).

There are cases of lobster fisheries in other parts of the world where reproductive capacity apparently has been maintained even with very high levels of fishing effort and low size limits. In the Australian rock lobster fishery, the minimum size is less than the size of first maturity. A high percentage of legal-sized lobsters apparently is caught each year, and in spite of a limited entry program effected in 1963, effort levels generally exceed the 1963 level. Catches, however, have generally been high and stable since 1968. It appears that yield and recruitment have not differed significantly since 1968 except for year-to-year fluctuations (Morgan).

The fishery off Florida and in the Gulf of Mexico also appears to demonstrate relatively high and stable recruitment and yields in spite of very large increases in fishing effort and probable decreases in spawning. Reported catches have fluctuated very little since 1969. The reported catch is presumably a good index of recruitment since the fishery takes almost all the available recruits each year. It appears that density dependent growth and mortality effects

FIGURE 7.2 CUMULATIVE PERCENT OF EGG PRODUCTION AS A FUNCTION OF FEMALE CARAPACE LENGTH AT THREE LEVELS OF NATURAL MORTALITY (M) BASED ON REPRODUCTION, FECUNDITY, AND SIZE FREQUENCY ESTIMATES FROM DATA COLLECTED AT SEVERAL LOCATIONS IN THE NWHI.

Source: Polovina



in the juvenile stage absorb most of the fluctuation in postlarvae recruitment (South Atlantic Council).

The fishery at Oahu and other main islands presents a complicated situation. At first glance, even a size limit of 8.25 cm appears to have been inadequate to maintain reproductive capacity. Reported commercial landings have declined steadily since 1949, the peak year. It must be noted, however, that the main Hawaiian Islands fishery is not similar to the NWHI, Australian, or Florida fisheries. The main islands fishery is essentially a sport fishery, and sport catches are not recorded in a systematic fashion. At the same time, there is very limited ability to enforce the size limit for the large number of recreational SCUBA divers who take lobster. The commercial landings are made by fishermen using tangle nets (as do some subsistence and recreational fishers), traps (often incidental to trapping bottomfish), and SCUBA, but none of these fishers are known to be dependent on spiny lobster catches for their income (see Section 7.4). In practical terms, one cannot determine the effect of the size limit now in force; productivity may still be high, but there are no counts the of actual harvest.

7.1.8 Size Relationships

The relationships for carapace length and total weight for male and female *P. marginatus* from various islands in the NWHI are given in Table 7.3. For 7.7 cm (3.1 in.) carapace length lobsters, linear regression equations predict a total weight of 13.3 ounces for

males and 14.5 ounces for females. A tail weight of 4.6 ounces for males and 5.5 ounces for females is predicted for 7.7 cm CL lobsters, while average tail segment widths are 4.7 cm and 5.0 cm, respectively. Freezing does not significantly affect weight and length, but tail width has yet to be verified (Uchida, et. al.).

Discriminant analysis was used on a sample of 1615 lobsters to estimate a decision rule which will classify a lobster as either having a carapace length greater than or equal 7.7 cm (legal) or as having a carapace length less than 7.7 cm (sublegal) based on the width of the first tail segment. The decision rule derived classifies lobsters with a width of the first tail segment equal to or exceeding 4.9 cm as legal and lobsters with a width of the first tail segment less than 4.9 cm as sublegal. Based on the sample of 1615 lobsters classified under this rule, 94.6% of the sublegals were correctly classified and 85.8% of the legals were correctly classified (Polovina, personal communication).

For enforcement purpose, where the fishers measure the carapace length, separate and freeze the tails, and discard the carapaces, and where the enforcement agents have only tail width to insure the size limit is observed, the carapace length to frozen tail width relationship must be verified. There is a natural variation of the relationship between legal length lobsters and their tail sizes. Therefore the Council chose to allow a tolerance factor related to a revised discriminant analysis of percent legals misclassified. This factor and the exact equivalent tail width will be specified in the regulations.

TABLE 7.3 RELATIONSHIP OF CARAPACE LENGTH TO WEIGHT AND WIDTH

Carapace Length	Average Tail Width		Average Tail Weight	
cm	cm		oz.	
	Male	Female	Male	Female
7.70	4.7	5.0	4.6	5.5
8.00	4.8	5.2	5.0	6.1
8.25	4.9	5.3	5.3	6.3
9.00	5.2	5.7	6.5	8.4

Sources: Tail Weight - Uchida, et. al.
Tail Width - Council report

Based on linear regression estimates

fathoms is about 15,800 km^2 (see Table 7.5).

Not all areas within this total are equally suitable for spiny lobsters. The species is normally found in abundance only where there are numerous boulder and coral formations offering cracks, crevices, and other types of shelter. Specific sites where densities are high are only beginning to be identified.

7.2.2 Areas of Concern

The spiny lobster grounds around the main Hawaiian islands mostly lie within the State's jurisdiction. In the NWHI, while the extent of waters under State jurisdiction is disputed (see Section 7.3.2) the fishery is largely within the FCZ. This jurisdictional relationship is a point of concern to the Council, which seeks to increase inter-jurisdictional cooperation.

The impact of the spiny lobster fishery on the habitat of endangered species and other elements of the flora and fauna of the NWHI is also a concern of the Council. The HINWR refuge is an onshore reserve but the offshore area, whether in State or FCZ waters, provides an area for interaction between a fishery and wildlife. The proposed management measures seek to achieve long-term protection of this environment.

7.2.3 Protection Programs in Effect

The State of Hawaii and the Territories of Guam and American Samoa retain jurisdiction over fishing within their territorial seas,

and over all fishing by vessels registered under the laws in the respective jurisdictions, so long as their regulations are not in conflict with Federal regulations to implement a FMP. The State of Hawaii has regulatory measures for the spiny lobster fishery in waters under State jurisdiction which prohibit use of spears, taking lobsters smaller than 3.25 inches (8.25 cm) carapace length, taking berried lobsters, or taking lobsters during the months of June, July and August. Lobsters must be landed whole. In the territorial sea of the NWHI spiny lobsters may be taken during the closed season with a special permit; but the minimum size limit still applies. A special permit is also required to land frozen tails, but lobsters taken in the FCZ are currently regarded as "imports" to Hawaii and are not subject to State fishing regulations. A State import license is required.

Guam prohibits the capture of lobsters under one pound, or berried lobsters during May, June and July. American Samoa has no regulations.

7.2.4 Tern and Midway Islands

The status of proposed fishery support services at Midway and Tern Islands is uncertain at this time, but success in developing these islands as fishery stations would change the nature of commercial (and perhaps recreational) fishing effort in the NWHI. Midway Island has been used as a refueling and transfer station for albacore tuna trollers in the Northern Pacific fishery.

7.3 Resource Management Jurisdiction

7.3.1 Boundaries

Seaward boundaries of the FCZ in the Western Pacific have been defined by the Department of State for most areas. The only portion of the boundary not yet established is the FCZ around American Samoa; however, a treaty defining this boundary has been proposed for ratification by the U.S. Senate.

Legislation is pending in Congress to include the Commonwealth of the Northern Mariana Islands as a voting member of the Council. An amendment to the FCMA to include the FCZ of the Pacific islands of Wake, Howland, Baker, Jarvis, Johnston, Palmyra, Midway and Kingman Reef within the Council's jurisdiction is also being considered.

7.3.2 Status of the Northwestern Hawaiian Islands (NWHI)

Hawaiian Islands National Wildlife Refuge (HINWR)

The HINWR is administered by the U.S. Fish and Wildlife Service (FWS) of the Department of the Interior. The refuge islands in the NWHI include: (1) Nihoa Island, (2) Necker Island, (3) French Frigate Shoals, (4) Gardner Pinnacles, (5) Maro Reef (entirely submerged except for a single rock extending about 2 feet above high water), (6) Laysan Island, (7) Lisianski Island, and (8) Pearl and Hermes Atoll. Kure Atoll and Midway Islands are not part of the HINWR. Offshore waters are not included in the HINWR.

Commercial fishing is prohibited within the boundaries of the Refuge. The FMP's recommended area restrictions for lobster fishing (prohibition of fishing within lagoons and in waters shallower than 10 fathoms around all of the NWHIs) are fully consistent with U.S. Fish and Wildlife Service regulations governing uses of the refuge lands and waters.

Midway Islands

The Midway Islands, lying at the northwest end of the NWHI, is a "possession" of the United States, administered by the U.S. Navy. Entry to Midway is strictly prohibited unless authorized by the Secretary of the Navy. Midway is not a part of the State of Hawaii nor of the HINWR. The plan recommends that complementary management measures be adopted by the Navy to control fishing by Navy personnel within the 5-mile Naval Defensive Sea Frontier around Midway Islands.

State of Hawaii Seabird Sanctuary

Kure Atoll, the northernmost island of the NWHIs, is a State Wildlife Refuge administered by the Hawaii Department of Land and Natural Resources. State regulations govern fishing in waters under State jurisdiction around Kure, including recreational fishing for lobster by Coast Guard personnel at the LORAN station at Kure.

Boundaries of State of Hawaii

With the exception of Midway, each of the NWHIs is a part of the State of Hawaii. As such, they are bounded by a territorial sea

which is under the jurisdiction of the State.

The extent of the State's territorial sea is a matter of some controversy between the State and the Federal government. Hawaii's 1978 Legislature called for a moratorium on Federal "encroachment" on the State's territorial waters. The dispute includes not only the extent of Federal control of waters in the NWHI but also concerns the waters between the islands of the Hawaiian Archipelago, which Hawaii considers inland waters under the jurisdiction of the State. No resolution of this dispute is anticipated in the near future, and its relevance to the spiny lobster fishery is limited. The State of Hawaii and the Council are cooperating in developing complementary management and conservation measures for the entire region so this FMP can be effective.

7.3.3 Environmental Protection

Marine Mammal Protection

The Marine Mammal Protection Act of 1972 (MMPA) imposes a moratorium on the taking of marine mammals and includes provisions prohibiting harassment of marine mammals. Permits may be granted for the incidental "take" of marine mammals in commercial fishing operations, provided these are not endangered marine mammals. Non-endangered marine mammals found in the areas in which lobster fishing occurs include the bottlenosed dolphin (*Tursiops trancatus*) and the Hawaiian spinner dolphin (*Stenella longirostris*).

Endangered Species

The Endangered Species Act of 1973 (ESA) prohibits the taking or harassment of any species declared as endangered.

As indicated earlier, several species listed as endangered or threatened under the ESA are resident in or occasional visitors to the NWHI, including the sperm whale (*Physter catodon*), humpback whale (*Megaptera novaeangliae*), Hawaiian monk seal (*Monachus schauinslandi*), hawksbill turtle (*Eretmochelys imbricata*), leatherback turtle (*Dermochelys coriacea*), and green sea turtle (*Chelonia mydas*). Of these species, only the Hawaiian monk seal and green sea and leatherback turtles are believed to be possibly impacted by lobster fishing.

Hawaiian Monk Seals

The Hawaiian monk seal exists on and occurs around many islands and atolls of the NWHI. The species is apparently experiencing a decline in total population - current estimates indicate there are probably no more than 1000 monk seals in the NWHI (NMFS Biological Opinion).

The causes of the apparent decline in the monk seal population are not known. Human presence on breeding and haul out areas has been implicated as a contributing factor to declines at Midway and Kure (Kenyon). However, it has been noted that the French Frigate Shoals population increased even while the U.S. Coast Guard LORAN Station was operating at Tern Island. (DEIS for Critical Habitat). Other possible causes of mortality are ciguatoxin poisoning (suggested

for the 1978 Laysan mortality) and predation by sharks, especially large tiger sharks (Taylor and Naftel, cited in DEIS for Critical Habitat; MacDonald).

The feeding habits and patterns of the Hawaiian monk seal are not well understood. Octopus and lobsters have been found in food remains at French Frigate Shoals and Laysan Island, while eels and fish have been found in remains at Midway, Kure, and Pearl and Hermes Reef. When at the breeding islands, monk seals appear to feed on fish and invertebrates on the inner reef and outer reef slope.

Monk seals are capable of diving to considerable depths for feeding and other purposes. DeLong suggests the frequency of dives deeper than 10 or 20 fm. is substantial. It appears that feeding occurs in lagoons and in offshore waters along the slopes to the deepest extent necessary to find food. (NMFS, 1980). Monk seals are most likely opportunistic feeders. The relative importance of any single, specific prey item (e.g., spiny lobster) is unknown.

There is no evidence to date of a negative interaction between the lobster fishery of the NWHI and the Hawaiian monk seal. No incidents of injury to monk seals by entanglement in gear have been reported.

The potential impacts of lobster fishing on monk seals are: injury or mortality from entanglement in traps or other lobster fishing gear; harassment from increased frequency of contact with fishing vessels in the NWHI; and adverse impacts (direct and indirect) from

possible decreased availability of lobster as a food source.

Injury or mortality from gear entanglement has not been reported to date. No incidents of any injury have been recorded or reported either by fishers or by observers of commercial operations in the NWHI. It is noted, however, that only lobster traps have been used in the NWHI to date. It is possible that tangle nets or other damaging gear could be used in the future in the absence of a FMP. Tangle nets can be and are used in the main islands and could possibly be used in the NWHI under present State law.

Harassment has not been a problem to date. The number of vessels involved in the fishery, and the number of fishing trips within the NWHI, have been low. Most of the fishing until 1980 occurred at Necker Island where the count of monk seals has increased in recent years(NMFS). Also, most of the fishing has occurred in the FCZ, more than three miles from shore.

The potential for adverse impacts on monk seals from a reduced supply of spiny lobsters cannot be determined with confidence. Monk seals apparently feed on a variety of food sources, one of which is spiny lobster. The importance of spiny lobster relative to other sources is unknown. Under this FMP, however, there appears to be relatively low risk of any impacts.

In summary, there seems to be little likelihood that removal of spiny lobsters will result in adverse impacts on monk seals. The

Council recommends that NMFS continue and even accelerate food habit studies to address this issue .

Sea Turtles

Green sea turtles (Chelonia mydas) are listed as threatened under the ESA. These turtles have been exploited for food for centuries. As late as 1959, green turtles were taken at French Frigate Shoals by a commercial fishing operation. This species was known to nest in the main Hawaiian Islands up to 45 or 50 years ago, but there are no current reports of nesting at these islands. There is considerable nesting now in the NWHI, especially at French Frigate Shoals. The stability of the population there is unknown (NMFS Biological Opinion).

Leatherback turtles (Dermochelys coricea) are not known to nest in Hawaii, but are regularly sighted in offshore waters. The species is listed as endangered.

There have been no documented or alleged instances of interaction between the spiny lobster fishery and green sea turtles. There are reports of occasional entanglement of leatherback turtles in fishing gear (lines and nets) around the Hawaiian Islands.

The green sea turtle could be adversely affected by gear entanglement if tangle nets, explosives or chemicals are permitted; they would not be permitted in the NWHI under the FMP. There is a major breeding colony of green turtles at French Frigate Shoals. Predation on hatchlings could occur if they are attracted to boats with

lights on at night in the NWHI. There could be an occasional entanglement of a turtle in lobster traps or lines. The plan provides for reporting of such incidents if they occur.

Other Species

The humpback whale (Megaptera novaeangliae) population that winters in Hawaii has 500-700 whales. These whales are particularly attracted to broad bank areas and usually concentrate in waters shallower than 100 fm. during the winter breeding season. Major areas of concentration are around the main Hawaiian islands, but they have occasionally been sighted in and around the NWHI. Due to their normal distribution away from the NWHI, no interaction with the spiny lobster fishery is anticipated (NMFS Biological Opinion).

The four species of endangered birds in the NWHI are the Laysan duck (Anas wyvilliana laysanensi), Laysan finch (Psittirostra cantans cantans), Nihoa millerbird (Acrocephala familiaris kingi), and Nihoa finch (Psittirostra contans ultima). These will not be affected by the fishery operating under the FMP.

The long-term, cumulative impacts of expanded fisheries in the NWHI cannot be determined with any confidence. Fishery yield potentials above present harvest levels has been estimated to range from 60 to 104 million pounds per year for all Hawaiian fisheries, including open ocean tuna fisheries (Hawaii Fisheries Development Plan). The same source indicates planned growth of the fleet could result in 105 new vessels by the year 2000. Most of the increase would

be for tuna fisheries and quite far from the NWHI.

Concern also has been expressed that as general NWHI fishery expansion occurs, there will be increased risk of interaction with marine mammals and turtles from unauthorized landings on the NWHI for emergency or other purposes. This is beyond the control of the Council. The Council's authority is limited to the particular fishery being managed under a FMP, and to only that part of a fishery in the FCZ. The Council notes, however, that U.S. Fish and Wildlife Service and State of Hawaii regulations governing landings on and use of NWHI resources are very strict. The Council believes current controls are sufficient to protect against harassment, disturbance, or other events unfavorable to NWHI species.

The relationship between the lobster fishery and monk seals and marine turtles is discussed in Section 9.3 of the FMP. Further discussion is found in the NMFS Biological Opinion included in the Source Document.

Proposals for Designation of Critical Habitat for the Hawaiian Monk Seal

Under the authority of the ESA, the NMFS has proposed the designation of critical habitat for the Hawaiian monk seal in the NWHI. The draft EIS for this action proposes that all beach areas, lagoons waters, and surrounding water areas out to a depth of either (a) 10 fathoms, (b) 20 fathoms, or (c) three nautical miles around Necker Island, French Frigate Shoals, Laysan Island, Lisianski Island, Pearl

and Hermes Reef, Midway Island and Kure Atoll be designated Critical Habitat under the Act. To complement the critical habitat designation, the NMFS proposed to establish a monk seal recovery team to prepare a comprehensive research and management plan for the Hawaiian monk seal (Recovery Plan). The recovery team has been named, but the Recovery Plan has not yet been submitted to nor adopted by NMFS. The NMFS also indicated it would continue to work with the State of Hawaii and the U.S. Fish and Wildlife Service in carrying out the Tripartite Cooperative Agreement for the Survey and Assessment of the Living Resources of the Northwestern Hawaiian Islands.

The 10-fathom alternative for monk seal critical habitat would cover approximately 1260 km^2 according to the draft EIS, while a 20-fathom isobath seaward extension of a monk seal critical habitat would encompass about 4,095 km^2 or over 25 percent of the total spiny lobster habitat. The 3-nautical-mile alternative (2523 km^2) would be only sixty percent as large as the 20-fathom option.

Section 7 Consultation

The Council requested consultations with NMFS under Section 7 of the ESA to determine whether the actions proposed in this FMP will jeopardize the continued existence of any threatened or endangered species. A biological opinion has been prepared and is included in the Source Document.

The biological opinion concludes that there is insufficient information to demonstrate conclusively that the proposed action will

not jeopardize the continued existence of the monk seal and sea turtle populations of the NWHI. Implementation of the FMP, however, is preferable to the "no action" alternative because the FMP offers safeguards that reduce the potential of adverse impacts. The biological opinion made several recommendations regarding research, monitoring, and establishment of a provision for controlling fishing to investigate the causes of any incidental seal or turtle mortality.

The biological opinion (as well as other reviewers) also indicated the importance of complementary management in waters under the jurisdiction of the State of Hawaii. There has been considerable progress in drafting State regulations to complement the FMP and the Hawaii Department of Land and Natural Resources has expressed its intent to proceed with such regulations.

7.3.4 Coastal Zone Management (CZM)

The Coastal Zone Management Act (CZMA) of 1972 encourages states to establish policies and programs for the conservation of coastal resources balanced by the needs of economic development. Conservation and the rational use of living resources in the offshore coastal zone (territorial sea) are among the objectives of the National CZMA. Promotion of domestic fisheries, the development of unutilized or underutilized fishery stocks, and fisheries management according to sound conservation principles are the major objectives of the FCMA. While the geographic area of management authority and application differs under each statute, the CZMA and the FCMA embody unanimity of

objectives with regard to fishery resources.

Section 307 (c) (1) of the CZMA requires that all Federal activities which directly affect the coastal zone be conducted in a manner which is consistent with approved State coastal zone management programs to the maximum extent practicable. The State of Hawaii and the Territories of Guam and American Samoa all have federally approved State CZM programs. This fishery management plan, therefore, must be reviewed to determine if the measures proposed will or are likely to affect the coastal zone, and if so, whether the proposed measures are consistent with each State's program. The Source Document provides the full text of such determinations of consistency, and copies of the plan are being sent to each CZM program director for concurrence.

Hawaii CZM

A federally approved CZM program has been in effect in Hawaii since 1978 and was set into law by Chapter 205A of the Hawaii Revised Statutes.

The FMP and the management measures selected by the Council are considered consistent with the policies outlined in Hawaii's CZM Program. In particular:

1. Coastal Ecosystems

   a) Technical basis: The FMP proposes a thorough information-gathering scheme to obtain base-line data on lobster resources in the NWHI, the offshore areas in the NWHI, and in the offshore areas of the main Hawaiian islands. Observers which may accompany lobster vessels may be able to provide much more detailed observations

of the ecological interrelationships in the NWHI than has been possible to date.

b) Preserve ecosystems: The FCMA requires that biological overfishing be avoided. The various management measures proposed for the NWHI would provide protection for the reproductive potential of spiny lobsters and would promote the recovery of Hawaiian monk seal and leatherback and green sea turtle populations. Conservation and management measures would be applicable to all vessels in the FCZ. State landing laws are currently not applied to Hawaii-registered fishers by the State of Hawaii for lobster caught outside the territorial sea, nor to any out-of-state vessels.

Although neither the Hawaii State Plan nor the CZM Program make specific provisions for the priority of the fishing industry within marine resource management and development, the Hawaii Fisheries Development Plan prepared in 1979 sets priorities for developing the NWHI fishery, including the lobster fishery, which is considered to be the leading edge of commercial development for the State of Hawaii fisheries program.

2. Economic Uses: Permit Coastal Development

a) Although the FMP may be viewed as a stimulus for commercial fisheries development in the NWHI, especially with a smaller carapace length restriction than existing State of Hawaii regulations, it also will serve to direct such development away from the apparently fully exploited stocks near the main Hawaii islands.

b) Environmental impacts are reduced through a variety of the measures incorporated in the FMP.

c) The FMP is consistent with State of Hawaii economic development goals.

3. Managing Development: Communicate Impact and Increase Public Involvement

The FMP attempts to integrate the relevant substantive material on the fishery and its management to provide

for improved public review of the proposed regulations. By integrating environmental, economic, social and fisheries requirements into a single, concise document, the Spiny Lobster FMP provides the public with a comprehensive review of the potential impacts of the proposed regulatory regime, as well as alternative policies, in a form much less bulky and unweildy as compared to most government documents. The draft FMP was sent to more than 300 individuals, organizations, and government agencies for review and comment.

In summary, the measures proposed in this plan are believed to be fully consistent with the State of Hawaii CZM Program.

A "Determination of Consistency" has been prepared for review and concurrence by the Hawaii Department of Planning and Economic Development.

Guam

The Territory of Guam CZM Program was approved in August, 1979. The seaward boundary extends to the outer limit of the U.S. territorial sea, i.e., three miles out to sea. Principal activities under the first year implementation grant include master plan implementation for a commercial port; preparation of a Fisheries Management and Development Plan; and increased management of fish and wildlife resources.

The measures proposed in this FMP are consistent with the Guam CZM policies and requirements and lobster fishing regulations. The FMP's recommended management measures which require all commercial vessels fishing for spiny lobsters within the FCZ of Guam to obtain permits and submit catch records are expected to increase the data base

for coastal zone planning in the territorial sea.

A "Determination of Consistency" has been prepared for concurrence by the Territory of Guam Bureau of Planning.

American Samoa

The Territory of American Samoa CZM Program was approved by the U.S. Office of Coastal Zone Management on September 9, 1980. The program will be implemented by the Development Planning Office of the Government of American Samoa.

Because the Spiny Lobster FMP does not anticipate commercial development of lobster resources in American Samoa in the near future, shoreside developments which might occur from a growing fishery do not pertain to the FMP. However, the objective of encouraging development of Samoa's fisheries does relate to the general concerns of the Council.

The American Samoan Office of Marine Resources is developing a comprehensive fisheries development plan which is supported by the CZM program. Several surveys are currently underway to assess fishery resources and fishing activity patterns in American Samoa.

The measures proposed in this FMP are consistent with the American Samoa CZM policies and requirements. The FMP's recommended management measures which would require all commercial vessels fishing for spiny lobster in American Samoa's FCZ to report their catch are expected to increase the data base upon which future fisheries management and deve-

lopment can be based, not only in the FCZ but also in the territorial sea. The Council is ready to work with the Territory of American Samoa to insure timely action can be taken if landing records demonstrate the development of a commercial lobster fishery requiring management to prevent over-fishing.

A "Determination of Consistency" has been prepared for concurrence by the Territory of American Samoa's Development Planning Office.

7.3.5 Surveys and Research

The Honolulu Laboratory of the NMFS, the Department of Land and Natural Resources of the State of Hawaii, and the U.S. Fish and Wildlife Service are in midstream of a five-year program to investigate the marine resources of the Northwest Hawaiian Islands. The University of Hawaii is also cooperating in the program. The study program is scheduled to conclude in 1983.

A critical element of the research program is work underway at Kure Atoll and planned at French Frigate Shoals by MacDonald. Current efforts are focusing on growth and reproductive rates, mortality rates, population structure, recruitment, and movement patterns at Kure. Similar work at French Frigate Shoals should help demonstrate differences and similarities between lobsters at the two locations. Data from continuation of this work, in combination with data from other surveys and commercial fishing, should provide a reasonably sound basis for recognizing any significant changes in stock or habitat conditions.

7.4 Description of Fishery Activities

7.4.1 Main Hawaii Islands

The spiny lobster fishery in the main Hawaii islands has been primarily an incidental or recreational fishery since World War II. The commercial catch has declined from a high of 43,632 pounds in 1949 to 6,317 pounds in 1976. Probably this is offset by an increase in recreational catch. The commercial catch is a small percentage of Hawaii's total fishery, and most if not all is caught within the territorial sea.

The main islands fishery also includes a substantial recreational and subsistence catch, but the extent of these fisheries is unknown at this time.

7.4.2 Northwestern Hawaiian Islands

A research cruise of the NOAA ship R/V Townsend Cromwell during 1975 revealed the presence of high concentrations of lobsters near Necker Island and a few other areas in the NWHI.

Utilization of these resources began gradually in 1976 with a few vessels venturing into the fishery on an experimental basis. Early emphasis was on the fresh, whole lobster market, but this market appeared to have limited capacity.

Since 1976, about six firms have fished for lobster in the NWHI. Vessels have increasingly utilized on-board processing as a means to overcome the limitations of the fresh market and to take

advantage of the international market for frozen lobster tails (see Sections 7.5.2 and 7.6). Participation in the fishery has been limited due to the distance from port to the fishing grounds (500-1500 miles each way) and the uncertainty concerning yield potentials.

Catch data for the NWHI fishery are extremely limited because the small number of firms in the fishery imposes confidentiality restrictions on the publishing of this data. Council estimates, based on a variety of sources, indicates this fishery grew from 72,000 pounds ($208,800) in 1977 to 200,000 - 400,000 lobsters ($680,000 - $1,360,000) in 1980. Estimates of fishing effort are unavailable.

Estimate of NWHI Lobster Landings

	Whole-Weight	Ex-Vessel Price	Revenue
1977	72,000	$2.90	$ 208,800
1978	45,000	$3.00	$ 135,000
1979	100,000	$3.20	$ 320,000
1980	400,000	$3.40	$1,360,000

Sources: NMFS; State of Hawaii Division of Fish and Game; direct interview by Council staff.

7.4.3 American Samoa and Guam

There is no documented commercial fishery for spiny lobster in American Samoa or Guam. Sport and subsistence fishing in inshore and reef waters takes place but catch is believed to be small. Interest has been expressed in developing the spiny lobster fishery in these areas, but the locally-based fishing industries are small and

undeveloped at this time.

7.5 Economic Characteristics of the Fishery

7.5.1 Harvesting and Processing Sector

The traditional commercial lobster fishery in Hawaii was simply an incidental fishery associated with fish trapping. Volumes of lobster sold prior to the opening of the NWHI fishery were very small, in the range of five to ten thousand pounds during the past ten years. The lobsters were sold whole, and usually alive, through the fresh fish market and directly to retail outlets and restaurants. The NWHI fishery represents a fundamental transformation in Hawaii's commercial lobster fishery.

NWHI Fishery

Participants in the NWHI fishery first attempted to sell their catch in the fresh fish market. Record landings were made in 1977, when 72,000 pounds of whole live lobsters were landed (Table 7.6). The market became saturated, however, and retail prices fell. The whole lobster market apparently was limited. Several vessels stopped fishing for lobsters in the NWHI, and others spread their effort to a variety of species.

In 1978 and 1979, several vessels attempted to fish for lobsters and process them at sea. The target market was the frozen lobster tail export market, where price is generally established by

international market forces. Total landings in 1978 were about 45,000 pounds (in whole lobster equivalent weights), and an estimated 100,000 pounds in 1979.

Renewed efforts were made to expand the fishery in 1980. Three vessels carrying as many as 2500 traps were fishing for lobsters in the NWHI during the summer. The combined hold capacity of these vessels was about 340,000 pounds. All three vessels had processing and freezing capacity. Fishing occurred not only at Necker Island but at Maro Reef, about 350 miles farther up the NWHI chain. Total 1980 harvests are unknown, since catch data are being maintained on a confidential basis; but unofficial estimates range from 200,000 to 400,000 lobsters, primarily landed as frozen tails.

It appears that the frozen lobster tail market in Hawaii can readily absorb this level of production. One firm has begun to specialize in exporting frozen seafood to the Mainland U.S. and to Japan, and other fishing interests may be attracted to the processing and exporting sector as Hawaii's overall fishery develops. The critical question is whether domestic vessels can harvest and offer frozen lobster tails at competitive prices in the Hawaii and international market.

7.5.2 Markets

Hawaii's consumers, including tourists, purchase approximately 245,000 pounds in frozen lobster tails (or equivalent dinners), worth about $2.5 million ex-warehouse in 1980. The tails are mostly imported, with Australia and New Zealand being the prime sources. Thus

domestic production of some 50,000 pounds (whole weight) is a small percentage of the local market. The current wholesale price for frozen tails is about $10/pound and $3/pound for whole lobster.

The market for spiny lobsters in American Samoa, Guam and the Northern Mariana Islands is not known, but based on an equivalent per capita consumption, the market would be 44,000 pounds, worth $452,000 retail.

The NWHI lobster fishery has developed outside the confines of the local fresh fish market by opening the export market in frozen seafood products. Both established and new entrepreneurs are involved in this marketing endeavor, which is indirectly supported by the State of Hawaii.

7.5.3 Employment

Current employment in the spiny lobster fishery fluctuates with the entry and exit of vessels. During 1980 approximately 30 people were employed on the vessels, most of which processed their catch on board. Approximately 25% of the workforce is composed of foreign workers. The State of Hawaii estimates that 30 people would be involved in on-shore handling of a lobster catch of 900,000 pounds (projected for 1990). Processing may also be complemented by rapid expansion of Hawaii's new aquaculture prawn industry.

7.5.4 Economic Feasibility

The State of Hawaii Fisheries Development Plan estimates a catch rate of 938 pounds per day, or about 2.0 pounds per trap night, would provide an 80 foot multi-purpose vessel with a marginally profitable operation. Based on historic catches in the NWHI, catch rate of 2.5 pounds per trap night would create a monthly operating profit of $1,265, at 1978 prices.

An economic feasibility analysis conducted in 1978 suggested that catch rates could fall as low as 1.00/trap night and maintain profitability with a low discount rate. However relative prices probably have changed in the past two years. (Adams)

7.5.5 Fisheries Development

The State of Hawaii has embarked on an ambitious fishery development program. The State's Fishery Development Plan was approved by the Governor in 1979, and was endorsed by the legislature in 1980, when more than $500,000 was appropriated for fishery development projects. It is estimated that annual Hawaii fishery landings could increase as much as 60 to 104 million pounds over current yearly landings (Fisheries Development Plan). A large portion of this increase (especially high seas tuna) would likely come from fisheries in and even beyond the FCZ around the NWHI.

There are, however, some serious constraints to development of fisheries in the NWHI. The foremost is distance, with the associated time and fuel costs just going to and returning from the NWHI.

The 1000-3000 mile round trip may take 5-10 days of transit time for each trip.

Viewed in this context, the spiny lobster fishery has played an important role in NWHI fishery development to date. A few, large, multi-fishery vessels have been able to use the spiny lobster fishery to cover the early costs of exploring the NWHI to locate other harvestable resources. That is, marginal revenues have exceeded marginal costs of lobster fishing operations so that exploratory fishing for other species could continue even if not at an immediate profit. The relative certainty of catching at least some lobsters has been an inducement to overall increases in NWHI fisheries.

In the future, however, the spiny lobster fishery is expected to stabilize unless new, high productive grounds are discovered. A major fishery targetting primarily on spiny lobster is not anticipated in the long-term. Most spiny lobster harvesting in the NWHI will most likely be done by multi-fishery vessels which spend only part of their time and effort fishing for spiny lobsters.

7.6 Socio-Cultural Framework

The subsistence and recreational fisheries of American Samoa and Guam are important, but spiny lobster is not a major component of these fisheries. Spiny lobster is an important recreational catch in Hawaii's main island waters.

Two social aspects of the NWHI spiny lobster fishery are especially important. First, as noted, the NWHI represents a chance for Hawaii's fishing

industry to expand. Although spiny lobsters are not likely to be a major component of Hawaii's overall fishery in the long-term, it does represent a leading component of current fisheries development. The NWHI fishery is a sharp departure from the main islands commercial fishery, which has been in decline since World War II. However, several firms involved in the local fishery are also involved in developing the NWHI fishery, thus extending Hawaii's link to the sea. For most residents and visitors to the state this is experience by in the wide availability of fresh fish in local markets.

Second, the NWHI are a significant natural resource, where the impact of industrial society has been minimal. Although incidental intrusion into the area's ecology occurs from a variety of sources, a commercial fishery would have a more sustained impact on the ecosystem than many other activities. How society weighs the value of a region like the NWHI relates to the social characteristics of the community. The management plan attempts to balance economic and ecological concerns.

7.7 Native Hawaiian Fishing Rights

Unlike the native Americans in the continental United States, where a series of treaties and agreements has provided formal legal ground for allocation of fishing rights to native Americans, no such treaties were formed in Hawaii. Traditional Hawaiian society was significantly affected in the quarter century prior to annexation of Hawaii by the United States in 1900. Formal agreements between the two governments concerning fishing rights were not incorporated into the Organic Acts relevant to Hawaii's political integration into the United States.

However, there is a growing concern about the manner in which Hawaii was annexed and Hawaiian land ceded to the United States government. The relationship between ancient Hawaiian land and water rights, including the extent of allocation by traditional leaders such as the Konohiki, and the developing commercial fisheries is not known. There does not appear to be an interaction between the FCMA in the Western Pacific region and native Hawaiian rights, but further research may be required on this issue.

This plan will not affect any native Hawaiian, Samoan, or Chamorran cultural or religious practices so far as can be determined at this time.

Alternative Measures

A 2.1 Release of all Egg-Carrying Female Lobsters

A 2.2 Return of Lobsters to Maximize Chances for Survival

8.3 Seasonal Restrictions

It appears that there is a pronounced seasonality in the reproductive cycle of spiny lobsters found north of Maro Reef, which is not apparent to the south. Seasonal restrictions have the effect of increasing chances for reproduction among available mature females. The reproductive season appears to be during summer months, probably related to warmer water temperatures. Females appear to be reproductively active throughout the year in the warmer areas to the south.

Alternative Measures

A 3.1 Seasonal closure north of Maro Reef

8.4 Area Restrictions

Spiny lobsters are bottom dwellers and occupy depths in the NWHI from the shoreline to a depth of approximately 100 fathoms. Lobsters of all age classes and both sexes are found throughout the habitats from the lagoons to the offshore banks. There is evidence in lobster fisheries elsewhere that the animals may segregate by age to the extent that in some fisheries the shallows are used as nursery areas; however, there does not appear to be such segragation by age in the NWHI.

If lobsters do not segregate by age, then a restriction of fishing

within the lagoons or in shallow waters outside the reef would not have a direct effect on the survival of juveniles. If lobsters occur and are able to complete their life cycles within lagoons and shallow waters as well as offshore, then restricting fishing in shallow waters or lagoons would establish refugia. In the event of excessive fishing around a particular island, lobsters within a lagoon would potentially provide juveniles that would replenish exploited stocks in deeper waters.

Similarly, an island or group of islands within the NWHI could be set aside as a refuge. Such a measure may act to reduce the risk of depletion by protecting spawning lobsters that provide for recruitment throughout the rest of the island chain. Although the extent of larval and juvenile recruitment from one island to another is unknown, tagging results indicate adult lobsters are relatively non-migratory and thereby may be protected through area restriction.

Alternative Measures

A 4.1 Restriction on shallow areas

A 4.2 Restriction on specific sites

8.5 Time-Area Restrictions

The existence of lobster stocks along the NWHI leads to the possibility of sequential harvesting of islands along the chain. Without management restrictions, it is possible that local populations might be overfished. This is especially true if size restrictions alone do not adequately protect the reproductive potential of the population.

One method to deal with this possibility is to monitor the characteristics of the catch at each island and to restrict fishing at particular

islands at designated times based on the inferred condition of the population. Local areas might be closed if the catch rate fell to a certain level, if the size structure of the catch showed depletion of specific size classes, or if few mature females were present. Information obtained from research programs might supplement catch data. Time-area restrictions could act to reduce the risk of local depletion by forcing fishing effort over a large geographic area.

Alternative Measures

A 5.1 Sequential closures

A 5.2 Monitored stock closures

8.6 Landing Restrictions

The State of Hawaii requires lobster caught in waters under State jurisdiction to be landed whole and marketed alive. A complementary measure could be to restrict the dumping of offal or other processing wastes, and left-over bait in order to avoid attracting predatory fish or monk seals.

Alternative Measures

A 6.1 Landing of Whole Lobsters

A 6.2 Restricted Waste Dumping

8.7 Quotas

It could be possible to impose limitations on the number of lobsters taken from the NWHI each year (or month) by island or in total yield. This would help guarantee that the harvest would not exceed MSY and provide an alternative means to avoid over-fishing. A system of annually increasing quotas could be established to reduce the risk of overfishing. The increase would be

allowed if catch data demonstrated no significant changes in stock size or composition. Quotas may result in inefficient allocation of effort as boats compete for catches early in a season to get as large a share as possible before the quota is reached. Another alternative is to establish a license system which allocates a specific quota to various types of vessels in the fishery.

Alternative Measures

A 7.1	Quota for NWHI
A 7.2	Quotas for individual islands within the NWHI
A 7.3	Vessel allocation system

8.8 Limitation of Entry or Effort

It might be possible to directly limit the number of fishing units which can exploit the resource. Various methods of selection could be utilized to choose the permitted operators. Restrictions on the effort placed in the fishery, either through time limits or limiting the number of traps, may be used to restrict total exploitation of the resource.

Alternative Measures

A 8.1	Limitation on entry
A 8.2	Limitation on gear quantity
A 8.3	Limitation of time fishing/vessel

8.9 Gear Restrictions

The gear currently used in the NWHI lobster fishery is a version of the two-chambered California style pot (trap). Other gear, such as tangle nets

and the larger Hawaiian-style fish trap could be used, but might also present risks of monk seal or marine turtle entrapment. Restriction of the size of the opening (or aperture) in the trap is one means to decrease the possibility of adverse impact on the monk seals without imposing substantial hardships on fishing operations. Performance standards could be set such that gear restrictions might be effected only upon evidence of harm to monk seals or turtles.

The California style trap can be modified in two ways to prevent capture of sublegal size lobsters and to minimize continued fishing of traps when they are lost: escape gaps and rot-out panels. The former may allow sub-legal lobsters to escape before the trap is pulled to the surface. Thus, small lobsters could escape trapping or would not be subject to predation upon surface release.

Rot-out panels are designed to cause the trap to cease trapping after a period of time should it become lost. However, if lobsters that enter a trap can escape through the entrance when they choose (such as after the bait is exhausted), then such panels are not needed.

A further method of gear restriction, which could have the effect of limiting effort, is to restrict the number of traps on a line. The purpose of this restriction is to reduce the risk of losing large numbers of traps to ghost fishing.

The State of Hawaii prohibits spearing lobsters, which enhances the chance for return and survival of undersized and berried lobsters. Similarly, poisons, chemicals, explosives and related methods of capture are prohibited.

Chemical attractants in lieu of bait may be acceptable.

Alternative Measures

A 9.1	Trap design with limited aperture
A 9.2	Escape gaps
A 9.3	Rot-away panels
A 9.4	Prohibition on poisons and deadly chemicals
A 9.5	Prohibition on spears, nets, explosives, etc.
A 9.6	Limit Traps/line

8.10 Permits, Reporting and Inspection

In order to obtain information on the effect of fishing on the populations and the degree of compliance with regulations, several management measures can be considered: permits, fishing logs, observer placement, and inspection of catch. The first two would generate the information on the nature and degree of fishing activity, and the information so gained would be useful in inferring the status of the lobster populations and the industry. Data on catch and effort by location should be recorded and reported in some manner. Permits and logs, if required, should be available for at-sea and shoreside inspection. Permits could be required of all who take lobsters in the FCZ, or be limited only to commercial fishers as is the case in State and Territorial regulations. The subsistence nature of "recreational" fisheries makes such reports difficult.

The placement of observers on vessels would primarily act to increase the information base about the impact of the fishery by insuring more detailed observations on the nature of the catch (length, sex composition) than is reaso-

nable to request of the fishing crew. Observations on monk seal or turtle interaction with the fishery also could be recorded.

Inspection of the catch in port would insure compliance with size and reproductive condition regulations and insure realization of the overall goals of managment. Vessels could be required to land their catch at a specified port, e.g. Honolulu, or arrange for NMFS inspection of catch if landed elsewhere.

Alternative Measures

A 10.1 Permits for commercial lobster fishers

A 10.2 Permits for recreational lobster fishers

A 10.3 Require log books

A 10.4 Observers on board

A 10.5 Inspection of catch

a) Landing in Honolulu
b) Landing elsewhere

8.11 Management Measures for American Samoa, Guam and the Main Hawaiian Islands

The spiny lobster fisheries in the FCZ waters of these areas are basically undocumented. Many of the local fishers are involved in subsistence fishing. Given these factors, the FMP only considered regulation of these fisheries in terms of permit and reporting requirements.

Alternative Measures

A 11.1 Permits for commercial fishers

A 11.2 Permits for recreational fishers

A 11.3 Require log books

A 11.4 Observers on board

A 11.5 Inspection of catch

Section 9.0 IMPACT OF ALTERNATIVES

The present deficiencies in the data base and the newly developing nature of the NWHI spiny lobster fishery preclude a quantitative analysis of the impacts of the management measures on the management objectives. The following material qualitatively summarizes the impact of measures relative to the objectives of the FMP. Section 10 analyzes alternative management "regimes" (packages of regulatory measures), including the preferred alternative.

9.1 Economic Impact

The management plan is concerned with two general economic objectives: achievement of a long-term, stable Optimum Yield from the NWHI spiny lobster fishery; and promotion of economic development by fishing enterprises interested in that fishery and other NWHI fisheries.

A variety of factors affect these objectives and may have different impacts on society, or may be viewed in contrasting manners by different sectors of society. Specific factors to be considered under the economic impacts of the proposed management measures are: Vessel Profitability and Operating Costs; Industry Growth; Supply of Whole Lobsters and Frozen Tails; and Price of Whole and Frozen Product.

Vessel profitability is a short-run factor, relating essentially static revenue conditions (for frozen lobster tails) with varying cost and productivity conditions. Industry growth is a long-term objective, concerning the overall development of Hawaii's NWHI fishery. Such growth would be measured by the ex-vessel revenue of the vessels in the fishery, including all species which are

developed through or enhanced by the lobster fishery.

The overall optimality of economic return from the fishery involves not only a trade-off of short- vs. long-term interests (such as windfall profits from biological overfishing vs. sustained coverage of operating costs), but also the benefits derived by consumers and the alternative uses of related economic resources, such as toward aquaculture development or charter-boats.

The tabular values for the impact of alternative management measures are subjective evaluations of these effects, based on experience in analyzing the fishery. A similar process pertains to the social, environmental and biological impacts evaluated in Sections 9.2 and 9.3. Profitability, growth, operating costs and supply are evaluated as positive or negative contributions to that specific aspect of the fishery. Prices are evaluated from the point of view of consumers.

Four management measures might be expected to have significant economic impacts on the commercial lobster fishery: carapace length minimum size options, requirements to land lobsters whole, rot-away panels or escape gaps on traps, and limitations on the number of traps/line. Each has a balancing biological benefit. Quotas and limited entry are discussed as overall management regimes in Section 10.

Although the long-term economic viability of on-board processing of lobster tails is still unproven, there is no doubt that a requirement to land whole lobsters would limit the range of the fishery in terms of distance covered and time spent in transit. Expansion of the lobster fishery would be practically impossible under this restriction. The cost of installing holding

Economic Impact - Summary Table

Alternative Measures	Management Objectives: Profitability	Growth	Supply - Whole	Supply - Frozen	Price - Whole	Price - Frozen	Operating Cost
A 1.1 Minimum Size							
Size Restrictions							
7.7 cm CL	+	+	+	+	0	+	0
8.25 cm CL	0	0	+	+	0	+	-
9.00 cm CL	—	—	0	—	0	—	—
A 1.2 Maximum Size	0	0	0	0	0	0	-
A 1.3 Differential Size by Sex	0	0	+	+	0	+	—
Reproductive Condition							
A 2.1 Egg-Carrying	0	+	+	0	0	0	0
A 2.2 Maximize Return	0	+	+	+	0	0	-
Seasonal							
A 3.1 North of Maro Reef	?	?	0	?	-	-	?
Area Restrictions							
A 4.1 Ten Fathoms	0	+	0	0	0	0	0
A 4.2 Site Specific -	?	+	?	?	0	0	?
Laysan 20 miles	0	0	0	-	0	0	0
Time-Area Restriction							
A 5.1 Sequential Closures	0	?	?	?	0	0	0
A 5.2 Monitored Stock Closures	0	?	?	?	0	0	-
Landing Restriction							
A 6.1 Whole Landings	—	-	+	—	+	-	—
A 6.2 Waste Dumping	0	0	0	0	0	0	-
Quotas							
A 7.1 Entire NWHI	?	-	0	?	0	0	?
A 7.2 Island Specific	?	+	?	?	?	0	?
A 7.3 Vessel Allocation	+	-	0	?	0	0	?
Limited Entry							
A 8.1 License Limitation	+	?	-	?	0	0	0
A 8.2 Gear Quantity	?	?	0	-	0	-	-
A 8.3 Fishing Time	?	?	0	?	0	0	?
Gear-Type Restriction							
A 9.1 Trap Aperture	0	0	-	0	0	-	0
A 9.2 Escape Gaps	0	0	0	0	0	-	-
A 9.3 Rot-Away Panels	-	0	0	0	0	0	—
A 9.4 Chemicals	0	0	0	0	0	0	0
A 9.5 Spears	0	0	+	0	0	0	0
A 9.6 Traps/Line	—	-	-	—	-	—	—
Information							
A 10.1 Commercial Permit	0	+	0	0	0	0	0
A 10.2 Recreational Permit	0	+	0	0	0	0	0
A 10.3 Log Book	0	+	0	0	0	0	-
A 10.4 Observers	0	+	0	0	0	0	-
A 10.5 Inspection	0	+	0	0	0	0	-

Symbols: ++ Very positive impact; + Positive impact; 0 Neutral impact; - Negative impact; -- Very negative impact; ? Impact Unknown

Rationale based on subjective evaluation of impact - see text

tanks, the opportunity cost of reducing space for freezing lobster tail and other species, and the need for frequent trips to unload relatively small volumes of desirable product (i.e., whole lobster alone) would probably combine to make the fishery economically unprofitable. The market for whole, live lobsters appears to be quite limited, especially in comparison to the frozen tails market.

Rot-away panels are normally provided by hinges or fasteners which corrode. Escape gaps provide a means for juvenile lobsters to escape trapping. The advantage of rot-away panels is that lost traps might not have a continuing impact (ghost fishing) on lobster populations. The use of these traps results in increased maintenance costs and they increase the risk that sections of traps will fail to hold legal lobsters. This can effectively reduce catch and increase operating costs. Traps currently in use do not have rot-away panels or escape gaps, thus, this requirement would force investment in trap modification.

Restricting the number of traps set per line would cause considerable operating inconvenience for vessels with many hundred traps on board. The increased cost in terms of time spent setting and retrieving traps would be substantial. Higher per trap catches would be necessary to offset this added cost. Since different vessels have different capability to set and retrieve a number of traps in a given period, some vessels would probably be more adversely affected than others.

The impact of a relatively large minimum size restriction is considered the most significant economic impact. Two factors enter the estimation of economic impact. First, smaller lobster tails sell for a higher price per pound.

SPINY LOBSTER PRICES

New York Market June 19, 1980

Australian Tails	5-6 oz.	$9.20/lb.
	6-8 oz.	8.50/lb.
	8-10 oz.	8.30/lb.
	10-12 oz.	8.40/lb.
	12-16 oz.	8.40/lb.

(NMFS Fishery Market News N-74)

Smaller sized tails are more amenable to the relationship between serving size and the total cost of a lobster dinner. Furthermore, dealers indicate that sale of lobster tails over 10 ounces is linked to their ability to provide the smaller size classes.

Second, a greater dollar yield can be obtained from smaller lobster sizes, as estimated by rough approximations of differences in economic yield. It was noted earlier that the range of MSY for the stock, based on 8.25 cm CL size limit, was 200,000 to 435,000 lobsters. It is reasonable to assume that 300,000 lobsters size 8.25 cm CL or larger can be harvested each year. The average tail size of such a lobster is approximately 6.0 ounces, roughly the midpoint of the range of 5.3-6.6 for all lobsters 8.25 cm CL. The harvest will be 1,800,000 ounces, or 112,500 lbs. At $8.50/lb for 6-8 oz. tails, total revenue is $956,000/yr.

A 9.0 cm CL restriction might reduce yield by 25%, as compared with 8.25 cm CL, to 225,000 lobsters with 7.0 ounce tails or $826,900 at $8.40/lb.

If we assume sustainable yield at 7.7 cm CL is 15% greater than at 8.25

cm CL based on estimates of yield per recruit, catch is then 345,000 lobsters per year. The average size is 5.1 ounces of tail per lobster, so total harvest is 1,760,000 ounces, or 110,000 lbs. At $9.20 per pound, gross revenue equals about $1,012,000/yr.

Although the differences in revenue are not great (18% for 9.0 cm CL and 5½% for 8.25 cm CL as compared to 7.7 cm CL), they must also be linked to differences in operating costs. A lower size limit will result in a higher catch per unit effort rates and thus lower costs per lobster. Also, less effort and time would be needed to sort the catch. Available data are not sufficient to calculate the precise change in cost structure, but a lower carapace length restriction suggests greater profitability.

Finally, the earlier the harvest occurs, the greater the net present value of the catch, especially with high discount rates. A lower size limit allows a greater portion of the "surplus" stock to be harvested in early years, increasing the net benefits of the fishery compared to the larger size limit. This would assist in the long-term fishery development of the NWHI.

9.2 Social Impact

Specific objectives to be considered with the social impact of the proposed management measures are:

Long-term development and stability of the fishing industry,
Maintenance of the recreational/subsistence fishery; and
Supply of lobsters to the fresh food market.

Given the isolation of the NWHI, most social factors will simply operate through

the product and labor markets. Environmental effects are considered in Section 9.3.

Social Impact - Summary Table

Relevant Measures		Social Impacts: Commercial Fishery	Recreational/ Subsistence	Supply To Fresh Fish Market
A 1.1	Minimum Size			
	7.7 cm CL	+	0	-
	8.25 cm CL	0	0	+
	9.00 cm CL	—	0	0
A 6.1	Landing Lobsters Whole	—	+	+
A 8.1	Limited Entry	?	0	-
A 9.1-5	Gear Type	0	-	0
A 10.2	Recreational Permit	0	-	0

Symbols:
++ Very positive impact
+ Positive impact
0 Neutral impact
- Negative impact
— Very negative impact
? Impact unknown

Subjective evaluation of impact on management objective — see text, Section 9.1.

9.3 Environmental Impact

Among the objectives of the plan are to protect endangered and threatened species and to improve the data base for future management decisions which might affect overall resource conservation. Alternative management measures would have different impacts in terms of these objectives. Specific factors are considered in the following sub-sections.

9.3.1 Air and Water Quality

None of the alternatives is expected to have any significant impact on the air and water quality of the NWHI. The lobster fishery is not expected to involve large numbers of vessels even at peak production levels. There will be occasional bottom disturbance as traps are set and retrieved, and small amounts of oil, gasoline, and fumes will be discharged in engine exhausts. The plan itself is not expected to generate large, long-term increases in NWHI fishing vessel operations; fishery development is likely to occur in the long-run with or without the spiny lobster fishery. Impacts of development, however, will be spread throughout the entire FCZ around the NWHI (about 600,000 square miles).

9.3.2 Marine Mammals

The potential for direct and indirect impacts on Hawaiian monk seals could vary with changes in gear restrictions, area closures, quotas, effort limits, seasons, and size limits. Allowing the use of tangle nets, spears, or traps with large apertures could result in

injury to or mortality of monk seals. Limiting gear types or configurations can reduce the risk of such injury or mortality.

Area closures can reduce the potential for direct interaction between fishing vessels and monk seals, which apparently are very sensitive to disturbance by humans. Area closures also would provide room for monk seal foraging free from competition with fishing vessels.

Quotas may reduce the risk of overfishing stocks at specific islands, insuring that competition between the fishery and monk seals will not occur. A total fishery quota would likely lead to intensive fishing first at islands nearest Oahu where the monk seal population appears to be moving in recent years.

Island-specific quotas or effort limits can similarly reduce the potential for impacts of the fishery on monk seals.

Seasonal closures could be used to disperse effort away from islands with monk seal populations when seals are pupping or immediately after weaning.

Each of the measures designed to reduce the risk of adverse impacts on monk seals will likely reduce the potential for a profitable fishery.

9.3.3 Impacts on Sea Turtles

Area closures, gear restrictions, effort limits, and quotas could have different impacts on sea turtles. Area closures could reduce the potential for injury to or mortality of turtles in nearshore

waters. Green sea turtles nest at French Frigate Shoals from the middle of May to early August. An area closure oriented to these months could reduce the risk of entanglement in neashore or shallow waters.

Quotas and effort limitations can affect the timing and location of fishing effort as well as total effort. If applied as total limits for all NWHI, the result probably would be intensified effort at nearer islands nearer the main islands of Hawaii and less effort at more distant islands. The risk of entanglement probably increases with intensification of effort. Island-specific limits could disperse effort and reduce entanglement potentials.

9.3.4 Impacts on Lobster Populations

Virtually all alternative mangement measures will have impacts on lobster populations, assuming the fishery is pursued.

As indicated in Section 7, variations in size limits will result in different levels and structures of the lobster population. Size limits in the range of 7.5 to 8.5 cm CL appear adequate to assure sufficient protection of reproductive capacity and sustainable production of harvestable lobsters, but there is increased risk of overfishing at the lower end of the range. A "maximum" size limit may protect larger, more fecund females if those larger lobsters survive or if a portion of the year class recruited to the fishery each year avoids capture. Two factors can be used to construct a rough estimate of the effect of different size limits: the egg-carrying capacity of

female lobsters relative to the minimum size, and the extent of skewing in the population through exploitation.

The increase in catch is estimated in a static situation to be 24% when lowering the carapace length restriction from 9.0 cm to 8.25 cm, and a further 16% increase in catch if the CL is lowered to 7.7 cm CL.

Intensive fishing would substantially shift the size distribution of the population, and alter the relative reproductive contribution of different size classes. The finding that 30-40% of the relative contribution to egg production results from females with carapaces below 7.7 cm suggests that a considerable reproductive potential would exist with smaller length restrictions. (These considerations are discussed in Section 7.1.)

Requiring the release of berried lobsters may provide some protection of reproductive capacity, especially if measures are taken to insure survival.

Area closures can effectively prevent exploitation of some portions of the stock. The degree of impact varies with the size of the closures and the distribution and abundance of lobsters in the open and closed areas. Mature lobsters in closed areas would be protected and would continue to provide reproductive capacity.

Biological Impacts - Summary Table

Alternative Measures	Management Objectives		
	Survival of Illegals	Juvenile Stock	Reproductive Stock
Size Restrictions			
A 1.1 Minimum Size			
7.7 cm CL	+	0	0
8.25 cm CL	0	+	+
9.00 cm CL	0	+	+
A 1.2 Maximum Size	-	+	0
A 1.3 Differential Size by Sex	0	+	?
Reproductive Condition			
A 2.1 Egg-Carrying	+	+	++
A 2.2 Maximize Return	++	++	++
Seasonal			
A 3.1 North of Maro Reef	0	+	+
Area Restrictions			
A 4.1 Ten Fathoms	0	+	+
A 4.2 Site Specific -	0	+	+
Laysan 20 miles	0	+	+
Time-Area Restriction			
A 5.1 Sequential Closures	0	+	?
A 5.2 Monitored Stock Closures	0	+	+
Landing Restrictions			
A 6.1 Whole Landings	+	0	0
A 6.2 Waste Dumping	++	?	?
Quotas			
A 7.1 Entire NWHI	0	0	?
A 7.2 Island Specific	0	+	?
A 7.3 Vessel Allocation	0	?	?
Limited Entry			
A 8.1 License Limitation	0	?	?
A 8.2 Gear Quantity	+	?	?
A 8.3 Fishing Time	0	?	?
Gear-Type Restriction			
A 9.1 Trap Aperture	-	-	+
A 9.2 Escape Gaps	+	+	0
A 9.3 Rot-Away Panels	++	+	+
A 9.4 Chemicals	++	++	++
A 9.5 Spears	++	+	+
A 9.6 Traps/Line	+	+	+
Information			
A 10.1 Commercial Permit	0	+	+
A 10.2 Recreational Permit	+	+	+
A 10.3 Log Book	0	0	+
A 10.4 Observers	0	+	++
A 10.5 Inspection	0	++	++

Symbols: ++ Very positive impact; + Positive impact; 0 Neutral impact; - Negative impact; -- Very negative impact; ? Impact Unknown

Rationale for degree of impact - see text, Section 9.1

Quotas can be used to limit total fishing mortality and reduce the risk of overfishing. As noted before, however, if not applied on an island-by-island basis, quotas can result in heavier fishing at nearer lobster grounds and thus localized overfishing may be more likely to occur. A gradually increasing quota approach will reduce the risk of overfishing but will not prevent localized overfishing unless done on an island-by-island basis. The cost of monitoring island quotas would be very high.

Effort limitations can reduce the risk of overfishing, especially if established on an island-specific basis. Similarly, seasonal closures can be used to shift the pattern of fishing between different islands. This might result, however, in greater intensity of fishing during open seasons, with possible adverse impacts on the stock if other measures are not also in effect.

9.3.5 Impacts on Other Fishery Resources

Fishery development is occurring in the NWHI and will continue with or without this FMP. To the extent this plan generates greater short-term profits, the pace of investment and development may accelerate. Most of this investment will likely be in vessels capable of operating in several fisheries on a single trip. It does not appear at this time, however, that the level of fishing will be so great in the foreseeable future that any fish stocks are likely to be affected adversely even if development were accelerated in part due to the spiny lobster fishery management regime.

9.3.6 Impacts on HINWR Resources

The spiny lobster fishery occurs predominately in the fishery conservation zone, which is well removed from the Hawaiian Islands National Wildlife Refuge (HINWR). There may be substantial increases in participation in a number of the NWHI fisheries but it is noted that participation in these fisheries requires a 500 to 1200 mile trip in rough waters just to get to the grounds. Even with a liberal management program a large fleet will not be involved in the lobster fishery. The plan will not significantly affect the risk of accidental, emergency, or even intentional unauthorized landings of vessels on refuge islands.

9.3.7 Improvement in Data Base

Different measures contribute in varying degree to improvement of the data base. It is recognized that data from research alone are not expected to be sufficient for reliable lobster stock assessments or for determinations of inter-species and ecological relationships. Measures which restrict or limit the fishery itself will likely limit the amount of information obtainable from fishery participants. On the other hand, fishery data alone probably will be insufficient to determine population dynamics, density dependence, and marine mammal-lobster relationship factors within the needed time frame. Also, fishery participants may not be the appropriate people to collect highly detailed data. Data submission requirements should be reasonable and should be related to specific information needs and research plans. Observers may be a useful approach to balance between

research and fishery data needs and reasonable demands for data from fishers.

9.3.8 Summary Comparison of Environmental Impacts

The "Summary Table of Environmental Impacts" provides a qualitative comparison of the expected impacts of alternative management measures on the environmental factors discussed. All estimated impacts are meant to reflect changes in comparison to the "no action" alternative, in the long-term.

1. Air and Water Quality: Positive impact (+) means either less discharge of pollutions or decreased probability of discharge; negative impact (-) means more discharge or higher probability of discharges.

2. Hawaiian Monk Seals: Positive impact (+) means greater degree of protection or less risk of adverse impact; negative impact (-) means decreased protection or greater risk of adverse effects.

3. Sea Turtles: As above, positive impact (+) is greater protection or less risk of adverse impact; negative impact (-) is decreased protection or increased risk of adverse effects.

4. Spiny Lobsters: Positive impact (+) means the measure will increase the potential to achieve high harvests without overfishing; negative impact (-) means the measure will result in lower probability of sustained high harvests without overfishing.

5. Other Fishery Productivity: Positive impact (+) means the measure will protect other fishery resources from overfishing; negative impact (-) means the measure will increase the probability of overfishing other fishery resources.

6. HINWR Terrestrial Resources: Positive impact (+) means the measure decreases the potential for adverse effects on terrestrial resources; negative impact (-) means the measure results in increased risk of adverse impacts.

7. Biological Data Base: Positive impact (+) means the data base will be improved; negative impact (-) means the data base will not be improved or will in fact decrease.

It is assumed for purposes of this assessment that each measure is separately approvable and enforceable. Also, for the "Biological Data Base" column, each assessment is based on implementation of the measure with adequate record-keeping.

Environmental Impacts - Summary Table

Alternative Measures	Impact Categories						
	Air & Water Quality	Hawaiian Monk Seal	Sea Turtles	Spiny Lobster Stock Productivity	Other Fishery Productivity	HINWR Terrestrial Resources	Biological Data Base
Size Limits							
A.1.1 Minimum Size							
7.7 cm CL	0	+	+	++	+	0	+
8.25 cm CL	0	+	+	+	0	0	+
9.0 cm CL	0	++	++	+	0	0	0
A.1.2 Maximum Size	0	+	0	+	0	0	+
A.1.3 Differential Size by Sex	0	+	0	+	0	0	+
Reproductive Condition Limit							
A.2.1 Release Berried	0	+	0	+	0	0	+
A.2.2 Manner of Release	0	0	0	+	0	0	0
Seasonal Control							
A.3.1 Summer Closure North of Maro Reef	0	0	0	-	0	0	-
Area Closures							
A.4.1 Ten Fathoms	0	++	++	+	0	+	0
A.4.2 Refugium at Laysan	0	++	++	0	0	+	+
Time/Area Closures							
A.5.1 Sequential	0	+	+	+	0	+	0
A.5.2 Monitored	0	+	+	+	0	+	+
Landing Conditions							
A.6.1 Whole Lobster Only	0	+	+	-	-	+	-
A.6.2 Dumping of Wastes Prohibited	+	0	0	0	0	0	0
Quotas							
A.7.1 Entire NWHI	0	+	+	+	0	0	-
A.7.2 Island-by-Island	0	+	+	+	0	0	+
A.7.3 Vessel Trips	0	+	+	0	0	+	-
Limited Entry							
A.8.1 License #	+	0	+	0	-	0	+
A.8.2 Gear Amount	+	+	+	+	-	0	0
A.8.3 Fishing Time	+	+	+	+	0	+	-
Gear Restrictions							
A.9.1 Aperture Size	0	++	0	0	0	0	0
A.9.2 Escape Gaps	0	0	0	+	0	0	0
A.9.3 Rot-Away Panels	0	+	0	+	0	0	0
A.9.4 Spearing Prohibited	0	0	0	+	0	0	0
A.9.5 Chemical Prohibited	+	++	++	+	+	+	0
A.9.6 Traps/Line	+	+	0	-	0	0	0
Data Submission							
A.10.1 Commercial Permit	0	0	0	+	0	0	+
A.10.2 Recreational Permit	0	0	0	0	0	0	0
A.10.3 Log Book	0	++	+	+	0	+	++
A.10.4 Observers	0	++	++	++	-	+	++
A.10.5 Catch Inspection	0	0	0	+	0	0	+

Symbols: ++ Major positive effect + Minor positive effect 0 No effect
- Minor negative effect -- Major negative effect

9.4 Cost of Enforcement

Ultimately the effectiveness of management depends on the ability to enforce the regulations. Restrictions which are ignored are irrelevant, and costs of enforcement for some measures might be such as to overcome whatever social benefit which might arise from a regulated fishery. Administrative costs must also be considered as an aspect of enforcement cost.

The management measures are categorized in the following table in terms of their relative costs of enforcement; that is, relative to the need for active enforcement. For example, although the cost of enforcing a requirement to release egg-bearing female lobsters would be high because of the need for on-board inspection, most fishers understand the necessity of this restriction. Therefore the effective cost is minimal. Such might not be the case for the restriction to return prohibited lobsters so as to maximize their chances for survival upon release. A "high cost" measure involves a substantial increase in overflights, at-sea inspection, etc. "Moderate costs" involve some field investigation, while "low costs" are essentially self-enforcing with shore-side inspection. Actual costs of enforcement are considered in Section 10.

Cost of Enforcement - Summary Table

Alternative Measures	Cost		
	High	Moderate	Low
Size Restrictions			
A 1.1 Minimum Size			
7.7 cm CL			Δ
8.25 cm CL		✓	
9.00 cm CL		✓	
A 1.2 Maximum Size			Δ
A 1.3 Differential Size by Sex		✓	
Reproductive Condition			
A 2.1 Egg-Carrying			Δ
A 2.2 Maximize Return	*		
Seasonal			
A 3.1 North of Maro Reef		✓	
Area Restrictions			
A 4.1 Ten Fathoms	*		
A 4.2 Site Specific - Laysan 20 miles		✓	
Time-Area Restriction			
A 5.1 Seque t al Closures	*		
A 5.2 Monitored Stock Closures	*		
Landing Restriction			
A 6.1 Whole Landings			Δ
A 6.2 Waste Dumping		✓	
Quotas			
A 7.1 Entire NWHI			Δ
A 7.2 Island Specific	*		
A 7.3 Vessel Allocation		✓	
Limited Entry			
A 8.1 License Limitation			Δ
A 8.2 Gear Quantity		✓	
A 8.3 Fishing Time		✓	
Gear-Type Restriction			
A 9.1 Trap Aperture			Δ
A 9.2 Escape Gaps			Δ
A 9.3 Rot-Away Panels			Δ
A 9.4 Spears			Δ
A 9.5 Chemicals			Δ
A 9.6 Traps/Line			Δ
Information			
A 10.1 Commercial Permit			Δ
A 10.2 Recreational Permit			Δ
A 10.3 Log Book		✓	
A 10.4 Observers	*		
A 10.5 Inspection		✓	

Symbols: * High cost
✓ Moderate cost
Δ Low cost

Section 10.0 CONSERVATION AND MANAGEMENT POLICY

10.1 Evaluation of Alternative Management Regimes

The management objectives of the Western Pacific Spiny Lobster Management Plan will not be achieved by any one particular management measure but by several management measures working in concert. It is an important aspect of the FMP process to assess the effectiveness of alternative management regimes, which are outlined in Table 10.1.

10.1.1 Analysis of Alternative Regimes

10.1.1.1 Management Regime Option 1 — No Action

The option exists to provide no federal regulation of the spiny lobster fishery in the FCZ except as applied to requests for foreign fishing permits. In the absence of federal regulations, State and Territorial regulations would continue to apply in the FCZ over boats registered with their respective governments. U.S. fishing boats from other states would only be regulated in the FCZ around the NWHI through landing laws of the states in which they were registered.

The advantage of this option is it minimizes federal intervention in the spiny lobster fishery, allowing the lobster fishery to develop as those involved deemed best, which might allow the economic benefits from expanded commercial lobster fishing in the FCZ to be realized sooner than

they would under restrictive management. There would be little reduction in current Federal costs because Coast Guard air and sea surveillance programs, and NMFS research and marine mammals and fishery management programs would continue.

The primary disadvantages are that the fishery might develop too rapidly without regulation and overfish lobster stocks, thus foreclosing long-term economic benefits; and the fishery could adversely affect protected species such as the monk seal and sea turtles.

10.1.1.2 Management Regime Option 2 — Minimal Restriction

The minimal restriction regime consists of the simplest, most inobtrusive management measures. Its principal advantage is that, except for no regulation, it would be the least costly to both fishers and government. All the management measures in this option are generally acceptable to fishers and most can be enforced at the landing site. Observers' notes combined with the vessels' logbooks would build a valuable information base which is now virtually non-existent.

The principal disadvantage of this package of management measures is that it probably does not assure adequate protection of the lobster reproductive stock from

TABLE 10.1 ALTERNATIVE MANAGEMENT REGIMES

Management Regime Option 1 — No Action

State and Territorial government regulations continue over lobster fishing in the FCZ by vessels from those jurisdictions.

Management Regime Option 2 — Minimal Restriction

a. Require licenses, log books and observers when requested.

b. Prohibit landing egg-bearing female lobsters.

c. Require inspection of landings as requested.

d. Gear restricted to traps with specified aperture.

Management Regime Option 3 — Protection of Reproductive Stock

a. Management measures of Option 2; and

b. Minimum size limit; and

c. Permanent closed areas.

Management Regime Option 4 — License Limitation

a. Management measures in Option 2; and

b. Limit the number of licenses issued.

Management Regime Option 5 — Quotas

a. Management measures in Option 2; and

b. Limit on area-specific catch.

closed and open areas, and 16% of the total habitat will be closed to fishing, then OY from the fishery will likely be within the range of 168,000 to 420,000 lobsters per year under the management measures selected, minus some number of berried females which must be returned to the ocean. Again, this is the long-term OY. In the short-term, the range of possible OY more likely is 356,000 to 772,000 lobsters in the first year; and 281,000 to 609,000 lobsters the second year. By the third year, OY is expected to be at the sustainable steady-state level. This matches the experience in the first three years at Necker Island. OY may be greater than the above ranges indicate since yield per recruit analysis indicates MSY could be 15% greater at a 7.7 cm CL size limit than at the 8.25 cm CL size limit on which the MSY stock assessment was made.

The Council must emphasize that neither the range of MSY estimates nor the range of OY estimates is meant to constitute quotas or targetted harvest levels. The Council does not propose to set any limits on how many lobsters can be harvested, nor does the Council intend a certain sequence of harvest amounts. There may be few areas in which there are fishable concentrations of lobsters larger than 7.7 cm CL. There may be many such areas. The fishery and research cruises to date have not explored all areas with lobster habitat, so available data on abundance are inconclusive. If actual harvests do not fall within the ranges estimated, the Council will review the data to try to determine the reasons. However, falling below or exceeding the ranges, in itself, does not represent or reflect failure to achieve the objectives of the FMP.

10.3 Domestic Annual Harvest

Vessels in the fishery already have sufficient capacity to harvest the

OY. The State of Hawaii Fisheries Development Plan projected that yields of 892,000 lobsters in 1990 and 1,400,000 in the year 2000 may be achieved, indicating that the domestic fishery can be expected to increase its capacity if lobster abundance warrants it. Indeed, the risks of biological overfishing and economic instability have been carefully addressed in assessing the need for the proposed management measures (see Sections 9.1 and 9.3). However, the restrictions on the fishery are expected to protect reproductive capacity sufficiently so that biological overfishing is unlikely. Vessels currently exploring the NWHI have the capacity to take the entire optimum yield and shift into other species if necessary. The 1980 experience indicates they may be expected to undertake such a strategy.

We estimate DAH to equal OY. Domestic harvesters will be able to take the greatest catch of spiny lobsters in the NWHI which is possible consistent with the conditions set out in the proposed management regime. The ranges associated with DAH are the same as those for OY.

10.4 Domestic Annual Processing

The vessels currently harvesting spiny lobster in the NWHI for the frozen tails market have the ability to process the catch on board. King crab and black cod vessels from the North Pacific and Alaska regions which might shift into the fishery on a part-time basis also have this capacity. Fresh, live lobster are not processed prior to sale. Domestic annual processing capacity and intent will equal the portion of the catch made by the former portion of the fleet.

10.5 Foreign Fishing (TALFF)

The domestic fishery has the capacity and intention to harvest the entire optimum yield from the fishery. The total allowable level of foreign fishing (TALFF) is therefore zero.

10.6 Joint Venture Processing

There is no apparent harvesting capacity in excess of available domestic on-board and shoreside processing capacity. Therefore, the amount of lobster available for joint venture processing (JVP) is zero.

10.7 Implementation and Enforcement

10.7.1 Implementation

After the Secretary of Commerce approves the plan, he is responsible for implementing the regulations to carry out this FMP. This involves informing fishers when the regulations become effective and assisting them in carrying out the spirit of the law. Important educational activities should include: describe the method of carapace or tail width measurement; distributing charts of 10 fathom contours; developing methods for return of undersized and egg-carrying lobsters; assisting in design of appropriate trap construction; preparing and distributing log books which are easy to fill out; and collecting, analyzing, and reporting to the Council data from the fishery.

The Secretary should cooperate with the State and Territorial authorities to insure that there is reasonable consistency between their laws and this FMP. The State of Hawaii's current regulations

prohibit retention of lobsters smaller than 8.25 cm CL, but lobster fishing in water shallower than 10 fathoms and the use of tangle nets and fish traps are permitted in State waters. Import licenses are required to land frozen lobster taken beyond the territorial sea. State, Council and NMFS staff are working together to prepare revised Hawaii regulations pertaining to lobster fishing in the NWHI to insure that the two management regimes are fully complementary.

10.7.2 Compliance and Enforcement

The measures are designed to have a minimal burden on operating patterns of the fishing enterprises, as required by the Regulatory Flexibility Act of 1980. Most information requirement are consistent with present State of Hawaii requirements, and the gear restrictions are consistent with current fishing practices.

The NMFS and the Coast Guard are responsible for enforcing the management regulations. It is anticipated that State and Territorial agencies will cooperate in on-shore reporting and inspection activities. NMFS in cooperation with State and Territorial agencies will be responsible for issuing permits for commercial fishing in FCZ waters and in working out schedules with Coast Guard, State, and Territorial officials for monitoring the fishery.

The relative costliness of various management measures was outlined in Section 9.4. The proposed management regime will not significantly add to current NMFS, Coast Guard, State and Territorial agency enforcement program requirements.

The minimum size, reproductive condition, and gear restrictions will be enforced by shore-side inspection of landings by NMFS and State and Territorial agency staff. It is recommended that procedures be developed to require fishers to notify the NMFS of the pending arrival in Hawaii ports of any vessel from the NWHI. Any vessels intending to land lobsters taken in the FCZ of the NWHI at ports other than Honolulu should be required to notify NMFS (through the 14th District, U.S. Coast Guard) prior to landing.

The Coast Guard will be able to conduct surveillance in the NWHI through their regular FCZ overflights. The Coast Guard will also be able to assist in enforcing the permit requirements in the FCZ of American Samoa, Guam and Hawaii's main islands through multi-purpose flights.

NMFS will be responsible for enforcing the log book and data submission requirements in cooperation with State and Territorial agencies. It is noted that data confidentialiity may be a constraint with respect to reporting progress of the fishery. NMFS should work with State and Territorial agencies and fishery participants to address this potential problem.

A detailed plan for enforcement activities will need to be developed by the NMFS, State and Territorial agencies, and the Coast Guard. It will be important to integrate enforcement of spiny lobster regulations with other FMP and FMP enforcement activity.

Estimated additional annual NMFS costs of enforcement are

indicated in the following table:

Inspection of catches	$ 5,000
Logs and Permits	1,000
	$ 6,000

The U.S. Coast Guard currently conducts air surveillance flights over the NWHI on a biweekly basis, with NMFS participation. It is anticipated these flights will continue regardless of the implementation of this FMP. No significant impact on Coast Guard costs is expected, although deployment patterns may change.

Section 11.0 CONTINUING FISHERY MANAGEMENT

11.1 Supportive Management Recommendations

11.1.1 Biological Research

There are several aspects of spiny lobster biology which are not well known and about which assumptions have been made in this plan. The most important of these are:

Maximum Sustainable Yield

(1) stock assessment

(2) density dependence and population dynamics for fished populations;

Reproductive Potential

(3) relation of larval settling to recruitment to the stock and the fishery;

Ecological Relations

(4) space utilization, territorial behavior, and home range characteristics, with special regard to the importance of different areas (lagoons, waters less than 10 fm., waters deeper than 10 fm.) to the population;

(5) interaction between the two species of spiny lobster and slipper lobsters;

(6) the role of lobsters in the food chain, especially as food for monk seals;

Adequacy of Regulations

(7) the response of lobsters to the carcasses and offal of other lobsters which have been discarded after processing at sea;

(8) methods of release of sublegal and berried lobsters which will maximize survival;

(9) lobster losses due to lost traps, and the potential benefits and costs of rot-out panels and escape gaps to reduce such losses; and

(10) the role of larger lobsters in the population.

Limited and controlled management experiments could be implemented allowing fishing under less restrictive conditions in exchange for cooperation in obtaining additional detailed biological information. A key feature in updating this FMP will be to decide upon the best way in which such controlled adjustments in regulations can be carried out.

NMFS should accelerate its research on Hawaiian monk seals and sea turtles with special regard for potential interaction with the

fishery.

11.1.2 Socio-Economic Information

Management options such as quotas and limited entry may become more viable alternatives if harvesting of the resource significantly reduces catch rates and threatens to make the fishery inefficient. The Council needs to have better information on vessel economics, especially relating to operating costs of harvesting and the relationship between on-board and shore-side processing, and multiple-fishery feasibility. The Council may find it useful to undertake a specific inventory of vessels and crews involved in the NWHI fishery since 1976 to provide an improved socio-economic profile of the industry.

11.2 Monitoring Activities

11.2.1 Regular Monitoring

Management of this fishery requires monitoring of catch and effort data from the NWHI. The Council will maintain close liaison with the Hawaii Department of Land and Natural Resources and NMFS to assist in the prompt analysis of catch and effort data filed in State catch reports. The Council also will work closely with the American Samoa Office of Marine Resources and the Guam Division of Aquatic and Wildlife Resources to become aware of any efforts made toward commercial exploitation of spiny lobsters in these areas.

11.2.2 Additional Monitoring Activities

To proceed smoothly and to be responsive to changes in fishing conditions, management of the spiny lobster fisheries will require new information about the biology of populations and status of spiny lobster stocks. Several additional activities are needed. The Council's highest priorities are to:

(1) Keep abreast of research and management developments in other lobster fisheries.

(2) Keep informed of the research programs of NMFS, State of Hawaii Department of Land and Natural Resources, and the University of Hawaii.

(3) Develop and maintain contact with other governmental fishery agencies throughout the area of the Council's jurisdiction and in other areas, keeping them advised of management measures and informed concerning the development of lobster fisheries.

(4) Develop and maintain an up-to-date data base, including all of the information used in the preparation of the management plan, and any new data which is released by other individuals working on this fishery.

(5) Investigate the use of larval collectors at key sites throughout the NWHI. Such collectors, which are used extensively in other lobster fisheries, can provide up-

to-date information on larval recruitment and may provide the means for predicting annual availability.

(6) Escape ports, rot-out panels, and release of sublegals at the seafloor should be tested to examine their effectiveness in protecting the resource and conserving the stocks.

11.2.3 Costs of Monitoring and Research

The National Marine Fisheries Service Honolulu Laboratory has been collecting and analyzing data for spiny lobster stock assessments during the past several years through its NWHI survey program. That program is scheduled to terminate in the next year. Continuation of stock assessment work would require funding at about $50,000 per year.

The University of Hawaii Sea Grant program has been cooperating and coordinating with the State and with NMFS in NWHI investigations. The portion of the Sea Grant Program directed at life history studies is about $45,000 in FY81 and FY82.

An observer program for on-site data collection from commercial vessels would cost approximately $2000 per trip, assuming a GS-6 equivalent staff person, a 20-day fishing person overtime payments, and complete write-up and processing of the data recorded. The total cost of 100% coverage, assuming six boats taking six 20-day trips each in a year would be about $70,000 (R. Shomura, pers. comm.).

The Council will consider the need for occasional economic studies in the annual review of the FMP. Most such analysis will be

conducted by the staff economist, in cooperation with NMFS.

11.3 Amendment of FMP and Regulations

The Council acknowledges again that the conservation and management measures proposed in this plan are based on incomplete information. Research needs have been identified, and data from the fishery and from research must be continually reviewed to insure timely responses to changing conditions. The following procedure for reviewing the effectiveness of the FMP annually will be followed.

1. On or about January 31 each year, NMFS in cooperation with the State of Hawaii and the Territories of Guam and American Samoa, should prepare and submit a report on the previous year's fishery to the Council indicating:

   a. Catch, by species, by area

   b. Effort, by area, by type of vessels

   c. Landings, by species, and estimated ex-vessel value

   d. Summary of research results from past year

   e. Assessment of changes in species composition, size composition, or other catch characteristics which reflect major changes in stock or fishing practices

   f. Recommendations (if any) for alternative management measures which should be considered by the Council for possible FMP or regulatory amendments.

2. The Council will refer this report to the SSC for immediate review and recommendations.

3. The Council will meet to review these recommendations and identify:

a. Regulatory changes which could be adopted by NMFS to facilitate the effective administration of the FMP, e.g., reporting requirements.

b. Potential changes in conservation and management measures which should be selected only after preparation of FMP amendments, e.g., changes in size limits, area closures, or trap design.

4. Following this assessment, NMFS will initiate regulatory changes and the Council will initiate FMP amendment as needed.

Section 12.0 APPENDIX

12.1 GLOSSARY

Carapace Length (CL): the length of the hard protective covering over the head and thorax of a spiny lobster

Catch Per Unit Effort (CPUE): a measure of a resource's fishability, in this case, the average number of lobsters caught per trap per night

Commercial fishing: fishing with the intent to sell any or all lobster harvested

Domestic Annual Harvest (DAH): see Section 10.3

Domestic Annual Processing (DAP): see Section 10.4

Environmental Impact Statement (EIS): an analysis required by National Environmental Policy Act of 1969

Fathom: 6 feet

Fishery Conservation Zone (FCZ): waters from the territorial sea to 200 nautical miles offshore in which the U.S. exercises exclusive fishery management authority

Fishery Management Plan (FMP): a conservation and management program and associated rationale for fishery management proposed by a fishery management council (authorized by the FCMA)

Hawaii's main islands: eight major populated and nearby islands at the southern end of the Hawaiian archipelago (Hawaii to Kauai), east of 161° W. longitude

Leeward Islands: another name for the Northwestern Hawaiian Islands extending northwest from Hawaii's main islands (Nihoa to Kure Island), west of 161° W. longitude

Magnuson Fishery Conservation and Management Act (FCMA):
Federal law covering fishing activity in the FCZ (P.L. 94-265, passed in 1976, amended in 1978 and 1980)

Maximum Sustainable Yield (MSY):
the largest average annual catch of fish which can be taken from an area on a continuing basis

Northwestern Hawaiian Islands (NWHI):
the small islands, reefs and shoals which extend 1500 miles northwest from Hawaii's main islands (also called Leeward Islands)

Optimum Yield (OY): the amount of fish from a fishery which will provide the greatest benefit to the nation, considering food production and recreational opportunities; it is derived as a deviation from MSY for ecological, economic, or social reasons

Recruitment: for a lobster fishery there are two types of recruitment - larval recruitment is the settlement of floating larvae to the lobster stock; juvenile recruitment is the growth by which small lobsters become fishable and enter the fishery

Regional Director: Regional Director for the Southwest Region, NMFS

Subsistence fishing: fishing for personal use - not for sale or recreation - as an important part of total household consumption.

Total Allowable Level of Foreign Fishing (TALFF):
see Section 10.5

12.2 KEY SOURCES

*Adams, Michael F.
"Economic Feasibility of Lobster Fishing in the Northwestern Hawaiian Islands," Southwest Fisheries Center Administrative Report 23H, 1978; revised April 1979.

Brock, V.E.
1973. A new distributional record for Panulirus marginatus (Quoy and Gaimard, 1825). Crustaceana 25:111-112.

Brock, R.E. and T.C. Chamberlain
1968. A geological and ecological reconnaissance off western Oahu, Hawaii, principally by means of the research submarine "Asherah." Pac. Sci. 23(3):373-394.

State of Hawaii, Department of Land and Natural Resources, Fisheries Development Plan, 1979.

Johnson, M.W.
1968. Palinurid phyllosoma larvae from the Hawaiian archipelago (Palinuridae). Crustaceana, Suppl. 2:59-79.

MacDonald, C.D.
1979. Management aspects of the biology of the spiny lobsters Panulirus marginatus, P. penicillatus, P. versicolor, and P. longipes femoristriga in Hawaii and the Western Pacific. Final report to the Western Pacific Regional Fishery Management Council. 46 pp, 52 Tables, 27 Figures.

MacDonald, Craig D. and Stimson, J.S.
"Population Biology of Spiny Lobsters in the Lagoon at Kure Atoll - Preliminary Findings and Progress to Date, 1980", 1980.

MacDonald, C.D. and B.E. Thompson
Contrasts in the biology and fishery of spiny lobster, Panulirus marginatus, at Midway Islands and Oahu, HI, 1979.

*Marten, Gerald G.
Personal communication to Scientific and Statistical Committee; February 11, 1980.

McGinnis, F.
1972. Management investigation of two species of spiny lobsters, Panulirus japonicus and P. penicillatus. Division of Fish and Game, State of Hawaii (mimeo.) 47 p.

*Included in Source Document

Morgan, G.R.
"Population Dynamics and Management of the Western Rock Lobster Fishery", 1980.

Morris, D.E.
1968. Some aspects of the commercial fishery and biology of two species of spiny lobsters Panulirus japonicus (De Siebold) and Panulirus penicillatus (Oliver), in Hawaii. Master of Science Thesis, University of Hawaii.

National Marine Fisheries Service, Draft EIS for Critical Habitat Proposed Designation of Critical Habitat for the Hawaiian Monk Seal in the Northwestern Hawaiian Islands, U.S. Department of Commerce, February 1980.

*Polovina, Jeffrey T.
"An Estimate of the Relationship Between Female Size and Their Contribution to Total Population Egg Production", Southwest Fisheries Center, 1980.

*Polovina, J.J. and D.T. Tagami
1979. Analysis of catch and effort data for the spiny lobster, Panulirus marginatus, at Necker Island. NMFS, SWFC, Admin. Report. H-79-18. 18 pp.

Scientific and Statistical Committee
"SSC Report to the Council Re: Consideration of Spiny Lobster Minimum Carapace Length," September 11, 1980.

Shaklee, James B.
"Genetic Aspects of Population Structure of Four Species in the Northwestern Hawaiian Islands", University of Hawaii, 1980.

South Atlantic Fishery Management Council
Draft Fishery Management Plan (FMP) for Spiny Lobster Fisheries of the South Atlantic, January 1981.

Uchida, R.N. and J.H. Uchiyama et.al.
"Biology, Distribution, and Estimates of Apparent Abundance of the Spiny Lobster, Panulirus Marginatus (Quoy and Gaimard), in Waters of the Northwestern Hawaiian Islands: Part I.—Distribution in Relation to Depth and Geographical Areas and Estimates of Apparent Abundance"; "Part II.—Size Distribution, Legal to Sublegal Ratio, Sex Ratio, Reproductive Cycle, and Morphometric Characteristics". NMFS, SWFC, Report

*Included in Source Document.

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12.3 SCIENTIFIC AND STATISTICAL COMMITTEE REPORT

SSC REPORT TO THE COUNCIL RE CONSIDERATION OF
SPINY LOBSTER MINIMUM CARAPACE LENGTH

September 11, 1980

The Council at its 26th meeting in Hilo requested the SSC to re-review the spiny lobster minimum carapace length.

Following full discussion on this matter on 9/11/80 the SSC notes:

1. The Hawaiian spiny lobster fishery is a developing fishery and information on the resource and the fishery is limited.

2. It appears this resource may provide a modest and continuing fishery provided the resource is managed as soon as practicable. We urge the State of Hawaii and the Council to take all actions necessary to implement appropriate management action at the earliest possible date.

3. Data demonstrate that the lobster resource varies in density and size in various areas of the Northwestern Hawaiian Islands.

4. Analysis of all data available including recent and new information reveals that small female lobster make a greater contribution to the reproductive potential of the lobster stocks than earlier estimates provided to the SSC indicated.

5. Based on all information available to the SSC it is our judgment tha the appropriate minimum carapace size of spiny lobsters for harvest lies between 7.5 and 8.5 cm and the lower the limit set within this range the higher the risks would be.

6. The SSC recognizes that a minimum carapace length is an important management tool but that it also must be considered in view of other management measures, such as:

a. Prohibition of retention of berried lobster.

b. The proposed closure within 10 fathoms and the 20 miles area set aside around Laysan Island.

c. Limitation of gear to trap fishing only.

7. SSC also recognizes that not all legal size lobsters will be harvested and there will be many areas either not fished or lightly fished.

8. SSC particularly wishes to stress that there are many gaps in the current data base and significant areas of research yet to be done.

9. Any research in the NWHI will be expensive and will require extremely close cooperation between the fishermen and the scientists in order to develop fishery data an research information that is required to manage the resource. Accordingly, the SSC recommends:

a. A minimum carapace length of 7.8 cm.

Also, the SSC recommends to the Council that:

a. The monitoring provisions in the draft FMP also include the obtaining of data through the use of special research traps, designed to obtain a representative sample of the lobster population, including juveniles, on

(1) Percentage of berried females by size class.
(2) Length-frequency distribution of populations.
(3) Periodic sampling of egg mass by size class.

We suggest that the research traps be put into operation by commercial fishing vessels under the supervision of observers, who will be responsible for recording data obtained from the research traps. These data will be obtained for all species of spiny and slipper lobsters.

b. The Council undertake a feasibility study of the design and cost of a research program to assess the impacts of fishing on recruitment, possibly including

(1) The relation of egg production to larval settling.
(2) Establishing the relation of larval settling to recruitment to the fishery.

c. The monitoring process shall be continuing, the resulting data to be analyzed and reviewed annually. The Executive Director will communicate this review to the Council.

10. The SSC recognizes that surface release of berried and sub-legal lobsters can result in high mortality rates when lobsters are released in the presence of predators. The SSC, thereby recommends that the NMFS, as a high research priority, should:

a. devise a statisically significant experimental design to determine the effectiveness of escape gaps in reducing the proportion of "short" lobsters, and to determine whether escape gaps can reduce the catch of marketable legal lobsters and the extent of any such reduction.

b. make whatever modifications and alterations are necessary on the type of trap(s) in use by industry in order to perform the experiments. Monies to cover the costs of modifications (about $1,000) should be sought from the Council.

c. with the cooperation and consent of industry, deploy a sufficient number of experimental traps with commercial trap strings on sites covering a range of lobster densities in order to determine if there are any differences in the catch rates of legal and sub-legal lobsters between experimental traps equipped with escape gaps and commercial traps lacking escape gaps.

d. carry out experiments to design simple equipment and procedures for the bottom release of lobsters in the event escape gaps are found to be ineffective, and for the release of berried lobsters too large to escape via escape gaps and sub-legals still remaining in traps.

e. carry out experiments to determine the disintegration time of different materials that could be useful for the construction of rot-out panels and/or entire traps should trap loss and ghost fishing become problems.

Section 13.0 DRAFT REGULATIONS

Subpart A - General Provisions: American Samoa, Guam and Hawaii

900.1 Purpose and Scope

900.2 Relation to State Law

900.3 Definitions

900.4 Permit Areas

900.5 Permits

900.6 Recordkeeping and Reporting

900.7 Observers

900.8 Vessel Information

900.9 Prohibitions

900.10 Enforcement

900.11 Penalties

Subpart B - Management Measures for the Northwestern Hawaiian Islands

900.20 General

900.21 Size Restrictions

900.22 Reproductive Condition Restrictions

900.23 Closed Areas

900.24 Gear Restrictions

900.25 Landing Requirements

900.26 Observers

SPINY LOBSTER REGULATIONS FOR THE WESTERN PACIFIC REGION

SUBPART A - GENERAL PROVISIONS

900.1 Purpose and Scope

(a) The purpose of this part is to implement the Spiny Lobster Fishery Management Plan developed by the Western Pacific Regional Fishery Management Council as pursuant to the Fishery Conservation and Management Act of 1976, as amended (the "Act").

(b) These regulations govern fishing for spiny lobsters by fishing vessels of the United States, within the United States fishery conservation zone (FCZ) seaward of American Samoa, Guam and Hawaii. The management measures specified in subpart B apply only in the FCZ seaward of the Northwestern Hawaiian Islands.

900.2 Relation To State Law

This Part recognizes that any state or territorial law which pertains to vessels registered under the laws of the State or Territory, while in the Western Pacific Spiny Lobster Management Area, including any State or Territorial landing law, and which is consistent with the Spiny Lobster Fishery Management Plan, shall continue to have force and effect respecting fishing activities addressed herein.

900.3 Definitions

In addition to the definitions in the Act, and unless the context requires otherwise, the terms used in this Part have the following meanings:

(a) Act means the Fishery Conservation and Management Act of 1976, Public Law 94-265 (16 USC 1801-1882).

(b) Assistant Administrator means the Assistant Administrator for Fisheries, NOAA, or a designee.

(c) Authorized Officer means:

(1) Any commissioned, warrant, or petty officer of the Coast Guard;

(2) Any certified enforcement agent or special agent of the National Marine Fisheries Service;

(3) Any officer designated by the head of any Federal or State or Territorial agency which has entered into an agreement with the Secretary and the Secretary of Transportation to enforce the provisions of the Act; and

(4) Any Coast Guard personnel accompanying and acting under the direction of any person described in paragraph (1) of this sub-section.

(d) Closed area means spiny lobster grounds that are closed to the harvest of lobster.

(e) Commercial fishing means all fishing with the intent to sell all or part of the catch of spiny lobsters. All spiny lobster fishing in the NWHI is deemed to be commercial fishing.

(f) Fishery Conservation Zone (FCZ) means that area adjacent to the United States which, except where modified to accomodate international boundaries, encompasses all waters from seaward boundary of each of the coastal states and territories (the territorial sea) to a line each point of which is 200 nautical miles from the baseline from which the territorial sea of the United States is measured.

(g) Fishing means:

(1) The catching, taking or harvesting of fish;

(2) The attempted catching, taking or harvesting of fish;

(3) Any other activity which can reasonably be expected to result in the catching, taking or harvesting of fish;

(4) Any operations at sea in support of or in preparation of (1) through (3) above.

(h) Fishing Vessel means any vessel, boat, ship or other craft which is used for, equipped to be used for, or of a type which is normally used for fishing or for assisting or supporting a vessel engaged in fishing.

(i) Land or Landing means bringing fish to shore or off-loading fish from a fishing vessel.

(j) Operator, with respect to any vessel, means the master or other

individual on board and in charge of that vessel.

(k) Owner, with respect to any vessel, means:

(1) Any person who owns that vessel in whole or in part;

(2) Any charterer of the vessel, whether bareboat, time or voyage; or

(3) Any person who acts in the capacity of a charterer, including but not limited to parties to a management agreement, operating agreement, or any similar agreement that bestows control over the designation, function or operation of the vessel;

(4) Any agent designated as such by a person described in paragraph (1), (2), or (3) of this definition.

(l) Person means any individual (whether or not a citizen or national of the United States), corporation, partnership, association, or other entity (whether or not organized or existing under the laws of any State), and any Federal, State, local or foreign government or any entity of any such government.

(m) Regional Director means Director, Southwest Region, National Marine Fisheries Service, 300 South Ferry Street, Terminal Island, California 90731, or a designee.

(n) Secretary means the Secretary of Commerce or a designee.

(o) Spiny Lobster means either of the following two species of crustaceans: *Panulirus marginatus* or *Panulirus penicillatus*.

(p) State means the State of Hawaii, the Territory of American Samoa and the Territory of Guam.

(q) Trap means a box-like device used for catching and holding lobsters.

(r) Vessel of the United States means:

(1) Any vessel documented or numbered by the Coast Guard under United States law; or

(2) Any vessel, under five net tons, registered under the laws of any State.

900.4 Permit Areas

(a) General. For the purposes of these regulations, the FCZ of the Western Pacific region is divided into two management areas.

(b) Areas.

(1) Area 1 includes The United States fishery conservation zone of the Hawaiian Islands Archipelago lying to the West of 161°W longitude, i.e., the Northwestern Hawaiian Islands.

(2) Area 2 includes the United States fishery conservation zone of the Hawaiian Islands Archipelago lying to the East of 161°W longitude, i.e., the main islands of Hawaii, and the United States fishery conservation zones of American Samoa and Guam.

900.5 Permits

(a) General

(1) No vessel may engage in commercial fishing for spiny lobsters in the FCZ of the Western Pacific region unless a permit has been issued for it under this section.

(2) Each permit shall be valid for fishing only in the area specified in the permit. Permit areas are described in Section 900.4.

(3) The holder of a permit allowing a vessel to fish in one area may obtain a permit for that vessel to fish another area upon surrendering to the Regional Director any permit previously issued for that vessel under this Part.

(b) Applications

(1) An application for a permit under this section shall be submitted to the Regional Director by the vessel owner or operator at least 10 days prior to the date on which the applicant desires to have the permit made effective.

(2) Each application shall be submitted on an appropriate form which may be obtained from the Regional Director. Each application shall be signed by vessel owner or operator and contain the following information:

(i) the applicant's name, mailing address and telephone number;

(ii) the owner's name, mailing address and telephone number;

(iii) the operator's name, mailing address and telephone number;

(iv) the name of the vessel;

(v) the vessel's United States Coast Guard documentation number or State license number;

(vi) the radio call sign of the vessel;

(vii) the home port of the vessel;

(viii) the engine horsepower of the vessel;

(ix) the approximate fish hold capacity of the vessel;

(x) the processing capacity of the vessel;

(xi) the type and quantity of fishing gear used by the vessel;

(xii) the permit area in which the applicant proposes to fish;

(xiii) whether the application is for a new permit or a renewal; and

(xiv) the number and expiration date of any prior permit for the vessel issued under this section.

(c) Fees. No fee is required for a permit under this Part.

(d) Change in Application Information. Any change in the information specified in paragraph (b) of this section shall be reported to the Regional Director 10 days prior to the effective date of change.

(e) Issuance.

(1) Within 10 days after receipt of a properly completed application the Regional Director shall determine whether to issue a permit.

(2) If an incomplete or improperly completed permit application is filed, the Regional Director shall notify in writing the applicant of the deficiency in the application.

(f) Expiration. Permits issued under this section shall expire on the June 30 following the issuance of the permit.

(g) Renewal. An application for a renewal of a permit shall be submitted to the Regional Director in the same manner as described in paragraph (b) of this section.

(h) Alteration. Any permit which has been substantially altered, erased, or mutilated shall be invalid.

(i) Replacement. Permits may be issued to replace lost or mutilated permits. An application for a replacement permit shall not be considered a new application.

(j) Transfer. Permits issued under this section are not transferable or assignable to other persons. A permit is valid only for the vessel for which it is issued.

(k) Display. Any permit issued under this section shall be on board the vessel at all times while the vessel is fishing for spiny lobster in the FCZ and shall be available for inspection upon request of any Authorized Officer.

(l) Sanctions. Subpart D of 50 CFR Part 621 (Civil Procedures) governs the imposition of sanctions against a permit issued under this Part. As specified in that subpart D, a permit may be revoked, modified, or suspended if the vessel for which the permit is issued is

used in the commission of an offense prohibited by the Act or this Part; or if a civil penalty or criminal fine imposed under the Act, and pertaining to such a vessel, is not paid.

900.6 Recordkeeping and Reporting

(a) Logbook. The operator of any fishing vessel fishing for spiny lobster, subject to this Part, shall

(1) Maintain on board the fishing vessel, while fishing for spiny lobster, an accurate, and up-to-date (within 24 hours) complete, fishing logbook recording all information specified in Section 900.5(b);

(2) Make the fishing logbook available for inspection by an Authorized Officer or employee of the National Marine Fisheries Service designated by the Regional Director to make such an inspection;

(3) Within 72 hours of each landing of spiny lobster, submit to the Regional Director a copy of the log sheet(s) pertaining to that fishing trip.

(b) Fishing Information. Fishing logbooks shall contain the following information for all spiny lobster taken under this Part:

(1) Vessel information

(i) name of vessel

(ii) call sign of vessel

(iii) permit number of vessel

(iv) size of crew; and

(v) number of traps.

(2) Fishing Information

(i) location of lobster catch by statistical area as indicated in State of Hawaii Fisheries Chart #3; National Ocean Survey Charts for American Samoa #83484 and for Guam #81048.

(ii) date and time of trap deployment, and number of traps utilized;

(iii) date and time of trap retrieval and number of traps retrieved, and number lost, if any

(iv) number of legal lobsters retained per trap deployment;

(v) number of sublegals discarded per trap deployment;

(vi) number of berried female lobsters discarded per trap deployment; and

(vii) number of slipper lobster and Kona crab taken by area.

(viii) description of any inter-action with threatened or endangered species.

(3) Sale Information

(i) poundage of spiny lobsters sold per trip and whether whole or frozen; and

(ii) ex-vessel value of spiny lobsters sold per trip and whether whole or frozen.

(4) Processing Information

(i) method for holding lobsters until landing — whether landed whole, live, frozen, and/or detailed, legs and heads retained, carapace offal retained; and

(ii) number, poundage, and value of lobsters landed whole and number and poundage processed at sea.

(c) Processor Information. Processors of lobster products harvested in the Western Pacific Region shall submit an annual report to the Regional Director on a form which can be obtained from the Regional Director providing the information:

(1) Original source of lobsters;

(2) Poundage and condition (whole, live, frozen, detailed) of such lobsters processed;

(3) Number and condition of such lobsters processed;

(4) Method of processing, form and value of final product;

(5) Present actual lobster processing capacity.

900.7 Observers

All commercial fishing vessels subject to this Part shall carry an observer when requested o do so by the National Marine Fisheries Service.

900.8 Vessel Information

(a) Official Number. The official number issued by the Coast Guard or the certification number issued by a State or the Coast Guard for undocumented vessels. Each fishing vessel subject to this Part shall display its Official Number on the port and starboard sides of the deckhouse or hull, and on an appropriate weather deck so as to be visible from enforcement vessels and aircraft.

(b) Numerals. The official number shall be affixed to each vessel subject to this Part in block Arabic numerals at least 18 inches in height for fishing vessels of 65 feet in length or longer and at least ten inches in height for all other vessels. Markings must be legible and of a color that contrasts with the background.

(c) Duties of Operator. The operator of each fishing vessel subject to this Part shall:

(1) Keep the displayed official number clearly legible and in good repair; and

(2) Ensure that no part of the vessel, its rigging or its fishing gear obstructs the view of the Official Number from an enforcement vessel or aircraft.

900.9 Prohibitions

(a) Prohibitions in General

(1) Permits. No person shall fish commercially for spiny lobsters in the FCZ waters of American Samoa, Guam and Hawaii unless either the owner or operator of the vessel from which the fishing occurs has been issued a permit under this Part for that vessel and area and such permit is on board the vessel.

(2) Records. No person shall falsify or fail to make, keep, maintain, or submit any logbook or other record or report required by this Part.

(3) Presumption. It shall be a rebuttable presumption that any spiny lobster found on board a fishing vessel in the Western Pacific Council Spiny Lobster Management Area was caught and retained in violation of this Part unless:

(i) A valid permit has been issued for the vessel pursuant to this Part, or

(ii) The owner or operator of the vessel can document the origin of that spiny lobster by receipts of purchase, invoices, or other documentation.

(4) Search and Inspection. No person shall:

(i) Refuse to permit an Authorized Officer to board a fishing vessel subject to such person's control for purpose of conducting any search or inspection in connection with the enforcement of this Act, this Part, or any other regulation issued under the Act;

(ii) Forcibly assault, resist, oppose, impede, intimidate, or interfere with an Authorized Officer in the conduct of any search or inspection described in paragraph (1) of the subsection;

(iii) Resist a lawful arrest for any act prohibited by this Part; or,

(iv) Interefere with, delay, or prevent, by any means, the

apprehension or arrest of another person by an Authorized Officer, knowing that such other person has committed any act prohibited by this Part.

(5) Transfer to Foreign Vessel. No person shall transfer directly or indirectly, or attempt to so transfer, any United States harvested spiny lobster to any foreign fishing vessel, while such foreign vessel is within the FCZ unless the foreign fishing vessel has been issued a permit under section 204 of the Act which authorizes the receipt by such vessel of United States harvested spiny lobster of the species concerned.

(6) Other Provisions. No person shall violate any other provision of this Part, the Act, or any regulation or permit issued under the Act.

(b) Prohibitions in the Northwestern Hawaiian Islands (Management Area 1).

(1) Fishing. No person shall fish for, take or retain spiny lobsters:

(i) by means of gear or methods prohibited by this Part; or,

(ii) in closed areas specified in this part.

(2) Size Limit. No person shall take and retain or possess any spiny lobster with a carapace length less than the minimum size specified in this Part. No person shall possess spiny lobster tails with

a tail width less than the minimum size in quantities in excess of the tolerance factor specified in this Part.

(3) Reproductive Condition. No person shall take and retain or possess any spiny lobster which is prohibited by its reproductive condition under this Part.

(4) Possession and Sale. No person shall possess, have custody or control of, ship, transport, offer for sale, sell, purchase, import, export, or land, any spiny lobster which was taken in violation of the Act, this Part, or any regulation issued under this Act.

900.10 Enforcement

(a) General.

The owner or operator of any fishing vessel subject to this Part shall immediately comply with instruction issued by an Authorized Officer to facilitate safe boarding and inspection of the vessel, its gear, equipment, logbook, permit, and catch for purposes of enforcing the Act and this Part.

900.11 Penalties

Any person or fishing vessel found to be in violation in this Part is subject to the civil and criminal penalty provisions, permit sanctions, and forfeiture provisions of the Act, and to 50 CFR Parts 620 (Citations) and 621 (Civil Procedures) and other applicable law.

SUBPART B - MANAGEMENT MEAASURES FOR THE NORTHWESTERN HAWAIIAN ISLANDS (AREA 1)

900.20 General.

The Management Measures specified in this subpart govern fishing for spiny lobster in the FCZ seaward of the Northwestern Hawaiian Islands only. (Permit Area 1)

900.21 Size Restrictions

(a) Whole Lobster Size Limit. Only spiny lobsters with a carapace length of 7.7 cm or greater may be retained. The lobster is measured in a straight line from the ridge between the two largest spines above the eyes, back to the rear edge of the carapace (see Figure 10.1).

(b) Tail Size Limit. For a lobster for which the carapace length cannot be determined, the tail size limit shall be 4.9 centimeters across at the first segment from the carapace (see Figure 10.2).

(c) Tolerance Factor. For lobsters for which the carapace length cannot be determined, no more than 15% of the total number may be less than the tail size limit.

900.22 Reproductive Condition Restrictions.

Female spiny lobster of any size shall not be retained if they are carrying eggs externally, and such lobsters may not be molested to disturb the egg mass.

900.23 Closed Areas.

(a) Spiny lobster fishing is not permitted within 20 nautical miles of Laysan Island.

(b) Spiny lobster fishing is not permitted within the FCZ waters landward of the 10 fathom curve as depicted on National Ocean Survey Charts #19022, #19019, and #19016.

900.24 Gear Restrictions

(a) Spiny lobsters may be taken only with lobster traps. (For example, lobsters may not be taken by means of poisons, drugs, other chemicals, spears, nets, hooks, or explosives).

(b) The outer-most opening to the trap may be no greater than 10½ inches in its greatest diagonal or diameter and the inner-most opening may be no greater than 6½ inches in its greatest diagonal or diameter.

900.25 Landing Requirements

The operator of a fishing vessel that has taken spiny lobsters in the FCZ off the Northwestern Hawaiian Islands before landing the lobsters shall contact, by radio or otherwise, an Authorized Officer (see §900.3(c)) prior to leaving the FCZ, and report to the officer the port at which the lobster will be landed and the approximate and time date on which they will be landed.

900.26 Observers

All fishing vessels permitted to fish in Area 1 must, when so requested

by the Regional Director, take aboard an observer.

Section 14.0 REGULATORY ANALYSIS OF THE FMP

A draft Regulatory Analysis was completed in compliance with Executive Order 12044 and Department of Commerce Administrative Order 218-7. The Executive Order has since been rescinded. However, consistent with the intent of the Executive Order, we are including the following summary comparison of management options and analysis of the economic impact of the proposed management regime. Section 8-10 provide detailed analysis of the management alternatives.

14.1 The Problem

Commercial spiny lobster fisheries in the Western Pacific region (American Samoa, Guam, and Hawaii) are either developing or undeveloped. A basic concern of the Council is to encourage development of spiny lobster fisheries throughout the region, without overfishing the resource before its ecology, population dynamics and fishability are fully understood. The spiny lobster fishery is of particular concern because it is the first fishery in the NWHI to undergo development and because overfishing could occur in the near future without action. Lobster fishing in other island areas is either wholly within state or territorial jurisdiction, or of a recreational, subsistence or commercially undeveloped nature, and no conservation problems are anticipated (Section 7.4). Therefore, the recommended fishery management measures focus on the NWHI spiny lobster fishery. Only basic monitoring and information collection measures are recommended for the other island areas.

The conservation and management problems that the FMP is designed to

solve are:

a. the potential for biological and economic overfishing (Section 5.1 and 5.2);

b. the lack of information on the ecology and population dynamics of spiny lobster populations and their response to fishing pressure (Section 5.3); and,

c. the need to protect the sensitive environment and endangered and threatened species of the NWHI from adverse impact from a commercial fishery (Section 5.4);

d. The Council has been aware of the need for consistency between state and federal management programs to assure comprehensive management of the spiny lobster fishery (Section 5.4).

The FMP addresses these problems by specifying four management objectives (Section 6.0). It is believed that the recommended management regime will achieve these objectives with greater efficiency than any other regime considered by the Council.

14.2 Alternative Management Regimes

Five alternative management regimes are compared for their effectiveness in meeting the stated objectives at least cost (Section 10.1). Each management regime option, except for the no action option, is made up of a combination of management measures (Table 10.1). Likewise, each management measure has at least one alternative. A total of 31 individual management measures are considered, arranged in ten topical groupings (Section 8.0).

14.3 Comparison of Alternative Regimes

The effectiveness of individual management measures will vary depending on the other measures, if any, which they complement. While the economic impacts of individual management measures are compared in Section 9.1, a more realistic analysis is of alternative regimes incorporating functional groupings of management measures (Section 10.1.2 and Table 10.1).

The "no action" and "minimal restriction" regimes were rejected on the basis that they did not adequately protect the spiny lobster fishery from overfishing. This consideration involves the estimation that the fishery could be faced with considerable commercial fishing effort, especially since the NWHI are likely to face much greater commercial activity in fishing for a variety of species (especially bottomfish and shrimp).

The three additional management measures in the "preservation of reproductive potential" regime (Section 10.1.2.3), particularly the closed areas measure, would increase enforcement costs due to the need for on-site monitoring of fishing vessels. The benefits derived from this extra cost include increased protection of lobsters and the endangered monk seals. There would be an opportunity to fishermen under this regime in that the area and amount of resource legally susceptible to fishing would be reduced.

The "license limitation" option (Section 10.1.2.4) is based on the principle that economic efficiency of the fishery as a whole can be increased, and regulatory costs decreased, when the common property aspect of the resource is modified by limiting free access to or effort in the lobster fishery to a specified number of licensed fishermen (or fishing vessels). Unfortunately

there are scant empirical data with license limitation. Experience with this technique in other states suggests that it requires a large administrative effort, it does not preclude the need for biological management measures, and it is generally used in situations of severe overcapitalization of a highly developed fishery. This regime is deemed more restrictive than necessary at this time and would be the most costly to administer of all management regime options.

The "quota" option (Section 10.1.2.5) essentially adds area-specific quotas to the basic management measures proposed in the "minimal restriction" option. Such quotas can provide assurance that stocks at individual island areas will not be depleted below reasonable levels. However, such quotas imply good information on growth rate and stock size at each island area which is simply unavailable at this time. Also, monitoring catches for enforcement of island-by-island quotas could be extremely costly.

14.4 Rationale for Selection of the Preferred Alternative

The management option protecting the reproductive stock of the lobster resource is recommended for implementation because it appears to provide the best balance, given existing information, between protecting the NWHI lobster stock from overharvest and protecting the lobster fishery from excessive regulation. In addition, this option contributes to the protection of monk seal and sea turtle stocks without imposing prohibitive restrictions on the fishery. Moreover, this option can be implemented at the least additional cost considering the conservation objectives, existing institutional arrangements, and the quality of information currently available on which to base management decisions (Section 10.1.5).

14.5 Specific Economic Impacts

The proposed management regime is expected to result in a total domestic harvest of up to 420,000 lobsters annually while protecting the reproductive stock in the long term. The information on the fishery is such that continual monitoring of the resource will be required. However, it is estimated that the 7.7 cm carapace length restriction will provide greater economic returns than the more restrictive 9.0 cm carapace length restriction (see Section 9.1). At the same time, the effect of the 7.7 cm CL restriction on reproductive capacity is not precisely known, but it is estimated to reduce reproductive potential by perhaps 25% compared to 9.0 cm CL. The impact of increased survival for lobsters based on a thinning of the larger sized animals could not be quantified (Section 9.3).

The knowledge of biological behavior of spiny lobsters is too uncertain to allow any precise projections of the effect of different management regimes. However, it is certain that the "no action" alternative would allow greater windfall revenues in the short-term. Using different technologies and applying intensive effort to the virgin stocks throughout the NWHI could allow vessels high catch rates for a few trappings. However, rough analysis suggests that with any appropriate discount rate and foreseeable catch rates the present value of such revenues does not match a ten-year sustained fishery because of the rapid collapse of the fishable resource at any particular location.

Although 30% of the expense involved in operating a fishing vessel in the spiny lobster fishery represents a fixed or sunk cost, this margin may make it feasible for vessels to endure high operating costs in the short-run

to enter the fishery and exploit the resource if it is unprotected. Profit on operating costs is estimated to be 30 % with a regulated catch. The windfall revenues that could be obtained in an unregulated fishery may prove to provide greater total profitability than a regulated fishery if the catch rates at sustainable yields prove to be too low to cover operating costs. Therefore it cannot unequivocably be stated that the "no action" alternative does not provide an economic benefit. The primary charge against the "no action" alternative must be the biological risk and environmental danger it poses. (See Section 10.1.6).

The "minimal restriction" option presents the same biological risk but at a higher operating cost because of the restriction on fishing technology. Furthermore, a 7.7 cm CL provides lobsters in the prime 4-6 oz. size class, and thus provides little economic incentive for choosing a management regime that simply allows windfall harvesting. Thus there is probably not even an offsetting economic benefit for this option, while the risk of over-fishing remains.

The advantages of the "protection of reproductive potential" option have been analyzed in Sections 9 and 10. The key aspect of this option is that the development of the fishery is left to the initiative and risk of fishing operators who cannot expect windfall profits because they face a restricted yield through the minimum carapace length.

The "license limitation" and "quota" options would provide the basis for maximizing operating efficiency for vessels engaged in the fishery, but they would allocate oligopoly benefits with no cost/earnings rationale.

Therefore these options would tend to restrict the marginal advantages to be gained from the initial utilization of the spiny lobster fishery while vessels are preparing to enter the fishery for other species in the NWHI.

In summary, there is no basis on which to predict a zero net economic yield from the fishery and thus no basis for anticipating economic overfishing in this developing fishery. The proposed regime leaves fishing operations to the fishing enterprises while providing the basic biological protection to the spiny lobster resources and the environment of the NWHI.

Section 15.0 FINAL ENVIRONMENTAL IMPACT STATEMENT

A draft EIS was prepared in compliance with Section 102(2) (c) of the National Environmental Policy Act of 1969 (P.L. 91-190; 42 U.S.C. 4321 *et seq.*) and with implementing regulations published in the *Federal Register* on November 29, 1978 (43 FR 55970-56007). Final environmental impact statement (FEIS) requirements are substantially satisfied in Sections 1 through 11 of this document. This section summarizes and indicates which of the earlier sections satisfies specific EIS requirements.

15.1 COVER SHEET - See Preface

15.2 RESPONSIBLE AGENCIES - See Preface

15.3 TITLE AND LOCATION OF PROPOSED ACTION - See Preface

15.4 STATEMENT DESIGNATION - See Preface

15.5 ABSTRACT (also see Executive Summary)

One species of spiny lobsters, *Panulirus marginatus*, is identified as having commercial fishing potential. The lobster fishery around the Northwestern Hawaiian Islands occurs predominately in the FCZ and is in early developmental stages. The fishery around the main Hawaiian Islands is mature and occurs predominately within state jurisdiction. The lobster fisheries around American Samoa and Guam are characterized as recreational and subsistence; their commercial potential is not explored. Management recommendations focus on the Northwestern Hawaiian Islands fishery and include a minimum size limit, closed areas, gear restrictions and commercial permits. No quotas or effort limits are recommended. These measures are designed to promote full use of lobster resources while avoiding overfishing and to promote the well-

being of indigenous marine mammals and endangered species, particularly the Hawaiian monk seal. Also recommended are provisions to increase existing information on the spiny lobster resource in all areas of the region.

15.6 DISTRIBUTION AND REQUEST FOR COMMENTS - See Preface

15.7 PREPARERS - See Preface

15.8 SUMMARY (also see Executive Summary)

The FMP will control fishing for spiny lobsters in the FCZ of the Western Pacific region under provisions of the Magnuson Fishery Conservation and Management Act. The recommended management regime focuses on the lobster fishery of the Northwestern Hawaiian Islands (NWHI) because this area has the only known potential for immediate commercial fishery development.

To prevent detrimental environmental effects while encouraging optimal economic development of the resource in the NWHI, the FMP concludes that the following management measures are necessary (Section 10.1.3 and Table 10.2):

- Require fishermen to obtain permits, maintain log books of catch and effort, submit catch and effort data, and when requested, carry official observers and make catches available for inspection (A 10.1, A .0.3, A .0.4, A 10.5).
- Require release of egg-bearing lobsters (A 2.1).
- Require release of lobsters smaller than 7.7 cm carapace length (A1.1).
- Restrict harvesting gear to traps with specified maximum openings (A 9.1, A 9.4, A 9.5).
- Establish permanent closed areas (A 4.1, A 4.2).

The FMP concludes that the long-term optimum yield (OY) from the

domestic NWHI lobster fishery is likely in the range of 168,000 - 420,000 lobsters annually (Section 10.2 and 10.3), and that domestic vessels will harvest the full OY. This results in a zero allocation to foreign fishing (Section 10.6). The FMP concludes that spiny lobster fisheries could develop in other areas of the Western Pacific Ocean FCZ. To establish an appropriate information base for management purposes, the FMP concludes that permit and data submission requirements should be instituted in the FCZ of all other island areas (Table 10.2: A 11.1, A 11.3, A 11.4, A 11.5).

The management measures proposed by the Western Pacific Spiny Lobster FMP are not expected to have a negative impact on the environment of the NWHI or other fisheries in the Western Pacific. The measures should help to protect the endangered species in the NWHI, especially the Hawaiian monk seal and sea turtles.

The FMP describes the fishery (Section 7.0) and estimates maximum sustainable yield (Section 7.11). The alternative management measures are analyzed in Sections 8, 9, 10. Monitoring of the fishery is discussed in Section 11.

The FMP provides analysis of five alternative management regimes (Section 10.1.2) from a total of 31 individual management measures (Section 8.0).

15.9 PURPOSE AND NEED (Sections 5 and 6)

Spiny lobster harvests in the NWHI fluctuated considerably in the 1976-80 period; however, there is sufficient interest and capacity so that overfishing is a distinct possibility in the absence of this FMP. Present State of

Hawaii controls do not adequately protect against lobster resource depletion in the FCZ of the NWHI. Rapid increases in harvests in the short-term may result in maximum short-term profits at the cost of long-term economic instability and idle capital investment. An unregulated fishery also may result in harm to the endangered Hawaiian monk seal or sea turtles. The FMP will minimize the risk of such damage. Finally, additional data on stock abundance, distribution, and size classes, and reproduction are needed. Research budgets are limited, so data will have to be generated by the fishery. The FMP establishes data submission requirements and identifies high priority research needs to improve the data base for future management decisions. The FMP outlines problems and issues in Section 5.0 and sets management objectives in Section 6.0.

15.10 DESCRIPTION OF THE AFFECTED ENVIRONMENT

15.10.1 The Physical Environment (Section 7.2)

The physical environment affected by the spiny lobster fishery is the entire range of the NWHI extending 1500 nautical miles northwest of the main Hawaiian Islands. The lobster habitat in this archipelago consists of the bottom area of 100 fathoms or less. It is noncontiguous and about 15,800 square kilometers in total area. This environment is characterized by the near total absence of human habitation and activity. Until recently it has experienced little intensive fishing of any kind (Section 7.2.1) because of the cost of travelling such long distances.

15.10.2 The Biological Environment (Section 7.1)

Two species of spiny lobster are the target of spiny lobster fishing in the NWHI. These are *Panulirus marginatus* and *Panulirus penicillatus*. They inhabit the sea bottom in depths generally less than 100 fathoms. Another type of lobster, known as the slipper lobster, genus *Scyllaridae*, co-exists in the same general habitat with *Panulirus* species. Quantities of Kona crab (family *Raninidae*) also co-exist in the habitat and are incidentally caught in lobster traps. The nature and extent of interspecific competition is unknown at this time. The marine biological environment of the NWHI includes a wide assortment of other animals. All species of marine mammals in Hawaiian waters are protected under the Marine Mammal Protection Act.

Several species protected under the Endangered Species Act may be found in the vicinity of the NWHI. Endangered species include the sperm whale (*Physter catodon*), humpback whale (*Megaptera novaeangliae*), Hawaiian monk seal (*Monachus schauinslandi*), hawksbill turtle (*Eretmochelys imbricata*), and leatherback turtle (*Dermochelys coriatcea*). The green sea turtle (*Chelonia mydas*) is listed as threatened. Of these species, only the Hawaiian monk seal and leatherback and green sea turtle are believed to have potential interaction with lobster fishing. Spiny lobsters are a known food item for monk seals, and sea turtles rely on undisturbed beaches to haul out and lay their eggs. Possible interactions with these species include entanglement in gear, harassment, and reduction of food supplies for monk seals.

15.10.3 The Economic Environment (Sections 7.4 - 7.6)

The spiny lobster fishery in the NWHI began in 1976 but commercial exploitation is still in the early stages. Domestic production of lobsters has amounted to a small percentage of the total amount of lobster product sold in Hawaii. There has been considerable new investment in vessels to fish the NWHI and there is a growing economic interest in developing the NWHI lobster fishery (and other NWHI fisheries).

At this time the lobster fisheries at American Samoa and Guam are limited to subsistence or recreational fishing. There is no foreign fishery for spiny lobsters at any island area in the Western Pacific region.

15.10.4 The Social-Political-Cultural Environment (Sections 7.3, 7.7 and 7.8)

Pacific island communities have a cultural heritage closely linked to the sea. Seafood has remained a significant source of sustenance, more so than in continental cultures.

Jurisdiction over the territorial sea adjacent to the FCZ is held by state and territorial governments. Jurisdiction over fishery resources (except for highly migratory tuna) between the territorial sea boundary and two hundred miles offshore is a federal and council responsibility (see Preface). Most of the NWHI are part of the Hawaiian Islands National Wildlife Refuge administered by the U.S. Fish and Wildlife Service. Kure Atoll, a State of Hawaii wildlife refuge,

is not part of the federal refuge. The Midway Islands are a possession of the U.S. and are administered by the U.S. Navy.

15.11 DESCRIPTION OF THE PROPOSED ACTION

The proposed action is to establish a management regime for the spiny lobster fisheries in the Western Pacific region. The conservation and management measures for the NWHI include a minimum size limit of 7.7 cm carapace length; required release of berried and sub-legal sized lobsters; gear restrictions; prohibition of fishing in FCZ waters shallower than 10 fathoms and within 20 miles of Laysan Island; and requirements for commercial fishers to obtain permits, maintain fishing logs, and submit catch and effort data. Commercial permit and data submission requirements are proposed for fishing in other parts of the FCZ. The FMP recommends that complementary state and territorial regulations be adopted for fishing in the territorial seas (Section 10.1.3).

15.12 ENVIRONMENTAL CONSEQUENCES OF THE PROPOSED ACTION

This section summarizes the analysis in Section 9.0 of the FMP. Impacts are considered in terms of anticipated results compared to the "no action" alternative.

15.12.1 Economic Impacts

The FMP will allow growth of the fishery. The size limit allows targetting on and retention of lobsters with 5-6 ounce lobster tails which attract the highest price in the lobster market. Short-

term profits may be less than in an unregulated fishery, but long-term productivity and stability should be maintained. Domestic supplies of lobster tails should be able to compete with foreign imports. Operating costs may be reduced due to higher catch rate, although data submission and release of sub-legal and berried lobsters will add slightly to costs. Area restrictions will reduce the total fishable habitat by about 16 percent. However, most fishing to date has occurred outside those closed areas, so the net impact may be minimal (Section 9.1).

15.12.2 Biological Impacts

The FMP will protect and maintain the reproductive potential of the spiny lobster stock. The minimum size probably allows all lobsters an opportunity to spawn at least once before becoming subject to harvest. Berried females must be released, allowing completion of their reproductive cycle. Area closures provide nursery areas and protected habitat as well as being sources of baseline data. Review of catch and effort data will provide a basis for rapid corrective action if stock conservation problems arise. Analysis of catch and effort data and completion of research as recommended will allow refinement of management as more and better information on abundance, distribution, and yield becomes available (Section 9.3).

15.12.3 Ecological Impacts

The FMP will have beneficial ecological impacts compared to the "no action" alternative. Area closures and gear restrictions will

minimize the risk of injury to and mortality of Hawaiian monk seals and other endangered and threatened species, and will minimize the potential for endangered species harassment. The minimum size limit, area closures, and release of berried and undersize lobsters will protect the reproductive potential of the stock and should assure long-term productivity and availability of lobster forage for monk seals. There will be only minor disturbance of the bottom ecosystem, and pollution from vessels will not be a problem (Section 9.3).

15.12.4 Social Impacts

The FMP will provide for long-term economic stability of the fishery and, thus, will have beneficial impacts. The fishery will be permitted to grow within the limits of the resource base. Slight increases in employment are expected. The plan will not affect sport or subsistence fishing. The availability of increased domestic supplies of lobster tails is not expected to affect consumer prices because the price of frozen tails is set by international rather than local market conditions (Section 9.2).

15.13 RELATIONSHIP BETWEEN LOCAL SHORT-TERM USES OF THE ENVIRONMENT AND MAINTENANCE AND ENHANCEMENT OF LONG-TERM PRODUCTIVITY

The FMP will protect the reproductive potential of the stock in order to achieve long-term productivity in the fishery. Short-term overfishing will be prevented by size limits, area closures, and the requirement to release undersized and berried lobsters. Catch and effort data required to be submitted under the plan will be analyzed to improve the basis for future management

decisions. Monitoring of landings and research results also will provide a basis for rapid corrective action in response to short-term biological problems. The plan provides a sound framework for long-term conservation and management of the fishery (Section 9 and 10).

15.14 RELATIONSHIPS BETWEEN THE PROPOSED ACTION AND EXISTING FEDERAL, STATE, AND TERRITORIAL POLICIES FOR THE AFFECTED AREA

The FMP is consistent with the goals and objectives of other Federal laws in the area. The plan reinforces the provisions of the Marine Mammal Protection Act and Endangered Species Act. The FMP also is consistent with current administration of the Hawaiian Islands National Wildlife Refuge and with regulations governing lobster fishing by Navy personnel at Midway.

The FMP is believed consistent with Coastal Zone Management programs and policies of Hawaii, Guam and American Samoa. The FMP recommends revision of State of Hawaii fishing regulations governing lobster fishing in the territorial sea off the NWHI to achieve consistent management throughout the range of the fishery (Section 7.3).

There are no treaties or known formal agreements establishing legal rights to specific allocations of fish (including lobsters) for native Hawaiians fishing in the FCZ (Section 7.8).

15.15 IRREVERSIBLE AND IRRETRIEVABLE COMMITMENTS OF RESOURCES

There are no anticipated irreversible commitments of resources under this FMP. The plan is intended to achieve a long-term, sustained fishery and to

prevent overfishing. There is a low risk of overfishing, even on a localized basis. If any localized overfishing occurs, it is likely to be short-lived. Curtailed fishing would result in restoration of the stock. There may be a low risk that some private investment may be irreversibly committed to the fishery; however, most new vessels will likely be equipped to fish for a variety of species and will not be overly dependent on the lobster fishery (Section 9.0).

15.16 MEANS TO MITIGATE ADVERSE ENVIRONMENTAL IMPACTS OF THE PROPOSED ACTION

The FMP is a means of mitigating potentially adverse impacts of an unregulated spiny lobster fishery on its resource base. As fishery and environmental conditions change and information on spiny lobsters increased, the FMP can be amended to take into consideration new information and changes in regulations as necessary (Section 11.0).

15.17 NATURAL OR DEPLETABLE RESOURCE REQUIREMENTS

The proposed action has no impact on natural resources except to the extent that it allows continuation of the fishery in the long-term. The prevention of depletion of the spiny lobster resource is an expressed purpose of the FMP (Section 6.1).

15.18 ENERGY REQUIREMENTS

The cost of fuel is an increasing concern of any firm fishing in the NWHI because of the area's remoteness from centers of population and supply. The FMP makes no recommendation concerning the fuel efficiency of fishing

vessels or the growth in number of fishing vessels trapping for spiny lobsters. However, the proposed action would permit fishers, faced with a range of fishing options, variable weather conditions, and operating costs, flexibility in their decision making. Such flexibility would allow for increased efficiency in energy consumption.

15.19 URBAN QUALITY, HISTORIC AND CULTURAL RESOURCES

The NWHI are essentially uninhabited, except for military and research personnel stationed in two or three locations. However, fishing in general is an important cultural tradition throughout the Western Pacific region (Section 7.7). By proposing measures to prevent the depletion of spiny lobsters, the proposed action contributes to preservation of regional traditions and culture.

15.20 CONSEQUENCES OF REASONABLE ALTERNATIVES TO THE PROPOSED ACTION

Five alternative management regimes were analyzed by the Council - including "no action", "minimal new restrictions", "preservation of reproductive potential", "license limitation and "quota system" options (Table 10.1).

These alternatives are analyzed in Section 10.1 with preservation of the reproductive potential being the preferred option. Only the "no action" alternative allows any specific danger to the environment of the NWHI, while each of the other alternatives provides means for protecting the environment to varying degrees.

15.21 CONCLUSION

The Council has concluded that the preferred alternative best meets the economic, biological, ecological, and social/administrative objectives of the plan by:

- limiting restriction of the fishery to measures needed for conservation;
- protecting the long-term productivity of the resource;
- providing for continuing management as more data become available;
- establishing a cost effective management regime.

16.0 SUMMARY OF COMMENTS

16.1 Summary of Extent of Comments Received

The Council received 37 reviews of the draft FMP. The Environmental Protection Agency, Region IX, categorized the draft FMP/EIS in Category LO-1. This means, first, that there is no objection to the proposed action as described in the draft; and, second, that the draft document adequately described the environmental impacts of the proposed action and of alternatives to the action. Eight letters submitted through the State of Hawaii Office of Environmental Quality Control (OEQC) essentially indicated the originating agency had no comment on the draft plan. The OEQC offered several substantive comments which are discussed in later sections of this summary. The Hawaii Department of Land and Natural Resources (DLNR) presented several substantive comments as well as a large number of much appreciated editorial corrections. The Hawaii Department of Planning and Economic Development (DPED) commented principally with respect to consistency requirements of the FMP in relation to the Hawaii Coastal Zone Management (CZM) Program. These State agency concerns have been addressed in subsequent discussions.

The Council received technical comments from individuals at the University of Guam and at the Office of Marine Resources, Government of American Samoa. The Environmental Center of the University of Hawaii at Manoa offered comments on several substantive issues (e.g., determinations of MSY and OY, minimum size limit).

Federal agencies commenting on the draft FMP included the U.S. Fish and Wildlife Service, the Department of the Interior, the Marine Mammal Commission,

the Honolulu District of the U.S. Army Engineers, and the Headquarters and Fourteenth District offices of the U.S. Coast Guard. The National Marine Fisheries Service provided review comments on the plan as well as a Biological Opinion under Section 7 of the Endangered Species Act of 1973 (ESA).

Two individuals who formerly worked on aspects of the FMP offered comments. Four organizations with environmental protection and conservation concerns offered comments as well. The comments from the Center for Environmental Education were extremely detailed and reflected in-depth analysis. More than 60 pages of material were submitted, which have been extremely useful in revision of the FMP.

Finally, public hearings were held in Honolulu, Pago Pago, and Agana for public response to the draft FMP.

The comments totalled more than 100 pages and therefore it has not been possible to include in this final FMP/EIS or the Source Document copies of the comments received. The cost of doing so is prohibitive. We have attempted in the Source Document to identify the substantive and technical comments and to indicate either the changes made in the FMP in response to the comments or the reasons why changes in the FMP were deemed not necessary. The Council believes this presents an adequate response to comments and is within the framework encouraged by Council on Environmental Quality (CEQ) regulations governing preparation of environmental statements. Individuals or organizations who want a full set of comments may order a set by writing to the Council.

Section 16.2 List of Reviewers

DATE	PERSON/ORGANIZATION	
11/26/80	Jake Makenzie	U.S. Environmental Protection Agency, Region IX, San Francisco, California
12/3/80	Roy Mendelssohn	Center for Coastal Marine Studies, University of California at Santa Cruz
12/8/80	Public Hearing	Honolulu, Hawaii
12/8/80	Susumu Ono	Chairman and Member, Board of Land and Natural Resources, State of Hawaii
12/8/80	Hideto Kono	Director, Department of Planning and Economic Development, State of Hawaii
12/11/80	Public Hearing	Pago Pago, American Samoa
12/11/80	Douglas Perkins	Pago Pago, American Samoa
12/11/80	Richard Wass	Office of Marine Resources, Government of American Samoa
12/12/80	Dale Coggeshall	Pacific Islands Administrator, U.S. Fish and Wildlife Service, Honolulu, Hawaii
12/17/80	Kisuk Cheung	Chief, Engineering Division, Army Engineer District, Honolulu, Hawaii
12/17/80	RADM B.E. Thompson	Commander, 14th Coast Guard District, Honolulu, Hawaii
12/17/80	Kelley Dobbs	Greenpeace Foundation, Honolulu, Hawaii
12/18/80	Public Hearing	Agana, Guam
12/18/80	Eileen Cooney	Office of General Counsel, S.W. Region, Terminal Island, California
12/26/80	Harry Akagi (8)	Acting Director, Office of Environmental Quality Control, Honolulu, Hawaii
12/30/80	R.W. Christiansen	Chief, Fisheries Law Enforcement Branch, U.S. Coast Guard, Washington, D. C.

DATE	PERSON/ORGANIZATION	
12/30/80	Patricia Port	Regional Environmental Office, U.S. Department of Interior, San Francisco, California
12/30/80	Susumu Ono (2nd)	Chairman and Member, Board of Land and Natural Resources, State of Hawaii
1/2/81	Tim Smith	NMFS Southwest Fisheries Center, La Jolla, California
1/5/81	Mits Hataoka	Fisherman, Honolulu, Hawaii
1/5/81	Steven Amesbury	Marine Laboratory, University of Guam, Agana, Guam
1/6/81	Doak cox	Director, Environmental Center, University of Hawaii, Honolulu, Hawaii
1/9/81	Courtenay M. Slater	Chief Economist, U.S. Department of Commerce
1/19/81	Marilyn Milberger	Hawaii Audubon Society, Honolulu, Hawaii
1/19/81	Thomas Grooms	Executive Director, Center for Environmental Education, Washington, D.C.
1/21/81	Ernest Kosaka	U.S. Fish and Wildlife Service, Honolulu, Hawaii
1/21/81	John R. Twiss	Executive Director, Marine Mammal Commission
1/21/81	Steven L. Montgomery	Conservation Council for Hawaii, State Board Member and Representative, National Wildlife Federation, Honolulu, Hawaii
2/12/81	Jeff Polovina	NMFS Southwest Fisheries Center, Honolulu, Hawaii
2/12/81	Terry L. Leitzell	Assistant Administrator for Fisheries, NOAA-NMFS, Washington, D.C. (Biological Opinion)
2/18/81	Alan Ford	Regional Director, NMFS Southwest Region, Terminal Island, California