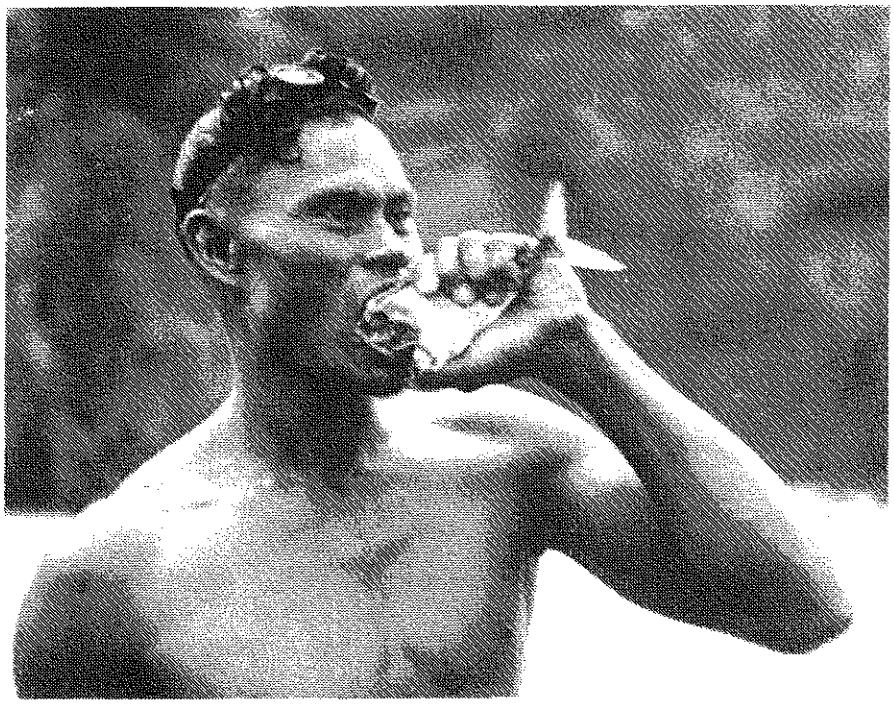
PACIFIC FISHERIES
CONSULTANTS

45-626 Halekou Place • Kaneohe, Hawaii 96744 U.S.A. • (808) 599-5867 • FAX (808) 531-0867

NATIVE HAWAIIAN FISHING RIGHTS



PHASE 2

MAIN HAWAIIAN ISLANDS AND THE NORTHWESTERN HAWAIIAN ISLANDS

A Report Prepared For The Western Pacific Regional Fishery Management Council

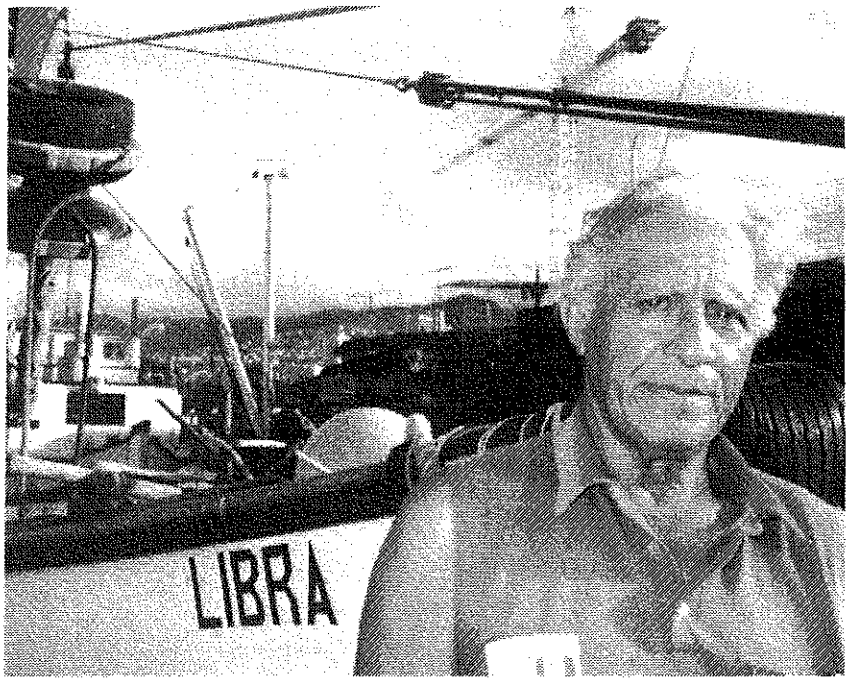
by

Robert T. B. Iversen, B.S.

Tom Dye, Ph.D.

Linda M. Paul, M.S., J.D.

JULY 1990



Office Location • Second Floor, Hawaiian Tuna Packers Building • Kewalo Basin • Honolulu, Hawaii

COVER PHOTOGRAPHY CREDITS

Upper: Hawaiian fisherman eating a raw fish, probably a papio (trevally) at Hamoa, Hana, Maui, 1936. Used by permission of Bishop Museum (negative 77483).

Lower: Capt. Leo A. Ohai, native Hawaiian fisherman, is shown on the deck of his modern 58-foot, multi-purpose fishing vessel LIBRA in Honolulu Harbor, 1990. Shown in the background is the LIBRA's 20-foot skiff, which is used while fishing for akule (big eyed scad). (Pacific Fisheries Consultants photo by Robert T.B. Iversen.)

INSIDE PHOTOGRAPHY CREDITS

Page 37: A view of the King's temple at Kaiakeakua, Island of Hawai'i by J. Arago. Used by permission of Bishop Museum (negative 20610).

Page 38: Wooden shark image from Pu'ukoholā Heiau, Hawai'i Island. Used by permission of Bishop Museum (negative 1677).

WESTERN
PACIFIC
REGIONAL
FISHERY
MANAGEMENT
COUNCIL

September 5, 1990

MEMORANDUM

TO: All Interested Parties

FROM: Kitty Simonds
Executive Director

SUBJECT: Native Hawaiian Fishing Rights Reports

Under the Magnuson Act, a system of preferential access rights may be developed based upon historical fishing practices in, and dependence on, the fishery in question and the cultural and social framework relevant to that fishery. The Western Pacific Regional Fishery Management Council (WPRFMC) and the Office of Hawaiian Affairs (OHA) recently funded a study by Pacific Fisheries Consultants to investigate the evidence available to support development of a system of preferential rights for the indigenous people of Hawaii.

The contractor was asked to provide evidence, if any, to address the following questions:

(1) Was there and is there a set of historical fishing practices within the Exclusive Economic Zone (EEZ)?
(2) Was there and is there a dependence by indigenous people on such fish species?
(3) Was there and is there a cultural and social framework relevant to such fishery?
(4) Is there present participation by indigenous fishermen in such fishery?

The Native Hawaiian Fishing Rights Reports are presented in 2 volumes. The Phase I report addressed the potential of preferential rights for native Hawaiian fishermen with regard to the harvesting of certain species of deep-sea bottomfish in EEZ waters around certain of the Northwestern Hawaiian Islands where there is presently a federal limited entry program in place. The purpose of the Phase 2 study was to collect, catalog and authenticate evidence which could provide the necessary historical and legal grounds required for preferential treatment or privileged status of native Hawaiian fishermen in Fishery Management Plan (FMP) fisheries around the entire Hawaiian archipelago.

These documents were prepared as reference materials for the Council, OHA and other interested parties by independent contractors and the results do not necessarily represent the Council or OHA.

We hope that you find these reports informative and thought-provoking. Questions and comments are welcome and may be directed to Dorothy Lowman, staff economist, at the Council offices (808) 523-1368.

STATE OF HAWAII
OFFICE OF HAWAIIAN AFFAIRS
1600 KAPIOLANI BLVD., SUITE 1500
HONOLULU, HAWAII 96814
(808) 548-8960
(808) 946-2642

TO: All Interested Parties

FROM: Thomas Kaulukukui, Sr., Chair
Board of Trustees

DATE: August 29, 1990

SUBJECT: Native Hawaiian Fishing Rights Report

The Office of Hawaiian Affairs is pleased to have had a part in the preparation and presentation of this report. The assertion and protection of Native Hawaiian Fishing Rights is considered crucial by this Office not only in the context of traditional usage but in recognition of modern pressures on the fishing industry as a whole.

As with any comprehensive report there are limitations in scope and presentation of the report. The following is intended to acquaint the reader with the limitations of this report from the perspective of the Office of Hawaiian Affairs.

This study presents the independent findings and conclusions of the contractor, Pacific Fisheries Consultants. Although the Office of Hawaiian Affairs reviewed this document, certain concerns were not incorporated into the final report. As a consequence, this report does not wholly represent the position of the Office. In particular, our concerns focus on:

1. A legal analysis which tended to ignore Native Hawaiian traditions and Kingdom precedents placing greater emphasis on western legal concepts.

2. Retrospective application of concepts from modern international law to nineteenth century situations.

3. Outstanding Native Hawaiian claims against the federal government which may afford significant opportunity to revise existing laws to address, recognize and restore traditional native rights.

We commend the Western Pacific Regional Fishery Management Council for undertaking this project and hope that this report will encourage others to continue research on the questions and conclusions presented in this material.

SUMMARY

This report provides the results and conclusions of Phase 2 of a two phase study on native Hawaiian fishing rights undertaken by the Western Pacific Regional Fishery Management Council (WPRFMC), a quasi-Federal government agency. The study investigates whether, under the Magnuson Fishery Conservation and Management Act of 1976 (MFCMA), Public Law 94-265, there are sufficient historical and legal grounds to give native Hawaiian fishermen preferential treatment in various fisheries that have now, and in the past, been undertaken in waters of what is now the U.S. Exclusive Economic Zone (EEZ). These fisheries include species of fish, crustaceans, and precious corals over which the U.S. now claims jurisdiction as the result of the MFCMA.

The EEZ encompasses those waters from three to 200 miles offshore of the entire Hawaiian archipelago, and does not include State of Hawaii territorial waters. State of Hawaii territorial waters extend from the shoreline out to the beginning of the EEZ three miles offshore.

Phase 1 of this study has covered, in a separate report, the potential of preferential rights for native Hawaiian fishermen with regard to the harvesting of certain species of deepsea bottomfish in EEZ waters around certain of the Northwestern Hawaiian Islands (NWHI). These EEZ bottomfishing waters are divided in two zones that are now under Federal regulation. These two zones are called the Mau Zone and the Ho'omalu Zone and begin slightly west of Kaua'i Island, and extend to the extreme westward end of the EEZ around the NWHI, which is slightly west of Midway Islands and Kure Island (see figure 1). Bottomfishing for deepsea species in the Ho'omalu Zone is the principal subject of the separate report on Phase 1 of this study. New Federal regulations limit access to fishermen who wish to fish in the Ho'omalu Zone, and control access to fishermen who wish to fish in the Mau Zone. These new Federal regulations into effect on January 1, 1989.

The purpose of this Phase 2 study is to collect, catalog, and authenticate evidence which could provide the necessary historical and legal grounds required for preferential treatment or privileged status of native Hawaiian fishermen in certain fisheries in the EEZ around the <u>entire</u> Hawaiian archipelago, provided certain criteria cited in the MFCMA are met [emphasis added].

It is possible for a fishery management plan (FMP) prepared by the WPRFMC to establish a system of limiting access to a fishery regulated under an FMP to certain fishermen, including <u>indigenous native American fishermen</u> [emphasis added], if in developing the FMP, the WPRFMC and the U.S. Secretary of Commerce have taken into account the following criteria:

present participation in the fishery; historical fishing practices in, and dependence on the fishery; the economics of the fishery; the cultural and social framework relevant to the fishery; and any other relevant considerations.

Therefore, under the MFCMA, the WPRFMC has undertaken both Phase 1 and Phase 2 of this study to determine if the necessary historical and legal grounds exist to give native Hawaiian fishermen preferential treatment under FMPs which limit access to certain fisheries in Hawaii's EEZ. The Phase 2 study also includes information on various species of open ocean fish like tuna, over which the U.S. does not claim jurisdiction [emphasis added].

The research methodologies used in this Phase 2 study included: (a) a review and description of the present day fisheries for deepsea FMP bottomfish, pelagic fish species, crustaceans, precious corals, as well as the fisheries for non-FMP species such as the tunas; (b) a search of the historical literature; (c) interviews with fishermen and *kupuna*; (d) a search of pertinent legal documents; (e) a search of the archeological literature; and (f) a search of archeological collections concerning all FMP regulated fisheries in Hawaii's entire EEZ, as well as the non-FMP regulated fisheries for tunas. In addition, we obtained information on the fishing histories of both young present day fishermen and older *kupuna* fishermen, which are presented as affidavits in this report. This is because the terms of reference for this study state that the evidence must be able to withstand legal scrutiny.

We report below the results and conclusions drawn from the investigations carried on during this study.

BOTTOMFISH. Concerning the bottomfish fishery in the Ho'omalu Zone of the NWHI, we have been unable to verify any bottomfishing for FMP species of bottomfish by native Hawaiians prior to the 1920s, though the scanty archaeological evidence from the NWHI includes a fishhook of the type used in deepsea *kaka* fishing. Evidence for the Ho'omalu Zone bottomfish fishery begins in the 1930s. There were only two native Hawaiians participating in the Ho'omalu Zone fishery during 1988 and 1989. They are outnumbered by non-native Hawaiian fishermen. We know there have been other native Hawaiian fishermen in this fishery in the past, but we do not know how many, or their names. In 1988, 13 vessels caught an estimated 625,000 pounds of bottomfish with an ex-vessel value of $1.5 million. There are now eight vessels licensed to fish in the Ho'omalu Zone and 10 in the Mau Zone. The maximum sustainable yield (MSY) of the NWHI bottomfish fishery is about 605,000 pounds per year. Fishery scientists studying these stocks believe that in general there is little evidence the NWHI stocks of bottomfish are stressed.

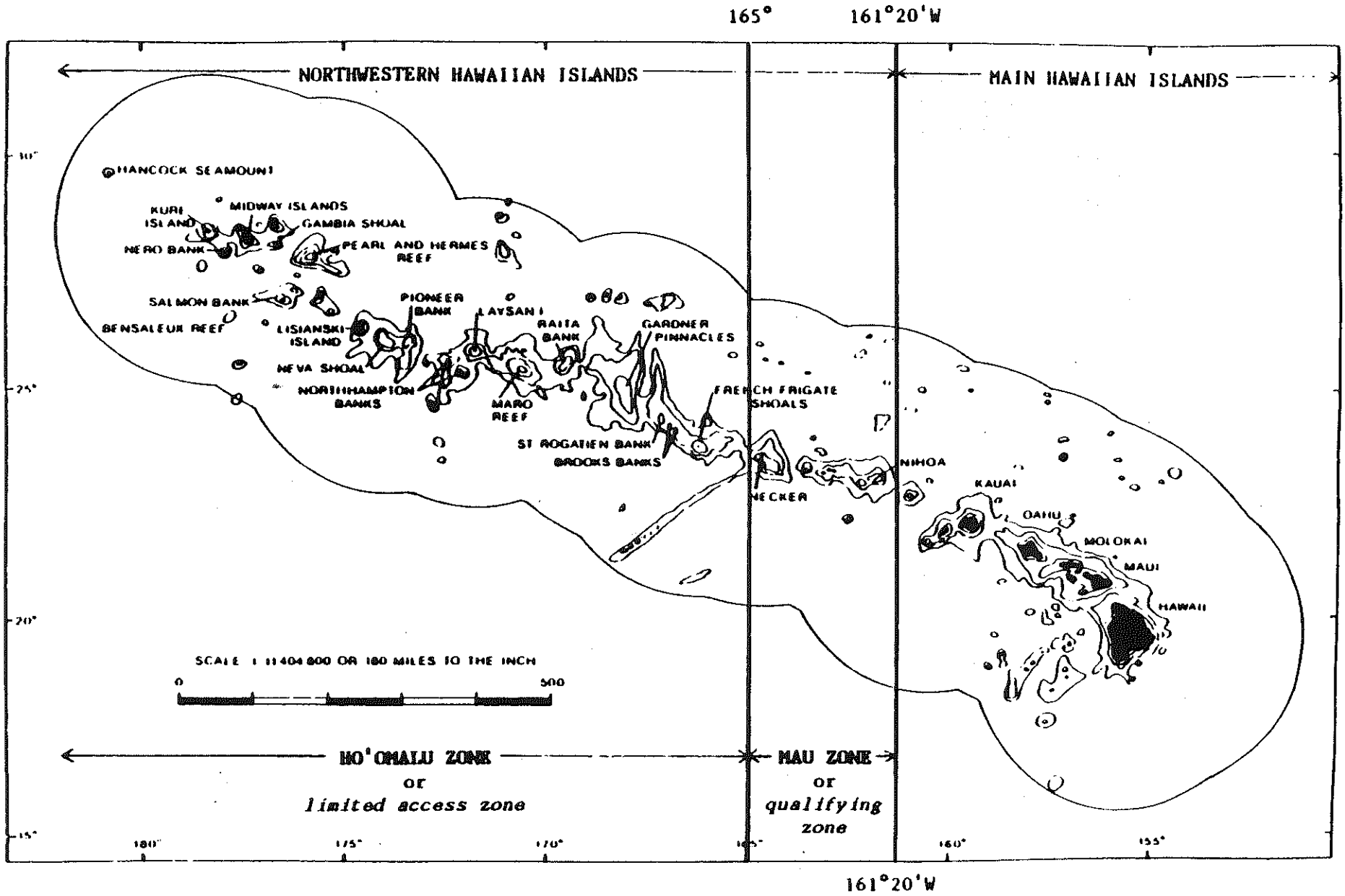


Figure 1. U.S. EEZ of the Northwestern Hawaiian Islands divided into two zones: the Ho'omalu Zone (*limited access zone*) and the Mau Zone (*qualifying zone*).

We believe there has been a dependence by native Hawaiians in the present and recent past on FMP species caught in the Ho'omalu Zone, which includes such factors as a dependence on bottomfish for food, cultural, religious, and traditional values which in the past have been shown to exist for fisheries for some of the same species in EEZ waters of the Main Hawaiian Islands (MHI). We state that a legal case can be made to give native Hawaiian fishermen preferential treatment in the MHI, and possibly in the NWHI bottomfish fishery, providing certain criteria are met.

The conclusions of the legal research for the Phase 1 study are the same as those given below for this Phase 2 study. For additional details on the bottomfish fishery for deepsea FMP regulated species in the NWHI, the reader is referred to the separate Phase 1 report, some of which are also included in this Phase 2 report.

In 1988 there was a total of 2,276,000 pounds of deepsea species taken from both areas, 1,651,000 pounds from the deepsea grounds in the MHI and 625,000 pounds from the EEZ in the NWHI. This is in spite of the fact that amount of bottomfishing grounds in the MHI is less than that of the NWHI. The combined ex-vessel value of the catch of bottomfish from both the MHI and NWHI was $6.0 million in 1988, $5.3 million in 1987, and $4.5 million in 1986. Ex-vessel prices of MHI caught deepsea bottomfish are usually higher than NWHI caught bottomfish. This is because, in general they are smaller and thus more desireable, and fresher than NWHI bottomfish due to the longer length fishing trips made by NWHI fishing vessels. Fishery scientists studying bottomfish caught in MHI waters have concluded there is evidence the total catch exceeds the best estimates of MSY and that a persistent pattern of harvesting undersized MHI bottomfish exists.

PELAGIC OPEN OCEAN FISH INCLUDING TUNAS. There are four major types of fishing that catch open-ocean FMP pelagic fishes as well as the non-FMP tunas. These include the longline fishery for pelagic fishes, which in 1988 landed an estimated 6,734,000 pounds of tunas, marlins, sharks, and other smaller FMP pelagic species. Catches of skipjack tuna by the small fleet (eight Honolulu based fishing vessels) were approximately 4,345,000 pounds in 1988, compared to 3,631,000 pounds in 1987. The catch of pelagic species by handline in 1987 was 3,092,723 pounds, mainly caught by the ika-shibi and palu-ahi methods, which are described in this report. Trolling for pelagic species in 1987 totaled 4,227,723 pounds.

CRUSTACEANS. Hawaii's fishery for spiny lobsters and slipper lobsters during 1988 was worth $4,436,000 for estimated landings of 1,217,000 pounds of spiny lobsters and 187,000 pounds of slipper lobsters. Nine vessels fished in the lobster fishery, which takes place primarily on relatively

shallow water banks in the EEZ around the NWHI. The fishery for two species of deepsea shrimps (Heterocarpus sp.) has fluctuated widely in the last nine years, as much as 700 percent between years. The combined catch of both species in 1987 was 10,798 pounds worth $44,135, (1988 data not available). In 1989 a new large deepsea shrimp trapping vessel entered the fishery and reportedly is making very large catches of one species of the shrimp in very deep waters, perhaps 1,500 to 2,000 feet deep.

PRECIOUS CORALS. The fishery for precious pink, gold, and bamboo coral essentially ended in 1978, when a submarine harvested 1,100 pounds on the beds off Makapuu Point, Oahu Island. A new entrant tried dredging for these species in 1989, but was unsuccessful. Landings of black coral (Antipathes sp.) have continued, with the latest figures showing 4,341 pounds landed in 1987. Most of this probably came from State of Hawaii territorial waters.

PARTICIPATION BY NATIVE HAWAIIAN FISHERMEN. We have identified numerous native Hawaiian fishermen who have participated in all these fisheries using the methods described above, and some not described, in the present day and recent past. By this we mean going back to the 1920s and 1930s when some present day fishermen and *kupuna* fishermen paddled canoes five to ten miles offshore of Milolii and Napoopoo, Hawaii Island. They were trolling for tunas and other pelagic species. Such practices probably reflect techniques used at least until the very early 1900s and perhaps late 1800s, but knowledge of the nature and extent of old Hawaiian fishing techniques we found not to be available from today's *kupuna*. Consequently, this knowledge must come from other sources, including historical literature and archaeology.

HISTORICAL LITERATURE SEARCH. A review of the major sources on traditional Hawaiian fishing practices was supplemented by a search through the Hawaiian Ethnological Notes at Bishop Museum Library and many minor sources. This literature establishes traditional fishing for bottomfish, aku, and sharks in EEZ waters, suggests that black corals were snagged by hooks in the deepwater bottomfishing grounds, provides equivocal evidence for traditional capture of other pelagic fishes, and no information on the harvest of crustaceans, or of the precious pink, precious gold, and bamboo corals in the EEZ. The historical literature also provides abundant evidence for the social and religious importance of fisheries for bottomfish, aku, and the sharks, as well as evidence for the ritual importance of ahi fishing. We also read the logs of 113 American whalers that visited Kaua'i and Niihau Islands, as well as the NWHI, from 1791 to 1878. The reason was to seek evidence that native Hawaiians were fishing in EEZ waters around the NWHI, but we found no evidence that native Hawaiians were fishing in those waters

for deepsea fish, or for that matter, for any kind of fish. The logs contained nothing about native Hawaiians fishing.

INTERVIEWS WITH FISHERMEN AND *KUPUNA*. This was only partially successful. We were unable to identify any *kupuna*, elders who may or may not have been fishermen, from which to receive authentic, yet unrecorded, *kama'aina* testimony of fishing practices in EEZ waters around Hawaii dating back to the early 1800s. Apparently such individuals have either died or as the result of infirmities, are unable to be located. We did, however, interview a number of present day and recent day fishermen 60 years old or older who can be considered *kupuna*. From these individuals, and from a number of younger present day native Hawaiian fishermen, we obtained detailed fishing histories. These histories, were then written down and prepared as affidavits, and are included in this report. We obtained 18 such affidavits that cover all types of Hawaii's FMP fisheries, both in the MHI and NWHI, as well as for fisheries of non-FMP species such as tunas.

LEGAL ANALYSIS AND REVIEW. An extensive review of Federal statutes, primarily the MFCMA, and their legislative histories, as well as a search of the Hawaii Revised Statutes, as well as their legislative histories, was made to develop information pertaining to preferential fishing rights for native Americans. A special effort was also made to review the extant literature on Hawaii's konohiki fishing rights. We believe this legal analysis and review was very successful and resulted in a detailed record on the subject of the fishing rights of native Americans, including native Hawaiians, on both a domestic and international law basis.

The review section is very lengthy and forms a major part of this Phase 2 report.

Concerning the legal analysis and review, we state it is an established fact that the Hawaiian people do not have a formal treaty with the U.S. which spells out their fishing rights. They did have, and arguably still have, laws which spelled out those rights, laws which survived the otherthrow and annexation into territorial status and many have survived admission into the Union. With each transfer of sovereignty, the U.S. stated repeatedly that it would honor all those extant laws not in conflict with Federal law unless they were cancelled by specific Federal or State Legislation.

Prior to the establishment of EEZs, coastal people could assert rights to high seas resources under two legal theories: (1) effective exercise of sovereign control, and (2) long and continuous usage. If both sovereign control and continuous usage were present, traditional fishermen could assert an exclusive right to the resource; if continuous usage only was established they could still assert a preferential right to the resource. The establishment of historic offshore fishing

grounds still in use in the Hawaiian archipelago opens the door to a claim for preferential native Hawaiian fishing rights in the EEZ. However, the fact that the exact boundaries of this grounds were never established argues against a claim for exclusive, vested fishing rights.

The usage rights of the common people to the fisheries beyond the three mile territorial sea were not repudiated by either the provisional government or the Republic of Hawaii.

Hawaii State law still recognizes "Hawaiian usage" as an exception and qualifier to the common law system of the State. U.S. Federal law recognizes the concept of usage in its direction to Fishery Management Councils to take "historical fishing practices" into consideration when drafting FMPs. Under international law, sovereign States have an obligation to honor preferential fishing rights established through usage and in the U. S., international law is part of Federal common law to the extent that it is not in conflict with any domestic law.

It is not clear, however, which people can be considered the inheritors of these rights. The laws of the U.S. define the term "native Hawaiian" in at least two different ways. One definition means any decendant of not less than one-half part of the blood of the races inhabiting the Hawaiian islands prior to 1778. Another definition means any individual any of whose ancestors were natives of the area which consists of the Hawaiian Islands prior to 1778. The latter definition is the most recent.

ARCHAEOLOGICAL LITERATURE AND DATABASE SEARCH. A complete review of archaeological reports held by the State Historic Preservation Office was undertaken to document finds of the remains of FMP taxa in archaeological sites. These finds indicate the widespread importance of bottomfish, tunas, and sharks in prehistoric Hawai'i and the great antiquity of these fisheries in the islands. Finds of FMP taxa left as offerings in religious temples and in burials support conclusions based on the historical literature that these fishes were important in the traditional Hawaiian religion. Records of prehistoric fishing gear designed to capture bottomfish, aku, and sharks are contained in a fishhook database that accompanies this report.

DEPENDENCE BY NATIVE HAWAIIANS. In the present and recent past, the dependence by native Hawaiians on catches of FMP species of bottomfish, open ocean pelagic FMP species, pelagic tunas, and crustaceans can be thought of in two ways. One would be the actual consumption of these species by the native Hawaiian fishermen as food, and another can be thought of in monetary terms. In 1900 many native Hawaiian fishermen depended on their catches both as a source of food and as a source of monetary income. The reported commercial landings

in 1900 were 6,222,455 pounds, with a value of $1,083,646. These commercial catches reportedly involved the efforts of 1,571 native Hawaiian men and women. A lot of native Hawaiian fishermen were involved in these activities, but we do not know the actual number.

CULTURAL, RELIGIOUS, AND TRADITIONAL FACTORS. The historical literature, bolstered by archaeological evidence, provides strong evidence for the significance of several FMP fishes in traditional Hawaiian religion. The *aku* and the *ulua* both played crucial roles in sacred ceremonies held in the *luakini* temples. Ritual ahi fishing was a feature of the important Makahiki ceremony. Sharks and *aku* were both claimed as personal and family gods (*'aumakua*) by chiefs as well as commoners. In the Hawaiian theory of the supernatural world, *'aumakua* were often seen as the incarnation of ancestors, and were thought able to change to human form and back again. The fisherman and his family followed religious taboos to ensure the continued favor of the gods and success at fishing. Fishermen built numerous temples (*heiau ko'a*) at which rites related to fishing took place and offerings were frequently made.

Black coral was used medicinally to treat respiratory and certain childhood diseases.

SOCIO-ECONOMIC FACTORS. Present day native Hawaiian fishermen who are involved in one or the other present day fisheries - bottomfishing, catching open ocean FMP pelagic species and non-FMP species like the tunas, and the other FMP fisheries, have an economic dependence on their catches. The native Hawaiian fishermen who we have identified, or speculated as to their numbers, as having taken part in these fisheries, would have a strong economic dependence on their catches. We suggest there is another category of native Hawaiians who also have an economic interest in these fisheries. That category is the consumer who is Hawaiian or part Hawaiian. As described above, there has in the past been a strong cultural and religious connection between native Hawaiians and some FMP bottomfish species, such as snappers. Some present day native Hawaiian consumers of such species may still associate such snappers with traditional beliefs and with their dependence on these snappers for food. They may be frustrated in doing so, however, because such bottomfish can often cost more than other species. Industry sources have told us that Hawaiians buy a large proportion of open ocean fish, especially some of the tunas, because they are less expensive than FMP bottomfish snappers. Many native Hawaiians probably have less disposable income with which to purchase the higher priced fish, and may have to purchase other species instead.

ACKNOWLEDGMENT

The Western Pacific Regional Fishery Management Council Wishes to Express its Deepest Appreciation

To the

OFFICE OF HAWAIIAN AFFAIRS

For Its Assistance Which Made It Possible For This Study To Have Been Conducted On The Potential Of Preferential Fishing Rights For Native Hawaiian Fishermen

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INTRODUCTION

General

On January 1, 1989, new Federal regulations went into effect that restrict bottomfishing in certain waters of the Federal Exclusive Economic Zone (EEZ) around the Northwestern Hawaiian Islands (NWHI) west of 165°00'W. to only those fishermen who have qualified under the Magnuson Fishery Conservation and Management Act of 1976 (MFCMA). These new regulations do not give native Hawaiian fishermen any preferential fishing rights, an issue which has recently received renewed attention (Meller 1985, Anders 1987, Murakami and Freitas 1987).

This was due to a lack of evidence at that time to support a determination under the MFCMA that native Hawaiian fishermen should receive preferential treatment in the NWHI for bottomfish, part of the broader issue concerning native Hawaiian fishing rights in all fisheries in the EEZ around the entire Hawaiian archipelago, which is the subject of this report.

As a result of the new NWHI limited entry regulations, the Western Pacific Regional Fishery Management Council (WPRFMC), which was responsible for developing the Fishery Management Plan (FMP) that led to the new bottomfishing regulations, has undertaken a study that examines potential bottomfishing rights for native Hawaiian fishermen both in waters around the NWHI and for fisheries in general around the entire Hawaiian chain. Phase 1 of this study is confined to an examination of potential preferential fishing rights in EEZ waters around the NWHI, and is the subject of a separate report.

This report covers potential preferential fishing rights around the entire Hawaiian Island chain including not only bottomfish, but also crustaceans, precious corals, and open ocean fish (pelagic species including tunas) in offshore areas encompassing the entire Hawaiian Island EEZ. Because the Phase 1 report described the bottomfish fishery in EEZ waters around the NWHI in considerable detail, the reader is referred to that part of the Phase 1 study which describes the present condition and status of the bottomfish fishery in EEZ waters around the NWHI.

The areas of concern of this report are the major fisheries around the entire Hawaiian Island chain (figure 1), namely bottomfish that were not covered in the Phase 1 report, crustaceans, precious corals, and open ocean fish, those pelagic fishes which are caught by longlining, trolling and pole and line methods - including the tunas. The scientific, common, and Hawaiian names of these fishes are presented in

Appendix A, which describes the naming conventions followed in the rest of this report. A list of acronyms used and their meanings is given in Appendix F. A glossary of Hawaiian words and phrases is given in Appendix G.

MFCMA criteria

Under the MFCMA, limited entry to FMP regulated fisheries may be established for certain fishermen, including indigenous native American fishermen, providing certain criteria are taken into account. Section 303 (b) (6) sets forth the criteria as follows:

> "DISCRETIONARY PROVISIONS. Any fishery management plan which is prepared by any Council; or by the Secretary, with respect to any fishery, may --
>
> (6) establish a system for limiting entry to the fishery in order to achieve optimum yield, if, in developing such system, the Council and the Secretary taken into account --
>
> (A) present participation in the fishery,
>
> (B) historical fishing practices in, and dependence on the fishery,
>
> (C) the economics of the fishery,
>
> (D) the cultural and social framework relevant to the fishery, and
>
> (F) any other relevant considerations;"

In addition, MFCMA section 303 (A) (2) specifies that any fishery management plan contain a description of "the nature and extent of . . . Indian treaty fishing rights . . ."

Purpose

In accordance with the MFCMA, the WPRFMC has undertaken Phase 2 of this study to examine whether preferential fishing rights could be established for native Hawaiian fishermen with regard to harvesting of deep-dwelling bottomfish, crustaceans, precious corals and open ocean fish including tunas in offshore areas surrounding the entire Hawaiian island chain.

The study is entitled RIGHTS OF NATIVE HAWAIIAN FISHERMEN WITH SPECIFIC REGARDS TO HARVESTING OF BOTTOMFISH IN THE NORTHWESTERN HAWAIIAN ISLANDS AND WITH REGARD TO HARVESTING OF BOTTOMFISH, CRUSTACEANS, PRECIOUS CORALS AND OPEN-OCEAN FISH

IN OFFSHORE AREAS SURROUNDING THE ENTIRE HAWAIIAN ISLAND CHAIN (WPRFMC 1988)

At the present time, the United States does not include tuna as part of the fishery resources over which it claims sovereign jurisdiction in Federal EEZ waters. In Hawai'i, Federal EEZ waters are those waters between the outer boundary of State of Hawaii territorial waters which are three miles offshore and the outer limit of the EEZ which is 200 miles offshore. It is beyond the scope of this report to provide detailed background information as to why the U.S. does not claim jurisdiction over tuna within its EEZ, other than to say that when the MFCMA was passed in 1976, the law described tuna as highly migratory species, and as such should be managed by an international management regime, and not by coastal states jurisdiction. However, in recent years there has been a concerted effort by a portion of the U.S. commercial and recreational fishing industry to amend the MFCMA to include tuna under the MFCMA.

Because of recent efforts to bring tuna under U.S. jurisdiction, which is supported by the WPRFMC, the scope of this study was expanded to include tuna in the category of open ocean or pelagic species that are fished in Hawai'i's EEZ. For further details, the reader is referred to a WPRMFC report entitled "Reasons for Including Tuna in the Magnuson Act" (WPRFMC 1988a) and other testimony offered by Pacific island representatives at the July 20, 1989 hearing before the U.S. Senate Committee on Commerce, Science and Transportation, which discussed amendments to the Magnuson Act (testimony on file at the WPRFMC).

Terms of reference

In order to meet the MFCMA criteria, the following are the types of archaeological, anthropological, and historical evidence as well as current information sought to support preferential treatment for native Hawaiian fishermen, according to the terms of reference, and which are given in the WPRFMC request for proposals dated June 7, 1988:

1. That there was and is a set of historical fishing practices for the bottomfish species . . . in the areas encompassed by Federal waters . . . in the NWHI . . . and for offshore species . . . caught in offshore areas of the Hawaiian islands as a whole (see Appendix A).

2. That there was and is a dependence by native Hawaiians (or at least a significantly identifiable portion thereof) on the bottomfish species . . . in the NWHI . . . and on the other species . . . found in offshore areas of the Hawaiian islands as a whole.

3. That at least some dimension of Hawaiian society in the aforesaid areas has in the past reflected and still reflects cultural, social and religious values, traditions, and practices derived or based upon the fishery for bottomfish . . . and for other species identified in Appendix A.

4. That there is present participation by native Hawaiian fishermen (together with non-native fishermen) in the fishery for bottomfish of the species listed . . . and the other species identified . . . in offshore areas surrounding the entire Hawaiian island chain (see Appendix A).

The WPRFMC request for proposals noted that the evidence submitted must be of such quality and be presented in a manner so as to withstand legal scrutiny.

RESEARCH METHODOLOGIES

Review and description of present day fisheries

This review was conducted by searching the available fisheries literature, primarily in the libraries of the National Marine Fisheries Service (NMFS), WPRFMC, The University of Hawai'i, and the project researchers. Present day native Hawaiian fishermen were interviewed to record their activities in the various fisheries under study. Because this phase of the study also includes fishing activities in the entire EEZ around the Hawaiian Island chain, results of interviews of fishermen who have fished in EEZ waters around the Main Hawaiian Islands (MHI) as well the NWHI were sought to determine the extent of their fishing activities in both areas.

In the report covering Phase 1 of this project, the bottomfish fishery for FMP species in the Ho'omalu Zone and closely associated fishing grounds of the NWHI is shown to be controlled by a Federal limited access program. As a result, the Phase 1 report has devoted a considerable amount of detail giving the background, regulations, and permit requirements covering the NWHI bottomfish fishery. Because this Phase 2 report describes and covers many more fisheries, both for FMP and non FMP species in the EEZ around the entire Hawaiian Island chain, we did not feel the need to provide details on the regulatory background of these FMPs that cover crustaceans, pelagic species (except tunas), and precious corals. An important thing to note concerning the FMPs for pelagic fishes species, crustaceans, and precious corals is that none of them contain any language or regulations that are either pro or con concerning preferential fishing rights for native Hawaiian fishermen (emphasis added).

Historical literature search

The primary sources on native Hawaiian fishing practices include Beckley (1883), Kahaulelio (1902), Kamakau (1976), and Malo (1951). Of these four, the only first-hand account of fishing practices appears to be A.D. Kahaulelio's. Born about 1837, Kahaulelio fished the waters between Maui, Moloka'i, Lana'i, and Kaho'olawe for 41 years, the first 16 as an apprentice to his father and grandparents and the final 25 as a master fisherman in his own right. The breadth of his knowledge is best illustrated by the 98 *ko'a* (fishing grounds) that he names and his detailed understanding of the relationships between winds, currents, and the probability of fishing success at each of the *ko'a*. His writings on fishing were published in 13 installments in *Ka Nupepa Kuokoa;* an English translation of this work by Mary Pukui is in Bishop Museum Library.

Both David Malo and S.M. Kamakau studied at Lahainaluna Seminary on Maui in the early 1830s, Malo as a middle-aged man and Kamakau as a teen-ager. Both wrote as historians, their goal to preserve the wisdom of the old Hawaiian culture as it was remembered by knowledgeable elders. Neither Malo nor Kamakau is noted for fishing prowess and it is likely that most of the information on fishing that they present was abstracted from interviews with master fishermen. Their accounts lack the detail and precision evident in Kahaulelio's descriptions.

Emma Nakuina Beckley's writing on fishing is strongest in its description of inshore fishing techniques; as a woman it is unlikely that she would have had extensive first hand experience in offshore fishing. Her writings on offshore fishing, based on second-hand information collected at a relatively late date, are probably less representative of ancient Hawaiian practices than are the accounts of Kahaulelio, Malo, and Kamakau.

Minor primary sources, including miscellaneous Hawaiian language newspaper articles and ethnographic notes from various researchers, were consulted in the Hawaiian Ethnological Notes (HEN) at Bishop Museum Library. The HEN are largely the work of Mary Pukui, who for many years was in charge of Hawaiian language translations at Bishop Museum. These sources generally cover some specific topic, such as a fisherman's prayer or a list of *ko'a* in an *ahupua'a*, and make no attempt at the exhaustive treatment provided in the major primary sources. These sources provide less information than one might expect. Strict missionary attitudes toward the practices of the past appear to have inhibited the generational transmission of information on fishing. S.Z.E. Kalaaukumuole of Puahoowali, Lahaina wrote to *Ka Nupepa Kuokoa* on 6 November 1866 with an ancient Hawaiian fishing prayer so that "the new people dwelling on the surface of the earth from

Hawaii to Kaua'i will see it, that they may see the ignorant worshipping of the ancient people... [who] did not know that Jehovah made the fish and left them for the use of men" (Kalaaukumuole 1866). Kalaaukumuole's correspondence was followed by an editor's note stating that "we did not wish to print this paper to the aumakuas to teach the young people of the future the useless practices of our ancestors . . . . We are telling this without hypocrisy that all may know the evil of the prayers of our parents." Another factor was the reluctance of fishermen to reveal the locations of secret fishing grounds (*ko'a huna*). Kamakau claimed, in 1869, that "most of the fishing grounds of *ka po'e kahiko* are unknown to their descendants and their locations have been lost" (Kamakau 1976:78). He describes an elaborate routine for ensuring the secrecy of *ko'a* that involved baiting fish hooks on shore, setting out to sea under the cover of night, and towing hooked fish out of sight of the *ko'a* before pulling them into the canoe (Kamakau 1976:78-79).

Articles from the 1890s through the 1930s in *Paradise of the Pacific* and the *Hawaiian Almanac and Annual* were reviewed for pertinent information. These sources provided little of interest, perhaps because the Japanese virtually monopolized deep sea line fishing by the turn of the century (Cobb 1902:457).

The primary sources are the basis for several recent works that deal directly or indirectly with native Hawaiian fishing. These include Hiroa's (1964) inventory of Hawaiian material culture, Titcomb's (1972, 1978) summaries of Hawaiian use of sea creatures, Newman's (1972) discussion of native Hawaiians in ecosystemic context, and Valeri's (1985) exploration of Hawaiian religion. The primary sources have also been used to develop models of Hawaiian fishing for the area in and around Kahalu'u Bay, North Kona, Hawai'i (Severance 1986), for the island of Hawai'i (Newman 1970), and for the Hawaiian Islands as a whole (Goto 1986).

Included in the literature search were the logs of American whalers who visited Kaua'i and Ni'ihau Islands and the NWHI area from 1791 to 1878 and which are part of the Pacific Manuscripts Bureau collection of over 2,000 whalers logs on microfilm in the Hamilton Library, University of Hawai'i. Logs of 113 visits by whalers to Kaua'i, Ni'ihau, and the NWHI were read to determine if any whalers operating in this area encountered any native Hawaiian fishermen engaged in fishing activities in present day EEZ waters.

Interviews with fishermen and *kupuna*

Interviews with native Hawaiian fishermen were held on O'ahu, Hawai'i, Kaua'i, and Moloka'i Islands in order to document some dimensions of their present fishing activities

in EEZ waters around all the MHI as well as along the NWHI. A special effort was made to try and locate *kupuna*, either fishermen or observers, in order to obtain *kama'aina* testimony that could serve as evidence to support preferential rights for native Hawaiian fishermen. This proved to be only partially successful, as only six individuals who could be considered *kupuna* (older persons) were identified, and all six were still engaged as active present day fishermen and could not provide any specific information on fishing practices beyond those learned in their early childhoods. Interviews with these older fishermen and with younger present day fishermen consisted of a number of core questions that brought out the salient facts concerning the fisherman (and one fisherwoman) including the percentage of his or her Hawaiian ancestry and the informant's fishing history. Information was sought on all types of fishing undertaken by the informants, including all FMP species, and also tunas. A summary of the informant's personal background and fishing history was then prepared as an affidavit which was signed and notarized. The purpose of preparing affidavits was to produce a record which could withstand legal scrutiny.

Legal document search

This search was made by reviewing Federal statutes, primarily the MFCMA, and their legislative histories, for information pertaining to preferential fishing rights for native Americans. The search also included the Hawaii Revised Statutes and their legislative histories for similar references. The status of the common law regarding Hawaiian fishing rights, which is found in Federal and State case law (results of judicial proceedings), was also reviewed. A special effort was made to review the extant literature on konohiki fishing rights.

Archaeological literature search

The purpose of the archaeological literature search was to locate evidence for the prehistoric exploitation of FMP species in the Hawaiian Islands. This was accomplished through an exhaustive review of the archaeological reports on file at the State Historic Preservation Office, Department of Land and Natural Resources, which maintains the most complete library of this type in the state. Every report that mentions fish remains was entered into a bibliography, with annotations that describe the nature of the fish remains and the circumstances of their collection, where this information seemed useful. The resulting annotated bibliography is reproduced in full as Appendix E.

The annotated bibliography served as the basis for a summary of the remains of FMP taxa in archaeological sites.

The summary details the distribution of FMP taxa across space and through time, and describes instances of FMP taxa that were recovered in sites with special social and/or religious significance.

Computer data base search and collections research

The computer database search was to be carried out at the Anthropology Department of B.P. Bishop Museum, using a copy of the computer program MINARK. A review of the database compiled by Goto (1986), which served as the kernel for this research, revealed that its entries on 2,550 fishhooks contained some conspicuous omissions, notably all of the fishhooks from the important H1 site at Ka Lae, Hawai'i Island, and much effort was expended adding the more than 1,000 hooks from the H1 site to the database. It was only after this work was completed, and analysis had already begun, that it became apparent that Goto's database was incomplete in other ways. Searches of the database consistently yielded fewer hooks of a particular type than were reported by Goto, and in some instances by Emory, Bonk, and Sinoto (1968) over twenty years ago. Unfortunately, neither Goto nor Emory et al. provides a complete list of the artifacts used in their analyses, so that there is no direct way to fill in the gaps in the database. It appears that nothing short of a complete re-inventory of the fishhooks in Bishop Museum and other collections will remedy this problem. Until this daunting task is completed, the fishhook database used in this report will be the most comprehensive list of archaeological fishhooks in the State.

Information on a total of 1,225 specimens from the collections of B.P. Bishop Museum and Paul H. Rosendahl, Inc. was entered into the database, bringing the grand total of entries to 3,775. The complete database is included, in a non-proprietary format, on the accompanying floppy disk in the file HOOK.DAT, with its associated index file, SITE.NDX. A utility program, WPRFMC.EXE, entirely menu-driven for ease of use, provides functions for reviewing the information in the database. Instructions for installation and use of WPRFMC.EXE with the database are provided below.

The 3,775 entries in the database were searched mechanically for fishhooks that may be confidently associated with harvesting WPRFMC bottomfish and pelagic FMP species, and the tunas, based on criteria for the form and size of such hooks that have been developed in the archaeological literature. Where the results of these searches produced fewer fishhooks than are reported in the archaeological literature, reference is made to appropriate published and unpublished sources.

RESULTS

Review and description of present day fisheries

Bottomfish

The present day bottomfish fishery in EEZ waters around the NWHI is the subject of a lengthy review in the report on Phase 1 of this study, and in general will not be repeated here. The Phase 1 report should be read for a detailed description of the fishery, including the location, its history of exploration, fishing zones, species of FMP bottomfish caught, numbers of vessels permitted, gear used, details of the FMP regulations controlling limited access to the fishery, the permitting process, and the present status of the NWHI fishery. In general, the method of bottomfishing employed by vessels in both the NWHI and MHI is the same, although commercial vessels which fish MHI grounds tend to be smaller than those fishing NWHI grounds. In addition, there are hundreds of small bottomfishing boats that are transported on trailers to launching sites in the MHI during the height of the bottomfishing season. Such boats tend to be in the 24 foot long size range and are used for both commercial and recreational fishing purposes.

For the purposes of this Phase 2 report, the dividing line between MHI and NWHI waters is 161°20'W., as shown in figure 1. Thus the MHI extend from approximately Nihoa Island east to Hawai'i Island, and the NWHI extend from just west of Nihoa Island to the westward extremities of the NWHI at approximately 178°15'E. There are considerably less bottomfishing grounds in the MHI as compared to the NWHI. Bottomfishing grounds are usually described as the length, in nautical miles, of the 200 meter (m) isobath (approximately 100 fathoms). The length of the 200 m isobath for the MHI is 977 nautical miles, and 1,231 nautical miles for the NWHI (Polovina 1987).

It is not known how much of the bottomfishing grounds around the MHI are located in EEZ waters. Inspection of nautical charts shows that much of the 200 m isobath is located in waters less than three miles offshore, or within State of Hawaii territorial waters. There are notable exceptions, however. Industry sources report that a large percentage of bottomfish taken in the MHI are caught on what is called "Penguin Banks", the westward underwater projection of Moloka'i Island. Other areas where the 200 m isobath is more than three miles offshore include a bank southwest of Nihoa Island, an offshore bank west of Ka'ula Island, banks south and east of Ni'ihau Island, a few areas off the northerly shore of O'ahu Island, an area between Moloka'i, Lana'i, Maui, and Kaho'olawe Islands, and a small bank north of Kailua-Kona, Hawai'i Island. MHI fishermen interviewed for this report indicated that a significant amount of their

bottomfishing activities occurred in waters less than three miles offshore.

Pounds landed. A comparison of commercial landings from both the MHI and NWHI, based on the market monitoring program of the National Marine Fisheries Service (NMFS), shows that total landings from the MHI increased significantly in 1988, while landings from the NWHI dropped significantly in 1988. The drop in 1988 NWHI landings reflects fewer fishing trips, and the increase in MHI landings reflects a cyclical increase in uku (gray job fish), a snapper. Trends from 1984 - 1988 are shown in the following table.

Table 1. NMFS estimate of Hawai'i bottomfish market volume, by source, 1984-1988. Source: Kawamoto and Pooley (1989).

YEAR	MHI	NWHI	TOTAL
	(thousand pounds)		
1984	697	661	1,358
1985	727	922	1,649
1986	746	948	1,694
1987	852	1,017	1,869
1988	1,651	625	2,276

Composition of the catch. Although there are a great many species of bottomfish taken in Hawaiian waters, the principal catches are from three groups: snappers (Lutjanidae), groupers (Serranidae), and jacks (Carangidae). Ralston and Kawamoto (1988), for example, list 42 species of bottomfish that are taken in Hawaiian waters. During 1986 -1988 in the MHI and NWHI, there were 10 principal species that made up the bulk of the landings, as shown in table 2.

Table 2. Landings of principal bottomfish species from the main Hawaiian Islands (MHI) and Northwestern Hawaiian Islands (NWHI), 1986-1988. Source: Somerton, Kikkawa, and Everson (1989). *Gindai, *Pristipomoides zonatus*, is not one of the FMP bottomfish species, but is included so that these statistics are complete.

SPECIES	REGION	1986	1987	1988
		(Catch in metric tons)		
Lehi	MHI	4.8	10.3	20.2
	NWHI	0.0	0.0	0.03
Uku	MHI	41.8	25.0	281.8
	NWHI	3.1	1.6	3.5
Ehu	MHI	23.8	30.2	21.2
	NWHI	12.5	18.0	20.3
Onaga	MHI	116.2	144.7	102.7
	NWHI	43.6	28.9	36.3
Opakapaka	MHI	73.0	138.0	215.3
	NWHI	122.6	165.3	69.5
Kalekale	MHI	11.2	18.2	8.2
	NWHI	2.8	1.9	1.0
Gindai*	MHI	1.8	1.2	2.2
	NWHI	3.4	3.8	1.6
Hapu'upu'u	MHI	7.2	9.1	11.5
	NWHI	86.6	99.8	70.3
White ulua	MHI	13.8	9.1	37.7
	NWHI	13.4	25.3	27.5
Butaguchi	MHI	1.2	2.9	7.9
	NWHI	66.1	97.0	50.0
Area total	MHI	295.0	389.6	707.6
	NWHI	354.1	441.6	280.0
Grand total		649.1	831.2	987.6

Value of the catch. Bottomfish caught in 1988 from the NWHI were worth $1.5 million, down 35 percent from 1987, when catches were worth $2.3 million. Market revenue for 1986-1988 from the NWHI and the MHI are given in table 3.

Table 3. Hawai'i bottomfish market revenue, 1986-1988. Source: Kawamoto and Pooley (1989).

SOURCE	1986	1987	1988
		(In Million $)	
Northwestern Hawaiian Islands	$1.9	$2.3	$1.5
Main Hawaiian Islands	$2.6	$3.0	$4.5
Total	$4.5	$5.3	$6.0

The price distribution by species between the NWHI and the MHI are given in table 4. The ex-vessel prices of bottomfish caught in the NWHI in 1988 were not as high as bottomfish caught in the MHI. This is because MHI bottomfish are smaller than NWHI bottomfish and thus more desirable, and also because they are generally fresher than NWHI bottomfish due to the longer fishing trips needed by vessels targeting bottomfish in the NWHI.

Table 4. Price (per pound) distribution and product source for the Hawaiian bottomfish market, 1986-1988. Source: Kawamoto and Pooley (1989).

	1986		1987		1988	
SPECIES	NWHI	MHI	NWHI	MHI	NWHI	MHI
Opakapaka	$3.20	$3.78	$3.27	$3.97	$3.54	$3.55
Onaga	3.13	4.39	3.24	5.12	3.30	5.06
Ehu	2.14	2.32	2.36	3.75	2.01	3.80
Hapu'upu'u	1.56	2.23	1.87	2.74	1.84	2.99
Butaguchi	1.07	2.00	1.16	2.51	1.05	2.54
Other	2.39	2.26	2.11	2.55	2.23	1.91

Biological assessment of the landings. Material for this summary has been taken from the 1987 and 1988 annual reports for the bottomfish fishery produced for the WPRFMC.

Ralston and Kawamoto (1987) have estimated the maximum sustainable yield (MSY) of bottomfish for the NWHI at 275 metric tons (605,000 pounds) and at 285 metric tons (627,000 pounds) for the MHI. After further analysis, they concluded that, in general, there is little evidence that NWHI fish stocks are stressed. Although the 1988 catch of bottomfish from the NWHI slightly exceeded the estimated MSY, they concluded that "the multi-species fishery is probably in a state of non-equilibrium and MSY estimates are somewhat ambiguous" (Ralston and Kawamoto 1988).

Concerning MHI bottomfish, the 1987 annual report states "that there is evidence that total catch exceeds the best

estimate of MSY and that a persistent pattern of harvesting undersized (immature) fish exists, especially for opakapaka [pink snapper], onaga [long tailed snapper], ehu [squirrel fish snapper], and white ulua [giant trevally]. "The 1988 annual bottomfish report essentially agrees with the 1987 report noting that the condition of the stocks differs considerably between the NWHI and the MHI (Somerton, Kikkawa, and Everson 1989). It also concludes there is little to suggest the NWHI fishery is stressed, although the decrease in catches of opakapaka probably reflects the fishers decreasing ability to locate new opakapaka grounds. They point out that disequilibrium has existed in the NWHI fishery since it started, but there are signed that equilibrium conditions will soon be achieved.

With regard to 1988 MHI bottomfish catches, Somerton, Kikkawa, and Everson (1989) point out that several stocks are clearly stressed, especially ehu, onaga, and kalekale (snapper), which exhibited declining catches. They speculate that declines in catches of these species may reflect an apparent change in the fishing patterns of the MHI fleet during 1988.

For example, the very large increase in catches of uku may reflect a change by fishermen towards fishing in the shallower areas inhabited by uku, rather than by a sudden increase in the abundance of uku. Similarly, the large increase in MHI catches of opakapaka, which are caught incidentally by fishermen targeting uku, may be due to an increase in fishing effort directed towards uku in the MHI. They note that the catch of four species (opakapaka, ehu, onaga, and white ulua) are primarily of juveniles and that high fishing pressures may indicate the spawning stock is likely to be low, perhaps enough to influence future recruitment.

In summary, then, there is little evidence to indicate that stocks of NWHI bottomfish are in a stressed condition, but in the MHI a persistent pattern of harvesting undersized (immature) bottomfish exists, especially for opakapaka, onaga, ehu, and white ulua.

Open ocean fish including tunas

A description of present day open ocean fisheries involves at least four major types of fishing that land a wide variety of pelagic species including tunas, marlins, sharks, mahimahi (dolphin fish), and ono (wahoo). These types of fishing include longline fishing primarily for tunas, marlins, and sharks, pole and line fishing using live bait for aku (skipjack tuna), a relatively new fishery known as ika-shibi or night handline fishing for a variety of tunas and billfish, and trolling in pelagic waters for mahimahi and ono. It is beyond the scope of this paper to cover each of these fisheries in as much detail as has been given to the

bottomfish fisheries in the NWHI and MHI, particularly since there is considerable movement by fishing vessels into and out of the different types of pelagic fisheries. It is also not known with any certainty what percentage of the various open ocean fishes are caught within state waters, so for the purposes of this section it is assumed that all reported catches have been made in EEZ waters around the Hawaiian archipelago, although this is discussed in more detail below under the category of aku catches via pole and line, and of mahimahi and ono.

a. Longline caught pelagic species. Longlining for pelagic species was introduced to Hawai'i by a Japanese immigrant in 1917 (Otsu 1954). As improvements in technology occurred, the fleet expanded and in the immediate post World War II period the fleet expanded to about 33 vessels by 1952 (Otsu 1954). After 1957, the number of longliners declined and by 1964, only 24 longline vessels were based in Honolulu (Hida 1966). By 1968, there were only 22 active vessels in the fleet (Otsu and Sumida 1970), and by 1979 there were only 14 vessels fishing full time. During the early 1980s the fleet increased and there were 37 vessels with longline gear in 1983 (Honda 1984). Increased demand for longline caught fish in the latter part of the 1980s further led to increases in the numbers of longliners, many of which have come to Hawai'i from either Alaska, California, or states bordering the Gulf of Mexico. Most of the new arrivals are equipped with a continuous mainline, which allows a relatively small vessel to fish as many as 1,000 hooks during each set. According to the WPRFMC, in 1988 Hawai'i's pelagic longline fleet was composed of 65 vessels, but not all were longlining at any one time, as some are multi purpose vessels that are also capable of fishing for lobsters, shrimps, or bottomfish. According to industry sources, operations of these 65 longliners take place almost exclusively in EEZ waters more than three miles offshore, and that on occasion, some vessels fish beyond the outer 200 mile limit of the EEZ. According to the fishing season, weather factors, and market factors, the Hawai'i based longline fleet that targets pelagic fishes can be said to fish, in a general sense, throughout EEZ water around the entire Hawaiian archipelago, but the location of the fleet during the various months throughout the year is unknown. Current data (1987 - 1988) on the area of catch are unavailable because of incomplete and inconsistent reporting by fishermen (Kawamoto, Ito, Clarke, and Chun 1989).

According to an NMFS estimate, the revenue from longlining is Hawai'i's largest commercial fishery by value and landings and reached $16 million in 1988 (NMFS 1988).

Table 5. Longline fishing in Hawai'i. 1988 Landings (NMFS estimate). Source: WPRFMC (1988b).

FISH	CATCH
Bigeye tuna	2,738,000 lb.
Yellowfin tuna	1,312,000
Other tuna	693,000
Striped marlin	1,112,000
Other marlin	431,000
Other misc.	448,000
Total	6,734,000 lb.

Some industry sources have indicated these estimates are on the low side, and could be as high as 10 to 15 million pounds for 1988.

b. Tuna caught by pole and line. The seasonal appearance of aku in Hawai'i was the basis for a subsistence fishery for the Hawaiians. Venturing far offshore in outrigger canoes and double canoes, the Hawaiians sought the schools of aku as they entered waters adjacent to the small villages scattered throughout the islands (Cobb 1905, June 1951). Commercial development of the aku fishery in Hawai'i began about 1900. With the introduction of Japanese fishing sampans and gear, the fishery expanded rapidly. The early sampans were small, usually propelled by a scull or by sail, and crewed by four to six men. In 1907, gasoline powered boats were introduced, thus making it possible to expand fishing operations farther offshore, and increased numbers of small wooden sampans were constructed in order to expand the fishery for aku. The fishery continued to expand so that by 1948 there were 32 boats that fished exclusively for aku in Hawai'i (June 1951). Since that time many boats have left the fishery, either due to sinkings or other casualties, or for economic reasons, until at present there are only eight full time aku boats fishing in Hawai'i, all of them based on O'ahu.

Landings of aku by the fleet has varied widely over the years. As early as 1900, Cobb (1905) reported the catch of aku was slightly over 422,000 lbs. Since then the catch has fluctuated widely. Shomura (1987) reports that aku catches between 1950 and 1986 were as follows: 1950 - 9,506,000 lbs.; 1953 - 12,059,400 lbs.; 1985 - 2,105,100 lbs.; 1986 - 2,342,600 lbs. The large drop in landings between 1953 and 1985 was due to the closing of the Hawaiian Tuna Packers cannery in Honolulu, which canned any excess aku that could not be absorbed by the local fresh fish market. Since 1986, the fleet's catches appear to have increased substantially,

and recent NMFS estimates show that approximately 3,631,000 lbs. were landed in 1987 and 4,345,000 lbs. were landed in 1988 (Pooley, Teramoto, and Todoki 1988, NMFS 1988). Increased catches in 1987 and 1988 apparently are a reflection of increased revenue to the aku boat fleet. According to Pooley, Teramoto, and Todoki, 1988) total revenue for the fleet is estimated at $2.2 million in 1986 and $4.2 million in 1987. Higher fish prices, higher percentages of large aku in the catch, higher total landings, and lower fuel costs are the sources of this apparent improvement.

The fishery for aku does not take place in EEZ waters around the entire Hawaiian archipelago. Although the small Hawaiian fleet ranges over an extensive area in pursuit of aku, most of the effort is concentrated near shore. Uchida (1967) has estimated that from 60 to 90 percent of the annual landings of skipjack tuna came from within 37 kilometers (22 miles) of the main islands. Very little aku fishing has occurred along the islands of the NWHI. In previous years, some aku boats were based on Maui and Hawai'i, but at present all aku boats operate out of O'ahu. Therefore, it is most likely that most of the present aku catches are taken in waters not to far from O'ahu.

This brings up the question of how much of the aku catch, both in years gone by and at the present time, was caught in EEZ waters, three miles or more from shore.

Research conducted in the mid 1960s (Uchida 1966, 1967) refers to aku catches being taken either inshore or offshore. Uchida defined inshore waters as those less than 20 miles from land and offshore waters those more than 20 miles from land. Uchida found that the majority of aku catches came from inshore waters, those less than 20 miles from land. The question arises, however, as to how much of the inshore catch was actually outside three miles offshore, or in EEZ waters. Industry sources report that the vast majority of aku catches are caught more than three miles offshore. Figure 9 in June (1951) depicts the major fishing grounds for aku in Hawaiian waters in 1946-1948 around the main Hawaiian islands. Inspection shows that a very large percentage of the grounds are more than three miles offshore. Further, annual reports submitted by the Honolulu office of the Southwest Region of NMFS show that the vast majority of aku are caught in the EEZ more than three miles offshore. For example, NMFS aku catch data for the year 1985 (revised in 1988), shows that 99 percent of all aku caught by Hawai'i based boats was caught in EEZ waters (NMFS 1988a). From the above, it can be concluded that the Hawaiian fishery for aku is undertaken primarily more than three miles offshore in EEZ waters.

c. Handline caught tuna and other pelagic fishes. There are a number of fishing techniques employed in Hawaiian waters that come under the general heading of handline caught fish.

These techniques primarily include the ika-shibi and palu-ahi method of catching tunas and other large pelagic fishes, as well as other miscellaneous fishing gears. The descriptions that follow are of only the ika-shibi and palu-ahi methods and are taken from the FMP prepared by the WPRFMC for Pelagic Fisheries of the Western Pacific Ocean (WPRFMC 1976), Yuen (1979), and updated by Ikehara (1981).

Ika-shibi fishing is a handline fishery for tuna carried on at night primarily from relatively small boats. "Ika-shibi" is a composite word, with ika meaning squid and shibi referring to the big species of tuna that are caught. According to Yuen (1979), ika-shibi fishing evolved from a squid fishery started by Japanese immigrants who fished out of Hawai'i Island at night for squid. This was in the early 1900s. In the process, they incidentally caught large tunas. The squid fishery was stopped by World War II, but after the war a number of the squid boats equipped themselves with iceboxes and began to target on catching the large tunas. By 1976 there were an estimated 30 to 40 ika-shibi boats fishing in waters primarily off the Hilo side of Hawai'i Island, and this increased to at least 230 boats (WPRFMC 1986).

Ika-shibi fishing consists basically of attracting squid with a night light, catching them with jigs or gaffs, and then using the squid as bait on simple handline gear to catch tuna. The fishery targets on ahi (yellowfin and bigeye tuna), and ahipalaha, but also catches other pelagic species, such as a'u ku (broadbill swordfish) and a'u (blue marlin, black marlin, and short nosed spearfish).

The most recent catch statistics from ika-shibi fishing are those given by Ikehara (1981) for 1980 and for 1987 by the WPRFMC (1989). Ikehara (1981) reported that the night handline fishery for tunas in 1980 landed 888 metric tons of tuna worth $2,799,000. The fishery also landed 35 metric tons of other pelagic fishes (swordfish, marlin, etc.) worth $107,000.

Palu-ahi fishing is a revitalization of what many believe is an ancient Hawaiian method of fishing for deepsea pelagic fishes such as tuna, marlin, swordfish, mahimahi, and ono, though no early historic sources describe the method. The name of the fishery comes from the two Hawaiian words, "*palu*" meaning chum, and "*ahi*" referring to the large species of tuna caught. The palu-ahi fishery is carried out during daylight hours with freshly caught '*opelu*, or mackerel scad (*Decapturus pinnulatus*) being the preferred bait. The technique involves the use of a stone sinker which takes a baited hook attached to a handline down to a depth of 35-65 fathoms (210-390 feet). The rock, baited hook, and chum, bundled together with the leader line are dropped over the side of the boat, and when the bundle reaches the desired depth, the line is jerked releasing the chum and exposing the baited hook. Palu-ahi

fishing is normally carried out in areas where tuna are known to aggregate during certain times of the year. These areas are known by the Hawaiian word "*ko'a*" and apply to certain spots in the deepsea where ahi (yellowfin and bigeye tuna) or large ahipalaha (albacore tuna) congregate close to shore. It is not known how many fishermen employ the palu-ahi method of catching tunas, but it probably is in the several hundreds, especially since the State of Hawaii has deployed 52 fish aggregating devices (FADs) in waters off all islands. These FADs undoubtedly have attracted additional palu-ahi fishermen.

The magnitude of the catch of pelagic fishes by the palu-ahi method is not known, since Hawaii Division of Aquatic Resource (HDAR) statistics do not have a separate classification for palu-ahi catches. The most recent compilation of handline catches of pelagic fishes that is available is given in the first annual report on pelagic fishes (WPRFMC 1988). The data given below include not only palu-ahi, but also ika-shibi, other handline gear and miscellaneous gears.

Table 6. Pelagic species caught by handline in 1987. Source: First Annual Report for the FMP for the pelagic fisheries of the Western Pacific Region (WPRFMC 1989).

SPECIES	WEIGHT (lbs.)
Bigeye tuna	39,188
Yellowfin tuna	2,831,923
Skipjack tuna	45,048
Albacore tuna	3,172
Other tuna	249
Subtotal	2,919,580
Blue marlin	35,144
Striped marlin	4,566
Other billfish	5,176
Subtotal	44,887
Mahimahi	91,669
Ono (wahoo)	30,032
Other pelagic fishes	6,554
Total	3,092,723

d. Open ocean troll caught fish. Open ocean troll caught fish include those species enumerated above, including the tunas, marlin, mahimahi, and ono. Making even a rough estimate of the percentage of open ocean troll fish that are caught in EEZ waters is extremely tenuous at best, as there is no precise data available on actual levels of fishing effort for the commercial trolling sectors of Hawai'i's fisheries, as landings according to annual and monthly time periods based on

commercial landing records have not been completed (WPRFMC 1989). The NMFS, however, through its Honolulu market survey has estimated the magnitude of 1987 troll caught open ocean species, as given in table 7.

Table 7. Pelagic species caught by trolling in 1987. Source: First annual report for the FMP for the pelagic fisheries of the Western Pacific Region (WPRFMC 1989).

SPECIES	WEIGHT (lbs.)
Bigeye tuna	139,905
Yellowfin tuna	1,822,371
Skipjack tuna	424,417
Albacore tuna	38,149
Other tuna	4,910
Subtotal	2,429,027
Blue marlin	667,734
Striped marlin	71.541
Other billfish	14,733
Subtotal	754,008
Mahimahi	672,242
Ono (wahoo)	303,661
Other pelagic fishes	68,063
Total	4,227,723

Crustaceans

a. Lobsters. Hawai'i's commercial lobster fishery traditionally had been conducted around the MHI and did not spread to the NWHI until 1976. From 1948 through 1976, spiny lobster catches reported by the HDAR ranged from a high of 43,632 lbs. caught in 1949 to a low of 4,414 lbs. in 1967. These lobsters were almost all caught around the main Hawaiian Islands. Because there are few shallow banks around the MHI, catches reported by HDAR before 1976 are almost all taken within State of Hawaii territorial waters (DLNR 1979). This is in contrast with the NWHI, where virtually all of the lobsters caught are in EEZ waters. In contrast, it is interesting to note that the report of biologist John N. Cobb (1903) for the year 1900 showed a catch of 131,182 pounds of lobsters from the MHI. Cobb's note is the only reference extant which actually gives the amount of lobsters taken by Hawaiians in what could be consider the "olden days" that we were able to locate. According to Cobb, the method of fishing for lobsters was by the use of a snare. He reports that "In fishing for ula (ahele ula), a long pole, to which dead bait has been tied about three inches from the bottom, is put down in the water in front of a hole in the rocks. As the ula

(lobster) comes out of its hole to get the bait another pole, with a crotch or fork at the end to both arms of which a noose is fastened, is slipped under its tail and suddenly jerked, tightening the noose, so that the animal can be brought to the surface." Cobb also reported that native Hawaiian fishermen was also taken frequently by a diver using his hands to capture the lobster. Cobb also reported that gill nets with a seven inch mesh were set around clusters of rocks in the evening and then retrieved in the morning when the entangled lobsters were removed. This shows that catches of lobsters around the turn of the century were primarily carried out in very shallow waters close to the shoreline.

Starting in 1976, one commercial vessel began fishing in the NWHI. This increased to five vessels in 1977 and between 1977 and 1988 the number of lobster vessels fishing in EEZ waters in the NWHI has fluctuated from a low of 2 vessels in 1978 to a high of 16 vessels in 1985 and 1986.

Statistics collected by the NMFS on catches of spiny and slipper lobsters in the NWHI between 1977 and 1988 are given in table 8.

Table 8. Estimated annual landings of spiny and slipper lobsters from the NWHI, 1977-1988. Source: Clarke (1989).

YEAR	SPINY LOBSTERS (WEIGHT IN LBS.)	SLIPPER LOBSTERS	NUMBER VESSELS	REVENUE ($1,000)
1977	72,000	- - -	5	209
1978	45,000	- - -	2	135
1979	100,000	- - -	2	320
1980	328,000	- - -	3	1,115
1981	780,000	- - -	10	2,730
1882	187,000	- - -	7	673
1983	203,000	- - -	4	591
1984	935,000	82,000	11	2,490
1985	1,438,000	930,000	16	4,227
1986	1,149,000	1,053,000	16	3,710
1987	530,000	439,000	11	2,479
1988	1,217,000	187,000	9	4,436

According to Clarke (1989), the significant jump in spiny lobster catches in 1988 compared to 1987 was due to fishermen targeting more on two-spined spiny lobster (red lobsters) than on slipper lobsters. The fishermen reported that both wind and sea conditions allowed fishing on top of the banks throughout most of 1988. Two-spined spiny lobsters tend to congregate in the upper bank areas, whereas slipper lobsters (ula papa) tend to be found in deeper waters or around the deeper edges of the banks.

b. Deep sea shrimps. The present fishery for two deepwater shrimps of the genus *Heterocarpus* began in 1967 and 1968 with exploratory fishing by the NMFS by trapping for deepwater shrimp in the Hawaiian Islands (Struhsaker and Aasted 1974). The two species are the spotted shrimp (*Heterocarpus ensifer*) and the ono shrimp (*H. laevigatus*). Further intermittent trapping conducted by the NMFS during 1972 showed that the spotted shrimp was found to be most abundant in depths of 200-250 fathoms. The larger ono shrimp was found to be most abundant in depths from 240-375 fathoms. Because of its larger size, ono shrimp were considered to be the more desirable of the two species for commercial fishing activities. Over the ensuing years, a large number of both small and large *Heterocarpus* fishing vessels entered and left the fishery. By 1984, seven large vessels (23-40 m) vessels and at least 10 smaller (<20 m) vessel were actively fishing for deepsea shrimp (WPRFMC 1984). Since 1981 a number of large vessels have entered and left the fishery for ono shrimp, including the F/Vs EASY RIDER TOO, EASY RIDER, HAWAII MAKAI, MOKIHANA, and the CHERYL ANN. At the present time, the principal fishing vessel trapping ono shrimp is the F/V SHAMAN, a large Bering Sea trawler that has been converted to fish exclusively for the deep dwelling ono shrimp. The catches made by the F/V SHAMAN are confidential, but industry sources indicate that in 1989 catches of several tens of thousands of pounds of frozen ono shrimp have been obtained during fishing trips of a month or so in EEZ waters. The exact fishing areas are unknown. In addition to operations by the F/V SHAMAM, a number of other smaller vessels that are landing both ono shrimp and the shallower dwelling spotted shrimp.

Table 9 indicates catches of both ono shrimp and spotted shrimp as reported by the HDAR for 1983-1988. In some years, there was no reported catch for spotted shrimp. The data do not include the recent large reported landings by the F/V SHAMAN. The wide variations in reported landings reflects the entry and exit of large vessels during 1983 and 1984 as well as incomplete and unreported landings by a number of small vessels still fishing for ono shrimp and, to a lesser extent, for spotted shrimp.

Table 9. Landings of shrimp of the genus *Heterocarpus*, 1983-1988. Source: HDAR annual statistics.

YEAR	SPECIES	POUNDS LANDED	VALUE ($)
1983	*H. laevigatus*	147,697	315,156
	H. ensifer	289	842
1984	*H. laevigatus*	275,548	420,242
1985	*H. laevigatus*	1,880	3,760
1986	*H. laevigatus*	393	1,586
	H. ensifer	35	105
1987	*H. laevigatus*	10,004	42,024
	H. ensifer	794	2,111
1988	*H. laevigatus*	500	——
	H. ensifer	400	1,300

c. Pajama shrimp, *Parapandalus serratifrons*. This deepwater shrimp is one of the crustacean FMP species listed in the WPRFMC's request for proposal for the native Hawaiian fishing rights project. Because there has been little or no research done on this species, and because catches of pajama shrimp do not appear in the annual landing statistics issued by the HDAR, it will not be considered further in this report.

Precious corals

a. Precious pink and gold corals. Since there is no fishery for precious pink and gold corals in the EEZ around the Hawaiian archipelago at the present time, the purpose of this section is to describe what has happened to the fishery since it began in 1966 until 1988, when local fishermen attempted to drag for precious corals during several voyages until abandoning the effort in 1989. Domestic participation in harvesting precious corals began in 1966, when U.S. scientists discovered a commercial bed of precious pink coral off Makapu'u, O'ahu in the Moloka'i Channel. Shortly thereafter, a small group of fishermen began dredging this bed on a small scale. Research at the University of Hawai'i led to the development of a selective harvesting system utilizing a manned submersible. Using this system, Maui Divers of Hawaii, Ltd., began harvesting the coral in 1973. The system was used until 1979, when high operating costs forced the discontinuance of the manned submersible. Between 1966 and 1979, the annual harvest of pink and gold coral from the Makapu'u bed totaled 10,324 kg., as shown in the following table.

Table 10. Annual harvest of pink and gold coral from the Makapuu Bed. Source: WPRFMC (1980). *Exact number of trips and locations unknown. Also, information is lacking as to the amount of bamboo coral harvested during 1966-1989.

YEAR	GEAR	PINK (Harvest in kilograms)	GOLD
1966-1969	Dredge	1,800	0
1970-1972	No harvesting	--	--
1973	Submersible	538	0
1974	"	2,209	734
1975	"	1,385	621
1976	"	400	363
1977	"	1,421	329
1978 (Jan-Jun)	"	474	50
	Total	8,227	2,097
1988-1989	Dredge*	--	--

There is a potential for a U.S. fishery for precious coral in the EEZ around the Hawaiian archipelago, but the economics of such harvesting make such a fishery a very tenuous venture at best, based on the unsuccessful experience of the fishermen who attempted several voyages during 1988-1989. Poaching by foreign fishermen on U.S. precious coral stocks is reputed to have been as high as 10,000 kg. of precious pink coral in the EEZ surrounding the NWHI. In 1981 alone, there were 21 documented violations of illegal fishing by Taiwanese and Japanese vessels inside the EEZ in the Hancock Seamount area near Kure Island (WPRFMC 1988).

b. Black coral. Several species of black coral have been harvested in Hawaiian waters by scuba divers dating back to 1958 when divers discovered the beds off Lahaina, Maui. There are three species of black coral it is estimated that about 85 percent is taken within the three mile Hawaii state territorial sea, with the remaining 15 percent being taken in EEZ waters, mostly within the Auau Channel between the islands of Lana'i and Moloka'i at depths below 40 meters (Hawaii Fisheries Development Plan 1979).

The majority of the harvest is taken in the Auau Channel and off the southern half of the island of Kaua'i. In 1979, it was estimated that the annual harvest of black coral was approaching 50,000 lbs. per year, which was much higher than the commercial catch records required to be submitted by divers to the State of Hawaii. In the 1979 Hawaii Fishery Development Plan, Grigg estimated that about 84,000 colonies (166,000 kg.) comprised the standing crop of black coral in the Auau channel, and the standing crop off Kaua'i at about

40,000 kg., about 25% of the Auau Channel population. The precision of these estimates is probably no better than 33 percent because of the patchiness in distribution and the variability in growth rate of black corals.

What is not known with any certainty is the quantity of black coral which has been harvested since Grigg's 1979 figures. Reported catches of black coral in the years 1979-1982 have ranged between 0 and 1,200 lbs., and it is very likely that recent harvesting of black coral is considerably underreported, as shown in table 11.

Table 11. Landings of black coral in Hawai'i, 1983-1988. Source: Annual statistics published by the HDAR.

YEAR	POUNDS LANDED
1983	1,911
1984	3,128
1985	308
1986	935
1987	4,341
1988	435

While divers are required to possess commercial fishing licenses and to report their catches, there are no regulations to date that restrict the take of this resource. The problem of management is complicated by the fact that SCUBA divers take undersize colonies and sell them to curio dealers, and also, as recently reported, to interior decorators who seek them to decorate homes.

Historical literature search

Methods and sources

This section reviews literature that describes traditional fishing practices, the social and religious framework within which fishermen operated, and the place of certain fish in Hawaiian ritual and cosmology. Special attention is paid to the locations where fishing is said to have taken place, because these accounts comprise the sole source of evidence for traditional fishing within the EEZ. Direct statements attesting to the dependence of native Hawaiians on the various fisheries are lacking. In lieu of these, special attention has been paid to ancillary evidence that relates to the depth of traditional knowledge about the operation of a fishery and the kinds of fish that it produced. In particular, evidence for sophisticated fishing tools and techniques, and a detailed nomenclature for these and the animals they were designed to catch, will be interpreted as indicating a dependence upon a

fishery. The literature reviewed here is also the best evidence for the traditional fisherman's social and religious concerns, since these are not directly preserved in the archaeological record.

Also included in the literature search were the logs of American whalers who visited Kaua'i and Ni'ihau Islands, and the NWHI from 1791 to 1878. These logs are part of the Pacific Manuscripts Bureau collection of over 2,000 whalers logs on microfilm in the Hamilton Library, University of Hawai'i. Logs of 113 visits by whalers to Kaua'i, Ni'ihau, and the NWHI were read to determine if any whalers operating in those areas encountered any native Hawaiian fishermen engaged in fishing activities in present day EEZ waters. There was no reference to any type of fishing activities by native Hawaiian fishermen in any of the 113 logs examined. However, lack of mention in the whalers' logs should not be taken as evidence for the absence of Hawaiian fishing in EEZ waters near Kaua'i and Ni'ihau Islands or along the NWHI. A list of the whalers' logs examined is found in appendix B.

The social and religious importance of fish and fishing are discussed below in separate sections, though the Hawaiian's holistic conception of the natural, cultural, and supernatural worlds occasionally makes the assignment of evidence to one category or the other rather arbitrary. The lack of clear boundaries between these worlds, and the commingling of kinship, political, religious, and economic principles in the descriptions of everyday activities, often strike the modern reader as lapses in the memory of the writer, due most likely to the rapid social changes that followed contact with the non-Polynesian world, or to fanciful flights of a romantic mind. As the editor of *Ka Nupepa Kuokoa* wrote in 1866, "we all know that life today is not like that of the past." Anthropologists have been convinced for over sixty years, however, that this mode of expression, so prevalent in the non-European world, is not due to faulty memory or to a romanticization of the past, but is instead an expression of a world view that differs markedly from that of the modern European-derived tradition (Mauss 1969). The challenge for the anthropologist and for the policy maker concerned with traditional Hawaiian social and religious beliefs is to resist the ethnocentrism that arises from the unquestioned assumption that one's own world view is somehow the only correct one. Only then can one begin to appreciate the social and religious significance of fish and fishing in old Hawai'i.

Aku fishing

Aku fishing (*lawai'a hī aku*) in old Hawai'i was, according to Kamakau, "an aristocratic way of fishing and one that called for proud display" (1976:72). *Aku* fishing can be divided into two distinct pursuits: casting from a stationary double canoe after *aku* and *kawakawa* (little tunny) had been

attracted with chum; and trolling a composite bonito hook behind a paddled canoe. Both methods required a degree of group coordination unique in Hawaiian food-getting activities and often resulted in large catches made in a very short time (see Kamakau 1976:71-74, Beckley 1883, and Kahaulelio 1902 for descriptions of these fishing techniques). Kamakau remarks that "fishing for *aku* was greatly enjoyed by the chiefs and rulers in the old days . . . Kamehameha I was accustomed to fishing for these fishes, and they were famous in ancient times" (1976:75). Kamakau also suggests that fishing with chum was an innovation and that trolling was a practice of "the very old days" (1976:74), but the source of his information is not clear.

Aku fishing took place wherever a school of fish happened to come to the surface to feed. The location of a school was signalled by the actions of Hawaiian terns (*noio*) as they dove into the water to feed on the same small fish pursued by the *aku*. Several accounts indicate that *aku* fishing often took place far from shore and well within the EEZ. Kahaulelio (1902) relates that in his youth he often fished from 5 to 7 miles offshore, and that the usual practice when fishing with chum from a double canoe was to leave for the fishing grounds at 3:00 AM and to paddle until "the sun had shed its light." Experienced paddlers would almost certainly reach the EEZ in the approximately three hours from 3:00 AM until daybreak. Waterhouse (1898), for example, in a description of deep sea fishing from a canoe off the Kona coast of Hawai'i, estimates that one hour of "hard paddling" took his party about 2 miles offshore. D. Kahaulelio (1863) reported in *Ka Nupepa Kuokoa* that a canoe of fishermen was lost while fishing for *aku* some seven miles from shore, about the distance that an experienced crew might be expected to travel during a three hour paddle. Newman (1972:580) argues that problems of bait life and supply, the small size of most canoes, and the tendency for signals of pelagic fish concentrations to congretate near shore would have limited most pelagic fishing to no more than 5-10 miles offshore.

The fishing tackle used in *aku* fishing was extremely sophisticated. The Hawaiian composite bonito hook (*pā hī aku*) is a local form of a general Polynesian type known throughout the region as *pā*. The typical Hawaiian hook consists of a pearl shell shank, a bone point, pig bristle hackle, lashing to secure the point and hackle to the shank, and a long snood that was attached directly to the fishing rod. Special skill and care was taken in the choice of material and manufacture of the pearl shell shank. Hiroa (1964:334) relates that Kalokuokamaile, a native Hawaiian of Kona, Hawai'i distinguished 14 different types of pearl shell shank on the basis of patterns of color in the shell. Time of day, weather, and sea conditions determined which type of lure was likely to prove most effective (Beckley 1883, Kahaulelio 1902). The parts of the pearl shell lure were all named: *ihu*

(head); *muli* (tail); *pukaihu* (hole in head for snood); *pou* (snood); *'uo* (seizing); *hulu* (hackle); *lālā* (point); *kapuahi* (base of point); *humu* (hole in point); *hāmama* (gape of point); *'auwae* (portion of point which overhangs the shank). Hiroa (1964:333-337) provides a detailed description of Hawaiian composite bonito hooks.

Ahi fishing

The historical literature is nearly silent on the tools and techniques used in ahi fishing, though passing mention is often made to fishing for ahi. Severance (1986) has dealt with this problem in the greatest detail in a discussion of fishing at Kahalu'u, Hawai'i Island. He notes that smaller ahi are frequently caught while fishing with chum or trolling for aku, and that it is not known if the style of hook used for ahi differed from the style used to catch aku.

> Larger *ahi* were quite possibly caught with the "*palu ahi*" technique that wraps a baited hook and chum around a stone which is released when it reaches a marked depth (30-70 fathoms) over an *ahi koa*. Contemporary fishermen use larger rotating hooks with this technique, but the ethnohistoric literature is also unclear whether rotating or larger two-piece jabbing hooks were preferred for this technique. Relatively large *ahi* could be captured with weaker hooks than one might expect because of the behavior of the fish. When *ahi* are hooked, they dive deep very fast and the line is allowed to uncoil over the side of the canoe. They stop after reaching a certain depth, and can be drawn back toward the surface with adequate pressure. While this technique may have been practiced [at Kahalu'u], it did not predominate as a popular strategy (Severance 1986:12-13).

Newman opined that pelagic fishing, in general, was of "tertiary importance -- behind the exploitation of both benthic and inshore areas" (1972:580).

Bottom fishing

Kamakau (1976:75) names three types of deep sea fishing grounds: *kūkaula* grounds about 80 fathoms deep; *ka'aka'a* grounds of unspecified depth for kahala (amberjack) and tuna; and *pōhākialoa* grounds 200, 300, or 400 fathoms deep. Kahaulelio (1902), who fished primarily in the shallow waters between Maui, Lana'i, and Kaho'olawe puts the depth of *kūkaula* grounds at 50-70 fathoms and the *pōhākialoa* grounds, which he calls *kialoa* or *kaka* grounds, at 200 fathoms, a figure also mentioned by Fornander (1919:184). Newman (1970) argues on functional grounds that 200 fathoms is the deepest that native Hawaiians could fish using handline techniques. The

discrepancy between Kamakau's account and the writings of Kahaulelio, Fornander, and Newman may have arisen from Kamakau's assumption that the length of the fishing line accurately measured the depth of the fishing ground. In practice, coir cord lines "belly" considerably in a current, so that it may have been necessary, under certain sea conditions, to use a 300 or 400 fathom line to fish a *ko'a* that was 200 fathoms deep. Kahaulelio (1902) mentions slacking the line between seven and ten fathoms to compensate for the current while fishing at a *ko'a* 50 fathoms deep.

Accepting 80 fathoms as a maximum depth for *kūkaula* grounds and 200 fathoms as a maximum depth for *pōhākialoa* grounds, it is likely that both types of fishing ground were found in the EEZ around all of the islands. The area of sea floor less than 200 fathoms deep within the EEZ is least around the islands of Kaua'i, where it is found primarily off the Na Pali coast, and Hawai'i, where it is found off the leeward North Kona and Kohala coasts. Extensive areas less than 200 fathoms deep are found around the islands of Moloka'i, Lāna'i, Kaho'olawe, and Maui. The area of *kūkaula* and *pōhākialoa* fishing grounds at Penguin Bank, off the west end of Moloka'i, extends over ten miles beyond the outer limit of the EEZ. Thus, there are no environmental reasons to doubt that traditional Hawaiian bottom-fishermen plied the waters of the EEZ.

The common technique for fishing the deep water *pōhākialoa* grounds was called *kaka* or *kialoa*. Kahaulelio, who often fished using this technique, describes it as follows:

> In this kind of fishing, no stone weight was needed to anchor the canoe and it drifted to and fro moving with the current. The line was five *ka'au* in length, which was the equivalent of two hundred fathoms and that was about the depth of the fishing grounds . . . Two or three men were enough for this type of fishing and each man had from forty to fifty hooks on his line.
>
> This is the way in which it was done. The thread that fastened the hook to the line was a yard or so in length to tie on both hook and a coconut stem [leaf midrib?] to keep them firmly in place. The hooks were fastened at intervals the length of each stem, lest the hooks be mixed up and entangled. This was done until all 40 or 50 hooks were fastened on. Bait was secured in the evening and the hooks of all three fishermen were baited before time. When all was ready then just before daylight they set out for the fishing grounds. Each man let down his line with a stone weight at the bottom of the line to make it sink. . . .

> Sometimes all the hooks were taken, sometimes they were not. . . . If all the fishermen were lucky, the canoe was filled. In this kind of fishing, the fishermen went home while it was day. . . . This method of fishing has not been done for more than thirty years here at Lahaina. This kind of fishing has also been called *kialoa* fishing and the fish caught were the kahala, ulaula, opaka, hapuu, koae, ulaula niho, opakapaka, hahanui, ukikiki, lehe, uku, ulua, kahala, mahukia, oio and so on (Kahaulelio 1902).

Newman (1972:569 Fig. 1) illustrates the deep-water fishing rig described by Kahaulelio.

Fishing the shallower *kūkaula* grounds was more time consuming. Kahaulelio notes that *kūkaula* fishermen remained on the ocean "all day long and they returned home late at night. Sometimes they remained out all night" (1902). Unlike *kaka* fishing, where the hooks set themselves, the fish would "snatch" at the *kūkaula* hook. "Put your hand under the line and lift it up and away from the edge of the canoe, and your hand will feel the tugging of the fish" (Kahaulelio 1902). A notable feature of this technique was the bits of coconut husk that were tied to the line at five fathom intervals between 40 and 70 fathoms. These were named, from shallowest to deepest, *kānuku*, *alo*, *kua*, *kāmanamana*, *kaiaiki*, *kua-o-kaiaiki*, and *kāmoe*. These markers signalled the fisherman that a fish had taken the hook and also helped estimate the depth of the bottom. This latter bit of information was often crucial in finding the precise location of a *ko'a*.

The Hawaiians had many names for fishhooks. 21 names of fishhook types, other than lures, octopus hooks, and shark hooks are listed in Pukui and Elbert (1971:58), with distinctions for material (turtle shell, whale ivory, shell, bone, human bone), and form and features of the hook (rotating/jabbing, one piece/two/piece, and presence/absence, location, and number of barbs). Individual parts of the hook were also named: *ka'a*, *ka'i* (snood); *kū'au*, *pou* (shank); *kohe* (inside barb); *lo'e*, *pohona* (bend); *lihi* (portion just below point); *lihi lou* (point of barbless hook); *lālā* (bone or shell point of two piece hook); *maka* (point). Hiroa (1964:325) claims that the profusion of Hawaiian names for fishhooks and their parts is because "Hawaiian terms vary for the different islands not only as regards the parts of a hook but as to the different forms of hooks."

Lines (*aho*) were made of coir cord, apparently by specialists (Kamakau 1976:76), and were stored in gourd containers with fitted tops (Hiroa 1964:351). A stone plummet sinker (*pōhākialoa*) (see Hiroa 1964:345-346) rounded out a deep sea fisherman's gear.

The winter months of Ho'oilo (October to March) were favored for deep sea fishing; heavy rains often muddied the bottom inshore, making fishing there difficult (Kamakau 1976:77, Kahaulelio 1902).

Shark fishing

Kamakau relates that shark fishing was "done in the deep sea out of sight of land[1]. These were not fishes to be found in the ko'a fishing grounds -- they moved about and *ka po'e kahiko* caught them far, far out at sea" (Kamakau 1976:75).

The common method of capturing sharks in the deep ocean was with a hook and line. Pukui and Elbert (1971:58) list *makau manō*, *lawa*, and *kīholo* as names for shark hooks. Shark hooks are described in detail by Hiroa (1964:338-342). Kamakau and Beckley describe a specialized method, called *kupalupalu mano* by Kamakau, of fishing for great white sharks (*niuhi*) with chum. The two sources disagree on the nature of the chum. Kamakau claims that the common chum was decomposed pig flesh, but that chiefs used dead men for chum (Kamakau 1976:87). Beckley (1883) describes the chum as the livers and "a little of the flesh" of vast numbers of common sharks that had been baked in an underground oven. Beckley claims that the chumming would take place for a period of days, until the sharks in the vicinity were "comparatively" tame. Fornander describes a practice of patting sharks until they became accustomed to being touched. In either case, when a shark came close to the canoe a fisherman "slipped a noose over its head with his hands . . . When the snare reached the gills, the fisherman eased it downward to the center of the body, then he pressed a foot on the shark's head, bending it forward as he tightened the noose" (Kamakau 1976:87). Sometimes a snare made of crossed sticks was used to slip the noose over the shark. Kamakau claims that the shark was killed at sea, while Beckley suggests that it was towed to shallow water, where it was stranded and then killed. The men of O'ahu were "famous for just seizing sharks" with their hands (Kamakau 1976:87-88).

Precious coral collection

Black corals were used medicinally to treat various respiratory (Kaaiakamanu and Akina 1922:23-24) and childhood diseases (Kamakau 1964). A detailed description of black coral harvest in old Hawai'i appears to be lacking, though Kaaiakamanu and Akina claim that it is found "in deep water where deep sea fish is sought" (1922:23), which suggests that it may have been collected with hook and line.

No mention of the precious pink corals, precious gold corals, or bamboo corals was found in the historical literature.

Crustacea collection

Crustacea were caught by hand, with snares, and perhaps with spears and in traps. None of these methods would have been practiced in the EEZ, and no record of deep-sea crustacea collection was found.

Social importance

There are two linguistic clues to the importance of the FMP species to Hawaiian society. The first, and most general, is the meaning of the Hawaiian word *i'a*. Pukui and Elbert define the term as:

> 1. Fish or any marine animal, as eel, oyster, crab, whale. 2. Meat or any flesh food. 3. Any food eaten as a relish with the staple (*poi*, taro, sweet potato, breadfruit), including meat, fish, vegetable, or even salt (1971:87).

The primary use of the term to refer to sea creatures is undoubtedly a very old usage, as an ancestral form of the term with this meaning can be reconstructed for the Proto-Austronesian language, which was spoken some 5000 to 7000 years ago in Island Southeast Asia (Bellwood 1979:121). The extension of the term to refer more generally to foods eaten with a staple starch suggests the importance of fish in the Hawaiian diet. Other Polynesian languages make a distinction between staples and relishes, but in these languages fish are simply one among many kinds of relish and do not comprise the focal category of the term.

The second linguistic clue may be found in the large number of names that Hawaiians used to refer to several of the FMP species (see Appendix A). Notable in this regard are the growth stage names for opakapaka, white ulua, kahala, aku, and kawakawa, and the varietal names for ula'ula (onaga), uku, and mahimahi. This phenomenon, called "polytypy," is widespread in folk biological classifications (Geoghegan 1976). Several studies have shown that polytypy is most likely in classes of plants or animals that are culturally significant (Berlin et al. 1974, Conklin 1954, Dye 1983). Possible reasons for cultural significance include economic importance and ritual salience. The presence of polytypy in the Hawaiian names for FMP species thus can support evidence for the social and religious importance of those species.

The importance of fishing to Hawaiian society is reinforced by the prohibitions observed by members of the fisherman's family and others while he was at sea. These prohibitions are summarized as follows:

> It was customary with those whose vocation was that of fishing to have certain regulations. Before a

person went out fishing he would admonish those who remained at home not to do any act which would interfere with the fishing trip. He cautioned them in this wise:

1. The wife was forbidden from committing adultery.

2. Adultery by other inmates of the house of the fisherman was also forbidden.

3. Fighting was forbidden in the house of the person going out fishing.

4. Inquiries such as "Where is (the fisherman)" while he was out on the ocean were forbidden.

5. Eating the bait reserved by the fisherman was forbidden.

6. Covetousness during the fisherman's absence at sea was prohibited. If any of these things was violated by those at home while one was out fishing his labor was in vain; by observing the sanctity of the house of those going out fishing success would result (Fornander 1919:118).

Once back ashore the fisherman would divide his fish into those that were taboo to women and those that were free, and would take the taboo fish to the men's house (Kamakau 1976:74). Fish that were taboo to women include the FMP taxa *ulua* (probably including white ulua, black ulua [black trevally], and butaguchi [sea bass]), and some sharks (especially the great white shark) (Valeri 1985:116-117).

Religious importance

David Malo begins his account of Hawaiian fishing practices with the statement that "fishing was associated with religious ceremonies" (Malo 1951:208). In Hawaiian cosmogony, as related by the Kumulipo chant, fish were created through the union of Pouliuli and Powehiwehi, after the creation of corals and mollusks, but before the creation of insects and birds, amphibians, land animals, and humans (Beckwith 1951). Many fish were venerated as family, personal, or professional gods (*'aumakua*), including the FMP taxa sharks and aku. The relationship of humans to *'aumakua* went beyond worship, however. According to Hawaiian beliefs, *'aumakua* could "appear in human form or even manifest themselves in living humans" (Valeri 1985:21). Kamakau writes that

most of the sharks who had become supernatural beings were people who had been changed into forms of their shark ancestors. These ancestral sharks,

mano kumupa'a, were not beings deified by man; they got their shark forms from the god (1964:74).

He describes the process by which a dead person was transfigured into a shark *'aumakua* as follows:

> people would take a loved one who had died--a father, mother, child or some other beloved relative--to the keeper of a shark, a *kahu mano*, or to one who had shark *'aumakua*, to be transfigured into whichever shark *'aumakua* they wanted, and it was done according to their wishes. The gifts and offerings to the *kahu mano* were a sow, a bundle of tapa, and a clump of *'awa*. If the *kahu* was satisfied with the gifts, he would command the persons who owned the body to prepare the ritual offerings for the god, as well as the gift offerings, for the body to become a shark All was made ready on the sacred day of Kane, the most important day of the kapu periods. At dawn of this day, a fire was lighted at the *kuahu* altar of the *ko'a* shrine or heiau of the ancestral shark . . . Then the owners of the body and the *kahu* of the shark god brought the sacrifices and offerings . . . and also the whole body of the dead person, or a bundle of his bones or some other part of the body, wrapped in a distinctive tapa. The shark would take on the character of the wrapping. . . . The persons who owned the body would thus be able to recognize their own after it became a shark.
>
> The fire was lighted at the *ko'a* shrine and the food and the offerings were made ready. . . . Then the persons to whom the body belonged and the *kahu mano* went with the bundled corpse and all the offerings to be given to the shark, while the *kahu mano* murmured prayers. Then the shark . . . rose to the surface of the sea and opened its mouth and the [offerings] were poured into it. . . . Then the body was given to it, being placed close to the "belly fin," the *halo*, of the shark. The *kahu mano* and the owners of the body returned to the *ko'a* and made ready their *mohai* offerings. . . . They offered (the essence) to the god, and when they had finished eating of the *mohai 'ai* offerings they threw the remainder into the sea. This ended they went home.
>
> The *kahu mano*, however, took *'awa* at dawn and at dusk for two or three days, until he saw clearly the body had definitely assumed the form of a shark and had changed into a little shark, with recognizable marks on the cheeks or sides like a tattoo or an earring mark. After two or three days more, when

> the *kahu mano* saw the strengthening of this new shark that had been transfigured, he sent for the relatives who had brought the body to go with him when he took the *'awa*. If he had gone constantly, morning and evening, it strengthened quickly, and when the relatives came they would see with their own eyes that it had really become a shark (Kamakau 1964:76-78).

In this way the *'aumakua* became related to family groups through bonds of kinship; they became ancestors of Hawaiian people (Valeri 1985:20). Chants (*mele*) for shark *'aumakua* were performed throughout the islands on a range of occasions (Tatar 1982:41). Sharks were believed to have engendered chiefly lineages (Beckwith 1940:439, 447), and were often associated with particular chiefs. Kamehameha I was often associated with the great white shark (Valeri 1985:151). The aku was an *'aumakua* of the descendants of Pa'ao, who comprised the chief lineage of priests in old Hawai'i.

Fish, especially game fish, were associated with the major god, Kū (Valeri 1985:15). This association is evident in a fisherman's prayer that was printed in the newspaper *Hae Hawaii* on 15 May 1861, and which mentions several FMP taxa, including ulua, kahala, and ula'ula.

> Arise, O *ulua* fish, arise, O *kahala* fish,
> Arise, O *ulaula* fish, arise O great *kahana* fish,
> Arise and eat the bait of squid meat,
> A tender bait, a delicious one.
> And when you have taken the bait, O *kahala*,
> Eat and swallow it,
> Swallow it down into your stomach.
> O Kū, my god who dwells here in the ocean,
> When the fish have taken our bait
> Hold it fast to our line.
> Harken, O Kū, my god who is here in the ocean,
> Grant us fish until you are satisfied with the supply.
> Should there be any unuttered wish of mine, grant it.
> [The fisherman] calls, O Kū, hold fast our fish.
> Ha! I believe my sow has given birth to her young.

Malo's assertion that fishing was associated with religious ceremonies is supported by the prayer's implication that Kū was involved in the fishing through references to "our line," "our bait," and "our fish."

Fishermen carried out their rites at a special class of temple known as *heiau ko'a* or *heiau kū'ula*, which were dedicated to any one of a number of gods associated with fishing (Kamakau 1976:133), especially Kū'ula, but including Kinilau, Kamohoali'i (the goddess Pele's older brother, an

ancestral shark god, [Pukui and Elbert 1971:386]), and Kanemakua or Kaneko'a, two forms of the major god Kane most likely associated with fishponds (Valeri 1985:376). *Heiau ko'a* were generally built near the sea and could take any number of forms, from simple altars of coral to more elaborate structures with platforms or terraces (Kirch 1985:261; Figs. 220, 221). Stokes, who completed the first survey of Native Hawaiian temple sites in the first decades of this century, opined that *heiau ko'a* "used to exist on nearly every prominent headland in the group, and many are still in existence" (Stokes in press).

The most common rite held at these temples was an offering of fish from the day's catch. Kamakau describes the distribution of fish after fishing for *aku*: "First the head fisherman went ashore with fish in his right and left hands and went into the Ku'ula heiau to pay homage to the gods. He cast down the fish for the male *'aumakua* and for the female *'aumakua*" and, when finished with the offering, returned to distribute the rest of the fish to the fishermen and others (1976:73-74).

Heiau ko'a were also the site of special rites held at the opening of the *'opelu* (mackerel scad) season. Malo summarizes these rites as follows:

> the fishermen would assemble at the *kuula heiau* in the evening, bringing with them their nets of the sort called *aei* and pigs, bananas, coconuts, *poi*, and their sleeping apparel, that they might spend the night and worship the god of fishing.
>
> While engaged in this ceremony, all the people sat in a circle; and the *kahuna*, bringing a dish of water that had in it a coarse sea moss and turmeric, stood in their midst and uttered a prayer for purification . . . With this the ceremony of purification was ended.
>
> All the people slept that night about the sanctuary. It was strictly forbidden for any one to sneak away secretly to his own house to lie with his wife. They had to spend the night at the sanctuary in observance of tabu.
>
> When this service was performed the canoes could put to sea, and the pigs were then laid into the ovens for baking. On the return of the men with their fish, the *kahuna* having offered prayer, the pork, bananas, cocoanuts, and vegetables were laid upon the *lele* [altar]; and the function of the *kahuna* was ended.

> After that the people feasted themselves on the food, and religious services were discontinued by express command, because the prayers had been repeated and the whole business was *noa;* fishing was now free to all (1951:209-210).

A fuller description of these rites is presented by K. Kamakau (1919:30-34).

Rites marking the opening of the *aku* season were stricter than those for the *'ōpelu*, and were carried out in the *luakini* temple where humans were sacrificed (Valeri 1985:185). At the culmination of these rites, Kahoali'i (a title meaning "royal companion") "removes the eye from an *aku* fish and from a human victim and eats them. From this moment, and for the next six months one can freely fish for *aku* . . ." (Valeri 1985:228).

Ahi fishing appears to have been an integral part of a sacred chiefly rite associated with the Makahiki, or New Year's, festival (Sahlins 1989:409). Ritual ahi fishing would have begun around the middle of December and continued until the end of the month, when a five day prohibition on fishing began. Near the middle of the ritual fishing period the king himself would fish for ahi.

The *ulua* fish plays a major role in the sacred rites for the inauguration of the chief's temple, the *luakini heiau*. On the seventh day of the ritual

> the priest who catches *ulua* fish goes out to sea with several fishermen and they try to catch the *ulua* with lines, using squid for bait. If they do not succeed in catching a fish, they come back to shore and go from house to house, trying with some lie to make the inhabitants come out. If someone does come out they kill him. They thrust a hook in his mouth and carry him to the temple (Valeri 1985:309).

The *ulua*, or the unlucky human victim, is later sacrificed at the temple.

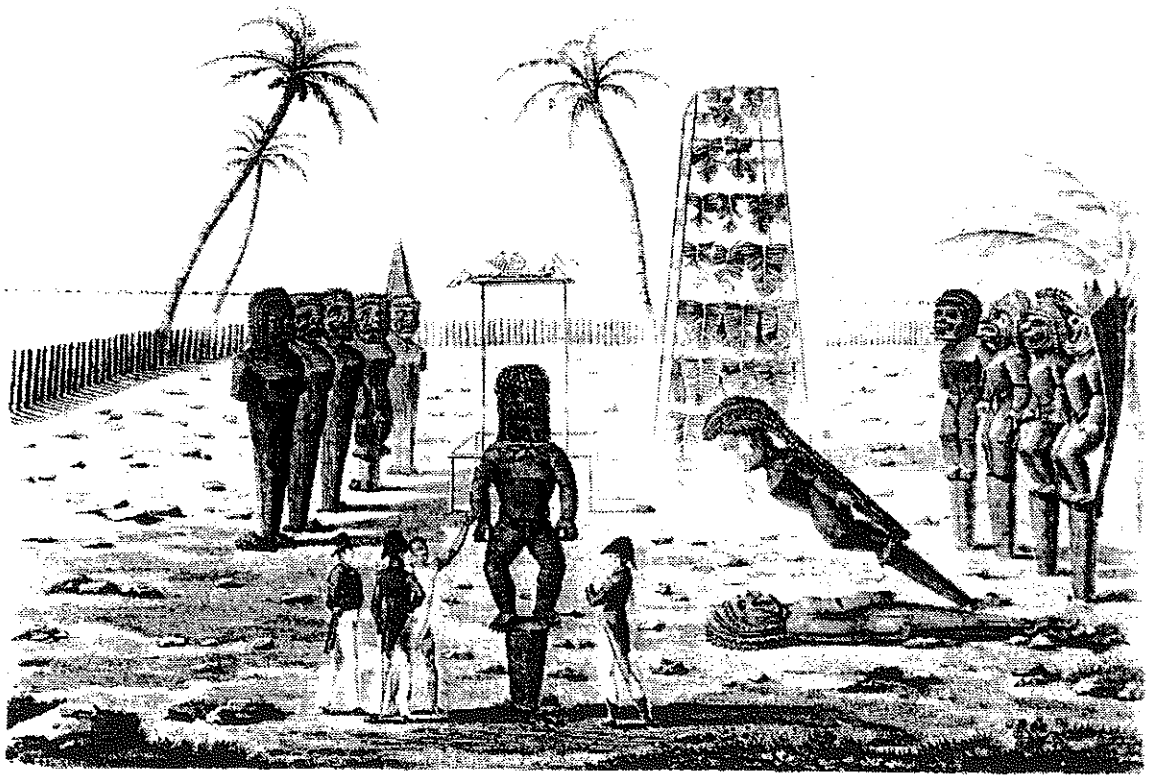

Figure 2. A view of the King's temple at Kaiakeakua, Island of Hawai'i, by J. Arago (Freycinet 1839: plate 87; see Wiswell and Kelly 1978: fig. 15). Bishop Museum Neg. 20610.

The importance of fish in religious ritual can be seen in figure 2, which shows an interior view of a temple near Kailua, Hawai'i. In the mouths of two of the wooden images at the right hand side of the figure are fish of an unidentified species, apparently left as offerings to the gods. It is possible that these are not real fish at all, but wooden fish images. Figure 3 is a photograph of a wooden shark image from Pu'ukohola Heiau on Hawai'i Island, now held in Bishop Museum. Though the lower portion of the tail has been broken, the shape of the upper portion suggests that the model for this shark tail was the homocercal tail of the great white shark, and not the more common heterocercal tails of the smaller, inshore species of shark.

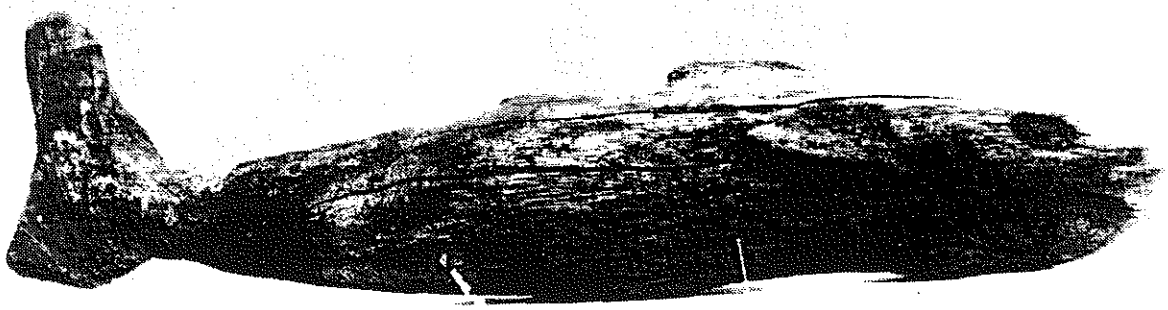

Figure 3. Wooden shark image from Pu'ukoholā Heiau, Hawai'i Island. The tail of this image suggests that it was modeled after the great white shark. Bishop Museum Neg. 1677.

Interviews: fishermen and *kupuna*

Our original intent was to conduct interviews with three types of native Hawaiians who could provide information on present and historical fishing practices carried out in the FMP fisheries enumerated above in EEZ waters surrounding the entire Hawaiian island chain, as well as non-FMP fisheries such as tuna. One type of native Hawaiian informant sought was a fisherman who was actively participating in FMP or non-FMP fisheries, or had done so in the immediate past. We encountered little difficulty in identifying such fishermen. The second type of native Hawaiian informant sought was a person who by age could be considered a *kupuna* and who might or might not still be an active fisherman. We were successful in locating several individuals who fit this description. We were successful in obtaining what could be considered *kama'aina* testimony from these *kupuna*. The third type of native Hawaiian informant sought would be a considerably older

kupuna, for example a person in their 80s who might or might not have been a fisherman. However, through the handing down of oral traditions from his or her family members, the *kupuna* might be able to recount authentic, yet unrecorded information concerning native Hawaiian fishing practices in various fisheries that were carried on in generations gone by in waters more than three miles offshore (i.e., EEZ waters). This was the type of informant from who we sought to obtain previously unrecorded *kama'aina* testimony. We were not successful in locating any such elderly *kupuna*. Apparently such individuals, who undoubtedly existed in the past, have all died or are of such an age that infirmities make it impossible for them to be a source of *kama'aina* testimony.

Because we were not successful in locating any very elderly *kupuna*, we found it unnecessary to use tape recorders to provide an audio record of the fishing histories of those informants who were interviewed. All interviews were carried on in English without any difficulty and there was no need for a person who spoke the Hawaiian language to act as a language liaison between the interviewer and the informant. For interviews conducted on Hawai'i Island, which was the first island chosen in the search for *kupuna*, we did utilize the services of master fisherman Walter H. Paulo, a native of Milolii who speaks fluent Hawaiian. It was largely through Mr. Paulo's efforts that we learned that the very elderly *kupuna* who might have provided unique *kama'aina* testimony were not to be found. For interviews conducted on O'ahu, Moloka'i, and Kaua'i, the services of such a master fisherman were not needed, as other knowledgeable informants confirmed the lack of very elderly *kupuna*.

In interviewing informants we were faced with two different approaches. One approach would be to conduct a large number of what could be considered informal discussions with fishermen at dockside, boat launching ramps, and other places where fishermen congregate, but where private conversations are often difficult to conduct. The other approach, and the one that was adopted, was to settle for a relatively small number of privately conducted interviews of native Hawaiian fishermen in which a comprehensive amount of detail was obtained as to their fishing history in FMP fisheries, and also non-FMP fisheries (e.g., tuna fisheries).

This second approach was chosen because the terms of reference for this project are very clear that the evidence produced must be of such a quality as to withstand legal scrutiny. The WPRFMC's request for proposals is very specific in this regard by stating ". . . the evidence must be of such quality and presented in such a manner so as to withstand any legal question." We decided the best way to produce evidence of present and recent past participation by native Hawaiian fishermen that would withstand legal scrutiny would be to record their fishing histories and then, with their

permission, produce their signed and notarized affidavits which set forth the comprehensive history of that individual's fishing background. A list of persons interviewed is given in appendix C.

We were able to secure signed and notarized affidavits from 17 native Hawaiian fishermen and one fisherwoman, who ranged from 22 to 76 years of age and who, at one time or another, have or are presently participating in the various FMP fisheries, including fisheries for non FMP tuna species. Interestingly, the 76-year old fisherman is still an active fisherman. The original affidavits are on file in the office of the WPRFMC, and photocopies of each complete affidavit are given in appendix D.

The following is a summary of the fishing histories of these fishermen in FMP fisheries and non-FMP fisheries in offshore areas surrounding the entire Hawaiian island chain.

Henry Andrew Leslie, Jr., a fisherman of 50 percent Hawaiian ancestry aged 76, has been a fisherman almost his entire life, and continues until today to be an active commercial fisherman. Mr. Leslie, who is also known as "Piety", is considered by many to be the dean of commercial fishermen on the Kona coast of the Island of Hawai'i. In 1921, when he was 11 years of age, he assisted his father is catching ahi (yellowfin tuna) by the longline and palu-ahi method and catching aku on his father's 36 foot long fishing vessel EHU KAI. This fishing occurred in waters more than 10 miles offshore of Nāpō'opo'o, which was the residence of the Leslie family. In those years he also assisted the family in catching such bottomfish as opakapaka, onaga, and kalekale (snapper) using a "kaka line" or bottom longline, in waters up to 900 feet deep more than three miles off Nāpō'opo'o. He also assisted his family in catching 'ōpelu in near-shore waters to be used as bait for longline fishing in the deeper waters well offshore. He continued these activities until 1929, when at the age of 16 he became a full-time commercial fisherman. For the next several years, he was crew aboard the EHU KAI which used the longline method of fishing for various species of tuna, a'u, mahimahi, kaku or barracuda (*Sphyraena barracuda*), and sharks. In 1930, at the age of 17, he became the captain of the EHU KAI and continued longline fishing for FMP pelagic species and tunas in waters more than three miles offshore of the Kona coast. He continued these fishing activities until 1955 when his father retired and he assumed leadership of the Leslie family's fishing business. Over the next 30 years, he was also the owner and captain of several other longline fishing vessels, the PEARL HARBOR, JOANNA, HULA GIRL, AND MORNING STAR, but by the mid 1960s, he had sold these vessels and acquired the 48-foot long longline fishing vessel HOLOKOHANA I, which he ran as captain in longline fishing until 1979, when the HOLOKOHANA I was sold. He then acquired the 56 foot long longline fishing vessel HANALIKE

which is still in use today by the Leslie family in fishing for pelagic species in EEZ waters off of the Kona coast, and as far south as the McCall and Cross seamounts, which are more than 100 miles offshore. Mr. Leslie also trolled for ahi (yellowfin tuna) from small fishing boats, about 19 feet long, and during the period 1978-1986, trolled for ahi (yellowfin tuna) from such small boats in waters well offshore, and in one instance more than 50 miles offshore. In 1980 Mr. Leslie retired from being the regular captain of the HANALIKE in favor of his son, but still participates in longline fishing expeditions aboard the HANALIKE as crew, and participates with other family members in catching the ʻōpelu needed for longline fishing bait aboard the HANALIKE.

Abel P. Kahele., a fisherman of 75 percent Hawaiian ancestry aged 69, who lives at Milolii, Hawaiʻi Island, has been a fisherman almost his entire life. In 1925, when he was six years of age, he assisted his father in trolling for aku, ahi (yellowfin tuna) and aʻu using pearl shell lures while paddling an outrigger canoe in waters more than five to ten miles offshore of Milolii. He also assisted his father in fishing from a canoe in near shore waters for ʻōpelu and ahi (yellowfin tuna) by the lift net and palu-ahi methods in *koʻa* two miles off Milolii. He continued his canoe fishing activities in waters five to ten miles offshore of Milolii until 1934. In 1934, at the age of 15, he became a full-time commercial fisherman aboard the longline fishing vessel LEILANI, and later became the captain of the longline fishing vessels MIYOJIN MARU and KAIMANA. These longline vessels fished in waters up to 150 miles offshore of the Kona and windward coasts of Hawaiʻi Island for various species of pelagic fish such as aku, ahi (yellowfin tuna and bigeye tuna), ahipalaha, aʻu, aʻu ku, ono, mahimahi, and sharks. He continued fishing aboard these longline vessels until 1940 when he entered the U.S. Army. He completed his Army duty in 1946 and returned to Milolii, where for the next ten years he fished in a canoe in waters five to ten miles offshore of Milolii by the trolling method for aku, ahi (yellowfin tuna), and aʻu. During 1956-1966 he was the captain of the longline fishing vessel KAIMANA which fished in waters more than three miles offshore of the windward coast of Hawaiʻi Island for aku, ahi (yellowfin and bigeye tuna), ahipalaha, aʻu, aʻu ku, mahimahi, ono, and sharks. He returned to Milolii in 1967, and since then has been semi-retired but still engages in fishing from a small boat 16 feet long in nearshore waters for aku, ahi (yellowfin tuna), and mahimahi. He also fishes for ʻōpelu by lift net, and for opakapaka and onaga by bottomfishing in waters up to 120 fathoms deep.

Leo A. Ohai, a fisherman of 60 percent Hawaiian ancestry aged 66, who has been a full-time commercial fisherman since 1941 in a variety of fisheries, including bottomfishing for FMP species in the Hoʻomalu Zone of the NWHI, longline fishing for pelagic species include tunas in waters more than three

miles offshore of all the MHI, and net fishing for akule (big-eyed scad) in nearshore waters of almost all of the MHI and NWHI. In 1941, Mr. Ohai became the captain and owner of the fishing sampan GARDEN ISLAND, which engaged in akule fishing in nearshore waters, but also conducted fishing for FMP bottomfish species in waters more than three miles offshore of Kaua'i and Ka'ula Islands. Bottomfishing species caught included opakapaka, onaga, kalekale, ehu, lehi (silver jawed job fish), uku, white ulua, black ulua, hapu'upu'u, and kahala. During 1944 and 1945 he was a commercial fisherman aboard the F/V FUKUI MARU, which fished for bottomfish and akule within three miles of Ni'ihau Island. In 1945, he became the captain and owner of the F/V KAMOKILA, which engaged in bottomfishing for FMP species along the NWHI at what is known as "middle bank", located about 80 miles northwest of Kaua'i Island. In 1952, he built the aku fishing vessel MOKU OHAI and engaged in fishing for aku in waters more than three miles offshore of all the MHI. He sold the F/V MOKU OHAI in 1955, and for the next twenty years he was the captain and owner of a variety of fishing vessels primarily engaged in akule fishing in waters less than three miles offshore around all the MHI. These vessels included the SHIRLY I, PANAY, MALAHINI, AND KAIMAMALA. In 1975, he purchased and became the captain of the F/V LIBRA, a 58-foot long multi-purpose fishing vessel. Since 1975, the F/V LIBRA has been engaged in the following fisheries:

1. Fishing for akule around all the main Hawaiian Islands in waters less than three miles offshore;

2. Bottomfishing for FMP bottomfish species in waters more than three miles offshore along most of the islands and banks of the NWHI from Pearl and Hermes Reef to the Island of Ni'ihau. These areas include waters in both the Ho'omalu and Mau Zones. Also trapping for bottomfish FMP species in waters more than three miles offshore of Ni'ihau, Moloka'i, and Kaua'i Islands.

3. Longline fishing for species of ahi (both yellowfin and bigeye tuna), and other pelagic FMP species such as a'u, a'u ku, and ono in waters more than three miles offshore of all the MHI.

4. Trapping for red spiny and slipper lobsters on banks more than three miles offshore on almost all of the banks of the NWHI between Pearl and Hermes Reef and Nihoa Island.

5. Trapping for deepwater ono shrimp in Hawaiian waters more than three miles offshore southwest of Kaua'i Island, and in the Kaiwi channel between O'ahu and Moloka'i Islands.

Walter H. Paulo, a fisherman of 50 percent Hawaiian ancestry aged 65, who originally was from the Kealia-Milolii section of the Kona coast of Hawai'i Island, and who has been

a fisherman, commercial fisherman, and master instructional fisherman almost his entire life. He began his fishing career in 1932, when at nine years of age, and continuing until 1937, he helped his ʻohana (extended family) catch ʻōpelu and other shallow water reef fishes from a canoe in nearshore waters off the Milolii-Hoopoloa area. During this period he also assisted his ʻohana in fishing for aku using pearl shell lures by trolling in an outrigger canoe in waters more than three miles off of Milolii for various FMP pelagic species, and such tunas as aku, ahi (yellowfin tuna), and kawakawa. During this period he also fished for aku and ahi (yellowfin tuna) in waters from one to ten miles offshore of the Milolii-Hoopoloa area by trolling and by the palu-ahi method. This fishing was carried out from an outrigger canoe. In 1937 he became a full time commercial fisherman on board the F/V LEILANI, which fished for ahi (yellowfin and bigeye tuna), ahipalaha, aʻu, and sharks in waters more than three miles offshore of the Kona and Hilo coasts of Hawaiʻi Island. In 1939-1940 he was a commercial fisherman aboard the longline fishing vessel MIYOJIN MARU which fished for the above pelagic FMP species, as well as for various species of tuna. This fishing was conducted in waters more than three miles off shore of the Kona coast of Hawaiʻi Island. In 1941, Mr. Paulo became the alternate captain of the F/V MIYOJIN MARU and conducted longline fishing for the above-named species in waters more than three miles offshore of the Kona coast of Hawaiʻi Island. During 1941 and 1942, Mr. Paulo was employed on a construction project at Palmyra Island, a U.S. possession 960 miles south of Honolulu. Mr. Paulo returned to Hawaiʻi in 1943 and during 1943-1945, he was the captain of the longline fishing vessels KASUGA MARU and TENJIN MARU which fished for various FMP pelagic species, as well as various species of tuna in waters more than three miles offshore of all the main Hawaiian Islands. During 1945-1947, Mr. Paulo was in the U.S. Army. Upon returning from Army duty, he became a commercial fisherman during 1947-1948 on board the longline fishing vessels LOKELANI, KOFUKU, and SHINMEI MARU, which fished for various species of tuna, as well as for other FMP pelagic fishes species in waters more than three miles offshore of all the main Hawaiian Islands. During the years 1948-1952, he was a commercial fisherman aboard the fishing vessels MOMI, SAILFISH, ELECTA, and BONITO, which fished for aku using the pole-and-line technique with live bait in waters more than three miles offshore of all the main Hawaiian Islands. Following his successful career as a commercial fishermen, Mr. Paulo joined the Federal National Marine Fisheries Service (formerly Pacific Oceanic Fisheries Investigations). During the period 1952-1974, Mr. Paulo served successfully as fisherman, skilled fisherman, navigator, and master of several large research vessels of the NMFS. His last position was captain and master of the 163-foot long (652 gross tons) research vessel TOWNSEND CROMWELL which carried out fishery, biological, and oceanographic research missions throughout the tropical central, south, and western Pacific. Since 1974, Mr. Paulo has been employed as a master fisherman by the UNDP

program of the Food and Agriculture Organization of the United Nations as a consultant in such Pacific island countries as Western Samoa, Tonga, Niue, Cook Islands, and the Federated States of Micronesia. During 1989, he returned to Milolii where he has been a commercial fisherman using the ika-shibi and trolling methods to catch FMP pelagic fishes species and various species of tuna from a 20 foot long boat in waters more than three miles offshore of the Kona coast, Hawai'i Island. When not otherwise engaged, Mr. Paulo directs "Project Opelu" a fishing program designed to help Hawaiian youth in leeward O'ahu learn Hawaiian fishing culture and methods.

Louis K. Agard, Jr., a fisherman of 25 percent Hawaiian ancestry aged 65, whose fishing career started at the age of 11, when he caught inshore reef fish on Kaua'i Island, and later sold his catch at various plantation camps on Kaua'i. He continued such activities until approximately 1942. During 1942 and 1943, he became a full-time commercial fisherman aboard the F/V KIYO MARU, which fished using the pole-and-line technique with live bait for aku in waters more than three miles offshore of O'ahu Island, and which delivered its catch to the Hawaiian Tuna Packers Cannery in Honolulu. During 1946-1948, Mr. Agard was the owner and captain of the F/V NAIA, an 80-foot long sampan which fished primarily for reef fish and akule in waters less than three miles offshore of O'ahu Island and of French Frigate Shoals, one of the NWHI about 440 miles northwest of O'ahu. During the period 1948 - 1950, he was the captain of the 72-foot long F/V SEAHAWK, which engaged in bottomfishing for FMP bottomfish species in the NWHI more than three miles offshore of Necker Island, French Frigate Shoals, "100 fathom bank" (located 10 miles east of French Frigate Shoals). Bottomfishing conducted by the F/V SEAHAWK near French Frigate Shoals took place in waters now considered to be part of the Ho'omalu Zone of the EEZ around the NWHI. During the period 1947-1956, he was also the owner of several other fishing vessels, the support vessel SILVER, and the F/V OCEANIC, which primarily were engaged in fishing for akule in waters less than three miles offshore. During the period 1956-1958, Mr. Agard was also the owner and captain of the fishing vessel MANA, which was used primarily to catch reef fish in nearshore waters around all the main Hawaiian Islands. However, when transiting between the main Hawaiian Islands, the F/V MANA routinely fished for pelagic FMP species, such as a'u, mahimahi, and ono, and for non-FMP species such as various species of tuna. During the period 1958-1963, Mr. Agard was the owner and captain of the F/V MOMI, which fished for aku in waters more than three miles offshore of all the MHI, and during transits between islands caught other tunas as well as FMP pelagic species, such as mahimahi, a'u, and ono. During the period 1963-1973, Mr. Agard was the owner and captain of the F/V ALIKA which fished for reef fish in waters less than two miles offshore of O'ahu Island. During part of this period (1967-1973), Mr. Agard was

engaged as a fish spotter, flying a Cessna 172 aircraft around all the MHI in search of akule and ulua, and from 1973-1977 he was employed as an aerial fish spotter searching for aku in waters more than three miles offshore of all the MHI. Since 1977, Mr. Agard has been involved in the operation of the F/V AHONUI, which has fished for akule in nearshore waters. Since 1979 he has acted as a sales agent for the Tuna Boat Owners' Cooperative, and has also been an independent fish dealer selling a variety of pelagic species, mainly aku, other tunas, mahimahi, and a'u. Mr. Agard is also involved in the operations of the fishing vessels SEA QUEEN and NEPTUNE, which are primarily engaged in the pole-and-line fishery for aku in waters more than three miles offshore of the islands of O'ahu and Moloka'i. Mr. Agard subsequently told us, although this information is not in his affidavit, that during 1969-1970 he fished for ono shrimp from the F/Vs MOMI II and the ALIKA in waters more than three miles offshore of O'ahu Island outside of Honolulu, Pearl Harbor, and Koko Head.

George Lorian Costa, Jr., a fisherman of 25 percent Hawaiian ancestry aged 57, began his career as a commercial fisherman from 1952-1956 when he was a fisherman aboard the longline fishing vessel FLORENCE which fished for pelagic FMP species such as a'u, mahimahi, ono, and sharks, and also non-FMP pelagic species such as ahi (yellowfin tuna), ahi (bigeye tuna, ahipalaha in waters more than three miles offshore of all the MHI. From 1956-1963, Mr. Costa was a commercial fisherman aboard the aku boat BUCCANEER which caught aku in waters more than three miles offshore of all the main Hawaiian islands. Since 1963, Mr. Costa has been continuously employed as a commercial fisherman aboard the aku fishing vessel KULA KAI. His position is that of chief engineer. While he was a fisherman aboard the F/V KULA KAI, fishing occurred in EEZ waters beyond three miles offshore of the following islands of the State of Hawaii: O'ahu, Hawai'i, Maui, Moloka'i, and Ni'ihau. Fishing aboard the F/V KULA KAI in the general vicinity of Ni'ihau Island occasionally occurred 20 to 25 miles west of Ni'ihau Island. While commercial fishing aboard the longliner FLORENCE, and the aku fishing vessels BUCCANEER and KULA KAI, Mr. Costa assisted these vessels in routinely fishing for pelagic FMP species, as well as non-FMP species such as tunas, while transiting to and from the fishing grounds from their home ports.

Louis M. Paulo, Sr., a fisherman of 100 percent Hawaiian ancestry aged 55, and who now makes his home at Milolii, Hawai'i Island, began his fishing career in 1942, when at eight years of age he assisted his father, uncle, and 'ohana (extended family) in catching 'opelu and moana (goatfish) from a canoe in waters less than three miles offshore of Milolii. At that time, he also assisted his 'ohana in catching aku and ahi (yellowfin tuna) by paddling a canoe and trolling with pearl shell lures for these species in waters more than three miles offshore of Milolii. He continued to fish for pelagic

species in waters more than three miles offshore until 1946. In 1942, when he was 12 years of age, he became a full-time commercial fisherman aboard the 38-foot long fishing vessel SANTA MARIA, which fished for the following pelagic species in waters more than three miles off the Kona coast, Hawai'i Island: aku, ahi (yellowfin and bigeye tuna), ahipalaha, a'u, a'u ku, mahimahi and sharks. He continued fishing aboard the SANTA MARIA until 1948. During the years 1948-1950, Mr. Paulo was a fisherman aboard the longline fishing vessel LEILANI which fished for the pelagic species described above in waters more than three miles offshore of the windward coast of Hawai'i Island (i.e., Hilo, Hamakua, and Cape Kumakahi). During 1950-1952, Mr. Paulo joined the Federal National Marine Fisheries Service (formerly Pacific Oceanic Fisheries Investigations), and was a commercial fisherman aboard the fishery research vessels JOHN R. MANNING and CHARLES H. GILBERT, which carried out fishery, biological, and oceanographic research in the central, north, south, and western Pacific. During the years 1953-1958, Mr. Paulo was a commercial fisherman aboard the longline fishing vessel NAALEHU MARU, which fished for pelagic FMP species, and non-FMP species such as tunas, in waters more than three miles offshore of the windward coast of Hawai'i Island. In 1959, he became the captain of the longline fishing vessel IWALANI which fished for the pelagic FMP and non-FMP species described above in EEZ waters more than three miles offshore of the windward coast of Hawai'i Island. During 1960-1965, Mr. Paulo was employed in the construction industry in Honolulu, and following an industrial accident, was unable to resume his commercial fishing career until 1971, when he returned to Milolii. Since then, Mr. Paulo has concentrated on fishing for a variety of species from a 19-foot long fishing boat in the following fisheries: bottomfishing for opakapaka and onaga in waters up to 900 feet deep off Milolii; trolling for aku, and ahi (yellowfin tuna) in waters more than three miles offshore; and fishing by the ika-shibi and palu-ahi method for aku, ahi (yellowfin tuna) and ahipalaha in waters more than five miles offshore of Milolii, Hawai'i Island.

Clarence Hookala, a fisherman of 50 percent Hawaiian ancestry aged 49, who is a self-employed commercial fisherman and since 1982 has been the captain and owner of the F/V NA ALII KAI, which specializes in bottomfishing for bottomfish FMP species. While bottomfishing aboard the F/V NA ALII KAI, the principal fishing grounds have been in EEZ waters known as Penguin Banks, which is the underwater westward extension of Moloka'i Island, and known as good fishing grounds for opakapaka, onaga, kalekale, ehu, lehi, uku, white ulua, black ulua, butaguchi, hapu'upu'u, and kahala. While the NA ALII KAI transited to and from the Penguin Banks fishing grounds from Honolulu, the vessel also caught by the trolling method pelagic FMP species such as mahimahi, ono, a'u, and sharks, all in waters more than three miles offshore of O'ahu and Moloka'i Islands. From 1980-1982, Mr. Hookala was a

commercial fisherman and captain of the F/V KOKO, and also engaged in bottomfishing for FMP bottomfish species on Penguin Banks, and also in waters more than three miles offshore of Maui, Moloka'i, Ni'ihau, and Ka'ula Islands. From 1976-1980, he was a self-employed commercial fisherman as the owner and captain of the F/V LADY KANIALA, which conducted bottomfishing for FMP bottomfish species in EEZ waters of Penguin Banks, and in waters more than three miles offshore of Maui and Moloka'i Islands. The species caught bottomfishing and trolling by the F/V LADY KANIALA were the same as those described above as having been caught by the F/Vs NA ALII KAI and the KOKO. Mr. Hookala began his commercial fishing career during 1972-1974 when he was employed as a deckhand on the sport charter fishing vessel COREENE C, which fished by the trolling method for pelagic FMP species and non-FMP species such as tunas in waters more than three miles offshore of Moloka'i, and O'ahu Islands. Pelagic species normally caught by the COREENE C included aku, ahi (yellowfin tuna), mahimahi, ono, a'u and sharks.

Charles K. Leslie, a fisherman of approximately 60 percent Hawaiian ancestry aged 48, who makes his home at Napo'opo'o, Hawai'i Island, began his commercial fishing career in 1948, when at seven years of age, he assisted his father, Henry A. Leslie, Jr., on weekends aboard the tuna longliner PEARL HARBOR. Mr. Leslie was a part-time commercial fisherman on the PEARL HARBOR until the mid-1960s when the PEARL HARBOR was sold. During the period 1948-mid-1960s, the PEARL HARBOR primarily fished for the following species of FMP pelagic species and non-FMP pelagic species in waters more than three miles offshore of the Kona Coast, Hawai'i Island: ahi (yellowfin and bigeye tuna), ahipalaha, a'u, a'u ku, kaku (barracuda), mahimahi and sharks. The PEARL HARBOR also caught aku and mahimahi by the trolling method more than three miles offshore while enroute to and from the longline fishing grounds. From the mid-1960s, when his father acquired the longline fishing vessel HOLOKOHANA I, until 1970, Mr. Leslie continued to be a commercial fisherman aboard the HOLOKOHANA I, which fished for the above named pelagic FMP species as well as non-FMP pelagic species such as various species of tunas in waters more than three miles offshore. The longline fishing vessel HOLOKOHANA I was sold by the Leslie family in 1979 and the 56-foot longline fishing vessel HANALIKE was purchased for the Leslie family's fishing business. From late 1979 to the present, Mr. Leslie has been the full-time captain of the HANALIKE, which fishes via the longline method for the above mentioned FMP pelagic species and non-FMP pelagic species such as tunas. The grounds fished by the HANALIKE are all more than three miles offshore of the Kona coast of Hawai'i Island, and as far south as the waters above the McCall and Cross seamounts, which are in U.S. EEZ waters more than 100 miles offshore. Also, during the years 1977-1980, Mr. Leslie Intermittently fished for ahi (yellowfin tuna) via

the trolling method from a small 19-foot long boat in waters more than three miles off Nāpō'opo'o, Hawai'i Island.

Barrington G. M. Blomfield, a fisherman of 25 percent Hawaiian ancestry aged 43, at present is a part-time commercial fisherman, although in the past he has been a full-time commercial fisherman. Mr. Blomfield is employed by the Fire Department of the City and County of Honolulu. Mr. Blomfield's commercial fishing career began during the years 1971-1977 when he fished for reef fish within three miles of O'ahu, Moloka'i, Maui, Lana'i, and Hawai'i Islands, using a variety of fishing methods. During 1977-1981, Mr. Blomfield shifted his fishing activities and used SCUBA diving techniques to harvest precious black corals in EEZ waters more than three miles offshore in the Auau Channel between Moloka'i, Maui, and Lana'i Islands. Employing SCUBA techniques, Mr. Blomfield routinely dived as deep as 260 feet to harvest the black corals. In 1984, Mr. Blomfield was also engaged in trapping from a 24-foot long boat for ono shrimp in waters about 10 to 14 miles offshore of Haleiwa, O'ahu, where the water's depth was about 1,800 feet. He also fished for ono shrimp in waters less than three miles offshore of Waianae, O'ahu. Since 1984, Mr. Blomfield has been a part-time commercial fisherman capturing various species of reef fish in waters less than three miles offshore of O'ahu Island.

Clayton K. Ching, a fisherman of one-eighth Hawaiian ancestry aged 42, who is a resident of Moloka'i Island, has been a part-time commercial fisherman since 1978 when he became the owner and captain of a 19-foot long fishing vessel named HALLELUJAH, which he has used since then in various fishing techniques in EEZ waters more than three miles off Moloka'i and Lana'i Islands. Mr. Ching is also employed by the Hawaiian Telephone Company. During 1978-1981, he fished from the HALLELUJAH in waters more than three miles offshore of Moloka'i and Lana'i Islands by the trolling method to catch the following species of FMP pelagic species: mahimahi, a'u, ono, and sharks, and non-FMP pelagic species such as aku, ahi (yellowfin tuna), and kawakawa. During 1981 he also fished by handline in waters less than three miles offshore of Moloka'i Island for akule, 'ōpelu, uku, and several species of uluas. Since 1984, he has concentrated on fishing in EEZ waters more than three miles offshore on Penguin banks for numerous FMP bottomfish species including opakapaka, onaga, ehu, lehi, uku, hapu'upu'u, kahala, and white ulua. While enroute to and from the bottomfishing grounds on Penguin Banks, Mr. Ching also caught via trolling such pelagic FMP species as mahimahi, ono, a'u, and sharks, and non-FMP pelagic species such as aku, ahi (yellowfin tuna), and kawakawa.

Frank A. Medeiros, Jr., a fisherman of 25 percent Hawaiian ancestry aged 39, is a part-time commercial fisherman and also employed by the Kaua'i County Fire Department. Mr. Medeiros'

fishing career began in 1957, when at seven years of age, he accompanied his grandfather and other members of his 'ohana (extended family) aboard a 24-foot long fishing boat which fished by trolling in waters more than three miles off Kaua'i Island for such pelagic FMP species as mahimahi, ono, a'u, and sharks, and non-FMP pelagic species such as aku and ahi (yellowfin tuna). Mr. Medeiros fished with his 'ohana on this boat from 1957-1965. In 1965, he also fished aboard the 17-foot long boat HAPA HAOLE, and aboard the 28-foot long fishing vessel KALALEO, two boats which fished by bottomfishing for onaga, uku, kahala, and ulua, and by trolling for pelagic FMP species such as mahimahi, ono, and a'u, and for non-FMP pelagic species such as aku in waters less than three miles offshore of Kaua'i Island. Mr. Medeiros' commercial fishing career began in 1974, when he acquired a 19-foot long boat named ELEU, which he fished from 1974-1983 for FMP bottomfish species such as uku, ulua, kahala, and onaga, and for non-FMP pelagic species such as aku, and ahi (yellowfin tuna) in waters less than three miles offshore of Kaua'i Island. In 1983, Mr. Medeiros became the owner of a 30-foot long Radon fishing vessel, also named ELEU, from which he has fished until the present time by trolling for FMP pelagic species such as mahimahi, ono, and a'u, and for non-FMP pelagic species such as aku and ahi (yellowfin tuna) in waters more than three miles offshore of Kaua'i Island. At the present time, Mr. Medeiros is concentrating his fishing activities by fishing for FMP bottomfish species such as onaga, opakapaka, ulua, and kahala - all in waters more than three miles offshore of Kaua'i, Ni'ihau, Lehua, and Ka'ula Islands.

Garry D. Kaaihue, a fisherman of 100 percent Hawaiian ancestry aged 35, began his commercial fishing career during the years 1968-1971 when he fished from a small boat in waters less than three miles offshore of South Point, Hawai'i Island by trolling for FMP pelagic species such as ono and for non-FMP pelagic such as aku, ahi (yellowfin tuna), and kawakawa, and also by the palu-ahi method of fishing for ahi (yellowfin tuna) and ahipalaha. During 1972-1974 he was a commercial fisherman aboard the aku boat ELECTA, which fished for aku in waters more than three miles offshore of O'ahu, Moloka'i, Maui, and Kaua'i Islands. During 1975-1979 he worked in construction on Hawai'i Island. During 1980-1984 he returned to commercial fishing and served aboard the aku boat TRADEWIND, which fished for aku in waters more than three miles offshore of O'ahu, Moloka'i, Maui, and Kaua'i Islands. During 1984-1985 he was a commercial fisherman aboard the longline fishing vessels LIKELIKE, VIKING, AND DRIFTWOOD. These longliners fished for FMP pelagic species such as mahimahi, a'u, a'u ku, and ono in EEZ waters more than three miles offshore of all the MHI, including waters above the Cross Seamount, which is about 100 miles south of Hawai'i Island. During 1986-1988, he was the captain of the fishing vessels AIKANE 49 and ST. PETER, both of which fished for FMP

bottomfish species on the banks of the Ho'omalu Zone of the NWHI as far west as Gardner Pinnacles and also in waters more than three miles offshore of Nihoa Island. FMP bottomfish species taken included opakapaka, onaga, ehu, kalekale, uku, butaguchi, and hapu'upu'u. During 1988 he also was a commercial fisherman aboard the F/V PATTY ANN, which fished for the above FMP bottomfish species in waters more than three miles offshore of Ka'ula Island and also at "middle bank", which is located approximately halfway between Kaua'i and Nihoa Islands. During 1989, Mr. Kaaihue has worked construction, but intends to return to being a full-time commercial fisherman as soon as possible.

Moana Alquiza, a fisherwoman of 50 percent Hawaiian ancestry aged 29, she is the owner and general manager of Kaua'i Fishing Co., an exporter of fresh fish from the Island of Kaua'i. She is also the owner of the F/V LEI MOANA, a 24-foot long Radon type fishing vessel. She began her fishing career in 1985 when she was a commercial fisherwoman aboard the F/V MARYNICK, a 24-foot long vessel that fished in waters more than three miles offshore of Kaua'i and Ni'ihau Islands and caught by the trolling method FMP pelagic species such as mahimahi, ono, and a'u, and also non-FMP pelagic species such as aku, ahi (yellowfin tuna), and kawakawa. The F/V MARYNICK also caught ahi (yellowfin tuna) at night using the ika-shibi method in waters more than three miles offshore. Ms. Alquiza has also worked as a part-time commercial fisherwoman aboard the F/V MARYNICK during 1985-1988. During the years 1987-1989, she worked as a part-time commercial fisherwoman on her boat, the LEI MOANA, which fishes by trolling and the ika-shibi method for the species listed above in waters more than three miles offshore of Kaua'i and Ni'ihau Islands.

Dane A. Johnson, a fisherman of 25 percent Hawaiian ancestry aged 29, is the captain of the F/V KAWAMEE, a fishing vessel that spends most of its time fishing for FMP bottomfish species in the Ho'omalu Zone in EEZ waters around the NWHI. Mr. Johnson became a commercial fisherman aboard the F/V KAWAMEE in 1977 and has been the vessel's captain since 1981. The F/V KAWAMEE has a Federal permit to fish for FMP bottomfish species in the Ho'omalu Zone of the NWHI. The areas fished by the KAWAMEE are those Ho'omalu Zone grounds that extend from Pearl and Hermes Reef to the French Frigate Shoals area and thence to the "middle bank" area, which is about halfway between Kaua'i and Nihoa Islands. Species of FMP bottomfish usually caught by the KAWAMEE in the Ho'omalu Zone include opakapaka, onaga, kalekale, ehu, lehi, white ulua, black ulua, butaguchi, hapu'upu'u, and kahala. Mr. Johnson has also been a commercial fisherman aboard the following vessels at various times. In 1977 he fished aboard the F/V KEAWE for ono shrimp and also bottomfished for FMP bottomfish species in waters more than three miles offshore of O'ahu Island. In 1981 he was a fisherman aboard the F/V FERESA while bottomfishing for FMP bottomfish species and

trolling for various species of FMP pelagic species and non-FMP pelagic species such as tuna in EEZ waters more than three miles offshore of the NWHI. He also was a bottomfisherman for FMP bottomfish species while aboard the F/V HAOLE QUEEN during part of 1982 in waters more than three miles offshore of Ka'ula Island, and during part of 1984 he was a bottomfisherman aboard the F/V E.T. for FMP bottomfish species in waters more than three miles offshore of the NWHI.

George L. Costa, III, a fisherman of 60 percent Hawaiian ancestry aged 28, began his career as a commercial fisherman aboard the F/V HAZEL MARIE, a longline vessel which fished for pelagic FMP species and also non-FMP pelagic species such as tunas during fishing operations in waters more than three offshore of the MHI. In 1979, Mr. Costa became a commercial fisherman aboard the aku fishing vessel KULA KAI, and he has continued to be a commercial fisherman aboard the KULA KAI until the present time. In the process, Mr. Costa has worked his way up from being an ordinary fisherman, skilled fisherman, to the captain of the KULA KAI. Fishing operations aboard the KULA KAI, which uses the pole-and-line technique with live bait to capture aku, usually takes place in waters more than three miles offshore. While he has been a fisherman and captain aboard the KULA KAI, aku fishing operations have taken place in waters more than three miles offshore of O'ahu, Kaua'i, Moloka'i, and Ni'ihau Islands. On some occasions aku fishing operations have taken place 20 to 25 miles west of Ni'ihau Island.

William Kawika Moniz, a fisherman of approximately 40 percent Hawaiian ancestry aged 22, began his commercial fishing career in 1983, as a fisherman aboard the F/V RENEE M., a 17-foot long boat that fished by the trolling method in waters more than three miles offshore of Kaua'i Island. Fishes caught by trolling aboard the RENEE M. included pelagic FMP species such as mahimahi, ono, and a'u, and also pelagic non-FMP species such as aku, ahi (yellowfin tuna), and kawakawa. Since 1983, Mr. Moniz has also been a commercial fisherman aboard the F/V LEI MOANA, a 24-foot long vessel that fished by the ika-shibi method at night for pelagic non-FMP species such as ahi (yellowfin tuna) and ahipalaha in waters more than three miles offshore of Kaua'i Island. During the period 1986-1989 he has also been a commercial fisherman aboard the following vessels:

1. The F/V PI'I OLA, a 45-foot long vessel which bottomfished for FMP bottomfish in waters more than three miles offshore of Nihoa Island for such species as onaga, opakapaka, ehu, kalekale, hapu'upu'u, butaguchi, and ulua, and by trolling in EEZ waters near the weather buoy approximately 25 miles northwest of Nihoa Island for FMP pelagic species such as mahimahi, ono, and a'u, and for pelagic non-FMP species such as aku and ahi (yellowfin tuna).

2. The F/V FORTUNA, a 49-foot long vessel which fished by trolling for the above listed species around the weather buoy northwest of Nihoa Island, and for the same species in waters more than three miles offshore of Kaua'i Island.

3. The F/V LEI ALANA, a 40-foot long vessel that has fished by trolling for the above listed species in waters more than three miles offshore between Kaua'i and Nihoa Islands, and by the palu-ahi method for ahi (yellowfin tuna) and a'u in offshore waters at the same fishing grounds.

Christopher T. M. O'Leary, a fisherman of 25 percent Hawaiian ancestry aged 24, began his Hawai'i commercial fishing career in 1985 and 1986 when he was a fisherman aboard the F/V ALEUTIAN SPRAY when the vessel fished for the two-spined spiny lobster, or Hawaiian red lobster, and also for slipper lobsters, in waters more than three miles offshore of islands in the NWHI. During 1987, he was a commercial fisherman aboard the F/V PETITE ONE, which also fished for the red spiny Hawaiian lobster and slipper lobsters in waters more than three miles offshore of islands in the NWHI. During the years 1988 and 1989 he was a commercial fisherman aboard the F/V ARCHER, which also fished for red spiny Hawaiian lobsters in EEZ waters around islands in the NWHI. During this period the F/V ARCHER also fished by the longline method for pelagic species in waters more than three miles offshore in the EEZ mainly around the MHI. Pelagic species caught by the F/V ARCHER during this period include ahi (yellowfin tuna), ahi (bigeye tuna), ahipalaha, a'u, a'uki (striped marlin), a'u ku, mahimahi, and various species of sharks. Mr. O'Leary also worked as a commercial fisherman in Alaska during part of 1988.

Other interviews with fishermen

Three other interviews with native Hawaiian fishermen were also held, but these interviews, because of the lack of time, did not result in obtaining their affidavits. These three individuals were:

Edward Malia, a fisherman of 100 percent Hawaiian ancestry aged 55, said that between 1969 and 1986 he had been a commercial fisherman aboard the F/Vs LIKELIKE, DAVY BOY, MANTA, PRINCESS, TWO KI, and LEALEA. Mr. Malia said that these vessels used the longline method of fishing to catch pelagic FMP species and other non-FMP pelagic species such as tunas, in waters more than three miles offshore in the EEZ around both the NWHI and MHI. Species caught included ahi (yellowfin tuna), ahi (bigeye tuna), ahipalaha, a'u, a'u ku, mahimahi, ono, and various species of sharks. Mr. Malia is presently semi-retired and is associated with the Oceanic Libra Corporation, Pier 15, Honolulu.

Melvin Zane, a fisherman of 25 percent Hawaiian ancestry aged 50, said that from 1979 through 1984, he was a commercial fisherman aboard the F/Vs MANTA, LIKELIKE, LEALEA, and KOLEA. Mr. Zane said these vessels used the longline method of fishing in EEZ waters around both the NWHI and MHI to catch pelagic FMP species and other pelagic non-FMP species such as tunas. The pelagic species caught by these vessels during the time Mr. Zane was aboard are the same as those pelagic species listed for Mr. Malia, above. Mr. Zane is semi-retired and is associated with the Oceanic Libra Corporation, Pier 15, Honolulu.

Mr. James Kahamakai, a fisherman of 50 percent Hawaiian ancestry aged 55, said that at various periods during the years 1960 through 1989 he worked as a commercial fisherman aboard the F/Vs KAREN F, SPACER K (formerly the MARCIA), KAIMI, and LEALEA. Mr. Kahamakai said these vessels used the longline method of catching pelagic species, some of which were pelagic FMP species and some, such as tunas, were not FMP species. The species of pelagic fish, both FMP and non-FMP, caught by these vessels while Mr. Kahamakai was aboard as a commercial fisherman were the same species as those caught by Mr. Zane, and Mr. Malia, and listed above. Mr. Kahamakai is semi-retired and is associated with the Oceanic Libra Corporation, Pier 15, Honolulu.

Hawaiian fishermen who were not interviewed

The owners of several commercial fishing vessels that specialize in lobster and shrimp fishing provided information on some of their crews who they stated were of Hawaiian ancestry. Mr. Dave Dieter, owner of the F/V HAIDA, which is a lobster fishing vessel, told us there were three commercial fishermen of Hawaiian ancestry who were crew aboard the HAIDA during lobster fishing for the two-spined red Hawaiian lobster and slipper lobsters in EEZ waters around the NWHI. Mr. Dieter identified these Hawaiian fisherman as Mr. Lloyd Rogers, Sr. during the years 1984-1988; Mr. William Hookanu, who worked aboard the HAIDA in 1987; and Mr. Richard Walker, who worked aboard the HAIDA during 1989. The F/V HAIDA was at sea at the time of the discussion with Mr. Dieter.

Mr. Steve Kaiser, owner and captain of the F/V PAHIKI, told us that he has fished for the two-spined red Hawaiian lobster and slipper lobsters in EEZ waters more than three miles offshore off the islands of O'ahu and Moloka'i since 1983. During that period he said that two of his crew were of Hawaiian ancestry: Mr. Lionel Agiuar during the years 1983-1989, and Mr. Henry Rosa during the years 1985-1989. Mr. Kaiser said that the F/V PAHIKI also fished for ono shrimp during 1986 and 1987 in EEZ waters off O'ahu and Moloka'i Islands, and that Mr. Agiuar and Mr. Rosa were part of his crew during these fishing operations.

Mr. John Young, owner and captain of the F/V SAILFISHER, told us that during 1988 and 1989 the SAILFISHER has been fishing for ono shrimp in EEZ waters of the MHI off the island of O'ahu, mainly in the Waianae and Kaena Point areas. During this time, Mr. Young said two of his crew were of Hawaiian ancestry. He identified them as Mr. Nolan Holi and Mr. Gary Moreira, but that at present neither was a crew member aboard the F/V SAILFISHER.

Native Hawaiian fishermen and non-native fishermen

One of the four categories of evidence to be provided is "that there is present participation by native Hawaiian fishermen (<u>together with non-native fishermen</u>)" [emphasis added] in the fishery for FMP bottomfish in the NWHI and in fisheries for the other FMP and non-FMP species in offshore areas surrounding the entire Hawaiian Island chain. We are unable to present any evidence or statistics that gives a breakdown on commercial fishermen by their ethnic background. Commercial fishing license applications at the HDAR, Department of Land and Natural Resources, do not require applicants to show their ethnic or racial background. It is obvious that there are many more native Hawaiian fishermen in various statewide fisheries than the 18 who volunteered to provide their affidavits. It is beyond the scope of this project to state or even speculate how many native Hawaiian commercial fishermen are employed in fisheries in the State of Hawaii. The State of Hawaii Data Book for 1987 (DBED 1987), shows there were 2,880 individuals with commercial fishing licenses in 1986. It would be sheer speculation to estimate how many of these commercial fishermen are native Hawaiians. By the same token, it is beyond the scope of this project to speculate on how many non-native Hawaiian fishermen participate in the various fisheries in the State of Hawaii, other than to say that there appears to be a very large number of non-native Hawaiian fishermen so employed. Pacific Fisheries Consultants has in its files the names of approximately 200 documented commercial fishing vessels (vessels of more than five net tons) that fish out of Hawai'i based ports. A casual inspection of these vessels when they are berthed at Kewalo Basin, or at the Pier 15 to 18 area in downtown Honolulu, will demonstrate that a very large percentage of the crews are of non-native Hawaiian extraction.

Evolution of fishing technology and fishing roles

Two points concerning the evolution of fishing technology and jobs in fishing which might bear on potential native Hawaiian fishing rights were brought out by the data collected during interviews. First, a shift in fishing technology used by the fishermen is demonstrated by the range in ages of the fishermen interviewed. The older fishermen started with traditional technology paddling canoes while trolling for aku and other pelagic species off Kona in the 1920s. The younger

fishermen have fished from power vessels utilizing the full range of modern technology. Second, as fishing technology developed, the jobs performed by the native Hawaiian fishermen aboard their commercial vessels became differentiated. Some became crewmen, others became captains, and a few became owners of commercial vessels.

Such a differentiation of roles has a possible bearing on the allocation of potential preferential treatment accorded native Hawaiin fishermen. Should preference be extended to all occupational fishing roles, or be limited to those Hawaiians who are full or part owners of vessels?

Legal analysis and review

Introduction

This section explores the issue of whether there is a legal basis for granting special consideration to fishermen of Hawaiian ancestry in the allocation of rights to harvest the living resources of the exclusive economic zone (EEZ) of the Hawaiian archipelago. Since this zone begins three miles from shore, this section does not delve into the issue of *konohiki* rights. It is well established that *konohiki* rights are limited to an inshore area bounded by the outer edge of coral reefs and where there are no reefs, by a distance of one geographical mile from the beach at low water (Session Laws of 1846, Art. 5(6); *Haalelea v. Montgomery*, 2 Haw. 62). (For a complete treatment of *konohiki* rights see Stanton and Clay 1980, Meller 1985, Anders 1987, and Murakami and Freitas 1987.)

In addition, this section does not address the issue of fishing rights based on the concept of archipelagic waters. At the present time the federal government does not recognize any Hawaii state claim to the channel waters between the islands beyond three miles from ordinary low water. According to the Submerged Lands Act, 43 U.S.C. §§ 1301-1343, the territorial prerogative of the state of Hawaii stops at three miles. The December 27, 1988, Presidential Proclamation of a 12-mile territorial sea did not expand state jurisdiction. The President expressly stated that

> [n]othing in the Proclamation: (a) extends or otherwise alters existing Federal or State law or any jurisdiction, rights, legal interests, or obligations derived therefrom. (Proclamation No. 5928, 54 Fed. Reg. 777 (January 9, 1989)).

Beyond three miles EEZ resources are exclusively under federal jurisdiction, subject only to those restrictions which may bind the sovereign United States collectively. Federal jurisdiction over these waters, however, is a recent

phenomenon. In 1976 the United States unilaterally exerted a claim over the living resources of its coastal waters out to 200 miles, but it was not until the 1980s that coastal state sovereignty over the living resources of a 200 mile-wide exclusive economic zone became a principle of international law as accepted by a majority of states. Prior to this time the principle of freedom of the high seas predominated over this zone. That freedom included the freedom to fish and no nation was legally entitled to subject the living resources of the high seas beyond the range of a canon shot - three miles - to claims of national sovereignty (Brownlie 1979).

Jurisdiction Over the Living Marine Resources of the United States Exclusive Economic Zone (EEZ) Surrounding the Hawaiian Archipelago

In the Second Act of Kamehameha III (Statute Laws of 1846, Vol. I, Chap. VI, Art. 1, Sec. I) the King delineated the seaward boundaries of the Hawaiian Kingdom as follows:

> The jurisdiction of the Hawaiian Islands shall extend and be exclusive for the distance of one marine league seaward, surrounding each of the islands . . . . The marine jurisdiction of the Hawaiian Islands shall also be exclusive in all the channels passing between the respective islands, and dividing them; which jurisdiction shall extend from island to island.

This claim of jurisdiction over channel waters was subsequently endorsed in a Resolution by the King's advisory Privy Council issued on August 29, 1850, and in a neutrality proclamation issued by the King on May 16, 1854. However, the Hawaiian Civil Code of 1859, Section 1491, expressly repealed the Second Act of 1846 and the Neutrality Proclamation of 1877 referred to "the full extent of our jurisdiction including not less than one marine league from the low water mark on the respective coasts of the islands," and did not claim the channels dividing the islands. Whether or not the channel waters were part of the territory of Hawaii at the time of annexation is debatable. Article 15 of the 1894 Constitution of the new Republic provided that

> The Territory of the Republic of Hawaii shall be that heretofore constituting the Kingdom of the Hawaiian Islands, and the territory ruled over by the Provisional Government of Hawaii, or which may hereafter be added to the Republic.

The Admission Act of March 18, 1959, states that

> The State of Hawaii shall consist of all the islands, together with their appurtenant reefs and territorial waters, included in the Territory of

> Hawaii on the date of enactment of this Act. . . (P.L. 86-3, 73 Stat. 4, Sec. 2).

Hawaii courts have refused to extend state jurisdiction beyond three miles. In *The King v. Parish*, 1 Haw. 58 (1849), the Hawaii Supreme Court limited criminal jurisdiction to a distance of one marine league (approximately three miles); in *Island Airlines v. Civil Aeronautics Board*, 352 F.2d 735 (9th Cir. 1965), the court held that Congress did not establish the channels between the islands as being within state boundaries. The 1978 Hawaii Constitution, however, includes archipelagic waters as being within the boundaries of the state (Art. XI, Sec. 6, and Art. XV, Sec. 1).

In 1976 the Congress of the United States passed the Magnuson Fishery Conservation and Management Act (MFCMA), referred to in this section as FCMA, under which it asserted exclusive jurisdiction over all fish, not including "highly migratory species", found within a 197-mile wide zone surrounding its coasts (P.L. 94-265, 90 Stat. 331, codified in 16 U.S.C. § 1801 *et seq*).

> The inner boundary of the fishery conservation zone is a line coterminous with the seaward boundary of each of the coastal States, and the outer boundary of such zone is a line drawn in such a manner that each point on it is 200 miles from the baseline from which the territorial sea is measure. (P.L. 94-265, Section 101).

The concept of a 200-mile exclusive economic zone (EEZ) was developed during the Third United Nations Conference on the Law of the Sea in the 1970s. The final text of the 1982 Law of the Sea Convention (LOS Convention 1982) gives coastal States "sovereign rights" to explore, exploit, conserve and manage the natural resources of their EEZs (Art. 56). In 1983 President Reagan announced that the United States would not sign the 1982 LOS Convention, but would claim an Exclusive Economic Zone in which it would exercise sovereign rights over all marine resources within 200 nautical miles of its coasts (Proclamation No. 5030, 48 Fed. Reg. 10,605 (March 10, 1983)). In a companion statement the President added that the United States would also honor those provisions of the 1982 Convention which represented customary international law. Accordingly, Section 101 of the FCMA was amended to conform to the proclamation. To date the 1982 LOS Convention is not yet in force. However, by 1985 some 54 coastal states had declared 200 mile EEZs and exclusive state jurisdiction over the resources of this zone is becoming a customary norm.

Whether or not the territorial waters of the Hawaiian archipelago include the channel waters between the islands is an issue beyond the scope of this report. The current view of the federal government is that state jurisdiction over

fisheries in the Hawaiian Archipelago is limited to three miles and that the resources of the EEZ are exclusively under federal jurisdiction. This fact, however, does not diminish any preferential rights that may be held by the Hawaiian people to the fish within their historic fishing grounds.

Historic Rights to the Living Marine Resources of the Kingdom of Hawaii

Prior to 1976 the waters of the Hawaiian Archipelago beyond three miles were part of the high seas and the living resources found there were *res communis omnium*, the common property of mankind (Historic Waters Study 1962, p. 46). Under *res communis* no State has exclusive jurisdiction over high seas resources unless it is acquired by adverse possession unchallenged by other States (Historic Waters Study 1962, p. 46). The Hawaiians, however, may have had rights to the resources of at least some of those waters under two legal theories: (1) effective exercise of sovereign control, and (2) peaceful and continuous usage.

In pre-contact Hawaii all the inhabitants were free to fish on the high seas

> except as specifically directed by their *ali'i*, or as restricted by the king, or as prohibited by general religious tabus, or as prevented by physical force which denied access to ocean resources (Meller 1985).

In 1839 King Kamehameha III enacted a law that officially defined and apportioned the fishing grounds of his Kingdom. The Act to Regulate Taxes specified that

> His majesty the King hereby takes the fishing grounds from those who now possess them, from Hawaii to Kaua'i, and gives one portion of them to the common people, another portion to the landlords, and a portion he reserves to himself. These are the fishing grounds which his Majesty the King takes and gives to the people; the fishing grounds without the coral reef, viz. the *Kilohee* grounds, the *Luhee* ground, the *Malolo* ground, <u>together with the ocean beyond</u> (emphasis added). (Laws of 1842, Chap. 3, Sec. 8).

The fishing grounds within the reefs were given to the landlords (*konohikis)* and their tenants. The King retained a share of certain shoal fish and fish caught from certain grounds beyond the reef for the support of the government (Laws of 1842, Chap. 3, Sec. 8; see also Meller 1985, note 10). Many of the open sea fisheries were designated by named species, a convention still used by twentieth century fisheries managers. For example, bonito (*kawakawa*) in the

waters off Lanai and albacore (*ahi*) in the waters off the Big Island of Hawaii are listed as fishing grounds subject to protection and taxation (Laws of 1842, Chap. 3, Sec. 8(2)). Other fisheries were designated by the commonly-known name of the fishing grounds, another convention still in use today.

According to the court in *Haalelea v. Montgomery*, 2 Haw. 62, 65 (1858), the Act of 1839 marked the time that ancient Hawaiian custom ceased to regulate fishing practices and written regulations took over.

> His Majesty Kamehameha III., as Supreme Lord of the Islands, and having in himself the *allodium* [absolute ownership] of all the lands in the Kingdom, did at that time, with the concurrence of the Chiefs, resume the possession of all the fishing grounds within his dominions, for the purpose of making a new distribution thereof, and of regulating the respective rights of all parties interested therein, according to written laws.

The 1839 Act also delineated the tax burdens on the fisheries and the laws governing "taboo'd" fishing grounds. However, as codified in 1842, the laws expressly exempted the fisheries beyond the reef from any restrictions.

> But no restrictions whatever shall by any means be laid on the sea without the reef even to the deepest ocean. (Laws of 1842, Chap. 3, Sec. 8 (2)).

In 1846, the Act to Organize the Executive Departments further defined the fishing grounds and delineated more precisely the line that separated the *konohiki* fishing grounds from those of the deep sea.

> The fishing grounds from the reefs, and where there happen to be no reefs from the distance of one geographical mile from the beach at low water mark, shall in law be considered the private property of the landlords. (Session Laws of 1846, Art. 5, Chap. 6).

In *Haalelea v. Montgomery* the court interpreted the 1846 amendments, specifying that the boundary line separating the open sea from the *konohiki* fishing grounds ran along the outer edge of the coral reef.

In 1851, in an act passed by the House of Representatives and the House of Nobles and signed by King Kamehameha III, those fishing rights still retained by the King/Government were given to the people since they were "productive of little revenue" and were "a source of trouble and oppression to the people."

> SECTION 1. [A]ll fish belonging to or especially set apart for the Government, shall belong to and be the common property of all the people, equally . . ." subject only to certain conservation restrictions by the Minister of the Interior.
>
> SECTION 2. All fishing grounds appertaining to any government land, or otherwise belonging to the government, excepting only ponds, shall be, and are, hereby, forever granted to the people for the free and equal use of all persons: Provided, however, that, for the protection of such fishing grounds, the minister of the interior may taboo the taking of fish thereon, at certain seasons of the year. (Session Laws of 1851, Act of July 11th, 1851.)

The July 11th act was passed shortly after the Act of May 24th, 1851, which refers in its preamble to a deprivation of the rights of the common people to fish those grounds given to them in the Laws of 1842.

> . . . whereas the people in numerous instances, have been unjustly deprived of their rights to fish on the grounds long since made free to them by law, namely, on the fishing grounds commonly known as the *Kilohee Grounds*, the *Luhee Grounds*, the *Malolo Grounds*, and the fishing of the ocean from the reefs seaward, and whereas the present law affords no sufficient protection to the people in those rights; (Preamble, Session Laws of 1851, Act of May 24th, 1851.)

With the Act of July 11th 1851, the ocean seaward of the *konohiki* fisheries was opened to the common people with respect to all fish (Meller 1985). The provisions of Section 2 were encoded again in the Civil Code of 1859, Sec. 384; the Hawaii Penal Code of 1869, Chap. 84, Sec. 1; and the Penal Laws of 1897, Chap. 84, Sec. 1449.

In addition to the named deep sea fishing grounds beyond the reef there were (and probably still are) deep sea *ko'a huna*, or secret fishing grounds. The locations of these grounds were kept as family secrets. There is mention in the literature of one master fisherman who could name 100 *ko'a* on which he had fished: one reportedly five miles from land, but only 90 to 120 feet deep; another 1,200 feet deep (Kahaulelio 1902, cited by Meller 1985, note 9). "Even when out of sight of shore, reference was made to sightings on the high mountains of Hawaii to establish the location of fishing grounds." (Beckley 1883, cited by Meller 1985, note 9).

The existence of both the named offshore fishing grounds and the secret family offshore fishing grounds opens the door to a claim for preferential fishing rights in the EEZ.

However, the fact that the exact boundaries of these grounds were never established argues against a claim for exclusive, vested fishing rights. The Hawaii supreme court has ruled that vested rights require known boundaries (*Bishop v. Mahiko*, 35 Haw. 608 (1940). In addition, the effective exercise of sovereign control, the legal theory upon which an exclusive claim might be based, ended when sovereignty over the Hawaiian Islands passed to the United States in 1898.

The Transfer of Sovereignty from the Kingdom to the Republic of Hawaii

The Constitution of 1840 specified that the sovereignty of the people of the Hawaiian Islands rested with the king, then Kamehameha III.

> [The King] is the sovereign of all the people and all the chiefs. The kingdom is his.

In 1852 a constitutional monarchy was established under a new Constitution. King Kamehameha III continued to serve as the "Supreme Executive Magistrate" (Article 24). The rules of succession were as follows:

> The crown is hereby permanently confirmed to His Majesty Kamehameha III. during his life, and to his successors. The successor shall be the person whom the King and the House of Nobles shall appoint and publicly proclaim as such, during the King's life; but should there be no such appointment and proclamation, then the successor shall be chosen by the House of Nobles and the House of Representatives in joint ballot. (Article 25).

The Constitution of the Kingdom was amended again in 1864 and again in 1887. Each change saw a diminishment of the powers of the Hawaiian King and an increase in the powers of his western "advisors". However, the sovereignty of the Kingdom of Hawaii continued to rest with the monarchy until its unconstitutional overthrow in 1893. The legality of the method by which the provisional government succeeded the government of the Kingdom of Hawaii continues to be debated to the present day. It is undisputed that the chosen sovereign and representative of the Hawaiian people was removed by coercion and force in direct contradiction of the method of succession provided for in the Kingdom of Hawaii's Constitution. However, constitutional or not, the sovereignty of the Kingdom of Hawaii passed from the monarchy to the oligarchy then in effective control of the provisional government on January 17, 1893. On September 9, 1897, the new Senate of the Republic of Hawaii passed a resolution assigning certain sovereign rights to the United States in the Treaty of Annexation. The formal transfer of sovereignty under the

Joint Resolution of Annexation, 30 Stat. 750, (July 7, 1898) took place August 12, 1898.

Preferential Rights to EEZ Resources Established by Peaceful and Continuous Usage by the Hawaiian People

Although in Article I of the Treaty of Annexation the Republic of Hawaii expressly "cedes absolutely and without reserve to the United States of America all rights of sovereignty of whatsoever kind in and over the Hawaiian Islands", absolute sovereignty over the Hawaiian Islands was not actually accepted by Congress. In the Hawaiian Organic Act of April 30, 1900, 31 Stat. 141, the act of Congress that conferred powers of government upon the Territory of Hawaii, specifies

> That the laws of Hawaii not inconsistent with the Constitution or laws of the United States or the provisions of this Act shall continue in force, subject to repeal or amendment by the legislature of Hawaii or the Congress of the United States. (Sec. 6).

Among those laws neither repudiated, condemned nor cancelled by either the provisional government or the Republic of Hawaii were the usage rights of the common people to the fisheries beyond the three-mile territorial sea (Murakami and Freitas 1987, p. 17). Since these waters were considered high seas by both the United States and nineteenth century customary international law, "the universal law of nations" (*The King v. Parish*, 1 Haw. 58 (1849)), this is understandable. Accordingly, those fisheries regulations encoded in the Organic Act of 1900, the Hawaii State Constitution, and the Hawaii Revised Statutes are applicable only to the territorial waters of the state.

The rights of indigenous people to historic high seas fishing grounds are not legally the same as property rights vested by deed and recorded boundaries. Traditional fishing rights may be established by continuous, habitual usage and as such are recognized by international law and most nation states. Hawaii state law recognizes "Hawaiian usage" as an exception and qualifier to the common law system of the state (H.R.S. § 1-1). United States federal law recognizes the concept of usage in its direction to fishery management councils to take "historical fishing practices" into consideration when drafting management plans (16 U.S.C. § 1853(b)(6)(B)). International law has long recognized preferential claims to the resources of historic waters based on long and continuous usage (Institute of International Law 1894 as cited by the International Law Commission Historic Waters Study 1962, Norwegian Fisheries Case 1951, Iceland Fisheries Cases 1974, LOS Convention 1982).

> It has for long been part of international law that, on a basis of long-continued use and treatment as part of the coastal domain, waters which would not otherwise have that character may be claimed as territorial or as internal waters. . . . (British Yearbook of International Law, Vol. 30 (1953), p 27-28).

In 1951 the International Court of Justice (ICJ) allowed Norway to claim as internal waters all waters within a baseline that connected a line of outer islands. All fishing resources found in those internal waters thus became exclusively Norway's. The ICJ held that a sovereign State could make a successful claim for severeign rights over waters normally considered high seas if it had historically and continuously demonstrated effective sovereignty over the area claimed, including the forcible and unchallenged exclusion of all fishing by non-nationals. Norway's claim to its "historic waters" was based on long, continuous and peaceful usage coupled with an economic dependence on the fishing resources of those waters, the exclusion of non-Norwegian fishermen and the absence of protest by other States (ICJ Fisheries Case 1951).

In 1962 an international study determined that "usage" is required to establish a valid claim to historic waters (International Law Commission Historic Waters Study 1962, p. 44). "Usage" may mean a general pattern of behavior or repetition by the same persons of the same or similar activity (*Id.* at 44, 45) A State must exhibit repeated or continued usage over a period of time to give rise to historic title. (*Id.* at 45) A simple assertion of a "right for its citizens to fish in the area" would not be sufficient to establish a historic claim (*Id.* at 39). However, "usage", though sufficient for a claim of preferential rights to resources under customary international law, is not sufficient for a claim of an exclusive, territorial-type right. In order for a State to claim an exclusive right it must have effectively expressed sovereignty over the area (*Id.* at 43). Such expressions would include acts normally within the power of a sovereign, such as the forcible exclusion of foreign fishermen from the area claimed (*Id.* at 40).

In 1974 the ICJ, citing customary international law, "gave preferential fishing rights to Iceland in the high seas off Iceland's coast because of its special dependence on these fisheries and because the intensity of exploitation of the resources made it imperative to limit the catch" (Van Dyke and Heftel 1981). Iceland was not entitled, however, to unilaterally exclude United Kingdom vessels from fishing in the high seas beyond its 12-mile territorial sea since the United Kingdom had traditionally fished in those waters on a continuous basis since 1920 and the catch from those waters

was important to the British economy (ICJ Fisheries Jurisdiction Case 1974, p. 27-28).

The rights of traditional fishing communities were also considered by the Third United Nations Law of the Sea Conference during its deliberations on the requirements of equitable fishing allocations within the EEZ. The informal working papers of the conference reveal a number of formulas which grappled with the problem of the economic dislocation of traditional fisheries, including:

> PROVISION XVII
> Formula A. Neighboring developing coastal States shall allow each other's nationals the right to fish in a specified area of their respective fishery zones on the basis of long and mutually recognized usage and economic dependence on exploitation of the resources of that area.
> Formula B. Measures adopted by the coastal State shall take account of traditional subsistence fishing carried out in any part of the fisheries zone. (Second Committee, Informal Working Paper No. 4/Rev. 1, August 24, 1974).

The final draft of the 1982 LOS Convention confined itself to an admonition to coastal states to give access to the traditional fisheries of other states which had formerly fished in their EEZs and made no mention of traditional subsistence fishing. Since the resources of these zones were no longer *res communis*, having been placed under coastal state jurisdiction by the Convention, the internal allocation of EEZ resources had become a matter of sovereign prerogative.

> In giving access to other States to its exclusive economic zone under this article, the coastal State shall take into account all relevant factors, including, *inter alia* . . . the need to minimize economic dislocation in States whose nationals have habitually fished in the zone . . . . Art. 62, Sec. 3.

However, as customary international law, sovereign States are still under an obligation to honor preferential fishing rights established by long and continuous usage of the resource. In the United States customary international law is part of federal common law to the extent that it is not in conflict with any domestic law (*The Paquete Habana*, 175 U.S. 677, 20 S.Ct. 290 (1900)).

The Fishery Conservation and Management Act and Native American Fishing Rights

Congress passed the FCMA to protect and promote the United States fishing industry by limiting the access of foreign

fishermen to the waters of the fishery conservation zone (now the EEZ) and by managing the fishery resources within that zone. According to Jarman (1986), the management standards set up by the act support the concept of fisheries as a common property resource and are consistent with public stewardship principles and the public trust doctrine. The legislative history of the act is consistent with this view. The House Report on the FCMA (H.R. No. 445, 1976) specifically acknowledges fisheries as a "common property resource in which there is no ownership of the resource."

In addition to conservation and management measures, the authors of fishery management plans under the FCMA are required to consider a number of other factors, including economic and recreational interests and the fishing rights of native Americans.

> [a]ny fishery management plan which is prepared by any Council . . . shall (2) contain a description of the fishery, including, but not limited to, . . . Indian treaty fishing rights, if any. (16 U.S.C. § 1853(a)(2)).

The FCMA also sets out a number of discretionary provisions which are applicable to allocations of EEZ resources to native Americans (Sec. 303(b)(6)). The drafters of fishery management plan may

> establish a system for limiting access to the fishery in order to achieve optimum yield if, in developing such system the Council and the Secretary take into account--
>
> (A) present participation in the fishery,
>
> (B) historical fishing practices in, and dependence on, the fishery,
>
> (E) the cultural and social framework relevant to the fishery, and
>
> (F) any other relevant considerations;

The legislative history of the FCMA, however, does not elaborate further on the native American rights. There is no indication one way or the other whether Congress meant to limit consideration only to "Indian treaty fishing rights" or whether that was just a generic reference to fishing rights held by native Americans. The House version of the bill did not include the phrase at all; the Senate version did, and when the two bills were combined into the act the clause was included. The report of the Senate Committee on Commerce to accompany Senate Bill 961, October 7, 1975, discusses seven standards as guidelines for fishery management plans.

> Standard five states that management and conservation measures shall, where appropriate, promote efficiency in the utilization of fishery resources. Historically, fish stocks have been treated as common property natural resources. As no one has property or ownership rights in them, fishery resources are open to anyone who desires to invest in the requisite vessels and gear, and fish. (U.S. Congress Senate Rep. No. 416, 1975 p. 29-31).

The report goes on to address how the councils and Secretary of Commerce are to structure the management system, stating that they

> should, among other considerations, recognize: present participation in the fishery; historical fishing practices; dependence on the fishery; . . . and the cultural and social framework in which the fishery is conducted. . . . [T]his provision should not be construed, in any way, to affect or change the treaty rights of Indians such as have been recognized in the decision of the United States Court of Appeals for the 9th circuit, in the case *The United States v. the State of Washington*, or any other applicable decision or treaty. (U.S. Congress Senate Rep. No. 416 at 36).

The seven Senate committee standards were later incorporated into the Code of Federal Regulations. Included in the discussion of the fourth national standard dealing with allocations is the following provision:

> Where relevant, judicial guidance and government policy concerning the rights of treaty Indians and aboriginal Americans must be considered in determining whether an allocation is fair and equitable. (50 CFR § 602.14).

In the CFR appendix to that section it further states:

> The guidelines link "fairness" with FMP objectives and OY [optimum yield] and acknowledge that fishing rights of treaty Indians and aboriginal Americans should be factored into Council judgments. (50 CFR § 602 Subpt. B, App. A).

Caselaw Supporting Preferential Fishing Rights for Native Americans

Most of the adjudication that spells out the fishing rights of native Americans has arisen out of controversy over salmon allocations in the Northwestern United States. These cases focus on "Indian treaties", but the principles and issues involved go beyond the letter of any particular treaty and are

applicable to all allocation controversies involving native Americans fishing rights. In *The United States v. Washington*, 520 F.2d 676 (9th Cir. 1975), the case mentioned in the Senate committee report, the court held that the treaties were "not a grant of rights to the Indians, but a grant of rights from them--a reservation of those not granted." (Citing *United States v. Winans*, 198 U.S. 371, 381, 25 S.Ct. 662, 664 (1905).) Furthermore

> [t]he extent of that grant will be construed as understood by the Indians at that time, taking into consideration their lack of literacy and legal sophistication, and the limited nature of the jargon in which negotiations were conducted. (520 F.2d at 684).

In the Columbia River basin native American Indians had lived a nomadic existence, traveling from river to river to fish. In the Stevens treaties negotiated in the mid-nineteenth century, the tribes gave up their right to a nomadic existence and agreed to live on reservations, but they retained the right to continue to fish in their "usual and accustomed places" and the treaties "cloak[ed] the Indians with an extraterritoriality while fishing at these locations." (520 F.2d at 685). The court recalled that when the treaties were signed the United States regarded the tribes as independent and sovereign nations. The treaties reserved a communal property right that belonged to the tribe.

> "The fact that, in general, Indians held property communally has led the courts to hold that property rights, vis-a-vis the United States, are vested in the tribe not the individual." (520 F.2d at 691).

Indian negotiators, by entering into treaties which reserve to the Indians the right to fish at usual and accustomed grounds in common with white settlers, did not intend to secure for each member of the tribe the right to compete for fish on equal terms with individual settlers (520 F.2d at 688). The court held that the Indians are entitled to an equitable apportionment of their opportunity to fish in order to safeguard their federal tribal treaty rights. (520 F.2d at 687). However, the court pointed out that this right to fish in certain areas did not define a property interest in the fish; "fish in their natural state remain free of attached property interest until reduced to possession." (520 F.2d at 687, citing *Geer v. Connecticut*, 161 U.S. 519, 529, 16 S.Ct. 600 (1896)). Furthermore, the state may interfere with Indians' treaty right to fish when necessary to prevent the destruction of the resource. In response to an argument that the present day fishing areas were not part of the "usual and accustomed areas", the court defined the term "grounds" to include distances from shore at which present Indian fishing occurs, even though fishing may not have been done at such

distances at the time of the treaty (520 F.2d at 691, 692). Finally, nonrecognition of a tribe by the Federal government has no impact on vested treaty rights (520 F.2d at 693).

The principles delineated in *United States v. Washington* were upheld in a number of subsequent cases. In *Puget Sound Gillnetters Assoc. v. U.S. District Court*, 573 F.2d 1123 (9th Cir. 1978), the court noted that the Indian claim to sovereignty predates that of the United States and any of its states and that Indian tribes are still quasi-sovereign entities and not merely voluntary associations of private citizens. (573 F.2d at 1127). In answer to the argument that preferential fishing rights for Indians are a violation of basic equal protection principles, the court answered that the classification was not an impermissible racial classification but was based upon tribal sovereignty (573 F.2d at 1127-1128). In *Washington v. Washington State* 443 U.S. 658, 99 S.Ct. 3055 (1979) the Supreme Court upheld the Ninth circuit's interpretation of equal protection applied to preferential Indian treaty fishing rights, stating that the Court

> has repeatedly held that the peculiar semisovereign and constitutionally recognized status of Indians justifies special treatment on their behalf when rationally related to the Government's 'unique obligation toward the Indians'." (443 U.S. at 673, note 20).

Furthermore,

> A treaty, including one between the United States and an Indian tribe, is essentially a contract between two sovereign nations . . . When the signatory nations have not been at war and neither is the vanquished, it is reasonable to assume that they negotiated as equals at arm's length. (443 U.S. at 676).
>
> [T]he central principle [in allocation] must be that Indian treaty rights to a natural resource that once was thoroughly and exclusively exploited by the Indians secures so much as, but no more than is necessary to provide the Indians with a livelihood--that is to say, a moderate living. (443 U.S. at 687).

In addition,

> Absent explicit statutory language, we have been extremely reluctant to find congressional abrogation of treaty rights. (443 U.S. at 691). . . . [T]he treaties are self-enforcing. (443 U.S. at 694, note 33).

In *Oregon Dept. of Fish v. Klamath Indian Tribe*, 473 U.S. 773, 766-767, 105 S.Ct. 3420, 3227-3228 (1985), the Supreme Court agreed with the Court of Appeals that "Indians may enjoy special hunting and fishing rights that are independent of any ownership of land, ..." However, in this case the Court held that no off-reservation exclusive right to hunt and fish had survived as a special right free of state regulation after the 1901 Cession Agreement.

Rights in the FCMA fishery conservation zone were litigated in *Hoh Indian Tribe v. Baldrige*, 522 F.Supp. 683 (W.D. Wash. 1981). At issue was a management plan that required that sufficient fish be allowed to escape from the ocean fishery to meet both Indian treaty allocation requirements and the State's spawning escapement goals for coho salmon. The district court, citing *United States v. Washington*, held that the rights secured by the treaties to the plaintiff tribes is a reserved right which is linked to the areas where the Indians fished during treaty times and which exists in part to provide a volume of fish which is sufficient for the fair needs of the tribes. (522 F.Supp. at 686).

A 50-50 sharing of the total optimum yield of the resource was upheld and the court ordered the Secretary of Commerce to "attempt to develop practical and flexible rules for management of the fisheries in accordance with the Tribes' treaty rights and other applicable law." (522 F.Supp. at 689).

In *Washington State Charterboat Assoc. v. Baldrige*, 702 F.2d 820 (9th Cir. 1983) the court held that "Congress' intent to abrogate or modify an Indian treaty must be clear. . . . Such an intent may be found in the express provisions of an act or in its surrounding circumstances and legislative history." (702 F.2d at 823). Furthermore, the FCMA was not intended to abrogate treaties entered into in the 1850s concerning fishing rights. (702 F.2d at 823). The FCMA expressly provides that each fishery management plan approved by the Secretary shall be consistent with all provisions of the Act and "any other applicable law." (16 U.S.C. § 1853(a)(1)(C)). "The extension of the zone indicates that Congress was concerned about harvests by foreign fishers, not catches by treaty fishers." (703 F.2d at 824).

In *Muckleshoot Indian Tribe v. Hall*, 698 F.Supp. 1504 (W.D. Wash. 1988), the court held that

> The United States has a fiduciary duty and "moral obligations of the highest responsibility and trust" to protect the Indians' treaty rights. . . . The right to take fish at all usual and accustomed fishing places may not be abrogated without specific and express Congressional authority. (698 F.Supp. at 1510-1511).

The burden was on the tribes, however, to give evidence that the grounds in question were the usual and accustomed ones. (698 F.Supp. at 1511).

In *Sohappy v. Smith*, 302 F.Supp. 899 (D. Ore. 1969), subseq. order aff'd 529 F.2d 570 (9th Cir. 1976), the court determined that the Indians were entitled to a "fair share" of certain Chinook salmon stocks on the Columbia River. While the subsequent implementation plan involved only the States of Oregon and Washington, the Pacific Fisheries Management Council was indirectly involved since it had to adjust the offshore catches of Chinook to allow adequate escapement into the river. By 1977 four Indian tribes were recognized as directly having treaty fishing rights within the area of Council jurisdiction: the Makah, Quinault, Quileute and Hoh Tribes (Isherwood 1977).

Archaeological literature search

The only direct evidence for prehistoric (before 1778) native Hawaiian exploitation of FMP species comes from the remains of these species in archaeological sites. Ideally, archaeological data should document where Hawaiians fished for FMP species and the antiquity and relative importance of the various fisheries. In practice, fish remains are often incompletely described and the archaeological contexts from which they derive are not dated, so that the relatively full record that one might expect from nearly forty years of scientific archaeological excavations in Hawaii is not available. In spite of these limitations, which are discussed in detail below, a review of the published and unpublished archaeological literature yields sufficient information to make a strong case for the wide geographic importance and great antiquity of fisheries for bottomfish, sharks, and tunas. A more limited case can be made for the importance of dolphin fish. The archaeological literature yields no evidence for the exploitation of marlins, sailfish, spearfish, swordfish, crustacean FMP species, or the precious corals.

This section describes the general limitations of the archaeological literature as a source of data on Hawaiian fishing practices by outlining how archaeologists go about the task of identifying fish bones and how these data are presented in archaeological reports. The specific limitations of the archaeological literature with respect to individual FMP taxa are then reviewed. This is followed by a description of the annotated bibliography of fish bones from Hawaiian archaeological sites in Appendix E, and a summary of fish remains reported in published and unpublished archaeological literature. Opportunities for future research, should the data be judged insufficient to prove the importance and antiquity of native Hawaiian fishing practices, conclude the section.

How fish remains are identified and reported by archaeologists

Archaeological reports generally present the results of fish, crustacea, and coral identifications in a section entitled "Faunal analysis" or "Midden analysis,"[2] which outlines the specific identification methods that were employed. The basic process involves sorting the midden material several times, each time identifying the material to a more specific level. Typically, the initial sort divides the midden by material into shell, bone, plant, and other categories as needed. The second sort divides bone into major taxonomic groups, such as fish, bird, and mammal, and separates the remains of crustacea and echinoderms from the molluscs. Subsequent sorts identify remains to the family, genus, or species level depending on such factors as the availability of reference collections, their completeness with respect to the remains being identified, and the interest and skills of the investigator.

The systematic identification of diagnostic fish bones by a trained analyst requires a fish bone reference collection that includes the taxa represented in the archaeological assemblage. In addition, standard reference books (Fowler 1955, Barnett 1978) which illustrate diagnostic fish bones from various species may be used. Ideally, the analyst proceeds by comparing a particular diagnostic fish bone with specimens in the reference collection and with illustrations in the reference books, systematically <u>rejecting</u> families until the most similar family in the collection is located. This process is repeated for each genus within the family, and each species within the genus. The fish bone is then assigned to the species <u>that was not rejected</u> in the identification process. In practice, neither of the two fish bone reference collections in the State, the Bishop Museum reference collection which contains over 150 individual specimens and more than 100 species, nor the University of Hawaii, Hilo reference collection which contains over 30 specimens of an equal number of species, are complete at the generic or specific levels, though both contain specimens from all of the major food fish families exploited in old Hawai'i. This means that the analyst is unable to reject all of the genera within most families, because specimens for some genera are lacking, and thus must be content with a family-level identification of most bones.

Often, however, the trained analyst is struck by the concordance between features of the archaeological specimen and a bone of a particular genus or species in the reference collection and reports a generic or specific level identification. If the reference collection for the family is reasonably complete, so that the analyst may plausibly reject genera or species not present in the reference collection, then a tentative generic or specific identification may be made. Traditionally, this practice is noted by preceding a

tentative identification with the letters "cf" (L. compare) to indicate that the archaeological specimen compares favorably with the reference specimen. In this case, the generic or specific identification is an added detail to an otherwise exhaustive list of family-level identifications.

In practice, most fish bone identifications reported in the archaeological literature are not the result of systematic analyses by trained analysts. Most faunal analyses abort the identification process after fish bones have been separated from the bones of other animals, but before systematic family-level identifications have been made. The reports of these analyses often include a few family-level, generic, or specific identifications. Generally, this occurs when a casual analyst reports the presence of distinctive remains, such as the dentaries, premaxillae, and pharyngeal mills of a parrotfish (Scaridae), shark teeth, the vertebrae of the cartilagenous fishes, or the unique dermal spines of the spiny puffer (Diodontidae). Among the FMP species, only the sharks are likely to be identified at this level of analysis. The other FMP species are not particularly distinctive and are routinely identified only by trained analysts. Thus, investigator bias may lead to a distorted picture of the relative importance of fish taxa by over-reporting certain easily identifiable taxa and under-reporting other taxa. The effects of investigator bias are considered in detail below.

The specific limitations of the archaeological literature with respect to individual FMP taxa

Two characteristics of the identification process used by archaeological faunal analysts, the general practice of reporting family level identifications and the under-reporting of taxa that are not easily identified, impose limitations on the use of archaeological data for determining both the importance and antiquity of fisheries for FMP taxa. Family-level identifications leave open the possibility that identified bones may derive from non-FMP species within the family. These possibilities vary from one family to the next. They are fairly high for Carangidae and Serranidae, relatively slight for Lutjanidae and Scombridae, and non-existent for Coryphaenidae. Investigator bias leads to the under-reporting of most FMP taxa, thereby underestimating their importance in the marine economy of old Hawai'i. The effects of family-level identifications for the families Carangidae, Serranidae, Lutjanidae, Scombridae and Coryphaenidae are discussed in detail below. This is followed by examples of investigator bias in the archaeological literature.

Yamaguchi (Gosline and Brock 1960:165-180) lists 12 genera and 25 species of Carangidae found in Hawaiian waters. Four species from 3 genera are covered by the FMP. Several of the remaining 21 species of Carangidae were important food fishes in old Hawai'i and could be expected in archaeological

middens. Thus, an identification of Carangidae in an archaeological report is likely to refer to a species of Carangidae not covered by the FMP.

Gosline and Brock (1960:155-158) list 8 genera and 10 species of Serranidae found in Hawaiian waters, though they question the membership of one genus and species in this family. Only a single species, *Epinephelus quernus* (hapu'upu'u), is covered by the FMP. Of the remaining eight or nine species, seven appear from time to time in the Honolulu fish markets and thus must be considered likely to have been exploited by native Hawaiian fishermen, though none appear to be as abundant in Hawaiian waters as *E. quernus*. Thus, an identification of Serranidae in an archaeological report most likely refers to *E. quernus*, but the other species can not be ruled out.

Gosline and Brock (1960:182-187) list 6 genera and 9 species of Lutjanidae in Hawaiian waters. Six species from 4 genera are covered by the FMP. The 3 species not covered by the FMP are *Symphysanodon typus*, *Rooseveltia brighami*, and *Aphareus furcatus*. Of these, *S. typus* has never been seen in the market, and the other two occasionally reach the market in small numbers. Given the large numbers of the FMP species of this family that enter the local market, it seems unlikely that bones of *S. typus*, *R. brighami*, or *A. furcatus* would constitute a significant portion of an archaeological fish bone assemblage. Thus, an identification of Lutjanidae in an archaeological report almost certainly refers to one or more of the FMP species.

Gosline and Brock (1960:253-261) list 7 genera and 11 species of Scombridae in Hawaiian waters. Six species from 4 genera are covered by the FMP. The 5 species not covered by the FMP, *Scomber japonicus*, *Auxis thazard*, *Auxis thynnoides*, *Sarda orientalis*, and *Thunnus thynnus*, are all relatively rare in Hawaiian waters in comparison to the FMP species. Thus, an identification of Scombridae in an archaeological report is likely to refer to one of the FMP species.

Gosline and Brock (1960:181-182) list 1 genus and 2 species of Coryphaenidae from Hawaiian waters. Both species are covered by the FMP. Thus, an identification of Coryphaenidae in an archaeological report is certain to refer to an FMP species.

The degree to which investigator bias results in an under-reporting of FMP species may be gauged by comparing the identifications of FMP species made by Goto (1986), a skilled fish bone analyst with access to the Bishop Museum fish bone reference collection, with the identifications reported in the original site reports, and by comparing identifications made by a single analyst at different times. Goto's (1986:416) reanalysis of the fish remains from extensive excavations at

Koaie hamlet at Lapakahi, Hawai'i identified the FMP families Lutjanidae, Carangidae, and Scombridae in addition to the shark teeth that were identified by Newman (1970). Goto (1986:345-349) identified the FMP families Lutjanidae and Carangidae in fish remains from sites in Ka'u, Hawai'i in addition to the "tuna, bonito, ... [and] shark" (Sinoto and Kelly 1975:54) identified in the original site report. The importance of exhaustive faunal analyses for the identification of FMP species is clear. In a general article on Hawaiian fishing strategies, Kirch (1982) identifies Lutjanidae in the fish remains from site MO-A1-3, when the initial report (Kirch and Kelly 1975) made no mention of this FMP family and Carangidae remains from site HA-E1-355 that were identified as "Mullidae/Carangidae (?)" in the site report (Kirch 1979:139). These examples of investigator bias, which most likely resulted from improvements in the fish skeleton reference collection and in the skills of the analyst, point once again to the desirability of the reanalysis of archaeological faunal remains.

A description of the annotated bibliography

Appendix E is an annotated bibliography of fish remains in archaeological reports. Published entries are presented in standard bibliographic form. Unpublished entries, which make up the bulk of the bibliography, specify the name of the organization that produced the report, or if this information is not available, the organization for which the report was prepared. Both Bishop Museum and Paul H. Rosendahl, Inc. generally assign unique manuscript numbers to their reports and these are noted when available. Entries are listed alphabetically by author's last name for the islands of O'ahu, Kaho'olawe, Kaua'i, Hawai'i, Moloka'i, and Maui, and for general references that report fish remains from more than one island. References to archaeological fish remains from the islands of Lana'i and Ni'ihau were not found. Specific geographic locations are often given in the titles of the reports. An asterisk marks each reference that identifies an FMP taxon.

Annotations follow a standard format. The specific location of the information within the reference is followed by either a short quotation or a brief summary statement that mentions any identified FMP taxa. General comments are set off in paragraphs of their own.

Every mention of fish bone has been recorded, even when FMP taxa were not identified. The bibliography may thus serve as a resource for future identification of fish bones held in collections, should further fish bone information be required to prove the importance or antiquity of a fishery for a particular FMP taxon.

Summary of fish remains reported in the archaeological literature

Fifty of the 141 entries in the bibliography identify FMP taxa. Twenty-two of these refer only to shark teeth or to vertebrae of cartilagenous fishes, both of which are easily identified by the casual analyst. Two reports refer only to crustacea, though these remains are not identified more specifically and can not be associated confidently with FMP taxa. The remaining 26 reports each identify one or more FMP fish taxa.

Table 12 summarizes the geographic distribution and numbers of archaeological sites with identified FMP fish taxa. As expected, the class Chondrichthyes, which includes the sharks and the rays (it is not possible to distinguish the vertebrae of sharks from rays), has been identified at the greatest number of sites. The diagnostic elements of this class are easily identified even by the casual analyst. The sharks and rays are followed by the important food fish families Carangidae, Lutjanidae, and Scombridae, each of which have been identified from sites on all of the major islands except Lana'i. The other four families are only rarely identified in archaeological reports. Serranidae have been identified in archaeological deposits from Maui, Moloka'i, and Kaua'i, and Coryphaenidae have only been identified from a single site on O'ahu. No Istiophoridae or Xiphiidae have been identified in the archaeological literature.

Table 12 shows great differences between islands in the number of sites that have yielded FMP taxa. In particular, the large number of sites from Hawai'i Island stands out. On the surface it would appear that there was a greater exploitation of Chondrichthyes, Carangidae, Lutjanidae, and Scombridae on Hawai'i Island than there was on the other major islands. However, this situation probably reflects the emphasis given to the identification of fish remains from Hawai'i Island sites by skilled faunal analysts, in particular Goto (1986), who focussed on sites from the Ka'u District. In fact, investigator bias makes the identified fish bones from archaeological sites a poor sample with which to infer the relative importance of FMP taxa across space or through time. The available data do establish that FMP taxa were widely exploited throughout the Hawaiian Islands in prehistory.

Table 12. Distribution of FMP fish taxa (family and class) in archaeological sites by island

TAXON	ISLAND							
	HA	MA	MO	LA	KH	OA	KA	TOTAL
Chondrichthyes	40	6	7	-	5	7	4	68
Carangidae	27	1	6	-	7	4	2	47
Lutjanidae	24	4	2	-	2	1	3	35
Scombridae	25	1	1	-	1	5	2	35
Serranidae	-	1	1	-	-	-	1	3
Coryphaenidae	-	-	-	-	-	1	-	1
Istiophoridae	-	-	-	-	-	-	-	0
Xiphiidae	-	-	-	-	-	-	-	0

Table 13 shows the presence/absence distribution of FMP fish taxa by prehistoric period. The periods are taken from Hommon (1986). Hommon assigns tentative dates of AD 500-1400 to the Early prehistoric period, AD 1400-1600 to the Middle prehistoric period, and AD 1600-1778 to the Late prehistoric period. The historic period begins with Cook's visit in 1778.

The table shows that the four taxa for which remains are most numerous, the Chondrichthyes, Carangidae, Lutjanidae, and Scombridae, were exploited in every prehistoric period. The Serranidae, which are rarely identified in archaeological remains, were exploited in the early prehistoric period and in historic times. It is likely that the lack of Serranidae remains from the Middle and Late prehistoric periods is due to the small sample of fish remains that have been analyzed by specialists and does not indicate that Serranidae were not exploited during the last four centuries of Hawaiian prehistory. Coryphaenidae have only been recovered from Late prehistoric contexts.

These data suggest that the initial settlers of Hawai'i were already skilled fishermen, adept at the exploitation of pelagic and benthic marine environments. The persistence of several families through the prehistoric sequence shows that the skills associated with the capture of Chondrichthyes, Carangidae, Lutjanidae, and Scombridae were successfully passed down through generations of Hawaiian fishermen.

Table 13. Distribution of FMP fish taxa (family and class) in archaeological deposits by period

TAXON	PREHISTORIC PERIOD* EARLY	MIDDLE	LATE	HISTORIC
Chondrichthyes	X	X	X	X
Carangidae	X	X	X	X
Lutjanidae	X	X	X	
Scombridae	X	X	X	X
Serranidae	X			X
Coryphaenidae			X	
Istiophoridae				
Xiphiidae				

*Period boundaries follow Hommon (1986). Early, AD 500-1400; Middle, AD 1400-1600; Late AD 1600-1778; Historic, post AD 1778.

The importance of FMP taxa to the people of prehistoric Hawai'i is most reliably determined by considering the types of sites from which their bones have been recovered. In particular, the association of FMP taxa with prehistoric religious structures, burials, and sites associated with high status individuals, attests to the social importance of these taxa in prehistory.

The remains of sharks are frequently found in religious structures. Chapman (1970) identified shark teeth in a small religious shrine at Makaha, O'ahu, and Goto (1986:349, 438) identified sharks from a religious structure at Pakini Nui *ahupua'a* in Ka'u, Hawai'i, and from Ku'ilioloa Heiau at Wai'anae, O'ahu. Hammatt and Folk (1979) provide interesting evidence that the association of sharks with religious activities persisted into the early historic period. Their excavations at the Waioli Mission Hall at Halele'a, Kaua'i yielded shark remains from the dirt floor of the 1841 church building. The importance of sharks in family rites is suggested by the recovery of shark remains from a probable *hale mua* (men's eating house and homestead shrine) at Pakini Nui *ahupua'a* in Ka'u, Hawai'i (Goto 1986:349).

Carangidae have been recovered from two religious sites, Site Ha-B22-55 at Pakini Nui, Ka'u, Hawai'i and Ku'ilioloa Heiau at Wai'anae, O'ahu (Goto 1986:349, 438), the latter remains identified to the genus *Caranx*, 3 of whose 8 species are covered by the FMP. Carangidae have also been recovered from prehistoric and early historic period high status households. Goto (1986:349) reports carangid remains from a prehistoric *hale mua* at Pakini Nui, Ka'u, Hawai'i. Rosendahl and Carter (1988:77) recovered bones of Carangidae during excavation of John Young's homestead at Kawaihae, Hawai'i. This homestead, built in 1798 and abandoned shortly after

Young's death in 1835, was home to one of Kamehameha the Great's closest advisors. Young was steward of lands at Kawaihae, as well as in the Puna and Hilo districts of Hawai'i Island, and on the islands of Lana'i, Moloka'i, and O'ahu. He was governor of Hawai'i Island from 1802 to 1812 and was "directly or indirectly involved in most of the major events that shaped the early post-contact history of the Hawaiian Islands" (Rosendahl and Carter 1988:1).

The remains of Lutjanidae have been recovered from religious structures on Hawai'i and Maui islands. Goto (1986:349) found lutjanid remains at a religious structure in Pakini Nui, Ka'u, Hawai'i. Kirch (1971:80) found burned remains at Palauea, Maui and concluded that "this material undoubtedly represents offerings made at this religious structure." The articulated skeleton of an uku was found at the right shoulder of 25-30 year old woman buried between AD 1245 and AD 1425 at the ancient Hawaiian cemetery at Keōpū, Hawai'i (Han et al. 1986:93). The careful placement of this whole fish in the grave indicates that it was offered as a grave good and points to the importance of lutjanids in family rites during the Early prehistoric period.

The remains of Scombridae were recovered at Ku'ilioloa Heiau, Wai'anae, O'ahu (Goto 1986:438). Bones identified to the genus *Katsuwonus* were found at John Young's homestead (Rosendahl and Carter 1988:77). A fragment of the jaw of an ono, found with burial M19-5 at the Keōpū cemetery, is interpreted by the excavators as an offering. This burial dates to the period AD 1340 - AD 1645 and thus provides evidence for the importance of this fish in family rituals during the Middle period of Hawaiian prehistory.

The only remains of Coryphaenidae identified in the archaeological literature were recovered from Ku'ilioloa Heiau (Goto 1986:437).

Opportunities for future research

The usefulness of the data presented above is limited by the uneven treatment given to fish remains in the archaeological literature. Should more precise and complete information be required to establish the cultural importance of FMP species in the prehistoric period, the fish bones reported in the archaeological literature could be reanalyzed. The first step in this reanalysis would be to complete the Bishop Museum reference skeleton collection for the families of interest. This would allow routine species level identifications of FMP species. The second step would target archaeological assemblages of particular interest for reanalysis. Most of these assemblages are stored in the collections of Bishop Museum or other archaeological firms in the State and would be available for reanalysis.

Computer data base search and collections research

Installing the database on a hard disk

The computer database, its associated index file, and a utility program are provided on the accompanying "FISHHOOK DATABASE" diskette. The diskette contains three files: WPRFMC.ARC, PKUNPAK.EXE, and INSTALL.BAT.

WPRFMC.ARC is an archive file that contains the database and its associated files in compacted form. The files in the archive include HOOK.DAT, which contains the fishhook database, SITE.NDX, an index into the fishhook database, and WPRFMC.EXE, a utility program the provides functions to browse the database. The uncompacted size of these three files is 934,645 bytes. A hard disk with at least 1.5 megabytes of free space is required to install the database, index, and utility program.

PKUNPAK.EXE is a shareware utility that extracts and expands archive files. The details of its operation are not important if the accompanying program, INSTALL.BAT, is used to install the database. Experienced computer users who wish to install the database themselves should type PKUNPAK/h at the A> prompt for details on the operation of PKUNPAK.EXE. This command also supplies the user with information about this handy shareware utility.

INSTALL.BAT is a batch file that automates the process of installing the database on a hard disk. First, insert the "FISHHOOK DATABASE" diskette in the A: drive. Create a subdirectory on the C: drive to hold the database. Log on to this subdirectory, then log on to the A: drive. From the A> prompt, type INSTALL. INSTALL.BAT will copy WPRFMC.ARC and PKUNPAK.EXE to the C: drive, call PKUNPAK and instruct it to extract the files in WPRFMC.ARC, erase the copy of PKUNPAK from the C: drive, then check to see if all three files were properly installed. If INSTALL.BAT is unable to find all of the files on the C: drive an error message is displayed. The most likely cause of an installation failure is not enough space on the C: drive. Please note that INSTALL will only install the database on a drive named "C:," and will not recognize a drive with any other name.

Using the utility program to browse the fishhook database

The utility program WPRFMC.EXE provides functions to browse the fishhook database. The program is entirely menu-driven for ease of use. To start the program, type WPRFMC at the DOS prompt. The Main Menu provides two choices: the Find command is used to find a record in the database; the ReIndex command is used to reconstruct an index file that has become corrupted, a condition that will be signalled by the inability of the Find command to function properly. It is unlikely that

the ReIndex command will ever have to be used; it is provided to ensure the continued usefulness of the fishhook database.

The Find command offers two ways to locate a record in the database. The first is by system number; the records are numbered sequentially from 1 to 3775. Locating a record by system number will be convenient for users who wish to get more information on fishhooks that are mentioned below as specifically related to the capture of FMP taxa. The second is by Bishop Museum Artifact number. Bishop Museum artifact numbers consist of a series of codes separated by dashes. First is the island code; this is followed by district and ahupua'a codes; the next code is the site number[3]; the final code is the individual artifact catalog number. The Artifact command will accept either complete or partial artifact numbers; thus, a user who wishes to browse all of the fishhooks recovered in the district of Honolulu would enter "OA-A,"[4] while a user interested in all the fishhooks from a particular site would enter a complete site number.

Table 14. Bishop Museum artifact numbering system island codes.

ISLAND	CODE
Hawai'i	HA
Maui	MA
Moloka'i	MO
Kaho'olawe	KH
Lana'i	LA
O'ahu	OA
Kaua'i	KA

Table 15. Bishop Museum artifact numbering system district codes. The islands of Kaho'olawe and Lana'i have only one district -- the district code for these islands is always "A".

CODE	HA	MA	MO	OA	KA
A	Puna	Hana	East	Honolulu	Lihue
B	Ka'u	Makawao	West	'Ewa	Koloa
C	S. Kona	Wailuku		Wai'anae	Waimea
D	N. Kona	Lahaina		Waialua	Hanalei
E	S. Kohala			Wahiawa	Kawaihau
F	N. Kohala			Ko'olauloa	
G	Hamakua			Ko'olaupoko	
H	Hilo				

Once a record has been located, two commands, Previous and Next, allow the user to step backwards or forwards through the database, respectively. Note that these two commands work

slightly differently for the two find methods. For example, if the Find system number command was used to locate record 78, then the Next command will locate record 79. If the Find Artifact number command was used to locate the first record for site OA-C7-6, then the Next command will locate the second record for that site. This record may not be the record with the next system number.

The structure of the fishhook database

Standards for the description of prehistoric Hawaiian fishhooks were established by Emory, Bonk, and Sinoto (1959) in their study of the first large assemblages of fishhooks recovered by archaeologists, and Sinoto (1962) in his study of the variation in lashing devices of one-piece hooks. This standard was followed, with some minor changes and a few additions, by Goto, whose database reflects this structure.

The first six fields in the database hold provenience information and identify the island, district, ahupua'a (region), archaeological site and its type, and stratigraphic layer from which the specimen derived. The seventh field identifies the general type of the specimen, which determines which of the following 21 fields will contain information and which will contain no information, a condition distinguished by the code "N/A". Hook types recognized by Goto include: one-piece hooks, fashioned from a single piece of raw material; two piece hooks, where a point was lashed to a separate shank; wooden hooks; bonito lures (Hiroa's (1964) composite bonito hook); and octopus hooks. If the specimen is a one-piece hook then the next five fields will contain data on the type of one-piece hook, either jabbing or rotating, details of the shape of the shank, point, and bend, and the head type, or nature of the lashing device. If the specimen is a two-piece hook then the 13th through the 16th fields will contain information on whether the shank or base is small, long and slender, or massive, and details of any modifications made to the base of either a shank or a point to facilitate fitting the two pieces (Inner base) or lashing them (Outer base). The 17th field distinguishes between large and small wooden hooks. The 18th field records the type of crescent point -- the point of a two-piece hook used to catch sharks (Hiroa 1964:338). The following five fields record variations in the shank lure and point of composite bonito hooks. The next five fields are concerned with composite octopus hooks. The 29th field records the presence and position of hook barbs. The 30th field gives some idea of the completeness of the specimen; most archaeological specimens were discarded by their owners because they were no longer functional. The 31st field is concerned with the material out of which the specimen was fashioned. The 32nd field records features of hooks that were discarded in the manufacturing process before they were completed. The 33rd through the 35th fields record measurements in millimeters. The penultimate field gives a

popular name for the site, if one exists. The final field records the specimen's catalog number.

Fishhooks confidently associated with the capture of FMP taxa

Out of the many types of fishhooks known and named by Hawaiians, only three can be confidently associated with the capture of FMP taxa. The first, and for which the association with an FMP species is most confidently made, is the composite bonito hook designed for the capture of aku and kawakawa. Eighteen relatively complete bonito hook points, from archaeological sites on the islands of Hawai'i and O'ahu, have been entered into the fishhook database (table 16). This is not a complete listing of composite bonito hook components from Hawaiian archaeological sites: Emory, Bonk, and Sinoto (1968:26) list 44 points and 22 shanks, primarily from the island of Hawai'i, but including Lana'i, Moloka'i, O'ahu, and Kaua'i; and Goto (1986: 265) analyzes certain features of 33 points from Hawai'i, Kaua'i, and Lana'i.

Table 16. Composite bonito hook points recovered from Hawaiian archaeological sites. Only relatively complete points have been included in the table.

System #	Bishop Museum Artifact Number	Layer	Material
1101	HA-B21-6-F5-31	2	Pearl Shell
1102	HA-B21-6-D10-07	1	Mammal Bone
1104	HA-B21-6-G10-18	0	Pearl Shell
1105	HA-B21-6-C5-40	0	Mammal Bone
1145	HA-B21-10-TP1-0	0	Human Bone
1204	HA-B21-20-D5-10	1	Human Bone
1269	HA-B21-58-TP5-4	0	Mammal Bone
1511	HA-B22-65-DP-40	0	Pearl Shell
1588	HA-B22-70-C-15	2	Mammal Tooth
1647	HA-B22-210-H-09	0	Pearl Shell
1872	HA-E1-103-#52	0	Pearl Shell
1943	HA-F0-20-C85	2	Mammal Bone
2010	HA-F0-271-LC-23	0	Mammal Bone
2013	HA-F0-271-LC-08	0	Pearl Shell
2015	HA-F0-271-LC-12	0	Pearl Shell
2162	OA-C7-6-BR-07	0	Pearl Shell
2163	OA-C7-6-G4-04	0	Pearl Shell
2164	OA-C7-6-G4-07	0	Pearl Shell

The second fishhook type that can be confidently associated with the capture of FMP taxa is the large "rotating" fishhook used to fish the deepwater *kaka* or *kialoa* grounds. A rotating fishhook is one in which the point and/or the shank are incurved so that the tip of the hook points back to the shank.

Its function has been described by several authors, including Scobie (1949), Crain (1966), Reinman (1970) and Johannes (1981). Its primary advantage over the jabbing hook, which has an unconstricted gap between the shank and the point, is that it will set itself with the force of the fish strike. An additional advantage of the rotating hook is that it seldom snags on the bottom. It is thus perfectly adapted to multiple hook handline methods, such as the *kaka* method described by Kahaulelio (1902), whose primary prey was the deepwater jacks, snappers, and groupers listed in the bottomfish FMP. Newman (1970) argued from size and functional characteristics, and with the aid of *kama'aina* testimony, that the rotating hooks used in deepwater *kaka* fishing had shanks longer than 40 mm. Emory, Bonk, and Sinoto (1968:15) show that the shank lengths of a sample of 62 rotating hooks is markedly bimodal, with the smaller hooks centering around 19 mm and the larger hooks forming a peak at around 37 mm, though the graph that they present (fig. 8b) is curiously truncated at its upper end. Goto (1986) has shown that the one-piece hooks from two sites, one on Hawai'i and the other on Kaua'i, both show a second, minor, mode between 40 and 45 mm. These results provide general support for Newman's suggestion that rotating hooks with shanks longer than 40 mm form a distinct type.

A search of the fishhook database revealed ten rotating hooks with shanks longer than 40 mm, all fashioned from mammal bone. Seven of these hooks are from the island of Hawai'i and three are from Kaua'i. These small numbers are apparently due to the comparative rarity of such large hooks and the high proportion of broken hooks recovered by archaeologists. This latter circumstance is likely the most important, since most hooks break at the bend and thus frustrate the possibility of distinguishing jabbing hooks from rotating hooks.

Table 17. Rotating one-piece fishhooks with a shank length greater than 40 mm recovered from Hawaiian archaeological sites.

System #	Bishop Museum Artifact #	Layer	Material	Shank Length(mm)
1302	HA-B22-64-B7-04	1	Human Bone	49.0
1303	HA-B22-64-E5-12	3	Human Bone	51.0
1846	HA-B20-15-E5-06	0	Mammal Bone	43.2
1923	HA-E1-197-#003	0	Human Bone	54.5
2024	HA-F0-941-2132	0	Human Bone	44.4
2046	HA-C19-2--503	0	Mammal Bone	47.9
2057	HA-C19-2--505	0	Mammal Bone	43.2
2302	KA-C10-2-F12-40	6	Mammal Bone	42.5
2334	KA-C10-2-F15-05	1	Mammal Bone	41.0
2388	KA-C10-2-G12-15	4	Mammal Bone	52.6

The third fishhook type associated with the capture of FMP taxa is the crescent point. Crescent points are bone points that were lashed to large wooden hooks to form the largest fishhooks in old Hawai'i. Examples of the woodens hooks are rare in archaeological sites, though Kirch (1979:157 ff.) reports a cache of 16, some in an early stage of manufacture, recovered from the depths of a dry lava tube cave at Kalāhuipua'a on the island of Hawai'i. Seven of these were not designed to take a crescent point, however, and have sharpened tips. They resemble a hook figured by Hiroa (1964:330) and tentatively assigned to the functional class of *ulua* hooks. Of the remaining 9 wooden hooks, 4 have modifications to the point that suggest that they were designed to hold a crescent point.

Crescent points, fashioned from human and pig bone, preserve well in the soil, and have been found on the islands of Hawai'i, Kaho'olawe, Moloka'i, and Kaua'i (Emory, Bonk, and Sinoto (1968:26). The fishhook database contains information on crescent points from the island of Hawai'i, and includes about half of the crescent points reported by Emory, Bonk, and Sinoto and only a sample of the points analyzed by Goto (table 18). Emory, Bonk, and Sinoto (1968:38) have shown that the popularity of crescent points waned over time at Ka Lae on the island of Hawai'i, a conclusion also reached by Goto (1986:257), though the points are found in the most recent deposits of many sites and were in use during the early historic period (Hiroa 1964:338 ff.).

Table 18. Crescent points for wooden hooks recovered from Hawaiian archaeological sites.

System #	Bishop Museum Artifact #	Layer	Material	Point Length (mm)
638	HA-B21-6-D7-21	2	Mammal Bone	31.4
639	HA-B21-6-D7-24	2	Human Bone	44.2
640	HA-B21-6-D7-17	2	Human Bone	50.0
669	HA-B21-6-D9-38	2	Human Bone	41.1
670	HA-B21-6-D9-55	3	Human Bone	49.6
736	HA-B21-6-E5-37	3	Human Bone	23.2
791	HA-B21-6-E8-67	3	Mammal Bone	25.4
879	HA-B21-6-F5-45	3	Human Bone	46.8
932	HA-B21-6-F11-11	3	Mammal Bone	25.6
939	HA-B21-6-G3-20	2	Human Bone	38.0
960	HA-B21-6-G5-56	3	Human Bone	39.8
961	HA-B21-6-G5-42	2	Human Bone	38.0
982	HA-B21-6-G7-34	3	Human Bone	58.2
997	HA-B21-6-G8-02	1	Human Bone	34.8
1011	HA-B21-6-G10-19	2	Human Bone	28.7
1082	HA-B21-6-H9-29	2	Mammal Bone	22.6
1095	HA-B21-6-I5-10	3	Human Bone	28.7
1242	HA-B21-58--78	0	Mammal Bone	40.0

1407	HA-B22-64-B6-38	1	Human Bone	59.8
1408	HA-B22-64-B6-55	4	Human Bone	38.0
1409	HA-B22-64-B7-45	2	Human Bone	50.4
1410	HA-B22-64-D5-07	1	Human Bone	31.6
1501	HA-B22-65-B-10	2	Human Bone	30.2
1502	HA-B22-65-B-09	2	Human Bone	39.6
1568	HA-B22-70-A-17	3	Human Bone	40.4
1643	HA-B22-210-H-03	2	Human Bone	30.6
1652	HA-B22-210-H-12	0	Human Bone	43.2
1858	HA-B20-15-D3-07	0	Human Bone	61.0
2553	HA-B20-1-C10-6	2	Mammal Bone	22.0
2557	HA-B20-1-C11-15	1	Mammal Bone	28.0
2558	HA-B20-1-C11-19	1	Mammal Bone	29.0
2561	HA-B20-1-C13-2	5	Mammal Bone	27.0
2563	HA-B20-1-C15-2	2	Mammal Bone	21.0
2565	HA-B20-1-D4-4	2	Mammal Bone	32.5
2573	HA-B20-1-D7-108	2	Mammal Bone	25.0
2578	HA-B20-1-D8-126	7	Mammal Bone	47.3
2580	HA-B20-1-D10-59	1	Mammal Bone	43.5
2583	HA-B20-1-D11-8A	1	Mammal Bone	42.4
2589	HA-B20-1-D11-39	1	Mammal Bone	36.0
2597	HA-B20-1-E1-2	1	Mammal Bone	32.0
2602	HA-B20-1-E2-5	2	Mammal Bone	23.5
2603	HA-B20-1-E2-12	7	Mammal Bone	33.7
2606	HA-B20-1-E4-26	8	Mammal Bone	25.0
2609	HA-B20-1-E5-50	7	Mammal Bone	33.5
2611	HA-B20-1-E6-9	2	Mammal Bone	30.2
2614	HA-B20-1-E7-9	2	Mammal Bone	19.5
2615	HA-B20-1-E7-10	2	Mammal Bone	41.3
2617	HA-B20-1-E7-17	7	Mammal Bone	30.0
2625	HA-B20-1-E10-9	2	Mammal Bone	29.6
2636	HA-B20-1-E14-6	2	Mammal Bone	36.3
2648	HA-B20-1-F2-5	2	Mammal Bone	33.0
2654	HA-B20-1-F6-20	7	Mammal Bone	44.0
2659	HA-B20-1-F8-20	7	Mammal Bone	31.0
2675	HA-B20-1-F12-13	7	Mammal Bone	23.5
2682	HA-B20-1-G1-1	1	Mammal Bone	34.1
2685	HA-B20-1-G1-16	7	Mammal Bone	35.5
2687	HA-B20-1-G1-18	7	Mammal Bone	35.0
2689	HA-B20-1-G1-25	2	Mammal Bone	48.5
2691	HA-B20-1-G2-7	1	Mammal Bone	29.6
2695	HA-B20-1-G3-3	1	Mammal Bone	34.4
2696	HA-B20-1-G3-8	7	Mammal Bone	21.5
2707	HA-B20-1-G6-15	1	Mammal Bone	23.5
2715	HA-B20-1-G7-6	1	Mammal Bone	28.3
2734	HA-B20-1-G9-12	1	Mammal Bone	32.6
2750	HA-B20-1-G11-2	2	Mammal Bone	30.5
2751	HA-B20-1-G11-8	8	Mammal Bone	25.2
2752	HA-B20-1-G11-9	8	Mammal Bone	33.2
2757	HA-B20-1-G8-2	3	Mammal Bone	45.0
2762	HA-B20-1-G13-2	3	Mammal Bone	24.4
2763	HA-B20-1-G13-6	2	Mammal Bone	23.0
2764	HA-B20-1-G13-7	2	Mammal Bone	26.0
2766	HA-B20-1-G13-12	7	Mammal Bone	35.0

2768	HA-B20-1-H3-1	3	Mammal Bone	34.3
2769	HA-B20-1-H3-2	1	Mammal Bone	29.2
2776	HA-B20-1-H4-16	2	Mammal Bone	49.9
2778	HA-B20-1-H4-18	2	Mammal Bone	31.6
2787	HA-B20-1-H7-24	10	Mammal Bone	29.0
2791	HA-B20-1-H9-1	3	Mammal Bone	20.3
2793	HA-B20-1-H9-12	1	Mammal Bone	29.2
2796	HA-B20-1-H10-27	8	Mammal Bone	29.2
2798	HA-B20-1-H10-34	7	Mammal Bone	37.9
2801	HA-B20-1-H11-2	1	Mammal Bone	39.6
2802	HA-B20-1-H11-7	2	Mammal Bone	22.0
2804	HA-B20-1-H11-13	7	Mammal Bone	26.0
2805	HA-B20-1-H11-15	7	Mammal Bone	27.5
2808	HA-B20-1-H11-26	8	Mammal Bone	27.2
2810	HA-B20-1-H12-6	1	Mammal Bone	22.7
2812	HA-B20-1-H13-5	1	Mammal Bone	23.9
2814	HA-B20-1-H13-11	2	Mammal Bone	24.3
2816	HA-B20-1-H14-2	1	Mammal Bone	29.9
2818	HA-B20-1-H14-6	1	Mammal Bone	25.7
2820	HA-B20-1-H14-11	2	Mammal Bone	39.4
2826	HA-B20-1-I2-3	2	Mammal Bone	45.6
2827	HA-B20-1-I3-9	2	Mammal Bone	27.7
2830	HA-B20-1-I4-13	2	Mammal Bone	28.0
2831	HA-B20-1-I4-18	7	Mammal Bone	35.3
2832	HA-B20-1-I4-19	7	Mammal Bone	23.1
2849	HA-B20-1-I11-14	15	Mammal Bone	18.4
2863	HA-B20-1-I13-2	1	Mammal Bone	42.3
2865	HA-B20-1-I'2-3	1	Mammal Bone	36.7
2866	HA-B20-1-I'4-3	1	Mammal Bone	24.0
2873	HA-B20-1-I'16-1	0	Mammal Bone	57.0
2875	HA-B20-1-I'17-2	0	Mammal Bone	32.7
2882	HA-B20-1-J5-17	2	Mammal Bone	18.5
2883	HA-B20-1-J10-1	1	Mammal Bone	26.0
2886	HA-B20-1-J11-22	9	Mammal Bone	21.1
2891	HA-B20-1-J14-10	13	Mammal Bone	36.6
2895	HA-B20-1-J16-2	1	Mammal Bone	21.0
2902	HA-B20-1-J20-1	1	Mammal Bone	26.6
2903	HA-B20-1-J20-12	2	Mammal Bone	40.5
2906	HA-B20-1-K5-5	2	Mammal Bone	48.8
2907	HA-B20-1-K6-2	4	Mammal Bone	26.1
2911	HA-B20-1-K10-8	1	Mammal Bone	44.6
2916	HA-B20-1-K11-13	1	Mammal Bone	28.0
2920	HA-B20-1-K11-53	14	Mammal Bone	34.4
2927	HA-B20-1-K12-26	7	Mammal Bone	17.2
2936	HA-B20-1-K14-19	7	Mammal Bone	23.2
2937	HA-B20-1-G7-31	8	Mammal Bone	29.4
2938	HA-B20-1-L3-4	17	Mammal Bone	33.2
2947	HA-B20-1-L14-17	2	Mammal Bone	21.7
2952	HA-B20-1-M7-4	3	Mammal Bone	41.1
2955	HA-B20-1-M11-1	1	Mammal Bone	32.1
2962	HA-B20-1-N9-11	1	Mammal Bone	37.5
2968	HA-B20-1-O9-2	1	Mammal Bone	30.6
2970	HA-B20-1-O11-4	2	Mammal Bone	26.0
2972	HA-B20-1-P6-2	1	Mammal Bone	36.0

2975	HA-B20-1-Q13-2	0	Mammal	Bone	27.0
2979	HA-B20-1-S8-10	18	Mammal	Bone	32.0
2981	HA-B20-1-EA-9	5	Mammal	Bone	26.5

CONCLUSIONS

Historical fishing practices

Bottomfishing

We have been unable to verify any bottomfishing for FMP bottomfish species by native Hawaiians in the Ho'omalu Zone of the NWHI, that is, west of 165°00'W. prior to the 1920s. This is likely due to the poor state of our knowledge about the history of this portion of the Hawaiian chain. Necker Island, for instance, is home to an impressive series of ancient Hawaiian religious temples, yet in 1928 Kenneth Emory was able to write that "the historic Hawaiians were apparently unaware of the existence of Necker Island" (Emory 1928:3). Islands in the Ho'omalu zone are virtually unknown archaeologically. The negative results of survey "on the islands northwest of Necker" reported by Emory (1928:3), were based on the observations of untrained observers, who could not be expected to find the stratigraphic traces of prehistoric occupation on sand islets. A review of the field notes from the expedition reveals that the ethnologist, Bruce Cartwright, spent most of his time on board the research vessel working up notes of his survey and excavations on Nihoa and Necker Islands. Apple, who made brief surveys of the NWHI for the U.S. Fish and Wildlife Service, found no definite traces of prehistoric occupation on the islands of the Ho'omalu Zone, but recommended that further survey work in these islands be carried out "to determine if any archaeological resource base exists" (Apple 1973:61). The post-project plan proposed by Pacific Fisheries Consultants, or some similar project, would likely yield evidence for prehistoric fishing practices in the NWHI.

For all practical purposes, our knowledge of bottomfishing by native Hawaiian fishermen in the NWHI commences in the 1920s and 1930s, when an unknown number of native Hawaiians conducted deepsea bottomfishing in EEZ waters of the Ho'omalu Zone. [The reader is referred to Phase 1 of this study for details on the bottomfishing for FMP species in the Ho'omalu Zone of the NWHI.]

Open ocean fish

With regard to open ocean fish, including tunas, we conclude that the native Hawaiian fishermen have fished in the

late 1800s and early 1900s for such open ocean fish as aku, ahi (yellowfin tuna and bigeye tuna), a'u, a'uki, a'u lepe (sailfish), mahimahi, ono, and a variety of species of sharks in waters more than three miles offshore .

Catching these species may have been mostly by the use of the trolling method, but the use of what today is termed the palu-ahi method of fishing (as described by our informants in their affidavits) is likely to have occurred in waters more than three miles offshore at least during the early 1900s. Use of the palu-ahi method of fishing is also likely to have occasionally resulted in the catching of ahipalaha. In recent years, fishermen who troll for tuna off the the Kona coast of Hawaii Island have caught ahi (bigeye tuna), so it is likely that in the early 1900s and late 1800s ahi (bigeye tuna) were also caught by the trolling method. It is reasonable to conclude that the fishing methods described by our informants as in use off the Kona coast in the 1920s and 1930s from canoes more than three miles offshore were the same basic techniques as practiced in what can be termed a historical period that started in the late 1800s.

Crustaceans

We conclude that the two species of spiny lobsters, the two-spined red Hawaiian lobster, and the four-spined green Hawaiian lobster (Panulirus penicillatus) and the various species of slipper lobsters were caught by native Hawaiian fishermen, but they were caught in waters less than three miles offshore, that is in non-EEZ waters.

With regard to the ono and spotted deepsea shrimps, we conclude there was no historical fishery for these species by native Hawaiians in waters either more or less than three miles offshore.

With regard to the precious pink, gold and bamboo corals, we have found no record of any fishery for these species by native Hawaiian fishermen in the historical past. According to the DLNR (1979), the depth range of black corals is from approximately 30 to 110 m (99 to 363 feet). Thus it is unlikely that native Hawaiians were diving for black coral in the historical period. They may, of course, have harvested some black coral while fishing for deepsea FMP bottomfish species, and it is also possible that pieces of black coral were washed up on the beach following storms. Small pieces of black coral have been found on the beach of a small island off the southern coast of Viti Levu, one of the main islands in Fiji, by Iversen in September, 1989.

Present day participation

Bottomfishing

At present there is bottomfishing by native Hawaiian fishermen in EEZ waters more than three miles offshore of the various MHI (e.g., Penguin Banks) and also in EEZ waters off islands in the Ho'omalu Zone. We do not known how many native Hawaiian commercial fishermen, or even native Hawaiian recreational fishermen, are engaged in such bottomfishing activities. Out of the 18 informants who provided affidavits giving their fishing histories, 10 stated that they conducted bottomfishing for FMP species in EEZ waters more than three miles offshore of either the MHI or the NWHI. Of the 10, only four stated they fished in the Ho'omalu Zone, west of 165°00′ W., although one of the four (Ohai) has told us that he usually operates with a crew that is mostly made of of native Hawaiians. We believe this is a significant underestimation of the actual numbers of native Hawaiian fishermen who are now or who have in the recent past fished for bottomfish FMP species in the Ho'omalu Zone of the NWHI. If deepsea fishing along the NWHI in the 1930s and 1940s qualifies as present day participation, then many more native Hawaiians have bottomfished in EEZ waters.

Open ocean fish including tunas

There are native Hawaiian commercial fishermen who are fishing for FMP pelagic species, and non-FMP pelagic species such as tunas, marlins, and sharks. All 18 of our informants stated they were fishing for such species in EEZ waters more than three miles offshore of either the MHI or the NWHI. The principal methods used are trolling, longlining, and the use of the pole and line technique for catching aku and ahi (yellowfin tuna). Again, we do not know the numbers of such fishermen, but it is not unreasonable to estimate there are now, have been in the very recent past, 100 or more native Hawaiian fishermen engaged in such fisheries aboard the larger commercial vessels. A documented fishing vessel is one that has a tonnage of at least five net tons (not gross tons). As a rule of thumb, a commercial fishing vessel should be about 28-30 feet long before it is large enough to become a documented fishing vessel. There are about 150 documented fishing vessels fishing out of ports in Hawaii of which we are aware, but there very well may been others that we do not know about. At the present time, or in the very recent past we believe a considerable number of native Hawaiian fishermen have worked on these vessels.

There are many small undocumented vessels in Hawaii that also fish for open ocean FMP fish species, and also for tunas. A visit to boat launching ramps on Oahu, such as Haleiwa, Waianae, or Hawaii Kai on any weekend when the weather is good, will reveal literally hundreds of large boat trailers

parked awaiting the return of their fishermen owners, who have gone trolling or bottomfishing, or some other type of fishing. These large trailers usually carry fishing boats in the 18 - 28-foot long category. Each boat probably has a crew of three or four individuals. Thus a lot of fishermen, including some that have commercial fishing licenses, and some that do not, are on the water seeking open ocean fish. Assuming there are 200 such boats out fishing, and each has a crew of three, then there should be over 600 individuals just from Oahu seeking open ocean fish in waters usually more than three miles offshore. When the other MHI are included, the number of such fishermen is obviously much greater. How many of these are native Hawaiian fishermen is impossible to estimate, other than to say that we think the percentage is probably substantial. It would take a detailed study of the demographics of the crews of both the large documented commercial vessels, as well as those fishermen who are often called "weekend warriors" or the "mosquito fleet" to determine how many are native Hawaiians.

Crustaceans

Lobsters. As far as the MHI are concerned, we do not believe there are a significant number of native Hawaiians taking either spiny or slipper lobsters in EEZ waters around the MHI. In the NWHI, only two of 18 informants are today active in fishing for lobsters. However, in the very recent past, starting in 1976 when commercial exploitation of spiny and slipper lobsters in EEZ waters of the NWHI region began, there undoubtedly were additional fishermen who are native Hawaiians. In 1985 and 1986 there were 16 commercial lobster vessels fishing on the banks in EEZ waters. As of August 14, 1989, there were 25 fishing vessels with Federal permits for lobster fishing. A commercial lobster vessel fishing those waters will have a crew of about five or six up to 14 or 15 individuals depending on its size. Assuming an average vessel has a crew size of seven (which may be an underestimation), then in those years there would have been about 112 commercial fishermen fishing for lobsters in the NWHI. We believe that just more than two or three would have been native Hawaiians, but we have no data upon which to provide an estimate, other than to say that we think native Hawaiian fishermen made up a relatively small percentage of the fishermen in those years. If lobster fishing in the 1930s and 1940s is included, and assuming these vessels did some lobstering in EEZ waters around the NWHI, than an unknown number of additional native Hawaiians would have been involved. What is not known is whether the lobster fishing by those boats was done in waters more than three miles offshore. Judging from the letter written by Shinsato (1973), most of the lobstering seems to have been done in nearshore waters. It was not until 1975, when the NMFS research vessel TOWNSEND CROMWELL discovered sizeable quantities of lobsters on the offshore banks in EEZ

waters around Necker Island and a few other areas of the NWHI that the present day commercial lobster fishery began.

Shrimps. Since the fishery for ono and spotted shrimp began in earnest in the late 1970s and early 1980s, there has been a considerable movement of both large and small vessels in and out of the fishery. Table 9 shows that in the years from 1983-1987, the catches of ono shrimp sometimes fluctuated as much as 700 percent in adjacent years. In 1984, seven large and 10 small vessels were active in this fishery (WPRFMC 1984). It is unknown how many native Hawaiians made up the crews of these vessels. In 1989 there is one large vessel and one smaller vessel that we know of that are fishing for ono shrimp in EEZ waters. Total crew between the two is about 15 -20 individuals. We have been told that two are native Hawaiians. Only two of the individuals who provided affidavits indicated they had fished for ono shrimp, but one of the 18 is the captain of the F/V LIBRA, which traditionally has a crew with a large number of native Hawaiians. The simple fact is that we do not have any realistic estimate as to the number of native Hawaiians who may have been fishermen for ono and spotted shrimps both in the present and in the very recent past (i.e., the late 1970s) other than to say we think the number overall is small.

Precious corals

We know of no native Hawaiians presently engaged in any fishery in the EEZ of either the MHI or NWHI for precious pink, gold or bamboo corals. There may have been some native Hawaiians involved in the precious coral fishery off Makapuu Pt., Oahu Island, between 1966 and 1978, but we have no information as to how many. The dredge operations by the new entrant into this fishery in 1989 did not have any native Hawaiians in the vessel's crew, according to the vessel's owner (Otani pers. comm.)

Regarding black coral, the most recent HDAR statistics show a landing of 4,341 pounds in 1987 and 435 pounds in 1988, most of which probably came from non-EEZ waters. We spent a considerable amount of time trying to locate native Hawaiians who are now engaged in this fishery, but could not locate any. Only one of our informants had a history of diving for black coral in EEZ waters between Maui, Lanai, and Molokai Islands. There may be few native Hawaiians still involved in this fishery, but we have no idea as to how many.

Dependence by native Hawaiians

Present and recent past

The dependence by native Hawaiians on catches of FMP species of bottomfish, open ocean pelagic FMP species, pelagic

tunas, and crustaceans, can be thought of in two ways. One would be the actual consumption of these species by the native Hawaiian fishermen as food, and another can be thought of in monetary terms. It seems unlikely that native Hawaiians who fish commercially for these species in the present and recent past would consume their catches - as doing so would defeat the purpose of their fishing - which is to return the catches to port for sale (Johnson, pers. comm.). This would not be true for catches made during the 1930s and 1940s during exploratory fishing around the islands of the Ho'omalu Zone of the NWHI. - a the fishermen depended on at least some of their catches for food.

Historical period

In 1900 many of the native Hawaiian fishermen depended on their catches for both as a source of food and as a source of monetary income. Cobb (1903) reported that the total commercial landings in 1900 were 6,222,455 pounds, with a value of $1,083,646, and that 1,571 native Hawaiian men and women were involved in the commercial fisheries. Undoubtedly some of their catches were made in EEZ waters more than three miles offshore. How many native Hawaiian fishermen were involved in such activities is unknown, but probably a substantial number. In 1900 the catch of fresh aku alone was 401,053 pounds, and 37,731 pounds of ahi. Catching this much aku and ahi indicates a good many fishermen were involved, though exactly how many is not known.

Early history and prehistory

Early historical documents indicate that Hawaiians fished for bottomfish, aku, and sharks within the EEZ, and that black corals, collected most likely with a hook and line from bottomfishing grounds, were common enough to have been used for important medicinal purposes. The early historical sources provide little information on fishing for the larger pelagic species and are silent on the collection of crustacea and precious pink, precious gold, and bamboo corals from the EEZ. This general picture of active exploitation of bottomfish, aku, and sharks is clearly supported by the archaeological remains of these species and the fishing gear used to exploit them, which have been recovered from all the major islands. The archaeological data also support claims for the great antiquity of these fisheries.

Further analysis of the archaeological data may provide stronger evidence for the traditional dependence of Hawaiians on FMP bottomfish species, aku, and sharks. The present practice of identifying archaeological fish bones to the family level introduces an element of uncertainty over whether or not FMP species were actually caught, although this uncertainty is relatively small for all families except Carangidae. Further analysis of the fish bones could also

provide crucial evidence for the exploitation of the larger pelagic FMP species. Several archaeologists have tentatively identified large tunas from archaeological sites and it seems likely that additional analysis of the collections at Bishop Museum and at archaeological firms would reveal information important to the determination of preferential rights to the harvest of these fish.

Cultural, religious, and traditional factors

There is abundant historical and archaeological evidence for the social and religious importance of bottomfish, aku, and sharks in traditional Hawaiian culture, as well as evidence for the ritual importance of ahi fishing. Aku, ulua, and sharks (in the form of wooden images) were important in the sacred rites of the *luakini* temple. Ahi fishing appears to have been an important feature of the Makahiki festival. The bones of Scombridae, Carangidae, Lutjanidae, and sharks have all been found in association with ancient temples. Shark remains have been recovered from the dirt floor of an early Christian church on Kaua'i, which suggests that traditional religious practices were not abandoned with the introduction of Christian worship.

At the family level, sharks and aku were often conceived as *'aumakua* -- family or personal gods. The boundary between the supernatural world of these personal gods and the natural world of the Hawaiian people was not sharply defined. The transformation from human to shark form, and the rites that accomplished the transformation, are well described by Kamakau. All *'aumakua*, whatever their form, were believed to have the power to transform themselves into human form. It is thus not surprising that some Hawaiian families, including those of chiefs, claimed sharks and other *'aumakua* as ancestors. The aku fish was claimed as an *'aumakua* by the descendants of Pa'ao, who founded the highest ranking line of priests in old Hawai'i. The depth of these feelings of affinity with fishes is perhaps best expressed by the *uku* buried with the young woman at Keōpū cemetery.

The ancient Hawaiian fisherman and his family followed a number of taboos to ensure success. Prayers to the god Kū were offered while fishing, and fish from each catch were offered at the numerous temples (*heiau ko'a*) dedicated to gods of fishing. Special rites were held to mark the opening of the aku season. Restrictions were placed on the behavior of a fisherman's family while he was at sea.

In contrast, there appears not to have been religious or social significance attached to crustaceans or the precious pink, precious gold, or bamboo corals.

Socio-economic factors

Present day native Hawaiian who are involved in one of the present day fisheries - bottomfishing, catching open ocean FMP pelagic species and non-FMP species like the tunas, and the various fisheries for crustaceans, have an economic dependence on their catches. The ex-vessel value of many of these species of many of these species are given above in the tables describing present day fisheries. Here we simply note that many of these values are very high, and that the native Hawaiian fishermen that we have identified, or speculated as to their numbers, as having taken part in these fisheries would have a strong economic dependence on their catches.

There is another category of Hawaiians who also have an economic interest in the catches of the fisheries described above. That category is the consumer who is Hawaiian or part Hawaiian. [We recognize other ethnic groups also have an economic interest in fish catches.] As described above, there has in the past been a strong cultural and religious connection between native Hawaiians and some FMP bottomfish snappers, such as uku. Some present day native Hawaiian consumers of these bottomfish (and perhaps other FMP species that are not bottomfish) may still associate bottomfish snappers such as uku with traditional beliefs and with their dependence upon snappers for food. Because of the high cost of some FMP bottomfish, they may be frustrated in maintaining such a traditional desire. Such individuals will purchase bottomfish caught in EEZ waters in either the NWHI or the MHI, sometimes directly from a fishing boat, but usually through retail outlets. The value of their purchases of bottomfish, however is unknown.

A recent study by the State of Hawaii, and reported by the Oceanic Institute (1988), estimated that in 1987, residents of the State of Hawaii consumed 26.8 pounds of seafood per capita. This is almost twice the U.S. national per capita consumption of seafood, which in 1987 was 15.4 pounds (NMFS 1988). How much of the 1987 Hawaii consumption of seafood per resident was consumed by native Hawaiians is not known, but should be substantial, since Hawaiians traditionally like to eat seafood. However, several industry sources have told us it was their opinion that native Hawaiians proportionally purchase less bottomfish than other ethnic groups. One possible reason is that, in general, bottomfish prices tend to be higher than other types of fresh fish, such as aku and ahi (yellowfin tuna), and that native Hawaiians have less disposable income with which to purchase higher priced fish, such as deepsea bottomfish.

Legal analysis

It is an established fact that the Hawaiian people do not have a formal treaty with the United States which spells out their fishing rights. They did have, and arguably still have, laws which spelled out those rights, laws which survived the overthrow and annexation into territorial status and may have survived admission into the Union. With each transfer of sovereignty the United States stated repeatedly that it would honor all those extant laws not in conflict with federal law unless they were cancelled by specific federal or state legislation. Any law that affected fishing rights on the high seas, however, could not be cancelled by the State of Hawaii at any time and could only be cancelled by the Federal government after the FCMA was passed and the Federal government assumed jurisdiction over the resources of the EEZ in 1976.

Prior to the establishment of exclusive economic zones coastal peoples could assert rights to high seas resources under two legal theories: (1) effective exercise of sovereign control, and (2) long and continuous usage. If both sovereign control and continuous usage were present, traditional fishermen could assert an exclusive right to the resource; if continuous usage only was established they could still assert a preferential right to the resource. The establishment of historic offshore fishing grounds still in use in the Hawaiian archipelago opens the door to a claim for preferential native Hawaiian fishing rights in the EEZ. However, the fact that the exact boundaries of these grounds were never established argues against a claim for exclusive, vested fishing rights. In addition, the effective exercise of sovereign control, the legal theory upon which an exclusive claim might be based, ended with the assignment of sovereign rights to the United States in the Treaty of Annexation.

However, the usage rights of the common people to the fisheries beyond the three-mile territorial sea were not repudiated by either the provisional government or the Republic of Hawaii. Hawaii state law still recognizes "Hawaiian usage" as an exception and qualifier to the common law system of the state. United States federal law recognizes the concept of usage in its direction to fishery management councils to take "historical fishing practices" into consideration when drafting management plans. International law has long recognized preferential claims to the resources of historic waters based on peaceful and continuous usage. Under international law, sovereign States have an obligation to honor preferential fishing rights established through usage and in the United States international law is part of federal common law to the extent that it is not in conflict with any domestic law.

It is not clear, however, which people can be considered the inheritors of these rights. The laws of the United States define the term "native Hawaiian" in at least two different ways. Under 16 U.S.C. § 396a(b) "native Hawaiian" means any descendant of not less than one-half part of the blood of the races inhabiting the Hawaiian Islands previous to 1778. In 42 U.S.C. § 2992c(3) "Native Hawaiian" means any individual any of whose ancestors were natives of the area which consists of the Hawaiian Islands prior to 1778. The latter definition is the most recent.

APPENDICES

Appendix A. Synonymy of common, Hawaiian, and scientific names of FMP species

This appendix contains a list of FMP bottomfish, pelagic fish, crustacea, precious corals, and tunas and their common and Hawaiian names organized by family or class. Each taxon (family, genus, or species) is referred to by its common English, Hawaiian, or Japanese-derived name in the body of the report; this name is given in boldface and is the first listed under the heading "Common names." The first time the name of one of the FMP or non-FMP species is used in the text, the common English, Hawaiian, or Japanese name is shown first, followed by an alternate name in parentheses. Subsequently, only the common name will be used, unless it is important to distinguish between species that are grouped under a single common name (e.g. a'u, which includes *Makaira nigricans*, *M. indica*, and *Tetrapturus angustirostris*).

The bibliography at the end of the appendix gives sources for the names and their spellings. Growth stage names are listed in order of increasing size.

BOTTOMFISH FMP SPECIES

Lutjanidae
Pristipimoides filamentosus

Common names: **opakapaka**, pink snapper.

P&E: *'ōpakapaka* - blue snapper.

G&B: *Pristipimoides microlepis*, *'opakapaka*.

T: Calls this fish a blue snapper. Gives *ukikiki* (under 12 inches), *pakale*, *opakapaka*, *kalekale* as growth stages. The Ka'ū name is *paka*. Claims that Hawaiians lumped a number of species under these names (see *P. sieboldii* and *Aphareus rutilans* below).

Etelis coruscans

Common names: **onaga**, long tail snapper, ula'ula.

P&E: *'ula'ula* - various red snappers. Varieties *'u. hiwa*, *'u. koa'e*, *'u. maoli*, *'u. 'ōpūlauoho*.

G&B: *Etelis marshi*, *'ula'ula*.

T: Calls this fish a red snapper. Alternative name *ma'ula'ula*. Claims Hawaiians lumped several species with *E. coruscans* (see *E. carbunculus* below), but presents no evidence to support this assertion. Gives several specific names, one of which, *'ula'ula kōa'e* (also given as *'ula'ula koa'e*), is illustrated by a long-finned caudal and probably refers to this species.

Pristipimoides sieboldii

Common names: **kalekale**, snapper.

P&E: *kalekale* a growth stage of *'ōpakapaka*.

T: see *P. filamentosus*.

G&B: *kalikali*.

Etelis carbunculus

Common names: **ehu**, squirrel fish snapper.

P&E: *ehu*, *'ehu* not fish names.

G&B: onaga.

T: *'ehu*, but gives no scientific name.

Aphareus rutilans

Common names: **lehi**, silver jaw job fish.

P&E: *lehe* - deep-sea fish resembling *ulua*.

G&B: no common name given.

T: see *Pristipimoides filamentosus*.

Aprion virescens

Common names: **uku**, gray job fish.

P&E: *uku* - *Aprion* sp.

G&B: *Aprion virescens*, *uku*.

T: *Aprion virescens* Valenciennes, *uku*, *uku palu* (descriptive or varietal name).

Carangidae
Caranx ignobilis

Common names: **white ulua**, giant trevally.

P&E: *ulua-aukea*, *ulua-kea*. *ulua* - certain species of jack. Growth stages - *pāpio* or *pāpiopio*, *pā'ū'ū*, and *ulua*.

G&B: *pa'u'u*, *ulua*, *papio*.

T: *ulua aukea*. Gives growth stage names for Carangidae as *papiopio*, *pau u'u* or *pau'u*, and *ulua*.

Caranx lugubris

Common names: **black ulua**, black trevally.

G&B: *ulua*, *papio*.

T: *ulua lauli*.

Pseudocaranx dentex

Common names: **butaguchi**, pig-lipped ulua.

G&B: *Caranx cheilio*, thick-lipped ulua, pig ulua, butaguchi, buta ulua.

Seriola dumerili

Common names: **kahala**, amberjack.

P&E: *kāhala*.

G&B: *Seriola dumerilii*, kahala, amberjack, yellowtail.

T: Gives possible growth stage names as *puakahala* or *amuka*, *kahala opio*, and *kahala*.

Serranidae
Epinephelus quernus

Common names: **hapu'upu'u**, sea bass.

P&E: *hāpu'u*, *hāpu'upu'u*, *'āpu'upu'u*

G&B: *hapu'upu'u*.

T: *hapu'u*, gives *hapu'upu'u* (or *apu'upu'u*) as a growth stage name.

Istiophoridae
Makaira nigricans

Common names: **a'u**, blue marlin, kurokajiki.

P&E: *a'u*.

G&B: *Makaira ampla*.

Tetrapturus audax

Common names: **a'uki**, striped marlin, naraigi, makajiki.

P&E: *a'ukī*, "a fish, perhaps a marlin."

G&B: *Makaira audax*.

T: *a'u kī* (*Makaira sp.*)

Makaira indica

Common names: **a'u**, black marlin, shirokajiki.

P&E: *a'u*.

G&B: *Istiompax marlina*.

Istiophorus platypterus

Common names: **a'u lepe**, sailfish, bashokajiki.

P&E: *a'ulepe* (*Istiophorus orientalis*).

G&B: *Istiophorus orientalis*.

T: *a'u lepe*.

Tetrapturus angustirostris

Common names: **a'u**, short nosed spearfish.

P&E: *a'u*.

G&B: *Tetrapterus angustirostris*.

T: *a'u*?

Xiphiidae
Xiphias gladius

Common names: **a'u ku**, broadbill swordfish, mekajiki.

P&E: *a'ukū*.

G&B: *Xiphias gladius*.

T: *a'u kū*

Coryphaenidae
Coryphaena hippurus & C. equiselis

Common names: **mahimahi**, dolphin fish.

P&E: *mahimahi*, *lapalapa* (large dolphin fish).

G&B: *Coryphaena hippurus*, *Coryphaena equisetis* (little mahimahi, little dolphin).

T: *mahimahi*, *mahimahi lapa* (male), *mahimahi oma* (female), *lapalapa* (large), *ao*, *papa'ohe*.

Chondrichthyes
Carcharhinidae

Common names: **shark**, oceanic whitetip shark, tiger, mano pa'ele, silky shark, blacktip shark, galapagos shark.

P&E: *manō*, *manō i'a*, *manōpā'ele*, also *manōkanaka*, *manō ihu wa'a*, *manōlelewa'a*, *manōpahāha*.

Alopiidae

Common names: **thresher shark**, mano hi'uka.

P&E: *manōhi'ukā* (*Alopias vulpinus*), *laukāhi'u* "a kind of shark, possible thresher."

G&B: *Alopias vulpinus*.

T: *manō hi'uka*, possibly *manō laukahi'u*.

Sphyrnidae

Common names: **hammerhead shark**, mano kihikihi.

P&E: *manōkihikihi* (*Sphryna zygaena*).

G&B: *Sphyrna lewini*.

T: *manō kihikihi, kihikihi*.

Lamnidae (Isuridae)

Common names: **great white shark**, mano niuhi, mako shark.

P&E: *manōniuhi, niuhi*.

G&B: *Carcharodon carcharias, Isurus glaucus*.

T: *niūhi, niūhi 'ailawa*.

Scombridae
Acanthocybium solandri

Common names: **wahoo**, ono.

P&E: *ono, onomālani*.

G&B: *Acanthocybium solandri*.

T: *ono, ono malani* (pale).

CRUSTACEAN FMP SPECIES

Panilirus marginatus

Common names: **two-spined spiny lobster**, red, ula.

Panilirus penicillatus

Common names: **four-spined spiny lobster**, green, ula.

Scyllarides sp.

Common names: **slipper lobster**, ula papa.

Heterocarpus laevigatus

Common name: **ono shrimp.**

P&E: *'ōpaekai, 'ōpaeluakini*.

Heterocarpus ensifer

Common name: **spotted shrimp.**

P&E: *'ōpaekai, 'ōpaeluakini*.

Parapandalus serratifrons

Common name: **pajama shrimp.**

P&E: *ʻōpaekai, ʻōpaeluakini.*

PRECIOUS CORAL FMP

Corallium spp.

Common name: **precious pink corals.**

Gerardia spp.

Common name: **precious gold corals.**

Lepidisis olapa, Acanella sp.

Common name: **bamboo corals.**

Antipathes spp.

Common name: **black corals.**

P&E: *ʻēkahakumoana*

TUNA SPECIES

Scombridae
Thunnus albacares

Common name: **ahi**, yellowfin tuna.

P&E: *ʻahi, ʻahi mālailena.*

G&B: *Thunnus albacares*, yellowfin tuna, *ʻahi*, shibi.

T: *ʻahi, malailena* (yellow fins).

Thunnus obesus

Common name: **ahi**, bigeye tuna.

P&E: *ʻahi poʻo-nui.*

G&B: bigeye tuna, *poʻo-nui*, mebachi shibi.

T: *ʻahi, poʻonui.*

Thunnus alalunga

Common name: **ahipalaha**, albacore tuna, tonbo tuna.

P&E: *ʻahi pālaha*.

G&B: albacore, ahipahala.

T: *ʻahi, palaha*

Katsuwonus pelamis

Common names: **aku**, skipjack tuna, bonito.

P&E: *aku*. Growth stages - *kīnaʻu, ʻāhua, aku*.

G&B: *aku*, skipjack, striped tuna, oceanic skipjack, katsuo.

T: *Katsuwonus pelamys* (Linne), ocean bonito, *kinaʻu* ([imperfect, immature] the spawn), *ʻahua* (half-grown), *aku* (full-grown).

Euthynnus affinis

Common names: **kawakawa**, little tunny, bonito, black skipjack tuna.

P&E: *kawakawa, pohopoho*. Growth stages, see *Katsuwonus pelamis*.

G&B: *Euthynnus yaito, kawakawa*, little tuna, black skipjack, bonito.

T: *Euthynnus alletteratus* (Raffinesque), *kawakawa, pohopoho* (patches). Growth stages, see *Katsuwonus pelamis*.

REFERENCES

Gosline, William A. and Vernon E. Brock. 1960. *Handbook of Hawaiian fishes*. Honolulu, The University Press of Hawaii. [G&B]

Pukui, Mary Kawena and Samuel H. Elbert. 1971. *Hawaiian dictionary*. Honolulu, University of Hawaii Press. [P&E]

Titcomb, Margaret. 1972. *Native use of fish in Hawaii*. Honolulu, The University Press of Hawaii. [T]

APPENDIX B. Whaling ships that visited or operated in the vicinity of Kaua'i Is., Niihau Is., or the Northwestern Hawaiian Islands during the years 1791 - 1878. Source: Langdon (1984). (Right column numbers refer to microfilms in the Pacific Manuscript Bureau collection, Hamilton Library, University of Hawaii.)

KAUAI IS. (port unspecified)

DATE	SHIP	PMB FILM NO.
1791, 28 May	Hope	774
1809, 2 - 6 Oct	Hamilton	202
1809, 7 - 10 Oct	Otter	774, 775
1811, 12 - 14 Oct	New Hazard	220
1811, 13 - 16 Oct	Hamilton	202
1822, 6 - 17 Feb	Paragon	202
1823, 2 Apr	Phoenix	863
1824, 20 Aug	China	216
1832, 13 Sep	Cadmus	803
1833, 16 Nov	Bengal	205, 576
1834, 27 Apr	Arabella	687
1839, 27 Apr	Charles Drew	736
1841, 10 - 12 May	Walter Scott	387
1845, betw. 17 - 20 Nov	Lucy Anne	688
1846, 14 - 17 Mar	Charleston	287
1846, 18 Apr	Orizimbo	886
1846, 28 Apr - 10 May	George Washington	287, 376
1847, 14 Feb	William & Eliza	837
1847, 6 - 7 Mar	Parachute	699
1847, 17 - 19 Dec	Samuel Robertson	327, 775
1848, 13 - 18 Feb	William Thompson	369
1848, 20 Mar	Charles Drew	792
1848, 31 May - 2 Apr	Erie	266
1848, 21 - 23 Oct	Erie	266
1848, 5 - 9 Nov	Liverpool 2nd	875
1848, 16 Nov	Atkins Adams	286
1848, 26 Nov	Jefferson	682
1849, 22 Feb - 2 Mar	Marengo	346
1849, 20 Mar	Champion	253
1849, 22 Mar	Charles Phelps	792
1849, 30 Sep - 25 Oct	Abraham Barker	671
1850, 6 - 9 Apr	Champion	253
1850, 30 Apr	Charles Drew	792
1851, 12 Apr	Charles Phelps	792
1851, 12 Apr	St. George	773
1851, 17 Apr	Abraham Barker	571
1851, 31 Oct - 1 Nov	St. George	773
1852, 8 Mar	Charles Phelps	792
1852, 9 - 10 Mar	Lancaster	267
1852, 14 - 19 Mar	Hillman	858
1852, 3 - 4 Apr	Abraham Barker	571
1852, 16 - 19 Apr	Milo	267

1852, 2 - 3 Nov	Levi Starbuck	681, 682
1852, 8 Nov	Sophia Thornton	893
1852, 28 - 30 Nov	Gratitude	330
1853, 23 - 29 Mar	Pioneer	772
1853, 2 Apr	Niger	736, 737
1853, 4 - 8 Apr	Benjamin Tucker	262, 312
1853, 4 - 8 Apr	Betsy Williams	698, 844
1853, 6 - 10 Apr	Nathaniel S. Perkins	543
1853, 11 - 12 Nov	California	772
1853, 17 Nov	Roman	836
1854, 27 Mar	Niger	736, 737
1854, 14 Apr	Europa	846
1854, 14 Oct	Martha	264
1854, 22 - 23 Nov	Lexington	378
1854, 25 - 27 Nov	Saratoga	892
1855, 12 - 13 Mar	Robert Morrison	734
1855, 22 - 23 Mar	Florida	301
1855, 28 - 30 Mar	Rebecca Sims	816
1855, 5 - 8 Mar	Saratoga	892
1855, 16 - 20 Nov	Lexington	378
1855, 13 - 14 Dec	Washington	369, 370
1856, 7 Apr	Benjamin Tucker	576
1857, 17 - 19 Feb	Fanny	326
1857, 23 - 26 Feb	Fanny	326
1857, 18 Mar	Fanny	326
1857, 28 Mar	Callao	579, 833
1857, 23 Apr	Cinncinnati	794
1857, 13 - 15 Nov	Silver Cloud	361, 840
1858, 10 - 24 Mar	Lark	694
1858, 18 - 19 Mar	Silver Cloud	361, 840
1858, 31 Mar	Speedwell	894
1858, 13 - 22 Sep	Fabius	325
1858, 10 - 13 Nov	Benjamin Tucker	312
1859, 28 Feb	Cinncinnati	794
1859, 30 - 31 Mar	Speedwell	894
1859, 31 Mar - 10 Apr	Fabius	325
1859, 1 -3 Apr	Martha	678
1859, 19 - 21 Apr	Tamerlane	367
1859, 14 Dec	Lancaster	812
1861, 25 Mar	Josephine	812
1862, 30 Nov - 1 Dec	Barnstable	575
1864, 7 - 19 Apr	Governor Troup	729, 791
1865, 22 -29 Apr	Governor Troup	729, 791
1855, 10 Apr	Cornelius Howland	796
1866, 28 Apr - 1 May	Governor Troup	729, 791
1867, 9 - 14 Apr	George Howland	241
1867, 15 Apr	Europa	259
1867, 16 Apr	Corinthian	796
1868, 14 - 18 Mar	Cornelius Howland	321, 796
1868, 30 Mar	Islander	811
1868, 3 - 4 Apr	Europa	259
1870, 29 Mar - 1 Apr	Cornelius Howland	321, 796
1870, 31 Mar - 26 Apr	Almira	573
1870, 21 Apr	Thomas Dickason	796

1870, 12 - 15 May	Navy	815
1877, 2 Mar	Mount Wallaston	910
1878, 15 - 17 Apr	Helen Mar	244

KAUA'I IS. - KILAUEA

1854, 3 - 13 Jan	Abigail	294
1854, 5 - 6 Feb	Abigail	294

KAUA'I IS. - WAIMEA

1869, 1 - 5 Apr	George Howland	241

NI'IHAU IS.

1809, 10 Oct	Otter	774
1823, 3 - 6 Apr	Phoenix	863
1848, 17 Nov	Atkins Adams	286
1850, 2 May	Charles Drew	792
1851, 12 Apr	Charles Phelps	792
1852, 25 - 26 Mar	Columbus	776
1854, 24 Mar	Mechanic	768
1854, 2 - 5 Aug	Mechanic	768
1859, 13 - 14 Apr	Oliver Crocker	815
1862, 15 - 23 Nov	Navy	281, 300, 814
1865, 8 May	Martha	348

Appendix C. List of individuals who were interviewed concerning native Hawaiian fishing in the Ho'omalu Zone of the NWHI, as well as around the MHI and offshore areas around the entire Hawaiian Island chain.

Date/place	Person interviewed	Persons present
March 6, 1989 Honolulu, Hawaii	George L. Costa, III	Costa/R. Iversen
April 18, 1989 Honolulu, Hawaii	Dane A. Johnson	Johnson/R. Iversen
April 8, 1989 Honolulu, Hawaii	George L. Costa, Jr.	Costa/R. Iversen
April 25, 1989 Honolulu, Hawaii	Louis K. Agard, Jr.	Agard/R. Iversen
April 21, 1989 Honolulu, Hawaii	Clarence Hookala	Hookala/R. Iversen
June 15, 1989 Honolulu, Hawaii	Leo A. Ohai	Ohai/R. Iversen
June 24, 1989 Haleiwa, Oahu	Barrington Blomfield	Blomfield/ R. Iversen
June 23, 1989 Honolulu, Hawaii	Walter H. Paulo	Paulo/R. Iversen
August 21, 1989 Napoopoo, Hawaii	Henry A. Leslie, Jr.	Leslie/R. Iversen/ W. Paulo
August 21, 1989 Napoopoo, Hawaii	Charles K. Leslie	Leslie/R. Iversen
August 23, 1989 Milolii, Hawaii	Abel P. Kahele	Kahele/R. Iversen/ W. Paulo
August 23, 1989 Milolii, Hawaii	Louis M. Paulo, Sr.	L. Paulo/W. Paulo/ R. Iversen
Sept. 28, 1989 Kaunakakai, Molokai	Clayton K. Ching	Ching/R. Iversen
October 3, 1989 Makaweli, Kaua'i	Bruce Robinson (no affidavit)	Robinson/ R. Iversen
October 3, 1989 Hanapepe, Kaua'i	Moana Alquiza	Alquiza/R. Iversen
October 3, 1989 Hanapepe, Kaua'i	William K. Moniz	Moniz/R. Iversen

October 4, 1989 Lihue, Kaua'i	Frank A. Medeiros, Jr.	Medeiros/R.Iversen
October 4, 1989 Hanapepe, Kaua'i	Garry D. Kaaihue	Kaaihue/R. Iversen
November 8, 1989 Honolulu, Hawaii	Christopher O'Leary	O'Leary/R. Iversen
November 8, 1989 Honolulu, Hawaii	Edward Malia (no affidavit)	Malia/R. Iversen
November 8, 1989 Honolulu, Hawaii	Melvin Zane (no affidavit)	Zane/R. Iversen
November 8, 1989 Honolulu, Hawaii	James Kahamakai (no affidavit)	Kahamakai/ R. Iversen

Appendix :D. Affidavits

AFFIDAVIT OF HENRY ANDREW LESLIE, JR.

Henry Andrew Leslie, Jr., being first duly sworn upon oath deposes and says:

1. He is a resident of the State of Hawaii, and maintains his residence at the following address: Rural Route #1, Box 179, Captain Cook, Hawaii 96704, which is located at Napoopoo, Hawaii.

2. He is 76 years of age, and was born on March 25, 1913 at Napoopoo, Hawaii, and is the natural son of Henry Andrew Leslie, Sr., and Joanna Gaspar Leslie.

3. He is of part Hawaiian ancestry, being of 50 percent Hawaiian ancestry and 50 percent Causasian ancestry.

4. That his father, Henry Andrew Leslie, Sr., was of 50 percent Hawaiian ancestry, and 50 percent Caucasian ancestry.

5. That his mother, Joanna Gaspar Leslie, was of 50 percent Hawaiian ancestry, and 50 percent Caucasian ancestry.

6. That he began his fishing career in 1921, when at eight years of age, he assisted his father in catching ahi or yellowfin tuna (Thunnus albacares) on his father's 36 foot long fishing vessel EHU KAI in waters ten miles off Napoopoo, Hawaii, by longline and also by using the palu ahi method (palu = chum or bait released at depth + a deepsea fishing line at depths up to 720 feet.) Aboard the EHU KAI, he also helped in fishing for aku or skipjack tuna (Katsuwonus pelamis) by trolling in waters more than three miles offshore of Napoopoo, Hawaii, and also fishing for various snappers such as opakapaka (Pristipomoides filamentosus), onaga (Etelis coruscans), and kalekale (P. sieboldii) using a "kaka line" or bottom longline in waters 750 -

900 feet deep more than three miles offshore of Napoopoo, Hawaii. He also assisted his family in catching opelu (Decapturus pinnulatus) from a canoe in waters one-fourth mile off Napoopoo. The opelu was used as bait for the ahi caught by longline from the EHU KAI. These activities continued until 1929, when at 16 years of age he became a full time commercial fisherman.

7. During 1929 and 1930 he was a commercial fisherman aboard the EHU KAI and fished for the above species and and also by longline for the following species: ahi or bigeye tuna (Thunnus obesus), ahipalaha or albacore tuna (Thunnus albacares), a'u or marlin (Makaira sp. and Tetrapturus audax), mahimahi (Coryphaena hippurus), kaku or barracuda (Sphryaena barracuda), and sharks (family Carcharhinidae).

8. In 1930, at the age of 17, he became the captain of the EHU KAI and fished for the above pelagic species (i.e., tuna, marlin, mahimahi, and sharks) more than three miles offshore of Napoopoo, Milolii, and the Makalawena areas of the Kona coast, Hawaii Island. These activities continued until 1955 when his father retired, and at that time he became the regular captain of the EHU KAI and took over running the family's fishing business. During the period 1930 - 1955, he was also the captain of the following fishing vessels: PEARL HARBOR, JOANNA, HULA GIRL, and MORNING STAR, which fished primarily by the longline method for the above pelagic species in waters more than three miles offshore of the Kona coast.

9. By the mid 1960's he had sold the PEARL HARBOR, JOANNA, HULA GIRL, and MORNING STAR, and acquired the HOLOKOHANA I, a 48 foot long tuna longline vessel. The HOLOKOHANA I was subsequently sold which in 1979. In 1979 he acquired the HANALIKE, a 56 foot

long tuna longline vessel which is still in use for the family's fishing business. Both the HOLOKOHANA I and the HANALIKE fished for the above pelagic species by longline in waters more than three miles offshore of Hawaii Island, including waters fished by the HANALIKE above the McCall and Cross seamounts, which are more than 100 miles offshore.

10. During the period 1978 - 1986 he also trolled for ahi (yellowfin tuna) more than three miles offshore in a 19 foot long boat, and once trolled for ahi in this small boat 50 miles offshore.

11. In 1980 he gave up being the captain of the HANALIKE in favor of his son, but still participates as an active fisherman aboard the HANALIKE until the present time. He also still participates in catching opelu as bait for tuna longlining from a 19 foot long boat for use aboard the HANALIKE and for commercial sale.

LS

Henry Andrew Leslie
HENRY ANDREW LESLIE, JR.

Subscribed and sworn to before me
this 4th day of Oct, 1989

Sally Alapai
Notary Public, State of Hawaii
My commission expires: 10-25-92

AFFIDAVIT OF ABEL P. KAHELE

Abel P. Kahele, first being duly sworn upon oath deposes and says:

1. He is a resident of the State of Hawaii, and maintains his residence at the following address: Rural Route 1, Box 361A, Captain Cook, Hawaii 96704, and that his residence is physically located at Mililii, Hawaii.

2. He is 69 years of age, and was born on October 10, 1919, at Mililii, Hawaii, and is the natural son of John Alena Kahele and Malia Halana Kahele.

3. He is of part Hawaiian ancestry, being approximately 75 percent Hawaiian ancestry, and 25 percent Caucasian ancestry.

4. That his mother, ~~Malia Halana~~ Malaea Nunuha Halena Kahele, was of ~~100~~ 50 percent Hawaiian ancestry, and 50 percent Caucasian (Norwegian)

5. That his father, John ~~Alena~~ Halena Kahele, was of ~~50~~ 100 percent Hawaiian ancestry, ~~and 50 percent Caucasian ancestry~~.

6. That he began his fishing career in 1925, when at six years of age, he assisted his father while fishing from a canoe in waters less than three miles offshore of Mililii for opelu or cigar mackerel (Decapterus pinnulatus) by lift net and for ahi or yellowfin tuna (Thunnus albacares) by the kaili or drop stone method in a koa two miles offshore of Mililii. He also fished from the canoe by trolling with pearl shell lures for aku or skipjack tuna (Katsuwonus pelamis), ahi or yellowfin tuna, and a'u or striped marlin (Tetrapturus audax) in waters five to ten miles offshore of Mililii. He continued to fish off Mililii in a canoe until 1934.

7. In 1934, at 15 years of age, he became a full time commercial fisherman aboard the longline fishing vessel LEILANI and later was captain of the longline fishing vessels MIYOJIN MARU and KAIMANA. These vessels fished in waters up to 150 miles offshore of the Kona and windward coasts of Hawaii Island for the following pelagic species: aku or skipjack tuna, ahi or yellowfin tuna, ahi or bigeye tuna (T. obesus), ahipalaha or albacore tuna (T. alalunga), a'u or marlin (Makaira sp.), a'u ku or broadbill swordfish (Xiphius gladius), mahimahi (Coryphaena hippurus), ono or wahoo (Acanthocybium solandri), and sharks (Family Carcharhinidae). He continued fishing aboard these vessels until 1940.

8. During 1940 - 1946 he was in the U. S. Army.

9. During 1946 - 1956, he returned to Milolii where he fished in a canoe for the species described in paragraph six, above.

10. During 1956 - 1966 he was captain of the longline fishing vessel KAIMANA which fished in waters more than three miles offshore of the windward coast of Hawaii Island for the species described in paragraph seven, above.

11. In 1967 he returned to Milolii, where he fished from a small boat (16 feet long) by both trolling and drop stone methods in waters less than three miles offshore of Milolii for ahi (yellowfin tuna), aku, and mahimahi. He also fished for opelu by lift net, and for opakapaka or pink snapper (Pristipomoides filamentosus) and onaga or red snapper (Etelis coruscans) in waters 110 to 120 fathoms deep.

12. He retired in 1984, but still fishes occasionally from a 16 foot boat by trolling for mahimahi, aku, and ahi (yellowfin tuna) in waters less than three miles offshore of Milolii.

Abel P. Kahele

ABEL P. KAHELE

Subscribed and sworn to before me this 27th day of October, 1989

Kimi Claire Haanio

Notary Public, State of Hawaii

My commission expires: 5/4/90

AFFIDAVIT OF LEO A. OHAI

Leo A. Ohai, being first duly sworn upon oath deposes and says:

1. He is a resident of the State of Hawaii, and maintains his residence at 1255 Nuuanu Avenue (#1001), Honolulu, Hawaii 96817.

2. He is 66 years of age, and was born on February 24, 1923, at Waialua Homstead, Kauai Island, Hawaii, and is the natural son of Benjamin M. and Alice M. Ohai.

3. He is of part Hawaiian ancestry, being of approximately 60 percent Hawaiian ancestry, and of 40 percent Caucasian ancestry.

4. That his father, Benjamin M. Ohai, was of 75 percent Hawaiian ancestry and 25 percent Caucasian ancestry.

5. That his mother, Alice M. Ohai, was of 50 percent Hawaiian ancestry and 50 percent Caucasian ancestry.

6. That at the present time he is the owner and captain of the F/V LIBRA, which is berthed at pier 15, Honolulu Harbor, and that the following is an accurate representation of his career as a commercial fisherman, fishing vessel owner, and aircraft spotter for various species of fish that his vessels were attempting to catch.

7. He began his career as a commercial fisherman in 1941 when he was the captain and owner of the fishing sampan F/V GARDEN ISLAND, and which was engaged in fishing for akule (Selar crumenopthalmus) within three miles of Kauai Island and Kaula

Island. He also conducted bottom fishing on a regular basis for the following species of bottomfish in waters more than three miles offshore of Kauai Island and Kaula Island: opakapaka (pink snapper), onaga (long tail snapper), kalekale (snapper), ehu (squirrel fish snapper) lehi (silver jaw jobfish), uku (grey snapper) white ulua (giant travally), black ulua (black travally), hapuupuu (seabass), and kahala (amberjack). He was the owner and captain of the F/V GARDEN ISLAND until 1944, when he sold the vessel.

8. During 1944 and 1945, he was employed as a commercial fisherman aboard the F/V FUKUI MARU, which fished for akule and bottomfish within three miles of Niihau Island.

9. In 1945, he purchased the F/V KAMOKILA, which engaged in bottomfishing for the species listed in paragraph 7, above, along the Northwestern Hawaiian Islands at what is known as "middle bank", located about 80 miles northwest of Kauai Island. From 1945 until 1952, he fished the F/V KAMOKILA in waters around Kauai Island and Kaula Island primarly for akule. In 1952 he sold the F/V KAMOKILA.

10. In 1952 he built the skipjack fishing vessel F/V MOKU OHAI and was the owner and captain of the F/V MOKU OHAI while it was engaged in fishing for aku [skipjack tuna (Katsuwonus pelamis)] in waters more than three miles offshore of all the main Hawaiian Islands. He also operated the F/V MOKU OHAI until 1955 while fishing for akule in waters less than three miles off French Frigate Shoals, which is approximately 440 miles northwest of Honolulu.

11. In 1955 he sold the F/V MOKU OHAI and purchased the fishing vessels SHIRLY I and PANAY. These vessels fished for akule around the main Hawaiian Islands in waters less than three miles offshore, and he flew as an airplane spotter for both vessels in order to locate schools of akule. The F/V SHIRLEY I fished for akule until 1970 when it burned and was lost. The F/V PANAY fished for akule until it was wrecked in 1974.

12. In 1970 he purchased the F/V OLYMPIC and was the owner, captain, and occasional airplane spotter for schools of akule being fished by the F/V OLYMPIC. The F/V OLYMPIC was wrecked on Kauai in 1974.

13. In 1974 he purchased the F/V MALIHINI and F/V KAIMAMALA, both of which fished for akule in waters around the main Hawaiian islands less than three miles offshore. The F/V MALIHINI was sold in 1974 and at the present time the F/V KAIMAMALA is inactive and tied up at pier 15, Honolulu Harbor.

14. In 1975, he purchased and became the owner and captain of the 58 foot long multi-purpose fishing boat F/V LIBRA. Since 1975, the F/V LIBRA has been engaged in the following fisheries:

a. Fishing for akule around all the main Hawaiian Islands in waters less than three miles offshore.

b. Bottomfishing in waters more than three miles offshore for the species of bottomfish listed in paragraph 7, above, along most of the islands and banks of the Northwestern Hawaiian Islands from Pearl and Hermes Reef to the Island of Niihau.

c. Longline fishing for species of ahi [yellowfin tuna (Thunnus albacares) and bigeye tuna (Thunnus obesus)], and other

pelagic species such as marlin and wahoo (ono) in waters more than three miles offshore of the main Hawaiian Islands.

d. Trapping for crustaceans (spiny and slipper lobsters) on banks more than three miles offshore in the following locations: Pearl and Hermes Reef, Lisianski Island, Laysan Island, Maro Reef, Raita Bank, Gardner Pinnacles, St. Rogatien Bank, Brooks Bank, Necker Island, Middle Bank, and Nihoa Island.

e. Occasional trapping for bottomfish listed in paragraph seven, above, in waters more than three miles off Niihau, Molokai, and Kauai Islands.

Leo A. Ohai

LEO A. OHAI

Subscribed and sworn to before me
this 21 day of June, 1989

K Chun

Notary Public, State of Hawaii

My commission expires: FEB 19 1991

OCEANIC LIBRA CORPORATION
P. O. BOX 28002
HONOLULU, HAWAII 96827

August 25, 1989

Mr. Robert T. B. Iversen
Pacific Fisheries Consultants
45-626 Halekou Place
Kaneohe, Hawaii 96744

Dear Mr. Iversen:

The purpose of this letter is to provide additional details of my past fishing activities as they concern fishing for the deepwater ono shrimp (Heterocarpus sp.). This information is provided as an addendum to paragraph 14(d) of my notarized affadavit dated June 21, 1989.

"Trapping for deepwater ono shrimp (Heterocarpus sp.) in Hawaiian waters more than three miles offshore of southwest Kauai Island, and in the Kaiwi channel between Oahu and Molokai Islands. I also trapped for ono shrimp in waters off Kaulapapa, Molokai Island, but this was in waters less than three miles offshore."

Sincerely,

Leo A. Ohai
President

Subscribed and sworn to before me
this 25th day of August, 1989.

Notary Public, State of Hawaii

My commission expires: 11/3/89

L.S.

AFFIDAVIT OF LOUIS K. AGARD, JR.

Louis K. Agard, Jr., being first duly sworn upon oath deposes and says:

1. He is a resident of the State of Hawaii, and maintains his residence at 55 South Kukui Street (Apt. D-404), Honolulu, Hawaii 96813.

2. He is 65 years of age and was born on February 25, 1924, in Honolulu, Hawaii, and is the natural son of Louis K. Agard, Sr., and Maria Prestige Agard.

3. He is of part Hawaiian ancestry, being of 25 percent Hawaiian ancestry, and 75 percent Caucasian ancestry.

4. That his mother, Maria Prestige Agard, was of 50 percent Hawaiian ancestry, and 50 percent Caucasian ancestry.

5. That his father, Louis K. Agard, Sr., was of 100 percent Caucasian ancestry.

6. That at the present time he is self employed, and that since 1946, he has been the owner of Marine Supply and Exchange, Inc., 1089A Ala Moana Blvd., Honolulu, Hawaii 96814, a firm that is engaged in the marketing of aku (skipjack tuna: Katsuwonus pelamis) and other pelagic species, and in the sale of equipment and supplies to commercial fishing vessels.

7. That the following is an accurate representation of his career as a commercial fisherman, fishing vessel owner, and a seller of various species of pelagic fish:

7.1 That his fishing career started in 1935, when at the age of 11, he caught fish on Kauai Island, and later sold his

catch at various plantation camps on Kauai. He was engaged in similar activities until approximately 1942.

7.2. That during 1943 and 1944 he was a fisherman aboard the F/V KIYO MARU, which fished for aku more than three miles offshore of Oahu, and which delivered its catch to the Hawaiian Tuna Packers cannery, Honolulu, Hawaii.

7.3. That during 1946 - 1948, he was the owner and captain of the F/V NAIA, a sampan 80 feet long, which fished primarily for reef fish and akule (big eyed scad: Selar crumenopthalmus), in waters around Oahu within three miles of shore and in the nearshore waters of French Frigate Shoals, Northwestern Hawaiian Islands. During 1946, he chartered a DC-3 cargo aircraft to fly akule caught near French Frigate Shoals to Honolulu for sale. During the period 1948 - 1950, he was the captain of the 72 foot long F/V SEAHAWK, which engaged in bottomfish fishing in the Northwestern Hawaiian Islands more than three miles offshore of Necker Island, French Frigate Shoals, "100 fathom bank" (located 10 miles east of French Frigate Shoals), and Gardner Pinnacles. While bottomfishing aboard the F/V SEAHAWK, the following species of bottomfish were caught on a regular basis: opakapaka (pink snapper), onaga (long tail snapper), kalekale (snapper), ehu (squirrel fish snapper), lehi (silver jaw jobfish), uku (grey snapper), white ulua (giant travally), black ulua (black travally), butaguchi (pig lipped ulua/travally), hapupuu (seabass), and kahala (amberjack). During the period 1947 - 1951, he was also the owner and captain of the support

vessel SILVER, which was used in connection with various fishing activities within three miles of shore at French Frigate Shoals.

7.4. That during the period 1950 - 1956, he owned and operated the F/V OCEANIC, which primarily fished for reef fish and akule in waters less than three miles offshore of French Frigate Shoals and the Main Hawaiian Islands, and that during this period he was the operations director of the DC-3 cargo aircraft which was used to fly the commercial fish catch from French Frigate Shoals to Honolulu for sale.

7.5 That during 1956 - 1958 he was the owner and captain of the F/V MANA, which caught reef fish in waters less than three miles offshore around all the main Hawaiian Islands, but which also engaged in trolling for pelagic species such as aku, other tunas, mahimahi, and marlin in waters more than three miles offshore while transiting between islands.

7.6 That during 1957 - 1958 he was the owner and captain of the F/V LELO, which caught reef fish around Oahu in waters less than three miles offshore.

7.7 That during 1958 - 1963, he was the owner and captain of the F/V MOMI, which fished in waters more than three miles offshore of all the main Hawaiian islands, and that while trolling during transit between islands, the F/V MOMI caught other tunas, mahimahi, and marlin.

7.8 That during 1963 - 1973, he was the owner and captain of the F/V ALIKA, which fished for reef fish in waters around Oahu Island.

7.9. That during the years 1967 - 1973, he was engaged as a fish spotter, flying a Cessna 172 aircraft around all the Main Hawaiian Islands in search of akule and ulua (travally), and that from 1973 - 1977 he was engaged as a fish spotter searching for aku in waters more than three miles offshore of all the main Hawaiian Islands.

7.10. That during 1977 - 1979 he was the owner and captain of the F/V AHONUI, which fished for akule in waters less than three miles around the Oahu Island.

7.11. That during 1978 - 1979 he acted as a sales agent for the Tuna Boat Owners' Cooperative in order to sell aku.

7.12. That since 1979 he has been an independent fish dealer selling a variety of pelagic species, mainly aku, other tunas, mahimahi, and marlin, and;

7.13. That since 1986 he has been financing the operations of the F/V SEA QUEEN and F/V NEPTUNE, which are primarily engaged in the pole-and-line fishery for aku in waters more than three miles offshore around the islands of Oahu and Molokai.

Louis K. Agard Jr.

LOUIS K. AGARD, JR.

Subscribed and sworn to before me
this 17th day of May, 1989

Notary Public, State of Hawaii

My commission expires: 4/03/92

AFFIDAVIT OF WALTER H. PAULO

Walter H. Paulo, also known as "Keliiokekai", being first duly sworn upon oath deposes and says:

1. He is a resident of the State of Hawaii, and maintains his residence at 1726 Hoohulu Street, Pearl City, Hawaii 96782.

2. He is 65 years of age, and was born on October 27, 1923, at Kealia, Kona, Hawaii Island, and is the natural son of John Henriques and Kakalina Sarah Hulama.

3. He is of part Hawaiian ancestry being of 50 percent Hawaiian ancestry and 50 percent Caucasian ancestry.

4. That his mother, Kakalina Sarah Hulama, was of 100 percent Hawaiian ancestry.

5. That his father, John Henriques, was of 100 percent Caucasian ancestry.

6. That at the present time he is a volunteer directing "Project Opelu", a fishing program to help Hawaiian youth in leeward Oahu (i.e., Waianae, Nanakuli, Makaha, etc.) to learn Hawaiian fishing culture. "Project Opelu" is a sponsored by organizations such as Alu Like, Office of Hawaiian Affairs, and the Waianae Coast Community Alternative Development Corporation.

7. That he began his career as a fisherman in 1932, when at nine years of age, he helped his ohana (extended family) catch opelu (Decapterus pinnulatus) from an outrigger canoe in a koa (fishing location) one-quarter mile offshore north and south of Milolii, Hawaii Island.

8. That he lived in Milolii-Hoopoloa, Kona, until 1936, and during that period he also fished at night for u'u (squirrel fish:

Myripristis sp.), aweoweo (big-eyes: Priacanthus sp.), upapalu (cardinal fish or apogonids), papio (young jacks or carangids), and hauliuli-puhi (snake mackerel: Gempylus sp.), and during the day fished for moano and weke ula (goatfishes or mullids) and mu (Monotaxis grandoculis) using the "kaili" method (fishing with a stone) in shallow waters (e.g., 60 ft. depth) off the Kapalilua coast, south Kona, Hawaii.

9. That during this period he also fished for aku (skipjack tuna: Katsuwonus pelamis) in waters more than three miles off Milolii from an outrigger canoe. The method of fishing involved paddling the canoe (with up to five fishermen) after the aku and then using pearl shell lures on trolling lines to catch the aku.

10. That during this period he also fished for ahi (yellowfin tuna: Thunnus albacares) in waters from one to ten miles offshore in the Milolii-Hoopoloa area by trolling and by the palu ahi method (palu = chum or bait released at depth + a deepsea fishing line) at depths up to 300 ft. This fishing was carried out from a canoe.

11. That during 1937 he was a commercial fisherman on the vessel LELANI (Capt. John Aki) which fished for yellowfin tuna, and other pelagic fish such as bigeye tuna (Thunnus obesus); albacore tuna (Thunnus alalunga); marlin (Makaira sp.); broadbill swordfish (Xiphias gladius); ono (Acanthocybium solandri); moonfish or opah (Lampris regis); mahimahi (Coryphaena hippurus); and sharks (family Carcharhinidae) in waters more than three miles offshore of the Kona and Hilo coasts of Hawaii Island.

12. That during 1939 - 1940 he was a commercial fisherman aboard the vessel MIYOJIN MARU (Capt. Abel Kahele/Frank Manalili, owner) which fished for yelllowfin tuna and the same species as

given in paragraph 11, above, in waters more than three miles offshore of the Kona coast of Hawaii Island.

13. That in 1941 he became the alternate captain of the MIYOJIN MARU and conducted longline fishing more than three miles offshore of the Kona coast, Hawaii Island, for yellowfin tuna and the species listed in paragraph 11, above.

14. That during 1941 and 1942 he was employed by the C.N.A.B. Construction Co. on Palmyra Island, a U. S. possession 960 miles south of Honolulu.

15. That during 1943 - 1945 he was captain of the longline fishing vessels KASUGA MARU and TENJIN MARU fishing for yellowfin tuna and the pelagic species listed in paragraph 11, above, in waters more than three miles offshore of all the main Hawaiian Islands.

16. That during 1945 - 1947 he was in the U. S. Army.

17. That during 1947 - 1948 he was a commercial fisherman aboard the longline fishing vessels LOKELANI, KOFUKU, and SHINMEI MARU fishing for yellowfin tuna and other pelagic species (see paragraph 11) in waters more than three miles offshore of all the main Hawaiian Islands.

18. That during the years 1948 - 1952, he was a commercial fisherman aboard the vessels MOMI, SAILFISH, ELECTA, and BONITO while fishing for aku using pole-and-line and live bait in waters more than three miles offshore all the main Hawaiian Islands.

19. That during the period 1952 - 1974 he was successively fisherman, skilled fisherman, navigator, and captain aboard various fishery research vessels of the U. S. National Marine Fisheries Service (formerly Pacific Fisheries Oceanic Investigations). As captain of the R/V CHARLES H. GILBERT (120

ft. long, 200 gross tons) and the R/V TOWNSEND CROMWELL (163 ft. long, 652 gross tons) he was master of vessels that conducted fishery, biological, and oceanographic research throughout the tropical central, south and western Pacific.

20. That during 1974 - 1989, he has been occasionally employed by the UNDP program of the Food and Agriculture Organization (FAO) of the United Nations as a master fisherman-consultant in various tropical Pacific island nations including Western Samoa, Tonga, Niue, Cook Islands, and the Federated States of Micronesia (Pohnpei State).

21. That during 1979 he was a commercial fisherman using the ika shibi (deepsea handline using baited hooks) and trolling methods for pelagic species (mainly tunas and mahimahi) in waters more than three miles offshore of the Kona Coast, Hawaii Island aboard various small (ca. 20 ft. long) fishing vessels.

22. That during 1980 - 1989 he has been engaged in "Project Opelu".

Walter H Paulo
WALTER H. PAULO

Subscribed and sworn to before me
this 18th day of September, 1989

Notary Public, State of Hawaii

My commission expires: 11-6-92

AFFIDAVIT OF GEORGE LORIAN COSTA, JR.

George Lorian Costa, Jr., being first duly sworn upon oath deposes and says:

1. He is a resident of the State of Hawaii, and maintains his residence at 2805 Winam Street, Honolulu, Hawaii 96816.

2. He is 57 years of age, and was born on February 11, 1931, and is the natural son of George Lorian Costa, Sr., and his wife Margaret Costa.

3. He is of part Hawaiian ancestry, being approximately approximately 25 percent Hawaiian ancestry, and approximately 75 percent combined Caucasian (Portuguese) and Chinese ancestry.

4. That his mother, Margaret Costa, was of approximately 50 percent Hawaiian ancestry, and approximately 50 percent Chinese ancestry.

5. That his father, George Lorian Costa, Sr., was of 100 percent Caucasian ancestry.

6. He is employed as a commercial fisherman aboard the F/V KULA KAI (official number 254-011) and that he has been continuously employed aboard the F/V KULA KAI since 1963.

7. That the F/V KULA KAI is primarily engaged in the live bait fishery for skipjack tuna (Katsuwonus pelamis), known as "aku" in the Hawaiian language.

8. Prior to being employed aboard the F/V KULA KAI, he was employed as a commercial fisherman from 1956 to 1963 aboard the F/V BUCCANEER, which also was engaged in the live bait fishery for skipjack tuna, and from 1952 to 1956 as a commercial fisherman aboard the F/V FLORENCE, which at that time fished in Hawaiian waters for tuna and other pelagic species such as marlin, mahimahi, and sharks using the longline fishing method.

9. While fishing for skipjack tuna aboard the F/V KULA KAI, the vessel customarily and regularly conducted fishing operations within the Exclusive Economic Zone of the United States, aforesaid EEZ being from three to 200 miles offshore in waters around the State of Hawaii. While he has been a fisherman aboard the F/V KULA KAI, fishing ocurred in the EEZ beyond three nautical miles offshore of the following islands of the State of Hawaii: Oahu, Kauai, Hawaii, Maui, Molokai, and Niihau. With reference to fishing near Niihau Island while he was aboard the F/V KULA KAI, fishing occasionally ocurred 20 to 25 miles west of Niihau Island.

10. While employed aboard the F/V FLORENCE, the vessel regularly conducted longline fishing operations in waters between three and 200 miles offshore of the Hawaiian Islands.

11. Other pelagic species regularly caught by the F/V KULA KAI while fishing in the United States EEZ, and aboard the F/V BUCCANEER more than three nautical miles offshore of the Hawaiian

Islands were yellowfin tuna (Thunnus albcacares) and mahimahi (Coryphaena hippurus).

George Lorian Costa Jr
GEORGE LORIAN COSTA, JR.

Subscribed and sworn to before me
this 20th day of April, 1989

Notary Public, State of Hawaii

My commission expires: 4/03/92

LS

AFFIDAVIT OF LOUIS M. PAULO, SR.

Louis M. Paulo, Sr., first being duly sworn upon oath deposes and says:

1. He is a resident of the State of Hawaii, and maintains his residence at the following address: P. O. Box 441, Honaunau, Hawaii 96726, and that his residence is physically located at Milolii, Hawaii.

2. He is 55 years of age, and was born on April 13, 1934 at Hoopuloa, Hawaii and is the natural son of Sarah Kakalina Hulama and Peter Paulo.

3. He is of 100 percent Hawaiian ancestry.

4. That his mother, Sarah Kakalina Hulama, was of 100 percent Hawaiian ancestry.

5. That his father, Peter Paulo, was of 100 percent Hawaiian ancestry.

6. That he began his fishing career in 1942, when at eight years of age, he assisted his father, uncle, and ohana (extended fxamily) in catching opelu or cigar mackerel (Decapterus pinnulatus) and moano or goatfish (Parupeneus multifasciatus) from a canoe with three fishermen in waters one quarter mile off Milolii, Hawaii. He also assisted in catching aku or skipjack tuna (Katsuwonus pelamis) and ahi or yellowfin tuna (Thunnus albacares) by trolling with pearl shell lures from a canoe in waters more than three miles offshore of Milolii. He continued to fish from a canoe off Milolii until 1946

7. In 1946, at 12 years of age, he became a full time commercial fisherman aboard the 38 foot long longline fishing

vessel SANTA MARIA, which fished for the following pelagic species in waters more than three miles off the Kona coast, Hawaii Island: aku (skipjack tuna), ahi (yellowfin tuna), ahi or bigeye tuna (I. obesus), ahipalaha or albacore tuna (I. alalunga), marlin or a'u (Makaira sp.), a'u ku or broadbill swordfish (Xiphius gladius), mahimahi (Coryphaena hippurus), and sharks (Family Carcharhinidae). He continued fishing aboard the SANTA MARIA until 1948.

8. During 1948 - 1950 he was a fisherman aboard the longline fishing vessel LEILANI (Capt. Frank Manalili) fishing for the pelagic species described in paragraph seven, above, in waters more than three miles offshore of the windward coast of Hawaii Island (i.e., Hilo, Hamakua, Cape Kumakahi).

9. During 1950 - 1952 he was a skilled fisherman with the Pacific Oceanic Fisheries Investigations (later U. S. National Marine Fisheries Service) aboard the fishery research vessels JOHN R. MANNING and CHARLES H. GILBERT, which carried out fishery, biological, and oceanographic research in the central, north, south, and western Pacific.

10. From 1953 -1958 he was a commercial fisherman aboard the longline fishing vessel NAALEHU MARU (Capt. Frank Paulo), which fished for the pelagic species described in paragraph seven, above, in waters more than three miles offshore of the windward coast of Hawaii Island.

11. In 1959 he was the captain of the longline fishing vessel IWALANI, which fished for the pelagic species described in paragraph seven, above, in waters more than three miles offshore of the windward coast of Hawaii Island.

12. During 1960 - 1965 he was employed in the construction industry in Honolulu, Hawaii. In 1966 he was disabled due to an industrial accident.

13. In 1971 he returned to Milolii and since then has been a commercial fisherman using a small boat (19 feet long) while fishing for opelu, aku, ahi (yellowfin tuna), bottomfish such as opakapaka or pink snapper (Pristipomoides filamentosus) and onaga or red snapper (Etelis coruscans) in waters 600 to 900 feet deep (100 to 150 fathoms) in waters off Milolii. He also fishes for aku and ahi (yellowfin tuna) by trolling and for ahi (yellowfin tuna) and ahipalaha (albacore tuna) by the ika shibi method (deepwater handlining using squid as bait) in waters more than three miles offshore of Milolii. He also fishes for ahi (yellowfin tuna) by the the palu ahi method (palu = chum released at depth + a deepsea fishing line) in waters five miles offshore of Milolii, and at night for u'u or squirrel fish (Myripristis sp.) in waters less than three miles offshore of Milolii.

Louis M. Paulo Sr.
LOUIS M. PAULO, SR.

Subscribed and sworn to before me
this 29th day of September, 1989

Helen M Nozaki
Notary Public, State of Hawaii

My commission expires: 1/4/93

AFFIDAVIT OF CLARENCE HOOKALA

Clarence Hookala, being first duly sworn upon oath deposes and says:

1. He is a resident of the State of Hawaii, and maintains his residence at 1321 Aala Street (#203), Honolulu, Hawaii 96817.

2. He is 49 years of age, and was born on August 4, 1939, in Waialua, Oahu, Hawaii, and is the natural son of Daniel Hookala, Sr., and Annie Kaninau.

3. He is of part Hawaiian ancestry, being of 50 percent Hawaiian ancestry, and of 50 percent Japanese ancestry.

4. That his mother, Annie Kaninau, was of 100 percent Hawaiian ancestry.

5. That his father, Daniel Hookala, Sr. was of 100 percent Japanese ancestry.

6. That he is self employed as a commercial fisherman, and since 1982 has been the owner and captain of the F/V NA ALII KAI (official number 504-437), specializing in bottomfishing and trolling for pelagic species. Since owning the F/V NA ALII KAI, the grounds he has fished have been in the United States Exclusive Economic Zone (EEZ) located in the following waters of the Main Hawaiian Islands (MHI): Penguin Banks (between Oahu and Molokai Islands), off Molokai Island, and off Maui Island.

7. That the species usually caught while bottomfishing from the F/V NA ALII KAI are the following: opakapaka (pink snapper),

onaga (long tail snapper), kalekale (snapper), ehu (squirrel fish snapper), lehi (silver jaw jobfish), uku (grey snapper), white ulua (giant travally), black ulua (black travally), butaguchi (pig lipped ulua/travally), hapuupuu (seabass), and kahala (amberjack).

8. That the F/V NA ALII KAI also caught pelagic species while trolling in the EEZ such as yellowfin tuna, skipjack tuna, mahimahi, ono (wahoo), and marlin while transiting to and from the bottomfishing grounds.

9. That from 1980 - 1982 he was employed as a commercial fisherman and was the captain of the F/V KOKO, and engaged in bottomfishing in the EEZ in waters of Penguin Banks, and around the following MHI: Maui Island, Molokai Island, Niihau Island, Kaula Island, and also conducted trolling for pelagic species in EEZ waters while transiting to and from the bottomfishing grounds, and that the species of fish caught bottomfishing and trolling were the same as those listed in paragraph numbers (7) and (8), above.

10. That from 1976 - 1980 he was a self employed commercial fisherman and was the owner and captain of the F/V LADY KANIALA which conducted bottomfishing and trolling (while transiting to and from the bottomfishing grounds) for pelagic species in the following EEZ waters: Penguin Banks, and in waters off Maui and Molokai Islands, and that the species of fish caught bottomfishing and trolling aboard the F/V LADY KANIALA were the same as listed in paragraph numbers (7) and (8), above.

11. That from 1974 - 1976 he was employed as a commercial fisherman (crew member) aboard the sport fishing charter boat F/V

COREENE C, which fished for pelagic species by trolling. While aboard the F/V COREENE C, the grounds usually fished were waters more than three miles offshore as follows: Penguin Banks, off Honolulu, and off the Waianae coast, Oahu Island, and that the pelagic species usually caught while trolling were skipjack tuna, yellowfin tuna, blue and striped marlin, ono (wahoo), mahimahi, and sharks.

Clarence Hookala
CLARENCE HOOKALA

Subscribed and sworn to before me
this 16th day of June, 1989

Lorna A. Tabai
Notary Public, State of Hawaii

My comission expires: 03/21/92

L.S.

AFFIDAVIT OF CHARLES K. LESLIE

Charles K. Leslie, being first duly sworn upon oath deposes and says:

1. He is a resident of the State of Hawaii, and maintains his residence at the following address: Rural Route #1, Box 180, Captain Cook, Hawaii 96704.

2. He is 48 years of age, and was born on May 7, 1941 at Napoopoo, Hawaii, and is the natural son of Henry A. Leslie, Jr., and Mary Leslie.

3. He is of part Hawaiian ancestry, being of approximately 62 percent Hawaiian ancestry, 25 percent Caucasian ancestry, and 13 percent Chinese ancestry.

4. That his father, Henry A. Leslie, Jr., is of 50 percent Hawaiian ancestry, and 50 percent Caucasian ancestry.

5. That his mother, Mary Leslie, is of 75 percent Hawaiian ancestry, and 25 percent Chinese ancestry.

6. That he began his fishing career in 1948, when at seven years of age, he assisted his father on weekends as a crewman aboard the fishing vessel PEARL HARBOR. He was a part time fisherman on the PEARL HARBOR until the mid 1960's, when the PEARL HARBOR was sold. During this time, the PEARL HARBOR primarily fished for the following pelagic species by the longline method in waters more than three miles off the Kona Coast, Hawaii Island: ahi or yellowfin tuna (Thunnus albacares), ahi or bigeye tuna (T. obesus), ahipalaha or albacore tuna (T. alalunga), a'u or marlin (Makaira sp.), a'u ku or broadbill swordfish (Xiphius gladius), kaku or barracuda (Sphryaena barracuda), mahimahi (Coryphaena

hippurus), and sharks (family Carcharhinidae). The PEARL HARBOR also caught aku or skipjack tuna (Katsuwonus pelamis) and mahimahi more than three miles offshore via the trolling method while enroute to and from the longline fishing grounds. During this period, he also assisted the Leslie family's fishing activities by helping to catch opelu (Decapterus pinnulatus) from a 24 foot long boat one quarter mile offshore of Napoopoo for use as bait to catch ahi and other pelagic species from the PEARL HARBOR.

7. From the mid 1960's, when his father acquired the longline fishing vessel HOLOKOHANA I, until 1970, he contined to be both a part time and full time commercial fisherman aboard the HOLOKOHANA I, which fished for those species described in paragraph 6, above.

8. From 1970 - 1979 he was the full time captain of the HOLOKOHANA I.

9. From late 1979 to the present, he has been the full time captain of the HANALIKE, a 56 foot long longline fishing vessel which was acquired in 1979 for the family's fishing activities. The HANALIKE fishes for the pelagic species described in paragraph 6 above, in waters more than three miles off of the Kona coast, Hawaii Island, and also in waters above the McCall and Cross seamounts, which are in the United States Exclusive Economic Zone in waters more than 100 miles offshore.

10. During the years 1977 - 1980, he also fished for ahi (yellowfin tuna) via the trolling method in a small boat 19 feet

long in waters more than three miles off of Napoopoo, Hawaii Island.

Charles K Leslie
CHARLES K. LESLIE

Subscribed and sworn to before me
this 23rd day of October, 1989

Helen M Nagata
Notary Public, State of Hawaii

My commission expires: 1/4/93

AFFADAVIT OF BARRINGTON G. M. BLOMFIELD

Barrington G. M. Blomfield, being first duly sworn upon oath deposes and says:

1. He is a resident of the state of Hawaii, and maintains his residence at 66-377B Haleiwa Road, Haleiwa, Hawaii 96712.

2. He is 43 years of age, and was born on February 16, 1946 in Kahuku, Oahu, Hawaii, and is the natural son of Valentine B. Blomfield and Emma M. Blomfield.

3. He is of part Hawaiian ancestry, being of 25 percent Hawaiian ancestry, and 75 percent Caucasian ancestry.

4. That his mother, Emma M. Blomfield, is of 50 percent Hawaiian ancestry, and 50 percent Caucasian ancestry.

5. That his father, Valentine B. Blomfield, was of 100 percent Caucasian ancestry.

6. That he is employed as a fireman with the Fire Department of the City and County of Honolulu.

7. That at present he is a part time commercial fisherman, and that in the past he has been both a full time and part time commercial fisherman, as well as a recreational fisherman.

8. That during 1971 through 1977 he fished for reef fish within three miles offshore of Oahu, Molokai, Maui, Lanai, and Hawaii Islands, using a Boston Whaler type boat and using gill nets, surround nets, and spears.

9. That off and on during the years 1977 through 1981, he harvested black corals (Antipathes sp.) in waters more than three miles offshore (e.g., in the Fedederal Exclusive Economic Zone)

between Molokai, Maui, and Lanai Islands. These black corals were harvested by scuba diving to depths from 140 to 260 feet.

10. That during 1984 he engaged in fishing via traps for ono shrimp (Heterocarpus sp.) in waters more than three miles offshore of Haleiwa, Oahu (usually about 10 - 14 miles offshore) in water about 1,800 feet deep, and that he also fished for ono shrimp in waters less than three miles offshore of Waianae, Oahu, and that he was a crew member aboard a 24 ft. fishing vessel.

11. That since 1984, he has been a part time commercial fisherman and occasional recreational fisherman neting reef fish, spearing reef fish, and trapping fish various crustaceans in waters less than three miles offshore of Oahu Island.

Barrington G. M. Blomfield

BARRINGTON G. M. BLOMFIELD

Subscribed and sworn to before me
this 18 day of August, 1989

Notary Public, State of Hawaii

My commission expires: 12-12-89

AFFIDAVIT OF CLAYTON K. CHING

Clayton K. Ching, being first duly sworn upon oath deposes and says:

1. He is a resident of the State of Hawaii, and maintains his residence at 483-B Ilio Road, Kaunakakai, Hawaii 96848.

2. He is 42 years of age, and was born on August 17, 1947, and is the natural son of Buddy W. Ching and Esther Amano.

3. He is of part Hawaiian ancestry, being of 12.5 percent Hawaiian ancestry, 75 percent Chinese ancestry, and 12.5 percent Caucasian ancestry.

4. That his father, Buddy W. Ching, is of 100 percent Chinese ancestry.

5. That his mother, Esther Amano, is of 25 percent Hawaiian ancestry, 50 percent Chinese ancestry, and 25 percent Caucasian ancestry.

6. That he is a self employed part time commercial fisherman, and that he is also employed by the Hawaiian Telephone Company.

7. That since 1978, as a commercial fisherman, he has been the owner and captain of the F/V HALLELUJAH, a 19 ft. long Reinell boat which he fishes in waters more than three miles offshore in the United States Exclusive Economic Zone (EEZ or 200 mile fishing zone).

8. That from 1978-1981 he has fished in EEZ waters more than three miles offshore of Molokai and Lanai Islands by the trolling method for the following species of pelagic fish: aku (skipjack

tuna), ahi (yellowfin tuna), a'u (marlin), kawakawa (little tuna), ono (wahoo), and mahimahi (dolphinfish).

9. That during 1981 he fished by handline in waters less than three miles offshore south of Molokai Island for akule (big eyed scad), opelu (mackerel scad), uku (grey snapper), and uluas (jacks/trevallys).

10. That since 1984, he has fished for the following species of bottomfish by handline in EEZ waters more than three miles offshore of Molokai Island on Penguin Banks, and in EEZ waters more than three miles offshore southeast of Molokai: opakapaka (pink snapper), onaga (red snapper) ehu (squirrel fish snapper), lehi (dark red snapper/silver jaw job fish), uku (grey snapper), hapuupuu (sea bass), kahala (amberjack), white ulua (giant trevally), and omilu (blue trevally).

Clayton K. Ching
CLAYTON K. CHING

Subscribed to and sworn to before me
this 24th day of October, 1989

Linda H. Chinn
Notary Public, State of Hawaii

My commission expires: 10-29-92

AFFIDAVIT OF FRANK A MEDEIROS, JR.

Frank A. Medeiros, Jr., being first duly sworn upon oath deposes and says:

1. He is a resident of the State of Hawaii, and maintains his residence at 4474 Kukuihale Street, Anahola, Hawaii 96703.

2. He is 39 years of age and was born on September 3, 1950 in Lihue, Kauai, Hawaii, and is the natural son of Frank A. Medeiros, Sr., and Rose L. Medeiros.

3. He is of part Hawaiian ancestry, being of 25 percent Hawaiian ancestry, 50 percent Caucasian ancestry, and 25 percent Puerto Rican ancestry.

4. That his mother, Rose L. Medeiros, is of 50 percent Hawaiian ancestry, and 50 percent Puerto Rican ancestry.

5. That his father, Frank A. Medeiros, Sr., is of 100 percent Caucasian ancestry.

6. That he is a part time commercial fisherman and is also employed as a fireman with the Kauai County Fire Department.

7. That he began his fishing career in 1957, when at seven years of age, he accompanied his grandfather and other members of his ohana (extended family) aboard a 24 foot long boat while fishing by trolling in waters more than three miles offshore of Kauai Island for aku (skipjack tuna), ahi (yellowfin tuna), mahimahi (dolphinfish), ono (wahoo) and a'u (marlin), and that he fished with his ohana on this boat intermittently from 1957 - 1965.

8. That during 1965 he also fished aboard the HAPA HAOLE, a 17 foot long boat, and aboard the F/V KALELEO (Capt. Goodhue), a

28 foot long vessel, both of which fished by bottomfishing for onaga (red snapper) uku (grey snapper), kahala (amberjack), and ulua (trevally), and by trolling for aku, ahi, mahimahi, ono, kaku (barracuda) and a'u in waters less than three miles offshore of Kauai Island.

9. That his career as a commercial fisherman began in 1974 when he fished by bottomfishing from his 19 foot long boat ELEU during the years 1974 - 1983 for uku, ulua, kahala, and onaga; by trolling for aku, ahi, mahimahi, ono, and kaku; and for ahi by the ika shibi (midwater handline at night) and palu ahi (palu = chum for bait + a deepsea line) methods - all in waters less than three miles offshore of Kauai Island.

10. That in 1983 he became the owner of a 30 foot long Radon fishing vessel also named ELEU, from which he has fished until the present time by trolling for aku, ahi, mahimahi, ono, and a'u, and by bottomfishing for onaga, opakapaka (pink snapper), ulua, and kahala - all in waters more than three miles offshore of Kauai, Niihau, Lehua, and Kaula Islands.

Frank A. Medeiros Jr.
FRANK A. MEDEIROS, JR.

Subscribed and sworn to before me
this 23rd day of October, 1989

Notary Public, State of Hawaii

My commission expires: 10/30/92

AFFIDAVIT OF GARRY D. KAAIHUE

Garry D. Kaaihue, being first duly sworn upon oath deposes and says:

1. He is a resident of the State of Hawaii, and maintains his residence on Enoki Place, Hanapepe, Kauai, Hawaii, and that his mailing address is P. O. Box 675, Hanapepe, Hawaii 96716.

2 He is 35 years old, and was born on September 10, 1954 in Pahala, Hawaii, and is the natural son of Isaiah Kala Kaaihue and Laura Panila Keanu Kaaihue.

3. He is of 100 percent Hawaiian ancestry.

4. That his father, Isaiah Kala Kaaihue is of 100 percent Hawaiian ancestry.

5. That his mother, Laura Panila Keanu Kaaihue, was of 100 percent Hawaiian ancestry.

6. That his regular occupation is as a full time commercial fishermen, and that he occasionally works in the construction industry.

7. That his career as a commercial fisherman began in 1968, and during the years 1968 - 1971 he fished from a small boat in waters less than three miles offshore of South Point, Hawaii Island by trolling for aku (skipjack tuna), ahi (yellowfin tuna), kawakawa (little tuna), ono (wahoo), and kaku (barracuda), and by the palu ahi method (palu = chum or bait released at depth + a deepsea fishing line) for ahi (yellowfin tuna) and ahipalaha (albacore tuna).

8. That during 1972 - 1974 he was a commercial fisherman aboard the F/V ELECTA (Capt. Albert Grace) which fished for aku by

the pole and line method using live bait in Exclusive Economic Zone (EEZ) waters more than three miles offshore of Oahu, Molokai, Maui, and Kauai Islands.

9. That during 1975 -1979 he worked in construction on Hawaii Island.

10. That during 1980 - 1984 he was a commercial fisherman aboard the F/V TRADEWIND (Capt. Albert Grace) which fished for aku in the manner and locations given in paragraph 8, above.

11. That during 1984 - 1985 he was a commercial fisherman aboard the longliners F/V LIKELIKE, F/V VIKING, and F/V DRIFTWOOD which fished for ahi (yellowfin tuna), ahi (bigeye tuna), ahipalaha (albacore tuna), mahimahi (dolphinfish), a'u (marlin), a'u ku (broadbill swordfish), ono, and opah (moonfish) in EEZ waters more than three miles offshore of all the main Hawaiian Islands, including waters above the Cross Seamount south of Hawaii Island.

12. That during 1986 - 1988 he was the captain of the F/V AIKANE 49 and F/V ST. PETER, bottomfishing vessels which fished in EEZ waters of the Ho'omalu Zone of the Northwestern Hawaiian Islands as far west as Gardner Pinnacles and also in EEZ waters more than three miles offshore of Nihoa Island for the following bottomfish species: opakapaka (pink snapper), onaga (red snapper), ehu (squirrel fish snapper), kalekale (snapper), uku (grey snapper), butaguchi (thick lipped trevally), and hapupuu (seabass).

13. That during 1988 he also was a commercial fisherman aboard the F/V PATTY ANN (Capt. Bill Mustard) which fished for the bottomfish species listed in paragraph 12, above, in EEZ waters more than three miles offshore of Kaula Island and also at Middle

Bank, which is located approximately halfway between Kauai and Nihoa Islands.

14. That during 1989 he has worked in the construction industry, but intends to return to being a full time commercial fisherman fishing Hawaiian waters.

Garry D. Kaaihue

GARRY D. KAAIHUE

Subscribed and sworn to before me
this 31st day of October, 1989

Notary Public, State of Hawaii

My commission expires: 4-28-90

AFFIDAVIT OF DANE A. JOHNSON

Dane A. Johnson, being first duly sworn upon oath deposes and says:

1. He is a resident of the State of Hawaii, and maintains his residence at 95-170 Kipapa Drive (#47), Mililani, Hawaii 96789.

2. He is 29 years of age, and was born on July 12, 1959 in San Diego, California, and is the natural son of Rockne H. Johnson and Rubellite K. Johnson.

3. He is of part Hawaiian ancestry, being of 25 percent Hawaiian ancestry, and of 75 percent combined Caucasian and Chinese ancestry.

4. That his mother, Rubellite K. Johnson, is of 50 percent Hawaiian ancestry, and 50 percent combined Caucasian and Chinese ancestry.

5. That his father, Rockne H. Johnson, is of 100 percent Caucasian ancestry.

6 He is employed as a commercial fisherman and is the captain and master of the F/V KAWAMEE (official number 253-322); that he has been the captain of the F/V KAWAMEE since 1981, and that prior to becoming captain of the F/V KAWAMEE, he was employed as a commercial fisherman aboard the F/V KAWAMEE from 1977 to 1981.

7. That the F/V KAWAMEE has a Federal permit (number BH-89-007) which permits it to fish for bottomfish in the Ho'omalu Zone of the United States Exclusive Economic Zone (EEZ) in the waters around the Northwestern Hawaiian Islands (NWHI) and that the Ho'omalu Zone grounds usually fished by the F/V KAWAMEE extend from Middle Bank to Pearl and Hermes Reef.

8. That the species of bottomfish caught by the F/V KAWAMEE while fishing in the Ho'omalu Zone include the following: opakapaka (pink snapper), onaga (long tail snapper), kalekale (snapper), ehu (squirrel fish snapper), lehi (silver jaw jobfish), uku (grey snapper), white ulua (giant travally), black ulua (black travally), butaguchi (pig lipped ulua/travally), hapuupuu (seabass), and kahala (amberjack).

9. That the F/V KAWAMEE has also caught other pelagic species such as yellowfin tuna, mahimahi, ono (wahoo), and marlin while trolling in the Ho'omalu and Mau Zones of the NWHI while transiting to and from the bottomfishing grounds in the Ho'omalu Zone.

10. That while aboard the F/V KAWAMEE he has also engaged in the following fisheries in the EEZ around the Main Hawaiian Islands (MHI): trapping for shrimp (Heterocarpus sp.) in waters outside of Honolulu; bottom netting for Kona crab on Penguin Banks, a shallow area in the EEZ between Oahu and Molokai Islands; and using the ika-shibi technique (midwater handline) to catch pelagic tunas in waters off Hilo, Hawaii Island.

11. He has also been employed as a commercial fisherman aboard the following vessel: F/V KEAWE during part of 1977 (trapping Heterocarpus sp. shrimp and bottomfishing in EEZ waters off Honolulu); F/V FERESA during part of 1981 (bottomfishing and trolling in EEZ waters of the NWHI); F/V HAOLE QUEEN during part of 1982 (bottomfishing near Kaula Island); and the F/V E.T. during part of 1984 (bottomfishing in EEZ waters of the NWHI).

Dane A. Johnson

DANE A. JOHNSON

Subscribed and sworn to before me
this 16th day of June, 1989

Henry W C Lo

Notary Public, State of Hawaii

My commission expires: 12/16/92

AFFIDAVIT OF MOANA ALQUIZA

Moana Alquiza, being first duly sworn upon oath deposes and says:

1. She is a resident of the State of Hawaii, and maintains her residence at 4867 Koho Road, Hanapepe, Hawaii 96716.

2. She is 29 years of age, and was born on August 2, 1960, in Escondido, California, and is the natural daughter of Percy Kinimaka and Aline Payne.

3. She is of 50 percent Hawaiian ancestry, and 50 percent Caucasian ancestry.

4. That her father, Percy Kinimaka, was of 100 percent Hawaiian ancestry.

5. That her mother, Aline Payne, is of 100 percent Caucasian ancestry.

6. That at the present time she is the owner and general manager of Kauai Fishing Company, Hanapepe, Hawaii, which is a wholesaler, distributor, and exporter of fresh fish, and is the owner of the F/V LEI MOANA, a 24 foot long Radon fishing vessel.

7. That the Kauai Fishing Company was formerly known as Aukai, Inc.

8. That her commercial fishing career began in 1985 when she was crew aboard the F/V MARYNICK, a 24 foot long vessel that fished in waters more than three miles offshore of Kauai and Niihau Islands by trolling for aku (skipjack tuna), ahi (yellowfin tuna), kawakawa (little tuna), mahimahi (dolphinfish), ono (wahoo), and a'u (marlin), and for ahi by the ika shibi method (midwater handline at night), and that she was a fisherwoman

aboard the F/V MARYNICK during the years 1985 - 1988 on a part time basis.

9. That during the years 1987 - 1989, she has also been a fisherwoman on a part time basis on the F/V LEI MOANA, which fished by trolling and by the ika shibi method for the species listed in paragraph 8, above, in waters more than three miles offshore of Kauai and Niihau Islands.

MOANA ALQUIZA

Subscribed and sworn to before me
this 12th day of October, 1989

Notary Public, State of Hawaii

My commission expires: 4-28-90

AFFIDAVIT OF GEORGE L. COSTA, III

George L. Costa, III, being first duly sworn upon oath deposes and says;

1. He is a resident of the State of Hawaii, and maintains his residence at 241-B South Vinyard Street, Honolulu, Hawaii 96813.

2. He is 28 years of age, and was born on March 25, 1961 in Honolulu, Hawaii, and is the natural son of George L. Costa, Jr., and Emily Costa.

3. He is of part Hawaiian ancestry, being approximately 60 percent Hawaiian ancestry, and approximately 40 percent combined Chinese and Caucasian (Portuguese) ancestry.

4. That his mother, Emily Costa (Mrs. George L. Costa, Jr.), is of 100 percent Hawaiian ancestry.

5. That his father, George L. Costa, Jr., is of approximately 25 percent Hawaiian ancestry, and approximately 75 percent combined Chinese and Causcasian (Portuguese) ancestry.

6. He is employed as a commercial fisherman and is the captain and master of the F/V KULA KAI (official number 254-011) and that he has been the captain of the F/V KULA KAI since October, 1984, and that prior to becoming captain of the F/V KULA KAI, he was employed as a commercial fisherman aboard the F/V KULA KAI since 1979.

7. That the F/V KULA KAI is primarily engaged in the live bait fishery for skipjack tuna (Katsuwonus pelamis), known as "aku" in the Hawaiian language.

8. Prior to being employed aboard the F/V KULA KAI, he was employed as a commercial fisherman for about three weeks in 1979 aboard the F/V HAZEL MARIE (official number 579-795), which at that time fished for tuna and other pelagic species such as marlin, mahimahi, and sharks using the longline fishing method.

9. While fishing for skipjack tuna aboard the F/V KULA KAI, the vessel customarily and regularly conducted fishing operations within the Exclusive Economic Zone (EEZ) of the United States, aforesaid EEZ being from three to 200 miles offshore in waters around the State of Hawaii. While he has been a fisherman aboard the F/V KULA KAI, fishing ocurred in the EEZ beyond three nautical miles offshore of the following islands of the State of Hawaii: Oahu, Kauai, Molokai, and Niihau. With reference to fishing near Niiahu Island while he was aboard the F/V KULA KAI, fishing occasionally occurred 20 to 25 miles west of Niihau Island.

10. While employed aboard the F/V HAZEL MARIE, the vessel regularly conducted longline fishing operations in the United States EEZ.

11. Other pelagic species regularly caught by the F/V KULA KAI while fishing in the United States EEZ were yellowfin tuna (Thunnus albacares) and mahimahi (Coryphaena hippurus).

GEORGE L. COSTA III

Subscribed and sworn to before me
this 14th day of April, 1989

Notary Public, State of Hawaii

My commission expires: 4/03/92

L.S.

AFFIDAVIT OF CHRISTOPHER T. M. O'LEARY

Christopher T. M. O'Leary, being first duly sworn upon oath, deposes and says:

1. He is a resident of the State of Hawaii and maintains his residence in Kailua-Kona, Hawaii Island, and that his mailing address is P. O. Box 3480, Kailua-Kona, Hawaii 96745.

2. He is 24 years of age, and was born on May 3, 1965 in Tacoma, Washington, and is the natural son of Thomas G. O'Leary and Roberta I. O'Leary.

3. He is of part Hawaiian ancestry, being 25 percent Hawaiian ancestry and 75 percent Caucasian ancestry.

4. That his mother, Roberta I. O'Leary, is of 50 percent Hawaiian ancestry, and 50 percent Caucasian ancestry.

5. That his father, Thomas G. O'Leary, is of 100 percent Caucasian ancestry.

6. That he began his career as a Hawaii commercial fisherman during the period December, 1985 - November, 1986, when he was a fisherman aboard the F/V ALEUTIAN SPRAY fishing in the U. S. Exclusive Economic Zone (EEZ) in waters more than three miles offshore of the Northwestern Hawaiian Islands for the two spined spiny lobster, or red Hawaiian lobster, and also for slipper lobsters.

7. That during the period April, 1987 - December, 1987 he was also a commercial fisherman aboard the F/V PETITE ONE, which fished for the red Hawaiian two spined spiney lobster and also for

slipper lobsters in the EEZ of the Northwestern Hawaiian Islands in waters more than three miles offshore.

7. That during part of 1988 he was a commercial fisherman in Alaska.

8. That during the period November, 1988 to November, 1989, he has been a commercial fisherman aboard the F/V ARCHER, which also fished for the red Hawaiian two spined spiny lobster and slipper lobsters in EEZ waters more than three miles offshore of the Northwestern Hawaiian Islands. During this same period, he also participated in fishing for pelagic species by the longline method aboard the F/V ARCHER in EEZ waters more than three miles offshore mainly around the Main Hawaiian Islands. Pelagic species caught by the F/V ARCHER by longlining while he was aboard include ahi (yellowfin tuna), ahi (bigeye tuna), ahipalaha (albacore tuna), a'u (blue and black marlin), a'uki (striped marlin), a'u ku (broadbill swordfish), mahimahi, and various species of sharks.

Christopher T. M. O'Leary

Christopher T. M. O'Leary

Suscribed and sworn to before me
this 14th day of November, 1989

Notary Public, State of Hawaii

My commission expires 4.5.92

AFFIDAVIT OF WILLIAM KAWIKA MONIZ

William Kawika Moniz, being first duly sworn upon oath deposes and says:

1. He is a resident of the State of Hawaii, and maintains his residence on Kaumakani Avenue, Kaumakani, Hawaii, and that his mailing address is P. O. Box 272, Kaumakani, Hawaii 96747.

2. He is 22 years of age, and was born on June 21, 1967, in Waimea, Kauai, Hawaii and is the natural son of Gilbert Moniz and Luella Moniz.

3. He is approximately 38 percent Hawaiian ancestry, 56 percent Caucasian ancestry, and six percent Cherokee Indian ancestry.

4. That his mother, Luella Moniz, is approximately 75 percent Hawaiian ancestry, 12.5 percent Caucasian ancestry, and 12.5 percent Cherokee Indian ancestry.

5. That his father, Gilbert Moniz, is 100 percent Caucasian ancestry.

6. That he is a full time commercial fisherman.

7. That his fishing career began in 1983 when he was crew on the F/V RENEE M., a 17 foot long boat, that fished by the trolling method in Exclusive Economic Zone (EEZ) waters more than three miles offshore of Kauai Island for aku (skipjack tuna), ahi (yellowfin tuna), kawakawa (little tuna), mahimahi (dolphinfish), ono (wahoo), and a'u (marlin), and that he also fished by

bottomfishing in waters less than three miles from Kauai Island for onaga (red snapper), ehu (squirrel fish snapper), kalekale (snapper), taape (blue lined snapper) and ulua (trevally or jack).

8. That since 1983 he has also been a commercial fisherman aboard the F/V LEI MOANA, a 24 foot long vessel that fished by the ika shibi method (midwater handline fishing at night) for ahi (yellowfin tuna), ahipalaha (albacore tuna), and sharks in waters more than three miles offshore of Kauai Island.

9. That during 1986 - 1989 he has also been a fisherman aboard the following fishing vessels:

a. The F/V PI'I OLA (Capt. Bill Strickland), a 45 foot long vessel which fished by bottomfishing in waters more than three miles offshore of Nihoa Island for the following bottomfish species: onaga, opakapaka (pink snapper), ehu, kalekale, hapuupuu (seabass), butaguchi (pig lipped trevally), and ulua (trevally), and by trolling in EEZ waters near the weather buoy approximately 25 miles northwest of Nihoa Island for aku, ahi, ono, and a'u.

b. The F/V FORTUNA (Capt. Bill Strickland), a 49 foot long vessel which fished by trolling for aku, ahi, ono, and a'u around the weather buoy northwest of Nihoa Island, and by trolling for the same species more than three miles offshore of Kauai Island.

10. That during 1988 - 1989 he has also been a fisherman aboard the F/V LEI ALANA (Capt. Lester Goo), a 40 foot long vessel that fished in EEZ waters between Kauai Island and Nihoa Island by trolling for aku, ahi, ono, and a'u, and by the palu ahi

method (palu = chum or bait released at depth + a deepsea fishing line) for ahi and a'u.

William K. Moniz
WILLIAM KAWIKA MONIZ

Subscribed and sworn to before me
this 25 day of October, 1989

Edna Z. Kawamura
Notary Public, State of Hawaii

My commission expires: 8/3/92

Appendix E. Annotated bibliography of fish remains in archaeological reports

O'ahu (OA)

Ayres, William S. 1970. *Archaeological survey and excavations Kamana-Nui Valley, Moanalua ahupua'a, South Halawa Valley, Halawa ahupua'a.* DRS 70-8.

P.45, Table 4, "Midden content of test pits in sites B1-51 and B1-55" reports fish bone from site B1-51 (HRHP 50-80-10-674), but it is not identified more specifically.

Athens, Stephen. 1983. Archaeological excavations on the Pohakupa-Kukanono slope, Kawainui marsh, Oahu. BPBM Ms 033183.

Appendix C, by Sara Collins, reports fish remains. Scaridae is identified.

Athens, Stephen. 1983. Archaeological excavations at a beach midden deposit, Kailua, O'ahu: The H.A.R.C. site (50-Oa-G6-40). BPBM Ms 022583.

Pp.36-38, Table 6a presents concentration indices of fish remains. Scaridae identified.

Athens, J. Stephen, and Kanalei Shun. 1982. Archaeological test excavations and mapping near Waimea Bay, O'ahu. BPBM Ms 021282.

Appendix C, by Sara Collins, identifies Sparidae and Labridae.

*Barrera, William, Jr. 1974. Preliminary archaeological investigations at Kualoa, Oahu. Report prepared for the Office of Human Resources, City and County of Honolulu.

P.33, fish remains include mouth parts of Scaridae, Diodontidae, and Isuridae.

Barrera, William, Jr. 1984. Archaeological services during installation of five replacement antennas at Bellows AFS, Oahu, Hawaii. Chiniago.

Appendix VI reports fishbone. Scaridae and Balistidae are identified.

Bath, Joyce E., Margaret L.K. Rosendahl, and Paul H. Rosendahl. 1984. Subsurface archaeological reconnaissnce survey, Kuilima Resort expansion project, lands of Opana, Kawela, Hanakaoe, Oio, Ulupehupehu, Punalau and Kahuku, Koolauloa, Island of Oahu. PHRI 137-100784.

P.43, Table 5, "Qualitative summary of midden remains," indicates that fish remains were recovered. Fish remains are not identified more specifically.

*Chapman, Peter S. 1970. Excavation of site C4-168, a possible religious shrine. In *Makaha Valley historical project Interim Report No. 2*, edited by R.C. Green, 65-79. PAR 10.

P.75, fish vertebrae and a single shark tooth are identified. Fish remains are not identified more specifically.

P.76, the principal cultural deposits at the site date to the period AD 1250-1630.

*Clark, Stephan D. 1987. Archaeological monitoring of the makai parking garage, corner of Punchbowl and Halekauwila Streets (TMK 2-1-31:23), Honolulu, O'ahu, State of Hawai'i. BPBM Ms 090287.

P.79, aku (*Katsuwonus pelamis*) recovered from "the feature 24 pit." Feature 24 pit may date to AD 1290-1410.

*Clark, Stephan Dane, and Mary Riford. 1986. Archaeological salvage excavations at site 50-Oa-G5-101, Waikalua-Loko, Kane'ohe, Ko'olaupoko, O'ahu Island, Hawai'i. BPBM Ms 102386.

Pp. 87-95, fish remains recovered include Scaridae and shark.

Connolly, Robert D. 1980. Intensive sub-surface archaeological reconnaissance of the Laie Beach Park site, Laie, Island of Oahu. Archaeological Research Associates.

Pp. 57-58, Tables 4 and 5, fish present in Test Pits 4, 9, 10, and 11. Fish remains not identified more specifically.

Davis, Bertell D., and Alan E. Haun. 1987. Interim Report: Phase 2 - intensive survey and test excavations, West Beach data recovery program. PHRI 225-031986.

P.33 ff., Table 5, lists Labridae, Balistidae, and Monacanthidae.

Dye, Thomas S. 1977. Archaeological reconnaissance survey of Prudential Insurance Company lands near Kuilima Hyatt Resort, Kahuku, Oahu Island. BPBM Ms 100777.

P.5, Scaridae present.

*Hammatt, Hallett H., Douglas Borthwick, and David Shideler. 1985. Archaeological excavations at the Wai'anae Army Recreation Center, Poka'i Bay, Wai'anae, O'ahu, Hawai'i. CSH.

Pp. 123-124, preliminary examination of the fish bone revealed Monacanthidae, Scaridae, Acanthuridae, Labridae, Carangidae (*papio*), Carangidae (*akule*, *opelu*), and Carcharhinidae.

A charcoal sample from the undisturbed prehistoric stratum (II) yielded a corrected date of AD 1270-1410.

Hammatt, Hallett H., Douglas Borthwick, and David Shideler. 1986. Archaeological testing for a proposed water main replacement, Fort Kamehameha, Oahu, Hawaii. CSH.

P.64, Table 3, lobster and fishbone reported, but neither are identified more specifically.

*Hammatt, Hallett H., and William H. Folk II. 1981. Archaeological and paleontological investigation at Kalaeloa (Barber's Point), Honouliuli, 'Ewa, O'ahu. ARCH.

P.184, Scaridae, Labridae, Diodontidae, Balistidae, Monacanthidae, Acanthuridae, Elasmobranchii (sites 2787 and 2745), and Carangidae (ulua) (sites 9682 and 2745).

*Hammatt, Hammatt H., and David W. Shideler. 1989. Archaeological reconnaissance and subsurface testing of proposed project KNMD 773133, park complex, north coastal region of Bellows AFS, Waimanalo, O'ahu, Hawaii. CSH.

P.26 ff., faunal analysis indicates that fishbone was found along with crab and lobster. Scaridae identified.

Hommon, Robert J. and Robert F. Bevacqua. 1973. Excavations in Kahana Valley, Oahu, 1972. Hawaii Historic Preservation Report 73-1.

Appendix C notes presence of fishbone. Fishbone not identified more specifically.

*Estioko-Griffin, Agnes, and George W. Lovelace. 1980. Patterns of coastal adaptation in the ahupua'a of Keawa'ula: The archaeology of site 50-80-03-2802. Report prepared for DLNR.

P.133-137, Tables 4a-4e, identify Balistidae, Scaridae, Labridae, and shark teeth.

Kirch, Patrick V. 1979. *Late prehistoric and early historic settlement-subsistence systems in the Anahulu Valley, O'ahu*. DRS 79-2.

P.46, Acanthuridae spines identified.

Komori, Eric K. 1987. Archaeological survey and testing at Mauna Lahilahi, Wai'anae District, Island of O'ahu. BPBM Ms 120787.

P.48, Table 3, and p.62, Table 4 report fish bone. Fish bone is not identified more specifically.

Luscomb, Margaret, and Rowland Reeve. 1976. Archaeological surveillance and salvage during the electrical conduit excavations on the grounds of Iolani Palace, Honolulu, Oahu. BPBM Ms 020176.

Appendix B reports the presence and weight of fish remains, but these are not identified more specifically.

Shun, Kanalei. 1981. Phase I archaeological investigations near Waimea Bay, O'ahu. BPBM Ms 082881.

Appendix B, by Sara Collins, identifies Sparidae and Labridae.

Sinoto, Aki. 1976. A report on cultural resources survey at Barber's Point, Island of Oahu. BPBM Ms 122476.

P.64 ff., fishbone is not identified more specifically.

Sinoto, Aki. 1977. Archaeological surveillance and salvage during trenching and installation of service conduit for Iolani Palace. BPBM Ms 070677.

P.8, Table 3, reports fish remains, but they are not identified more specifically.

*Sinoto, Aki. 1978. Archaeological and paleontological salvage at Barber's Point, Oahu. BPBM Ms 030178.

P.56, "Although fish bone recovered is largely unidentified, tuna, a deep-water fish, was represented."

Smart, Colin. n.d. Site O5, Hawaii Kai cave shelter (HRHP 50-80-15-5). Typescript in SHPO.

Notes fish in appended faunal identification forms, but the fish remains are not identified more specifically.

Spilker, Charles J. 1974. Iolani Palace moat wall waterproofing project: Archaeological salvage. Report prepared for Friends of Iolani Palace.

Pp. 60-64, fish remains are not identified more specifically.

*Walker, Alan T., Alan E. Haun, and Paul H. Rosendahl. 1988. Intensive survey and test excavations, Site 50-Oa-2911, Kahuku Point archaeological area, Kuilima Resort expansion project, Land of Kahuku, Koolauloa, Island of Oahu. PHRI 215-061786.

P.109, "Fish taxa recovered in the project area include Labridae (wrasses), Scaridae (parrot fish), Monacanthidae (including *Pervagor spilosoma*, file fish), Cirrhitidae (hawk fish), Mullidae (goat fish), and shark [tooth]."

Walker, Alan T., Alan E. Haun, and Paul H. Rosendahl. 1988. Intensive survey and test excavations, Site 50-Oa-2899, Kawela Bay archaeological area, Kuilima Resort expansion project, Lands of Opana and Kawela, Koolauloa, Island of Oahu. PHRI 209-062386.

P.115, "The fish remains were found to be predominantly of the reef taxa Scaridae (parrot fish) and Labridae (wrasses), but also including the remains of Acanthuridae (surgeon fish), Monacanthidae (file fish), Kyphosidae (rudder fish), and Diodontidae (porcupine fish)."

Wallace, William J., Edith T. Wallace, and Virgil Meeker. n.d. Excavation of a coastal dwelling site (O17) on the Island of Oahu. Typescript in SHPO.

Table near end (not paginated) reports fish remains from the excavation. These are not identified more specifically.

Yent, Martha and Agnes Estioko-Griffin. 1980. Archaeological investigations at Malaekahana (50-80-02-2801), Windward Oahu. Report prepared for DLNR.

Fish present in excavation units. Labridae, Scaridae and Mullidae identified.

Kaho'olawe (KH)

*Rosendahl, Paul H., Alan E. Haun, Joseph B. Halbig, Mikk Kaschko, and Melinda S. Allen. 1988. Kahoolawe excavations, 1982-3: Data recovery project, Island of Kahoolawe, Hawaii. PHRI 48-080585.

Appendix F, "Identification of fish bone remains, Island of Kaho'olawe, Hawai'i" by Deborah Hay, pp.F4-F5, Table F-1, "Distribution of minimum numbers of individual fish by site feature," identifies Elasmobranchii (5 sites), Carangidae (7 sites), Lutjanidae (2 sites), and Scombridae (1 site), along with 17 other families.

Site 378, a group of habitation terraces on the southern bank of Honokoa Stream, near its mouth, yielded the richest assemblage of fishbones on Kaho'olawe. The site yielded 3 elasmobranch bones, 11 Carangidae bones, including 2 tentatively assigned to *Caranx melampygus*, 6 Lutjanidae bones (out of 7 for the island as a whole), and the only Scombridae bone identified from the island. Volcanic glass and radiocarbon age estimates on wood charcoal yielded two ranges during which the site may have been inhabited; AD 1285-1415 and AD 1650-1950. Based on the dates from volcanic glass the excavators infer that the site was inhabited between AD 1766-1883, and thus that it spans the late prehistoric and early historic periods.

Kaua'i (KA)

Griffin, P. Bion, Richard M. Bordner, Hallett H. Hammatt, Maury E. Morgenstein, and Catherine Stauder. 1977. Preliminary archaeological investigations at Ha'ena, Halele'a, Kaua'i Island. ARCH.

P.43, Table II, "Concentration index for selected species," gives concentration indices (weight/excavated volume) for fish bone, but does not identify the bone more specifically.

*Hammatt, Hallett H., and William H. Folk. 1979. Archaeological excavations in the Waioli Mission Hall, Halele'a, Kaua'i Island. ARCH.

P.109, Table 8, "Identification of fish remains, Site 50-30-03-601" reports Carcharhinidae on the dirt floor of the 1841 church building. Labridae and Scaridae found throughout.

Hammatt, Hallett H., and Virgil W. Meeker. 1979. Archaeological excavations at Ha'ena, Halele'a, Kaua'i Island. ARCH.

P.38, Table 5, "Quantitative analysis of midden, Site 50-30-02-3200" reports 67.2 grams of fishbone. Fishbone is not identified more specifically.

*Hammatt, Hallett H., Myra J. Tomonari-Tuggle, and Charles F. Streck. 1978. Archaeological investigations at Ha'ena State Park, Halele'a, Kaua'i Island, Phase II: Excavations of beach localities and visitors facilities area. ARCH.

P.302, note, "Among fish bone in the midden, parrot fish (uhu, Family Scaridae), trigger fish (*humuhumu*, Family Balistidae), and yellowfin tuna (*'ahi*, Thunnus Albacares [sic]) were represented."

Prehistoric deposits at Ke'e Beach may date to the early prehistoric period.

Yent, Martha. 1980. Preliminary archaeological testing of House 4, Ha'ena State Park, Halele'a, Kaua'i. DLNR.

P.47, bone materials are in poor condition due to soil acidity and high moisture. Identified fish include Scaridae and Labridae.

*Yent, Martha. 1985. Archaeological testing of eroding cultural sites at Nualolo Kai, Na Pali Coast State Park, Kaua'i. DLNR.

Pp.5-6, Table 1, "Marine resources midden list for tested sites at Nualolo Kai, Na Pali Coast" identifies Balistidae, Scaridae, Lutjanidae, and shark.

Prehistoric deposits at Nualolo Kai may be as old as the early prehistoric period (see Emory, Bonk, and Sinoto 1968:viii). It is more likely that the fish remains reported here belong to the middle prehistoric period.

Yent, Martha and Jason Ota. 1983. Archaeological investigations: Site KAL-4 Rockshelter Kalalau Beach, Na Pali Coast, Kaua'i. DLNR.

P.49-67, fish bone present but not identified more specifically.

Hawai'i (HA)

*Allen, Jane. 1986. Phase I intensive survey and Phase II excavations at TMK 7-5-09:31, Kailua, Kona, Island of Hawaii. BPBM Ms 101586.

Pp. 116-117, identified fish remains include shark (white-tipped reef shark), Scaridae, Labridae, Diodontidae, Monacanthidae.

*Barrera, William M., Jr. 1971. *Archaeological excavations and survey at Keauhou, North Kona, Hawaii*. DRS 71-10.

P.11, Table 4, "Summary of midden material from site D3-29," identifies one shark tooth. Other fish remains from this and other sites are not identified more specifically.

*Barrera, William, Jr. 1989. Archaeological data recovery at the host park and NELH, Kalaoa and O'oma ahupua'a, North Kona, Hawaii Island. Chiniago.

P.223, Identified fish include Scaridae, Acanthuridae, Balistidae, Labridae, Diodontidae, Isuridae, and Sparidae.

Barrera, William M., Jr., and Robert Hommon. 1972. *Salvage archaeology at Wailau, Ka'u, Island of Hawaii*. DRS 72-1.

Pp. 46-52, Appendices B through N all report fish bone. Appendices L through N report fish scales. Appendix L reports fish spines. The fish remains are not identified more specifically.

Bath, Joyce E., and Margaret L.K. Rosendahl. 1984. Intensive archaeological survey and testing, HELCO sub-station project area. PHRI 125-072184.

P.32, Table 4, "Quantitative summary of midden remains from site T-1" reports fish bone, not identified more specifically.

Cleghorn, Paul L., and David W. Cox. 1976. Phase I archaeological survey of the Hilina Pali Petroglyph Cave (Site HV-383) and associated sites, Hawaii Volcanoes National Park. BPBM Ms 051576.

P.31, Table 3, "Analysis of midden from site HV-383" reports the presence of fishbone in 3 of the 4 test pits. Fishbone not identified more specifically.

*Collins, Sara, and Farley Watanabe. 1983. Analysis of faunal remains. In *Archaeological investigations of the Mudland-Waimea-Kawaihae road corridor, Island of Hawai'i*, edited by Jeffrey T. Clark and Patrick V. Kirch, pp. 371-383. DRS 83-1.

Pp.379-380, Table 13.8, "Comparison of identified bone from archaeological sites in West Hawaii," reports 6 families of fish identified at Waimea-Kawaihae, including Sparidae, Labridae, Scaridae, Acanthuridae, Balistidae, and Diodontidae. Also present are Chondrichthyes (shark/ray) vertebrae.

Cordy, Ross. 1985. Archaeological data recovery at C22-27 in Kalamakapala ahupua'a in the Kealakekula Bay region. DLNR.

P. 41, Fishbone recovered is not identified more specifically.

Crozier, S. Neal. 1971. *Archaeological excavations at Kamehameha III Road, North Kona, Island of Hawaii - Phase II*. DRS 71-11.

P.5, Table 1, "Quantitative list of midden mateiral at site D4-27," includes fish bone, but it is not identified more specifically.

Crozier, S. Neal. 1972. *Archaeological survey and excavations at Punalu'u, Island of Hawaii*. DRS 72-6.

P.31, Appendix A, "Midden analysis" lists fish bone. Fish bone not identified more specifically.

Crozier, S. Neal, and Dorothy B. Barrere. 1971. *Archaeological and historical survey of the ahupuaa of Pualaa, Puna District, Island of Hawaii*. DRS 71-1.

P.33, excavations at Test Area 3, a C-shaped enclosure, yielded "numerous fish bone ..." Fish bone is not identified more specifically.

Donham, Theresa K. 1986. Archaeological reconnaissance survey Hale-o-Ho'oponopono project site, Land of Honaunau, South Kona, Island of Hawaii. PHRI.

P.10, fish bones and scales recovered in shovel pits are not identified more specifically.

Estioko-Griffin, Agnes, and George W. Lovelace. 1980. Archaeological reconnaissance of Old Kona Airport State Park, Kailua-Kona, Island of Hawaii. DLNR.

P.80, "Fish bones were found throughout all levels of the cultural strata ... None of the recovered fish bone fragments are identifiable."

Hammatt, Hallett H. 1979. Archaeological survey and excavation at the proposed Komohana Kai subdivision, Holualoa, Kona, Hawai'i Island. ARCH.

P.41, Table 2, "Quantitative analysis of midden, sites 50-10-37-6657 and 50-10-37-6658" reports fish bone and scales but does not identify them further.

Hammatt, Hallett H., and Douglas Borthwick. 1986. Archaeological survey and excavations at Kohala Ranch, North Kohala, Hawaii Island. CSH.

P.63, Table 2, "Midden weights and totals," reports 0.1 gram of fishbone from site BM4. Fishbone is not identified more specifically.

Hammatt, Hallett H., Douglas Borthwick, and David Shideler. 1986. Archaeological survey and excavations on a 20-acre parcel, Holualoa, Kona, Hawaii Island. CSH.

P.67, Identified fishbone is Diodontidae.

Hammatt, Hallett H., Douglas Borthwick, and David Shideler. 1988. Intensive archaeological survey of 12.4 acres for proposed Lalamilo house lots, unit 2, Lalamilo, Kohala, Hawai'i. CSH.

P.60, "Only one parrot fish (*uhu*) palate (genus *Scarus*) from Site 11 Trench 2 Stratum IIIA could be identified with any certainty."

Hammatt, Hallett H., and William H. Folk. 1980. Archaeological surface survey and subsurface testing of coastal lands in Pao'o, Kohala, Hawai'i Island. ARCH.

P.27, Scaridae and Labridae are mentioned in a description of a stratigraphic section of Trench 16a in site 50-10-04-2375.

Hammatt, Hallett H., and William H. Folk. 1980. Archaeological survey and excavation of coastal sites, Ouli, Kohala, Hawai'i Island. ARCH.

P.57, "Fish bone was present although not in large quantities" in the excavation of site 50-10-05-8001. Fish bone is not identified more specifically.

Hammatt, Hallett H., and William H. Folk. 1980. Archaeological investigations within the proposed Keahole Agricultural Park, Kalaoa-O'oma, Kona, Hawai'i Island. ARCH.

Pp.88-92, Tables 1-5 report fish remains. Identified families include Scaridae and Labridae.

*Hammatt, Hallett H., William H. Folk, and David Shideler. 1984. Archaeological survey, testing, and excavation of a 174 acre parcel, Holualoa, North Kona, Hawaii. CSH.

P.82, identified fish remains include Scaridae, *Monotaxis grandoculis*, Diodontidae, Monacanthidae, Balistidae, Carcharhinidae, Mullidae, Carangidae, and Acanthuridae.

The authors assign the sites in the parcel to the late prehistoric and early historic periods.

Hammatt, Hallett H., and David W. Shideler. 1984. Survey and salvage of archaeological sites for a proposed driving range, Keaouhou, Kona, Hawaii Island. CSH.

P.29, identified fishbones include Monacanthidae, Carcharhinidae, Mullidae, and Acanthuridae.

*Hammatt, Hallett H., and David Shideler. 1987. Archaeological excavations of two sites, lower Greenwell property, 'Auhaukea'e, Kona, Hawaii Island. CSH.

P.34, identified families include Scaridae, Diodontidae, Carcharhinidae ("Requium Shark" [sic]), Labridae, and Carangidae.

A radiocarbon date (AD 1490-1950), and the prehistoric nature of artifacts, place the sites most likely in the late prehistoric period.

Hammatt, Hallett H., David W. Shideler, and Douglas Kahaneli Borthwick. 1985. Archaeological survey and testing, development parcel 22C. CSH.

P.89, "Only two sites (4689 and 7681B) yielded more than one gram of fish bone. None of this fish bone could be identified with any degree of certainty, but these bones were all typical of small reef species."

Hammatt, Hallett H., David Shideler, and Douglas Borthwick. 1987. Archaeological survey and test excavations of a 15-acre parcel, Kealakehe, Kona, Hawai'i. CSH.

P.55, "The only identifiable [fish] bone was of the shallow water parrot fish Ponuhunuhu of the genus *Calotomus*" from Site 14A, Trench 3.

*Han, Toni L., Sara L. Collins, Stephan D. Clark, and Ann Garland. 1986. Moe kau a ho'oilo: *Hawaiian mortuary practices at Keopu, Kona, Hawai'i*. DRS 86-1.

P.93, Burial K24-4, oldest at the site (AD 1245-1425), contained the articulated skeleton of an *uku* (*Aprion virescens*).

P.99, Burial J19-5 contained 3 shark teeth tentatively identified as tiger shark (*Galeocerdo cuvieri*). The burial had been vandalized, apparently for the long bones, and it is likely that the shark teeth belonged to a cutting implement wielded by the vandals.

P.93-94, Burial K25-2 contained a *moi* (*Polydactylus sexfilis*). Burial M19-5 contained the lower jaw fragment of an *ono* (*Acanthocybium solandri*).

Haun, Alan E. 1986. Archaeological survey and testing at the Bobcat Trail habitation cave site, Pohakuloa Training Area, Island of Hawaii, Hawaii. PHRI 184-041686.

P.91, fish remains were found but not identified more specifically. Faunal analyses by Alan C. Ziegler.

*Hay, Deborah, Alan E. Haun, and Paul H. Rosendahl, with Craig J. Severance. 1986. Kahaluu data recovery project: Excavations at site 50-10-37-7702, Kahaluu habitation cave, Land of Kahaluu, North Kona, Island of Hawaii. PHRI 61-022084.

Pp.7C-3-4, Table 17, "Summary of identified fish taxa, diagnostic parts, and number of individuals in site 7702 ecofactual remains," identifies 21 families of fish, including the FMP families Carangidae, Lutjanidae, and Scombridae (*Katsuwonus pelamis*). Also recovered were 46 shark teeth.

The Kahalu'u habitation cave was occupied during the middle and late prehistoric periods.

Hommon, Robert J. 1979. Intensive archaeological survey at the Kona Pacific Partners condominium site. Science Applications Inc.

P.17, Table 1, "Quantitative analysis of marine midden material from site 5610 test excavations," identifies Labridae. Other fish remains not identified more specifically.

Hommon, Robert J. 1980. An assessment of the archaeological and historic resources of Kaumalumalu makai, North Kona, Hawaii. Hawaii Marine Research.

Fish bone recovered during excavations is not identified more specifically.

*Hommon, Robert J. [1983]. Archaeological data recovery at site 342, Kalahuipua'a, Hawaii. SMI.

Pp. 27-29, identified fish remains include Scaridae, Balistidae, Diodontidae, Monacanthidae, Labridae, Chanidae, Carangidae (*Caranx* sp.), and Sphyraenidae.

Kirch (1979) dates this site to the late prehistoric period.

Jensen, Peter M., and Theresa K. Donham. 1988. Archaeological data recovery and intensive survey, resort expansion area and selected undeveloped resort parcels, Waikoloa Beach Resort. PHRI 371-031488.

Fish remains found in excavation were not identified more specifically.

Kaschko, Michael W. 1985. Intensive archaeological survey and testing, Kahaluu condominium development site. PHRI 65-103082.

Fish bone recovered during excavation is not identified more specifically.

Kennedy, Joseph. 1984. An intensive archaeological survey for the proposed Kaloko golf course, Kaloko, North Kona. Archaeological Consultants of Hawaii.

P.57, Scaridae and Tetraodontidae were recovered from excavations at Cave 22.

*Kirch, Patrick Vinton. 1973. *Archaeological excavations at Kahalu'u, North Kona, Island of Hawaii*. DRS 73-1.

P.55, identified fish remains include Isuridae, Scaridae, and Diodontidae.

*Kirch, Patrick Vinton. 1979. *Marine exploitation in prehistoric Hawai'i: Archaeological investigations at Kalāhuipua'a, Hawai'i Island*. PAR 29.

P.137, Table 25, "Fish bone from Site E1-324," includes Scaridae, Labridae, Lutjanidae, and Balistidae.

P.138, Table 26, "Fish bone from Site E1-342," includes Scaridae, Labridae, Diodontidae, Lutjanidae, Balistidae, Mullidae (?), and shark tooth.

P.138, Table 27, "Fish bone from Site E1-343," includes Scaridae, Labridae, Lutjanidae, and Balistidae.

P.139, Table 28, "Fish bone from Site E1-355," includes Scaridae, Labridae, Lutjanidae, Balistidae, Diodontidae, Mullidae/Carangidae (?), and shark teeth. See Kirch (1982), The ecology of marine exploitation in prehistoric Hawaii (listed below under the General heading), for an up-dated and slightly different listing of identified fish remains from this site.

P.139, Table 29, "Fish bone from Site E1-368," includes Scaridae, Labridae, Balistidae, and shark teeth.

P.140, Table 30, "Fish bone from Sites E1-328, -350E, and E2-51," includes Scaridae, Labridae, and Balistidae.

*McCoy, Patrick C. 1978. The B.P. Bishop Museum Mauna Kea Adz Quarry project. BPBM Ms 012778.

P.[24], Table 2, "Preliminary list of fishes from excavated rockshelter deposits," includes Carangidae *Seriola dumerilii*, Lutjanidae *Etelis marshi*, Labridae 5 spp., Scaridae 3 spp., Scombridae *Katsuwonus pelamis*, and Gobiidae 1 sp.

McCoy, Patrick C. 1984. Archaeological reconnaissance survey of Hopukani, Waihu, and Liloe Springs, Mauna Kea, Hawai'i. BPBM Ms 081084.

P.31, mentions fish bone found in Hopukani Rockshelter, an elevation of 10,160 ft asl. Fish bone is not identified further.

McCoy, Patrick C. 1986. Archaeological investigations in the Hopukani and Liloe Springs area of the Mauna Kea adze quarry. BPBM Ms 092386.

P.48, reports that the fish bones from Hopukani Rockshelter were too fragmentary to identify further.

*Newman, T. Stell. 1970. Hawaiian fishing and farming on the Island of Hawaii in AD 1778. DLNR.

P. 100, Fig. 13, bone from Koaie Hamlet excavations includes Carcharhinidae. Other identified fish are inshore species.

See Goto (1986:416) for detailed identification of fishbone from the Koaie Hamlet excavations.

*Rosendahl, Margaret L.K., and Karen Delimont. 1988. Additional analysis of portable remains: Site 2005, Land of Puaa 1st, District of North Kona, Island of Hawaii. PHRI 488-092388.

P.4, Table 1-A, "Bone identification table," identifies Acanthuridae, Monacanthidae, Diodontidae, and Elasmobranchii.

Rosendahl, Paul H. 1969. An archaeological survey of Ouli coastal lands between Hapuna Bay and Kaunaoa Bay, South Kohala, Hawaii. BPBM Ms 040069.

P.24, fish "spines, mouth plates, vertebrae, and scales" were recovered but were not identified more specifically.

*Rosendahl, Paul H. 1970. Aboriginal agriculture and residence patterns in upland Lapakahi. Ph.D. dissertation, UHM.

P.424-426, fish remains found at seven (of nine) excavated upland residential sites. The fishbone that was identified belongs to Scaridae and shark. Other fish vertebrae measured 2-9 mm in diameter, indicating small fish.

Rosendahl, Paul H. 1972. *Archaeological salvage of the Hapuna-Anaehoomalu section of the Kailua-Kawaihae road, Island of Hawaii*. DRS 72-1.

Fish remains reported from Complex E (p.67, Table 7), Complex F (p.73, Table 8), and Complex G (p.77, Table 9). Fish remains are not identified more specifically.

Rosendahl, Paul H. 1973. *Archaeological salvage of the Ke-ahole to Anaehoomalu section of the Kailua-Kawaihae road (Queen Kaahumanu Highway), Island of Hawaii*. DRS 73-2.

P.71, Table 16, "Qualitative summary of midden remains from refuge cave 900," lists fish bone, but none is identified more specifically.

*Rosendahl, Paul H. 1983. Cultural resource management work in the area of the Kamehameha III birthsite memorial. PHRI 77-080883.

Reports unidentified fish bone and shark teeth from excavations.

Rosendahl, Paul H. 1974. Survey and test excavtions at Kaumalumalu Kai, North Kona, Island of Hawaii. BPBM Ms 041874.

P.21, identified fish bone is Scaridae.

Rosendahl, Paul H. 1980. Intensive archaeological survey of Natural Energy Laboratory site, Keahole Point, North Kona, Hawaii. Archaeological Research Associates.

P.21, Table 3, "Summary of midden material from feature A, Site 50-10-27-1917" records fish bone without further identification.

*Rosendahl, Paul H., and Laura A. Carter. 1988. *Excavations at John Young's Homestead, Kawaihae, Hawaii*. WACCPA 47.

P.77, Table 12, "Summary of identified fish remains, structure 2, John Young homestead (upper portion)," reports Carangidae (Caranx sp.), 2-4 individuals and Scombridae (Katsuwonus sp.), 2-3 individuals.

Rosendahl, Paul H., and Michael W. Kaschko. 1983. Archaeological investigation of Ouli coastal lands, land of Ouli, South Kohala, Island of Hawaii. PHRI 38-030183.

P.90, "Some fish bone was recovered, though none were identified specifically."

Shun, Kanalei. 1984. Intensive archaeological survey, Waikoloa Hyatt hotel site. PHRI 140-090784.

P.48, Table 2, "Quantitative analysis of midden material from sites E1-234, E1-167, and T-102" reports the remains of Balistidae, Diodontidae, Labridae, Mullidae, Scaridae, and Sparidae.

*Sinoto, Yosihiko H., and Marion Kelly. 1975. *Archaeological and historical survey of Pakini-Nui and Pakini-Iki coastal sites, Waiahukini, Kailikii, and Hawea, Ka'u, Hawaii*. DRS 75-1.

P.54, identifiable bones include "tuna, bonito, parrot fish, shark and balloon fish."

See Goto 1986 for detailed identification of fish remains.

*Smart, Colin D. 1964. A report of excavations on site H22, Puako, Hawaii Island. Typescript in SHPO.

Pp.7-8, "A variety of shellfish, crustacea, echinoderms, fish, and turtle remains are present throughout the deposits." No further identification of fish remains.

Soehren, Lloyd J. 1966. Hawaii excavations, 1965. Typescript in SHPO.

Fish bone recovered from all excavated sites. Fish bone is not identified more specifically.

Spear, Robert L. 1987. Archaeological data recovery: Puueo agricultural lots. PHRI 239-102786.

P.31, bone collected during data recovery includes fish, but fish bone is not identified more specifically.

Toenjes, James H. 1986. Archaeological monitoring in the Kuakini Highway realignment, Kona, Hawai'i Island. BPBM Ms 101586.

Fish bone was recovered during excavation. Scaridae is the only family identified.

Walker, Alan T., and Paul H. Rosendahl. 1987. Archaeological reconnaissance, intensive survey, and testing, southernmost part of South Kohala resort. PHRI 199-092585.

P.36, Table 5, "Quantitative and qualitative summary of midden remains for sites T-120 and T-104A," reports Labridae, Scaridae, and other fish (not identified more specifically).

*Walker, Alan T., and Paul H. Rosendahl. 1988. Archaeological survey and test excavations, Kaupulehu Makai Resort project area. PHRI 213-032686.

P.188, fish bone includes Labridae, Scaridae, Monacanthidae, Mullidae, Diodontidae, Balistidae, Tetraodontidae, Kyphosidae, Acanthuridae, Scombridae, and shark.

*Wallace, William J., and Edith Taylor Wallace. 1969. *Pinao Bay site (H-24): A small prehistoric fishing settlement near South Point (Ka Lae), Hawaii*. PAR 2.

P.22, excavations at Site H-24 yielded Scaridae and Balistidae. "For the larger, deep-sea species, two skull bones of a big yellow fin (*ahi*) and head and tail elements from an unidentified species of tuna have been recognized."

P.28, excavation of site H-25 yielded 4 fish bones, which were not identified more specifically.

P.31, at site H-26 "the highest proportion [of fish bones] come from large off-shore species, mainly tuna or tuna-like fish. Among the recognized elements are vertebrae, skull bones and jaws of big yellow-fin tuna (*ahi*), which must have weighed 60-70 pounds. Back bones of skipjack tuna (*aku*), estimated at 15-20 pounds, are included. Lesser species, trigger fish, parrot fish, and snappers, at home in shallow waters close to shore, are represented by various skeletal parts."

Welch, David J. 1988. Archaeological investigations at Pauoa Bay (Ritz-Carlton Mauna Lani Resort), South Kohala, Hawai'i. IARII.

P.78, "The [fish] families identified indicate a total reliance on inshore reef fish rather than on larger offshore pelagic species." Identified families include Labridae, Scaridae, Balistidae, and Diodontidae.

Welch, David J. 1982. Archaeological survey and test excavations of the Kahakai (Kailua-Keauhou) elementary school site, North Kona, Hawai'i. BPBM Ms 051082.

P.59, fish bone present but not identified more specifically.

Moloka'i (MO)

Athens, Stephen J. 1983. Archaeological and historical investigations at a property near Kaunakakai Wharf, Island of Molokai, Hawaii. JSAAC.

Appendix B, "Identification of bone from site 50-Mo-B1-6," lists fish bone without more specific identification.

*Athens, J. Stephen. 1985. Prehistoric investigations at an inland site on the leeward slopes of central Molokai. JSAAC.

Pp.73-76, Table 26, lists shark, Scaridae, and Acanthuridae.

*Barrera, William. 1975. Archaeological investigations at Kaluakoi, Molokai. Chiniago.

Appendix II, "Midden tables," list Scaridae, Labridae, Diodontidae, and shark.

*Barrera, William, Jr. [1978]. Archaeological excavations at Kalaupapa, Molokai. Chiniago.

Appendix III, "Midden, by square," lists Balistidae, Diodontidae, Isuridae, Labridae, and Scaridae.

*Barrera, William, Jr. 1982. Kaluakoi, West Molokai: Archaeological excavations. Chiniago.

Appendix II (not paginated) lists Labridae, Scaridae, shark, Balistidae, Acanthuridae, and Diodontidae.

Bonk, William J. 1954. Archaeological excavations on West Molokai. M.A. thesis, UHM.

Pp.120-123, Tables IV-VII, list fish bone. Fish bone is not identified more specifically.

Collins, Sara. 1983. Archaeological investigations of site 50-Mo-B6-80, Moloka'i Island. BPBM Ms 101383.

P.17, fish remains are not identified more specifically.

Dye, Thomas S. 1977. Cultural resources survey, Kapa'akea flood control project, Molokai, Hawaii. BPBM Ms 091577.

P.25, Table 3, "Analysis of midden from TP3, Site 50-Mo-A19-7," identifies Scaridae.

*Hammatt, Hallett H. 1979. Archaeological excavations: Kawākiu-Nui, Kaluako'i, Moloka'i Island, Hawaii. ARCH.

P.75, Table 7, "Fish identified in site 50-60-01-38 midden," lists Carcharhinidae, Scaridae, Acanthuridae, Balistidae, Scombridae (ahi, aku), Corangidae [sic] (ulua, kahala), Lutjanidae (uku, opakapaka), Albulidae, Holocentridae, Kuhliidae, and Mullidae.

*Kirch, Patrick Vinton, and Marion Kelly, eds. 1975. *Prehistory and ecology in a windward Hawaiian valley: Halawa Valley, Molokai*. PAR 24.

P.48, Table 19, "Itemized fish remains from Layer IV, Mound B, Site A1-3," includes Scaridae, Serranidae, Labridae, and Elasmobranch. See Kirch (1982), The ecology of marine exploitation in prehistoric Hawaii (listed below under the General heading), for an up-dated and slightly different listing of identified fish remains from this site.

P.148, Table 36, "Presence/absence array of nonartifactual midden materials from inland residence sites," indicates that fish bone was recovered from sites A1-765 and -

1001. The fish bone is not identified more specifically.

The layer IV deposits at Mound B, Site A1-3 date to the early prehistoric period.

Schilt, A. Rose, and Kanalei Shun. 1981. Archaeological reconnaissance survey of a 20-acre parcel of land at Kawa'aloa Bay, Mo'omomi, West Moloka'i. BPBM Ms 082081.

P.7, fish remains are not identified more specifically.

Shun, Kanalei. 1982. Archaeological reconnaissance survey and test excavations of the wastewater treatment facility area, Kaunakakai, Moloka'i. BPBM [No Ms #].

P.18, Table 3, "Analysis of floral and faunal remains from Layer VII, Trench 6, Site 50-Mo-B1-5," includes Scaridae.

*Weisler, Marshall. 1987. Inventory, significance, and management of the archaeological resources of Northwest Moloka'i, Hawaiian Islands. Archaeological Consulting and Research Services.

P.74, fish identified from sites on Northwest Moloka'i include Acanthuridae, Balistidae, Carangidae, Diodontidae, Elasmobranchii, and Scaridae.

Weisler, Marshall, and P.V. Kirch. 1982. The archaeological resources of Kawela, Moloka'i: Their nature, significance, and management. BPBM [no MS #].

P.66, fish bone reported but not identified more specifically.

Maui (MA)

Chapman, Peter S., and P.V. Kirch. 1979. *Archaeological excavations at seven sites, Southeast Maui, Hawaiian Islands*. DRS 79-1.

P.34, identified fish include Scaridae and Labridae.

*Clark, David T., and Joseph F. Balicki. 1988. Preliminary research report - the Maui archaeology project of Waihe'e. Typescript in SHPO.

P.20, identifies Lutjanidae, Mullidae, Labridae, Scaridae, Acanthuridae, Balistidae, and Diodontidae.

Clark, Stephen D., and James Toenjes. 1987. Archaeological monitoring of sewer line construction from Spreckelsville to Ku'au, Maui, State of Hawaii. BPBM Ms 031687.

P.53, identified fish include Balistidae, Diodontidae, Labridae, Acanthuridae, and Scaridae.

Cleghorn, Paul L. 1974. Survey and salvage excavations in specified areas of Wailea lands, Maui. BPBM Ms 100274.

Appendix A, "Midden materials recovered from excavations," lists fish bone, but does not identify it further.

Cleghorn, Paul L. 1975. Phase II, Part 2, Archaeological salvage operations at site 50-Ma-B10-1, Wailea, Kihei, Maui. BPBM Ms 061075.

P.27, "Fish bone was significantly scarce in collections from all features." Fish bone is not identified more specifically.

Cleghorn, Paul L. 1975. Phase I archaeological research at the Seamen's Hospital (Site D5-10), Lahaina, Maui. BPBM Ms 031775.

P.16, fishbone recovered from excavations is not identified more specifically.

Cordy, Ross. 1978. Archaeological survey and excavations at Makena, Maui. BPBM Ms 113078.

Appendix B, "Midden analysis," lists small quantities of fish bone. Fish bone is not identified more specifically.

Cordy, Ross, and J. Stephen Athens. 1988. Archaeological survey and excavation, Seibu sites 1916 and 2101, Makena, Honuaula, Maui. IARII.

Small amounts of fish bone recovered in excavations are not identified more specifically.

Denison, David O. 1979. Archaeological Phase I testing and Phase II salvage of area designated for hotel construction on Seibu land, Makena, Makawao, Maui. BPBM Ms 092879.

P.9, Table 1, "Analysis of midden from site 50-Ma-B8-109," lists Scaridae.

Dicks, A. Merrill, and Alan E. Haun. 1987. Intensive archaeological survey and testing, Embassy Suites Hotel site, Wailea Beach Resort. PHRI 338-082987.

P.32, Table 4, "Quantitative distribution of midden remains from site 2017," lists vertebrate remains, but these are not identified more specifically.

*Dobyns, Susan, 1988, Archaeological investigations in coastal areas of Papa'anui, Waipao, Kalihi, and Keauhou *ahupua'a*, Maui Island, Hawai'i. BPBM Ms 010488.

P.122, list of identified fish families includes shark, Serranidae, Labridae, Scaridae, Acanthuridae, and Monacanthidae.

P.65, site B8-39, which yielded Serranidae remains, dates to the early historic period.

*Griffin, P. Bion, and George W. Lovelace, eds. 1977. *Survey and salvage - Honoapi'ilani Highway*. ARCH Occasional Papers 77-1.

P.145, Table 2, "Summary of midden analysis ...," includes shark teeth.

Han, Toni L. 1982. Archaeological investigations of a portion of the Waiehu dune area, Waiehu, Maui. BPBM Ms 120382.

P.34, Labridae and Scaridae are identified.

Haun, Alan E. 1978. Archaeological survey and salvage excavations in Mooiki and Maluaka, Makawao District, Maui. BPBM Ms 082278.

P.73, Table 6, "Identified fish and minimum numbers of individuals at three sites," lists Scaridae, Labridae, Holocentridae, Acanthuridae, and Balistidae.

Kirch, Patrick V. 1969. An archaeological survey of the Alexander and Baldwin property surrounding Wailea, Kihei, Maui. BPBM Ms 060069.

P.7, Table 2, "Midden from site B12-1," identifies Scaridae.

*Kirch, Patrick Vinton. 1971. Archaeological excavations at Palauea, South-east Maui, Hawaiian Islands. *Archaeology and Physical Anthropology in Oceania* 6:62-86.

P.80, "Included in the fish bone were jaws of the species *Scarus perspicillatus* (*uhu*), and a species of the family *Lutjanidae* [sic] (snappers). Much of the midden from Feature I had been burned. All of this material

undoubtedly represents offerings made at this religious structure."

Kirch, P.V. 1973. Archaeological investigation at site D13-1, Hawea Point, Maui, Hawaiian Islands. BPBM Ms 091173.

P.7, fishbone recovered in excavations is not identified more specifically.

*Rosendahl, Margaret L.K., and Alan E. Haun. 1987. Archaeological data recovery excavations: Development parcels A/B and C. PHRI 299-081787.

P.57, fish remains include Diodontidae, Scaridae, Acanthuridae, and shark.

Schilt, Rose, and Susan Dobyns. 1980. Archaeological reconnaissance and testing on Wailea properties in the *ahupua'a* of Paehu, Makawao District, Maui Island, Hawaii. BPBM Ms 030480.

P.82, fish remains recovered from excavations were not identified more specifically.

Shun, Kanalei, and Charles F. Streck. 1982. Archaeological test excavations and monitoring of the Wailea Development Company sewerline construction from Polo Beach to Wailea Beach, Maui, Hawaii. BPBM Ms 093082.

Pp.11-12, Table 2, "Summary of midden material, Test Pit 2, 50-Ma-B12-4, Feature E," identifies Scaridae.

Sinoto, Aki, 1981, Report on Phase I archaeological survey of a proposed golf course at Makawao, Maui. BPBM Ms 021081.

P.19, Table 3, "A brief presence/absence determination from exposed surface midden scatters at seven sites," lists fish bone but does not identify it more specifically.

*Sinoto, Aki, and Elaine Rogers-Jourdane. 1979. Archaeological Phase I survey of Makena Surf property, Makawao, Maui Island. BPBM Ms 072079.

P.56 ff, Appendix, "Quantitative analysis of midden recovered from Makena Surf sites," lists Diodontidae, Labridae, Scaridae, and shark.

*Walker, Alan T., Alan E. Haun, and Paul H. Rosendahl. 1985. Intensive survey and salvage research excavations, Wailea Point condominium site, Wailea Resort, Land of Paeahu, Makawao, Island of Maui. PHRI 150-021285.

P.121, Table 7, "Summary of identified fishbone from site complex B12-4," includes Acanthuridae, Apogonidae,

Balistidae, Carangidae (*Caranx melampygus*), Cirrhitidae, Diodontidae, Holocentridae, Labridae, Lutjanidae, Monacanthidae, Mullidae, Muraenidae, Pomacentridae, Priacanthidae, Scaridae, Scombridae, Tetraodontidae, and shark.

General

*Goto, Akira. 1986. Prehistoric ecology and economy of fishing in Hawaii: An ethnoarchaeological approach. Ph.D. dissertation, UHM.

P.329, Table 8.10, "Fish remains in 1/4 inch mesh samples at Site Ha-B22-64, Wai'ahukini," lists 19 taxa, including the FMP taxa sharks, Lutjanidae, Carangidae, and Scombridae.

P.330, Table 8.11, "Fish remains in 1/4 inch mesh samples at Site Ha-B22-248, Wai'ahukini," lists 19 taxa, including the FMP taxa sharks, Lutjanidae, Carangidae, and Scombridae.

P.331, Table 8.12, "Fish remains from Site Ha-B22-70, Wai'ahukini," lists 18 taxa, including the FMP taxa sharks, Carangidae, and Scombridae.

P.332, Table 8.13, "Fish remains from Sites Ha-B22-106, Ha-B22-140, and Ha-B22-174, Wai'ahukini," lists 14 taxa, including the FMP taxa sharks (3 sites), Lutjanidae (1 sites), and Carangidae (2 sites).

P.333, Table 8.14, "Fish remains in 1/4 and 1/8 inch mesh samples from Grid E5 of Layer III at Site Ha-B22-64, Wai'ahukini," lists 14 taxa, including the FMP taxon Lutjanidae.

P.334, Table 8.15, "Fish remains in 1/8 inch mesh sample from Site H8, Wai'ahukini," lists 16 taxa, including the FMP taxa sharks, Lutjanidae, and Scombridae.

P.345, Table 8.18, "Fish remains from shelter sites in Pakini Iki, Wai'ahukini," lists 16 taxa, including the FMP taxa sharks (2 sites), Lutjanidae (2 sites), Carangidae (1 site), and Scombridae (2 sites).

P.346, Table 8.19, "Fish remains from house sites in Pakini Iki, Waiahukini," lists 10 taxa, including the FMP taxon Scombridae (1 site).

P.347, Table 8.20, "Fish remains from shelter sites in Pakini Nui, Wai'ahukini," lists 17 taxa, including the

FMP taxa sharks (2 sites), Lutjanidae (2 sites), Carangidae (2 sites), and Scombridae (2 sites).

P.348, Table 8.21, "Fish remains from house sites in Pakini Nui, Wai'ahukini," lists 15 taxa, including the FMP taxa sharks (1 site), Lutjanidae (2 sites), Carangidae (2 sites), and Scombridae (1 site).

P.349, Table 8.22, "Fish remains from probable men's eating house (*mua*) (Ha-B22-211) and religious structure (Ha-B22-55), in Pakini Nui, Wai'ahukini," lists 15 taxa, including the FMP taxa sharks (both sites), Lutjanidae (religious structure), and Carangidae (both sites).

P.399, Table 9.9, "Fish remains from Sites H1 and H2, Ka Lae," lists 10 taxa, including the FMP taxa sharks (1 site), Carangidae (2 sites), and Scombridae (2 sites).

P.401, Table 9.10, "Fish remains from Sites H3 and H4, Ka Lae," lists 13 taxa, including the FMP taxa sharks (2 sites), Lutjanidae (1 site), Carangidae (2 sites), and Scombridae (1 site).

P.403, Table 9.11, "Fish remains from Sites H24 and H26, Ka Lae," lists 14 taxa, including the FMP taxa sharks (2 sites), Lutjanidae (2 sites), Carangidae (2 sites), and Scombridae (2 sites).

P.406, Table 9.12, "Fish remain [sic] from Site H65, Kahakahakea, Ka'u," lists 14 taxa, including the FMP taxa sharks and Carangidae.

P.408, Table 9.13, "Fish remains from Sites, H100 (Ha-E1-342) and H101 (Ha-E3-4) Kalāhuipua'a," lists 12 taxa, including the FMP taxa sharks (1 site) and Scombridae (1 site).

P.409, Table 9.14, "Fish remains from Sites, Ha-E1-343, Ha-E1-355 (Grid H9) and Ha-E1-368, Kalahuipua'a," lists 15 taxa, including the FMP taxa sharks (1 site), Lutjanidae (1 site), and Scombridae (1 site).

P.416, Table 9.16, "Fish remains from house sites in Lapakahi," lists 15 taxa, including the FMP taxa sharks (2 sites), Lutjanidae (2 sites), Carangidae (2 sites), and Scombridae (1 site).

P.419, Table 9.17, "Faunal remains from Sites Mo-1 and Mo-2, Western Moloka'i," lists Polynemidae, Kyphosidae, Labridae, Scaridae, Acanthuridae, Balistidae, and Monacanthidae.

P.420, Table 9.18, "Faunal remains from Sites Mo-2, Mo-4, Mo-5, Mo-6 and Mo-7, Western Moloka'i," lists 12 taxa, including the FMP taxon Carangidae (2 sites).

P.424, Table 9.19, "Fish remains from site of Pacific Beach Hotel Annex, Waikiki," lists 10 taxa, including the FMP taxa Lutjanidae, Carangidae, and Scombridae.

P.426, Table 9.20, "Fish remains from Sites K3 and K5, Nu'alolo Kai," lists 21 taxa, including the FMP taxa sharks (2 sites), Lutjanidae (2 sites), Serranidae (site K5), Carangidae (2 sites), and Scombridae (1 site).

P.434, Table 9.21, "Fish remains from Sites M6 and M7, East Maui," lists 9 taxa, including the FMP taxa sharks (1 site) and Lutjanidae (1 site).

P.437, "Bones of Scombridae and Coryphaenidae (*mahimahi*) have been identified" at Ku'ilioloa Heiau, Wai'anae, O'ahu. The site probably dates to the late prehistoric period, though it may be earlier.

P.438, Table 9.22, "Fish remains (NISP) from Ku'ilioloa Heiau, Wai'anae, O'ahu," lists sharks, Carangidae (*Caranx*), Scaridae, Scombridae, and Monacanthidae.

Hommon, Robert J. 1986. Social evolution in ancient Hawaii. In *Island societies: Archaeological approaches to evolution and transformation*, ed. P.V. Kirch, pp. 55-67. Cambridge: Cambridge University Press.

Divides Hawaiian prehistory into three periods. Periods are well grounded in archaeological data, so the sequence is extremely useful for archaeologists.

*Kirch, Patrick V. 1982. The ecology of marine exploitation in prehistoric Hawaii. *Human Ecology* 10:455-476.

P.468, Table VIII, "Itemized fish remains from selected sites," lists 10 identified taxa from sites MO-A1-3 and HA-E1-355. Site MO-A1-3 includes Serranidae and Lutjanidae. Lutjanidae was not identified in the site report, see Kirch and Kelly (1975:48). Site HA-E1-355 includes Carangidae and Lutjanidae. The Carangidae remains reported here were identified as "Mullidae/Carangidae (?)" in the site report, see Kirch (1979:139).

Abbreviations used in the bibliography

ARCH - Archaeological Research Center Hawaii, Lawa'i, Kaua'i.
BPBM - Bernice Pauahi Bishop Museum, Honolulu, O'ahu.

CSH - Cultural Surveys Hawaii, Kailua, O'ahu.
DLNR - Department of Land and Natural Resources, State of Hawaii.
DRS - Departmental Report Series, Department of Anthropology, Bernice P. Bishop Museum.
HRHP - Hawaii Register of Historic Places.
IARII - International Archaeological Research Institute, Inc., Honolulu, O'ahu.
JSAAC - J. Stephen Athens, Archaeological Consultant.
NPS - National Park Service, U.S. Department of the Interior.
PAR - Pacific Anthropological Records, Department of Anthropology, B.P. Bishop Museum.
PHRI - Paul H. Rosendahl, Ph.D., Inc., Hilo, Hawai'i.
SHPO - State of Hawaii Historic Preservation Office.
SMI - Science Management, Inc., Honolulu, O'ahu.
UHM - University of Hawaii at Manoa.
WACCPA - Western Archaeological and Conservation Center Publications in Anthropology, NPS.

APPENDIX F. List of acronyms used and their meanings.

CFR —— Code of Federal Regulations.

DBED —— Department of Business and Economic Development.

DLNR —— Department of Land and Natural Resources.

EEZ —— Exclusive economic zone.

FCMA —— Fishery Conservation and Management Act of 1976. Also known as the MFCMA (see below).

FMP —— Fishery management plan.

HDAR —— Hawaii Division of Aquatic Resources.

HEN —— Hawaiian Ethnological Notes.

ICJ —— International Court of Justice.

LOS —— Law of the Sea.

MFCMA —— Magnuson Fishery Conservation and Management Act of 1976. Also called FCMA.

MHI —— Main Hawaiian Islands.

MSY —— Maximum sustainable yield.

MT —— Metric ton.

NMFS —— National Marine Fisheries Service.

NWHI —— Northwestern Hawaiian Islands.

OY —— Optimum yield.

WPRFMC —— Western Pacific Regional Fishery Management Council.

Appendix G. Glossary of Hawaiian words and phrases.

Ahupua'a —— Land division usually extending from the uplands to the sea

'Aumakua —— Family or personal god.

'Awa —— The kava shrub, *Piper methysticum*.

Hale mua —— Men's eating house and homestead shrine.

Heiau ko'a —— fishing shrine.

Heiau ku'ula —— fishing shrine.

Ho'omalu —— To take care of, to protect.

Kahu mano —— keeper of a shark.

Kahuna —— priest or other specialist.

Kaka —— A deep water bottom fishing technique involving a single line with multiple baited hooks practiced from a drifting canoe.

Kama'aina testimony —— Authentic, but unrecorded evidence from *kupuna*; not necessarily in written form.

Ka Nupepe Kuokoa —— Kuokoa newspaper.

Ko'a —— Fishing grounds.

Ko'a huna —— Secret fishing grounds.

Kialoa —— The deepest bottom fishing grounds; also *pōhākialoa*.

Kuahu —— altar.

Kūkaula —— Bottom fishing grounds about 80 fathoms deep.

Kupuna —— Elder.

Mano kumupa'a —— Shark ancestors of humans.

Mau —— The continuation.

Mōhai —— Offering, sacrifice.

Mōhai 'ai —— Meat or food offering.

Moku —— Island.

Noa —— Free of taboo.

Olonā —— A native shrub (*Touchardia latifolia*), the fibers of which were used to make fishing lines.

Palu-ahi —— Deepsea handline fishing for pelagic species during the day using a stone, or other weight, to carry the baited hook to a fishing depth of about 300 feet.

END NOTES

1. Later, Kamakau (1976:87) described the shark fishing location as a place where "the land looked level with the sea."

2. "Midden" is derived from a Scandinavian word meaning "dungill, manure-heap, refuse-heap" and was introduced into the English language in 1851 to describe Danish archaeological features. In the archaeological literature the word has come to refer to remains that an archaeologist believes are food refuse. In Hawaii the term typically refers to marine shells and marine and terrestrial vertebrate remains.

3. See tables 14 and 15 for descriptions of the island and district codes. *Ahupua'a* codes are too numerous to list here; a complete list is on record at the Anthropology Department, B.P. Bishop Museum. As an example, the site number HA-B21-6 would be read as HA = Hawai'i Island, B = Ka'ū District, 21 = ahupua'a number for Pākini Iki, 6 = individual site number.

4. Please note that the quotation marks are used here to set off the command from the rest of the text. They are not part of the command itself.

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